Pl. return to Tony ~~Gould~~ JOHN CONOVER

HYDROGEOLOGIC/PHASE II INVESTIGATION REPORT

NYSDEC

FOR

THE SPRINGS-FIREPLACE ROAD LANDFILL
(FACILITY ID #52S05/152058)
FOR COMPLIANCE WITH
6 NYCRR PART 360, SECTION 2.15
AND NYSDEC CHAPTER 857

PREPARED FOR

THE TOWN OF EAST HAMPTON

Remediation

JUNE, 1991

fanning, phillips & molnar
ENGINEERS
RONKONKOMA NEW YORK

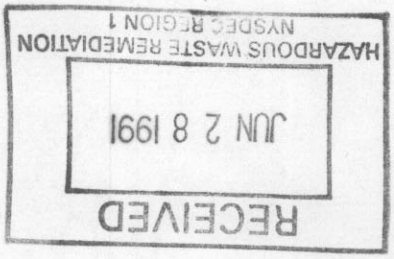
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deadline end of July or before to send comments Merlange

June 27, 1991



Mr. Norman H. Nosenchuck, Director
Division of Solid Waste
New York State Department
of Environmental Conservation
50 Wolf Road
Albany, New York 12233-4010

RE: Landfill Closure Assistance Program
Springs-Fireplace Road Landfill
Site Number 152058

Dear Mr. Nosenchuck:

Enclosed herewith, please find one original and one copy of the application package for the Springs-Fireplace Road Landfill closure project, superceding the December 27, 1990 application submitted by Fanning, Phillips and Molnar on behalf of the Town of EastHampton. This package addresses the deficiencies noted in your March 25, 1991 correspondence and provides an updated project work plan and reimbursement application.

Should you wish to discuss this application or require additional information, please call.

Thank you for your attention to this application and we look forward to a favorable response.

Very truly yours,

Martin O. Klein
Department Manager
Hydrogeology

Kevin J. Phillips, P.E., Ph.D.
Principal, Fanning, Phillips
and Molnar

KJP:pc
Enclosure

cc: T. Bullock
C. Shea, Esq.
M. O'Toole
J. Swartwout
T. Candella
P. Roth

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June 27, 1991

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HAZARDOUS WASTE REMEDIATION
NYSDEC REGION 1

Mr. Paul Roth
Regional Solid Waste Engineer
New York State Department of
Environmental Conservation
Building 40
Stony Brook, NY 11790

RE: Springs-Fireplace Road Landfill

Dear Mr. Roth:

Enclosed herewith, please find one copy of the report entitled Hydrogeologic/Phase II Investigation For The Springs-Fireplace Road Landfill for compliance with 6NYCRR Part 360, Section 360-2.11 and the New York State Department of Environmental Conservation Order on Consent (File No. 1-3699-89-06). This is the final submittal to meet the requirements of the closure investigation (i.e. Hydrogeologic, Methane, and Vector Investigation Reports).

Please call if you have any questions.

Sincerely,

Martin O. Klein
Department Manager
Hydrogeology

Kevin J. Phillips, P.E., Ph.D.
Principal, Fanning, Phillips
and Molnar

MOK/KJP:pc
Enclosure

cc: T. Bullock
C. Shea, Esq.
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June 27, 1991

Mr. Michael O'Toole, Director
Division of Hazardous Waste Remediation
New York State Department of
Environmental Conservation
50 Wolf Road
Albany, New York 12233-7010

RE: Request for delisting of the Town of East Hampton
Springs-Fireplace Road Landfill

Dear Mr. O'Toole:

Concerning the petition to delist the Springs-Fireplace Road Landfill from its present 2a classification, Fanning, Phillips and Molnar is submitting the Hydrogeologic/Phase II Investigation Report which will provide the necessary information to evaluate the site. As presented in the report, we recommend that this site be delisted from the NYSDEC Inactive Hazardous Waste Disposal Site Registry.

Should you require more information or clarification on this project, please call.

Very truly yours,

Martin O. Klein
Department Manager
Hydrogeology

Kevin J. Phillips, P.E. Ph.D.
Principal, Fanning, Phillips
and Molnar

MOK/KJP:pc
Enclosure

cc: T. Bullock
C. Shea, Esq.
N. Nosenchuck
P. Roth
T. Candella
J. Swartwout

TABLE OF CONTENTS

Section		Description	Page No.
		Disclaimer	i
1.0		Introduction	1
	1.1	Purpose	1
	1.2	Summary of the Hydrogeologic/Phase II Investigation Work Plan	1
2.0		Site History and Present Setting	4
3.0		Potential Contaminant Source Areas	7
	3.1	C&D Area	7
	3.2	Septage Lagoons	7
	3.3	Leachate Collection Wells and Putrescibles Cell	8
4.0		Regional Geology and Hydrogeology	15
	4.1	Regional Geology	15
	4.2	Regional Hydrogeology	16
5.0		Site-Specific Geology	19
	5.1	Surficial Geology	19
	5.2	Previous Methane Well Installation Geologic Results	22
	5.3	Groundwater Monitoring Well Installation	23
	5.4	Split-Spoon Sampling and Sediment Analysis	28
	5.5	Geophysical Log Methodology and Interpretation	29
	5.6	Summary of Geology	33
6.0		Site-Specific Hydrogeologic Setting	35
	6.1	Horizontal Groundwater Flow Direction and Velocity	35
	6.2	Hydraulic Conductivity Investigation	42
	6.3	Equipotential Fields and Flowlines	48

TABLE OF CONTENTS (CONTINUED)

Section		Description	Page No.
7.0		Groundwater Sampling Procedures and Results	51
	7.1	Groundwater Sampling Procedures	51
	7.2	Groundwater Sampling Results	52
8.0		Interpretation of Groundwater Results	55
	8.1	Upgradient Groundwater Quality	55
	8.2	Comparison of Groundwater Results to Groundwater Standards	55
	8.3	Organic Constituents	57
	8.4	Investigation of Potential Impacts from the C&D Area	57
	8.5	Investigation of Potential Impacts from the Septage Lagoons	58
	8.6	Investigation of Potential Impacts from the Leachate Collection Wells	60
	8.7	Summary of Groundwater Quality	60
9.0		Quality Assurance/Quality Control	63
	9.1	QA/QC Sample Results and Interpretation	63
	9.2	Decontamination Procedures During Drilling	66
	9.3	Decontamination Procedures During Sampling	66
10.0		Potential Receptor Investigation	68
11.0		Hazardous Ranking Score	73
	11.1	Introduction and Final Score	73
	11.2	HRS Work Sheets	74
12.0		Conclusions and Recommendations	95
	12.1	Conclusions	95
	12.2	Recommendations	97

APPENDICES

Appendix A	6 NYCRR Part 360 Requirements (2.11, 2.15)
Appendix B	NYSDEC Phase II Requirements Guidance Document
Appendix C	Field Reports
Appendix D	Boring Logs
Appendix E	Moretrench American Hydraulic Conductivity Charts
Appendix F	Summary of Grain-Size Analyses and Hydraulic Conductivity Estimates
Appendix G	Mineralogic and Physical Characteristics of the Split-Spoon Samples
Appendix H	Well Plumb Investigation and Results
Appendix I	Slug Test Calculations and Graphs
Appendix J	Field Reports for Sampling Methodology and Chain-of-Custody Reports
Appendix K	Groundwater Analysis Laboratory Reports
Appendix L	Sampling Locations and Results for Private Wells in the Vicinity of the Landfill

PLATES

2.1	Landfill Setting and Groundwater Monitoring Well Locations
5.1.1	Surficial Geologic Map of the Springs-Fireplace Landfill
5.3.1	Generalized Cross-Sectional Geology of the Springs-Fireplace Landfill
5.5.1	Geophysical and Graphical Logs of Deep Borings at the Springs-Fireplace Landfill

DISCLAIMER

These findings are based upon a detailed sampling procedure that has been formulated in accordance with sound technical procedures both for sampling and for laboratory analysis (USEPA where appropriate). Conclusions from this data are limited to those areas focused on in the study and represent our best judgment using analytical techniques and our past experience. Even though our investigation has been scientific and thorough, it is possible that certain areas of this site may pose environmental concerns that as yet are undiscovered. In addition, environmental regulations may change in the future and could have an effect on our conclusions.

SECTION 1.0
INTRODUCTION

This Hydrogeologic/Phase II report has been prepared for the Town of East Hampton concerning the Springs-Fireplace Road Landfill. The report has been developed for compliance with 6NYCRR Part 360 Section 360-2.11 and Chapter 857 of the laws of 1982 (New York State Superfund Law) for a Phase II investigation.

1.1 Purpose

This report will present the methodologies, results, and interpretations of this site investigation. The purpose of this hydrogeologic report is to: establish a groundwater monitoring system capable of readily detecting a contaminant release from the landfill and determine whether the site is contaminating subsurface waters (for compliance with 6 NYCRR Part 360 requirements). In addition, applicable Phase II investigation requirements of the New York State Superfund Law (Chapter 857 of the Laws of 1982) will be met. The purpose of the Phase II investigation is to determine if contaminants are leaving the site with a resulting impact on human population and/or the environment. The requirements of this combination of the two sets of regulations has been presented in the NYSDEC approved "Hydrogeologic/Phase II Investigation Work Plan for the Springs-Fireplace Road Landfill (June, 1990)" by Fanning, Phillips and Molnar (see Appendix A for 6 NYCRR 360 2.11 and 2.15 regulations and Appendix B for BHSC Phase II requirements document).

1.2 Summary of the Hydrogeologic/Phase II Investigation Work Plan

The Hydrogeologic/Phase II Investigation Work Plan was developed for compliance with 6 NYCRR Part 360 and the Bureau of Hazardous

Substances Control (BHSC) Phase II requirements. A summary of the work plan objectives is as follows: four paired piezometers (8 wells) were installed at the landfill to augment the one existing shallow well (which has been destroyed since the writing of the work plan) and one deep well on the west side of the landfill. In addition, due to the concern for the septage lagoons and construction and demolition areas at the landfill, two additional shallow wells were installed. The four paired piezometers were placed on the northwest, south, and east sides of the landfill. The purpose of the paired piezometers was to obtain water level measurements from the shallow and deeper zones of the first water bearing zone (upper-most aquifer) to estimate three-dimensional groundwater flow, and to obtain water quality data for detection of a plume generated from the landfill. The locations of the wells were chosen based on information obtained in the literature search which included studies on the regional and site specific hydrogeologic setting and recommendations by the New York State Department of Environmental Conservation (NYSDEC). Each paired piezometer consists of one shallow and one deep well (approximately 100 feet vertical spacing). The paired piezometers on the east side, along Accabonac Road, also incorporated a third well. This previously-existing deep well is screened from 114 to 119 feet below MSL. The deep wells were constructed with 20-foot screens (for greater vertical coverage) and the shallow wells were constructed with 15 foot screens (5 feet above and 10 feet below the water table).

The shallow wells were installed via the hollow stem auger method after the drilling and logging of the deep piezometers. Resistivity and spontaneous potential logging were used to attempt to identify

possible groundwater contamination and geology changes in the deep bore holes. This was supplemented by a gamma logger. The results of the geophysical logging were used to determine whether the well screens were to be adjusted or set at different depths in order to intercept a possible plume from the landfill.

The deep piezometers were proposed for the purpose of determining the geology, pressure distribution, and groundwater quality in the deeper portion of the aquifer beneath the landfill. The deep piezometers were intended to function for the compliance with 6 NYCRR Part 360-2.15 only.

The deep wells were installed via mud rotary method as a variance has been granted by the NYSDEC to use pure bentonite. The deep wells were installed to an elevation of approximately -100 feet MSL. Split-spoon soil samples were obtained at 5-foot intervals from the surface of the water table to the maximum depth of the deep wells to determine the characteristics of the formation. Drilling continued to a depth of 130 feet below MSL with continued split-spoon sampling at 5-foot intervals. This was proposed for the purpose of determining the existence or absence of a suspected clay layer.

In addition, due to the locations of the proposed paired piezometers relative to the sewage treatment plant and active putrescible landfill cell, local groundwater mounding was suspected. Although local groundwater mounding may be evident in the shallow piezometers, it will not effect the deeper piezometers (-100 MSL). Thus, the deep piezometers will reflect the regional flow direction. In addition, the deep piezometers in comparison with the shallow will indicate vertical pressure gradients.

SECTION 2.0
SITE HISTORY AND PRESENT SETTING

The Springs-Fireplace Road Landfill, also known as the Accabonac Landfill is located between Accabonac and Springs-Fireplace Roads on a parcel of property owned by the Town of East Hampton (see Figure 2.1 for site location). The Town of East Hampton established the landfill in the early 1960's on approximately 27 acres of undeveloped property. Recent calculations of the landfill size show it to be approximately 60 acres. It is reported to have accepted municipal, commercial, and septage waste (NYSDEC, 1991). The Long Island Community Right-to-Know Follow-up Investigation Report (May, 1991) prepared for the NYSDEC, Division of Hazardous Waste Remediation, indicated that no information was found to link hazardous waste shipments to the Springs-Fireplace Road Landfill.

The present landfill setting (see Plate 2.1), consists of a construction and demolition (C&D) debris lift in the northeast quadrant of the landfill. The C&D lift attains a maximum elevation of approximately 160 feet above mean sea level (MSL). The Springs-Fireplace Road Landfill operator has indicated that prior to landfilling, the C&D lift was reported to be excavated to approximately 35 to 50 feet below the surrounding grade of the site. The surrounding grade is approximately 85 feet above MSL in that area. Therefore, the C&D lift is estimated to extend to a depth of 35 to 50 feet above MSL with a maximum thickness of 110-125 feet.

To the west of the C&D lift, in the northern portion of the landfill, landscaping debris has been accumulated. This material has been identified as a brush pile where trees and vegetative matter are reduced to wood chips and stockpiled above ground.

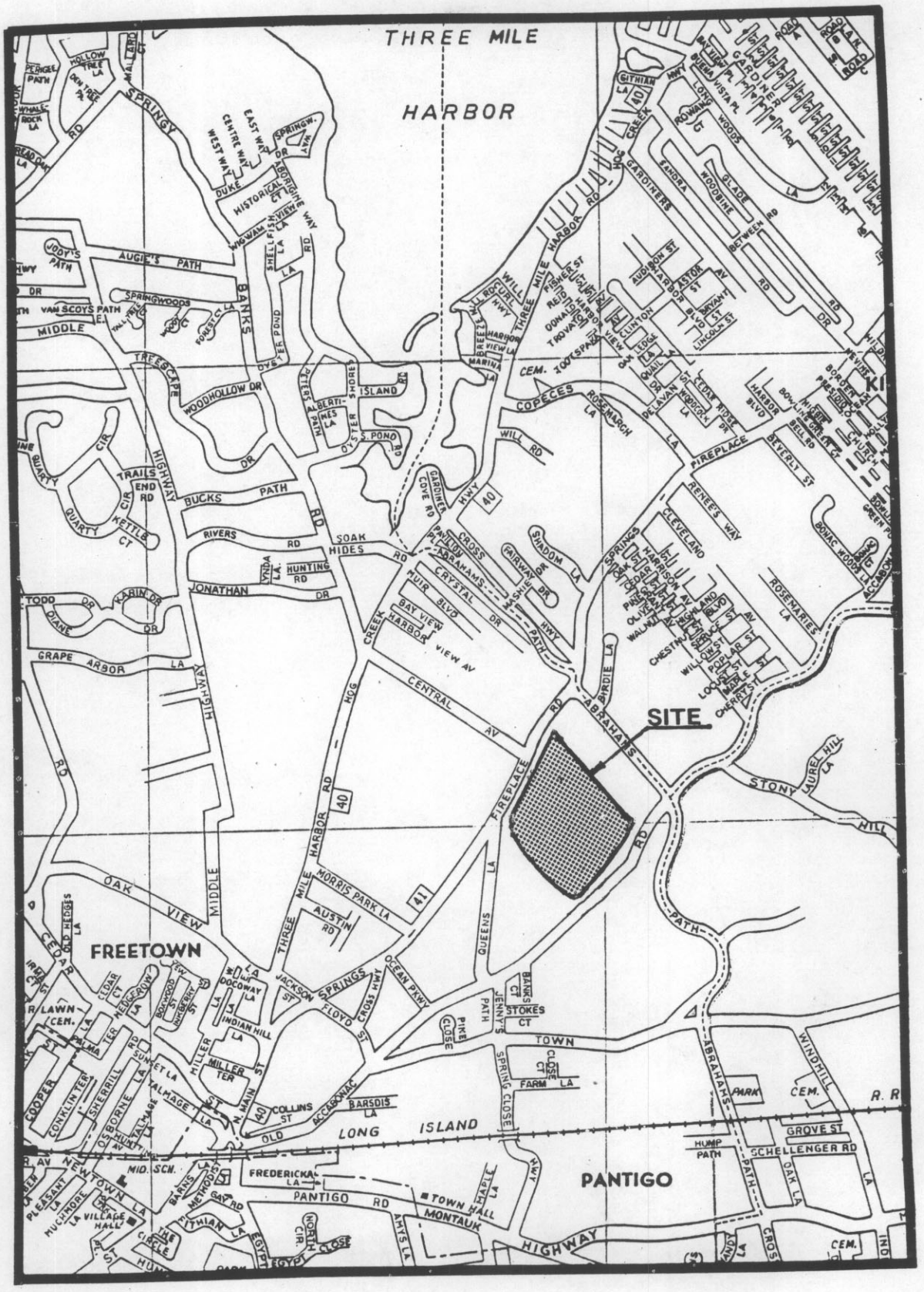


FIGURE 2.1– SITE LOCATION

F,P&M

Along the south-central portion of the landfill, a putrescible debris lift exists which mainly consists of municipal refuse. This material has been mounded to an elevation of approximately 130 feet above MSL. The putrescibles are reported to be landfilled to a depth of approximately 35 to 50 feet below the surrounding grade (85 feet above MSL). Therefore, the putrescible lift extends downward to approximately 35 to 50 feet above MSL. The maximum thickness of the putrescible lift is estimated to be 80 to 95 feet.

In the southeast corner of the landfill, a sand mining excavation area has been identified. This area has not been landfilled and is excavated down to an elevation of approximately 30 feet above MSL.

To the northwest of the sand-mining excavation area, two septage lagoons exist which have not accepted septage since 1987 when the sewage treatment plant began operating. Two leachate collection wells, consisting of 8-foot-diameter precast cement rings, exist at the eastern portion of the putrescibles lift. Both of these collection wells extend downward to an elevation of approximately 35 feet above MSL. The leachate collection wells are located above a two-acre, PVC liner which exists beneath the putrescibles in order to collect leachate. As the liner is reported to be 5 feet below the maximum extent of the leachate rings, the elevation of the liner is approximately 30 feet above MSL.

Structures on the site include the sewage treatment plant to the northwest, the Quonsett Hut (for machine storage) southwest of the landscaping debris area, a Town Road Building south of the Quonset Hut, a recently-constructed (1990) road salt storage building south of the Town Road Building, and a check-in booth near the center of the landfill.

SECTION 3.0
POTENTIAL CONTAMINANT SOURCE AREAS

As indicated in the Hydrogeologic/Phase II investigation work plan, the areas of concern have been identified as: the construction and demolition (C&D) area, the septage lagoons, and the leachate collection wells within the putrescibles area. Each potential source area will be evaluated separately. Plate 2.1 shows the locations of all potential contaminant sources.

3.1 C&D Area

The construction and demolition area is located on the northeast quadrant of the landfill. C&D debris consists primarily of wood, metal, and concrete. The thickness of the C&D debris is estimated to be 110 to 125 feet and distance between the lower extent of the C&D and the water table is estimated to be 25 to 40 feet.

To assess possible groundwater impacts from this area, two shallow wells have been placed in this area; one upgradient of the C&D and one downgradient. The groundwater sampling results from these wells are discussed in Section 8.0 of the report.

3.2 Septage Lagoons

Two unlined septage lagoons exist at the Springs-Fireplace Road Landfill which have accepted scavenger waste in the past. In 1987, the use of the sewage treatment plant began. In March, 1982, the Suffolk County Department of Health Services sampled sludge in one of the lagoons and detected methylene chloride (42,000 ppb), toluene (2,500 ppb), and phenol (39 ppb). The septage lagoons both contain approximately 4 feet of sludge with a total volume of approximately 44,000 cubic feet of sludge and 55,000 cubic feet of overlying water which has accumulated in the lagoons as a result of the low

permeability of the sludge. Fanning, Phillips and Molnar has sampled the sludge on two occasions; June, 1989 and October, 1990. The summarized results are presented in Tables 3.2.1 (June, 1989) and 3.2.2 (October, 1990) (see Figure 3.2.1 for sampling locations). The results show that the 15 volatile and semi-volatile organics have been detected in the sludge. The overlying water in each lagoon was also sampled and these results are also presented in Figure 3.2.2. These results show that for comparable parameters, the overlying water contains concentrations of parameters that are significantly less than those of the septage sludge.

3.3 Leachate Collection Wells and Putrescibles Cell

Two leachate collection wells consisting of 8-foot-diameter perforated precast sections exist on the east side of the putrescibles area (see Plate 2.1). These rings were installed in 1984 over a reported two-acre lined area consisting of two 20-millimeter PVC liners. The west leachate collection well is designated as L-1 and the east leachate collection well is designated as L-2. Measurements of leachate levels were obtained for the period from March 10, 1988 to August 23, 1990 (15 measurement events). The results show that Well L-1 has had an average of 0.15 feet (1.8 inches) of leachate with a maximum of 0.75 feet. Well L-2 has had an average of 0.91 feet (10.9 inches) with a maximum of 2.5 feet. Two leachate collection well monitoring reports by Fanning, Phillips and Molnar have been submitted concerning the results of sampling of the leachate wells. During the two sampling events, leachate Well L-1 did not contain sufficient levels of leachate to allow sampling. Therefore, leachate Well L-2 was the only well sampled and this was performed on two occasions. The results are presented in Table 3.3.1.

TABLE 3.2.1
SEPTAGE LAGOON DETECTED ORGANIC COMPOUNDS*
JUNE, 1989
(ALL RESULTS IN ug/kg)

Parameters	North Lagoon S-1	North Lagoon S-2	North Lagoon S-3	South Lagoon S-4	South Lagoon S-5
VOLATILE ORGANIC COMPOUNDS					
Toluene	1,100	16,000	1,700	2,700	3,300
Chlorobenzene	240	U	12,000	U	U
1,2-Dichlorobenzene	1,700	12,000	13,000	61,000	27,000
1,3-Dichlorobenzene	470	4,200	350	11,000	5,500
1,4-Dichlorobenzene	970	8,800	3,100	17,000	9,100
Acetone	360	3,700	1,100	1,300	2,000
Xylenes	144	1,100	180	17,000	8,100
Carbon Disulfide	U	1,500	210		2,000
Ethylbenzene	U	U	U	3,300	1,700
Total Volatile Organic Compounds	4,984	47,300	31,640	113,300	58,700
PESTICIDES & PCBs					
Total Pesticides & PCBs	U	-	-	U	-
SEMI-VOLATILE ORGANICS					
4-Chloroaniline	3,000	-	-	9,800	-
2-Methylnaphthalene	U	-	-	6,200	-
Total Semi-Volatile Organics	3,000	-	-	16,000	-

U - Undetected
\- - Not tested for

* See Figure 3.2.1 for sampling locations

TABLE 3.2.1 (CONTINUED)
SEPTAGE LAGOON DETECTED METALS FROM SAMPLES S-1 AND S-4*
JUNE, 1989

(ALL CONCENTRATONS AND RESULTS IN mg/kg)

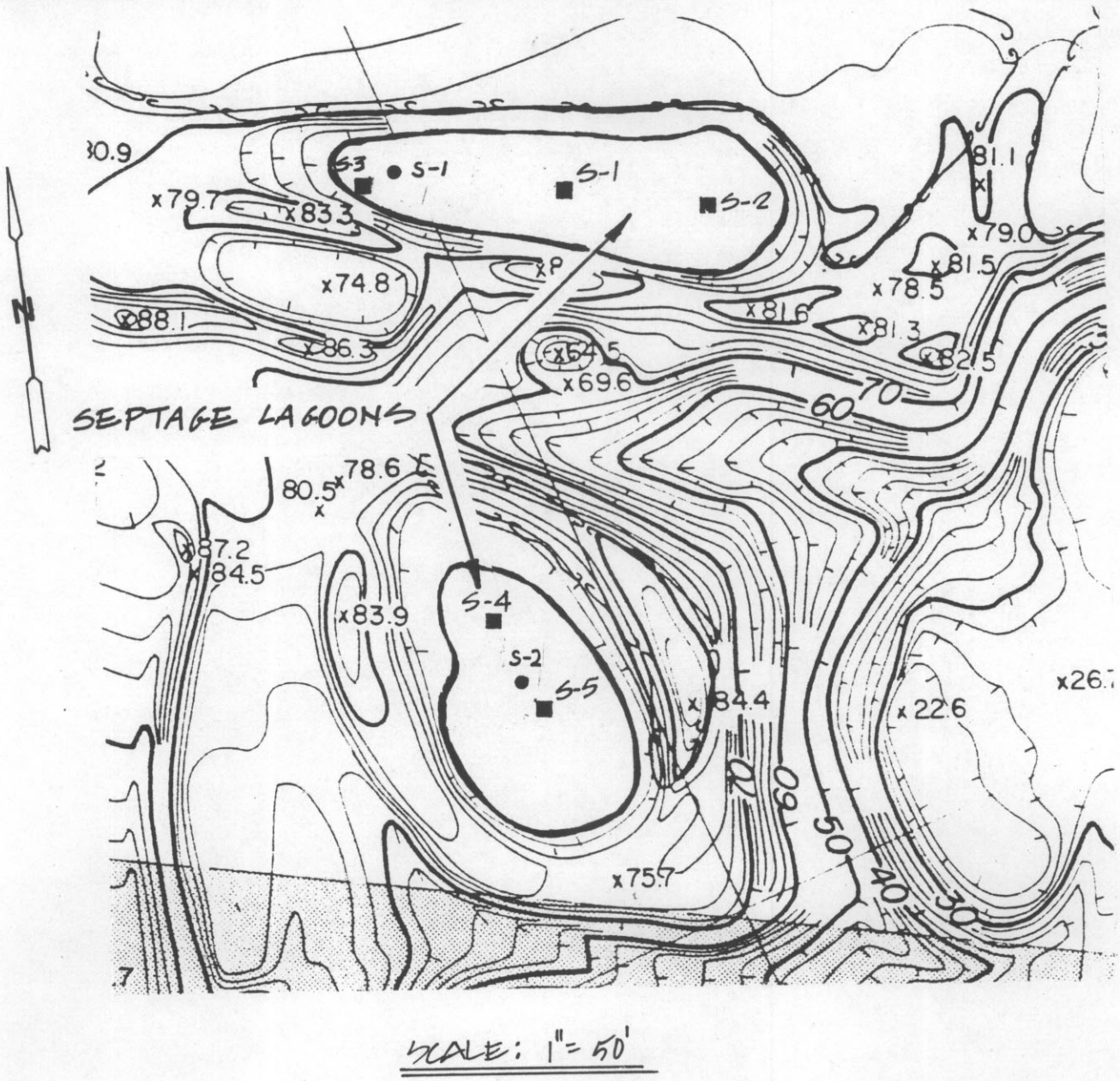
Parameter	Samples S-1	S-4
Aluminum	7,120	6,650
Arsenic	2.60	6.70
Barium	262	498
Cadmium	3.60	10.8
Chromium	26.2	44.0
Copper	1,020	1,550
Sodium	1,740	2,370
Zinc	1,210	1,880
Calcium	5,020	7,350
Iron	8,640	9,170
Lead	146	484
Magnesium	833	1,050
Manganese	64.3	61.5
Mercury	2.90	4.20
Nickel	19.0	26.4
Potassium	224	214
Selenium	1.40	2.90
Silver	21.4	26.4

* See Figure 3.2.1 for sampling locations

TABLE 3.2.2
SEPTAGE LAGOON DETECTED COMPOUNDS*
RESULTS FROM OCTOBER, 1990

	North Lagoon	Overlying Water (north)	South Lagoon	Overlying Water (south)
Metals (ppm)				
Barium	ND	ND	640	ND
Arsenic	ND	ND	ND	ND
Aluminum	7110	4.2	10500	1.9
Cadmium	1.4	ND	8.7	ND
Calcium	784	13.1	9160	50.8
Chromium	11.2	ND	50.9	ND
Copper	78	ND	1890	0.31
Iron	7420	3.0	12140	1.9
Potassium	476	3.8	618	3.4
Magnesium	756	1.7	1530	3.1
Manganese	101	0.74	101.8	0.23
Sodium	204	2.6	691	9.9
Lead (ppb)	18.5	16	798	67
Silver	ND	NT	29.1	NT
Zinc	115	0.06	2470	0.55
Mercury (ppb)	0.33	0.2	2.1	1.4
Nickel	ND	ND	36.4	ND
Selenium	ND	ND	4.2	ND
Calcium Hardness	NT	32.75	NT	127
Chloride	NT	13	NT	21
COD	NT	20	NT	130
Color (units)	NT	100	NT	50
Total Hardness	NT	39.72	NT	139.71
Ammonia (NH_3)	NT	0.39	NT	1.8
Total Phenols (ug/l)	NT	4.0	NT	7.2
Sulfate	NT	42.0	NT	44
Total Alkalinity	NT	42	NT	126
Total Dissolved Solids	NT	125	NT	308
Total Kjeldahl Nitrogen	NT	1.0	NT	22.0
TOC	NT	11.2	NT	110
Zinc	NT	0.06	NT	0.55
VOCs (ppb)				
Toluene	210	ND	2200	ND
Chlorobenzene	1200	ND	410	ND
Acetone	940	ND	23000	22
Xylenes	63	ND	6400	ND
Carbon Disulfide	ND	ND	650	ND
Ethylbenzene	ND	ND	1200	ND
2-Butanone(MEK)	200	ND	6600	ND
Methylene Chloride	ND	ND	51	ND
Trichloroethene	ND	ND	54	ND
Benzene	ND	ND	67	ND
Semi-Volatiles (ppb)				
4-Chloroaniline	ND	ND	ND	ND
2-Methylnaphthalene	ND	ND	4600	ND
1,2-Dichlorobenzene	2100	ND	2500	ND
1,3-Dichlorobenzene	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND
Bis(2Ethylhexyl)Phthalate	760	ND	2700	ND

* See Figure 3.2.1 for sampling locations
NT Not Tested
ND Not Detected



SCALE: 1" = 50'

LEGEND:

■ S-1 - SAMPLING LOCATION (1989)
● S-1 - SAMPLING LOCATION (1990)

FIGURE 3.2.1 - SEPTAGE LAGOON SAMPLING LOCATIONS

F,P&M

TABLE 3.3.1
SUMMARY OF LEACHATE SAMPLE RESULTS
SPRINGS-FIREPLACE ROAD LANDFILL

	L-2 Jan, 1990	L-2 July, 1990
Aluminum (mg/l)	2.40	1.7
Boron (mg/l)	2.7	1.7
Cadmium (ug/l)	ND	ND
Calcium (mg/l)	72.8	122
Chloride (mg/l)	380	248
Chromium (mg/l)	0.02	0.01
COD (mg/l)	370	420
Color (color units)	90	100
Copper (mg/l)	ND	ND
Iron (mg/l)	10.9	11.1
Hardness (total) (mg/l)	439	478.42
Potassium (mg/l)	260	163
Magnesium (mg/l)	62.7	42.3
Manganese (mg/l)	0.37	0.77
Sodium (mg/l)	360	217
Ammonia (NH_3) (mg/l)	192	198
Nickel (mg/l)	ND	0.06
Nitrate (asN) (mg/l)	12.5	8.8
Lead (ug/l)	7.00	8.5
pH (pH units)	8.00	NT
Total Phenols (ug/l)	8.00	7.0
Silver (mg/l)	ND	ND
Sulfate (mg/l)	90	104
Total Alkalinity (mg/l)	1600	1500
Total Dissolved Solids (mg/l)	2030	1725
Total Kjeldahl Nitrogen (mg/l)	208	324
Total Organic Carbon (mg/l)	289	54.3
Turbidity (units)	32	2
Zinc (mg/l)	0.06	0.04
<u>VOCs</u> (ug/l)		
Chloroethane	ND	12
Chlorobenzene	ND	ND

ND - Not Detected
NT - Not Tested

To assess possible groundwater impacts from the leachate collection wells and putrescibles cell, 2 paired piezometers and 2 shallow wells were positioned downgradient and 2 paired piezometers were positioned upgradient. The groundwater sampling results from these monitoring wells are discussed in Section 8.0 of this report.

SECTION 4.0
REGIONAL GEOLOGY AND HYDROGEOLOGY

4.1 Regional Geology

The South Fork of Long Island is underlain by unconsolidated deposits of the upper Cretaceous and Quaternary Period that rest, unconformable, on the Upper Paleozoic basement complexes. The upper Cretaceous deposits include, in ascending order, (1) the Raritan formation, which consists of the Lloyd sand member and an overlying clay member, (2) the Magothy formation-Matawan group, which is undifferentiated, and (3) the Monmouth group. Except for the Monmouth group, which occurs only at the eastern edge of the South Fork, the three units are continuous throughout the South Fork (Nemickas and Koszalka, USGS Paper 2073, 1982).

The Cretaceous deposits are overlain by Pleistocene deposits (Upper Glacial) which include a discontinuous marine clay unit that is overlain by glaciofluvial deposits.

In the vicinity of the Springs-Fireplace Road Landfill site, the bedrock is located approximately 1,200 feet below the National Geodetic Vertical Datum (NGVD) of 1929 (approximately equal to mean sea level) and dips to the southeast at approximately 1 degree. The Magothy formation in this area is approximately 400 feet thick and the Upper Glacial deposits are approximately 325 feet thick.

The landfill is located near the center of the Ronkonkoma Moraine, which runs generally east-west along the length of the South Fork. Moraine and outwash deposits form most of the surficial deposits in the area. The Ronkonkoma Drift consists of moraine deposits of sand and gravel with occasional lenses of clay. South of the Ronkonkoma Moraine are the outwash deposits which consist of

stratified, fine to coarse sand with occasional gravel. To the north of the Ronkonkoma Moraine, outwash deposits of stratified sand and gravel exist. On Springs peninsula (to the north), the outwash overlies till deposits and glaciofluvial kame deposits overlie outwash deposits. The kames consist of poorly sorted sand and gravel.

A boring log of a well in the vicinity of the site indicates that the Pleistocene glacial deposits are encountered to a depth of 239 feet below the NGVD. Since the surface elevation of the site ranges from 70 to 100 feet, this places the Upper Glacial-Magothy interface at approximately 309-339 feet below grade at this location.

4.2 Regional Hydrogeology

The aquifers of the South Fork are the sole source of water for public supply, agriculture, and industry. Groundwater accumulates above the bedrock in the unconsolidated sediments of Pleistocene and Cretaceous Age. The Upper Glacial aquifer is the aquifer associated with the Pleistocene deposits and the Magothy aquifer is associated with the Cretaceous Magothy formation deposits. The literature search found no evidence of the usage of the Lloyd Sand Member of the Raritan formation as a water supply, due to its depth (approximately 700-800 feet below MSL). This aquifer is also confined by an overlying clay member. Therefore, the Upper Glacial and Magothy aquifers are the aquifers of concern.

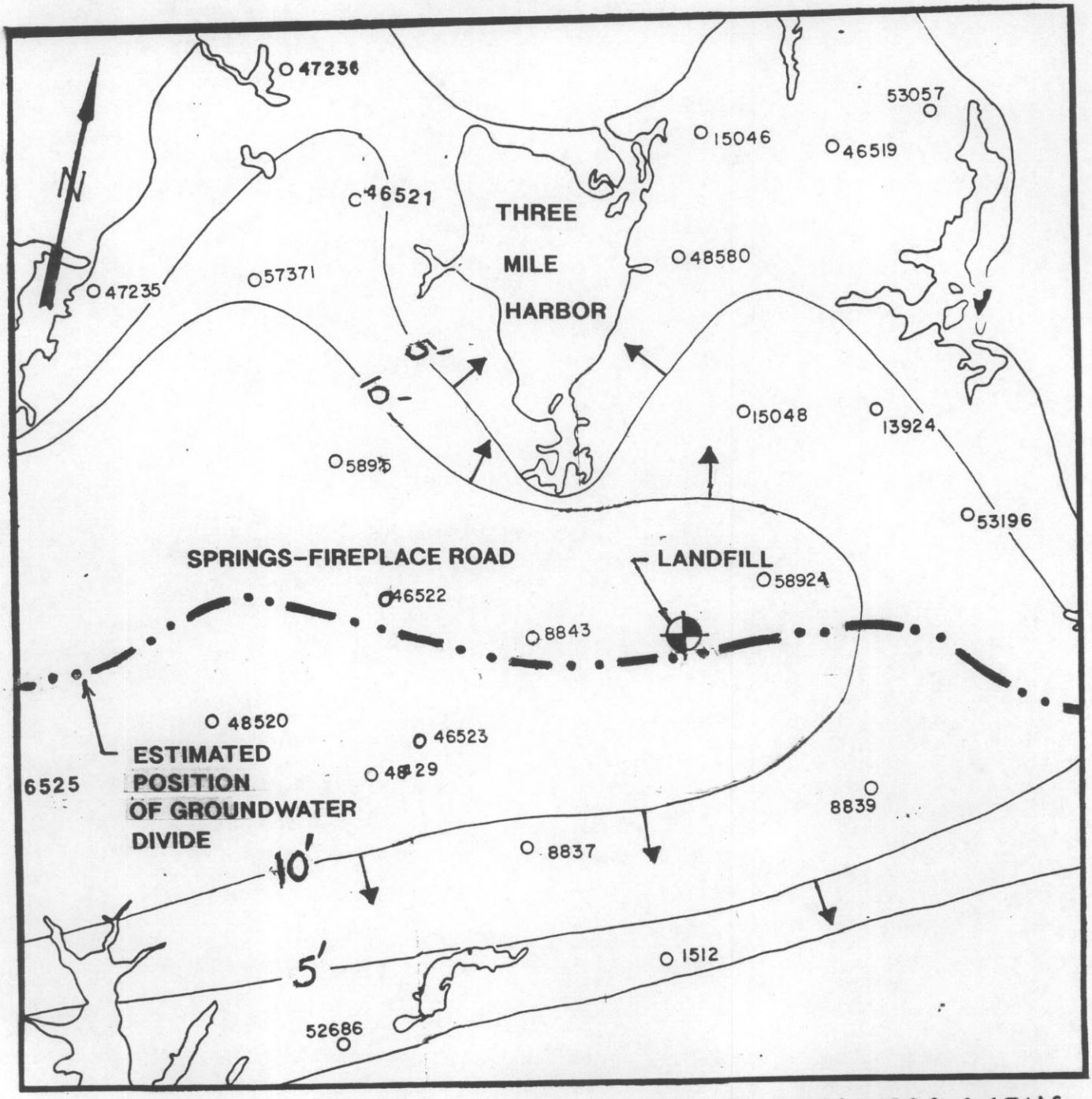
Recharge of the Upper Glacial aquifer occurs mainly through precipitation. The average annual precipitation on the South Fork is 45 inches per year (average precipitation at Bridgehampton, NY from the National Weather Service) of which approximately half is lost to evapotranspiration and runoff with the remaining half infiltrating and recharging the aquifer. The Magothy aquifer is recharged by downward

movement of water from the Upper Glacial aquifer.

The March, 1990 Regional Groundwater Elevation Contour Map from the Suffolk County Department of Health Services (SCDHS) shows the water table to be between 5 and 10 feet above MSL in the landfill vicinity (see Figure 4.2.1 for Water Table Contour Map). Also, the estimated position of the regional groundwater divide has been superimposed on this map and is located in close proximity to the landfill. The SCDHS has reported that the March, 1990 Groundwater Elevation Contour Map shows significant increases in groundwater elevations when compared to the March, 1989 map due to the above-average rainfalls during the period of April to November, 1989. Overall, for Suffolk County, elevations in March, 1990 closely resemble those measured in March, 1979 which are considered representative of recent historical highs for groundwater elevation.

The horizontal groundwater flow direction at the landfill has not been clearly established. However, a previous report has indicated flow in a north-northeast direction (Acabonack (sic) Road Landfill Study, Guerrera Associates, 1984).

On the South Fork, fresh groundwater "floats" above salt groundwater due to density differences. The depth to the fresh water-salt water interface, based on the theoretical Ghyben-Herzberg ratio of 40 feet of fresh water below every foot of water above sea level (approximately 9 feet), is approximately 360 feet which places the saltwater interface below the landfill within the Magothy Aquifer.



SOURCE: 1990 SCDHS GROUNDWATER CONTOUR MAP

SCALE: 1"=1 MILE

LEGEND

—10'— – GROUNDWATER ELEV. CONTOUR LINE

→ – GROUNDWATER FLOW DIRECTION

—••— – ESTIMATED POSITION OF GROUNDWATER DIVIDE

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FIGURE 4.2.1 – REGIONAL GROUNDWATER FLOW DIRECTION IN THE VICINITY OF THE LANDFILL

SECTION 5.0
SITE-SPECIFIC GEOLOGY

To interpret the site-specific geology, a surficial geologic map was constructed and well boring data (and split-spoon data) were used to evaluate the vadose-zone geology and the saturated-zone geology in the upper portion of the Upper Glacial aquifer. Borehole geophysics were also applied to the four deep wells in order to further clarify the geology and profile groundwater quality in the aquifer.

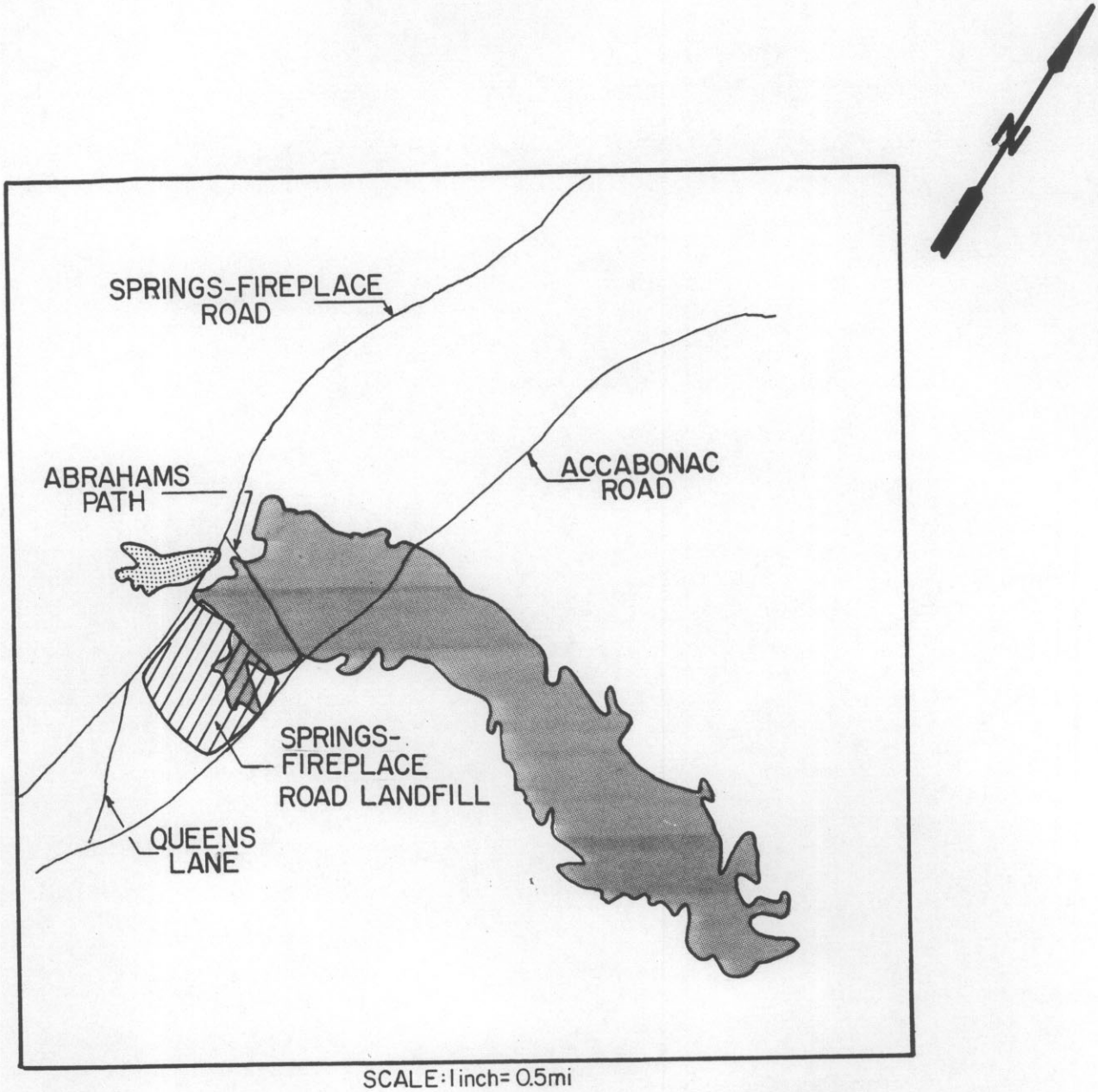
5.1 Surficial Geology

The surficial geology of the Springs-Fireplace Road Landfill was ascertained through published literature and an on-site geological investigation.

Since the landfill has been extensively excavated, some areas have exposed slope faces which were inspected visually for identification of stratigraphic units. The observations were recorded on videotape for analysis.

The regional surficial geology, adapted from geological reports, is presented in Figure 5.1.1 (after Nemickas and Koszalka, USGS Professional Paper 2073, 1982). This figure shows that the landfill vicinity contains surficial deposits of Ronkonkoma Drift in the northern portion of the landfill. Ronkonkoma Drift consists of morainal deposits that are primarily foreset beds of sand and gravel with occasional lenses of till and clay. Many of the sand and gravel deposits are folded and faulted as a result of glacial tectonics and slumping. In the southern portion of the landfill, outwash deposits exist. The outwash deposits consist of stratified, fine to coarse, light brown sand in which cross-bedding is common. The outwash also may contain gravel. Clays and silt are uncommon in these deposits.

The visual geologic inspection of the exposed slope faces



SCALE: 1 inch = 0.5mi

NOTE: ADAPTED FROM USGS PAPER 2073

LEGEND

- RONKONKOMA DRIFT
- OUTWASH DEPOSITS
- MARSH DEPOSITS
- SPRINGS-FIREPLACE ROAD LANDFILL

FIGURE 5.1.1 -REGIONAL MAP OF SURFICIAL GEOLOGIC DEPOSITS IN THE VICINITY OF THE SPRINGS-FIREPLACE ROAD LANDFILL

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confirmed the work of Nemickas and Koszalka in that morainal deposits (till, outwash, and clay) were identified in the northern portion of the site whereas outwash deposits were identified in the southern portion of the site. Plate 5.1.1 shows the site-specific surficial geology of the landfill as well as the approximate extent of a near-surface clay layer. This plate shows the stratigraphic units at several exposed slope faces during the reconnaissance mapping.

Till exposures identified in the northern portion of the site consist of poorly-sorted, poorly-stratified or unstratified deposits of sand, gravel, pebbles, cobbles, and boulders. These till units are often interbedded with outwash units which are likely to be a result of glacial meltwater breaching the moraine and depositing the outwash.

In the northern portion of the landfill, a gray silty-clay layer was identified which varies in thickness (where exposed) from approximately 2 to 9 feet (the near-surface clay layer). This clay layer was exposed in several areas in the northwest and north-central portions of the site and may be discontinuous. The approximate areal extent of the clay is shown in Plate 5.1.1. This clay layer, in addition to being observed in exposed faces, was also encountered during previous drilling of methane monitoring wells by Fanning, Phillips and Molnar. One methane well boring, which was abandoned due to encountering perched water at a depth of approximately 31 feet and was located approximately 250 feet West 40° South of Well S-3, may contain the clay layer as perched water exists there and the water must be perched by a relatively impermeable layer. This layer generally corresponds to the elevation of the clay layer in other areas on the site and is expected to be a continuation of the clay layer. The upper surface of the clay layer occurs at elevations

varying from approximately 85 to 100 feet above MSL and does not apparently dip significantly as it is generally horizontal on the site (based on visual inspection, field measurements, methane well drilling logs, and elevation comparisons).

The central portion of the clay layer has apparently been breached during the excavation for the C&D area. Therefore, this clay layer does not represent an impermeable boundary beneath the C&D debris. The C&D debris extends approximately 50 to 65 feet below, and 75 feet above, the clay layer.

In the southeast portion of the site, exposed faces in the sand excavation area show stratified deposits with a significant decrease in the amounts of cobbles and boulders (in comparison to the north part of the landfill).

In the northwest portion of the sand excavation area, cross-bedded outwash deposits of light brown, well-sorted, fine and medium-grained sands were noted. The exposed slope faces around the putrescible lift were not investigated as they are artificial slopes.

5.2 Previous Methane Well Installation Geologic Results

The vadose zone geology at the Springs-Fireplace Road Landfill was interpreted, in part, from the previous landfill methane investigation and installation of 19 methane monitoring wells in 1990 by Fanning, Phillips and Molnar. This investigation showed that the vadose zone geology generally consists of low permeability deposits existing at the north part of the landfill corresponding to the moraine deposits. Along the southern portion of the landfill, finer-grained material is less prevalent and permeability increases, which corresponds with the outwash zone. No obvious contact between the moraine and outwash deposits was identified. The vadose zone findings

also revealed that the low permeability of the moraine deposits extend downward only to approximately 65 above MSL. Beyond this depth, permeability increases, generally, to that of the outwash deposits. This suggests that till associated with the moraine deposits exist over outwash deposits.

5.3 Groundwater Monitoring Well Installation Procedures

During the months of October and November, 1990, a total of ten groundwater monitoring wells were installed at the Springs-Fireplace Landfill (see Plate 2.1 for well locations). Six of these wells (designated S-1 through S-6) were installed to intersect the water table and are designated "shallow" monitoring wells. At four of the six shallow monitoring well locations, "deep" monitoring wells (designated D-1 through D-4) were installed (at depths ranging from 96 to 105 feet below MSL and containing 20-foot screens) alongside the shallow monitoring wells to function together as paired piezometer locations. In addition to the newly-installed wells, one previously-existing well exists (designated GP-1) at the landfill. This well is the deepest well at the landfill as it is screened from 114 to 119 feet below MSL. Also, a formerly-existing well (designated as AG-2) was removed by landfill personnel during 1990, as its location conflicted with the location of their proposed composting facility.

The rationale for installing 10 wells to augment the one previously-existing well (11 wells total) is to detect a contaminant release from the landfill in the groundwater and to determine the site-specific groundwater flow direction. Four paired piezometers (8 wells total) were located at the landfill for specific purposes. These purposes are to provide lateral and vertical coverage capable of detecting a release. The placement of the paired piezometers was

based on the literature search of hydrogeologic and geologic information. Two paired piezometers were installed in the estimated area upgradient of the landfill and the other paired piezometers were placed in the estimated downgradient area. The two additional shallow wells (S-5 and S-6) were installed upgradient and downgradient of the C&D area to determine possible impacts from this area. Also, the well upgradient of the C&D (S-6) is also downgradient of the septage lagoons to determine if the chemical components of the lagoons have migrated to the groundwater.

The thickness of the Upper Glacial Aquifer is estimated to average 240 feet and, therefore, the deep wells represent coverage of generally the central portion of the Upper Glacial Aquifer.

The six shallow groundwater monitoring wells were installed using the hollow-stem auger drilling method. All auger sections and any downhole equipment was steam cleaned prior to use at each location. All shallow wells were constructed of four-inch PVC pipe which included a 15-foot section of 0.020-inch-slotted screen and the appropriate length of solid riser pipe. Each shallow well screen was placed to a depth of approximately 10 feet into the water table (with 5 feet of screen above the water table, and 10 feet below). Each well was gravel packed for the entire screened interval to a minimum of one foot above the screened interval. A minimum of one foot of bentonite tablets were then placed above the gravel pack. A bentonite/cement grout was then tremie-piped into the well annulus and filled to grade. Finally, to protect the well from accidents and tampering, a metal protective sleeve was placed over each well and cemented into place. The protective sleeves extend approximately 2 to 3 feet above grade and were affixed with locks.

Due to the excessive depths of the deep wells, the hollow-stem auger method could not be utilized and the mud-rotary drilling method was employed. This method entails the construction of two mud pits in the vicinity of the borehole for circulation of the mud from the borehole to the pits and back, which facilitates the transport of cuttings out of the borehole and allows them to settle out in the mud pit. The drilling mud used was "Pure Gold" pure sodium bentonite. Water to mix with the drilling mud was obtained from a Suffolk County Water Authority hydrant. Each of the two mud pits were excavated with a backhoe to dimensions of approximately 10 x 10 feet and 6 feet deep. Each pit was lined with plastic to prevent excessive water loss during the mud mixing process.

The four deep wells were constructed with 20-foot lengths of screen with 0.020-inch slots. The maximum extent of the four deep wells ranges from approximately 96 to 105 feet below mean sea level. Each of the borings for the deep wells was overdrilled approximately 25 feet beyond the maximum extent of the bottom of the constructed well. This was performed to confirm the existence or absence of a clay layer in this region (this topic will be addressed later in this section). The overdrilled portion of the deep wells were abandoned by grout and overlain with a one-foot layer of bentonite tablets. After allowing the grout to set, approximately 6 inches of gravel pack was placed in the well annulus. The PVC was then placed in the well and gravel packed. Thickened grout was tremie-piped above the gravel pack. The wells were grouted to grade and fitted with cemented metal protective sleeves and locked.

After the installation of the shallow and deep monitoring wells, the wells were developed. The development was performed with a

decontaminated (Liquinox and water followed by water were drawn through the pump and tubing) Gould EM-13 submersible pump (with an appropriate length of dedicated "poly" tubing affixed to the pump). Initially, the drilling mud was pumped off into a bermed area near each well and on landfill property for the development of the deep wells (permission for the mud disposition was granted by the NYSDEC). When the mud was cleared, the groundwater was pumped and contained in 55-gallon drums. For the shallow wells, S-1 through S-6, the amount of development water purged ranged from 165 to 220 gallons to achieve a turbidity value of less than 50 nephelometric turbidity units (NTUs). Turbidity was measured on site with a nephelometer calibrated to field standards. For the deep wells, D-1 through D-4, the range of development water purged was 550 to 1210 gallons per well to achieve turbidity values below 50 NTUs (see Appendix C for field reports detailing all field activities).

Following the completion of all groundwater monitoring wells, each location was surveyed by a New York State licensed surveyor to provide areal and elevational coordination to coast and geodetic survey markers U-324 (elev. 33.75 ft.) and Springs (elev. 52.02 ft.). See Plate 2.1 for survey results.

During the drilling of the groundwater monitoring wells, geologic logs were obtained. For the deep wells, visual logs could not be obtained due to the drilling mud which does not allow direct visual evaluation of formation cuttings. Sieve-residue collection of the drilling mud and cuttings was not performed as the mass and shape of sediments will affect the velocity at which the formation sediments are carried to the surface and can, therefore, lead to skewed results. To obtain a boring log for the deep wells, split-spoon sediment

samples were obtained at five-foot intervals upon encountering the water table and continued to the maximum depth to which the boring advanced. Boring logs for the deep wells were constructed by visually describing the split-spoon samples and interpolating between samples.

For the six shallow wells, visual logs were obtained from the hollow-stem auger cuttings. These logs were used to represent vadose-zone geology for each pair of piezometers. However, as shallow Wells S-5 and S-6 were not paired with a deep well, split-spoon samples were obtained at five-foot intervals upon encountering the water table to ten feet below the water table (the maximum depth of the shallow borings). Therefore, boring logs were constructed for all wells (see Appendix D for Boring Log Reports). The boring logs were used to create generalized cross-sections of the geology at the landfill (see Plate 5.3.1 for cross-sections). These cross-sections show that the general geology beneath the landfill primarily consists of sand and gravel deposits. No clay units or impermeable units were encountered in the saturated zone during the geologic investigation.

During the literature search for the Hydrogeologic/Phase II Work Plan, it was found through an investigation of boring logs of wells in the vicinity of the landfill that a clay layer may exists at a depth of approximately 120 feet below MSL. Therefore, overdrilling of the deep boreholes was performed to confirm the existence or absence of this layer. This over drilling extended to a depth of approximately 130 feet below MSL and the clay layer was not encountered. However, a silty layer was intercepted near the base of some of the borings which may have been described as clay in the driller's logs from the wells in the vicinity. Therefore, no clay layer was identified at the landfill down to a depth of 130 feet below MSL.

5.4 Split-Spoon Sampling and Sediment Analysis

During drilling of the monitoring wells, split-spoon soil samples were required by NYSDEC and obtained at five-foot intervals at paired-piezometer and single-piezometer locations. In some instances, split-spoon samples could not be obtained due to obstructions in the borehole such as large cobbles. The split-spoon samples were obtained to: aid in construction boring logs; to perform grain-size analyses by applying the Unified Soil Classification System (USCS) for grain-size classifications; to estimate hydraulic conductivity, and; to describe mineralogic content and physical characteristics of each sample.

The grain-size analyses were performed by placing each split-spoon sample into a marked glass jar for transport. Then, selected samples were placed in a series of U.S. standard sieves to segregate the different grain sizes. The sediment retained on each sieve was weighed to the nearest 0.01 grams and plotted on semi-logarithmic work sheets. This information allowed for ascertaining the 50 percent (median) grain-size. The uniformity coefficient (U_C), which is a measure of the degree of sorting, was obtained by dividing the 40 percent cumulative-retained size by the 90 percent cumulative-retained size. Lower U_C values represent well-sorted sediments and higher values represent poorly-sorted sediments. Generally, well-sorted sediments of comparable median grain-size have greater hydraulic conductivity values that poorly-sorted sediments due to higher effective porosities.

Hydraulic conductivity estimates were obtained from select split-spoon samples by utilizing the Moretrench American Corporation method. This method utilizes uniformity coefficients, median grain size, and

soil density (derived from drillers' blow counts - see field reports in Appendix C for blow counts) by averaging the number 2 and 3 blow count intervals and assigning a density category to the sediment as per the USCS method of soil density classification (see Appendix E for Moretrench American Hydraulic Conductivity charts). The summaries of the results of the grain-size analyses and the hydraulic conductivity estimates can be found in Appendix F. From this summary, average hydraulic conductivity estimates were calculated for each screened interval by averaging the values obtained for each five-foot interval. The average hydraulic conductivity results are presented in Table 5.4.1 and show that the average hydraulic conductivity values for all wells range from 17 to 107 ft/day. Comparison of average shallow and average deep hydraulic conductivity shows that shallow hydraulic conductivity is more than twice that of deep hydraulic conductivity. These values will be further analyzed and compared with hydraulic conductivity values obtained from in-situ aquifer tests (slug tests) in Section 6.2.

The mineralogic content and physical characteristics for each split-spoon sample were described visually (see Appendix G for mineralogic and physical characteristics of the split-spoon samples).

The results show that all samples are composed primarily of quartz sand. Small amounts (15 percent or less) of sodium and potassium feldspar were identified as well as trace amounts of biotite magnetite, muscovite, amphibole or pyroxene, garnet, and epidote. No correlation of mineral content and geologic unit changes were identified.

5.5 Geophysical Log Methodology and Interpretation

Upon completion of the drilling at each of the four deep well

TABLE 5.4.1
ESTIMATES OF
AVERAGE HYDRAULIC CONDUCTIVITY
VALUES FOR SCREENED INTERVALS
DERIVED FROM GRAIN-SIZE ANALYSES*
SPRINGS-FIREPLACE ROAD LANDFILL

Well #	Screened Interval (in feet relative to MSL)	Average Hydraulic Conductivity
S-1	10 to 0	78 ft/day
S-2	10 to 0	57 ft/day
S-3	10 to 0	34 ft/day
S-4	10 to 0	26 ft/day
S-5	10 to 0	50 ft/day
S-6	10 to 0	107 ft/day
Average Shallow Hydraulic Conductivity		59 ft/day
D-1	-83 to -103	19 ft/day
D-2	-85 to -105	20 ft/day
D-3	-76 to -96	39 ft/day
D-4	-85 to -105	17 ft/day
Average Deep Hydraulic Conductivity		24 ft/day

* See Plate 2.1 for Well Locations

locations, geophysical logging was performed in the open boreholes prior to well construction.

Geophysical logging was performed to identify potential contamination zones and correlate stratigraphy with well boring and split-spoon sample data. For each paired piezometer, the deep boreholes were drilled first and geophysical logs were interpreted prior to drilling of the shallow boreholes. This was performed to assist in the determination of the screened interval depth of the shallow wells. However, as the results were inconclusive with regards to potential contamination zones, the shallow wells were screened at the water table.

The wells were logged with a Widco Geophysical Logger (from Mineral Logging Systems, Inc.). Two probes were used during the logging: a Spontaneous Potential (SP)/Resistivity probe and a Gamma probe. The wells were logged by advancing each probe down the borehole and obtaining continuous-reading stripchart outputs as the probes ascended through the borehole. The borehole was filled with the drilling mud to prevent borehole collapse. All downhole equipment was decontaminated prior to use at each well. All probes were calibrated and sensitivity (scale) adjustments were performed to control the amplitude of the deflections.

The SP, resistivity, and gamma geophysical logging provided strip-charts which were interpreted qualitatively for all deep borings and compared to the geologic logs obtained from the split-spoon analysis (see Plate 5.5.1 for geophysical strip charts for all deep borings as well as geologic logs for comparison).

The SP logs represent a measure of potential or voltages that develop at the contacts between units such as a clay bed and a sand

aquifer where they are penetrated by a borehole. The spontaneous potential, measured in millivolts (mV), is a function of the chemical activities of the fluids in the borehole and the fluids in the adjacent formation, temperature, and the type and quantity of clay present.

Resistivity measures apparent resistivity which is resistance of a material to electric current. Resistivity was used in this project primarily to attempt to determine relative water quality zones in the zone intercepted by the borehole column.

Gamma logging was used primarily to identify stratigraphy by measuring gamma photon emissions. In water-bearing strata not contaminated by artificial radioisotopes, the most significant naturally-occurring, gamma-emitting isotopes are potassium-40 and daughter products of the uranium and thorium-decay series. Potassium is abundant in feldspar and mica that decompose to clay. Uranium and thorium can be concentrated in clay by the process of adsorption and ion exchange. Therefore, fine-grained detrital sediments that contain abundant clay are usually more radioactive than quartz sand.

The results of the geophysical logging indicated no significant anomalies in the SP and resistivity logs. **No zones of changes in water quality were identified.** At Well D-3, a small amplitude anomaly is seen from approximately 50 to 100 feet below grade in the SP log and also an inverted and generally corresponding anomaly is seen in the resistivity log. The cause of this anomaly is not known as it has been established that water quality changes are usually not involved in the vadose zone. In Well D-2, the thick trace of the resistivity log indicates electrical interference which may have been caused by the proximity to overhead electric power lines which exist in the

vicinity of this borehole. Surface interference has also rendered the upper 20 to 30 feet of the logs uninterpretable due to electric disturbances.

For the gamma logs, deflections could be reasonably correlated to the boring logs for identification of zones with higher clay content. Significant gamma deflections from the clay generally correlated with zones grouped as sand as opposed to sand and gravel which generally consist of larger-grained material. For example, at location D-4 the zone from 180 to 210 feet below grade was described generally as fine, silty sand and corresponds to large gamma deflections. Little or no correlation could be established between the gamma logs and the SP and resistivity logs.

To summarize, the geophysical logs did not indicate areas of discernible changes in water quality, possibly due to the lack of significant contamination in the groundwater and the homogeneous nature of the aquifer matrix. The gamma logs did indicate distinct zones of higher radioactivity which is likely to be due to areas of higher clay content. However, due to the presence of clay in till as well as silty units, it is difficult to distinguish units based solely on the geophysical logs. This was true even after confirmation of the geophysical log information with the boring logs where no measurable clay units or impermeable units were identified.

5.6 Summary of Geology

To summarize the geology, the vadose zone consists of low-permeability moraine deposits to the north and higher-permeability outwash deposits to the south. Within the saturated zone the hydraulic conductivity is significantly higher in the shallow saturated zone than in the deep saturated zone. No clay layers or

other significant geologic units were identified that would significantly alter flow within the saturated zone.

SECTION 6.0
SITE-SPECIFIC HYDROGEOLOGIC SETTING

This section will describe the site hydrogeology including horizontal flow direction and groundwater velocity estimates, hydraulic conductivity, vertical gradients, and a summary of the site-specific hydrogeology.

6.1 Horizontal Flow Direction and Velocity

Groundwater elevations were ascertained for the ten newly-installed wells at the Springs-Fireplace Landfill and contour maps were constructed. To improve the accuracy of the water level measurements, well plumbness measurements were performed for all wells. Wells that were found to deviate from plumb will indicate erroneously-greater depths to water. Therefore, for non-plumb wells, the average angle of deviation was calculated and a correction factor applied to the measurements (for a complete discussion of plumbness calculations and results see Appendix H).

For two selected sets of the groundwater elevation measurements, two maps for each set of measurements were constructed: one utilizing the shallow wells to represent local flow direction and one utilizing the deep wells to represent regional flow direction across the site. Local shallow flow is distinguished from deeper, more regional flow due to the possibility of groundwater mounding beneath the landfill due to increased recharge. Recharge is greater mainly as a result of reduced evapotranspiration due to the lack of vegetation within the landfill.

Head measurements were obtained on six occasions between January and April (see Table 6.1.1 for groundwater well head measurements). The average head measurement for all wells during a measuring event

TABLE 6.1.1
GROUNDWATER HEAD MEASUREMENTS

	1-11-91	2-11-91	2-27-91	3-21-91	4-3-91	4-4-91
S-1	8.96	9.02	8.99	9.10	9.17	9.19
S-2	8.96	9.00	8.97	9.05	9.12	9.15
S-3	8.67	8.64	8.58	8.76	8.80	8.85
S-4	8.95	9.04	9.04	9.14	9.21	9.22
S-5	8.57	8.56	8.47	8.63	8.69	8.73
S-6	8.97	9.02	8.99	9.07	9.13	9.16
Average	8.85	8.88	8.84	8.96	9.02	9.05

ranged from 8.85 feet (January 11, 1991) to 9.05 feet (April 4, 1991). In general, head has been rising from January to April with an increase of average head over this period of 0.20 feet.

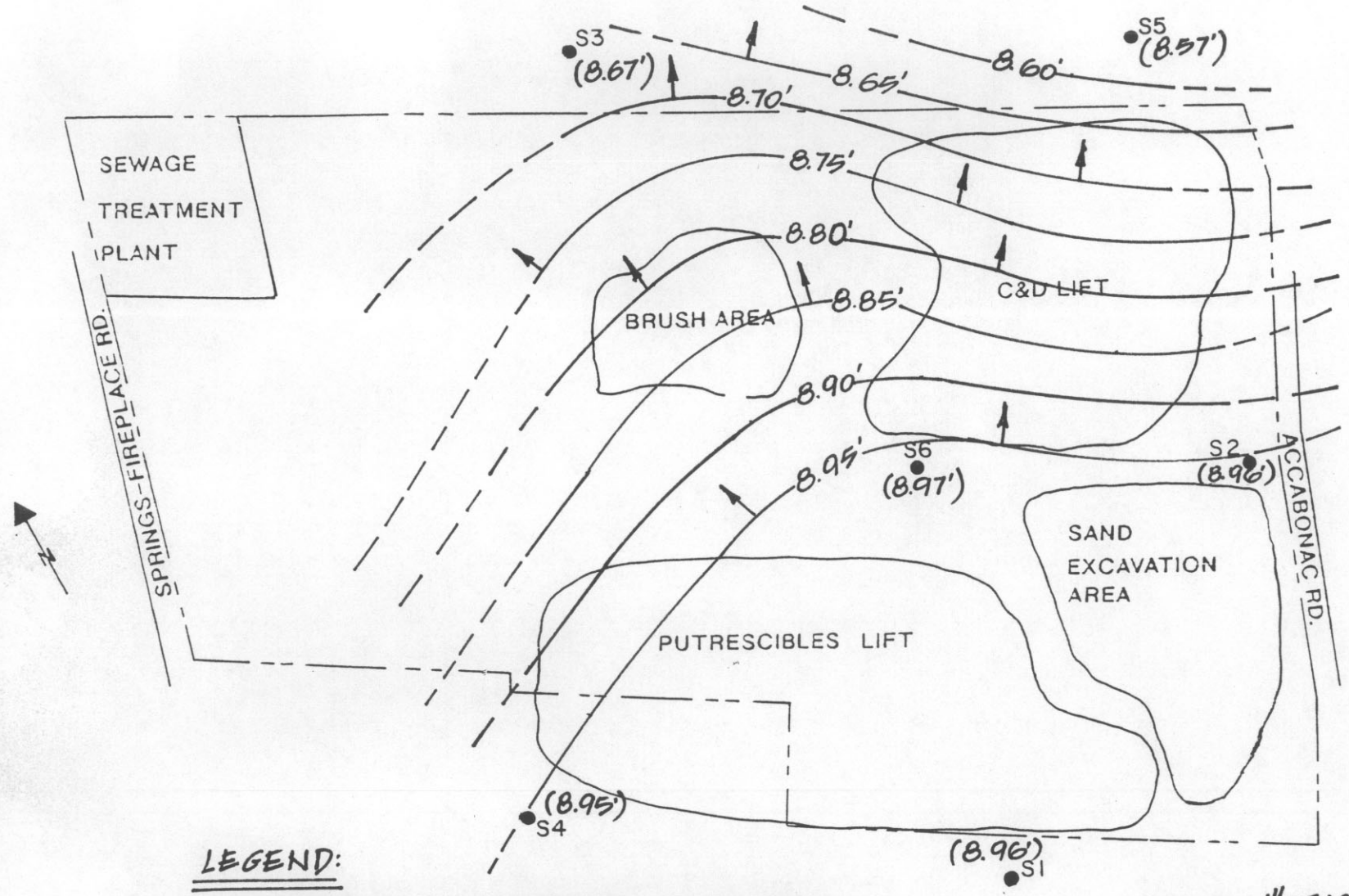
Groundwater contour maps are presented in Figures 6.1.1 and 6.1.2 for the shallow wells (representing January 11 and April 4, 1991) and Figures 6.1.3 and 6.1.4 for the deep wells (also representing January 11 and April 4, 1991). These figures indicate that for the shallow wells, the flow direction was generally north to northeast during both measurement events. For both shallow well maps, the gradient shows a steeper gradient at the north portion of the landfill and a relatively flat gradient at the southeast corner in the vicinity of the putrescibles lift and sand excavation area. This may be indicative of the zone of the regional groundwater divide near the southern border of the landfill or local shallow groundwater mounding beneath the landfill.

For the deep wells, the potentiometric surface measurements indicate flow in a northerly direction for both measurement periods. In addition, Figure 6.1.3 indicates that the groundwater divide may exist near the southern border of the landfill trending east-west during the January measurement. Shallow groundwater flow indicates northerly flow during both measurements.

Average groundwater gradient measurements were calculated in the dominant direction of groundwater flow in the deep and shallow wells (from location S-1/D-1 to S-3/D-3) with results as follows:

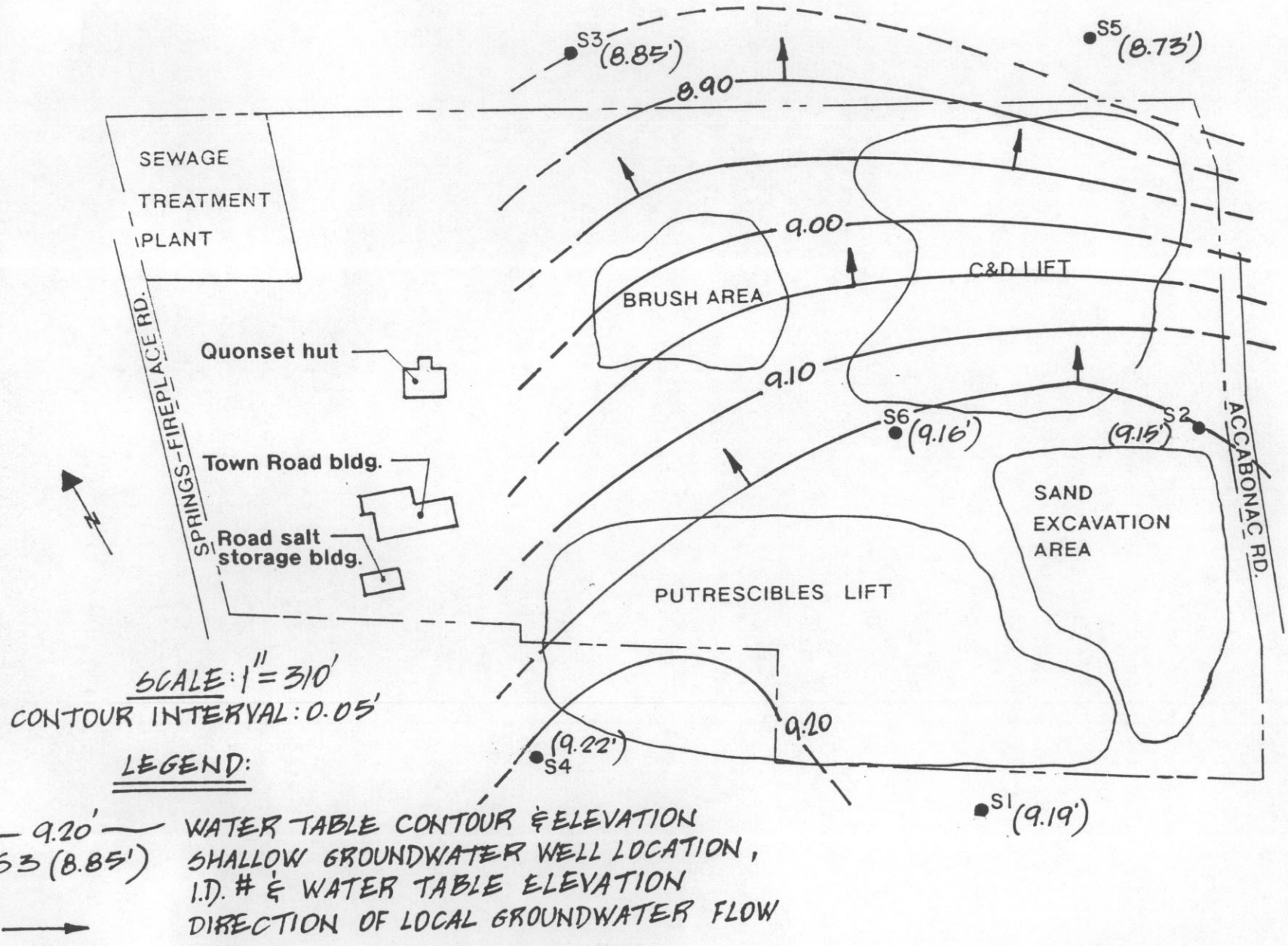
Measurement		Gradient
January 1991	(Shallow)	1.6×10^{-4}
April 1991	(Shallow)	1.8×10^{-4}
January 1991	(Deep)	1.1×10^{-4}
April 1991	(Deep)	1.2×10^{-4}

From these results, the average shallow gradient is 1.7×10^{-4}



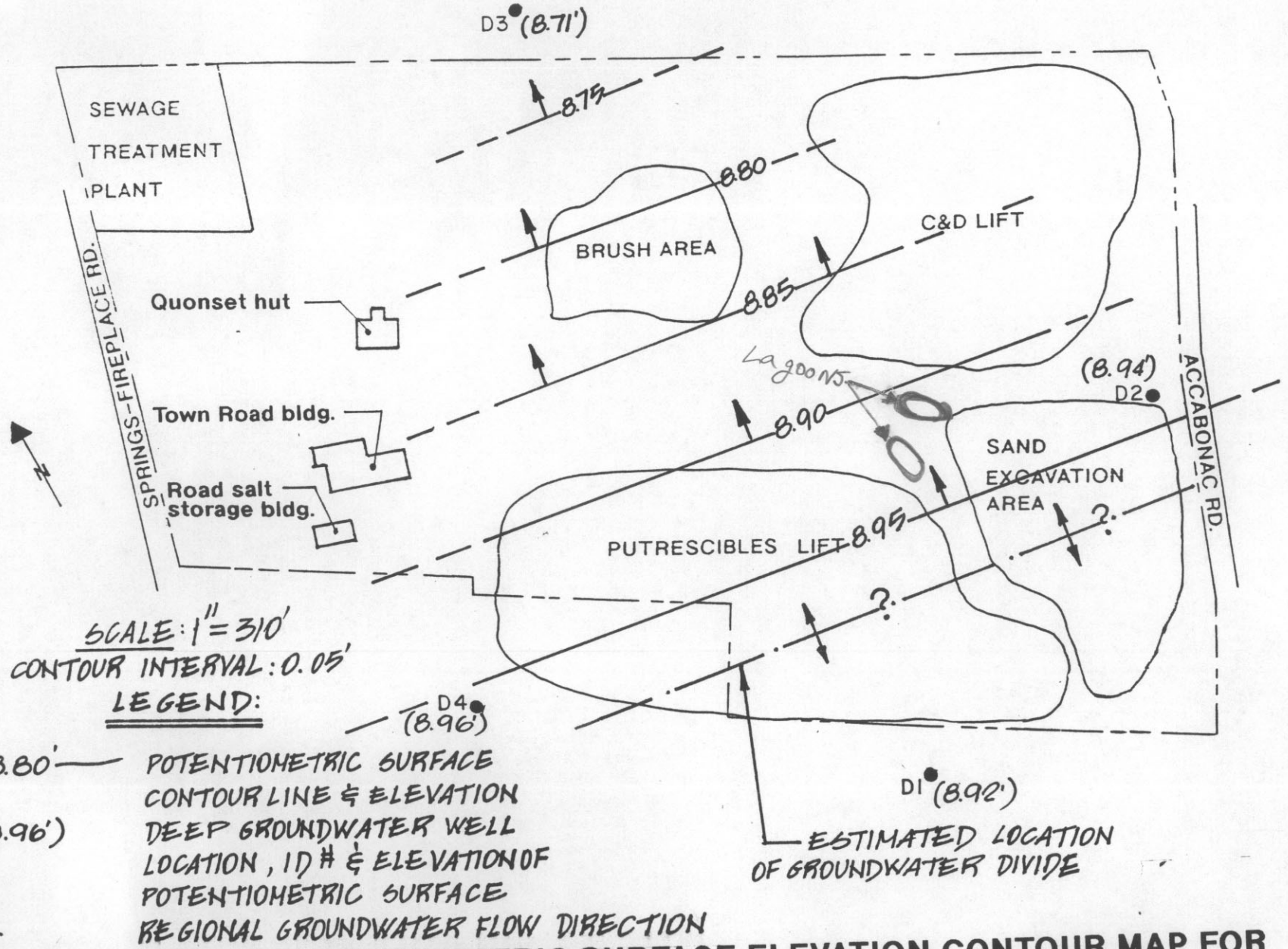
F,P&M

FIGURE 6.1.1–WATER TABLE ELEVATION CONTOUR MAP FOR SPRINGS–FIREPLACE ROAD LANDFILL SHALLOW WELLS (DATA FROM 1/11/91)



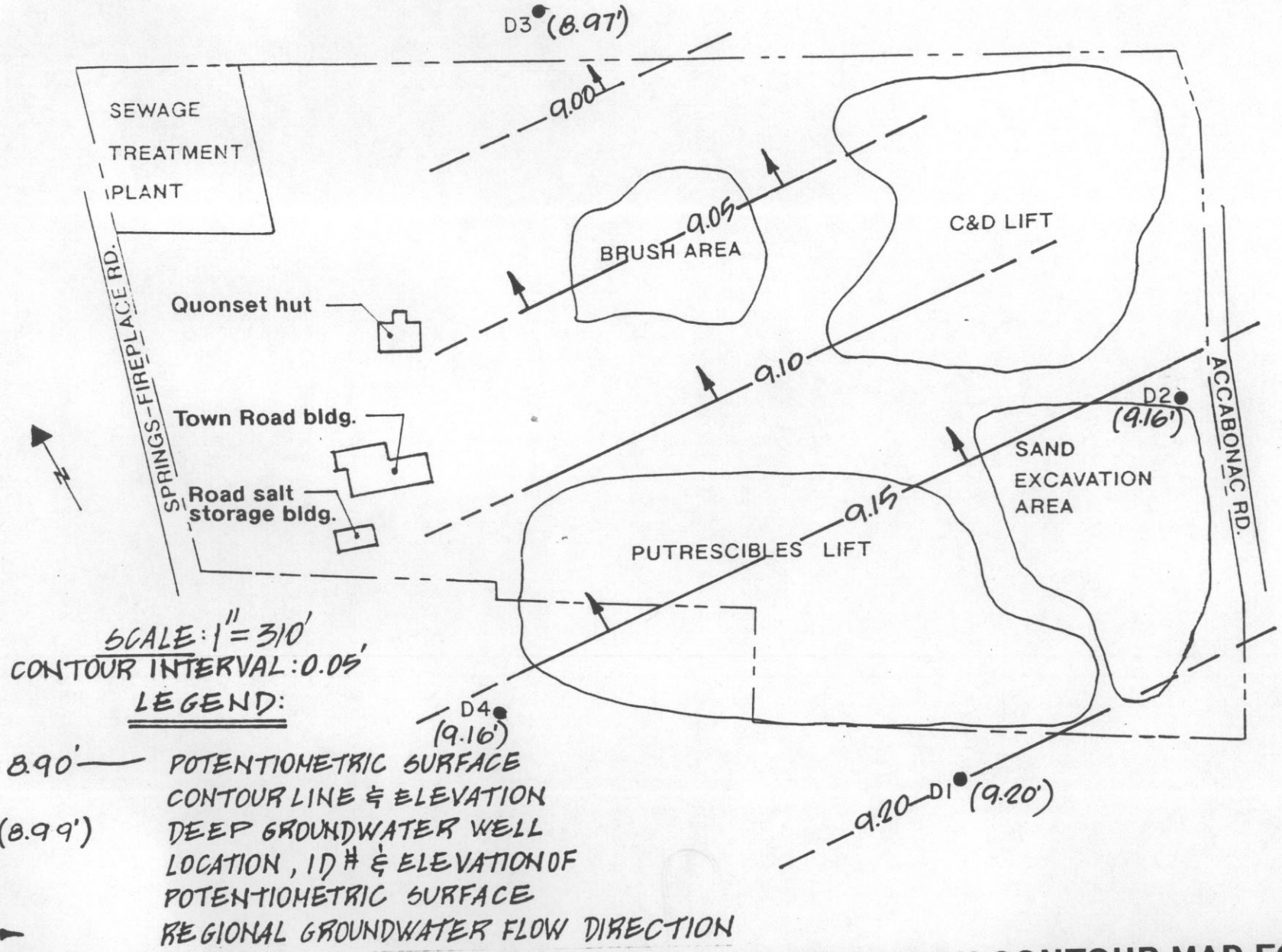
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FIGURE 6.1.2 – WATER TABLE ELEVATION CONTOUR MAP FOR SPRINGS–FIREPLACE SHALLOW WELLS (DATA FROM 4/4/91)



F,P&M

FIGURE 6.1.3–POTENTIOMETRIC SURFACE ELEVATION CONTOUR MAP FOR SPRINGS–FIREPLACE ROAD LANDFILL DEEP WELLS (DATA FROM 1/11/91)



F,P&M

FIGURE 6.1.4 -POTENTIOMETRIC SURFACE ELEVATION CONTOUR MAP FOR SPRINGS-FIREPLACE DEEP WELLS (DATA FROM 4/4/91)

and the average deep gradient is 1.2×10^{-4}.

Estimates were calculated for the average linear velocity of the groundwater by application of the following equation:

$$v = \frac{KI}{n_e}$$

Where:
- v = the average linear velocity
- K = the hydraulic conductivity
- I = the gradient
- n_e = the effective porosity

K values were obtained from slug test data which will be presented in the next subsection. Effective porosity estimates derived from Fetter (1980) were estimated to be 27 percent. The results are presented in Table 6.1.2 and show an average horizontal shallow linear velocity is 0.17 ft/day and the average horizontal deep linear velocity is 0.02 ft/day. The horizontal flow direction is estimated to have a hydraulic conductivity 10 times greater than in the vertical flow direction.

6.2 Hydraulic Conductivity Investigation

Hydraulic conductivity (K) estimates were obtained for the four paired-piezometer locations encompassing eight wells: S-1, D-1, S-2, D-2, S-3, D-3, S-4, and D-4. The K estimates were obtained by in-situ slug testing on each well. These K estimates compare well and are likely to be more accurate than the previously-presented Moretrench American Corporate (Moretrench) K estimates as the Moretrench method allowed for analysis only at the interval for which split-spoon samples were obtained. The slug test method provides values for the entire screened interval. The slug tests consisted of placing a decontaminated, five-foot section of 3.3-inch outside diameter PVC (water-filled and capped at both ends) with a volume of approximately 2.2 gallons which, in the four-inch (inside diameter) wells, produces

TABLE 6.1.2
AVERAGE LINEAR VELOCITY ESTIMATES
SPRINGS-FIREPLACE ROAD LANDFILL

Data From:	K (ft/day)	I	n_e (%)	v (ft/day)
January 1991 (Shallow)	275	1.6×10^{-4}	27	0.16
April 1991 (Shallow)	275	1.8×10^{-4}	27	0.18
January 1991 (Deep)	38	1.1×10^{-4}	27	0.02
April 1991 (Deep)	38	1.2×10^{-4}	27	0.02
Worst Case	513	1.8×10^{-4}	27	.34 ft/day

From Pg 45

$$V = \frac{KI}{n_e}$$

$$\frac{(513)(1.8 \times 10^{-4})}{27\%} = .34$$

a head change of approximately 3.3 feet. Measurements of head change were recorded with a Telog 2100 pressure transducer which records head (water level) changes at one-second intervals. The slug test was performed by placing the pressure transducer approximately ten feet below the water level in the well and establishing a static water level (to the nearest 0.03 feet) over a period of several minutes. The slug was then introduced into the well and the water level was allowed sufficient time to again achieve static level. Then, the slug was promptly removed and the rising head rate of recovery with respect to time was recorded. The results were graphed and K values were calculated using the Bouwer and Rice slug test method (Bouwer and Rice, 1976) (see Appendix I for slug test calculations). The K estimate results are presented in Table 6.2.1 and show that the K estimates range from 5.6 to 513 feet/day. At each paired piezometer location, the K estimate was higher for the shallow (S) wells. This indicates that hydraulic conductivity is higher near the water table than 100 feet below the water table.

To achieve a weighted average hydraulic conductivity value for the area encompassed by the four paired piezometer locations, Theissen polygons were constructed (see Figure 6.2.1 for Theissen polygon diagram). Calculated areas were assigned to each of the four resultant polygons and the hydraulic conductivity value for each shallow well was weighted based on the corresponding polygons' area contribution to the total area of the four polygons. The procedure was repeated for the deep wells (see Table 6.2.2 for results of the hydraulic conductivity weighted averaging). The results show that the weighted average K estimate is approximately 275 ft/day for the shallow zone and 38 ft/day for the deep zone.

TABLE 6.2.1
HYDRAULIC CONDUCTIVITY ESTIMATES*
OF PAIRED-PIEZOMETER WELLS
FROM SLUG TEST DATA
SPRING-FIREPLACE ROAD LANDFILL

Well Number	Slug Test Hydraulic Conductivity
S-1	131 ft/day
S-2	58 ft/day
S-3	396 ft/day
S-4	513 ft/day
D-1	15 ft/day
D-2	39 ft/day
D-3	94 ft/day
D-4	5.6 ft/day

* See Appendix I for data and calculations used to derive these estimates.

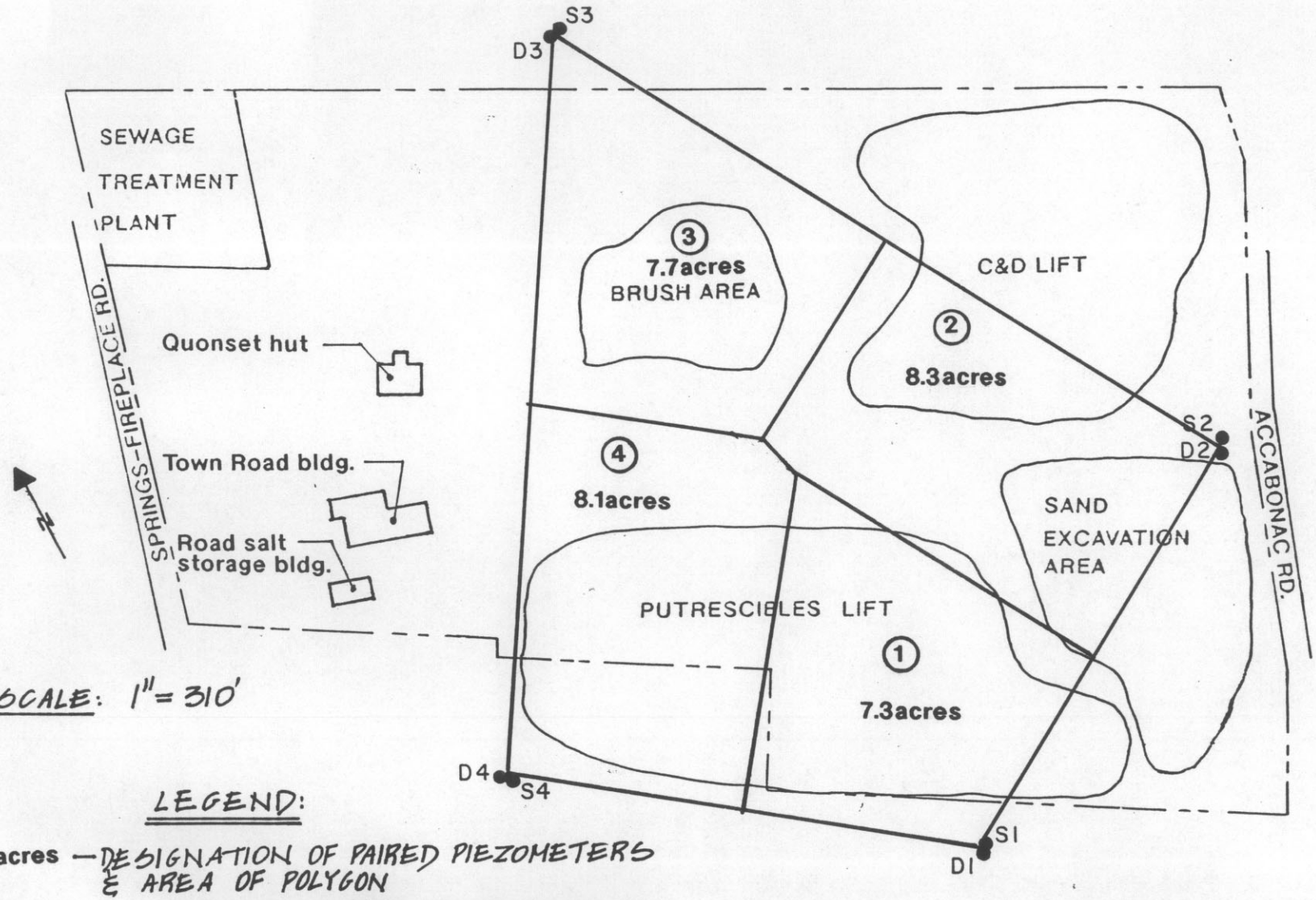


FIGURE 6.21–THEISSEN POLYGON DIAGRAM DEPICTING WEIGHTED AREAS FOR CALCULATION OF WEIGHTED AVG. HYDRAULIC CONDUCTIVITY OF THE AREA OF THE POLYGONS

F,P&M

TABLE 6.2.2
HYDRAULIC CONDUCTIVITY
WEIGHTED AVERAGE DATA
SPRINGS-FIREPLACE ROAD LANDFILL

SHALLOW WELLS

Well Number	Polygon area (acres)	Percent of Total Area	K Value (ft/day)	Weighted Contribution
S-1	7.3	23.2	131	30.4
S-2	8.3	26.4	58	15.3
S-3	7.7	24.5	396	97.0
S-4	8.1	25.8	513	132.4
Total	31.4	99.9	---	275

Weighted average shallow well K estimate: 275 ft/day

DEEP WELLS

D-1	7.3	23.2	15	3.5
D-2	8.3	26.4	39	10.3
D-3	7.7	24.5	94	23.0
D-4	8.1	25.8	5.6	1.4
Total	31.4	99.9	---	38

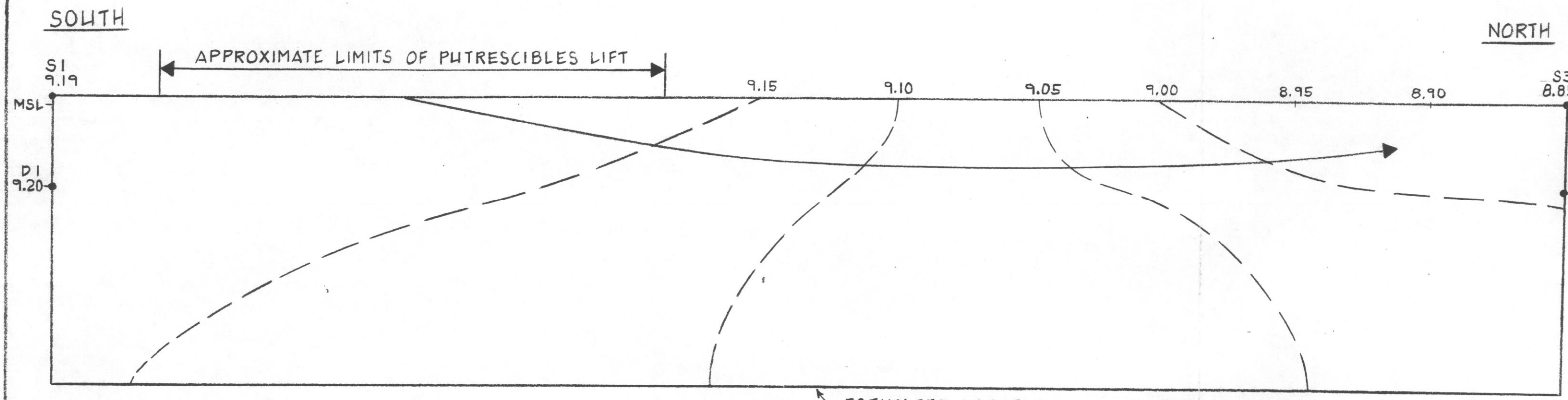
Weighted average shallow well K estimate: 38 ft/day

Previous published data for hydraulic conductivity of the Upper Glacial aquifer on the South Fork shows that 10 tested wells had a hydraulic conductivity range from 200 ft/day to 750 ft/day with an average of 350 ft/day (Nemickas and Koszalka (1982)). In another study, Fetter (1970) reported values of 43 to 435 ft/day with an average of 159 ft/day. These reports did not indicate the depths within the Upper Glacial Aquifer at which hydraulic conductivity was estimated. The results of the slug testing generally show agreement with the published values.

6.3 Equipotential Fields and Flowlines

To estimate the resultant groundwater flow direction beneath the Springs-Fireplace Road Landfill, an equipotential field diagram was constructed for the April 4, 1991 (most recent) data (see Figure 6.3.1). This diagram was constructed using head measurements and average hydraulic conductivity values from the paired piezometers. The wells chosen for the diagram were paired piezometers S-1/D-1 and S-3/D-3 as they are aligned in the direction parallel to the dominant deep and shallow flow direction (north). Information from the shallow and deep groundwater contour intervals (presented in the previous subsection) were used to locate interpolated equipotential lines. Flowlines were drawn to represent the estimated path of a water molecule through this area. This flowline was drawn by vectorization of vertical and horizontal flow velocities. The difference between K values in the shallow and deep zones required vertical flow to be mathematically treated as a two-layer system. For the April 4, 1991 equipotential field, the south side data shows an upward component of flow. Since the measurement accuracy is ±0.01 feet, this is likely to be a measurement inaccuracy as this area should have a downward or no

EQUIPOTENTIAL FIELD FOR APRIL 4, 1991 MEASUREMENTS



VERTICAL/HORIZONTAL SCALE: 1" = 125"

LEGEND:

9.15 – EQUIPOTENTIAL LINE & POTENTIAL HEAD VALVE

→ – FLOW LINE

S1 – SHALLOW WELL

D1 – DEEP WELL

NOTE: SEE PLATE 2.1.1 FOR WELL LOCATIONS

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ENGINEERS
RONKONKOMA NEW YORK

FIGURE 6.3.1 – EQUIPOTENTIAL FIELD AND FLOWLINES FOR DATA FROM APRIL 4, 1991

vertical component.

In the south portion of the landfill, groundwater has been measured to indicate a downward flow component and to the north, and upward component which correspond to recharge and discharge zones, respectively. The surface discharge area for groundwater traversing the Springs-Fireplace Landfill is Three-Mile Harbor based on the regional groundwater contour map (previously presented in Figure 4.2.1). Three-Mile Harbor has a horizontal groundwater flowline distance slightly more than one mile from the landfill.

SECTION 7.0
GROUNDWATER SAMPLING PROCEDURES AND RESULTS

7.1 Groundwater Sampling Procedures

All eleven groundwater wells were sampled in the period from January 7 through 10, 1991.

All wells were purged with a decontaminated submersible pump in accordance with NYSDEC approval. A minimum of three borehole volumes of water were removed from the well and contained in 55-gallon drums. Groundwater stability was established for pH, temperature, and specific conductance. Then, sampling took place by lowering a decontaminated teflon bailer with a dedicated polypropylene line. The bailer was acclimated to the well by discarding a bailerful of well water. Then, the subsequent bailer water was transferred to the sample bottles with minimum agitation. All sample bottles were appropriately labeled and placed in a cooler with ice packs to depress the temperature.

For Quality Assurance/Quality Control (QA/QC) two field blanks were prepared in the field during sampling activities on January 8 and 10, 1991. In addition, trip blanks accompanied the samples at all times. Samples S-1, D-1, S-4, D-4, Field Blank-1, and Trip Blank-1 were submitted to the laboratory on January 8, 1991. The January 10, 1991 submission was for samples D-3, S-3, S-5, S-6, GP-1, D-2, S-2, R-1 (sample R-1 is a duplicate sample from D-3 obtained for Quality Assurance/Quality Control (QA/QC) purposes), Field Blank-2, and Trip Blank-2. Results of the QA/QC sampling will be presented in Section 9.0.

All samples were delivered to H2M Labs, Inc. of Melville, New York (a NYSCLP laboratory) for analysis (see Appendix J for field

reports detailing sampling methodology and chain of custody reports).

7.2 Groundwater Sampling Results

Groundwater sampling results summaries of detected compounds are presented in Table 7.2.1 (inorganics) and Table 7.2.2 (organics) for the 11 groundwater wells (see Appendix K for Laboratory Reports). Tables 7.2.1 and 7.2.2 also present applicable NYS Class "GA" Standards for comparison to the groundwater results. "Bold Faced" results indicate contravention of GA Standards. NYS Class GA Standards consist of the following:

- Class GA Standards shall be the most stringent of 6NYCRR 703 Standards, 10 NYCRR Subpart 5-1, 40 CFR Part 141, and 10 NYCRR Part 170.
- If both (iron and manganese) are present, the total of both concentrations may not exceed 500 ug/l.
- Environmental Protection Agency National Primary Drinking Water Regulations (as of 7/17/89).
- Chapter 1 of Title 10 of the Official Compilation of Codes, Rules and Regulations of the State of New York, Part 5, Drinking Water Supplies, Subpart 5-1, Public Water Supplies (as of 11/28/88).
- Standards for raw water quality promulgated by the Commissioner of Health as found in 10 NYCRR Part 170. Sources of Water Supply (as of 1/90).
- Chapter 10 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York, Division of Water Resources, Article 2, Part 703.5 (a)(2) and (3), classes and quality standards for groundwaters.

TABLE 7.2.1
DETECTED COMPOUNDS FROM GROUNDWATER SAMPLES AT THE SPRINGS-FIREPLACE ROAD LANDFILL

Parameters		Date Sampled	1-7-91	1-10-91	1-9-91	1-8-91	1-9-91	1-9-91	1-7-91	1-10-91	1-9-91	1-8-91	1-9-91	
		Well #	S-1	S-2	S-3	S-4	S-5	S-6	D-1	D-2	D-3	D-4	GP-1	GA Standards
INORGANICS (units in parentheses)														
Aluminum	(mg/l)		1.2	0.74	1.8	1.6	2.9	1.9	1.3	16.9	11.5	0.62	1.2	NS
Boron	(mg/l)		ND	ND	ND	ND	ND	0.12	ND	ND	ND	ND	ND	NS
Cadmium	(ug/l)		8	ND	ND	ND	ND	ND	ND	ND	ND	ND	5	10
Calcium	(mg/l)		8.2	7.4	6.7	5.3	8.3	60.9	2.2	9.4	16.8	8.6	4.6	NS
Chloride	(mg/l)		11	26	10	540	10	20	10	17	13	**280**	11	250
Chromium	(mg/l)		ND	ND	0.02	ND	0.01	ND	ND	0.02	0.02	ND	ND	0.05
COD	(mg/l)		65	ND	ND	90	ND	25	ND	ND	20	90	25	NS
Color	(color units)		20	100	120	40	150	70	20	120	150	10	100	NS
Copper	(mg/l)		0.05	0.03	ND	ND	0.03	0.02	ND	0.02	0.03	ND	0.05	<0.2
Iron	(mg/l)		**3.1**	**3.8**	**6.8**	**12.8**	**8.4**	**8.1**	**0.86**	**15.2**	**10.0**	**0.37**	**2.1**	0.3
Hardness Total	(mg/l)		49.2	28.75	25.77	18.99	37.97	190.78	10.42	50.56	70.7	45.69	16.83	NS
Potassium	(mg/l)		2.0	0.60	1.1	1.8	1.1	11.6	0.70	1.8	2.6	2.9	1.1	NS
Magnesium	(mg/l)		7.0	2.5	2.2	1.4	4.2	9.4	1.2	6.6	7.0	5.9	1.3	NS
Manganese	(mg/l)		**29.7**	0.17	0.09	**1.9**	**7.0**	**35.4**	ND	0.27	**0.38**	0.05	0.19	0.3
Sodium	(mg/l)		8.5	9.1	9.2	**276**	8.2	11.4	**42.8**	**27.5**	**43.9**	**242**	6.5	<20
Ammonia (NH_3)	(mg/l)		1.5	ND	ND	0.41	0.52	1.1	ND	0.32	0.65	0.05	ND	<2.0
Nickel	(mg/l)		0.14	0.06	ND	ND	0.05	0.14	ND	ND	ND	ND	ND	NS
Nitrate (as N)	(mg/l)		ND	ND	ND	0.1	ND	ND	0.5	2.6	0.2	2.2	0.2	10
Lead	(ug/l)		6.3	6.1	8.7	8.1	10.7	8.7	ND	23.3	16.4	ND	8.2	25
pH	(pH units)		**5.8**	**6.4**	6.7	**5.4**	**6.0**	**6.2**	**9.1**	8.3	6.8	7.1	6.8	6.5-8.5
Total Phenols	(ug/l)		**4.0**	ND	ND	**4.2**	ND	ND	**3.7**	**1.5**	ND	**1.7**	**4.5**	1
Silver	(mg/l)		ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	0.05
Sulfate	(mg/l)		32	ND	9	27	ND	126	24	14.5	20	45	5.5	250
Total Alkalinity	(mg/l)		90.2	38.5	25.1	37.2	54.7	174.0	70.5	40.1	114.0	201	18.3	NS
Total Dissolved Solids	(mg/l)		178	102	74	**956**	88	**411**	151	168	281	**774**	61	500
Total Kjeldahl Nitrogen	(mg/l)		2.5	0.2	0.8	5.2	1.4	3.0	0.08	1.4	1.0	0.9	1.0	NS
Total Organic Carbon	(mg/l)		12.5	2.5	1.6	4.8	3.0	25.5	2.2	2.5	4.1	3.3	3.6	NS
Turbidity	(turbidity units)		8.0	18	15	10	6.0	10	10	100	100	2.5	10	NS
Zinc	(mg/l)		0.15	0.13	0.16	0.06	0.19	0.17	0.06	0.13	0.51	0.09	0.11	<0.8
Iron Plus Manganese	(mg/l)		**32.8**	**3.97**	**6.89**	**14.7**	**15.4**	**43.5**	**0.86**	**15.47**	**10.38**	0.42	**2.29**	0.5

ND = Not Detected
NT = Not Tested
NS = No GA Standard Exists

Note: "Bold Faced" results indicate contravention of NYS "GA" Standards

TABLE 7.2.2
DETECTED COMPOUNDS FROM GROUNDWATER SAMPLES AT THE SPRINGS-FIREPLACE LANDFILL

	S-1	S-2	S-3	S-4	S-5	S-6	D-1	D-2	D-3	D-4	GP-1	NYS Class "GA" Standard
Target Compound UST Volatile Organic Compunds (all results in ug/l)												
Chlorobenzene	**8**	ND	ND	ND	ND	**20**	ND	ND	ND	ND	ND	5
Acetone	ND	ND	**96**	ND	ND	ND	ND	ND	ND	ND	ND	50
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	ND	**110**	ND	ND	5
Total TCL VOCs	8		96			20			110			
Target Compound List Semi-Volatile Organic Compounds (all results in ug/l)												
Total TCL Semi-Volatile Organics	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Target Compound List Herbicides (all results in ug/l)												
Total TCL Herbicides	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Target Compound List Pesticides (all results in (ug/l)												
Total TCL Pesticides	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Target Compound List Polychlorinated Biphenyls (PCBs)												
Total TCL PCBs	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

ND = Not detected
NT = Not tested

Note: "Bold Faced" results indicate contravention of NYS "GA" Standards

SECTION 8.0
INTERPRETATION OF GROUNDWATER RESULTS

The results of the groundwater sampling of the 11 wells were presented in the previous section. These results will be interpreted by comparison to applicable NYSDEC "Class GA" groundwater standards, and investigations of chemical contributions from the putrescible and C&D areas, leachate rings, and septage lagoons. It should be noted that data analysis focused on inorganic parameters, due to the paucity of volatile organic compounds detected and no detections of semi-volatile organic compounds, pesticides, herbicides, or polychlorinated biphenyls (PCBs).

8.1 Upgradient Groundwater Quality

I disagree Both are too close

The upgradient water quality is represented by paired piezometers S1/D1 and S4/D4 which are located south of the putrescibles lift and upgradient of the groundwater flow direction throughout most of the landfill. However, as the landfill is located near the regional groundwater divide and local groundwater flow direction determinations indicate the possibility that the divide may exist near the south border of the landfill.

8.2 Comparison of Groundwater Results to Groundwater Standards

The groundwater results presented in the last section were compared to NYS Class GA Standards for groundwater. The inorganic results show contravention of standards for iron (11 of 11 samples), iron plus manganese (10 of 11 samples), pH (6 of 11 samples), phenols (6 of 11 samples), manganese (5 of 11 samples), sodium (5 of 11 samples), chloride (2 of 11 samples), and total dissolved solids (1 of 11 samples).

The chloride standard contravention both occurred at paired

piezometer location S-4/D-4. These high levels have been determined to be the result of road salt-laden runoff (from previous road salt outdoor stockpiles) from the Town Road Department property. This condition was observed at the site during rain events through evidence of a drainage swale along the west side of the foot of the putrescibles lift. This runoff has been noted by Fanning, Phillips and Molnar personnel to accumulate in the vicinity of the S-4/D-4 wells.

Iron, manganese, and the sum of iron plus manganese concentrations comprise 26 of the 47 GA Standard contravention (55 percent). Iron and manganese occur at naturally-high concentrations in groundwater on Long Island. It should be noted that standards for iron and manganese are "secondary" standards, that is, they are based on aesthetically - based rather than health-based criteria.

Sodium, of its five contraventions of standards, show two locations with significantly higher concentrations. These occur again as S-4/D-4 and are believed to also be associated with the road salt-laden runoff. This is also the case for total dissolved solids for which the only two contraventions of standards occur at S-4/D-4. Total dissolved solids concentrations are, in large part, a function of the concentrations of chloride and sodium ions.

Contraventions of standards for pH ranged from a low of 5.4 to a high of 9.1. Again, no upgradient conditions are thought to exist in the vicinity of the site to compare ambient pH to pH within the landfill groundwater.

Phenols were detected above standards in six samples with a peak concentration of 4.5 ug/l which occurred at Well GP-1 on the east side of the landfill. However, phenols were also detected in one of the

field blanks at 4.8 ug/l which is higher than any concentrations detected in the groundwater. This suggests the possibility that a laboratory error may have occurred.

Excluding the contraventions, which are believed to emanate from non-landfill-associated activities (chloride, two of the sodium contraventions, and total dissolved solids), and the secondary standards contraventions (iron, manganese, iron plus manganese, pH, total dissolved solids and sodium), the health-based contraventions which related to landfilling activities are phenols (6 of 11 samples). Again, the phenols results may be subject to laboratory error.

8.3 Organic Constituents

Three volatile organic compounds were detected in the groundwater samples. These compounds, chlorobenzene, acetone, and tetrachloroethene, were detected at concentrations ranging from 8 to 110 ug/l. Chlorobenzene was detected in two wells: S-1 and S-6 where the other two compounds were detected in one well only. The detected organic compounds are distributed in a corridor parallel to the direction of flow (north) and includes Wells S-1, S-6, and piezometer pair S-3/D-3. The concentrations of these contaminants are minor. Of the 34 volatile organic compounds tested, only three were detected and all were above NYS "GA" Standards with a maximum concentration of 110 ug/l. No other organic compounds were detected including semi-volatile organics, herbicides, pesticides, or PCBs.

8.4 Investigation of Potential Impacts from the C&D Area

To assess possible groundwater impacts from the C&D area, Wells S-6 (which is upgradient of the C&D area) and S-5 (which is downgradient of the C&D area) were compared to determine if known constituents were detected at greater concentrations downgradient than

upgradient. The results show that downgradient concentrations of inorganic constituents were not significantly higher than upgradient and no correlation could be made between the C&D area and downgradient groundwater quality. In addition, no volatile organics were detected in the downgradient well.

8.5 Investigation of Potential Impacts from the Septage Lagoons

To investigate potential groundwater impacts from the septage lagoons, mean concentrations from Fanning, Phillips and Molnar's two sampling efforts are presented in Table 8.5.1. In addition, downgradient Well S-6 results are also presented for comparison.

The results indicate that for the comparable 34 inorganic and organic parameters detected in the sludge, 12 of these parameters were detected in the downgradient well. Only one organic parameter, chlorobenzene, was detected in the downgradient well where 16 volatile and semi-volatile organics were detected in the sludge. In addition, since chlorobenzene was also detected in Well S-1, to the south of the putrescibles area, the source of the chlorobenzene may not be the septage lagoons.

In summary, no correlation could be made between the chemical constituents of the septage and the downgradient groundwater. No evidence exists that the chemical constituents of the septage lagoons have migrated to the groundwater. Precipitation does not readily infiltrate through the sludge as evidenced by the approximately five feet of water overlying the sludge which attests to the low permeability of the sludge. Also, the highly-organic nature of the sludge enhances the binding and immobility of the chemical constituents of the sludge.

TABLE 8.5.1
SEPTAGE LAGOON COMPARISON
TO DOWNGRADIENT GROUNDWATER RESULTS

	June, 1989		Oct, 1990		Septage Lagoon	(Groundwater)
	North	South	North	South	Mean	S-6 (mg/l)
Metals (mg/kg)						
Barium	262	498	ND	640	350	ND
Arsenic	2.60	6.70	ND	ND	2.3	ND
Aluminum	7120	6650	7110	10500	7845	1.9
Cadmium	3.60	10.8	1.4	8.7	6.1	ND
Calcium	5020	7350	784	9160	5579	60.9
Chromium	26.2	44.0	11.2	50.9	33.1	ND
Copper	1020	1550	78	1890	1135	0.02
Iron	8640	9170	7420	12140	9343	8.1
Potassium	224	214	476	618	383	11.6
Magnesium	833	1050	756	1530	1042	9.4
Manganese	64.3	61.5	101	101.8	82	35.4
Sodium	1740	2370	204	691	1251	11.4
Lead	146	484	18.5	798	362	0.0087
Silver	21.4	26.4	ND	29.1	19.4	ND
Zinc	1210	1880	115	2470	1419	0.17
Mercury	2.90	420	0.33	2.1	106	ND
Nickel	19.0	26.4	ND	36.4	20.5	0.14
Selenium	1.40	2.90	ND	4.2	2.1	ND
VOCs (ug/kg)	North(avg)	South(avg)	North	South		ug/l
Toluene	6267	3000	210	2200	2919	ND
Chlorobenzene	4040	ND	1200	410	1413	20
Acetone	1720	1650	940	23000	6828	ND
Xylenes	475	12550	63	6400	4872	ND
Carbon Disulfide	570	1000	ND	650	555	ND
Ethylbenzene	ND	2500	ND	1200	1850	ND
2-Butanone(MEK)	ND	ND	200	6600	1700	ND
Methylene Chloride	ND	ND	ND	51	13	ND
Trichloroethene	ND	ND	ND	54	13.5	ND
Benzene	ND	ND	ND	67	16.8	ND
Semi-Volatiles (ug/kg)						
4-Chloroaniline	3000	9800	ND	ND	3200	ND
2-Methylnaphthalene	ND	6200	ND	4600	2700	ND
1,2-Dichlorobenzene	6850	33667	2100	2500	11279	ND
1,3-Dichlorobenzene	2335	5617	ND	ND	1988	ND
1,4-Dichlorobenzene	4885	9733	ND	ND	3655	ND
Bis(2Ethylhexyl)Phthalate	ND	ND	760	2700	865	ND

8.6 Investigation of Potential Impacts from the Leachate Collection Wells

Comparisons were made between the mean leachate concentrations in L-2 and the downgradient groundwater wells to determine if a correlation exists between the leachate and the groundwater. Wells chosen for comparison include S-1 and S-6. These comparisons are presented in Table 8.6.1 and show that for the 28 parameters used in the comparison (pH was not used in this comparison), 20 of the parameters were detected in the downgradient wells at concentrations lower than in the leachate. This is expected as the leachate enters the groundwater it will be diluted, dispersed and, therefore, attenuated. Two parameters detected in the leachate were not detected downgradient. Five parameters were detected in the downgradient wells at concentrations greater than in the leachate wells or were not detected in the leachate wells. These five parameters were all metals (Cadmium, Copper, Manganese, Nickel, and Zinc).

For the organic compounds, chloroethane was detected in the leachate on one of the two sampling occasions. Chlorobenzene was detected in both up and downgradient wells of the landfill.

To summarize, there appears to be little impact of inorganic parameters in the leachate on downgradient Wells S-6 and S-1. For the organic parameters, no impact was found.

In addition, since the leachate wells are not collecting significant amounts of leachate, pumping of the leachate for disposal is not feasible at this time. Why not?

8.7 Summary of Groundwater Quality

Comparison of results to "GA" standards indicate that contraventions occurred for chloride, iron, manganese, sodium, pH, phenols, total dissolved solids, iron plus manganese, chlorobenzene,

TABLE 8.6.1
COMPARISON OF LEACHATE SAMPLE
RESULTS TO DOWNGRADIENT GROUNDWATER RESULTS

	L-2 Jan, 1990	L-2 July, 1990	Leachate Mean	S-6 Jan, 1991	S-1 Jan, 1991
Aluminum (mg/l)	2.40	1.7	2.1	1.9	1.2
Arsenic (ug/l)	10.0	ND	5.0	ND	ND
Boron (mg/l)	2.7	1.7	2.2	0.12	ND
Cadmium (ug/l)	ND	ND	ND	ND	8
Calcium (mg/l)	72.8	122	97.4	60.9	8.2
Chloride (mg/l)	380	248	314	20	11
Chromium (mg/l)	0.02	0.01	0.02	ND	ND
COD (mg/l)	370	420	395	25	65
Color (color units)	90	100	95	70	20
Copper (mg/l)	ND	ND	ND	0.02	0.05
Cyanide (ug/l)	30.0	ND	15.0	ND	ND
Iron (mg/l)	10.9	11.1	11.0	8.1	3.1
Hardness (total) (mg/l)	439	478.42	459	190.78	49.2
Potassium (mg/l)	260	163	212	11.6	2.0
Magnesium (mg/l)	62.7	42.3	52.5	9.4	7.0
Manganese (mg/l)	0.37	0.77	0.57	35.4	29.7
Sodium (mg/l)	360	217	289	11.4	8.5
Ammonia (NH_3) (mg/l)	192	198	195	1.1	1.5
Nickel (mg/l)	ND	0.06	0.03	0.14	0.14
Nitrate (asN) (mg/l)	12.5	8.8	10.7	ND	ND
Lead (ug/l)	7.00	8.5	7.8	8.7	6.3
pH (pH units)	8.00	NT	8.00	6.2	5.8
Total Phenols (ug/l)	8.00	7.0	7.5	ND	4.0
Silver (mg/l)	ND	ND	ND	ND	ND
Sulfate (mg/l)	90	104	97	126	32
Total Alkalinity (mg/l)	1600	1500	1550	174	90.2
Total Dissolved Solids (mg/l)	2030	1725	1878	411	178
Total Kjeldahl Nitrogen (mg/l)	208	324	266	3.0	2.5
Total Organic Carbon (mg/l)	289	54.3	172	25.5	12.5
Turbidity (units)	32	2	17	10	8.0
Zinc (mg/l)	0.06	0.04	0.05	0.17	0.15
VOCs (ug/l)					
Chloroethane	ND	12	6	ND	ND
Chlorobenzene	ND	ND	ND	20	8

ND - Not Detected
NT - Not Tested

acetone, and tetrachloroethene. However, many of these parameters exceeded secondary standards (non-health-based). The paired piezometers at location S-4/D-4 indicate probable impacts for chlorides, sodium, and total dissolved solids due to road salt-laden runoff emanating from the Town Road Department property.

The results of the leachate collection well sampling indicate little correlation between inorganic parameters in the leachate and downgradient groundwater. No correlation between organic compounds was found. For the septage lagoons, no clear evidence was found to indicate that the septage lagoons were impacting groundwater despite the concentrations of chemical constituents within the sludge. This may be due to the highly organic nature and very low permeability of the sludge.

SECTION 9.0
QUALITY ASSURANCE/QUALITY CONTROL

This section will present the results of the Quality Assurance/Quality Control (QA/QC) samples as well as detail the decontamination procedures used during the drilling of the wells and the sampling of the wells.

9.1 QA/QC Sample Results and Interpretation

QA/QC samples were obtained to provide evidence of the validity of the groundwater samples. The QA/QC results are presented in Table 9.1.1 for inorganic parameters and 9.1.2 for all other parameters. Sample results including a duplicate sample (and results of the duplicate well sample for comparison), a sample of the drilling mud, two field blanks, and two trip blanks were analyzed.

The duplicate sample, R-1 (a duplicate of D-2) was obtained to determine variation of laboratory analyses. Variation was determined by finding the difference of the reported concentrations and dividing by the D-2 concentration. The result was multiplied by 100 to achieve variation values in percent. The average variation for all parameters was calculated to be 9.1 percent (two parameter variations could not be calculated as D-2 results were non-detected which would entail division by zero). Therefore, the results of the duplicate sample indicated an acceptable correlation with the sample from Well D-2.

A drilling mud sample was obtained at location D-3 prior to drilling. The results of the drilling mud analysis were compared to the results of the deep wells. This mud sample was obtained at the D-3 drilling location after the mud was mixed in the plastic-lined pit but prior to the commencement of drilling.

The results show that no organic compound detected in the

TABLE 9.1.1
DETECTED COMPOUNDS FROM QA/QC SAMPLES AT THE SPRINGS-FIREPLACE LANDFILL

	Date Sampled	1-9-91	11-26-90	1-8-91	1-10-91	1-8-91	1-10-91
Parameters	Well #	(Duplicate of D-2) R-1	DRILLING MUD AT D-3	FIELD BLANK-1	FIELD BLANK-2	TRIP BLANK-1	TRIP BLANK-2
INORGANICS (units in parentheses)							
Arsenic	(ug/l)	ND	121	ND	ND	NT	NT
Aluminum	(mg/l)	17.9	62.7	ND	ND	NT	NT
Barium	(mg/l)	ND	1.0	ND	ND	NT	NT
Beryllium	(ug/l)	ND	17	ND	ND	NT	NT
Boron	(mg/l)	ND	ND	ND	ND	NT	NT
Cadmium	(ug/l)	ND	13	ND	ND	NT	NT
Calcium	(mg/l)	9.9	93.2	ND	0.24	NT	NT
Chloride	(mg/l)	12	260	ND	ND	NT	NT
Chromium	(mg/l)	0.02	0.01	ND	ND	NT	NT
COD	(mg/l)	ND	80	ND	35	NT	NT
Color	(color units)	150	NT	ND	ND	NT	NT
Copper	(mg/l)	0.03	0.04	ND	ND	NT	NT
Iron	(mg/l)	13.9	95.2	ND	0.06	NT	NT
Hardness Total	(mg/l)	50.58	367.48	ND	0.6	NT	NT
Potassium	(mg/l)	1.9	9.2	ND	ND	NT	NT
Magnesium	(mg/l)	6.3	32.8	ND	ND	NT	NT
Manganese	(mg/l)	0.24	3.8	ND	ND	NT	NT
Mercury	(ug/l)	ND	2.0	ND	ND	NT	NT
Sodium	(mg/l)	25.7	152	0.23	0.74	NT	NT
Ammonia(NH_3)	(mg/l)	0.21	11.2	ND	ND	NT	NT
Nickel	(mg/l)	0.06	0.07	ND	ND	NT	NT
Nitrate(asN)	(mg/l)	2.5	18.0	ND	ND	NT	NT
Lead	(ug/l)	22.1	458	ND	ND	NT	NT
pH	(pH units)	8.1	NT	5.0	6.3	NT	NT
Total Phenols	(ug/l)	ND	30	4.8	ND	NT	NT
Silver	(mg/l)	ND	ND	ND	ND	NT	NT
Sulfate	(mg/l)	17.5	380	ND	ND	NT	NT
Total Alkalinity	(mg/l)	39.2	740	2.1	2.3	NT	NT
Total Dissolved Solids	(mg/l)	135	7358	ND	ND	NT	NT
Total Kjelkahl Nitrogen	(mg/l)	1.1	12.0	ND	ND	NT	NT
Total Organic Carbon	(mg/l)	1.7	56.0	ND	ND	NT	NT
Turbioity	(turbidity units)	80	NT	ND	ND	NT	NT
Zinc	(mg/l)	0.15	0.79	ND	0.03	NT	NT

ND = Not detected
NT = Not tested

TABLE 9.1.2
DETECTED COMPOUNDS FROM QA/QC SAMPLES AT THE SPRINGS-FIREPLACE LANDFILL

	MUD SAMPLE				
	R-1	D-3	FB-1	FB-2	TB-1	TB-2
Target Compound List Volatile Organic Compunds (all results in ug/l)						
Chlorobenzene	ND	ND	ND	ND	ND	ND
Acetone	ND	140	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND	ND
Total TCL VOCs	ND	140	ND	ND	ND	ND
Target Compound List Semi-Volatile Organic Compounds (all results in ug/l)						
Total TCL Semi-Volatile Organics	ND	ND	ND	ND	NT	NT
Target Compound List Herbicides (all results in ug/l)						
Total TCL Herbicides	ND	NT	ND	ND	NT	NT
Target Compound List Pesticides (all results in (ug/l)						
Total TCL Pesticides	ND	ND	ND	ND	NT	NT
Target Compound List Polychlorinated Biphenyls (PCBs)						
Total TCL PCBs	ND	ND	ND	ND	NT	NT

ND = Not detected
NT = Not tested

drilling mud was detected in the groundwater at any location where drilling mud was used. In addition, there was no correlation between deep well groundwater results and drilling mud constituents as the groundwater results were significantly lower (than the drilling mud concentrations) or not detected. Also, no significant difference exists between the results of the shallow wells (drilled without mud and the deep wells that would indicate results altered by the drilling mud).

The field blank results indicated minor detections of some compounds with one significant detection; phenols were detected at 4.8 ug/l in Field Blank -1 (1-8-91) which is a higher concentration than detections in any of the groundwater samples. This appears to be an anomalous result and may indicate a lab error.

No volatile organic compounds were detected in either of the two trip blanks which accompanied the samples during field activities and transport to the lab.

9.2 Decontamination Procedures During Drilling

All augers, drill rods, split-spoons, and any downhole equipment utilized during the drilling process were contaminated by steam cleaning.

9.3 Decontamination Procedures During Sampling

During groundwater sampling of the 11 monitoring wells, the teflon bailers used for sampling were decontaminated prior to use at each location by fully disassembling the teflon bailer and scrubbing all components in a bath of potable water and liquinox. The bailer components were then rinsed with potable water and sprayed with methanol followed by hexane. Finally, the bailer components were rinsed with distilled water. A dedicated polyethylene line was

attached to the bailer and the bailer was handled with dedicated, disposable surgical gloves.

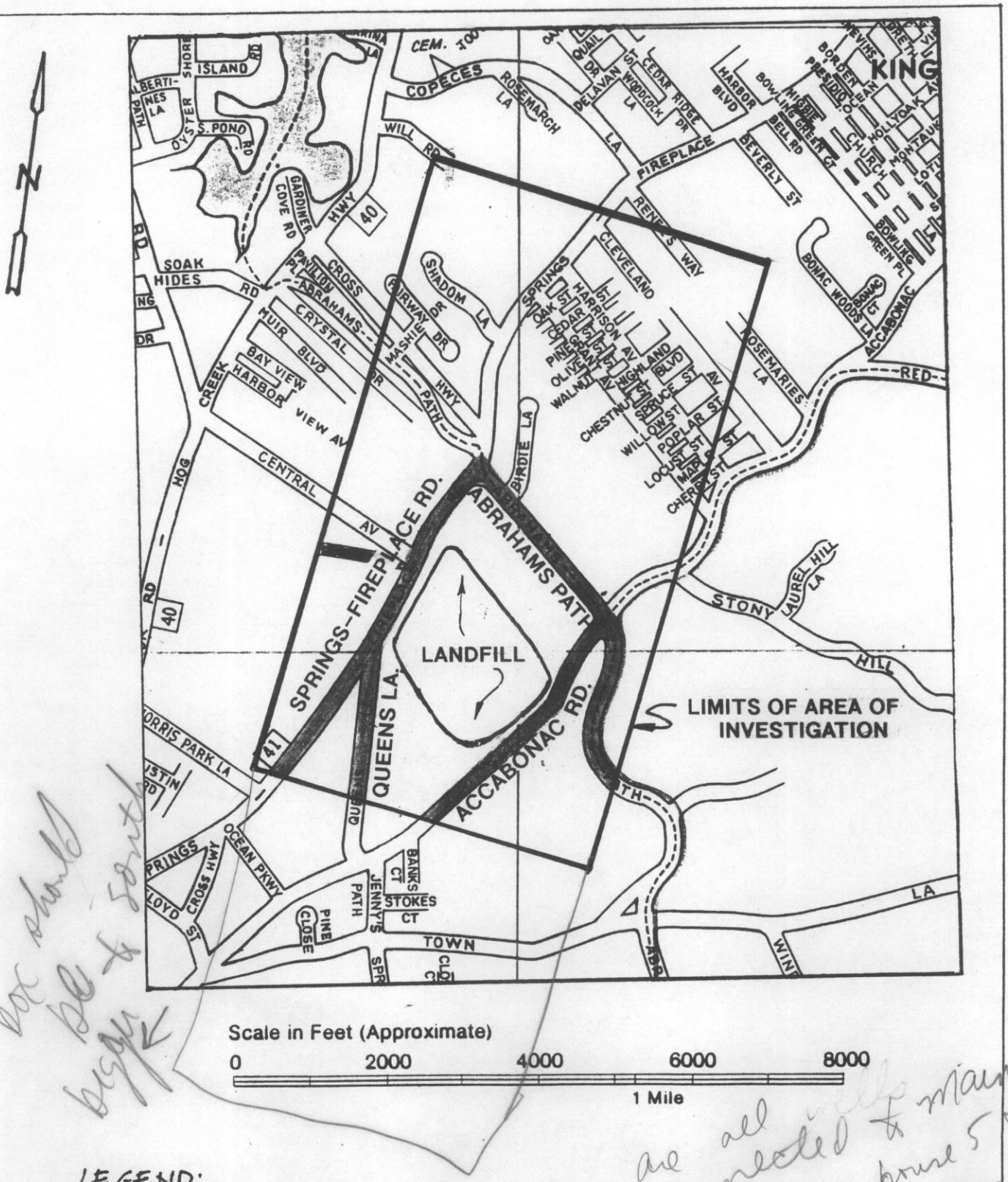
SECTION 10.0
POTENTIAL RECEPTOR INVESTIGATION

Based on the results of the groundwater sampling and the hydrogeologic setting, a potential receptor survey was performed to determine if potentially landfill-impacted groundwater was being utilized for potable purposes.

To achieve this, an investigation was performed in the vicinity of the landfill to identify which residents have private wells and which residents receive public water (from the SCWA). In addition, water quality results for private well users were obtained from the SCDHS.

To identify public water users, the SCWA was contacted. The SCWA provided maps and information concerning the location of public supply mains. This information is presented in Figure 10.1 for the area surrounding the landfill within one mile downgradient. Since groundwater flow is to the north for most of the landfill, one-quarter mile was extended upgradient of the landfill. To the east and west a one-quarter mile distance was encompassed to define the limits of the area of investigation. Within this area, all roads south of Abrahams Path, contain SCWA public supply mains (Central Avenue, to the west of the landfill, has a SCWA main adjacent to the road). In the areas were public water is available, not all residents have elected to hook-up to the mains. Appendix L shows a list of addresses, obtained from the SCWA, which indicates residents receiving SCWA public water. All other residents for the streets listed are assumed to be using private wells.

The nearest SCWA public supply well to the landfill is the Springs-Close Highway wellfield which is located approximately one



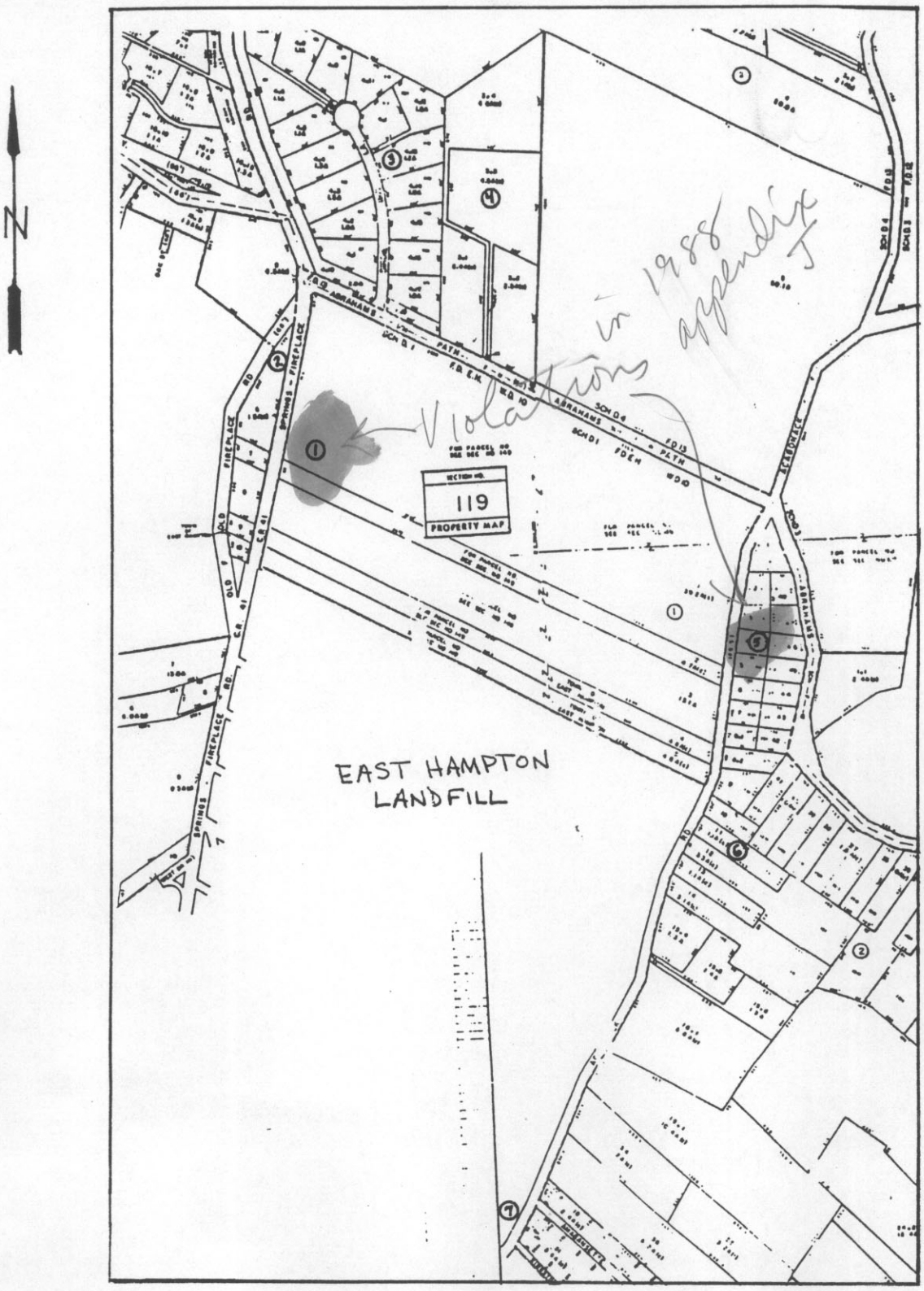
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FIGURE 10.1–PUBLIC WATER SUPPLY INVESTIGATION AREA FOR THE SPRINGS–FIREPLACE ROAD LANDFILL

mile south of the landfill. Two wells exists in this well field with rated pumping capacities of 1000 and 750 gallons per minute. Analysis results from the SCDHS for organic compounds showed that between the years 1978 and 1987 (the range of years for which data was available) no organic compounds were detected in either well at the Spring-Close Highway well field. → 1991?

South of the landfill, between Queens Lane and Accabonac Road, a new residential development is under construction at the time of this writing. Information obtained from the East Hampton Planning Department has indicated that the planned development will be conditioned on installation of public water to serve all lots. Within the boundaries of the landfill, the Town Road Building and the Quonsett Hut receive public water. The Sewage Treatment Plant is not supplied with public water. Do they drink the water? I hope not

To assess the water quality in the vicinity of the landfill, water quality data was obtained from the SCDHS for March 30, 1988 sampling of seven private well users (see Figure 10.2 for sampling locations and Appendix L for results). The results indicate that location #1, the Sewage Treatment Plant, had zinc and iron levels above NYS Class GA standards as well as tetrachloroethene at 8 parts per billion. Location #2 (to the west) and #5 (to the east) exceeded standards for sodium, Location #4 (to the north) exceeded standards for zinc, and Location #7 (to the south) exceeded standards for nitrates, manganese, and sodium. However, the exceedance for nitrates was significantly above levels detected within the landfill indicating a possible non-landfill source of nitrate contamination at this location. Five of the seven wells were outside of standards for pH. However, pH levels are commonly low in Long Island groundwaters and a



LEGEND:

⑤ - LOCATION AND I.D. # OF RESIDENCE

SOURCE: SCDHS

FP&M

FIGURE 10.2 – LOCATION OF RESIDENCES CHOSEN FOR WELL SAMPLING BY THE SCDHS

correlation to a landfill source cannot be made. While water quality violations do exist, they are generally not considered a significant health hazard nor is it directly traceable back to the landfill.

SECTION 11.0
HAZARDOUS RANKING SCORE

11.1 Introduction and Final Score

This section will present the results and worksheets of the USEPA Hazard Ranking System (HRS) (utilizing the revised guidance document from November, 1990). The final HRS score was tabulated as follows:

Sgw = 28.24
Ssw = 0
Ss = 0
Sa = 1.91

Final HRS Score = 14.15

This score is extremely low despite the high scores for groundwater due to the high density of private well users on Long Island. This situation will elevate scores irregardless of whether contamination exists at a site.

Do we have this Book? see Bob

VHRS

11.2 HRS Work Sheets

Facility name: Springs-Fireplace Road Landfill

Location: East Hampton

EPA Region: II

Person(s) in charge of the facility: Dave Paolelli

Name of Reviewer: Scott Stehlik/Graeme Wallace Date: 6/26/91

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.)

Active municipal landfill located between Accabonac Road and Springs-Fireplace Road in the Village of Springs, New York. The landfill is owned and operated by the Town of East Hampton, was established in the early 1960's and is presently approximately 60 acres in size. It is reported to have accepted municipal and commercial waste, and septage. Concerns: Methane emissions, possible groundwater impacts from the septage lagoons.

Scores: Sgw = 28.24
Ssw = 0
Ss = 0
Sa = 1.91

Score = 14.15

FIGURE 1
HRS COVER SHEET

Likelihood of Release to an Aquifer

3.1.1 Observed Release

- No Direct Observation — Ref. - Site Inspection

- Chemical Analysis (Table 8.5.1)

No observed release
Well S-1 (upgradient/background) has 8 ppb chlorobenzene
Well S-6 (downgradient) has 20 ppb chlorobenzene
Less than 3X background as per page 19 (Table 2-3)
Chlorobenzene was the only detected compound in lagoons & Groundwater

Ref. - Appendix of Hydrogeologic Phase II Investigation Report. Lab results of Groundwater Sampling and water table contour map.

No plume identified

Assigned Value = 0

TABLE 8.5.1
SEPTAGE LAGOON COMPARISON
TO DOWNGRADIENT GROUNDWATER RESULTS

	June, 1989		Oct, 1990		Septage Lagoon	(Groundwater)
	North	South	North	South	Mean	S-6 (mg/l)
Metals (mg/kg)						
Barium	262	498	ND	640	350	ND
Arsenic	2.60	6.70	ND	ND	2.3	ND
Aluminum	7120	6650	7110	10500	7845	1.9
Cadmium	3.60	10.8	1.4	8.7	6.1	ND
Calcium	5020	7350	784	9160	5579	60.9
Chromium	26.2	44.0	11.2	50.9	33.1	ND
Copper	1020	1550	78	1890	1135	0.02
Iron	8640	9170	7420	12140	9343	8.1
Potassium	224	214	476	618	383	11.6
Magnesium	833	1050	756	1530	1042	9.4
Manganese	64.3	61.5	101	101.8	82	35.4
Sodium	1740	2370	204	691	1251	11.4
Lead	146	484	18.5	798	362	0.0087
Silver	21.4	26.4	ND	29.1	19.4	ND
Zinc	1210	1880	115	2470	1419	0.17
Mercury	2.90	420	0.33	2.1	106	ND
Nickel	19.0	26.4	ND	36.4	20.5	0.14
Selenium	1.40	2.90	ND	4.2	2.1	ND
VOCs (ug/kg)	North(avg)	South(avg)	North	South		ug/l
Toluene	6267	3000	210	2200	2919	ND
Chlorobenzene	4040	ND	1200	410	1413	20
Acetone	1720	1650	940	23000	6828	ND
Xylenes	475	12550	63	6400	4872	ND
Carbon Disulfide	570	1000	ND	650	555	ND
Ethylbenzene	ND	2500	ND	1200	1850	ND
2-Butanone(MEK)	ND	ND	200	6600	1700	ND
Methylene Chloride	ND	ND	ND	51	13	ND
Trichloroethene	ND	ND	ND	54	13.5	ND
Benzene	ND	ND	ND	67	16.8	ND
Semi-Volatiles (ug/kg)						
4-Chloroaniline	3000	9800	ND	ND	3200	ND
2-Methylnaphthalene	ND	6200	ND	4600	2700	ND
1,2-Dichlorobenzene	6850	33667	2100	2500	11279	ND
1,3-Dichlorobenzene	2335	5617	ND	ND	1988	ND
1,4-Dichlorobenzene	4885	9733	ND	ND	3655	ND
Bis(2Ethylhexyl)Phthalate	ND	ND	760	2700	865	ND

3.1.2 Potential to Release
Source → Lagoons

3.1.2.1 Containment

Characterize Sources

3.2.1 Toxicity

Parameter	Cancer Potency Factory (Exhibit A-4)	Weight of Evidence (Exhibit A-4)	Assigned Value (Table 2-4)
Arsenic	1.5	A (Human Carcinogen)	10,000
Trichloroethene	0.011	B2 (Probable Human Carcinogen)	10
Benzene	0.052	A	1,000

Ref: USEPA Superfund Public Health Evaluation Manual 1986

	Reference Dose Factor (chronic) (Exhibit A-6)	Assigned Value (Table 2-4)
Cadmium	0.00029	10,000
Chromium	0.005	100
Lead	0.0014	10,000
Mercury	0.002	1,000
Selenium	0.003	1,000
Toluene	0.3	10
Chlorobenzene	0.027	100
Acetone	0.1	10
Xylenes	0.01	100
Carbon Disulfide	0.1	10
Ethylbenzene	0.1	10
Methyl Ethyl Ketone	0.05	10
Methylene Chloride	0.06	10

- No RFDs or slope factors are available for 4-chloroaniline, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene and 4-methylnaphthalene

Mobility Factors

Parameter	Solubility (Exhibit A-1)	Distribution Coefficient (Exhibit A-1)	Factor Value (Table 3-8)	Geometric Mean	Kd
Benzene	1.75×10^3	83.0	0.01	12.6	(2.49-63.91)
Trichloroethene	1.10×10^3	126.0	0.01	19.15	(3.78-97.02)
Toluene	5.35×10^2	300	0.01	45.6	(9-231)
Chlorobenzene	4.66×10^2	330.0	0.01	50.2	(9.9-254.1)
Acetone	1×10^6	2.2	1	0.33	(0.066-1.69)
Xylenes	1.98×10^2	240.0	0.01	36.5	(7.2-184.8)
Carbon Disulfide	2.94×10^3	54.0	1	8.2	(1.62-41.58)
Ethylbenzene	1.52×10^2	1100.0	0.01	167.2	(33-847)
2-Butanone (MEK)	2.68×10^5	4.5	1	0.68	(0.135-3.47)
Methylene Chloride	2×10^4	8.8	1	1.34	(0.264-6.78)
1,2 Dichlorobenzene	1×10^2	1700.0	0.002	258.38	(51-1309)
1,3 Dichlorobenzene	1.23×10^2	1700.0	0.01	258.38	(51-1309)
1,4 Dichlorobenzene	7.9×10^1	1700.0	0.002	258.38	(51-1309)

Ref: USEPA Superfund Public Health Evaluation Manual 1986

Toxicity/Mobility (Table 3-9)

Parameter	Tox/Mob Factor Value
TCE	0.1
Benzene	10
Toluene	0.1
Chlorobenzene	1
Acetone	10
Xylenes	1
Carbon Disulfide	10
Ethylbenzene	0.1
MEK	10
M.C.	10

Highest Tox/Mob Factor Value is **10**

HAZARDOUS WASTE QUANTITY

Hazardous Constituent Quantity

Parameter	Average Concentration (ug/kg) of Detected Hazardous Substances in Septage Lagoons
Arsenic	2300
Barium	350000
Cadmium	6100
Chromium^{+6}	33100
Copper	1135000
Lead	362000
Silver	19400
Mercury	106000
Zinc	1419000
Nickel	20500
Selenium	2100

VOCs	Total 3,455,500 ug/kg = 3,455.5 mg/kg
Toluene	2919
Chlorobenzene	1413
Acetone	6828
Xylenes	4872
Carbon Disulfide	555
Ethylbenzene	1850
2-Butanone MEK	1700
Methylene Chloride	13
Trichloroethene	13.5
Benzene	16.8
Semi-volatiles	
4 - Chloroaniline	3200
1,2 - Dichlorobenzene	11279
1,3 - Dichlorobenzene	1988
1,4 - Dichlorobenzene	3655
Bis(2 Ethylhexyl)Phthalate	865

	41,167.3 ug/kg = 41 mg/kg

Total Hazardous Substances 3,497 mg

TABLE

VOLUME CALCULATIONS AND DATA

NORTH LAGOON

LENGTH AND WIDTH -	140 ft. x 50 ft.
SURFACE AREA (πab) -	5498 ft.^{2}
AVERAGE THICKNESS OF SLUDGE LAYER -	4.3 ft.
AVERAGE THICKNESS OF WATER LAYER -	4.7 ft.
VOLUME OF SLUDGE -	176,835 gal.
VOLUME OF WATER -	193,291 gal.

SOUTH LAGOON

LENGTH AND WIDTH -	105 ft. X 55 ft.
SURFACE AREA (πab) -	4536 ft.^{2}
AVERAGE THICKNESS OF SLUDGE LAYER -	4.5 ft.
AVERAGE THICKNESS OF WATER LAYER -	6.5 ft.
VOLUME OF SLUDGE -	152,682 gal.
VOLUME OF WATER -	220,540 gal.

TOTAL

VOLUME OF SLUDGE -	329,517 gal.
VOLUME OF WATER -	413,831 gal.

SOURCE HAZARDOUS WASTE QUANTITY

Total Mass of Lagoon Sediment

Total Volume of Sediment

2 Lagoons 329,500 gallons x 10 lbs/gallon

= 3,295,000 lbs
= 1.5×10^6 kg

Mass of hazardous constituents

$$\frac{3{,}497 \text{ mg/kg}}{1 \text{ kg}} = \frac{X}{1.5 \times 10^6} = 5.2 \times 10^9 \text{ mg}$$

5.2×10^3 kg = 11464 lbs hazardous constituents

Table 2-5, 2-6

Hazardous Waste Quantity Factor Values

1 to 100 = Assigned Value **10000**

WASTE CHARACTERISTICS FACTOR CATEGORY VALUES

Toxicity/Mobility Value x Hazardous Waste Quantity Value

$10 \times 10{,}000 = 10^5$

Table 2 - 7 Assigned Value = **18**

3.1.2.1 Containment

Table 3-2 Assigned Value - **10**

3.1.2.2 Net Precipitation

Net Precipitation Factor Value

Annual Precipitation 45 inches
Annual Evapotranspirtion 23.2 inches
Net precipitation 21.8 Table 3-4
Assigned Value **6**

Ref: Nemickas B. & Koszalka E.J. (1982):
USGS Water-Supply Paper 2073

3.1.2.3

Depth to aquifer

Average water level elevation of lagoons

67' AMSL

Average, thickness of water layer 5.6'
Average, thickness of contaminated sediment 4.4'
Aquifer elevation 10' AMSL

Depth from lowest point of hazardous substance to top of aquifer 47'.

Table 3-5 Assigned Value - **3**

Ref: Septage Lagoon Sampling Report FP&M 1989

3.1.2.4 Travel Time Table 3-6, Table 3-7

$K = 2.0 \times 10^{-2}$ cm/sec estimated from slug test of S-2
Boring logs for S-2, S-6 med-coarse sand
Thickness of lowest K layer greater than 3'-5'

Travel time factor value 35

Ref: Hydrogeologic Phase II Report
FP&M 1991

3.1.2.5 Potential to Release

2a x (2b + 2c + 2d) Table 3-1
10 x (6 + 3 + 35) = 440

3.1.3 Likelihood of Release Table 3-1

Value = **440**

3.2 Waste Characteristics

3.2.1 Toxicity/Mobility Factor Table 3-9

Value = **10**

3.2.2 Hazardous Waste Quantity Table 3-1

Value = **10,000**

3.2.3 Waste Characteristics Toxicity/mobility x Hazardous Waste

$10 \times 10{,}000 = 10^5$

Value = **10^5**

3.3 Targets

3.3.1 Nearest well

Distance from source to nearest well

greater than ¼ to ½ mile Table 3-11

Assigned value = **18**

Ref: USGS East Hampton Quadrangle Map,
1989 Aerial photograph

3.3.2 Population

1990 U.S. Census Bureau figure show 13,072 housing units in the Town of East Hampton (excluding Montauk). Two of the three subdivisions of the Town of East Hampton Water District (Village of East Hampton and Amagansett) occur within a four-mile radius of the landfill. According to Mr. Ron Blake of the Suffolk County Water Authority, a total of 5,525 units receive public water in these two subdivisions. Therefore, in this area, 42% of the housing units receive public water. Approximately 40 non-community wells (wells that provide piped water to at least five service connections or one service connection that regularily serves 25 individuals or more) occur within a four-mile radius of the landfill (Water Resources Management Report, 1987). Furthermore, the 1987 report indicated that in 1980 6,400 (3,500 serving permanent residences and 2,900 serving seasonal residences) private wells existed in the Town of East Hampton. According to a Long Island Lighting Company Survey performed in 1988 the average household size in the Town of East Hampton was 1.97. Examination of a 1989 aerial photograph indicates that approximately 67 buildings occur within a ¼ mile of the Springs-Fireplace Landfill. Therefore, assuming approximately 40 percent of the houses are connected to

public water, approximately 53 residents are estimated to be using private wells within ¼ mile of the landfill. According to the same aerial photograph approximately 100 buildings occur from a ¼ to ½ mile radius around the landfill. 120 of the approximate 200 residents of these buildings are estimated to be receiving water from private wells. No public or non-community wells occur within a ½ mile radius of the landfill.

From a ½ to 1 mile radius from the landfill, 6 non-community wells and one public supply well field (Spring-Close well field consisting of two wells) are present. However, it should be noted that this well field and all others occurring within a 4-mile radius is up groundwater-gradient of the landfill. To calculate an average housing unit density around the landfill 12,500 houses were estimated to occur with a 4-mile radius. Using the housing unit density (350 houses/square mile), area occurring within the specified radial distance and the proportion of houses supplied by public water, 420 private wells are estimated to occur within a ½ to 1 mile radius around the landfill. The Spring-Close well field provided the largest portion of the water pumped in 1990 by public well fields (NYSDEC 1991) occurring within a four-mile radius of the landfill. The water from the Spring-Close well field is blended and contributes less than 40 percent of the total water pumped. In the system it is estimated to serve a population of 1979 people (5,525 units x 1.97 people per unit/11 public supply wells x number of wells (2) in the well field). The non-community wells are estimated to serve a population of 25 people each and, therefore, serve a total of approximately 150 people. The 420 private wells are estimated to serve approximately 827 people. Therefore, a total population of 2956 is served by wells located from a ½ to 1 mile radius around the landfill.

One public supply well field (Oakview Highway) and 11 non-community wells occur from a one-to-two mile radius around the landfill. Approximately 1492 private wells are calculated to exist within this area. The Oakview Highway well field is estimated to serve a population of 2,968 people. The non-community wells are estimated to serve a population of 275 and the private wells are estimated to serve a population of 2,940. Therefore, the total population estimated to be served by wells located between one and two miles of the landfill is 6,183.

Two public supply well fields (Cross Highway and Bridgehampton Road, both upgroundwater gradient of the landfill) and nine non-community wells are located between a two and three mile radius of the landfill. Approximately 1,400 private wells occur within the same area. Approximately 5,937 people are served by the public wells, 225 by the non-community wells and 2,760 people are served by private wells. Therefore, a total population of approximately 8922 is supplied by wells between two and three miles from the landfill.

Five non-community wells and approximately 1,495 private wells occur from three to four miles of the landfill. This corresponds to an approximate population of 125 supplied by non-community wells and 2,945 supplied by private wells. Therefore, approximately 3,070 persons receive water pumped from wells located from three to four miles from the landfill.

Using this data and Table 3-12 the potential contamination factor is calculated as follows:

$$PC = \frac{1}{10} \quad (53 + 102 + 523 + 939 + 678 + 417)$$

$$= 271.2$$

Ref: Town of East Hampton (1987)
Water Resources Management Report

3.3.3 Resources

Water drawn from target well aquifer used for commercial food preparation

Value - **5**

3.3.4 Wellhead Protection Area

No wellhead protection area within target distance limit. Article VII of the Suffolk County Sanitary Code defines well head protection areas as extending to 1500' upgradient and 500' downgradient of well field locations.

Furthermore, groundwater divide may exist between the well fields and the potential contamination source. Value - **0**

REF: Phase II Hydrogeologic Investigation, FP&M 1991

3.3.5 Calculation of Targets Factor Category Value

18 + 271.2 + 5 + 0 = 294.2

Value = **294.2**

3.4 Groundwater migration score for an aquifer

$$\text{Aquifer score} = \frac{\text{likelihood of release} \times \text{waste characteristics} \times \text{targets}}{82{,}500}$$

$$\frac{440 \times 18 \times 294.2}{82{,}500} = 28.24$$

Groundwater Migration Pathway Score = **28.24**

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT

Drinking Water Threat

4.1.2.1.1 Observed Release - No observed release of a hazardous substance from the potential contamination source (septage lagoons) to a water shed has been demonstrated by direct observation or chemical analysis. Therefore, a release factor value of 0 is assigned.

4.1.2.1.2 Potential to Release by Overland Flow - There is no potential for contamination of surface waters by overland routes as the potential contamination source is emplaced in a local topographical low area (an excavated pit) with an approximately 15 foot high berm surrounding the lagoons. The general surface drainage in the vicinity of the landfill is south with the closest surface water in the hazardous substance topographic migration pathway occurring over 1.5 miles away (Atlantic Ocean; the closest surface water is Tanbard Creek which is located 4000 feet west of the septage lagoons but is believed to be in a different water shed).

Furthermore, studies have indicated that surface water on the South Fork is derived predominantly from groundwater discharge as the high permeability of surficial materials results in less than 1% of the total precipitation resulting in runoff. Therefore, the potential to release by overland flow is 0. The source is also outside the flood plain of the closest surface water (Tanbark Creek). Therefore, there is also no potential for a release to occur by flood.

Ref: USGS East Hampton Quadrangle Map
Nemickas, B. and Kozalka, E.J. (1982)
USGS Water Supply Paper 2073
Federal Emergency Management Agenecy-Flood Insurance Map

4.2 GROUNDWATER TO SURFACE WATER MIGRATION COMPONENT

Federal Emergency Management Agency - Flood Insurance Map

The groundwater passing through the landfill is discharging into Three Mile Harbor which is located further than one mile from the septage lagoons. Therefore, following 4.2.1.1 it is not necessary to evaluate the groundwater to surface water migration component.

Reference: Hydrogeologic Phase II Report, FP&M 1991

4.3 Calculation of Surface Water Migration Pathway Score

As none of the two surface water migration components were scored the surface water migration pathway is given a score of 0.

Value = **0**

SOIL EXPOSURE PATHWAY

Resident Population Threat

5.1.1 Likelihood of Exposure

Observed contamination not in an area which threatens resident population (see 5.1)

Value = 0 Ref: Site Inspection

Waste Characteristics

5.1.2.1 Toxicity

Highest value from Section 2.4.1.1
Value = 10,000

5.1.2.2 Hazardous Waste Quantity

Considering only the top 2 feet of sludge

North Lagoon	82,250 gals
South Lagoon	67,860 gals
	150,110 gals
	1,501,100 lbs
	6.8×10^5 Kg

Mass of hazardous constituents from Section 3

$$\frac{3{,}497 \text{ mg/kg}}{1 \text{ kg}} = \frac{x}{6.8 \times 10^5 \text{ Kg}}$$

$= 2.4 \times 10^9$ mg
$= 2.4 \times 10^3$ Kg = 5243 lbs hazardous constituents

Greater than 100 to 10,000 = assigned value = 100 Table 2-6

5.1.2.3 Waste characteristics factor category value
toxicity x hazardous waste quantity factor value

$10{,}000 \times 100 = 10^6$ Table 2-7
Assigned Value = 32

Targets

5.1.3.1 No resident individual is subject to Level I or Level II concentrations

Value = 0 Ref: Site Inspection

5.1.4 Resident Population Threat Score

(Lines 1 x 4 x 10) 0 x 32 x 0 = 0

Value = 0

NEARBY POPULATION THREAT

5.2.1 Likelihood of Exposure

5.2.1.1 Attractiveness/Accessibility

The site of the septage lagoons is considered physically inaccessible to the public as there is a fence surrounding accessible areas of the landfill and a guard is present or the gate locked at the landfill entrance. No evidence has ever been observed that the landfill has been used for public recreation. Furthermore, the septage is covered by 5 feet of water. Therefore, the lagoons within the landfill are assigned an attractiveness/accessibility factor of 0. This means that it is not necessary to evaluate the septage lagoons as a nearby population threat (Section 5.2).

5.3 Calculation of Soil Exposure Pathway Score

As there is neither a resident or nearby population threat this section is given a Value of 0.

Value = **0**

AIR MIGRATION PATHWAY

Likelihood of Release

6.1.1 Observed release - no release of contaminants to the atmosphere has been documented by direct observation or chemical analysis.

6.1.2 Potential to release - the potential gas source (septage lagoons) is known to contain fourteen gaseous hazardous substances with a vapor pressure greater than or equal to 10^{-9} torr (mm of Hg) and an available Henry's Law Constant.

	Average Concentration in sludge ug/kg	Vapor Pressure mm Hg	Henry's Law Constant $(atm\text{-}m^3)/ml$
Acetone	6828	270	2.06 E-5
Benzene	16.8	95.2	5.59 E-3
2-Butanone (MEK)	1700	77.5	2.74 E-5
Carbon Disulfide	555	360	1.23 E-2
Chlorobenzene	1413	11.7	3.72 E-3
1,2-dichlorobenzene	11279	1	1.93 E-3
1,3-dichlorobenzene	1988	2.28	3.59 E-3
1,4-dichlorobenzene	3655	1.18	2.89 E-3
Ethylbenzene	1850	7.0	6.43 E-3
Methylene Chloride	13	362	2.03 E-3
Toluene	2919	28.1	6.37 E-3
Trichloroethene	13.5	57.9	9.1 E-3
Xylenes	4872	10	7.04 E-3

6.1.2.1.1 Gas Containment

The sludge present at the potential gas source is covered by 5 feet of water; however, a gas containment factor of 10 is indicated by Table 6-3.

Value = 10

6.1.2.1.2 Gas Source Type

The potential gas source is a surface impoundment containing sludge and 5 feet of water. From Table 6-4 the source type factor value will be 28.

Value = 28

6.1.2.1.3 Gas Migration Potential

Six of the hazardous substance present in the potential have a sum of values for vapor pressure and Henry's contant equal to six (Table 6-5). Therefore, the gas migration potential value will be 17 (Table 6-6).

Value = 17

6.1.2.1.4 Calculation of the Gas Potential to Release Value

The gas potential to release value will be:

(17 + 28) x 10 = 450

Value = 450

6.1.2.2 Particulate Potential to Release

As the potential particulate source (septage sludge lagoons) are covered by 5 feet of water the particle containment factor value (Table 6-9) will be zero. Therefore, the particulate potential to release will be zero (Section 6.1.2.2.4).

Value = 0

6.1.2.3 Calculation of Potential to Release Factor for the Site

The highest value of 6.1.2.1.4 and 6.1.2.2.3 is 450.

6.1.3 Calculation of Likelihood of Release Factor Category Value

As there is no observed release the value will be 450.

6.2 Waste Characteristics

6.2.1.1 Toxicity Factor - Toxicity factors were determined in Section 3.2.1.

	Source	Assigned Value
Acetone	RFD	10
Benzene	Slope Factor	1000
2-Butanone (MEK)	RFD	10
Carbon Disulfide	RFD	10
Chlorobenzene	RFD	100
Ethylbenzene	RFD	10
Methylene Chloride	RFD	10
Toluene	RFD	10
Trichloroethene	Slope Factor	10
Xylenes	RFD	100

6.2.1.2 Mobility Factor: Based upon the data given in 6.1.2 all the gaseous hazardous substances will have a gas mobility factor of 1.0 (Table 6-11). It is not necessary to determine a particulate hazardous substance as their is no potential for a particualte release.

Value = 1.0

6.2.1.3 Calculation of Toxicity/Mobility Factor

The highest toxicity/mobility factor is for benzene which has a toxicity/mobility factor of 1000.

Value = 1000

6.2.2 Hazardous Waste Quantity

From 6.1.2 the average concentration of potential gaseous hazardous substances in the potential gas source is:

3.71×10^4 ug/kg or 37.1 mg

From 3.2.2 the amount of sludge present in the septage lagoons is 1.5×10^6 kg.

Therefore, the mass of potential gaseous hazardous substances is:

$37.1 \text{ mg/kg} \times 1.5 \times 10^6 \text{ kg} = 5.57 \times 10^7 \text{ mg} =$
55.7 kg or 123 lbs.

From Table 2-6 the hazardous waste quantity factor is 100

Value = 100

6.2.3 Calculation of Waste Characteristics Factor Category Value

Multiplying the toxicity/mobility factor value and the hazardous waste quantity factor value gives 1×10^5. From Table 2-7 this gives a waste characteristics factor category value of 18.

Value = 18

6.3 Targets

The target population has not been shown to be subject to Level I or Level II concentrations. Therefore, the nearest indiviual and target populations will only be evaluated on the basis of potential contamination.

6.3.1 Nearest Individual

The shortest distance to any residence or regularily occupied building or area from the potential source of gaseous contamination (septage lagoons) is between 1/8 and 1/4 miles. Therefore, the nearest individual factor has a value of 7 (Table 6-16).

Value = 7

6.3.2 Population

From the US Census Bureau for Long Island Towns and Cities for 1990, 17,068 housing units are located within East Hampton Town, 3,996 total of these housing units are located in Montauk Village, According to Rochris & Associates Inc. etal. (1982) 2.9% of the Town's houses occur in Wainscott (located outside the 4-mile radius) which corresponds to approximately 500 households. Therefore, it is estimated that approximately 12,500 households occur within a four-mile radius of the East Hampton Landfill. Total population of the Town of East Hampton was 16,132 in 1990; however, this population approximately triples during the summer months due to second-home owners and day trippers (Town of East Hampton Water Resources Management Report, 1987). According to the Long Island Lighting Company Population Survey performed in 1988 the avereage household size was 1.97 persons. The number of buildings occurring within a one-quarter mile radius of the landfill is estimated as being 67 from a 1989 aerial photograph indicating and approximate population of 133. It was also estimated from the aerial photograph that approximately 100 buildings, indicating a population of approximately 200, occur from one-quarter to one-half mile around the landfill. Using a household density of 350 households/square mile determined using the approximate number of households occuring within a four-mile radius of the landfill, it is estimated that 1,050 households (2069 people) occur from ½ to 1 mile, 3,750 households (7,388 people) occur from 1 to 2 miles, 3,500 households (6,895 people) occur from 2 to 3 miles and that 3,740 households (7368 people) occur from 3 to 4 miles. These population figures will reflect both seasonal and permanent residents.

Using the estimated population figures and Table 6-17 above the potential contamination factor value (PI) will be:

$$PI = \frac{1}{10}(41 + 9 + 26 + 27 + 12 + 7)$$

$$= 12.2$$

Value = 12.2

Ref: Rochris & Associates, Inc., ERM-Northeast
and Catalano, T. (1982):
Town of East Hampton: Watershed District Study
Town of East Hampton (1987):
Water Resources Management Report

6.3.3 Resources

No commercial agriculture or solviculture, or a majore or designated recreation area occur within one-half mile of the potential source of gaseous contamination. Therefore, the value is assigned 0.

Value = 0

6.3.4 Sensitive Environments

According to Larry Penny, the Natural Resources Director of the Town of East Hampton, 7 sensitive environments occur within a four-mile radius of the Springs-Fireplace Landfill. These areas are all critical habitats for the piping plover and include Accabonic Harbor (2-3 miles from landfill), Three Mile Harbor (½-1 miles from landfill), Northwest Creek (3-4 miles from landfill), Hog Creek (3-4 miles from landfill), Napeague State Park (3-4 miles from landfill), Maidstone Beach (2-3 miles from landfill), and Coastal Interval from Two Mile Hollow to Atlantic Avenue (2-3 miles from landfill). According to Steve Sanford of the New York State Department of Environmental Conservation the critical habitat of the piping plover includes sandy beaches and tidal mud flats. From Table 4-23 each of the sensitive environments has a sensitive envirnment rating of 100.

The potential contamination factor value is calculated using the above data and Table 6-15 as follows:

$$EP = \frac{1}{10} \left((0.016 \times 100) + (0.0023 \times 300) + (0.0014 \times 300)\right)$$

$$= 0.27$$

Value = 0.3

6.3 Calculation of Targets Factor Category Value

$$7 + 12.2 + 0 + 0.27 = 19.47$$

Value = 19.47

6.4 Air Migration Pathway Score

$$\frac{(450 \times 18 \times 19.5)}{82,500} = 1.91$$

Air Migration Pathway Score
2.25

CALCULATION OF HRS SITE SCORE

$$S = \frac{Sgw^2 + Ssw^2 + Ss^2 + Sa^2}{4}$$

Where;

Sgw = 28.24
Ssw = 0
Ss = 0
Sa = 2.25

$$S = \frac{\sqrt{(28.24)^2 + (0)^2 + (0)^2 + (1.91)^2}}{4}$$

S = 14.15

SECTION 12.0
CONCLUSIONS AND RECOMMENDATIONS

12.1 Conclusions

Based on all information, analyses, and results obtained, the following is concluded:

- The Springs-Fireplace Landfill is approximately 60 acres in size and consists of two landfilling cells: a putrescibles lift to the south and a C&D lift to the northeast.
- The landfill is located on the Ronkonkoma Moraine. The geologic unit underlying the landfill is the Upper Glacial Aquifer.
- The aquifers of the South Fork are the sole source for public supply, industry, and agriculture.
- Ten wells were installed to augment the one previously-existing well for a total of 11 wells. Six of these wells were installed to intercept the water table and four wells were installed at depths of 96 to 105 feet below MSL. The previously-existing well extends to 119 feet below MSL.
- The geology at the landfill consists of surficial till deposits and a near-surface clay layer (of limited extent) to the north. To the south, surficial deposits consist of outwash deposits.
- Values from the slug test data indicate that hydraulic conductivity averages 275 ft/day for the shallow zone and 38 ft/day for the deep wells.
- Groundwater flow direction for the shallow wells was generally in the north and northeast direction. The deep wells indicated a north flow direction. However, there is the possibility that a groundwater divide exists near the south border of the landfill.
- The conservatively high estimates of average linear velocity is

groundwater velocity

.34 feet/day

30 years
365 days/year
10950 days
× .34 feet/day

3723 feet = .7 miles

1 mile = 5280 feet

.34 ft/day - worst case

0.17 ft/day.

- For the lifetime of the landfill (approximately 30 years) groundwater is estimated to have traveled 0.36 miles. .7 miles
- The equipotential field diagrams indicate a downward vertical component of flow at the south portion of the landfill and an upward component of flow at the north portion of the landfill.
- The results of the groundwater sampling show that volatile organic compounds were detected in four wells. No one well showed detection of more than one compound. The highest concentration detected was at Well D-3 on the north border which was detected with tetrachloroethene (110 ug/l). No semi-volatile organics, herbicides, pesticides, or PCBs were detected.
- The groundwater results for inorganic parameters showed 47 contraventions of NYS GA Standards. Of these, over half were related to "secondary" standards for iron, manganese, and iron plus manganese. In addition, contraventions of standards for chlorides, sodium, and total dissolved solids at paired piezometers location S-4/D-4 may not be related to landfilling activities but rather road salt-laden runoff emanating from the Town Road Department which is diverted to, and collects in, the vicinity of Wells S-4/D-4. Laboratory results for pH (as low as 5.4 and as high as 9.1) and sodium (as high as 43.9 mg/l) may be indicative of landfilling activity, but this is not conclusive. Phenols (as high as 4.5 ug/l) detected in the groundwater are most probably the result of laboratory error in analysis.
- The leachate collection well results showed little correlation with downgradient groundwater results which indicates that the putrescibles area is not significantly impacting groundwater.

- No correlation could be made between the septage lagoons and downgradient water quality. Although contamination exists in the septage sludge and to a much lesser extent, the overlying water, there is no clear evidence that the contamination has entered the groundwater.
- The potential receptor investigation indicated that many of the private residences in the vicinity of the landfill are not receiving public water. SCDHS records indicate that tetrachlorethene was detected in the Sewage Treatment Plant's supply well. This compound was also detected at location D-3 which is at the northwest of the landfill. For inorganic parameters, exceedance of standards were found on all sides of the landfill. However, little correlation exists between residential water quality and landfilling activities.

12.2 Recommendations

Based on the conclusions drawn in the previous section, the following is recommended:

- Although the impact of landfilling on the groundwater has not been determined to be significant, the possibility that this could occur in the future cannot be ruled out. Therefore, it is recommended that all private well users (including the Sewage Treatment Plant) within a minimum of a half-mile downgradient or within a one-quarter mile upgradient of the landfill be sent notices to hook up to public water from the SCWA. It should be noted that the Town of East Hampton has had the SCWA install public water mains which circumvent the landfill. Many houses within a one-half mile radius of the landfill have public water mains along the road adjacent to their property and could easily connect to the system.

If they have the $ Town should pay for hookup

- The Town Road Department should be advised that they should no longer allow their runoff to be diverted through the drainage swale to the area of Wells S-4/D-4. This swale should be bermed permanently. Although a road salt storage building has been recently constructed, salt spills outside the storage building may still contain salt-laden runoff.
- Additional groundwater monitoring wells should be installed for the following purposes:
  - o A paired piezometer (one shallow and one deep well) should be installed along Accabonac Road, approximately 400 to 600 feet south of the landfill border in a direction located south of Wells S-1/D-1. These wells will serve to confirm and/or clarify the existence and location of a groundwater divide in the vicinity of the landfill. In addition, this well pair will be used as an early warning system to the SCWA well 1 mile to the south of the landfill if groundwater is determined to be flowing in this direction.
  - o All groundwater wells should be resampled to confirm the previous sampling results and to monitor changes in the constituent concentrations. The two additional proposed paired-piezometer locations should be included in the well sampling to delineate future releases, if applicable.
  - o An additional shallow well should be installed in a north-south direction in line with wells S-1 and S-3 along Abrahams Path north of the landfill. This well will be used for future groundwater monitoring to detect a release from the landfill after closure.
  - o For the sludge in the lagoons, an engineering feasibility

study should be prepared in order to select the most reliable and cost effective remedial alternative from those listed below:

- Remove sludge from the lagoon, place on an impervious pad, and aerate.
- Remove the sludge from the lagoons, dewater in the scavenger waste treatment beds for the purpose of removal of volatiles, and place dried sludge on the lined portion of the landfill.
- Have a licensed hauler cart the waste to an appropriate facility for incineration.

o This site should be delisted from the NYSDEC Inactive Hazardous Waste Disposal Site listing based upon the NYSDEC Right-to-Know study, the data presented in this report, and the HRS score of 14.15.

Is the sludge hazardous waste? yes see page 82

REFERENCES

Nemickas, B. and Koszalka (1983), Geohydraulic Appraisal of Water Resources of the South Fork, Long Island, New York, VSGS Professional Paper No.2073

Bouwer and Rice (1976), A Slug Test for Determining Hydraulic Conductivity of Confined Aquifers with Completely or Partially Penetrating Wells, Water Resources, Research, Vol. 12, No. 3, 9-14.

Fetter, C.W.,Jr. (1971), Hydrogeology of the South Fork of Long Island, New York, Indiana University Unpublished PhD Dissertation.

Fetter, C.W.,Jr. (1980), Applied Hydrogeology, Charles E. Merrill Publishing Company.

APPENDIX A

HAMPTON

(j) a description of the project's gas monitoring program, which must discuss explosive gas generation at the landfill and the controls used to ensure that gas generated at the landfill will not create a hazard to health, safety, or property;

(k) a description of how winter and inclement weather operations will be conducted;

(l) if applicable, a description of the operation of a convenience station at the landfill for smaller private vehicles to unload refuse at an area other than the landfill's working face; and

(m) a description of procedures and precautions to be taken during the placement of the first lift of waste above the liner and leachate collection system, describing the select solid waste and its placement, approach and operation of collection vehicles and compaction equipment, with concern for minimizing adverse impacts on the liner and leachate collection system.

Section 360-2.10 Contingency plan.

The contingency plan must discuss an organized, planned and coordinated, technically and financially feasible course of action to be taken in responding to contingencies during the construction and operation of a landfill. The plan must address, at a minimum, actions to be taken with respect to personnel and user safety; on-site personal injury; fires; explosive landfill gases detected on site; dust; litter; odor; noise; equipment breakdown; unusual traffic conditions; vectors; deposition or receipt of waste not authorized by the department to be disposed of at the facility; releases of hazardous or toxic materials; groundwater and surface water contamination (which may include public and private water supply contamination); presence of leachate in the secondary leachate collection and removal system; and the occurrence of the leachate storage facility being at or above capacity. The contingency plan must specify the procedures to be used in response to: tank and surface impoundment spills or leakage (including removal of the waste and repair of such structures) and the event that the approved leachate treatment facility cannot accept leachate from the landfill for an indefinite period of time.

Section 360-2.11 Hydrogeologic report.

The hydrogeologic report must define the landfill site geology and hydrology and relate these factors to regional and local hydrogeologic patterns; define the critical stratigraphic section for the site; provide an understanding of groundwater and surface water flow at the site sufficient to determine the ultimate suitability of the site for landfilling; establish an environmental monitoring system capable of readily detecting a contaminant release from the facility and determining whether the site is contaminating surface or subsurface waters; and form

the basis for design of the facility and contingency plans relating to ground or surface water contamination or gas migration as required in section 360-2.10 of this Part. The scope and extent of investigations necessary in the hydrogeologic report will vary based upon the hydrogeologic complexity of the site and the ability of the site to restrict contaminant migration. Additionally, the hydrogeologic report must define the engineering properties of the site as necessary for proper design and construction of any facilities proposed to be built at the site.

This section is divided into three subdivisions. Subdivision (a) defines the site investigation plan and outlines specific requirements for many of the hydrogeologic investigative methods which may be used in the investigation. Subdivision (b) describes the specific requirements for reporting the results of the site investigation in the site investigation report. Subdivision (c) describes the requirements for the water quality monitoring of the facility which must be described in the environmental monitoring plan.

The hydrogeologic report for a new landfill; for a vertical expansion of an existing operating landfill for which a hydrogeologic report has not been previously submitted and approved by the department or does not have operating environmental monitoring points previously approved by the department; and for a lateral expansion of an existing landfill, must contain a site investigation plan, a site investigation report, and an environmental monitoring plan. The requirements for the hydrogeologic investigation and monitoring for landfill closure are discussed in section 360-2.15 of this Part.

(a) Requirements of the site investigation plan. The site investigation plan must clearly define all methods used in investigating the hydrogeologic conditions of the site, the scope of the intended investigation, and any specific hydrogeologic questions that the investigation is designed to address. The applicant is strongly encouraged to develop a draft version of the plan for review with the department before starting the hydrogeologic investigation that begins to define the critical stratigraphic section, and to keep the department informed of the findings and subsequent investigative proposals as the study proceeds. The final version of the plan included in the hydrogeologic report section of the permit application must fully describe all methods of investigation used. The plan must comply with the following:

(1) General requirements for all methods used. In obtaining the required hydrogeologic information, the applicant must employ current, standard, and generally accepted procedures in meeting the requirements of this subdivision. Unless otherwise approved by the department, all work must be done in accordance with applicable American Society for Testing Materials standards or current and appropriate U.S. Environmental Protection Agency and department guidance documents. Alternative or innovative methodologies may be approved by the department; however, the department may initially require redundant technologies to prove the reliability of a new methodology. All procedures must be conducted under

the supervision of a geologist, hydrogeologist, hydrologist, or geotechnical engineer having experience in similar hydrogeologic investigations, in a manner that ensures accuracy of the data and precludes environmental degradation. The location of all installations, geophysical and geochemical surveys, and seismic lines must be shown on a map with the same scale and coordinate grid system used on the engineering plans, (see subdivision 360-1.9[e] of this Part).

(2) Literature search. A comprehensive search must be made for pertinent and reliable existing information concerning regional and site-specific hydrogeologic conditions. The literature search must include, as available, records and reports of the New York State Department of Health, the New York State Department of Transportation, the U.S. Soil Conservation Service; and the New York State Geological Survey; basin planning reports, groundwater bulletins, water supply papers, professional papers and other open file reports of the U.S. Geological Survey; bulletins, circulars, map and chart series, memoirs and other publications of the New York State Geologic Survey; publications and bulletins of the Geological Society of America and other professional organizations; and publications of the U.S. Environmental Protection Agency and the department, college and university reports; and aerial photography or remotely sensed imagery.

(3) Surficial geologic mapping. The site must be mapped to determine the distribution of surficial deposits on and surrounding the site based upon information from the hydrogeologic investigation, field evaluations, and field confirmation of all interpretations made on the site itself.

(4) Test pits. Test pits may be used to determine shallow stratigraphy. The test pits must not create a health or safety hazard and must be logged by a geologist or geotechnical engineer with experience in similar hydrogeologic investigations. Logs must include: elevations; surface features before excavation; depth of the test pit and of all relevant horizons or features; moisture content of units; standard soil classifications (including the Unified Soil Classification System), stratigraphy, soil structure, bedrock lithology, brittle, or secondary structures in soil and bedrock; and a sketch showing these features for each test pit constructed. Test pits must be promptly backfilled and compacted with excavated materials. The department may require that, if a test pit is dug, undisturbed soil samples be taken and tested in accordance with subparagraph 360-2.11(a)(9)(ii) of this Part.

(5) Water well surveys. A survey of public and private water wells within one mile downgradient and one-quarter mile upgradient of the proposed site must be conducted. Surveys must obtain, where available, the location of wells which must be shown on a map with their approximate elevation and depth, name of owner, age and usage of the well; stratigraphic unit screened; well construction; static water levels; well yield; perceived water quality; and any other relevant data which can be obtained.

(6) Geophysical and geochemical surveys. The department may require the use of geophysical and geochemical methods, such as electromagnetic, resistivity, seismic surveys, and soil gas analysis, where necessary to justify the interpretations and conclusions of the site investigation report and to provide information between boreholes and aid in the siting of wells.

(7) Tracer studies. The department may require the use of tracer studies to aid in understanding groundwater flow or to otherwise assist in devising an effective environmental monitoring plan.

(i) Where sites overlie weathered limestone or dolostone bedrock or where karst environments cannot be avoided, the department may require tracer studies before finalizing the bedrock monitoring plan. Tracer studies must identify all areas of groundwater flow from the facility attributed to secondary permeability, all recharge and discharge areas on and surrounding the site, storage of groundwater and variations of water quality seasonally and during high and low flow periods.

(ii) Where a site is otherwise unmonitorable because of existing contamination, the department may allow the use of tracers to aid in monitoring.

(8) Monitoring wells and piezometers.

(i) Construction in general.

(a) Monitoring wells and piezometers must define the three-dimensional flow system within the critical stratigraphic section to justify the interpretations and conclusions of the hydrogeologic report.

(b) Construction techniques must be appropriate to ensure that groundwater samples and head level measurements characterize discrete stratigraphic intervals; and to prevent leakage of groundwater or contaminants along the well annulus. If leakage is detected, it must be corrected or the well abandoned.

(c) Monitoring wells and piezometers may be placed individually or as well clusters. Well clusters consist of individual wells at varying depths in close proximity, each installed in its own boring. Multiple wells placed into one large borehole are prohibited unless department approval is obtained.

(d) Soil borings, soil samples, and rock cores must characterize each stratigraphic unit within the critical stratigraphic section to justify the interpretations and conclusions of the hydrogeologic report.

(e) Every appropriate precaution must be taken during drilling and construction of monitoring wells to avoid introducing contaminants into a borehole. Only potable water may be used in drilling

monitoring wells or piezometers unless otherwise approved by the department.

(f) All equipment to be placed into the boring must be properly decontaminated before use at the site and between boreholes. The initial cleaning at the site must be sufficient to ensure that no contaminants from the last site drilled will be introduced into the borings. All equipment must be steam cleaned between holes. Where possible, upgradient wells should be drilled first. I-324

(g) Use of drilling muds is to be avoided. If drilling muds are used, the material used must avoid the introduction of stray contaminants. Drilling muds must not be used within ten feet of the screened interval.

(h) Air systems and drilling lubricants must not introduce contaminants into the borehole.

(i) Well borings must have an inside diameter at least two inches larger than the outside diameter of the casing and screen to ensure that a tremie may be properly used.

(ii) Construction of monitoring wells and piezometers.

(a) Well screens and risers must be constructed of materials selected to last for the required monitoring period of the facility without contributing contaminants to or removing contaminants from the groundwater. All materials used are subject to department approval. Joints, caps, and end plugs are to be secured by welds, threads with teflon tape, or force fittings. Solvents and glues or other adhesives are prohibited. Caps must be vented to allow for proper pressure equalization. The inside diameter of each well screen or riser pipe must be at least two inches. A permanent mark should be made at the top of the riser pipe to provide a datum for subsequent water level measurements.

(b) Unless otherwise approved by the department, well screens are required for all wells and piezometers. All screens used must be factory constructed of a material appropriate for long term monitoring without contributing contaminants to or removing contaminants from the groundwater. The slot size of the screen must be compatible with the sand pack. Water table variations, site stratigraphy, expected contaminant behavior, and groundwater flow must be considered in determining the screen length, materials, and position. Where existing contamination is suspected or known, down hole geophysical techniques may be required by the department to aid in selecting well screen elevations.

(c) The sand pack surrounding the well screen must consist of clean, inert, siliceous material. Grain size must be based upon a representative sieve analysis of the zone to be screened. The sand pack must minimize the amount of fine materials entering the well and must not inhibit water inflow to the well. The sand pack must be placed in the

annular space around the well screen and extend to no more than two feet above the top, or six inches below the bottom, of the screen. The sand pack material must be placed using the tremie method or another method approved by the department and must avoid bridging. The sand pack must be checked for proper placement. A finer grained sand pack material (100 percent passing the No. 30 sieve and less than two percent passing the No. 200 sieve) six inches thick must be placed at the top of the sand pack between the sand and the bentonite seal.

(d) Bentonite must be placed above the sand pack using the tremie or other approved method to form a seal at least three feet thick.

(e) Grout of cement/bentonite, bentonite alone, or other suitable, low permeability material, if approved by the department, must completely fill the annular space from the bentonite seal to the surface seal. The grout mixture must set up without being diluted by formation water, and must displace water in the annular space to ensure a continuous seal. The grout mixture must be placed under pressure using a tremie or other method approved by the department. Auger flights or casing must be left in the hole before grouting to prevent caving.

(f) A protective steel casing, at least two inches larger in diameter than the well casing, must be placed over the well casing or riser pipe and secured in a surface well seal to adequately protect the well casing. A distinctive, readily visible marker must be permanently affixed to the protective casing or near the well to identify the well number and ensure visibility even in periods of high snow cover. A weep hole must be drilled at the base of the protective casing for drainage. A locking cap and weather resistant padlock must be placed on the protective casing and duplicate keys provided to the department. During installation of the protective casing, a concrete surface well seal, designed to prevent freeze/thaw damage, must be constructed.

(g) Where under the circumstances of a particular situation the department believes that the methods identified in this section are inadequate, it may require additional measures to be taken to prevent migration of contaminants along the annulus of the well or to protect the well.

(h) Alternative construction methods for piezometers may be approved by the department if those methods meet the requirements set forth in clause 360-2.11(a)(8)(i)(b) of this Part.

(iii) Well and piezometer development. All wells and piezometers must be developed as soon as possible after installation but not before the well seal and grout have set. Water must not be introduced into the well for development except with approval of the department. Any contaminated water withdrawn during development must be properly managed. Development must not disturb the strata above the water bearing zone or damage the well. The entire vertical screened interval must be

developed. The department may require multiple attempts at well development to increase the likelihood that sediment free water can be obtained.

(iv) Survey. The locations and elevations of all existing and abandoned test pits, soil borings, monitoring wells, and piezometers must be surveyed to obtain their precise location and plotted on a map in the hydrogeologic report. The vertical location of the ground surface and the mark made on the top of the monitoring well and piezometer risers must be accurately measured to the nearest one hundredth foot.

(v) Replacement of wells. All wells must be properly protected to ensure their integrity. If in the opinion of the department water quality or other data show that the integrity of a well is lost, the well must be replaced and sampled within a time period acceptable to the department (but not to exceed 120 days) after written notification by the department. The initial sample for the replacement well must be analyzed for baseline parameters.

(vi) Abandonment of wells. All soil borings or rock cores which are not completed as monitoring wells or piezometers and other abandoned wells must be fully sealed in a manner appropriate for the geologic conditions to prevent contaminant migration through the borehole. Generally, such sealing must include:

(a) Overboring or removal of the casing to the greatest extent possible followed by perforation of any casing left in place. All casing and well installations in the upper five feet of the boring or within five feet of the proposed level of excavation must be removed.

(b) Sealing by pressure injection with cement bentonite grout using a tremie pipe or other method acceptable to the department must extend the entire length of the boring to five feet below the ground surface or the proposed excavation level. The screened interval of the borehole must be sealed separately and tested to ensure its adequacy before sealing the remainder of the borehole. Where the surrounding geologic deposits are highly permeable, alternate methods of sealing may be required to prevent the migration of the grout into the surrounding geologic formation. The upper five feet must be backfilled with appropriate native materials compacted to avoid settlement.

(c) The sealed site must be restored to a safe condition. The site must be inspected periodically after sealing for settlement or other conditions which require remediation.

(9) Geologic sampling.

(i) A representative number of borings and rock cores must be sampled continuously to the base of the critical stratigraphic section. In borings not continuously sampled, samples must be taken at five feet

intervals in unconsolidated deposits and, in rock, as required by the department. For well clusters, continuous samples must be collected from the surface to the base of the deepest well. Other wells in the cluster must be sampled at all stratigraphic changes, and at the screened interval. Soil borings must be sampled using the split spoon method and bedrock or boulders must be sampled by coring with standard size NX or larger diameter core bits. Samples must be retained in labeled glass jars or wooden core boxes. Core samples must be securely stored and accessible throughout the life of the facility. Unconsolidated samples must be retained for three years after the permit is issued. The proposed location of the storage area must be designated in the operation and maintenance plan for the facility.

(ii) A representative number of undisturbed samples must be collected from test pits and soil borings using appropriate methods to identify soil characteristics of all cohesive soil units. Such samples must be analyzed in the laboratory for: Atterberg limits; gradation curves by sieve or hydrometer analysis or both, as appropriate; undisturbed permeabilities; and visual descriptions of undisturbed soil structures and lithologies.

(10) Logs.

(i) Complete and accurate drilling logs must be provided to the department for all soil borings. These logs must provide detailed soil classification according to the Unified Soil Classification System (USCS). The USCS visual method must be used on all samples supplemented by the USCS laboratory tests on a representative number of samples from each stratigraphic unit. Logs also must contain a description of matrix and clasts, mineralogy, roundness, color, appearance, odor, and behavior of materials using an appropriate descriptive system. A clear description of the system used must be included with the logs. When undisturbed samples have been taken, the interval tested and the test results must be clearly shown on the logs. All well logs must contain drilling information as observed in the field including; moisture content, location of the water table during drilling, water loss during drilling; depth to significant changes in material and rock; sample recovery measured in tenths of a foot; hammer blow counts, and other pertinent comments; the method of drilling, anomalous features such as gas in the well, and the use and description of drilling fluids or additives, including the source and calculated and actual amounts of materials used.

(ii) Rock core logs must describe the lithology, mineralogy, degree of cementation, color, grain size, and any other physical characteristics of the rock; percent recovery and the rock quality designation (RQD); other primary and secondary features, and contain all drilling observations and appropriate details required for soil boring logs. A clear photographic record of all labeled cores must also be taken and submitted with the logs.

(iii) Well completion logs must contain a diagram of the completed well, all pertinent details on well construction, a description of the materials used, and elevations of all well features.

(iv) Copies of original field logs must be submitted to the department upon request.

(11) In-situ hydraulic conductivity testing. In-situ hydraulic conductivity testing must be done in all monitoring wells and piezometers, unless other methods that are approved by the department, are used. The testing method used must not introduce contaminants into the well. If contamination is known or suspected to exist, all water removed must be properly managed. Hydraulic conductivities may be determined using pump tests, slug tests, packer tests, tracer studies, thermal detection, or other suitable methods. 4140

(12) Water quality sampling and analysis. Water quality samples, low in turbidity, must be collected by personnel trained in sample collection methods and fully informed of the sampling techniques specified in the site investigation and environmental monitoring plans. These plans must specify: how samples will be collected and preserved; chain of custody documentation; analyses required; methods of analyses; and quality control/quality assurance protocols. All methods must be acceptable to the department. A record of the methods employed and the personnel involved must be kept and reported to the department with the analytical data.

(i) Monitoring well sampling techniques must be consistently performed each time a well is sampled, and must comply with the following:

(a) In areas where the presence of explosive or organic vapors is suspected, ambient air in the well must be checked for their presence before the well is evacuated. In addition, before evacuation of the well, static water level must be measured to the nearest one-hundredth of a foot using standard techniques; and for wells with documented contamination, where contamination by non-aqueous phase liquids may be present, standing water in the well must be checked for immiscible layers or other contaminants that are lighter or heavier than water (floaters or sinkers). If present, floaters or sinkers must be sampled and analyzed separately by a method described in the site investigation plan.

(b) Evacuation of the well must replace stagnant water in the well and the sand pack with fresh water representative of the formation. Evacuation methods, including pumping rate, depth of pump intake, and method of determining sufficiency of evacuation must be consistently applied each time the well is sampled. Evacuation methods must create the least possible turbidity in the well and must not lower the water in the well below the top of the sand pack. Evacuated water must be properly managed.

(ii) Surface water sampling. The department may require the sampling and analysis of surface water sampling points in a variety of situations (including, but not limited to, during investigations of existing landfills where an adverse impact to a specific surface water body is suspected; during a site investigation to understand site hydrogeology or existing patterns of contamination; or during contingency monitoring at a facility). Surface water sampling methods must be consistently applied each time a point is sampled and must comply with the following:

(a) Samples collected from shallow water should not include bottom sediment. In shallow moving water, downstream samples must be collected first to avoid disturbing the bottom sediments.

(b) Each water body over three feet deep that is sampled must be checked for stratification, and each stratum must be checked for contamination using field parameters. Each stratum showing evidence of contamination must be separately analyzed. If no stratum shows such evidence, a composite sample having equal parts of water from each stratum must be analyzed.

(iii) Water supply well sampling. If sampling and analysis of water supply wells is done, the analytical requirements (sampling frequency and parameters analyzed) may be less than those specified in subdivision 360-2.11(c) of this Part, with the approval of the department. Sampling methods must be consistently applied each time a well is sampled and must comply with the following:

(a) Before sampling any residential well, the New York State Department of Health or local health department must be notified.

(b) Samples should be collected directly from the well. If not possible, samples must be collected as near to the well as possible and before the water is softened, filtered, or heated.

(c) If possible, samples must be collected before the water enters the pressure tank, otherwise the water must run long enough to flush water stored in the tank and pipes.

(d) Before sampling, water must be evacuated from the well to ensure a fresh sample of aquifer water.

(e) If samples are collected from a tap, aerators, filters, or other devices must be removed before sampling.

(iv) Except as otherwise specified by the department, all samples must be whole and unfiltered and must be collected in a manner which produces the least possible turbidity.

(v) Analysis of water quality data.

(a) Field analysis must be performed after evacuation of the well, either within the borehole using a probe or immediately after

collection. All field test equipment must be calibrated at the beginning of each sampling day and checked and recalibrated according to the manufacturer's specifications. Calibration data must be reported with the analytical results.

(b) Laboratory analyses must be performed using analytical methodologies acceptable to the department, by a laboratory acceptable to by the department. Where necessary to achieve acceptable minimum detection levels, the department may require the use of specific analytical methods.

(c) All samples must be collected and stored in the order of the parameter's volatilization sensitivity using methods, consistently applied, which ensure sample integrity.

(d) After volatile organic samples have been collected, field parameters must be measured from the next sample collected.

(e) All sampling equipment must: be constructed of inert materials designed to obtain samples with minimal agitation and contact with the atmosphere; be cleaned in the laboratory and checked before use and protected during transport to avoid contamination. Dedicated equipment must be constructed of appropriate inert materials and must be appropriate for the type of samples to be taken in the well.

(f) Samples must be properly preserved and delivered to the laboratory within all appropriate holding times for the parameters to be analyzed and with proper chain of custody.

(g) Blanks and replicate samples must be collected and analyzed in accordance with a method acceptable to the department.

(b) Site investigation report. The site investigation report must include, at a minimum, a final version of the site investigation plan, raw field data collected, analytical calculations, maps, flow nets, cross sections, interpretations (and alternative interpretations where applicable) and conclusions. Such report must comprehensively describe, as a minimum:

(1) Regional geology. The discussion of regional geology must demonstrate how the regional geology relates to the formation of on-site geologic materials, the potential for and effects of off-site contaminant migration, and the location of nearby sensitive environments. This discussion must include available and appropriate information to describe:

(i) bedrock stratigraphy and structural features (represented on maps and columnar diagrams) constructed from field exposures and the geologic literature and describing formation and member names, geologic ages, rock types, thicknesses, the units' mineralogic and geochemical compositions and variabilities, rock fabrics, porosities and

bulk permeabilities, including karst development, structural geology including orientation and density or spacing of folds, faults, joints, and other features;

(ii) glacial geology including a discussion of the formation, timing, stages, and distribution of glacial deposits, advances and retreats of ice, hydrologic characteristics of the surficial deposits, such as kames, eskers, outwash moraines, etc.;

(iii) major topographic features, their origin and influence upon drainage basin characteristics; and

(iv) surface water and groundwater hydrologic features, including surface drainage patterns, recharge and discharge areas, wetlands and other sensitive environments, inferred regional groundwater flow directions, aquifers, aquitards and aquicludes, and known primary water supply and principal aquifers, public water supply wells, and private water supply wells identified in the water supply well survey; any known peculiarities in surface water and groundwater geochemistry and any other relevant features.

(2) Site specific geology. The site investigation report must define site hydrogeologic conditions in three dimensions and their relationship to the proposed landfill. The report must define site geology, surface water and groundwater flow, and must relate site-specific conditions to the regional geology. The report must describe the potential impact the landfill may have on surface and groundwater resources and other receptors, including future hydrogeologic conditions which may occur with site development, and must describe the hydrogeologic conditions in sufficient detail to construct a comprehensive understanding of groundwater flow which can be quantified and verified through hydrologic, geochemical, and geophysical measurements. The report must provide sufficient data to specify the location and sampling frequency for environmental monitoring points; form the basis for contingency plans regarding ground and surface water contamination and explosive gas migration; and support the engineering design of the landfill.

The site-specific hydrogeologic evaluation must specifically discuss all units in the critical stratigraphic section. Such evaluation must include maps, cross-sections, other graphical representations, and a detailed written analysis of the following:

(i) all hydrogeologic units such as aquifers, aquitards and aquicludes, and how they relate to surface water and groundwater flow. This must include all hydrogeologic data collected during the site investigation and explain and evaluate the hydrologic and engineering properties of the site and each specific unit; and

(ii) local groundwater recharge and discharge areas, high and low groundwater tables and potentiometric surfaces for each hydrologic unit, vertical and horizontal hydraulic gradients, groundwater flow

directions and velocities, groundwater boundary conditions, surface and groundwater interactions, and an evaluation of existing water quality.

(c) Environmental monitoring plan. The environmental monitoring plan must describe all proposed on-site and off-site monitoring, including the location of all environmental, facility, and other monitoring points, sampling schedule, the method of sample collection and preservation, chain of custody documentation, analyses to be performed, analytical and statistical methods, and reporting requirements. The plan must also include a schedule for initiation of the existing water quality and operational water quality monitoring programs and a contingency water quality monitoring plan which specifies trigger mechanisms for its initiation. The plan must comply with the following:

(1) Groundwater sampling. Groundwater monitoring wells must be capable of detecting landfill-derived groundwater contamination within the critical stratigraphic section.

(i) Horizontal well spacing.

(a) Horizontal well spacing must be based upon site-specific conditions including groundwater flow rates, estimated longitudinal and transverse dispersivity rates, proximity to or presence of sensitive environments and groundwater users, the nature of contaminants disposed of at the site, and the proposed design and size of the landfill including capability for liner monitoring through a leak detection system.

(b) In the first water-bearing unit of the critical stratigraphic section, monitoring well spacing must not exceed 500 feet along the downgradient perimeter of the facility. In sensitive environments or geologically complex environments, closer well spacing may be required. Up-gradient or cross-gradient well spacing must not exceed 1500 feet and may be less in sensitive environments or where up-gradient sources of contamination are known to exist. Subsequent water-bearing units must be monitored as required by the department based upon the potential for contaminant migration to that unit. At a minimum, well spacing must provide at least one upgradient and three downgradient monitoring wells or well clusters for each water-bearing unit of the critical stratigraphic section.

(c) Sensitive environments or areas where public health concerns exist will be subject to more intensive groundwater monitoring requirements. In addition, the department may require the applicant to develop acceptable computer models of contaminant plume behavior from hypothetical leaks in the liner system, if necessary to determine optimum monitoring well spacing.

(d) In areas where water flow is irregular and unpredictable, the applicant may be required to conduct spring, sinkhole, or other sampling to enhance the monitoring.

(e) All downgradient monitoring wells must be located as close as practical to the waste boundary to ensure early detection of any contaminant plume.

(ii) Well screen placement.

(a) Well screens must be located to readily detect groundwater contamination within the saturated thickness of the first water-bearing unit and must be installed at a representative number of points at each subsequent permeable unit throughout the critical stratigraphic section. Well screens must not act as conduits through impermeable layers. Wells monitoring the unconfined water table should be screened to ensure that the water table can be sampled at all times.

(b) Upgradient and cross gradient wells must monitor the same units within the critical stratigraphic section as the downgradient monitoring wells.

(iii) Screen length. Well screens must not exceed 20 feet in length unless otherwise approved by the department. The applicant must provide technical justification for the actual screen length chosen.

(iv) Geophysical and geochemical techniques. Where existing contamination is suspected, the department may require the use of geophysical and geochemical techniques to locate contaminated zones before selecting appropriate well locations and screen depths for environmental monitoring points.

(v) If a groundwater suppression system exists at a facility, the department may require representative sampling points to be designated as environmental monitoring points. Existing water quality monitoring at these points may not be required.

(2) Surface water sampling. The environmental monitoring plan must designate monitoring points, for use in contingency monitoring of the facility pursuant to subparagraph 360-2.11(c)(4)(iii) of this Part, for all surface water bodies that may be significantly impacted by a contaminant release from the facility. In bodies of standing water, these points must be located at the closest point to the facility and must be included in existing water quality monitoring. In flowing water bodies these points must include sufficient upgradient and downgradient locations to allow the facility's impact to be measured. These points, however, do not require existing water quality analysis. The detailed sampling and analysis requirements of these points must be specified in the contingency monitoring plan.

(3) Leachate sampling. The environmental monitoring plan must specify the location of and proposed analytical protocol for facility leachate sampling so as to obtain a representative characterization of the leachate composition in the primary leachate collection and removal system and to determine the nature of liquids detected in the secondary leachate collection and removal system. This protocol must include the following:

(i) Sampling points. All sampling points should be located to minimize pumping of leachate before sampling. Sampling points in the secondary leachate collection system should be adequate to sample liquids beneath each discrete leachate collection area or landfill cell.

(ii) Analysis required. Except as allowed by the department when a specific waste stream and its leachate are already well defined, initial analysis of the leachate in the primary leachate collection and removal system must be performed quarterly for expanded parameters. The department may require the use of specific analytical methods in these analyses when minimum detection levels are determined inadequate to fully characterize leachate. When required (see subparagraph 360-2.11[c][3][iii]) analysis of sampling points in the secondary leachate collection and removal system must be the same as operational water quality specified for the environmental monitoring points.

(iii) The environmental monitoring plan should specify the conditions under which monitoring and analysis of liquids in the secondary leachate collection and removal system will be conducted and the frequency of such monitoring and analysis.

(iv) The plan must also specify the conditions under which a reduction of analytical requirements (frequency and parameters analyzed) may be considered and the measures that will be taken thereafter to monitor the facility's leachate collection and removal systems.

(4) Water quality monitoring program. A water quality monitoring program must be implemented for all environmental monitoring points specified in the environmental monitoring plan. This program must be tailored to the site to establish existing water quality for the site prior to landfilling, operational water quality during operation of the site and the post-closure period, and contingency water quality if contamination is detected at the site. These programs must meet the following minimum requirements:

(i) Existing water quality. The applicant must establish an existing water quality database to characterize the site geochemistry.

(a) The permit application must contain a preliminary evaluation of water quality consisting of the first two rounds of sampling and analyses for a representative number of monitoring points in each water bearing hydrogeologic unit within the critical stratigraphic section. The first round of these samples must be analyzed for the expanded parameters. The second round must be analyzed for routine parameters except as specified in clause 360-2.11(c)(4)(i)(d) of this Part. These samples should be taken in early spring and late summer, or equivalent, to approximate periods of high and low groundwater flow. The department may require sampling and analysis of additional monitoring points as necessary to define site hydrogeology and geochemistry in support of the interpretations and conclusions of the site investigation report.

(b) Before disposition of waste in the facility all environmental monitoring points not previously sampled must be sampled and analyzed for two rounds of quarterly sampling. Except as specified in clause 360-2.11(c)(4)(i)(d) of this Part, the first of these rounds must be analyzed for the baseline parameters and subsequent rounds must be analyzed for routine parameters.

(c) Existing water quality monitoring must be continued until all environmental monitoring points have received, as a minimum, four rounds of quarterly sampling.

(d) If elevated contaminant levels are detected and additional detailed information is needed to establish a complete existing water quality database, the department may require one or more rounds of baseline or expanded parameter sampling and analysis in any sampling point, using the procedure specified for contingency monitoring required in subparagraph 360-2.11(c)(4)(iii) of this Part when contamination is detected.

(e) Additional sampling and analysis beyond the site boundaries may be required to determine the nature and extent of contamination and the source, if possible. This evaluation may include construction, sampling, and analysis of any additional monitoring wells, and surface water sampling points required by the department. Based upon the results of this additional data, the department may require analysis for any and all expanded parameters, to be included in quarterly or annual operational water quality sampling.

(ii) Operational water quality. The environmental monitoring plan must include a plan for operational water quality monitoring to be conducted during the operation, closure, and post-closure periods of the facility. The operational water quality monitoring plan must be able to distinguish landfill-derived contamination from the existing water quality at the site. The plan also must describe trigger mechanisms for initiating contingency water quality monitoring. The department may require modification of this plan as additional sampling data becomes available throughout the life of the facility. The minimum requirements for operational water quality monitoring are:

(a) Except as provided below in each calendar year, sampling and analysis must be performed at least quarterly, once for baseline parameters and three times for routine parameters. At environmentally sensitive sites the department may require more frequent sampling and analysis. The baseline sampling event must be rotated quarterly; one round of baseline parameters to be analyzed in each calendar year will be sufficient unless a pattern of contamination exists which may require the department to change the sampling frequency. For double lined landfills not located in a sensitive environment the department may allow omission of the winter sampling once a complete understanding of water chemistry has been obtained, provided that the liner performance is acceptable to the department.

(b) The department may approve phased sampling, where hydrogeologic conditions warrant, as landfill cells are constructed or as post-closure monitoring is completed as specified in subdivision 360-2.15(i) of this Part. With department approval, sampling of specific environmental monitoring points which are not potentially impacted by the portions of the landfill already constructed, may be deferred, provided that scheduled sampling commences at least one year before landfill construction in the vicinity. The department may withdraw this approval at any time based upon a change in facility design, operation, or performance.

(c) Routine and baseline analysis must include at least those parameters specified in the Water Quality Analysis Table. The department may modify this table before granting a permit for the facility, or during the duration of the permit if leachate composition so warrants. If subsequent leachate compositions vary or if the waste disposed of at the facility changes, the department may reinstate analytical requirements.

18-324

(iii) Contingency water quality. The environmental monitoring plan must include a plan for contingency water quality monitoring as described in this subparagraph which must be conducted when contamination is found. All contingency water quality monitoring plans are subject to department approval, may be modified at any time by the department when necessary to protect public health and the environment, and must include the following:

(a) If contamination for one or more routine parameters is found, then:

(1) the owner or operator of the facility must sample and analyze all affected monitoring points for the baseline parameters during the next quarterly sampling event. If the contamination detected by the baseline poses an immediate threat to public health or the environment as determined by the department, additional or more frequent sampling may be required as part of a corrective action plan approved by the department.

(2) Subsequent sampling and analysis for baseline parameters must be conducted at least semiannually until the conditions for curtailing contingency water quality monitoring specified in clause (d) of this subparagraph are met.

(b) If, during analysis for baseline parameters, contamination by any toxic metal, cyanide, volatile organic compound, or other substance identified in Appendix 33 of Part 373-2 of this Title (see section 360-1.3 of this Part) is found, then:

(1) the owner or operator of the facility must sample the appropriate environmental monitoring points, in the next scheduled sampling event after receiving the analytical results from the laboratory, and analyze for all of the expanded parameters listed in the Water Quality Analysis Table; and

(2) unless the department requires more frequent sampling to evaluate a potential or adverse environmental impact or perceived health risk, and until the condition of clause (d) of this subparagraph are met, subsequent annual analyses of these monitoring points must include all expanded parameters. Subsequent quarterly analyses must include all routine parameters and those baseline and expanded parameters that were elevated or were implicated in the expected pattern of contamination.

(c) The department may require initiation of specific contingency water quality monitoring based upon landfill containment failure shown by any means.

(d) Once initiated, contingency water quality monitoring must be continued until the elevated parameter is shown not to be landfill-derived, or that the release by the landfill has been remediated. Contingency water quality monitoring also may be reduced or discontinued with the approval of the department if such monitoring is no longer needed to protect public health or the environment.

(e) Where existing water quality shows contamination, the applicant must establish a contingency water quality monitoring plan capable of detecting additional groundwater contamination from the proposed facility. As a minimum, this plan must meet the requirements of subdivision 360-2.11(c) of this section.

(iv) Reporting of data. Unless more rapid reporting is required to address an imminent environmental or public health concern, the owner or operator of the facility must report all water quality monitoring results to the department on a quarterly basis as specified in subdivision 360-1.4(c) of this Part. The report must include:

(a) A table showing the sample collection date, the analytical results (including all peaks even if below MDL), designation of upgradient wells and location number for each environmental monitoring point sampled, applicable water quality standards, New York State Department of Health guidance values and statistical triggers, QA/QC notations, method detection limits (MDL), and Chemical Abstracts Service (CAS) numbers on all compounds.

(b) In addition, tables or graphical representations comparing current water quality and existing water quality and upgradient water quality must be presented. These may include Piper diagrams, Stiff diagrams, tables, or other analyses.

(c) A summary of the contraventions of State water quality standards, and discussion of results, including elevations of parameters above background concentrations or statistical trigger values; and any proposed modifications to the sampling and analysis schedule necessary to meet the requirements of subparagraphs (i) through (iii) of this paragraph.

(d) Any determination of contamination detected must be reported to the department within 14 days of such determination.

(e) All QA/QC documentation must be made available to the department upon request.

(f) The annual report must contain a summary of the water quality information presented in clauses (b) and (c) of this subparagraph with special note of any changes in water quality which have occurred throughout the year.

(5) Contaminant trigger mechanisms. In sensitive environments or in areas of existing contamination, the department may require the environmental monitoring plan to specify contaminant levels which when exceeded will signal groundwater contamination and commence contingency water quality monitoring and possibly remedial actions.

(6) The following Water Quality Analysis Table in this section lists the baseline, routine, and expanded parameters for analysis of all monitoring samples.

WATER QUALITY ANALYSIS TABLE

	GROUND AND SURFACE WATER		
	Baseline Parameters	Routine Parameters	Expanded Parameters
FIELD PARAMETERS			
Static water level (in wells and sumps)	x	x	x
Specific Conductance	x	x	x
Temperature	x	x	x
Floaters or Sinkers[1]	x		x
pH	x	x	x
Eh	x	x	x
Dissolved Oxygen[2]	x	x	x
Field Observations[3]	x	x	x
LEACHATE INDICATORS			
Total Kjeldahl Nitrogen (TKN)	x		x
Ammonia	x	x	x
Nitrate	x	x	x
Chemical Oxygen Demand (COD)	x	x	x
Biochemical Oxygen Demand (BOD_5)	x		x
Total Organic Carbon (TOC)	x	x	x
Total Dissolved Solids (TDS)	x	x	x
Sulfate	x	x	x
Alkalinity	x	x	x
Phenols	x	x	x
Chloride	x	x	x
Total hardness as $CaCO_3$	x	x	x
Turbidity	x	x	x
Color	x		x
Boron	x		x
METALS			
Potassium	x	x	x
Sodium	x	x	x
Iron	x	x	x
Manganese	x	x	x
Magnesium	x	x	x

Section 360-2.12 Landfill siting.

(a) Applications for permits to construct and to operate a new landfill must include a site selection study report. Applicants are encouraged to discuss the proposed site selection process with the department before initiating the siting study and to keep the department informed as the process proceeds.

(1) The report must describe the process used to select the proposed site, including evaluation criteria, deferral (elimination) criteria, assumptions, data sources, decision making means (such as numerical ranking systems) and other factors used to make the siting decisions. The report must demonstrate that the range of alternative sites evaluated was reasonable considering the objectives and capabilities of the applicant, and that the selected site is the most appropriate alternative. The decision making process must be described to provide a clear understanding of how and why the siting decisions were made, at a level of detail sufficient to provide for a comparative assessment of the alternatives discussed.

The report must also include maps of sites and describe the results of the field investigations, the comparative advantages and disadvantages of the highest ranked sites, and the basis for selecting the proposed sites.

(2) The site selection process must be comprehensive and it must identify and evaluate the complete range of alternative sites which are feasible considering the objectives and capabilities of the applicant. All of the criteria used to eliminate and evaluate the suitability of the potential sites must be clearly defined and consistently applied. An iterative (phased) approach should be used, in which a more detailed evaluation of sites occurs as the number of potential sites is reduced.

(i) Initially, the applicant must exclude inappropriate siting areas by avoiding the prohibited siting areas identified in section 360-1.14 of this Part and applying the landfill siting restrictions identified in subdivision 360-2.12(c) of this Part.

(ii) The applicant then should evaluate the remaining potential siting areas to identify alternative sites that are suitable for landfill development. At a minimum, the applicant must apply the landfill siting requirements identified in subdivision 360-2.12(d) of this Part to evaluate the suitability of potential sites. When applying the siting requirements, the evaluation must include the use of the type of data listed in paragraph 360-2.11(a)(2) of this Part, field reconnaissance to confirm the published information and a morphologic evaluation of landforms to identify the areas which are likely to have the thickest low permeable soils available within the study area.

(iii) The applicant should then evaluate the preferred sites, identified as required in subparagraph 360-2.12(a)(2)(ii) of this section,

to identify the sites that appear to be the most environmentally suitable. At a minimum, the site evaluation criteria in subdivision 360-2.12(e) of this Part must be applied to evaluate the suitability of these sites for landfill development.

(iv) Preliminary field investigations must be conducted at the highest ranking available site or sites, to identify any major obstacles to site development, and to provide sufficient data to differentiate among the preferred sites and support a siting decision.

(b) A site selection study will not be required pursuant to this Part for expansions of existing facilities if the proposed expansion is not located in an area identified in subdivision 360-1.14(c) of this Part; complies with the landfill siting restrictions identified in subdivision 360-2.12(c) of this Part; is consistent with the intent of the landfill siting requirements of subdivision 360-2.12(d) of this Part and can satisfy the landfill construction requirements identified in section 360-2.13 of this Part. For such expansions, the site selection report may be limited to a demonstration of the suitability based upon these criterion.

(c) Landfill siting restrictions. In addition to the provisions of subdivision 360-1.14(c) of this Part, the following landfill siting restrictions apply.

(1) Primary water supply and principal aquifers:

(i) Except in Nassau and Suffolk Counties, and except as provided in subparagraph (ii) of this paragraph, no new landfill and no lateral expansion of an existing landfill may be constructed over primary water supply aquifers, principal aquifers, or within public water supply wellhead areas.

(ii) The commissioner may allow lateral expansions of landfills in operation on the effective date of this Part that are on principal aquifers if there is a demonstrated public need for the capacity provided by the expansion that cannot be reasonably provided elsewhere and that outweighs the potential risk of contamination to the aquifer. Additionally, the facility's expansion must promote the implementation of the State's solid waste management priorities set forth in ECL 27-0106 and must be an integral part of any local solid waste management plan that may be in effect for the planning unit (as defined in ECL 27-0107) within which the facility is located; and the expansion must comply with all other requirements of this Part. However, the maximum time period allocated by the commissioner for any such expansion must not exceed seven years from the effective date of this Part. In granting any expansion under this subparagraph, the department must impose specific conditions that are reasonably necessary to assure that the expansion will, to the extent practicable, have no significant adverse impacts on public health or safety or on the environment and such approval contributes to the proper management of solid waste at the earliest possible time.

(iii) The required horizontal separation between deposited solid waste, and primary water supply aquifers, principal aquifers or public water supply wellhead areas must be sufficient (based on the rate and direction of groundwater flow, landfill design, and requirements for corrective action in the event of failure of the facility's containment system) to preclude contravention of groundwater standards in the aquifer.

(2) Floodplains. A new landfill must not be constructed or operated on a floodplain. Expansions of existing landfills must meet the provisions of paragraph 360-1.14(c)(2) of this Part.

(3) Airports.

(i) A landfill or landfill cell into which putrescible solid waste is proposed to be disposed must be located no closer than 5,000 feet from any airport runway used by piston-type aircraft and no closer than 10,000 feet from any airport runway used by turbojet aircraft.

(ii) The permittee of an existing landfill or landfill cell that is authorized to dispose of putrescible solid waste and that is located within 10,000 feet of any airport runway used by turbojet aircraft or within 5,000 feet of any airport runway used only by piston-type aircraft must demonstrate in its permit renewal application that the landfill or landfill cell does not pose a bird hazard to aircraft.

(iii) Landfills containing only non-putrescible solid waste may be located within 10,000 feet of any airport runway used by turbojet aircraft or within 5,000 feet of any airport runway used only by piston-type aircraft but their height must not present a safety hazard to air traffic.

(4) Unstable areas.

(i) A landfill must not be located in unstable areas where inadequate support for the structural components of the landfill exist or where changes in the substrate below or adjacent to the landfill may result in failure of the facility. An application for expansion of an existing landfill must demonstrate that adequate support for the structural components of the landfill exists or can be engineered to support any additional loads that may be generated by continued operation of the facility.

(ii) Factors to be considered when determining unstable areas include: soil conditions that may result in differential settling and subsequent failure of dikes, berms, or containment structures; geologic or man-made features or events that may result in sudden or gradual failure of dikes, berms or containment structures; the anticipated loading due to height and density of waste deposition; and the stability characteristics of the waste to be deposited.

(5) Unmonitorable or unremediable areas. New landfills must not be located in areas where environmental monitoring and site remediation cannot be conducted. Identification of these areas must be based upon ability to sufficiently characterize groundwater and surface water flow to locate upgradient and downgradient directions; ability to place environmental monitoring points which will detect releases from the landfill; ability to characterize and define a release from the landfill and determine what corrective actions are necessary; and ability to carry out those corrective actions.

Landfill expansions adjacent to existing landfills which are already contaminating groundwater may be allowed by the department if the proposed expansion area can be constructed in a way that demonstrates compliance with the regulations. This may be demonstrated using remedial actions at the existing site resulting in a demonstrated improvement in groundwater quality; acceptable levels of leachate in the secondary (detection monitoring) leachate collection and removal system of the expansion; and any additional monitoring requirements that the department needs to ensure the integrity of the expansion area, which may include lysimeter studies beneath the new liner, statistical triggers of groundwater monitoring, tracers, additional monitoring wells surrounding the entire site, and any other monitoring methods required by the department.

(d) Landfill siting requirements. The following criteria must be considered in a landfill site selection study:

(1) Unconsolidated deposits on the site must be those most likely to minimize the migration of contaminants from the facility. Preferred sites should be underlain by thick sequences of homogenous, clay and silt rich, low permeability materials where permeable lenses and channels are unlikely to be present. In evaluating alternative sites, preferred sites should have the greatest possible thickness of these materials to provide a barrier to contaminant migration into bedrock.

(2) Bedrock subject to rapid or unpredictable groundwater flow without thick, low permeability cover must be avoided. Preferred sites should have the greatest possible thickness of low permeability materials.

(3) Groundwater flow and quality evaluation. Probable groundwater flow patterns and water quality must be considered in finding areas where containment failure would do the least environmental damage and would be easiest to correct.

(4) Proximity and hydrogeologic relationship to water supply sources.

(5) Natural topography and its impacts upon the proposed facility.

(6) Relationship to mines, caves, or other anomalous hydrogeologic features that might alter groundwater flow.

(e) Site evaluation criteria. The following criteria must be considered when evaluating the environmental suitability of potential landfill sites:

(1) population density and anticipated growth, both around the site and around major transportation routes to the facility;

(2) adequacy of transport routes for the anticipated additional traffic and any increased safety hazards which may result;

(3) proximity to incompatible structures such as schools, churches, nursing homes, hospitals, commercial districts, etc.;

(4) proximity to utility lines and the likely effects, if any, the facility may have upon them;

(5) impacts upon the host community including conformance with local land use planning and zoning restrictions and any financial impacts the facility may have upon the community;

(6) risk due to fires and availability of appropriate emergency services;

(7) impacts of the facility upon the environment, including air quality and visual impacts;

(8) proximity to open space, cultural, historical, and recreation resources; and

(9) impacts on agriculture and agricultural land.

Section 360-2.13 Landfill construction requirements.

Except as otherwise expressly provided in section 360-2.14 of this Part, all landfills regulated under this Subpart must conform to the requirements set forth in this section:

(a) Horizontal separation requirements.

(1) The minimum horizontal separation between a landfill and the property line must be 100 feet as measured from the toe of the proposed final cover slope.

(2) The required horizontal separation between deposited solid waste and any surface waters must be adequate to preclude contravention of State surface water standards in the surface water body or flooding of the landfill from the surface water body. In no case can solid waste be deposited closer than 100 feet from the mean high water elevation of any surface waters.

of subdivisions 360-2.13(j) and (k) of this Part with the exception of subparagraph 360-2.13(j)(1)(i) of this Part.

(iii) The leachate collection and removal system above the liner system must be designed, constructed, maintained, and operated to collect and remove leachate from the landfill and ensure that the leachate head on the liner system does not exceed one foot at the expected flow capacity, except during storm events. This collection and removal system must be designed and constructed, at a minimum, in accordance with the requirement of subdivisions 360-2.13 (l) and (m) of this Part (with the exception of subparagraph 360-2.13[l][2][ii] of this Part).

(iv) The leachate collection and removal system must be designed and constructed to operate without clogging throughout the effective facility life and post-closure maintenance period. The leachate collection and removal pipe network must be designed to be accessible for routine cleaning and maintenance.

(v) The provisions of section 360-2.15 of this Part apply to these monofills with the exception that a gas venting layer is not required.

(2) All monofills used for disposal of fly ash only and all monofills in Nassau and Suffolk Counties used only for disposal of ash residue (including fly ash treated in a manner consistent with paragraph 360-3.5[g][2] of this Part) are subject to all the requirements of this Subpart with the exception of the gas venting requirements specified in the section 360-2.15 of this Part.

Section 360-2.15 Landfill closure and post-closure criteria.

In addition to the requirements of Subpart 360-1 and sections 360-2.13 and 360-2.17 of this Part, all landfills subject to regulation under this Part must conform to the requirements for closure and post-closure care set forth in this section. Complete applications to construct and operate a new, or an expansion to an existing, landfill must contain a closure plan. For existing sites where this information is known through previous efforts (such as monitoring of the facility during its operating life), some or all of the requirements of subdivision 360-2.15(a) of this Part may be waived upon approval of the department.

(a) To ensure that an adequate closure plan is developed, the nature and extent of current and potential release or migration of contaminants from the site must be defined. The minimum elements of a site investigation are as follows:

(1) A hydrogeologic investigation performed using the methods described in Section 360-2.11 of this Part that must, at a minimum:

(i) define the geologic and hydrogeologic conditions of the first water bearing unit, and, as required by the department and any other

units in the critical stratigraphic section which may be impacted by the facility;

(ii) establish a long-term monitoring well network in the first water bearing unit, and other units necessary to protect public health and the environment, to monitor the effects of facility closure or remediation; and

(iii) the initial round of samples in each monitoring point must be analyzed for baseline parameters. If contamination is detected the department may require additional sampling and analysis.

(2) An explosive gas investigation must be performed in accordance with the requirements of subdivision 360-2.17(f) of this Part. The intent of this investigation must be to:

(i) identify the presence and concentration of explosive gases at or near the landfill;

(ii) determine the extent of actual or potential gas migration off-site; and

(iii) identify the soil stratigraphy beneath and around the landfill.

(3) For landfills existing on or after the effective date of this Part, a surface leachate investigation must be performed. The objectives of this investigation must be to identify the presence of uncontrolled leachate at or emanating from the landfill; to document any instances where fugitive leachate from the landfill is discharging into local surface waters; and to characterize the chemical constituents of surface leachate.

(4) For landfills existing on or after the effective date of this Part, a vector investigation must be performed to identify the presence of any vectors at the landfill including, but not limited to, rodents, insects, and birds.

(5) Upon completion of the closure investigation, the data must be compiled and presented in a closure investigation report submitted to the department. The report must include a summary that describes the environmental conditions including, but not limited to, general site conditions, land use, soil conditions, hydrogeologic characteristics, surface and groundwater quality, presence and migration of explosive gas and surface leachate and vector populations. Landfill owners or operators or their consultants should have preliminary discussions with the appropriate regional solid waste engineer to review the specific landfill considerations and findings of the closure investigation.

(b) Final cover system. At a minimum, final cover must consist of a layered system meeting the following requirements: the bottom layer of a

final cover system must consist of a gas venting layer meeting the requirements of subdivision 360-2.13(p) of this Part, overlain by a low permeability barrier layer and a barrier protection layer meeting the requirements of either subdivision 360-2.13(q) or subdivision 360-2.13(r) of this Part, and a topsoil layer meeting the requirements of subdivision 360-2.13(s) of this Part.

(c) Landfill gas control systems must be designed to prevent the migration of concentrated amounts of landfill gases off-site. Gas venting systems are necessary for all landfills upon closure and must be designed and constructed in accordance with the requirements of subdivision 360-2.13(p) of this Part. These systems must prevent the accumulation of gas at greater than 25 percent of the lower explosive limit in structures on-site and off-site; prevent damage to vegetation both on the final cover and off-site; and control objectionable odors due to any gas emissions.

(d) Perimeter gas collection systems must be installed if landfill gases are found to pose a hazard to health, safety, or property. Perimeter gas collection systems must be designed and constructed in accordance with the requirements of this subdivision along with any other provisions required by the department. A perimeter gas collection system must consist of either:

(1) trenches keyed into a low permeability soil, a bedrock layer or the seasonally low groundwater table which can effectively cut off the lateral migration of gas; or

(2) gas wells screened in the unsaturated zone to the seasonably low water table or low permeability soil/bedrock layer that are spaced along the perimeter of the landfill to sufficiently prevent gas migration.

(e) All gas control systems which utilize flares must be designed in accordance with any applicable requirements of Parts 201 and 212 of this Title.

(f) Condensate generated and collected from gas processing or control systems must not be recirculated into the landfill unless analysis of the condensate demonstrates that it is acceptable to allow recirculation into landfills which have operating liner and leachate collection systems, providing it is demonstrated that the landfill is in compliance with the provisions of section 360-2.17 of this Part, and written approval is obtained from the department. Otherwise, the condensate must be appropriately disposed of by other means.

(g) If required by the department, a leachate collection system must be constructed to control leachate outbreaks that could adversely affect the landfill cover or threaten surface waters. If the collection system includes the construction and operation of a leachate storage facility, such facility must be designed, constructed, and operated in accordance with the requirements of Subpart 360-6 of this Part.

(h) If, through the site closure investigation report, vector problems are identified, an appropriate remediation program must be implemented. The vector remediation program must be implemented to mitigate vector problems before cessation of waste disposal occurs at the landfill.

(i) Post-closure operation and maintenance.

(1) For landfills existing on or after the effective date of this Part that are without a department approved plan for closure where the maximum slope of 33 percent was exceeded before the effective date of this Part, the landfill may be closed with slopes exceeding 33 percent if supported by a slope stability analysis, which must be submitted to the department, and providing the following are met:

(i) Final grades must not exceed 50 percent for more than a 20 feet vertical rise.

(ii) For longer slopes, run-off diversion terraces must be constructed at vertical intervals not exceeding 20 feet. The terraces must be designed to intercept runoff for diversion to appropriately spaced drainage ways leading off the landfill slopes. All terrace and drainage way slopes must be at least four percent.

(2) Drainage control structures must be designed, graded, and maintained to prevent ponding and erosion to the cover. The surface drainage system must be designed and constructed to protect the cover from, at a minimum, the peak discharge of a 24 hour - 25 year frequency storm.

(3) Soil cover integrity, slopes, cover vegetation, drainage structures, and gas venting structures must be maintained during the period of post-closure monitoring and maintenance or as required by the department.

(4) Environmental and facility monitoring points must be maintained and sampled during the post-closure period for a minimum of thirty years. Annual summary reports must be submitted to the department. Annual baseline and quarterly routine monitoring must be performed on groundwater, surface water and leachate samples for a minimum period of five years. The requirements for subsequent analysis will be determined at the end of each five year period by the department.

(5) Maintenance of the leachate collection system is required for landfill closure and the method of leachate treatment or disposal must be addressed for as long as leachate is capable of adversely impacting the environment.

(6) A vegetative cover must be established and maintained on all exposed final cover material within four months after placement. If this cannot be achieved due to seasonal constraints, measures must be taken to

ensure the integrity of the final cover system before the establishment of vegetative cover.

(7) A post-closure monitoring and maintenance operations manual is required. This document must provide personnel with detailed instructions for assuring efficient monitoring, leachate management which would include recording of the total volume of leachate stored and removed from the facility, sampling and analysis, and proper maintenance of all facility components to maintain the facility and meet the requirements of this Part for a minimum period of 30 years after landfill closure. This manual must be submitted with the closure plan developed in accordance with this Part.

Section 360-2.16 Landfill gas recovery facilities.

(a) This section regulates the construction and operation of all landfill gas recovery facilities (LGRF) that remove landfill gas from landfills subject to regulation under the provisions of this Part.

(b) All LGRF's existing on the effective date of this Part must obtain a permit to operate pursuant to this Part. All such LGRF's that are operating without such a permit must submit to the department within 180 days after the effective date of this Part a complete application prepared in accordance with the provisions of this subdivision and containing the following:

(1) An engineering plan detailing:

(i) A vicinity plan or map that must show the area within one mile of the boundaries of the landfill from which the gas is being recovered; the existing and proposed zoning and land uses within that area; and residences, access roads, and other existing and proposed man-made or natural features relating to the landfill gas recovery facility and associated landfill.

(ii) A site plan (certified by an individual licensed to practice land surveying in the State of New York) showing the landfill's property boundaries from which the landfill gas is to be removed; the location of the landfill gas recovery facility; off-site and on-site utilities including electric, gas, water, storm, and sanitary sewer systems and right-of-way easements; the names and addresses of abutting property owners; the location of existing and proposed gas venting structures, wells, piezometers, environmental and landfill monitoring points and devices identified in accordance with a numbering system acceptable to the department and whose horizontal and vertical locations are accurate to the nearest five hundredths and one hundredth foot, respectively, as measured from the ground surface; and on-site buildings and appurtenances, fences, gates, roads, parking areas, drainage culverts, and signs; the delineation of the total landfill area from which landfill gas is to be recovered including sequential or planned modular development of the landfill's

APPENDIX B

HWR-88-4007
May 9, 1988

New York State Department of Environmental Conservation

MEMORANDUM

RECEIVED FEB 05 1990

TO: Regional Solid and Hazardous Waste Engineers, Bureau Directors and Section Chiefs
FROM: Michael J. O'Toole, Jr., Acting Director, Division of Hazardous Waste Remediation
SUBJECT: DIVISION TECHNICAL/ADMINISTRATIVE GUIDANCE MEMORANDUM: PHASE II INVESTIGATION GENERIC WORK PLAN
DATE: MAY 09 1988

Michael J. O'Toole Jr.

The objective of a Phase II investigation carried out by consulting firms under contract with the Division of Hazardous Waste Remediation, Bureau of Hazardous Site Control, is to determine if contaminants are leaving an inactive hazardous waste site with a resulting impact on human population and/or the environment.

This document describes the requirements of a Phase II investigation of inactive hazardous waste sites, and should be used in the review of Phase II investigation reports to ensure that all applicable items have been met.

The Bureau of Hazardous Site Control (BHSC) requires that certain aspects be addressed in any investigative work (Phase II) undertaken to determine the hazardous nature of a site. This document describes the applicable work and reporting that must be accomplished by the consultant in performing a Phase II investigation; the requirements by the Division of the consultant in performing a satisfactory Phase II investigation are not limited to the items described herewith, but may include other needs to satisfy unanswered questions on a site-specific basis.

This generic work plan will be divided into nine main areas:

1. Geophysical Survey
2. Well Drilling/Development
3. Recommended Well Sampling and Analyses
4. Environmental Sampling
5. QA/QC Protocols
6. Health and Safety
7. Work Plan Format
8. Phase II Report Format
9. Special Conditions

1. Geophysical Survey

The broad considerations are:

a. Location of buried materials
b. Determination of the presence of contaminant plumes
c. Characterization of subsurface conditions

APPENDIX C

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL
GROUNDWATER WELL INSTALLATIONS
D-4

DATE: Tuesday, October 16, 1990

PRESENT:

Peter Dermody	Fanning, Phillips and Molnar
Keith S. Robins	Fanning, Phillips and Molnar
Phil	R&L Well Drilling
Greg	R&L Well Drilling
Ben	R&L Well Drilling
John Conover	Assistant Sanitary Engineer NYSDEC, Division of Hazardous Waste Remediation

WEATHER: 70°F, Sunny

OBJECTIVE: To set up for drilling groundwater well D-4 at the southwest corner of the landfill next to methane well M-5. The surface elevation at the well location is approximately 75 feet above MSL.

DETAILS:

Arrived on site at 8:00 a.m. and inspected drilling location. We left for the Montauk Landfill to perform methane monitoring and returned at 10:00 a.m. R&L had arrived at 9:30 a.m. and began setting up for drilling. Water was provided by the hydrant north of the Sewage Treatment Plant on Abraham's Path. A 1000 gallon tank was mounted on an R&L truck for this purpose. R & L had a Suffolk County Water Authority Hydrant Permit which had been obtained during installation of the methane wells in the spring.

Construction of the mud pits using a backhoe was completed. The two mud pits were approximately 10 x 10 feet each and 6 feet deep. R&L then began to mix the drilling mud using approximately 3,000 gallons of water and eighteen bags of pure gold (pure bentonite)

polymer free drilling mud.

During the time which R & L was setting up, the Fanning, Phillips and Molnar personnel performed a methane monitoring survey of the Springs-Fireplace Landfill. Peter Dermody received five locks for the methane wells from Phil.

John Conover arrived at the site early in the afternoon; however, as no drilling was going to take place he left the site shortly afterward.

At 4:00 p.m., Rick Imundo from Allied Drum arrived and dropped off 100 DOT approved, reconditioned, 55 gallon drums. These were stacked horizontally for storage behind the Quonset Hut. The drums are to be used to store development and purging water. The Fanning, Phillips and Molnar personnel left the site at 5:00 p.m., with mud mixing still taking place.

Respectfully submitted,

Peter Dermody
Hydrogeologist

FIELD REPORT
SPRINGS-FIREPLACE LANDFIL
EAST HAMPTON, NEW YORK
D-4

DATE: October 17, 1990

PRESENT:		
	Peter Dermody	Fanning, Phillips and Molnar
	Keith S. Robins	Fanning, Phillips and Molnar
	Tom Doriski	Fanning, Phillips and Molnar
	Graeme Wallace	Fanning, Phillips and Molnar
	Phil	R&L Well Drilling
	Ben	R&L Well Drilling
	John Conover	New York State Department of Environmental Conservation

WEATHER: Sunny

OBJECTIVE: To Commence the drilling of groundwater monitoring well D-4

DETAILS:

Fanning, Phillips and Molnar arrived on site at 9:00 a.m. R&L finished mixing the drilling mud.

Initial mud parameters were performed for 5 parameters by the following methods:

- Mud weight- using a Baroid mud scale, a mud sample was poured into the container and the top secured. This was placed on the mud balance. Prior to use with mud, the scale was checked for accuracy be measuring water weight. A water sample weighs 8.34 lbs/gal.
- Viscosity wells measured with a Baroid Marsh Funnel in which a known amount of mud is placed in the funnel while a finger stopped the bottom of the funnel. Then, the mud was allowed to drain into a graduated container to a specified level. The amount of time this required was timed and viscosity is reported in seconds.

- Sand content was measured by mixing known amounts of mud with water and shaking. This mixture was poured through a fine mesh to collect the sand. This sand was washed into a glass tube graduated in percent sand to read the sand content.
- Calcium content was measured with a Hach Calcium Test Kit which measures total hardness as $CaCO_3$. A mud sample was placed into a vial with a colorimetric titrating agent. A colorimetric titrant was added dropwise until a color change was obtained. This test had an accuracy of ± 20 mg/l.
- pH was tested with pH paper and a pH color chart.

The properties of the mud were determined prior to drilling and then several times during the day. The results are given in Table 1.

In the vadose zone no split spoons were collected; however, a log was maintained of cuttings contained in the drilling mud and is given in Table 2. A combustible gas indicator and a Photovac Microtip was used to monitor breathing conditions at the well head at regular intervals. At all times, the values observed were zero (Table 3).

At 11:10 a.m. John Conover arrived at the site and asked if viscosity will be reduced in the screen zone. He called Elaine Zuk (DEC Albany) and she allowed R & L to use the lowest viscosity they felt would be possible. Phil thought this would be around 31 seconds.

Split spoons were obtained at five foot intervals upon reaching the water table. The first split spoon was collected from 70 to 71.5 feet. Descriptions and blow count data from the split spoons are given in Table 4. No sample was collected from the split spoon obtained from 90 to 91.5 feet. Problems obtaining split spoon samples

TABLE 1
MUD PARAMETERS
OCTOBER 17, 1990

	Initial	@60'	@80'	@100'
Weight (lbs/gal)	8.8	8.8	8.8	8.7
Viscosity (sec.)	41	32	37	35
Sand Content (%)	0	1	3	0.5
pH	9.0	7.5	7.5	6.5
Calcium (mg/l)	380	240	366	420

TABLE 2 VADOSE ZONE GEOLOGY

Depth (ft)	Description
5	Medium brown sand with gravel, pebbles.
23	Medium coarse brown sand with abundant gravel.
26	Gravelly medium brown sand with gravel.
55	Medium coarse brown sand with gravel.
56-57	Cobble or boulder zone (indicated by drill rod rattle).
58	Medium coarse brown sand with gravel.

TABLE 3
HEALTH AND SAFETY READINGS

Time	CGI	MicroTip
10:00 a.m.	0	0
10:20 a.m.	0	0
10:40 a.m.	0	0
12:00 noon	0	0
12:20 p.m.	0	0
2:50 p.m.	0	0
4:30 p.m.	0	0
5:30 p.m.	0	0

were also encountered below 100 feet resulting from gravel entering the jars of the split spoon sampler and thereby preventing blow counting and sample recovery.

John Conover asked if we were going to ream the hole to remove the mud wallcake. I called Martin Klein and he said that since this presented the danger of losing the hole, it would not be done. Wallcake removal will be demonstrated by development to less than 50 NTU's. Furthermore, filter cake thickness is not being measured directly, but will be inferred from monitoring of mud loss into the formation. John Conover will allow the wallcake in place and to permit visual observations to identify fluid loss.

Graeme Wallace and Tom Doriski arrived at 2:00 p.m.. John Conover, Keith Robins and Peter Dermody left the site shortly afterward. The potable water used to mix the mud was tested for calcium hardness and it was found to be 40 mg/l. Soda ash was added to the mud to reduce calcium. To remove gravel from the hole, the mud was thickened and a new bit to grind up gravel will be used tomorrow. Drilling finished at approximately 6:00 p.m.. During the day, twenty (20) bags of pure gold drilling mud was used.

Respectfully Submitted,

Peter Dermody
Hydrogeologist

FIELD REPORT
SPRINGS-FIREPLACE ROAD LANDFILL
D-4

DATE: October 18, 1990

WEATHER: Sunny and 71°

PRESENT:

Tom Doriski	Fanning, Phillips and Molnar
Graeme Wallace	
Phil	R&L Well Drillers
Ben	

OBJECTIVE: To finish drilling well D-4

DETAILS:

Arrived at site at 8:30 AM with the drillers arriving shortly afterward. I calibrated the Microtip and reestablished the decontamination area. The hole drilled yesterday had not taken water in during the night. The drillers installed a new tricone roller bit to grind up gravel that was at the bottom of the hole at a depth of 110 to 116 feet. The rollers in this bit came in contact with each other. The drillers changed back to a drill bit that allows split spoon sampling. As drilling commenced, the interval from 115 feet and beyond appear to be non-gravelly. The properties of the mud were determined at various times of the day and are given in Table 1. At 12:30 PM, it was deemed by the field hydrogeologist that mud loss to this point had been minimal through visual observation. A combustible gas indicator and a Photovac Microtip were used to monitor breathing conditions at the well head at regular intervals. At all times, the values obtained were zero.

Descriptions of the samples obtained by split spoons, as well as blow counts, are given in Table 2. From 115 to 130 feet, a brown medium grained clean sand that exhibits some cm-scale finer or coarser layering is present. Sand is finer grained form 135 to 160 feet,

though it exhibits similar characteristics as the previous section. Another zone of medium-grained sand occurs from 110 to 175 feet with cm-sized areas of strong Fe-staining sometimes visible. From 175 to 195 feet, the sand becomes finer again until a dark red brown homogeneous silt is intersected from 195 to 210 feet. The last split spoon at 210 feet was obtained in a medium-grained sand.

Drilling was completed shortly after 6:30 PM, and we left the site at approximately 7:15 PM. A total of 40 bags of pure gold drilling mud were used for the construction of well D-4.

Respectfully submitted,

Graeme Wallace
Assistant Hydrogeologist

GW:lel

TABLE 1
DRILLING MUD PROPERTIES

Time	Density (lb/gal)	Viscosity (seconds)	Hardness (mg/l)	Sand Content (%)	pH	Comments
1035	8.85	56	440	2.5	9.5	
1215	8.9	47	420	4	9	
1430	8.95	38	420	5.5	9	
1600	8.8	33	340	4	9	Mud parameters at 170 feet
1630	9.0	33	360	3.5	8.5-9	Mud parameters at 180 feet

TABLE 2
SPLIT SPOON DATA

Sampling Interval	Blow Counts	Sample Description	Drill Information
120-121.5	6" - 99 12" - 100 18" - 75	Medium-grained, well sorted, brown sand with rare coarse gravel (gravel at top of sample may be from bottom of hole).	Drills like sand from 120 to 125 feet
125-126.5	6" - 10 12" - 35 18" - 74	Medium-grained, well sorted sand with cm scale stratigraphy with finer-grained layers.	Drills like sand from 125 to 130 feet
130-131	6" - 22 12" - 135 18" - N.C.	Medium-grained, brown sand with layers of finer and coarser sand.	Drills like sand from 130 to 135 feet
135-136.5	6" - 33 12" - 92 18" - 67	Brown, fine to medium-grained well-sorted clean sand with 2-cm coarse interbed.	Drills like sand from 135 to 140 feet
140-141.5	6" - 34 12"- 78 18"- 80	Brown, fine to medium-grained sand with 4 cm zone of strong iron staining (reddish brown). Weakly stratified on a cm or mm scale. Slight odor, however, nothing registers on the MicroTip.	Drilling appears to get harder as you approach 145 feet
145-146	6" - 60 12" - 100 18" - N.C.	Fine to medium-grained brown sand with veinlets of strong iron staining.	Drills like a hard packed sand from 145 to 150 feet
150-151	6" - 70 12" - 133 + 18" - N.C.	Brown, well sorted, fine to medium-grained sand with a thin, dark brown layer (< 1 cm) with strong Fe staining and a 2 cm wide coarser-grained layer.	Drilling easy for first 3 feet becoming harder from 153 to 155 feet
155-155.75	6" - 50 12" - 100/3" 18" - N.C.	Dark brown, fine to medium-grained homogeneous sand.	Mostly hard drilling with the exception of 1 foot in middle from 155 to 160 feet
160-161.5	6" - 20 12" - 45 18" -65	Brown to orange-brown medium sand with zones of strong Fe staining on cm scale. Also finer laminations on a cm scale. Rare fine gravel.	Drilling appears to be through hard packed sand from 160 to 165 feet

TABLE 2 (CONTINUED)
SPLIT SPOON DATA

Sampling Interval	Blow Counts	Sample Description	Drill Information
165-166.5	6" - 30 12" - 86 18" - 44	Medium-grained, brown well-sorted with coarser and finer zones on cm scale. A 3 cm thick layer with fine gravel is present.	From 165 to 170 feet drills like a hard-packed sand
170-170.33	6" - 25 12" - 72 18" - 100/4"	Medium-grained, well sorted brown sand with some weak laminations (color and grain size) visible on cm scale.	From 170 to 175 feet drills like a hard-packed sand
175-176.1	6" - 50 12" - 68 18" - 50/1"	Fine to medium-grained well sorted brown sand becomes highly stained by iron to reddish brown.	From 175 to 180 feet drills like a hard-packed sand
180-181.1	6" - 30 12" - 49 18" - 100/1"	Fine to medium-grained, brown weakly laminated (mm and cm scale) predominantly by color and amount of mafic minerals.	181 to 182 feet same, last 3 feet a little easier to drill
185-186.5	6" - 35 12" - 54 18" - 82	Fine to medium-grained, weakly laminated (color), well sorted sand.	Drilling about same as 182 to to 185 feet.
190-191	6" - 30 12" - 82 18" - 40/0	Medium to fine-grained brown sand, clearly finer than previous samples. Apparent laminations on mm scale.	Pretty hard drilling with some lumps of dark orange-brown silt from 190 to 195 feet
195-195.75	6" - 25 12" - 100/4" 18" - N.C.	Dark red brown fine-grained silt with some fine grained sand, homogeneous.	Drilling about same from 195 to 200 feet.
200-201.25	6" - 16 12" - 40 18" - 50/3"	Dark red brown, fine, homogeneous silty sand.	Hard drilling from 200 to 205 feet
205-206	6" - 25 12" - 78 18" - 25/0	Fine-grained, silty red brown sand or silt.	Hard drilling but appears to be through coarser material from 205 to 210 feet.
210-210.75	6" -30 12" - 100/3" 18" - N.C.	Medium to coarse sand with possible laminations on cm scale.	

NC - No blow count

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL
D-1

DATE: October 22, 1990

PRESENT: Peter Dermody — Fanning, Phillips and Molnar
Keith S. Robins
Phil, Greg and Ben — R&L Well Drillers

WEATHER: 65° Sunny

OBJECTIVE: To set up for drilling at location D-1 on the southeast side of the landfill

DETAILS:

Arrived on site at 8:30 a.m. R&L spent the day setting up for drilling deep well D-1. All rods, tremi pipes, and bits were steam cleaned. A payloader was used to clear an area around the location of D-1, which is adjacent to the methane well M-3. Pits were dug and lined, and the mud was mixed. A bermed area on the access road along the southern slope toe was constructed to accommodate the spent drilling mud. The mud pit constructed to drill D-4 was excavated by a payloader and dump truck. It's contents was disposed on the top of the putricibles mound between the two leachate rings and ostensibly over the lined area. Nineteen bags of mud were used in the initial mixing of the drilling mud for D-1.

We left the site at 5:00 PM.

Respectfully submitted,

Peter Dermody
Hydrogeologist

PD:lel

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL
D-4

DATE: Friday, October 19, 1990

PRESENT: Peter Dermody Fanning, Phillips and Molnar
Keith Robins Fanning, Phillips and Molnar
Phil, Greg, Ben

WEATHER: Sunny/50°F. Heavy winds/rain last night.
No effect on rig or mud.

DETAILS:

Arrived on site at 8:30 a.m.. Split spoon samples collected did not indicate the imminence of a clay layer as a trend in the split spoons towards coarseness with depth was observed. However, as a precaution, Phil advanced the drillbit to 215 feet to see if rotor drive torque pressure increased (which would be indication of clay). However, a more gravelly zone was intersected and drilling ceased. Therefore, the Gardiners Clay was not intersected at it's projected elevation. The rods were removed, with mud remaining to keep the borehole open. Then, Ben Rice of Aqua Terra Geophysics, Inc. (who also has been working with R & L) began the geophysical logging of the well at 10:30 a.m.

The Geophysical Logger is a Widco Logger (from Mineral Logging Systems, Inc.). The first probe attached was a spontaneous potential (SP)-resistivity probe. Initially, a reference point which marks ten feet was set at ground level. The SP probe was calibrated with a 100-millivolt test box. On the way down the hole, the log was run to ascertain the largest scale that could be used(sensitivity). The logger indicated that the borehole is 211 feet deep with apparently 4

feet having been lost (collapsed?)

The SP log drifts to the right above a depth of 15 feet, reflecting the effect of the ground surface. The final log was run from the bottom up and hard copy was obtained. Ben will give us the results in about a week.

The Gamma Logger probe was then used. Solid clay will generally read about 100 counts/second, while well-sorted sand will read about 20 counts/second. Two runs were done using the Gamma probe. Discrepancies between the two runs are due to the randomness of the gamma counts which are constantly averaged over a three-second period. On each log, the first-run represents the entire well depth. The second run was for the screened zone using a greater vertical scale for greater resolution.

Ben decontaminated the downhole equipment with phosphate-free detergent and hexane followed by a distilled water rinse.

After completion of the geophysical logging, the overdrilled portion of the well was grouted. The amount of grout was estimated by using the relationship of 2.61 gallons/foot as the volume for an 8 inch borehole. Approximately 3/5 gallons of grout were estimated to be required. After the grout was left to set for a while, 1 bucket of bentonite tablets were poured down the well and allowed to expand. The well was set at 180 feet below grade with a 20 foot screen zone (160-180 feet), which was constructed using 4 inch PVC with 0.020 inch slot. The well was grouted up to 185' and then gravel packed above this point to 10' above the screen. Then a viscous bentonite slurry was placed above the screen using a tremie-pipe. Finally,

standard-viscosity Volclay grout was tremie-piped to grade.

John Conover (DEC) had arrived on site at 12:00 noon and he spoke to Tony Candela and they both approved the pumping off of the mud pits to a bermed area on the landfill property. This berm was created with a backhoe on the south access road at the toe of the slope at the southwest corner of the landfill. John Conover left the site at 3:30 p.m. after signing my field book to confirm permission for the drilling mud disposal method to be used. Fanning, Phillips and Molnar left the site at 6:00 p.m.

Respectfully submitted,

Peter Dermody
Hydrogeologist

PD:lel

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL
D-1

DATE: October 23, 1990

PRESENT:

Peter Dermody	Fanning, Phillips and Molnar
Keith S. Robins	Fanning, Phillips and Molnar
Phil and Greg	R&L Well Drillers

WEATHER: 60° Rainy

OBJECTIVE: To commence the drilling of groundwater well D-1 on south side of the landfill, which has an elevation of roughly 70 feet above msl.

DETAILS:

Seven bags of bentonite were used to finish the initial mud mixing and drilling commenced at 10:00 a.m.. The initial mud parameters were mud weight, 8.7 lbs. per gallon; viscosity, 47 seconds; Ph, 9; Sand Content, 0; and calcium 400 milligrams per liter. The microtip which was being used for health and safety monitoring was malfunctioning, possibly due to humidity effects and was not employed. Only the CGI was used until a replacement for the microtip could be brought into the field. Since significant methane is known to exist at methane well M-3, the CGI will give an indication whether organic vapors are volatizing off the mud.

Vadose zone geology was not identified during drilling due to its inaccuracies and due to the fact that the geology will be more accurately represented by the information provided during the logging of the shallow groundwater monitoring well S-1. The geology determined from this well will be put into the drilling log. In addition, the depth of split spoons and blow counts will be recorded. The description of the split-spoons will be provided in the drilling

logs. The time will not be allotted to describe them in this field report. The first split-spoon was taken at 60-61.5 feet at the top of the water table. The blow counts were (1) 30, (2) 49, (3) 69. Mud parameters were taken when the augers were down at 66 feet. The viscosity was 45 seconds, sand content was 4%, the mud weight was 9 lbs. per gallon, the calcium was 440 milligrams per liter, and the ph was 8.5. Split spoon was taken from 65-66.5. The blow counts were as follows: (1) 20, (2) 40, (3) 53. Split spoon was taken at 70-71.5 feet. The blow counts were as follows: (1) 40, (2) greater than 100. No sample recovery was obtained from this split spoon. We will advance one foot and attempt again. Split spoon was taken at 71-72.5 feet. The blow counts were as follows: (1) 18, (2) 55, (3) 55. Split-spoon was taken at 75-76.5 feet. The blow counts were as follows: (1) 25, (2) 50, (3) 63. Split spoon was taken at 80-81.5 feet. The blow counts were as follows: (1) 40, (2) 65, (3) 37. Split spoon was taken at 85-86.5 feet. The blow counts were as follows: (1) 85, (2) 70, (3) 75. Split-spoon was taken at 90-91.5 feet. The blow counts were as follows: (1) 20, (2) 120, and stopped due to an obstruction. Split-spoon was taken at 95-96.5 feet. The blow counts were as follows: (1) 15, (2) 45, (3) was greater than 100. Split-spoon was taken from 100-101.5 feet. The blow counts were as follows: (1) 18, (2) 15, (3) 30. No further work was done this day.

Respectfully submitted,

Peter Dermody
Hydrogeologist

PD:lel

FIELD REPORT
SPRINGS-FIREPLACE ROAD LANDFILL
EAST HAMPTON, NEW YORK
D-1

DATE: October 24, 1990

PRESENT:

Tom Doriski	Fanning, Phillips and Molnar
Graeme Wallace	Fanning, Phillips and Molnar
Phil	R&L Well Drilling
Bob	R&L Well Drilling

WEATHER: Cloudy changing to sunny by late morning; 65°F

OBJECTIVE: To finish drilling D-1.

DETAILS:

Left office at 6:45 a.m. and arrived at site at 8:00 a.m. I setup a decontamination zone to clean split spoons. I was unable to calibrate the MicroTip, while the organic vapor analyzer indicated 64 ppm for a 50 ppm methane standard. The OVA was used to regularly monitor the breathing zone and always indicated readings of 0 ppm. Table 1 gives data obtained for different mud parameters as well as information on the addition of bentonite or water to the mud.

Descriptions of the samples obtained by split spoon as well as blow counts are given in Table 2. From 100 to 115 feet, drilling suggested the presence of one or several layers of gravel. Gravel was recovered in split spoons from 105 and 110 feet. Beneath the gravel zone, drilling was initially hard, but becomes easier at 120 feet. Geology from 120 to 150 feet is characterized by fine to medium and medium brown sand. Drilling was harder from 150 to 190 feet when fine to medium grained sand with trace gravel dominates. Drilling was easier from 190 to 200 feet through a zone characterized by a fine grained red brown silty sand.

Drilling was completed at 6:00 p.m. and we left the site at approximately 6:30 p.m.

Respectfully submitted,

Graeme Wallace
Assistant Hydrogeologist

GW:sa

TABLE 1 DRILLING FLUID MONITORING

Hole Depth (in feet)	Time	Fluid Level (in feet below mp)	Action
100	09:00	-------	Add two bags bentonite prior to drilling. No water added.
110	09:30	-------	Added three and one-half bags bentonite to increase viscosity for purpose of removing gravel following the bit.
115	10:30	1'- 2 1/4" (F.C.)	N/A
115	10:35	-------	Mud Characteristics Viscosity 60 seconds Hardness 440 mg/l ph 9.0 Sand Content 4 percent Weight 8.85 lbs/gal
115 to 120	10:45 to 11:00 (approximate)	1'- 2 1/4" to 1'- 2 3/4" (F.C.)	N/A
120 to 125	11:30 to 11:45 (approximate)	1'- 2 3/4" to 1'- 3 1/4" (F.C.)	N/A
125 to 130	12:00 to 2:15 (approximate)	1 - 3 1/4" to 1 - 2 1/4" (F.C.)	Water was added at estimated 25 gpm from 12:00 to 12:15 approximate
130 to 135	12:23 to 12:30	1'- 2 1/4" to 1'- 5/8" (F.C.)	Water was added at 7 gpm from 12:23 to 12:30
135	12:35	------	Mud Characteristics Viscosity 34 seconds Hardness 400 mg/l ph 8.5 Sand Content 4 percent Weight 8.8 lbs/gal
135 to 140	12:42 to 12:47	1'- 1 5/8" to 1'- 3/8" (F.C.)	Water added at 15 gpm from 12:42 to 12:47

TABLE 1 DRILLING FLUID MONITORING, continued

Hole Depth (in feet)	Time	Fluid Level (in feet below mp)	Action
140 to 145	13:02 to 13:11	1'- 1 1/2" to 1'- 1 1/8" (F.C.)	Water added at 15-17 gpm from 13:02 to 13:11
145 to 160			No monitoring data. MP change - raised approx. 4 in. - to cleaner suction screen from sand. No water or mud added during this interval. No noticeable mud loss/fluid loss.
160	14:45	1'- 4 7/8" (F.S.)	N/A
160 to 165	15:00 to 15:08	1'- 5 1/8" to 1'-5 1/2" (F.C.)	None
165	15:12	1'- 5 1/8" (F.S.)	Mud Characteristics Viscosity 34 seconds Hardness 400 mg/l ph 8.0 Sand Content 3 percent Weight 8.7 lbs/gal Hardness (H20) 40 mg/l
165 to 170	15:20 to 15:28	1'- 5 1/2" to 1'- 6" (F.C.)	None
170	15:35	1'- 5 1/8" (F.S.)	N/A
170 to 175	15:40 to 15:54	1'-6" to 1'- 5 7/8" (F.C.)	None
175	16:02	1'- 5 3/8" (F.S.)	N/A
175 to 180	16:07 to 16:15	1'-5 7/8" to 1'- 6" (F.C.)	None
180	16:20	1'- 5 3/4" (F.S.)	Mud Characteristics Viscosity 35 seconds Hardness 380 mg/l ph 8.0 Sand Content 3.3 percent Weight 8.65 lbs/gal

TABLE 1 DRILLING FLUID MONITORING, continued

Hole Depth (in feet)	Time	Fluid Level (in feet below mp)	Action
185	16:45	1'- 5" (F.S.)	N/A
185 to 190	16:47 to 17:02	1'- 5 1/2" to 1'- 4 1/2" (F.C.)	Water added at 20 gpm from 16:47 to 16:55
190	17:10	1'- 4" (F.S.)	N/A
190 to 195	17:12 to 17:25	1'- 4 1/2" to 1'- 4 5/8" (F.C.)	None
195	17:30	1'- 4 1/2" (F.S.)	N/A
195 to 200	17:33 to 17:50	1'- 4 1/2" to 1'- 4 1/2" (F.C.)	None

F.C. = Fluid Circulating
F.S. = Fluid Static
MP = Measuring Point
N/A = Not Applicable
mg/l = Milligrams per liter
lbs/gal = Pounds per gallon
gpm = Gallons per minute

TABLE 2
SPLIT SPOON DATA

Sampling Interval (feet)	Blow Counts	Sample Description	OVA Reading (ppm)
105-106.5	6"-12 12"-12 18"-12	Fine gravel only recovered, so sample was not considered to be representative. Clasts dominantly quartz with minor granite clasts.	—
110-111	6"-25 12"-40+ 18"-n.c.	Predominantly fine with trace coarse gravel (dominantly quartz clasts). Minor medium to coarse sand matrix. Sample unlikely to be representative.	0 (end piece)
115-116.56"-35	12"-41 18"-58	Fine to medium brown homogeneous sand.	6-8 (end piece)
120-120.9	6"-43 12"-120/4" 18"-n.c.	Fine to medium brown homogeneous sand.	up to 2 (end piece)
125-126.5	6"-13 12"-32 18"-50	Medium brown homogeneous sand.	0 (end piece)
130-131.5	6"-45 12"-95 18"-88	Fine to medium brown homogeneous sand.	0 (end piece)
135-136	6"-23 12"-109 18"-n.c.	Fine to medium brown sand which coarsens towards top where some fine gravel is visible.	—
140-141.3	6"-15 12"-70 18"-100/4"	Fine to medium brown homogeneous sand with some fine gravel at top (secondary ?).	6 (end piece)
145-146	6"-30 12"-130 18"-nc.	Fine to medium brown homogeneous sand with some veinlets (mm) of Fe-staining.	2-4 (end piece)
150-151.1	6"-37 12"-103 18"-50/1"	Medium brown sand grading into fine to medium sand with some fine to coarse gravel (secondary?).	<2 (end piece)
155-156.5	6"-25 12"-60 18"-90	Fine to medium, brown homogenous sand	8 (end piece)
160-161.5	6"-20 12"-40 18"-40	Fine to medium to medium brown sand with 2" wide zone with fine gravel.	0-2 (end piece)
165-166.5	6"-20 12"-30 18"-83	Fine to medium brown homogeneous sand, slight color laminations on a mm scale.	6 (end piece)
170-171.1	6"-38 12"-109 18"-50/1"	Fine to medium brown homogeneous sand with rare fine gravel.	<2
175-176.4	6"-21 12"-50 18"-100/5	Fine to medium brown homogeneous sand with some veins of strong iron staining (l/cm) resulting in red brown color.	10 (end piece) 0 (open split spoon)
180"-181.5	6"-25 12"-81 18"-86	Fine to medium brown sand with rare gravel. Maybe becoming finer.	4-6
185"-186	6"-35 12"-100 18"-n.c.	Fine to medium sand. Finer towards bottom (silty?) where have Fe-stained mica-rich layers (mm scale).	12
190"-190.8	69"-40 12"-105/4" 18"-n.c.	Fine silty red brown sand with a 2 cm wide fine sand interbed.	4 (end piece)
195-195.6	6"-40 12"-100/1" 18"-n.c.	No sample recovery	—
197"-198.3	6"-25 12"-50 18"-100/4"	Fine homogeneous red brown sand.	0
200"-201.5	6"-20 12"-75 18"-44	Fine dark red brown silty homogeneous sand.	32 (end piece) 0-2 (open split spoon)

GW:11

TABLE 1
SPLIT SPOON DATA

Sampling Interval (feet)	Blow Counts	Sample Description	OVA Reading (ppm)
75-75	6"-30 12"-50	Wet medium brown sand with trace fine gravel	20-30 (jar)
81-81.75	6"-30 12"-50/2"	Wet brown medium to coarse sand with some fine gravel and rare cobbles	280 (jar)
86-86.7	6"-15 12"-50/1"	Wet medium to coarse sand, very limited recovery	--

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL
D-1

DATE: October 25, 1990

PRESENT:

Peter Dermody	Fanning, Phillips and Molnar
Keith Robins	Fanning, Phillips and Molnar
Phil	R&L Well Drilling
Greg	R&L Well Drilling
Ben	R&L Well Drilling

OBJECTIVE: To perform the geophysical logging of well D-1 and construct the well.

DETAILS:

Arrived on site at 8:00 a.m.. Ben Rice began the geophysical logging of the well which was drilled to 200 feet. Also note on well D-4, it was found that the elevation was not 80 feet but 75 feet above msl. Therefore, the screen is set at 85-105 feet below msl. All deep wells will now be screened at 85 to 105 feet below msl to provide screen zones of equal elevations. While Ben Rice was logging D-1, Phil and Greg completed the grouting at D-4. This well will be completed tomorrow when the stand pipe and lock will be affixed to it. After the geophysical logging was complete, the overdrill portion was grouted by tremie pipe. Two feet of bentonite pellets was placed over the grout. After allowing approximately 20 minutes for expansion of the bentonite pellets, approximately four feet of sand was placed above the bentonite. The top of the sand was at 175 feet below grade. The well string was placed using a level on the vertical side of the PVC, in order to try to keep the well as straight and plumb as possible during gravel packing. This was also performed during the subsequent grouting. The gravel pack extended to 10 feet above the screen zone. Finally, the hole was grouted to grade. We left the site at 4:00 p.m..

Respectfully submitted,

Peter Dermody
Hydrogeologist

PD:lel

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL
D-1

DATE: October 26, 1990

PRESENT:

Peter Dermody	Fanning, Phillips and Molnar
Keith Robins	Fanning, Phillips and Molnar
Phil	R&L Well Drilling
Greg	R&L Well Drilling
Mark	R&L Well Drilling

WEATHER: 45°F and overcast

OBJECTIVE: To grout and finish the well D-1 and cement and steel case Well D-4.

DETAILS:

Arrived on site at 8:00 a.m. The well was grouted to grade and contains a gravel pack to ten feet over the screened interval. Well D-4 was cemented and received a steel stand pipe that was locked and finished. No further work was done.

Respectfully submitted,

Peter Dermody
Hydrogeologist

PD:lel

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL
D-2

DATE: October 29, 1990

PRESENT:

Peter Dermody	Fanning, Phillips and Molnar
Keith Robins	Fanning, Phillips and Molnar
Phil	R&L Well Drilling
Greg	R&L Well Drilling

WEATHER: 42°F and sunny

OBJECTIVE: To set up for drilling at groundwater well D-2 where the elevation is approximately 86 feet.

DETAILS:

Keith Robins and Peter Dermody performed a methane survey for the Springs-Fireplace Landfill, while Phil and Greg dug mud pits for D-2, which is located near existing groundwater Well GP-1 at the east gate along Acabonic Road. Mixing of the mud started and 24 bags of pure gold bentonite were initially used in the mud pits. We left the site at 4:00 to go to Montauk and to affix new locks to two wells which were found to require them. Phil finished grouting at Well D-1.

Respectfully submitted,

Peter Dermody
Hydrogeologist

PD:lel

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL
D-2

DATE: October 30, 1990

PRESENT:

Keith Robins	Fanning, Phillips and Molnar
Peter Dermody	
Phil and Greg	R&L Well Drilling

WEATHER: 55° Sunny

OBJECTIVE: To drill deep groundwater Well D-2 which is located at an approximate elevation of 86 feet above MSL.

DETAILS:

Arrived at site at 8:00 AM. Drillers steam cleaned all drilling rods before starting drilling at 9:00 AM. Initial mud parameters were determined at 9:15 AM and were as follows:

VISCOSITY	43 Seconds
WEIGHT	8.16 lbs/gal
CALCIUM	420
SAND CONTENT	0 (initial)
Ph	8.0

A mud level marker was placed on the mud pit to aid in determination of the amount of mud loss occurring. During the first 20 feet of drilling, the mud level dropped 2" in the drilling mud pit. The initial amount of drilling mud was estimated to be 2,500 gallons. The total surface area of the mud pits constructed for D-2 was calculated to be 154 square feet. The depth of well GP-1 was found to be 204 feet below grade. This is the same depth as that previously reported indicating that no rocks or significant obstructions are likely to exist in this well. Therefore, we will develop GP-1 to

establish it's hydraulic connection to the aquifer.

Mud loss was observed to be 2" during drilling from 60 to 80 feet. Mud parameters at 12:00 PM were:

VISCOSITY	47 Seconds
WEIGHT	9 lbs/gal
CALCIUM	460
SAND CONTENT	3½
Ph	7.5

The following is a visual description from cuttings sieved from mud at drill rod:

15'	Medium coarse light brown sand with gravel, pebbles
20'	Gravelly medium-coarse light brown sand
35'	Pebbly gravel, medium-coarse light brown sand
50'	Light brown medium sand with some gravel
55'-58'	Gravel and cobble zone
60'	Light brown medium sand with some gravel
70'	Medium-coarse brown sand with some gravel

Split spoon samples were obtained at five feet intervals starting at the water table which was established to be at 75 feet. The blow counts and data obtained during screening of the samples using an organic vapor analyzer (OVA) are as follows:

(75' - 76.5')

Depth	Blow Count
0-6"	40
6-12"	95
12-18"	75

No recovery in split spoon due to rock.

(80' - 81.5')

0-6"	25
6-12"	35
12-18"	54

OVA screening = 0 ppm.

(85' - 86.5')

0-6"	27
6-12"	40
12-18"	66

OVA screening = 0 ppm.

(90' - 91.5')

0-6"	25
6-12"	45
12-18"	57

(95'-95.9')

0-6"	40
6-12"	100/3 inches
12-18"	---

Due to rock stuck in split spoon only able to obtain 9 inches.

OVA screening = 0 ppm.

(100' - 101.5)

0-6"	25
6-12"	60
12-18"	41

OVA screening = 0 ppm.

(105' - 106.5')

0-6"	15
6-12"	15
12-18"	30

OVA screening = 0 ppm.

The breathing zone was monitored using the OVA at regular intervals. The results are as follows:

Time	OVA ppm
9:30 AM	0
10:15 AM	0
11:15 AM	0
12:15 AM	0
1:15 PM	0
2:15 PM	0
3:15 PM	0
4:15 PM	0

Sal from R&L arrived at 11:30 AM and Peter Dermody and Sal left to start well development at Well D-4. We decontaminated using two 55 gallon drums with their tops cut off. One drum was filled with tap water, while the other was filled with tap water and liquonox. The pump was affixed with the poly tubing and the well development pump was placed in each of the two drums. The drum with liquonox and water was used first. Then the drum with potable water was used to rinse the outside of the tubing. In between the liquonox and water and the potable water drum, methanol was poured down the intakes of the Gould 13 EM pump. Finally, the potable water drum was emptied, using the pump. The pump was placed in the well roughly three to four feet off the bottom. A well volume of potable water was injected into the well to break up the mud out of the casing. Roughly 150 gallons were

initially discharged to the berm area. Finally, ten drums were filled and the turbidimeter was used to measure turbidity, which was found to be finally 18 ntu's. Periodic surging was performed to help with the development process. The drums were placed on pallets covered with plastic and the area was bermed.

We left the site at approximately 4:30 PM.

Respectfully submitted,

Peter Dermody
Hydrogeologist

PD:lel

FIELD REPORT
SPRINGS-FIREPLACE ROAD LANDFILL
EAST HAMPTON, NEW YORK
D-2

DATE: October 31, 1990

PRESENT:		
	Graeme Wallace	Fanning, Phillips and Molnar
	Tom Doriski	Fanning, Phillips and Molnar
	Phil Zackman	R&L Well Drilling
	Sal	R&L Well Drilling
	Greg	R&L Well Drilling

WEATHER: Sunny and cool, 65°F

OBJECTIVE: To continue drilling D-2.

DETAILS:

We left the office at 7:00 a.m. and arrived at the site at 8:10 a.m. Drillers were having problems with the suction of the pump they were using so drilling was delayed until 10:45 a.m. During the delay I bought rope and plastic sheeting to cover drums of development water. I then labeled and covered the drums containing the development water for D-4. A decontamination area was set up and the calibration of the organic vapor analyzer (OVA) was checked (92 ppm for a 50 ppm methane standard).

After drilling started periodic monitoring of various mud parameters was carried out and is given in Table 1. A combustible gas indicator and the OVA were used to monitor breathing conditions at the well head at regular intervals. At all times, the values obtained were zero.

Descriptions of the samples obtained by split spoon as well as blow counts are given in Table 2. Due to the presence of gravel, no sample was obtained at 110 feet. Drilling from 115 and 118 feet indicated the presence of gravel. Drilling from 119.5 to 132 feet was easy though some gravel-rich zones were apparently intersected. This interval was characterized by a brown medium-grained sand with trace gravel which was observed until 145 feet when it became finer. Drilling from 132 to 160 feet was more difficult possibly reflecting the increased proportion of fine material in the sand. From 160 to 180 feet, drilling appeared to be easier though no major changes in sediment-type was observed. OVA started to give erratic readings towards the end of the day possibly reflecting a low battery charge.

Drilling was finished at approximately 5:00 p.m.

Respectfully submitted,

Graeme Wallace
Assistant Hydrogeologist

GW:lel

TABLE 1
DRILLING FLUID MONITORING DATA

Hole Depth (feet)	Time	Fluid Level (in feet below mp)	Action
115	11:00		Mud Characteristics Viscosity 36 seconds pH 7.5 Sand Content 1% Weight 8.55 lbs/gal Hardness 460
118	11:30	1'6¼"	
	11:40 - 11:46		No circulation of mud as sit and drill on gravel
120-125	11:46 - 12:00	1'7" to 1'7 3/8"	
125	12:05	1'7"	
132	12:57	1'7 7/8"	
132-135		1'8¼" to 1'8 5/8"	
135	13:45		Mud Characteristics Viscosity 34 seconds pH 7.0 Sand Content 2% Weight 8.7 lbs/gal Hardness 480
139-140	13:44 - 14:07	1'8½" to 1'8 7/8"	
140		1'8 5/8"	
140-145	14:10 - 14:25	1'9 1/8" to 1'9½"	
145	14:29	1'9"	
145-150	14:35 - 14:48	1'9 5/8" to 1'10"	
150	14:55	1'9 1/8"	
150-155	14:56 - 15:17	1'7 7/8"	Water added at a rate of 12 gpm from 15:05 until 15:17
155	15:20	1'7 3/8"	Mud Characteristics Viscosity 33 seconds pH 7 Sand Content 1.5% Weight 8.6 lbs/gal Hardness 440
155-160	15:25 - 15:47	1'7 7/8" to 1'8"	
165	16:05	1'8"	
165-170	16:10 - 16:20	1'8 3/4" to 1'9 1/8"	
170	16:25	1'8"	
170-175	16:31 - 16:41	1'8" to 1'6 3/4"	Water added at a rate of 20 gpm from 16:31 to 16:41
175	16:47	1'6¼"	
175-180	16:49 - 16:58	1'6 3/4" to 1'6½"	

TABLE 2
SPLIT SPOON DATA

Sampling Interval (feet)	Blow Counts	Sample Description	OVA Reading (ppm)
115-115.7	6"-96 12"-104/2" 18"-n.c.	No sample in split spoon.	—
118-119.5	6"-37 12"-33 18"-35	Brown medium well sorted sand with rare gravel.	0 (split spoon) 8 (in jar)
125-126.5	6"-25 12"-40 18"-34	Brown medium well sorted sand with trace gravel.	0 (split spoon) 28 (in jar)
130-131.5	6"-30 12"-55 18"-52	No sample in split spoon.	—
132-133.5	6"-18 12"-34 18"-27	Medium brown mostly homogeneous sand, appears to be slightly finer than before, some fine gravel concentrated in specific layers.	0 (split spoon) 20 (in jar)
135-136.5	6"-26 12"-48 18"-60	Medium brown mostly homogeneous sand.	0-2 (split spoon) 6 (in jar)
140-141.5	6"-25 12"-65 18"-43	Medium brown homogeneous sand with trace gravel.	0-2 (split spoon) 8 (in jar)
145-146.5	6"-18 12"-41 18"-52	Fine to medium brown homogeneous sand.	8 (split spoon) 8 (in jar)
150-151.5	6"-17 12"-33 18"-60	Fine to medium brown sand with minor mm scale laminations (dark minerals). Larger scale variations reflect more medium and finer layers. Contact between finer darker layer and lighter medium layer.	4-5 (split spoon) 22 (in jar)
155-156	6"-50 12"-150/5½" 18"-n.c.	Brown laminated sand with alternating finer, darker layers and coarser lighter layers on cm scale.	8 (split spoon) 50 (in jar)
160-161.5	6"-25 12"-45 18"-40	Fine to medium sand with cm wide lamellae of strong Fe-staining (orange-brown) at top, rare mm thick mafic-rich layers.	—
165-166.5	6"-25 12"-63 18"-40	Fine to medium brown sand with weak layering on mm and cm scale, trace fine gravel, mm scale mafic mineral-rich layers; also, grain size layering.	6 (split spoon) 70 (in jar)
170-171.5	6"-20 12"-58 18"-74	Fine to medium brown sand with some mm scale layering (Fe-staining); grain size variation and color on cm-scale.	70 (in jar)
175-176.5	6"-20 12"-33 18"-46	Fine to medium brown sand appears mostly homogeneous with the exception of thin (mm) bands of iron staining.	90 (in jar)
180-181.5	6"-20 12"-35 18"-50	Fine to medium brown homogeneous sand.	10 (in jar)

FIELD REPORT
SPRINGS-FIREPLACE ROAD LANDFILL
EAST HAMPTON, NEW YORK

DATE: November 1, 1990

WEATHER: Sunny

PRESENT:

Graeme Wallace	Fanning, Phillips and Molnar
Tom Doriski	Fanning, Phillips and Molnar
Phil Zackman	R&L Well Drilling
Sal	R&L Well Drilling
Greg	R&L Well Drilling
Ben	R&L Well Drilling

OBJECTIVE: To finish drilling D-2 and install the well.

DETAILS:

Arrived at site at 8:15 a.m. A decontamination area was setup and the calibration of the organic vapor analyzer (OVA) was checked (58 ppm for a 50 ppm methane standard).

The OVA and a combustible gas indicator were used to monitor breathing conditions at the well head at regular intervals. At all times, the readings obtained were zero. Periodic monitoring of various mud parameters was carried out and is given in Table 1.

Descriptions of the samples obtained by split spoon as well as blow counts are given in Table 2. The interval from 180 to 190 feet was characterized by a medium brown sand with a trace of fine gravel. From 190 to 200 feet, the sand becomes finer followed by a dark brown or red brown sand which dominates from 200 to 215 feet.

Ben arrived at approximately 11:30 a.m. and started his geophysical survey of the hole at 12:30 p.m. The bottom of the boring was located at 12:30 p.m. Two printouts were obtained of both spontaneous potential (sp)/resistivity and gamma radiation.

After the geophysical logging was completed, the hole was grouted to approximately 190 feet. A five gallon bucket of bentonite pellets was placed over the grout to form a two foot seal. Then 100 pounds of sand was immediately added to the hole. The depth of the hole after completion of the grouting was 191 feet. The casing was then placed in the hole and enough sand pack was added to a depth of 161 feet.

Work was completed at approximately 5:00 p.m.

Respectfully Submitted,

Graeme Wallace
Assistant Hydrogeologist

TABLE 1
DRILLING FLUID MONITORING DATA

Hole Depth (feet)	Time	Fluid Level (in feet below mp)	Action
180	8:30		4 bags of bentonite added to mud Mud Characteristics Viscosity 35 seconds pH 7 Sand Content 1% Weight 8.75 lbs/gal Hardness 480-500
195-200	10:15 - 10:21	1'8½"	Mud Characteristics Viscosity 37 seconds pH 6.5 Sand Content 1% Weight 8.7 lb/gal Hardness 540
200	10:30	1'7 5/8"	
200-205	10:34	1'8½" - 1'8 5/8"	
205	10:50	1'7 3/4"	
205-210	10:53 - 11:00	1'8 5/8" - 1'9"	
210-215	11:10 - 11:20	1'9" - 1'9 3/8"	

TABLE 2
SPLIT SPOON DATA

Sampling Interval	Blow Counts	Sample Description	OVA Reading (ppm)
185-186	6" - 25 12"-120/6" 18" - n.c.	Medium brown sand with trace fine gravel, some mm wide darker zones. These zones appear to be concentrations of garnet or other heavy minerals that are associated with gravel. Faint odor in jar.	500 (jar)
190-191.5	6" - 30 12" - 72 18" - 82	Fine brown sand becoming more medium towards the top of the split spoon.	10 (jar)
195-195.75	6" - 40 12"-115/3" 18" - n.c.	Fine to medium brown weakly laminated (mm scale) sand.	2-3 (jar)
200-201.5	6" - 23 12" - 23 18" - 30	Fine dark brown, silty sand with abundant mica. Appears homogeneous with possible thin lamination.	0 (split spoon) 40 (jar
205-206	6" - 36 12" - 106/4 18" - n.c.	Fine to medium dark brown sand and fine dark brown silty sand separated by medium Fe-stained layer (1 inch), silty sand on bottom slightly laminated.	0 (split spoon)
210-211.5	6" - 30 12" - 82 18" - 103	Fine dark brown, weakly laminated mm scale sand with fine to medium orange-brown layer (1 inch) includes some coarse sand.	2-3 (jar)
215-216.4	6" - 20 12" - 76 18"-100/5"	Fine red brown mostly homogeneous sand which in places is mica-rich.	0 (split spoon) 2-3 (jar)

FIELD REPORT
SPRINGS-FIREPLACE ROAD LANDFILL
EAST HAMPTON, NEW YORK

DATE: November 2, 1990

WEATHER: Sunny

PRESENT:		
	Peter Dermody	Fanning, Phillips and Molnar
	Graeme Wallace	Fanning, Phillips and Molnar
	Phil Zackman	R&L Well Drilling
	Sal	R&L Well Drilling
	Greg	R&L Well Drilling

OBJECTIVE: To finish constructing D-2 and develop well D-1.

DETAILS:

Arrived at site at 8:15 a.m. Drillers and P.D. arrived at site at 8:45 a.m. Proceeded to set up area for drums of development water. Submersible pump used to develop was decontaminated using liquinox and water followed by a water rinse. Water was initially pumped into D-1 until the water level was close to the surface. Turbidmeter was calibrated before use and water was pumped from the well until a turbidity of 50 NTU was obtained. Twelve 55 gallon drums were used developing the well. Developing of the well was completed at 1:00 p.m. Grouting of D-2 was completed during afternoon. Left site at approximately 3:15 p.m.

Respectfully submitted,

Graeme Wallace
Assistant Hydrogeologist

GW:sa

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL
D-2

DATE: November 5, 1990

PRESENT:

Keith Robins	Fanning, Phillips and Molnar
Peter Dermody	Fanning, Phillips and Molnar
Phil	R&L Well Drilling
Sal	R&L Well Drilling
Greg	R&L Well Drilling

WEATHER: 65°, Sunny

OBJECTIVE: To develop deep groundwater well D-2 in accordance with Part 360.211 (a) (8)(iii), and until the turbidity is 50 nephelometric turbidity units (NTUs) or less.

DETAILS:

Arrived on site at 8:15 a.m. when we had a payloader cut access for Well D-3. However, Dave Paolelli said he was attending an 11:00 a.m. meeting on the solid waste plan being unveiled by E&A Associates. He says that there may be problems with the well location. The plan may also necessitate destroying methane Wells M-13, M-14 and M-15. Paolelli will inform us of the meeting results and we will not drill on that location until we have clearance.

At 10:30 a.m., three representatives of NUS Corporation arrived for the EPA to do a preliminary site investigation for the purpose of an eventual hazardous ranking score. Mike, Steve and Phil (I received their business cards) were the people from NUS. Dave Paolelli took them around and I showed them where the methane wells were on the map and the groundwater flow direction. NUS performed a site reconnaissance and left early in the afternoon.

Before development of D-2, the pump was decontaminated following the same procedures described in the October 30, 1990 field report.

The drillers were using a Goulds 13 EM pump and new poly hose to develop the well. The pump was placed approximately 3-4 feet off the bottom of the well. A well volume of potable water was injected into the well to break up the mud out of the casing. At 12:15 p.m. the drillers started to pump with periodic surging performed to help with the development process.

At 12:45 p.m., twelve 55 gallon drums were filled at this time and the pump was shut off. Two additional drums were then brought to well D-2. Pumping was started again at 1:05 p.m. Several measurements of the water turbidity were made with the results being as follows:

Trials	NTUs	Time
1	65	1:06 p.m.
2	65	1:07 p.m.
3	53	1:08 p.m.
4	53	1:08 p.m.
5	48	1:10 p.m.
6	48	1:13 p.m.

At 1:15 p.m., the drillers stopped the pump and took it out of the well. They cleaned up the site and tightened the tops to the drums. There were a total of 14 (55) gallon drums filled with development water. All drums were placed on pallets, which are underlain by plastic. Each drum was labeled with the following information. Development water, location, date, analysis pending and name. Plastic was placed over the drums and string was used to tie that plastic in place. Finally, a berm area was added surrounding the drums. Left well site at 1:40 p.m. I asked Dave Paolelli to get us written permission from Tony Bullock to drill on the Miriam Smith property to the north of the landfill. They have asked us to move D-3 and S-3 to

a point 75 feet north of the existing M-13 which may be destroyed during the construction of the composting facility. I also met with Mark Gould of E&A Associates. He showed me the location of the proposed composting facility, as well as the approximately 7 acre lined area. They are in the conceptual stage and I told Mark Gould that I would send him a copy of the locations of our methane and groundwater wells, in order to see if we can avoid having to destroy some wells. He will attempt to avoid them in the construction of the facility.

Respectfully submitted,

Peter Dermody
Hydrogeologist

PD:lel

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL
S-2

DATE: November 6, 1990

PRESENT:

Keith Robins	Fanning, Phillips and Molnar
Peter Dermody	Fanning, Phillips and Molnar
Phil	R&L Well Drilling
Sal	R&L Well Drilling
Greg	R&L Well Drilling

WEATHER: 55°, Sunny

OBJECTIVE: Drill and install shallow groundwater well S-2 by hollow stem auger method. The elevation at this location is approximately 86 feet above MSL and the water table is approximately 76 feet below land surface.

SUMMARY:

Arrived at site at 8:15 a.m. R&L began switching their equipment over from the mud rotary to hollow stem augers to start the shallow wells. This is being done since the drilling cannot take place on the Miriam Smith property to the north of the landfill. Therefore, we will drill at location S-2. In the meantime, Keith and Peter performed a methane monitoring survey at the Montauk Landfill.

The drillers set up the drill rig at the location of shallow groundwater well S-2 at 10:00 a.m. Drilling was started at 11:30 a.m. The geology of well S-2 is given in Table 1.

A Century Model 128 OVA was used to monitor the breathing zone of the workers at grade level during drilling. The OVA calibration was checked in the morning by running a 50 ppm methane standard. A Gas Combustible Indicator CGI was present a the well site, however, it was not needed to determine explosive levels because there were no readings encountered with the OVA.

The health and safety data collected is given in Table 2.

TABLE 1 GEOLOGY OF S-1

DEPTH IN FEET	GEOLOGY
(0'-2')	Fine brown sand
(2'-4')	Fine gray silt
(4'-5')	Brown medium sand with trace cobbles
(5'-30')	Coarse medium brown sand with some pebbles and trace cobbles
(30'-40')	Medium coarse brown sand, trace pebbles and cobbles
(40'-55')	Light brown medium coarse sand, outwash
(55-65')	Medium coarse brown sand, trace pebbles and gravel
(65'-70')	Coarse brown sand with some gravel, pebbles and cobbles
70'-85')	Coarse brown sand with trace pebbles and gravel

TABLE 2 HEALTH AND SAFETY DATA FOR S-2

TIME	DEPTH IN FEET	OVA (ppm)
11:45 AM	5	0
11.52 AM	10	0
11.57 AM	15	0
12:04 PM	20	0
12:20 PM	25	0
12:30 PM	30	0
12:40 PM	35	0
12:45 PM	40	0
12:50 PM	45	0
1:10 PM	50	0
1:50 PM	55	0
2:00 PM	60	0
2:10 PM	65	0
2:20 PM	70	0
2:40 PM	75	0
2:45 PM	80	0
3:00 PM	85	0

The water table was encountered at 76 feet below grade by measuring down the opening of the auger head with a tape. At this time, water was pumped down the auger head in order to keep a constant head of water inside the auger while drilling into the saturated zone.,

At 3:20 PM the drillers added 6" of sand pack to the bottom of the well. Fifteen feet of four-inch schedule 40 PVC screen with a slot size of 0.02" was placed so that five feet was above the water table and ten feet was below. A bottom cap was installed below the well screen.

Sand pack was poured down the augers and extended two feet above the top of the well screen. This was confirmed by measuring down the annular space with a weighted tape. Next, a three feet bentonite seal was placed in the annular space above the sand pack by placing 1/4" diameter bentonite pellets into the annular space. Due to lateness of time, well construction was completed on 11/7/90. The day ended approximately at 4:40 PM.

Respectfully submitted,

Keith S. Robins
Assistant Hydrogeologist

KSR:lel

FIELD REPORT
SPRINGS-FIREPLACE ROAD LANDFILL
EAST HAMPTON, NEW YORK
S-2, S-6

DATE: November 7, 1990

PRESENT:

Tom Doriski	Fanning, Phillips and Molnar
Graeme Wallace	Fanning, Phillips and Molnar
Phil Zackman	R&L Well Drilling
Sal	R&L Well Drilling
Gregg	R&L Well Drilling

WEATHER: Sunny and Cool

OBJECTIVE: To finish constructing monitoring well S-2 and start drilling S-6.

DETAILS:

Arrived at site at 9:00 a.m. Drillers were still grouting S-2 using a mix of 19 gallons water/50 lbs bentonite/1 bag initiator. Bob Stewart of the NYSDEC arrived at 10:30 a.m. Grouting was finished at 11:20 a.m. After a tour of the landfill, Bob Stewart left at 11:50 a.m. Due to uncertainty of the location of the next well to be drilled. Drilling was delayed for a short period of time. It was decided that drilling at a new location for well S-6 would be carried out. The calibration of the organic vapor analyzer (OVA) was checked indicating 62 ppm for a 50 ppm methane standard. High levels of methane were obtained in auger and breathing zone immediately after drilling was started. To suppress this methane and the potential for sparks water was pumped into the hole during drilling. During drilling continuous monitoring of the breathing zone by an OVA and a combustible gas indicator (CGI) was carried out. While very high levels were observed in the augers (greater than 100% lower explosive limit (LEL) in auger) levels in the breathing zone were invariably

less than 5% of the LEL. Table 1 presents health and safety monitoring data; whereas, a description of the geology intersected is given in Table 2. Drilling was continued until the water table at which point it was discontinued and the augers were left in hole overnight.

Respectfully submitted,

Graeme Wallace
Assistant Hydrogeologist

GW:lel

TABLE 1
HEALTH AND SAFETY MONITORING DATA

Depth (feet)	OVA (ppm)	CGI (%)
6	0	
11	4-5	
16	up to 1000^{+} (auger	up to 10 (auger)
21	1000^{+} (auger)	up to 23 (auger)
21-36	Ranging up to 1000^{+} (breathing zone)	Greater than 100 (auger) less than 2 (breathing zone)
36-70		Greater than 100 (auger) less than 5 (breathing zone)
70	0-2 (auger)	0
	0-2 (breathing zone)	
75	0 (breathing zone)	0
	up to 30 (auger)	
80	0 (breathing zone)	
	100 (auger)	
85	0 (breathing zone)	

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL
D-3

DATE: November 27, 1990

PRESENT:		
	Keith Robins	Fanning, Phillips and Molnar
	Peter Dermody	Fanning, Phillips and Molnar
	Phil	R&L Well Drilling
	Greg	R&L Well Drilling
	Sal	R&L Well Drilling

WEATHER: 50°C

OBJECTIVE: To finish drilling deep ground water well D-3.

DETAILS:

Arrived on site at 8:15 a.m. Water table was at 97 feet below grade. Split spoon samples were obtained at 5 foot intervals. Split intervals and blow counts were recorded as follows:

Split Spoon (100'-101.5')

0-6" = 27
6"-12" = 60
12"-18" = 94

Split Spoon (105'-106.5')

0-6" = 16
6"-12" = 45
12"-18" = 50

Health and safety at 105', 0 ppm OVA reading

Split Spoon (110'-111.5')

0-6" = 27
6"-12" = 100 (for 3 inches)
12"-18" = __ No recovery due to oversized rock at bottom

Split Spoon (115'-116.5')

0-6" = 7
6"-12" = 21
12"-18" = 32

FIELD REPORT
SPRINGS-FIREPLACE ROAD LANDFILL
D-3

DATE: November 26, 1990

PRESENT:

Peter Dermody	Fanning, Phillips and Molnar
Uwe Anselm	
Phil, Greg, Sal	R&L Well Drilling

WEATHER: 50° and Sunny

OBJECTIVE: Set up and begin drilling at D-3. This is the final well to be drilled at the Springs-Fireplace Road Landfill.

DETAILS:

Arrived on site at 8:00 AM and met with R&L Well Drilling, who began setting up and constructing mud pits. Afterward, they began the mud mixing process. Peter and Uwe performed a methane monitoring well survey at the Springs-Fireplace Road Landfill while R&L was setting up. Drilling of the well D-3 began at approximately 1:30 PM. The initial mud parameters were as follows:

pH	7;
Viscosity	51 seconds;
Mud weight	8.7 pounds/gallon;
Calcium content	300 mg/l; and
Sand content	0

A sample of the mud was taken prior to drilling to be tested for aqueous landfill baseline parameters and was sent to H2M for analysis. We did drill down to approximately 95 feet. Right now the water table from a reading at the adjacent well is approximately 97 feet below grade. Therefore, we stopped drilling for the day at 95 feet. The total depth of this well, D-3, will be 203 feet and it will be screened from 183 to 203 feet. The total depth with overdrilling will be 225 feet. Mud parameters were checked at 60 feet and the results were:

Mud weight	9.6 pounds/gallon;
Mud viscosity	87 seconds;
Calcium content	300 mg/l;
Sand content	3%; and
pH	7.5

We left the site at approximately 5:00 PM.

Respectfully submitted,

Peter Dermody
Hydrogeologist

PD:lel

TABLE A

DEVELOPMENT OF SHALLOW GROUNDWATER WELLS ON 11/19/90

Well Number	# of 55 Gallon Drums	Start Pump	Stop Pump	Turbidity (NTU's) Trial	NTU's	Time	Periodic Surging	Pump and Poly Tube Decontaminated	Drums, labeled placed on pallets covered with plastic and surrounded by a bermed area
S-6	4	9:45 a.m.	10:05 a.m.	1	24	9:50 a.m.	√	√	√
				2	8	9:53 a.m.			
S-1	3	10:30 a.m.	10:40 a.m.	1	13	10:40 a.m.	√	√	√
S-4	3	11:17 a.m.	11:25 a.m.	1	44	11:25 a.m.	√	√	√
S-5	4	1:15 p.m.	1:30 p.m.	1	8	1:25 p.m.	√	√	√
S-3	4	1:45 p.m.	2:07 p.m.	1	29	1:55 p.m.	√	√	√
				2	48	2: p.m.	√	√	√
				3	45	2:05 p.m.	√	√	√

TABLE 2
GEOLOGY OF S-6

Interval	Description
0-6"	Gray fine sand.
6"-1'	Dark gray fine dirty sand.
1'-12'	Orange-brown fine to medium sand with alternating sand and gravel (cobble) rich layers.
12'-86'	Medium to coarse brown sand with trace fine gravel and rare gravel-rich layers.

FIELD REPORT
SPRINGS-FIREPLACE ROAD LANDFILL
EAST HAMPTON, NEW YORK
S-6, S-1

DATE: November 8, 1990

PRESENT:

Graeme Wallace	Fanning, Phillips and Molnar
Tom Doriski	Fanning, Phillips and Molnar
Bob Stewart	New York Department of Environmental Conservation (NYDEC)
Phil Zackman	R&L Well Drilling
Sal	R&L Well Drilling
Greg	R&L Well Drilling

WEATHER: Sunny and cold, 45°F

OBJECTIVE: To finish drilling and constructing S-6 and start drilling at S-1.

DETAILS:

I arrived at the site at 8:15 a.m. and proceeded to set up a decontamination area. The calibration of the organic vapor analyzer (OVA) was checked. A reading of 44 ppm was obtained for a 50 ppm standard. A background reading of 0 ppm was obtained in the vicinity of the future well head. Drilling was commenced at approximately 9:00 a.m.

While drilling continuous monitoring of breathing zone was carried out with the results being given in Table 1 of the November 7th field report. Bob Stewart of the NYDEC arrived at approximately 10:00 a.m. Split spoons were obtained at the depths of 75, 81 and 86 feet with the data collected given in Table 1. Sand heaving into the auger necessitated extra augering. The final depth of the hole was 86 feet.

Before construction of the well, a ¼ bucket of gravel was placed at the bottom of the hole. Fifteen feet of screen and 74 feet of casing was used to construct the well. Seven bags of sand were placed in the hole up to a depth of 67.5 to 68 feet. This was followed by one bucket of bentonite pellets after which 30 gallons of water was added. Grouting of the rest of the hole was started at 11:30 a.m. and 14 bags of bentonite were used. Bob Stewart left site at approximately 3:00 p.m.

Augers were steam cleaned and the drill rig was setup at the site of S-1. Continuous monitoring of the breathing zone was carried out. Significant amounts of methane were intersected and water was pumped into the hole. Readings in the breathing zone sometimes exceeded 1000 ppm. A visual gas chromatograph was obtained using the OVA which confirmed the presence of methane. Drilling was halted at 4:45 p.m. just above the water table.

Respectfully submitted,

Graeme Wallace
Assistant Hydrogeologist

GW:11

TABLE 1
SPLIT SPOON DATA

Sampling Interval (feet)	Blow Counts	Sample Description	OVA Reading (ppm)
75-75	6"-30 12"-50	Wet medium brown sand with trace fine gravel	20-30 (jar)
81-81.75	6"-30 12"-50/2"	Wet brown medium to coarse sand with some fine gravel and rare cobbles	280 (jar)
86-86.7	6"-15 12"-50/1"	Wet medium to coarse sand, very limited recovery	--

FIELD REPORT
SPRINGS-FIREPLACE ROAD LANDFILL
S-1

DATE: November 9, 1990

PRESENT:

Peter Dermody	Fanning, Phillips and Molnar
Keith Robins	Fanning, Phillips and Molnar
Phil	R&L Well Drilling
Sal	R&L Well Drilling
Bob Stewart	New York State DEC

WEATHER: 45°F and Sunny

OBJECTIVE: To finish drilling and to construct shallow groundwater well S-1.

DETAILS:

We arrived on site at 8:00 a.m. R&L is set up with hollow stem at location S-1 and will continue drilling. They are presently 5 feet above the water table and we will go to 10 feet below the water table. Bob Stewart from the DEC arrived to observe the drilling at 8:15 a.m.

The OVA was warmed up and it's calibration checked using a 50 ppm standard, giving a reading of 42 ppm. The initial OVA reading in the augers was greater than 1000 ppm. Therefore, the MSA gascope was utilized and read 2% of the LEL. Therefore, drilling commenced.

At 10:00 a.m., the water level was checked at D-1 and it was found to be 60 feet to water. This was done to give an indication of the depth to water in the shallow well. From 55-70 feet light-brown, gravelly coarse sand was observed.

At 10:18 a.m., we checked the water level in S-1 and it was found to be approximately 60 feet to grade. Therefore, the well is going to be 70 feet below grade. The screen is going to be 10 feet into the water table, 5 feet above and 15 feet length in all. The screen was placed at 10:40 a.m. Seven bags of gravel pack were added and two

buckets of bentonite tablets. This provided approximately a 3 foot bentonite seal. Grouting was finished at 1:20 p.m. and the well was left in that position. It will be cemented at a later date.

Respectfully submitted,

Peter Dermody
Hydrogeologist

PD:lel

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL
S-5

DATE: November 12, 1990

PRESENT:

Keith Robins	Fanning, Phillips and Molnar
Peter Dermody	Fanning, Phillips and Molnar
Phil	R&L Well Drilling
Sal	R&L Well Drilling

WEATHER: 41°, Sunny

OBJECTIVE: To drill and install shallow groundwater well S-5. Land surface at this location is approximately 85'AMSL.

DETAILS:

Arrived at site at 8:00 a.m. Drillers steam cleaned augers at 8:30 a.m. The drill rig was set up at S-5 at 9:30 a.m. The OVAs calibration was checked at 9:50 a.m. The calibration was checked against a 50 ppm methane standard and recorded 24 ppm/50 ppm. The drillers log for shallow groundwater well 5 is found in Table A and the health and safety monitoring can be found in Table B..mb6

TABLE A

Depth in Feet	Geology
(0'-2')	Medium-fine light brown sand
(2'-8')	Fine-medium gray silt.
(8'-15')	Fine light brown sand, with trace gray silt.
(5'-17')	Coarse-medium brown sand with some gravel, pebbles and cobbles
(17'-19')	Coarse-medium sand abundant cobbles, gravel and pebbles.
(19'-25')	Coarse brown sand abundant gravel, pebbles and 3 inch cobbles.
(25'-30')	Brown-orange coarse sand with abundant gravel and pebbles.

(35'-40')	Brown-coarse sand abundant gravel, some pebbles and cobbles.
(40'-47')	Coarse brown sand, some gravel and pebbles.
(47'-50')	Gravelly brown sand, trace pebbles.
(50'-60')	Brown coarse sand with some gravel and trace pebbles.
(60'-83')	Light brown coarse sand some gravel and trace pebbles.

At 12:00 p.m., checked for water level which was noted to be approximately 73'. Obtained split spoon samples from the following depths:

(73'-73'6°)

Blow counts
0"- 6" = 100
6"-12" = —
12"-18" = —

Samples were placed in a 8 oz. glass jar which was labeled.

(79'-80')

Blow counts
0"-6" = 45
6"-12" = 100
12"-18" = —

There was no recovery in split spoon due to oversized rock at the bottom of the auger.

(83'-83')

Blow Counts
0"-6" = 100
6"-12" = —
12"-18" = —

There was no recovery in split spoon due to rock. Total depth of well was 83'.

TABLE B
HEALTH AND SAFETY MONITORING

Time	Depth in Feet	OVA (ppm)	GCI %LEL
10:15 a.m.	5	0	—
10:20 a.m.	10	0	—
10:30 a.m.	15	0	—
10:40 a.m.	20	0	—
10:50 a.m.	30	0	—
11:05 a.m.	40	0	—
11:15 a.m.	45	0	—
11:25 a.m.	50	0	—
11:35 a.m.	60	4	—
11:45 a.m.	65	50	—
11:50 a.m.	70	150	—
12:00 p.m.	75	150	—
12:50 p.m.	83	>1000(1)	8%

(1) A visual G.C was ran and one peak was identified as methane.

Construction of S-5

At 1:00 p.m., started construction of shallow groundwater well S-5. Added six inches of sand at the bottom of the well. A bottom cap was installed and 15 feet of screen was used. The screen was placed 10 feet into the water table and extended 5 feet above the water table. Sand pack was then added so it extended 2 feet above the screen. This was confirmed by measuring down with a weighted tape. One bucket of bentonite tablets was added over the sand pack. There was only a 1½' seal of bentonite tablets used. There were no additional pellets added because the pellets were unable to go down and were getting caught on the inside of the augers. It was determined that the well was not plumb and trying to put another bucket of bentonite pellets was not advised by the driller. There were seven bags of sandpack used and due to lateness of time (3:45 p.m.) The well will be grouted November 13, 1990. Cleaned up the site and left approximately 3:45 p.m.

Respectfully submitted,

Keith Robins
Assistant Hydrogeologist

KR:lel

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL
S-5, S-4

DATE: November 13, 1990

PRESENT:

Keith Robins	Fanning, Phillips and Molnar
Peter Dermody	Fanning, Phillips and Molnar
Phil	R&L Well Drilling
Sal	R&L Well Drilling

WEATHER: 41°, Sunny

OBJECTIVE: To grout shallow ground water well S-5, and to start drilling shallow ground water well S-4, which is located at an approximate elevation of approximately 75 feet above MSL.

SUMMARY:

Arrived at site at 8:00 AM. Drillers set up grout mixing machine at 9:30 AM. A volclay grout was pumped from the top of the bentonite seal to the ground surface. Finished grouting by 12:00 PM, with eleven bags of grout being used for S-5 well.

Drillers steam cleaned augers and set drill rig up at S-4. At 3:15, the calibration of the OVA was checked, and recorded 62 ppm/50 ppm methane standard. To have an indication of methane at this well, methane well-5 was checked at 3:30 PM. A combustible gas indicator was used and recorded >100% LEL, and 2.4% oxygen. After venting the well for 30 seconds, the readings were zero. Drilling started at 3:30 PM. The log for S-4 can be found in Table A, and the Health and Safety monitoring can be found in Table B.

TABLE A

Depth in Feet	Geology
(0'-10')	Coarse brown sand, with some pebbles, gravel and cobbles.
(10'-12')	Gray well sorted medium-coarse sand.
(12'-25')	Brown medium-coarse well sorted sand.
(25'-35')	Light brown medium sand with trace gravel.
(35'-75')	Blonde, well sorted medium-coarse sand with trace gravel, and pebbles.

TABLE B
HEALTH AND SAFETY MONITORING

Depth in Feet	OVA Reading (ppm)
5	12
10	0
15	40
25	3
35	50-200
40	2
45	0
50	0
60	0
65	4

Due to lateness of time (4:30 PM), the well S-4 will be constructed the next day 11/14/90. The augers were left in the ground at 65'. Left site at 4:40 PM.

Respectfully submitted,

Keith Robins
Assistant Hydrogeologist

KR:lel

FIELD REPORT
SPRINGS-FIREPLACE ROAD LANDFILL
EAST HAMPTON, NEW YORK
S-4, S-3

DATE: November 14, 1990

PRESENT:

Graeme Wallace	Fanning, Phillips and Molnar
Peter Dermody	Fanning, Phillips and Molnar
Phil Zackman	R&L Well Drilling
Sal	R&L Well Drilling

WEATHER: Sunny, 45°F

OBJECTIVE: To finish drilling and construct S-4, determine the plumness of S-5 and start drilling S-3.

DETAILS:

Arrived on site at 8:15 a.m. to finish drilling at S-4. No methane was coming out of the hole due to a negative pressure which was confirmed at M-5. The augers were already at 65 feet and at the water table, so drilling was limited to another 10 feet. No split spoon sampling was required at this location. At 65 feet, 4 ppm was detected at the auger head. The interval from 65-75 feet was characterized by a blonde medium to coarse sand with trace gravel and cobbles.

The well was gravel packed to a level of 3 feet above the screen interval. Two buckets of bentonite were used to form a three foot seal above the gravel pack. While grouting of the hole was being carried out, the plumbness of S-5 was checked. The resulting data is given in Table 1.

Peter Dermody left the site at 2:00 p.m. The drill rig was set up at the location of S-3. Calibration of the OVA indicated a reading of 56 ppm for a 50 ppm methane standard. During drilling, monitoring of the breathing zone augers using the OVA was carried out at regular intervals. No readings greater than 0 were ever obtained. The geology of S-3 is given in Table 2. Several gravel- and cobble-rich layers were intersected through which the augers had difficulty penetrating. Drilling was completed at 5:00 p.m. and I left the site at 5:30 p.m.

Respectfully submitted,

Graeme Wallace
Assistant Hydrogeologist

GW:lel

TABLE 2
GEOLOGY OF S-3

Depth (feet)	Description
0 - 4	Brown fine homogeneous sand
4 - 11	Brown fine to medium sand containing moderately abundant fine to coarse gravel
11 - 14	Dark brown fine to medium sand with both gravel rich and gravel poor layers
14 - 15	Cobble rich zone intersected
16 - 28	Dark brown fine to medium sand with variable amounts of gravel and rare cobbles. Gravel-rich zone at 27 feet.
28-78	Dark brown medium sand with variable amounts of cobbles and gravel. Gravel and cobble rich zones intersected at 30-31, 37-38, 46-49, 59-60, 66, 72-74, and 77-78 feet.
78-107	Dark brown medium sand with minor to moderate gravel and rare cobbles.

FIELD REPORT
SPRINGS-FIREPLACE ROAD LANDFILL
EAST HAMPTON, NEW YORK
S-3

DATE: November 15, 1990

PRESENT:

Graeme Wallace	Fanning, Phillips and Molnar
Peter Dermody	Fanning, Phillips and Molnar
Phil Zackman	R&L Well Drilling
Sal	R&L Well Drilling

WEATHER: Cloudy, cool

OBJECTIVE: To finish drilling and construction of S-3 and determine the plumness of S-2 and D-2.

DETAILS:

Peter Dermody arrived on site at 8:15 a.m. and Graeme Wallace at 8:45 a.m. Drilling commenced at 9:30 a.m. to finish S-3. The water table was located at 97' 8" and then after ½ hour, rose to 97' 2". It was noted that the augers deviate at 38 feet to the point that the light indicator is not visible. Peter Dermody asked Phil Zackman if he has large diameter augers which he said he did not have. Geology of drilled interval is given in Table 2 of November 14 field report.

It was decided that the well would be installed straight. Fifteen feet of screen and 95' 8" of casing were used to construct the well. Seven bags of sand were used to form a gravel pack that extends up to 90 feet. This was followed by two buckets of bentonite until 86 feet.

Peter Dermody constructed a tripod to measure plumbness of wells S-2 and D-2. The data for these wells is given in Table 1. John Conover of the NYDEC arrived at the site at 2:30 and stayed until 3:00 p.m. Peter Dermody left shortly after 2:30 and Graeme Wallace left at 3:20 with grouting nearly completed.

Respectfully submitted,

Graeme Wallace
Assistant Hydrogeologist

GW:ll

TABLE 1
PLUMBNESS OF WELLS S-2, D-2

Well (feet)	Depth	Deviation (inches)
D-2	0	0
	10	0
	20	0
	30	0
	40	0
	50	0.15
	60	0.2
	70	0.25
	80	0.2
	0	0.2 (tripod movement)
S-2	0	0
	10	0.25
	20	0.55
	30	0.60
	40	0.70
	50	0.75
	60	0.75
	70	0.75

TABLE 1
PLUMBNESS OF WELL S-5

Depth (feet)	Deviation (inches)
0	0
10	0.3"
20	0.6"
30	0.7"
40	0.7"
50	0.7"

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL

DATE:	November 16, 1990	
PRESENT:	Peter Dermody	Fanning, Phillips and Molnar
	Sal, Greg, Mark	R&L Well Drilling
WEATHER:	Sunny/65°	
OBJECTIVE:	Development of wells GP-1 and S-2	

DETAILS:

Arrived at 8:00 AM . R&L prepared for development of wells GP-1 and S-2. All equipment was decontaminated and we began development at S-2 at 10:00 AM. S-2 was developed and filled four 55-gallon drums, with surging periodically. Final turbidity was 4 ntus.

At GP-1, four 55-gallon drums were filled, with periodic surging. Final turbidity was 23 ntus. GP-1 did become turbid for the ≈50th through 100th gallon of development before starting to clear.

Pumping rate was ≈20 gpm for both wells. GP-1 was tested for recovery and initial static 76'6" matched final post-development levels. R&L cemented metal sleeves on wells for rest of day. Pete Dermody left site at 1:00 PM.

Respectfully submitted,

Peter Dermody
Hydrogeologist

PD:lel

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL

DATE: November 19, 1990

PRESENT:		
	Keith Robins	Fanning, Phillips and Molnar
	Peter Dermody	Fanning, Phillips and Molnar
	Phil	R&L Well Drilling
	Greg	R&L Well Drilling
	Sal	R&L Well Drilling

WEATHER: 50°, Chilly

OBJECTIVE: To develop shallow groundwater wells S-6, S-1, S-4, S-5 and S-3. Each well to be developed until the turbidity is 50 nephelometric turbidity units (NTUS) or less.

SUMMARY:

Arrived at site at 8:10 a.m. The drillers loaded up the truck with equipment at 9:00 a.m. Table A is a summary of the development of groundwater wells. Left site at 2:30 p.m.

Respectively submitted,

Keith S. Robins
Assistant Hydrogeologist

KSR:sa

Split Spoon (120'-121.5')

0-6" = 32
6"-12" = 62
12"-18" = 66

Split Spoon (125'-126.5)

0-6" = 22
6"-12" = 66
12"-18" = 40

Split Spoon (130'-131.5)

0-6" = 39
6"-12" = 62
12"-18" = 53

Split Spoon (135'-136.5')

0-6" = 29
6"-12" = 32
12"-18" = 32

Split Spoon (140'-141.5)

0-6" = 35
6"-12" = 70
12"-18" = 82

Split Spoon (145'-146.5')

0-6" = 28
6"-12" = 42
12"-18" = 43

Split Spoon (150'-151.5')

0-6" = 30
6"-12" = 41
12"-18" = 41

No recovery due to rock

Split Spoon (155'-156.5')

0-6" = 35
6"-12" = 50
12"-18" = 76

Split Spoon (160'-161.5')

0-6" = 25
6"-12" = 25
12"-18" = 30

No recovery due to rock

Split Spoon (165'-166.5)

0-6" = 50
6"-12" = 100 (for 4½ inches)
12"-18" = __

Health and Safety monitoring at 165, OVA reading 0 ppm

Split Spoon (170'-171.5')

0-6" = 30
6"-12" = 78
12"-18" = 50

Split Spoon (175'-176.5')

0-6" = 30
6"-12" = 60
12"-18" = 100

Split Spoon (180'-181.5')

0-6" = 35
6"-12" = 59
12"-18" = 88

Mud parameters at 9:30 a.m.

Weight = 9 lb/gal
Viscosity = 40 seconds
Sand content = 2%
pH = 7
Calcium = 380 ppm

At 9:40 a.m., when the drilling rods were at a depth of 105 feet. The mud level was marked. At 1:20 p.m., the drilling rods were at a depth of 140 feet. Mud level was measured to be 3½" lower. Surface area of pit was measured to be approximately 162 ft^2. Mud borehole is 8 inch diameter and porosity is approximately 30%.

Mud parameters at 1:30 p.m.

Weight	= 8.9 lb/gal
Viscosity	= 40 seconds
Sand content	= 2%
pH	= 7.5
Calcium	= 400 ppm

Due to lateness of time, the drilling will be continued the next day. There was one bag of drilling mud used. Left the site at 4:30 p.m.

Respectfully submitted,

Keith S. Robins
Assistant Hydrogeologist

KSR:sa

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL
D-3

DATE: November 28, 1990

PRESENT:		
	Keith Robins	Fanning, Phillips and Molnar
	Graeme Wallace	Fanning, Phillips and Molnar
	Phil	R&L Well Drilling
	Sal	R&L Well Drilling
	Greg	R&L Well Drilling
	Bob Stewart	New York State Department of Environmental Conservation (NYDEC)
	Ben Rice	R&L Well Drilling

WEATHER: 60°, Sunny

OBJECTIVE: To finish drilling deep groundwater well D-3 and have geophysical logging performed on the well. The total depth of the well was 202 feet.

DETAILS:

Arrived on site at approximately 8:00 a.m. Actions taken by drillers to modify drilling mud along with the measurements of various mud parameters are given in Table 2.

Bob Stewart of the NYDEC arrived at 11:22 a.m. At 12:20 p.m. a seal on a pump needed to be replaced. Drilling restarted at 1:15 p.m. Keith Robins and Bob Stewart left site at approximately 3:00 p.m. Geophysical logging of the hole was started at 3:30 p.m. and finished at 4:20 p.m. Two SP and resistivity logs and one gamma radiation log were obtained. The bottom of the hole was noted to be at 224 feet.

185 to 200 feet interval was characterized by a medium to medium to coarse brown sand that contains trace amounts of gravel. From 200 to 210 feet the sand is predominantly finer than the previous zone. At 210 feet start to see a fine dark brown silty sand interbedded

with the coarser brown sand. From 210 to 226 feet, both fine and silty sands are observed. Dark brown to red brown silty sands tend to be more mica-rich than the coarser sands.

Headspace analysis of the sample jars indicated near zero values from 100 to 125 feet, 5ppm at 130 feet and then near zero values again, until 210 feet. The maximun reading (15 ppm) was obtained for the silty sand collected at 220 feet (Table 2).

Respectfully submitted,

Graeme Wallace
Hydrogeologist

GW:ccr
Enclosure

Table 1: Drilling Mud Data

Interval (feet)	Time	Details
180	9:30 a.m.	4 bags of bentonite and ½ pound of soda ash added to drilling mud.
180-185	9:45 a.m.	Drilling mud is 4" from top of label in pit.
180-185		Weight - 8.8 lbs/gal. Viscosity - 32 pH - 7.5-8 Sand Content - 1/4% Calcium - 400
185-190	10:15 a.m.	Drilling mud is 4¼" from the top of the label in the pit.
190-195	10:45 a.m.	Drilling mud is 4 3/8" from the top of the label in the pit.
	11:05 a.m.	Weight - 9.0 Viscosity - 39 seconds pH - 7.0 Sand - 2¼ Calcium - 380
200-205	11:40 a.m.	Drilling mud is 4½" from the top of the label in the pit.
205-210	11:55 a.m.	Drilling mud is 5" from the top of the label in the pit.
210-215	1:40 p.m.	Drilling mud is 5 1/8" from the top of the label in the pit.
220-225	2:10 p.m.	Drilling mud is 5¼" from the top of the label in the pit.
	2:15 p.m.	Water added to thin drilling mud to facilitate well installation and development.

Table 2: Split Spoon Data

Interval (feet)	Blow Counts	Description	OVA Reading (ppm)
185-185.9	0-6" =42 6"-11" =100	Medium brown sand with thin gravel-rich layers and some Fe staining.	3
190-191.5	0-6" =44 6"-12" =46 12"-18" =88	Medium to coarse brown sand with some grain size and color variation on cm. scale. Trace gravel concetrated in thin zone.	2
195-196.5	0-6" =30 6"-12" =80 12"-18" =36	Medium brown sand with trace of fine gravel, grain-size variation on cm. scale with some layers medium to course.	2
200-201.5	0-6" =32 6"-12" =59 12"-18" =78	Fine to medium homogenous brown sand with trace of fine gravel. Much finer than before.	0-2
205-205.7	0-6" =40 6"-8" =30	Fine to medium brown sand appears coaser than last interval. Trace of fine gravel and some iron staining.	0-2
210-211.5	0-6" =20 6"-12" =67 12"-18" =46	Medium laminated brown sand with rare mm-wide mica-rich layers and contact with fine dark brown silty sand. 50:50 medium sand and silty sand.	4
215-216.5	0-6" =80 6"-12" =80 12"-18" =80	Fine dark brown homogeneous sand.	6
220-221.5	0-6" =60 6"-12" =60 12"-18" =50	Fine dark brown silty sands with gradational contact with fine sand. Silty zones are more mica-rich.	15
225-225.9	0-6" =60 6"-11" =100	Reddish brown fine sand with red brown sitly layer (<4 in.) A separate sample of dark brown silt obtained.	2-4

* OVA readings obtained by headspace analysis of sample jars.

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL
D-3

DATE: November 29, 1990

PRESENT: Keith Robins — Fanning, Phillips and Molnar
Phil — R&L Well Drilling
Greg — R&L Well Drilling

WEATHER: 45°, Rain

OBJECTIVE: To construct groundwater well D-3.

DETAILS:

Arrived at site at 8:30 a.m. The construction of the well is as follows:

Drillers grouted eighteen feet of the overdrilling from 207 to 225.

Two feet of bentonite tablets were added above the grout. Approximately three feet of sand pack was placed below the well up to a depth of 202 feet.

There was 20 feet of 4 inch PVC screen from 182 to 202 installed with a bottom cap. One hundred and eithty two feet of casing was attached above the screen and a two feet riser pipe was added above surface.

Approximately 10 feet of sand pack extended above the screen zone. This was confirmed by measuring down with a weighted tape.

At 2:00 p.m., drillers started to grout from the top of the sand pack to the land surface. A volcay grout mixture was used. The drillers will let the grout settle and put on the protective casing and cement it the next day. Left site at 3:00 p.m.

Respectfully submitted,

Keith Robins
Assistant Hydrogeologist

KSR:sa

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL

DATE: November 30, 1990

PRESENT:		
	Keith Robins	Fanning, Phillips and Molnar
	Phil	R&L Well Drilling
	Sal	R&L Well Drilling
	Greg	R&L Well Drilling

WEATHER: 60°, Sunny

OBJECTIVE: Developed groundwater well D-3 in accordance with Part 360.2.11 (a) (8)(iii), the well was developed until the turbidity was less than 50 nephelometric turbidity units.

DETAILS:

Arrived at site at 8:30 a.m. Drillers decontaminated the pump and poly tubing at 8:00 a.m. Started pump at 9:00 a.m. The pump was shut off and periodic surging on seven separate occasions were performed in order to help with development. The pump was shut off after 12 drums were filled. Additional drums were brought to the well site. The pump was turned on and continued pumping until 12:00 p.m. The turbidity of the water was checked using a turbidity meter. The results and times are as follows:

Time	Nephelometric Turbidity Units (NTUS)	Trials
11:40 p.m.	70	1
11:50 p.m.	65	2
12:00 p.m.	50	3

There was a total of (22) 55 gallon drums filled. By 1:00 p.m. the drillers cleaned up and decontaminated the pump. The 55 gallon

drums were placed on wooden pallets. There was plastic below the wooden pallets and plastic covering the drums. String was used to tie down the plastic in place. A dirt berm surrounding the drums is to prevent any rain water from entering. At 2:30 p.m., drillers put protective casing on well D-3 and locked it. Left site at 2:45 p.m. and went back to the office.

Respectfully submitted,

Keith S. Robins
Assistant Hydrogeologist

KSR:sa

APPENDIX D

fanning, phillips & molnar
ENGINEERS

Drilling Log

Project SPRINGS FIREPLACE LANDFILL Owner TOWN OF EAST HAMPTONS

Location EAST HAMPTON N.Y. W.O. Number

Well Number S-1 Total Depth 70' Diameter 4"

Surface Elevation 70' AMSL Water Level: Initial 60' 24-hrs.

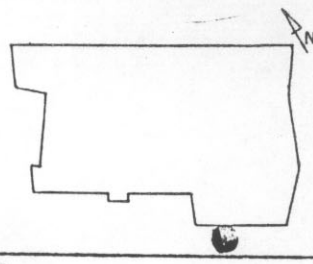
Screen: Dia. 4" Length 15' Slot Size 0.020

Casing: Dia. 4" Length 55' Type P.V.C.

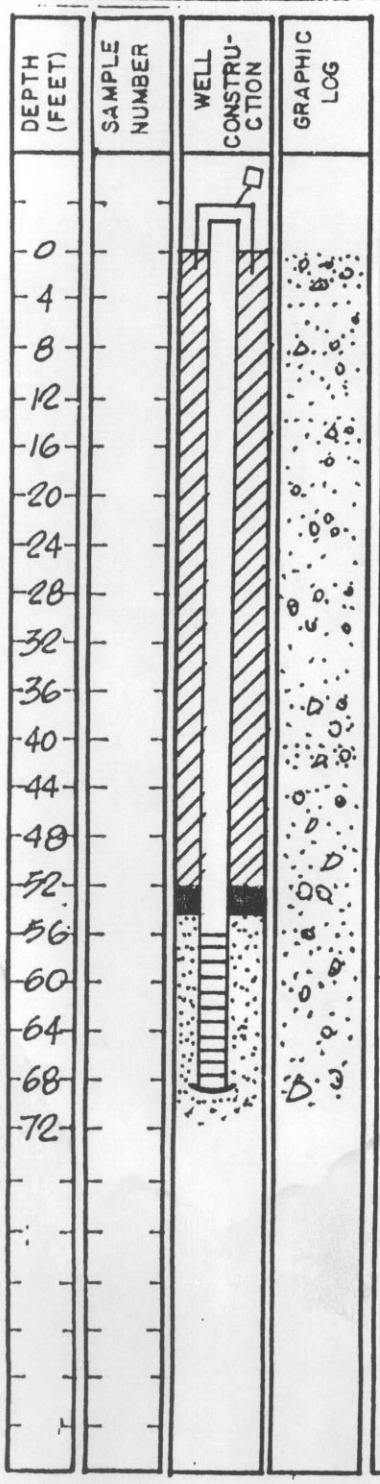
Drilling Company R&L DRILLING Drilling Method HOLLOW STEM AUGER

Driller PHIL ZACKMAN Log By KEITH ROBINS Date Drilled 11/8/90

Sketch Map



Notes S-1



DESCRIPTION/SOIL CLASSIFICATION
(COLOR, TEXTURE, STRUCTURES)

(0'-4') BROWN POORLY SORTED MED. SAND W/ GRAVEL & PEBBLES

(4'-13') GRAY MED. SAND W/TRACE GRAVEL

(13'-40') MED. GRAY BROWN GRAVELY SAND

(40'-43') LIGHT BROWN MED. WELL SORTED SAND W/ TRACE GRAVEL

(43'-55') LIGHT BROWN MED. GRAVELY SAND W/PEBBLES

▽

(55'-70') LIGHT BROWN GRAVELLY COARSE SAND

fanning, phillips & molnar
ENGINEERING
HAUPPAUGE NEW YORK

Drilling Log

Project SPRINGS-FIREPLACE LANDFILL Owner TOWN OF EAST HAMPTON

Location EAST HAMPTON, N.Y. W.O. Number

Well Number S-2 Total Depth 86' Diameter 4"

Surface Elevation ≈ 86' AMSL Water Level: Initial 76' 24-hrs.

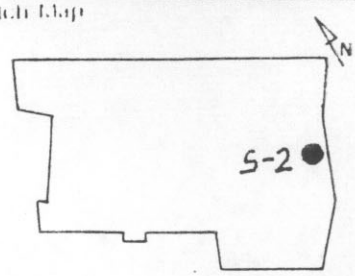
Screen: Dia. 4" Length 15' Slot Size 0.020"

Casing: Dia 4" Length 70' Type P.V.C.

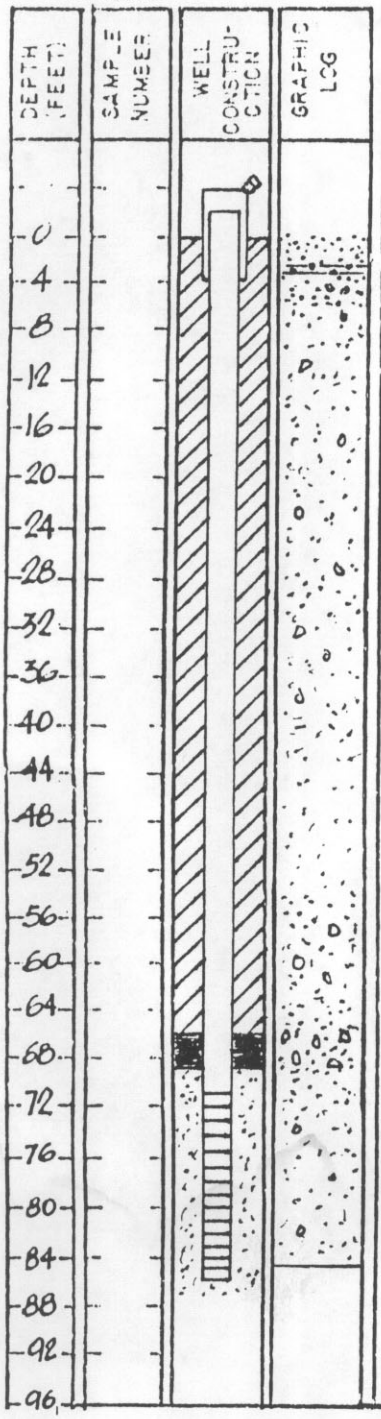
Drilling Company R & L DRILLING Drilling Method HOLLOW STEM AUGER

Driller PHIL ZACKMAN Log By KEITH ROBINS Date Drilled 11/5/90

Sketch Map



Notes



DESCRIPTION / SOIL CLASSIFICATION
(COLOR, TEXTURE, STRUCTURES)

0'-2' – FINE, BROWN SAND

2'-4' – FINE, GRAY SILT

4'-5' – BROWN, MEDIUM SAND, WITH TRACE COBBLES

5'-30' – COARSE-MEDIUM BROWN SAND, WITH SOME PEBBLES AND GRAVEL, TRACE COBBLES

30'-40' – MEDIUM-COARSE BROWN SAND, TRACE PEBBLES & GRAVEL

40'-55' – LIGHT BROWN MEDIUM-COARSE SAND, OUTWASH

55'-65' – MEDIUM-COARSE BROWN SAND TRACE PEBBLES AND GRAVEL

65'-70' – COARSE BROWN SAND WITH SOME GRAVEL, PEBBLES & COBBLES

70'-85' – COARSE BROWN SAND WITH TRACE PEBBLES & GRAVEL

fanning, phillips & molnar

Drilling Log

Project SPRINGS FIREPLACE LANDFILL Owner TOWN OF EAST HAMPTON

Location EAST HAMPTON N.Y. W.O. Number

Well Number S-3 Total Depth 107' Diameter 4"

Surface Elevation 106' Water Level: Initial 97' 24-hrs.

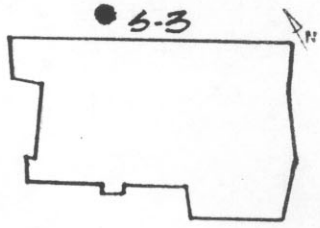
Screen: Dia. 4" Length 15' Slot Size 0.020"

Casing: Dia. 4" Length 92' Type P.V.C.

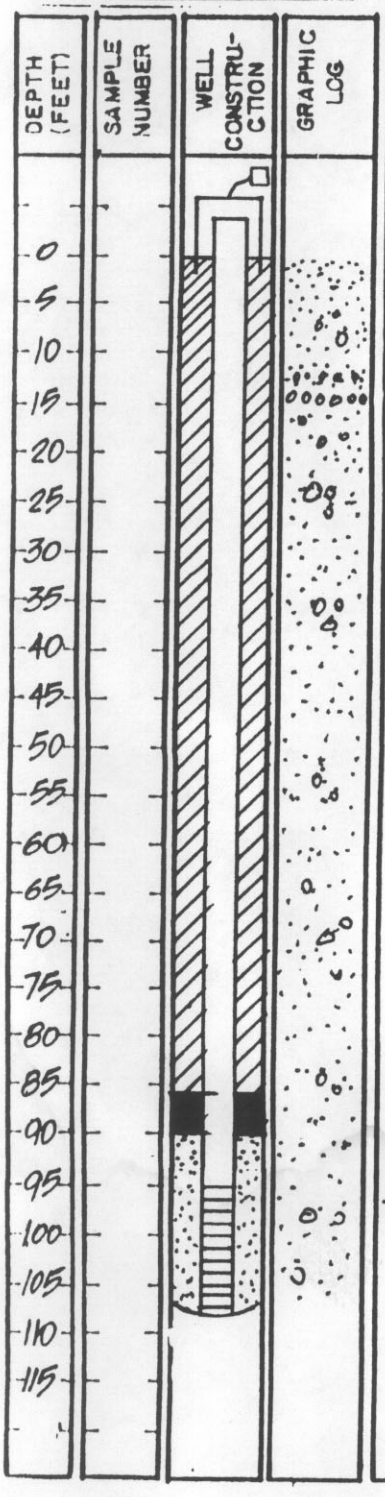
Drilling Company R&L DRILLING Drilling Method HOLLOW STEM AUGER

Driller PHIL ZACKHAN Log By KEITH ROBINS Date Drilled 11/14/90

Sketch Map



Notes



DESCRIPTION/SOIL CLASSIFICATION
(COLOR, TEXTURE, STRUCTURES)

(0'-4') BROWN FINE SAND

(4'-11') BROWN FINE TO MED. SAND W/ABUNDANT GRAVEL

(11'-14') DARK BROWN FINE TO MED. SAND W/GRAVEL

(14'-15') COBBLE ZONE

(15'-28') DARK BROWN FINE TO MED. SAND W/VARIABLE AMOUNTS OF GRAVEL & COBBLES.

(28'-78') DARK BROWN MED. SAND W/ SOME COBBLES & GRAVEL

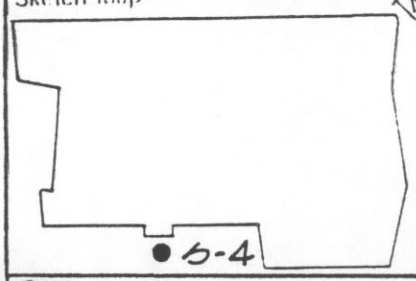
(78'-107') DARK BROWN MED. SAND W/ SOME GRAVEL GRAVEL & COBBLES

fanning, phillips & molnar
ENGINEERS
RONKONKOMA NEW YORK

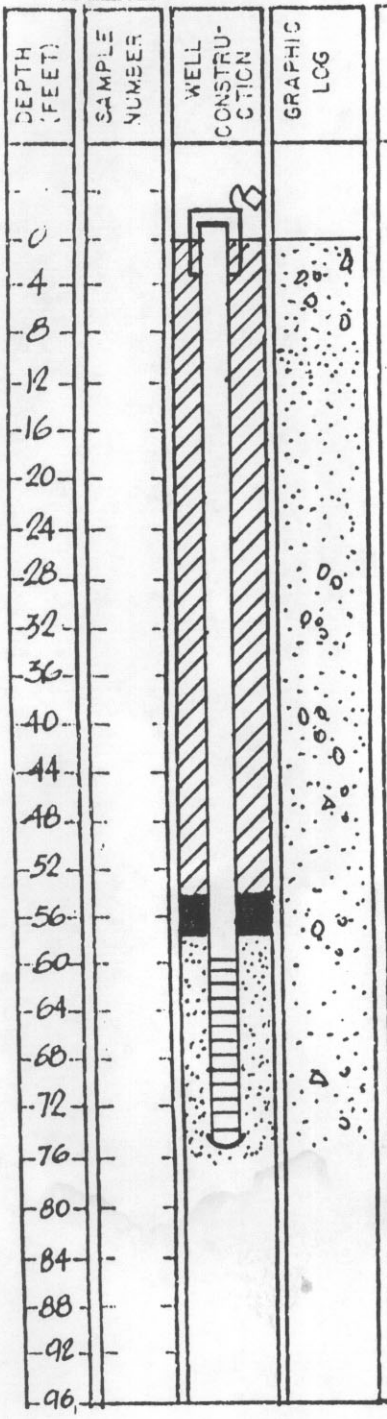
Drilling Log

Project SPRINGS FIREPLACE L.F. Owner TOWN OF EAST HAMPTON
Location EAST HAMPTON, N.Y. W.O. Number
Well Number S-4 Total Depth 75' Diameter 4"
Surface Elevation ≈75' AMSL Water Level: Initial 65' 24-hrs.
Screen: Dia. 4" Length 15' Slot Size 0.020"
Casing: Dia 4" Length 60' Type P.V.C.
Drilling Company R & L DRILLING Drilling Method HOLLOW STEM AUGER
Driller P. ZACKMAN Log By KEITH ROBINS Date Drilled 11/13/90

Sketch Map



Notes



DESCRIPTION / SOIL CLASSIFICATION
(COLOR, TEXTURE, STRUCTURES)

(0'-10') COARSE BROWN SAND, W/SOME PEBBLES, GRAVEL & COBBLE

(10'-12') GRAY WELL SORTED MED.-COARSE SAND

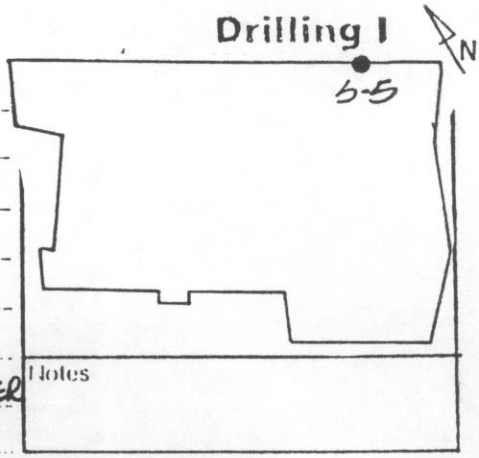
(12'-25') BROWN MED.-COARSE WELL SORTED SAND

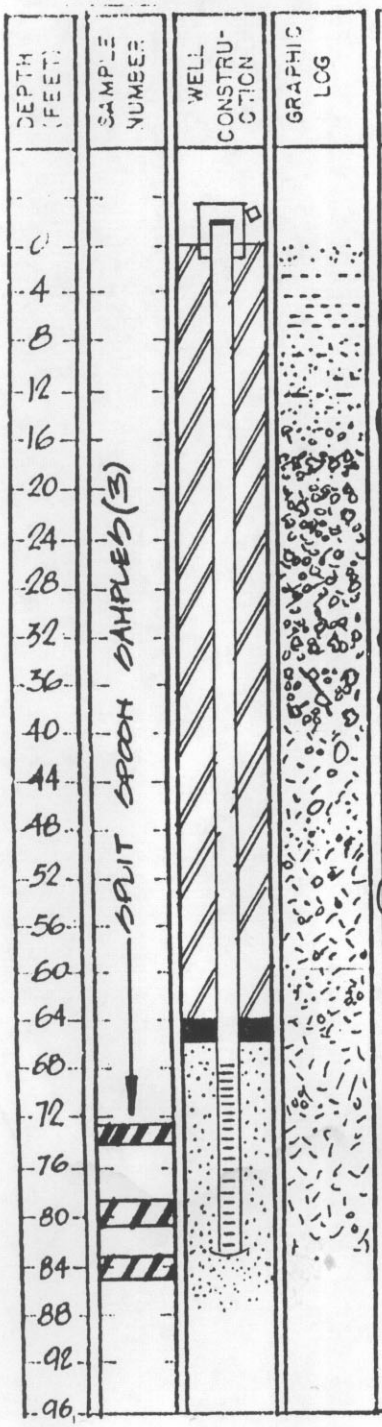
(25'-35') LIGHT BROWN MED.-SAND W/TRACE GRAVEL

(35'-75') BLONDE WELL SORTED MED.-COARSE SAND, W/TRACE GRAVEL, AND PEBBLES

fanning, phillips & molnar
ENGINEERS
ROCKVILLE CENTRE NEW YORK

Project SPRINGS FIREPLACE L.F. Owner TOWN OF EAST HAMPTON
Location EAST HAMPTON, N.Y. W.O. Number
Well Number 5-5 Total Depth 83' Diameter 4"
Surface Elevation ≈ 85' AMSL Water Level: Initial 73' 24-hrs
Screen: Dia. 4" Length 15' Slot Size 0.020"
Casing: Dia. 4" Length 68' Type P.V.C.
Drilling Company R+L DRILLING Drilling Method HOLLOW STEM AUGER
Driller PHIL ZACKMAN Log By KIETH ROBINS Date Drilled 11/12/90





DESCRIPTION/SOIL CLASSIFICATION
(COLOR, TEXTURE, STRUCTURES)

(0'-2') MEDIUM TO FINE LIGHT BROWN SAND.
(2'-8') FINE - MEDIUM GRAY SILT.
(8'-15') FINE, LIGHT BROWN SAND W/ TRACE SILT.
(15'-17') COARSE - MEDIUM BROWN SAND W/ SOME GRAVEL, PEBBLE AND COBBLE.
(17'-19') COARSE - MEDIUM SAND W/ ABUNDANT COBBLES, GRAVEL & PEBBLE.
(19'-25') COARSE - BROWN SAND, ABUNDANT GRAVEL, PEBBLE & COBBLE.
(25'-30') BROWN - ORANGE COARSE SAND W/ ABUNDANT GRAVEL & PEBBLE.
(30'-35') BROWN - GRAVELLY COARSE SAND W/ ABUNDANT PEBBLES & COBBLES.
(35'-40') BROWN COARSE SAND, W/ ABUNDANT GRAVEL SOME PEBBLES AND COBBLES.
(40'-47') COARSE BROWN SAND SOME GRAVEL AND PEBBLES.
(47'-50') GRAVELLY BROWN SAND TRACE PEBBLES.
(50'-60') BROWN COARSE SAND W/ SOME GRAVEL AND TRACE PEBBLES.
(60'-83') LIGHT BROWN COARSE SAND, SOME GRAVEL AND TRACE PEBBLES.

fanning, phillips & molnar
ENGINEERS

Drilling Log

Project SPRING/FIREPLACE LANDFILL Owner TOWN OF EAST HAMPTON

Location EAST HAMPTON N.Y. W.O. Number

Well Number S-6 Total Depth 86' Diameter 4"

Surface Elevation ≈90' AMSL Water Level: Initial 75' 24-hrs

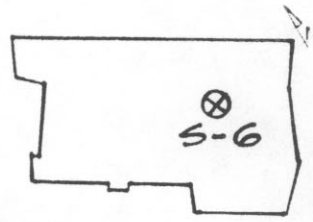
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Casing: Dia 4" Length 71' Type P.V.C.

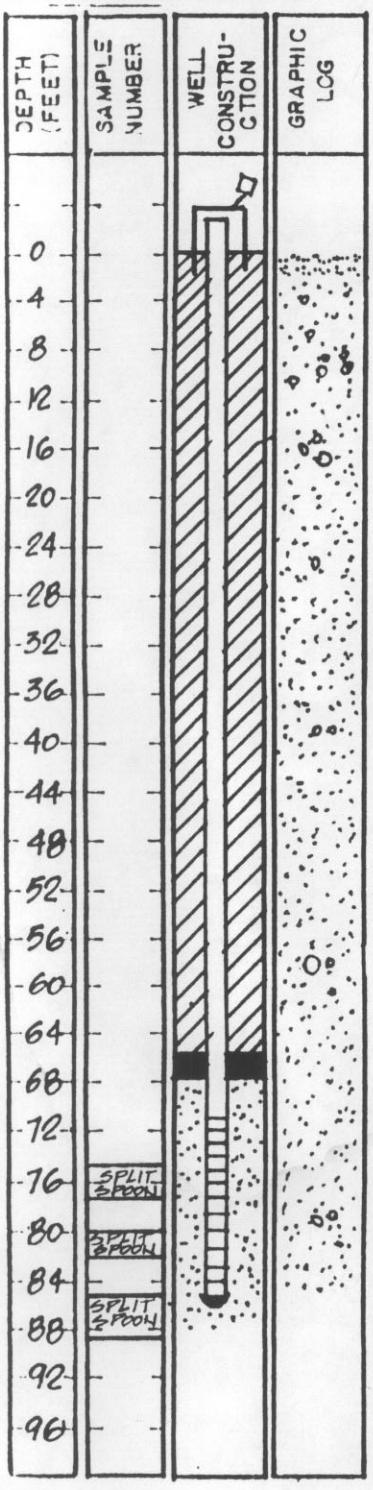
Drilling Company R&L WELL DRILLING Drilling Method HOLLOW STEM AUGER

Driller PHIL ZACKMAN Log By KEITH ROBINS Date Drilled 11/8/90

Sketch Map



Notes



DESCRIPTION/SOIL CLASSIFICATION
(COLOR, TEXTURE, STRUCTURES)

(0-6") GRAY FINE SAND
(6"-1') DARK GRAY FINE SAND W/ORGANIC MATERIAL

(1'-12') ORANGE-BROWN FINE TO MED. SAND W/ ALTERNATING SAND & GRAVEL (COBBLE) RICH LAYERS

(12'-86') MED. TO COARSE BROWN SAND W/TRACE GRAVEL

fanning, phillips & molnar
ENGINEERS
MONTGOMERY NEW YORK

Drilling Log

Project SPRINGS/FIREPLACE LANDFILL Owner TOWN OF EAST HAMPTON

Location EAST HAMPTON N.Y. W.O. Number

Well Number D-1 Total Depth 175' Diameter 4"

Surface Elevation ≈ 70' AMSL Water Level: Initial 24-hrs

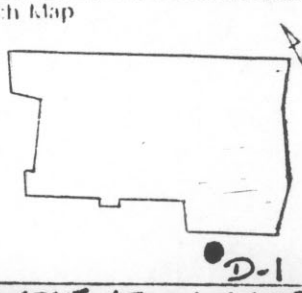
Screen: Dia 4" Length 20' Slot Size 0.020"

Casing: Dia 4" Length 155' Type P.V.C.

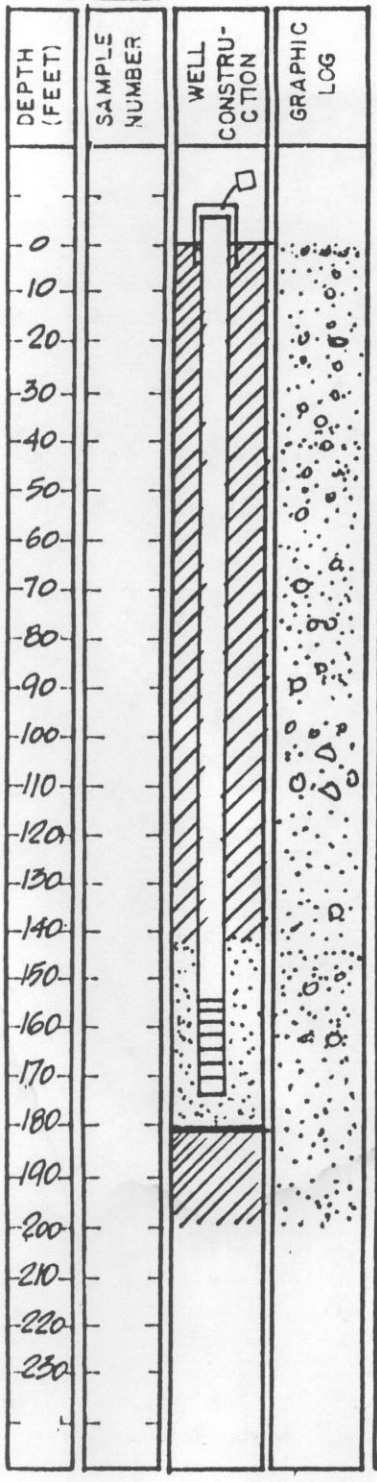
Drilling Company R&L DRILLING Drilling Method MUD ROTARY

Driller PHIL ZACKHAN Log By KEITH ROBINS Date Drilled 10/23/90

Sketch Map



Notes SPLIT SPOON SAMPLES EVERY 5', FROM 60'-200'



DESCRIPTION/SOIL CLASSIFICATION
(COLOR, TEXTURE, STRUCTURES)

(0'-4') BROWN POORLY SORTED MED. SAND W/GRAVEL & PEBBLES
(4'-13') GRAY MED. SAND W/ TRACE GRAVEL

(13'-40') MED. GRAY BROWN GRAVELY SAND

(40'-43') LIGHT BROWN MED. WELL SORTED SAND W/TRACE GRAVEL
(43'-60') LIGHT BROWN MED. GRAVELY SAND W/ PEBBLES

▽

(60'-75') MED. TO FINE BROWN SAND W/SOME GRAVEL
(75'-80') FINE TO MED. BROWN SAND W/SOME GRAVEL
(80'-95') MED. TO FINE SAND W/ABUNDUNT GRAVEL

(95'-115') GRAVEL ZONE MIXED W/MED. TO FINE SAND

(115'-130') FINE TO MED. BROWN SAND

(130'-145') FINE BROWN SAND W/TRACE GRAVEL
(145'-146') FINE BROWN SAND
(146'-155') MED. TO FINE BROWN SAND W/SOME GRAVEL
(155'-160') FINE BROWN SAND
(160'-165') FINE TO MED. BROWN SAND W/SOME GRAVEL

(165'-190') FINE BROWN SAND

(190'-200') FINE BROWN-RED SAND

fanning, phillips & molnar
ENGINEERS
RONKONKOMA NEW YORK

Drilling Log

Project SPRINGS FIREPLACE LANDFILL Owner TOWN OF EAST HAMPTON

Location EAST HAMPTON N.Y. W.O. Number

Well Number D-2 Total Depth 191' Diameter 4"

Surface Elevation ≈ 86' AMSL Water Level: Initial 24-hrs

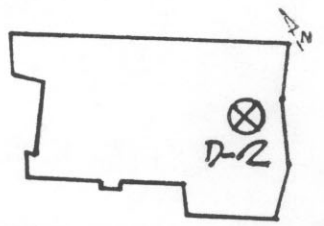
Screen: Dia 4" Length 20' Slot Size 0.020"

Casing: Dia 4" Length 171' Type P.V.C.

Drilling Company R&L DRILLING Drilling Method MUD ROTARY

Driller PHIL ZACKMAN Log By KEITH ROBINS Date Drilled 10/30/90

Sketch Map



Notes SPLIT SPOON SAMPLE EVERY 5' FROM (80'-210')

DEPTH (FEET)	SAMPLE NUMBER	WELL CONSTRUCTION	GRAPHIC LOG	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0				(0'-2') FINE BROWN SAND
10				(2'-4') FINE GRAY SILT
20				(4'-5') BROWN MED. SAND W/TRACE COBBLES
30				(5'-30') COARSE-MED. BROWN SAND, W/SOME PEBBLES & GRAVEL, TRACE COBBLES
40				(30'-40') MED.-COARSE BROWN SAND, TRACE PEBBLES & GRAVEL
50				(40'-55') LIGHT BROWN MED.-COARSE SAND, OUTWASH
60				(55'-65') MED.-COARSE BROWN SAND, TRACE PEBBLES & GRAVEL
70				(65'-70') COARSE BROWN SAND W/SOME GRAVEL, PEBBLES & COBBLES
80				(70'-80') COARSE BROWN SAND W/TRACE PEBBLES & GRAVEL
90				(80'-90') MED. LIGHT BROWN SAND W/SOME GRAVEL
100				(90'-105') MED. TO FINE LIGHT BROWN SAND W/SOME GRAVEL
110				(105'-118') COARSE GRAVEL ZONE
120				
130				(118'-145') FINE TO MED. LIGHT BROWN SAND W/TRACE GRAVEL
140				
150				(145'-150') FINE TO MED. LIGHT BROWN SAND
160				(150'-165') FINE TO MED. BLOND SAND W/TRACE GRAVEL AND SOME SILT
170				(165'-175') FINE TO MED. LIGHT BROWN SAND WITH TRACE GRAVEL
180				(175'-190') FINE TO MED. BROWN SAND W/TRACE GRAVEL
190				(190'-195') FINE LIGHT BROWN SAND
200				(195'-210') FINE TO SILTY BROWN SAND
210				(210'-215') FINE DARK BROWN-RED SAND
220				
230				

fanning, phillips & molnar
ENGINEERS
NEW YORK

Drilling Log

Project SPRINGS-FIREPLACE LANDFILL Owner TOWN OF EAST HAMPTON

Location EAST HAMPTON, N.Y. W.O. Number

Well Number D-3 Total Depth 203' Diameter 4"

Surface Elevation ≈100' AMSL Water Level: Initial 24-hrs

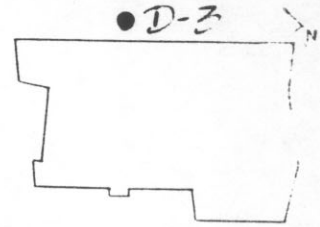
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Casing: Dia 4" Length 183' Type P.V.C.

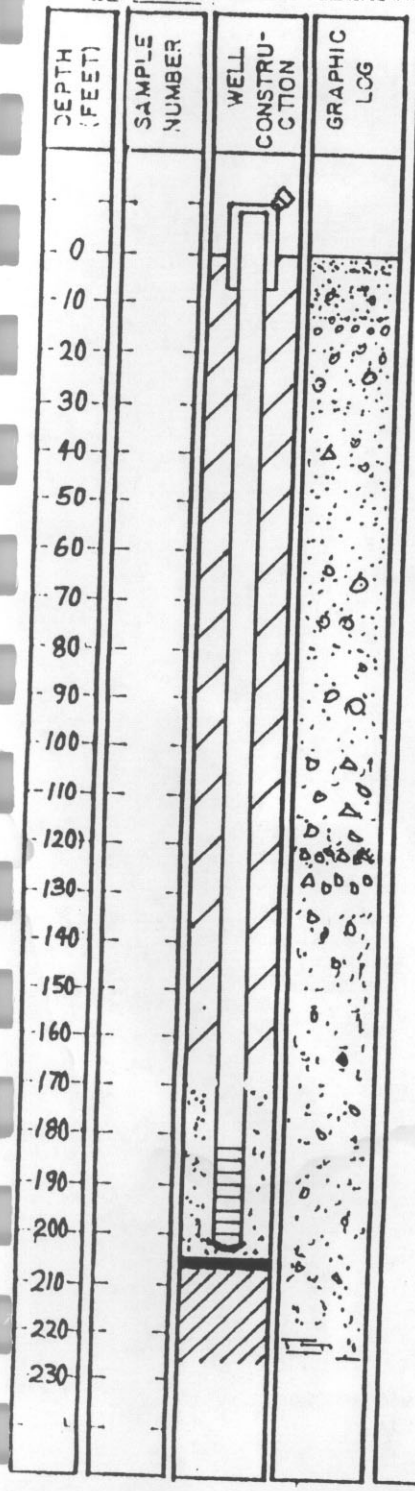
Drilling Company R & L DRILLING Drilling Method MUD ROTARY

Driller PHIL ZACKMAN Log By KEITH ROBINS Date Drilled 11/26/90

Sketch Map



Notes SPLIT SPOON SAMPLES EVERY 5' FROM (100'-225')



DESCRIPTION/SOIL CLASSIFICATION
(COLOR, TEXTURE, STRUCTURES)

(0-4') BROWN FINE SAND
(4'-11') BROWN FINE TO MED. SAND W/ABUNDANT FINE TO COARSE GRAVEL.
(11'-14') DARK BROWN FINE TO MED. SAND W/GRAVEL
(14'-15') COBBLE ZONE
(15'-28') DARK BROWN FINE TO MED. SAND W/ GRAVEL & COBBLES
(28-78') DARK BROWN MED. TO FINE W/COBBLES & GRAVEL
(78'-100') DARK BROWN MED. SAND W/ SOME GRAVEL & COBBLES

(100'-105') FINE TO MEDIUM, BROWN-LIGHT BROWN SAND W/ SOME GRAVEL
(105'-115') MEDIUM TO FINE, LIGHT BROWN SAND W/ SOME GRAVEL
(115'-120') FINE TO MEDIUM, LIGHT BROWN SAND W/ SOME GRAVEL
(120'-125') MEDIUM TO FINE, LIGHT BROWN SAND W/ ABUNDANT GRAVEL
(125'-130') FINE TO MEDIUM, LIGHT BROWN SAND W/ TRACE GRAVEL
(130'-140') MEDIUM TO FINE, LIGHT BROWN SAND W/ SOME GRAVEL
(140'-145') MEDIUM TO FINE, LIGHT BROWN SAND W/ TRACE GRAVEL
(145'-170') FINE TO MEDIUM, LIGHT BROWN SAND W/ TRACE GRAVEL

(170'-185') FINE, BROWN SAND W/ TRACE GRAVEL

(185'-200') FINE TO MEDIUM, BROWN SAND W/ TRACE GRAVEL

(200'-210') FINE, BROWN SAND W/ TRACE GRAVEL
(210'-220') FINE, BROWN SAND
(220'-225') FINE - SILTY, BROWN RED SAND

fanning, phillips & molnar

Drilling Log

Project SPRINGS-FIREPLACE LANDFILL Owner TOWN OF EAST HAMPTON

Location EAST HAMPTON N.Y. W.O. Number

Well Number D-4 Total Depth 190' Diameter 4"

Surface Elevation ≈75AMSL Water Level: Initial 24-hrs.

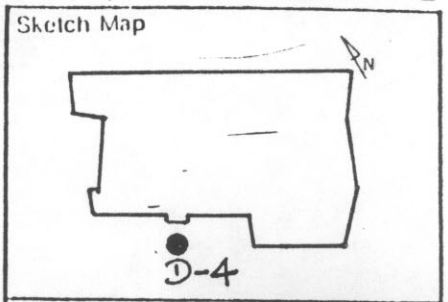
Screen: Dia. 4" Length 20' Slot Size 0.020"

Casing: Dia 4" Length 170' Type P.V.C.

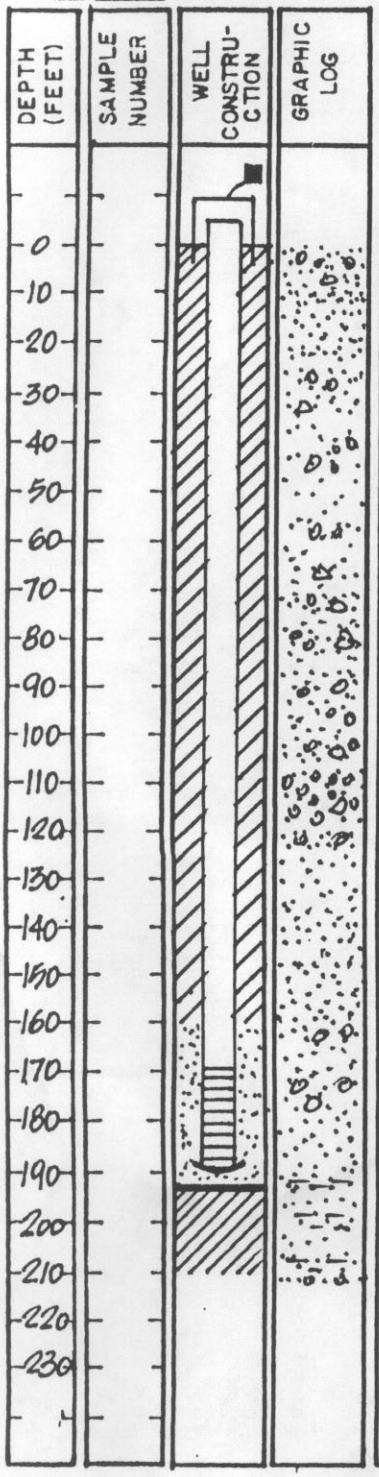
Drilling Company R&L DRILLING Drilling Method MUD ROTARING

Driller PHIL ZACKMAN Log By KEITH ROBINS Date Drilled 10/16/90

Sketch Map



Notes SPLIT SPOON SAMPLES EVERY 5' FROM (70'-210')



DESCRIPTION/SOIL CLASSIFICATION
(COLOR, TEXTURE, STRUCTURES)

(0'-10') COARSE BROWN SAND, W/SOME PEBBLES, GRAVEL & COBBLES
(10'-12') GRAY WELL SORTED MED. COARSE SAND
(12'-25') BROWN MED. COARSE WELL SORTED SAND
(25'-35') LIGHT BROWN MED. SAND W/TRACE GRAVEL.
(35'-70') BLONDE WELL SORTED MED. COARSE SAND, W/TRACE GRAVEL & PEBBLES
(70'-75') MED. TO FINE BROWN SAND W/ SOME GRAVEL
(75'-85') MED. TO FINE BROWN SAND, W/ABUNDANT GRAVEL
(85'-100') MED. BROWN SAND, W/ABUNDANT GRAVEL & TRACE PEBBLES
(100'-105') MED. TO FINE BROWN SAND W/SOME GRAVEL
(105'-120') GRAVEL ZONE, MIXED W/ MED.-COARSE BROWN SAND
(120'-125') FINE TO MED. BROWN SAND W/TRACE GRAVEL
(125'-140') FINE TO MED. BROWN-GRAY SAND
(140'-145') FINE TO MED. BROWN-ORANGE SAND
(145'-155') FINE TO MED. BROWN SAND
(155'-160') MED. BROWN SAND
(160'-165') MED. TO FINE BROWN SAND, TRACE GRAVEL
(165'-180') FINE TO MED. BROWN SAND, TRACE GRAVEL
(180'-190') FINE LIGHT BROWN SAND
(190'-195') FINE TO SILTY LIGHT BROWN SAND.
(195'-205') FINE TO SILTY BROWN TO RED SAND
(205'-210') FINE TO SILTY BROWN SAND
(210'-211') MED. FINE BROWN SAND W/TRACE GRAVEL

APPENDIX E

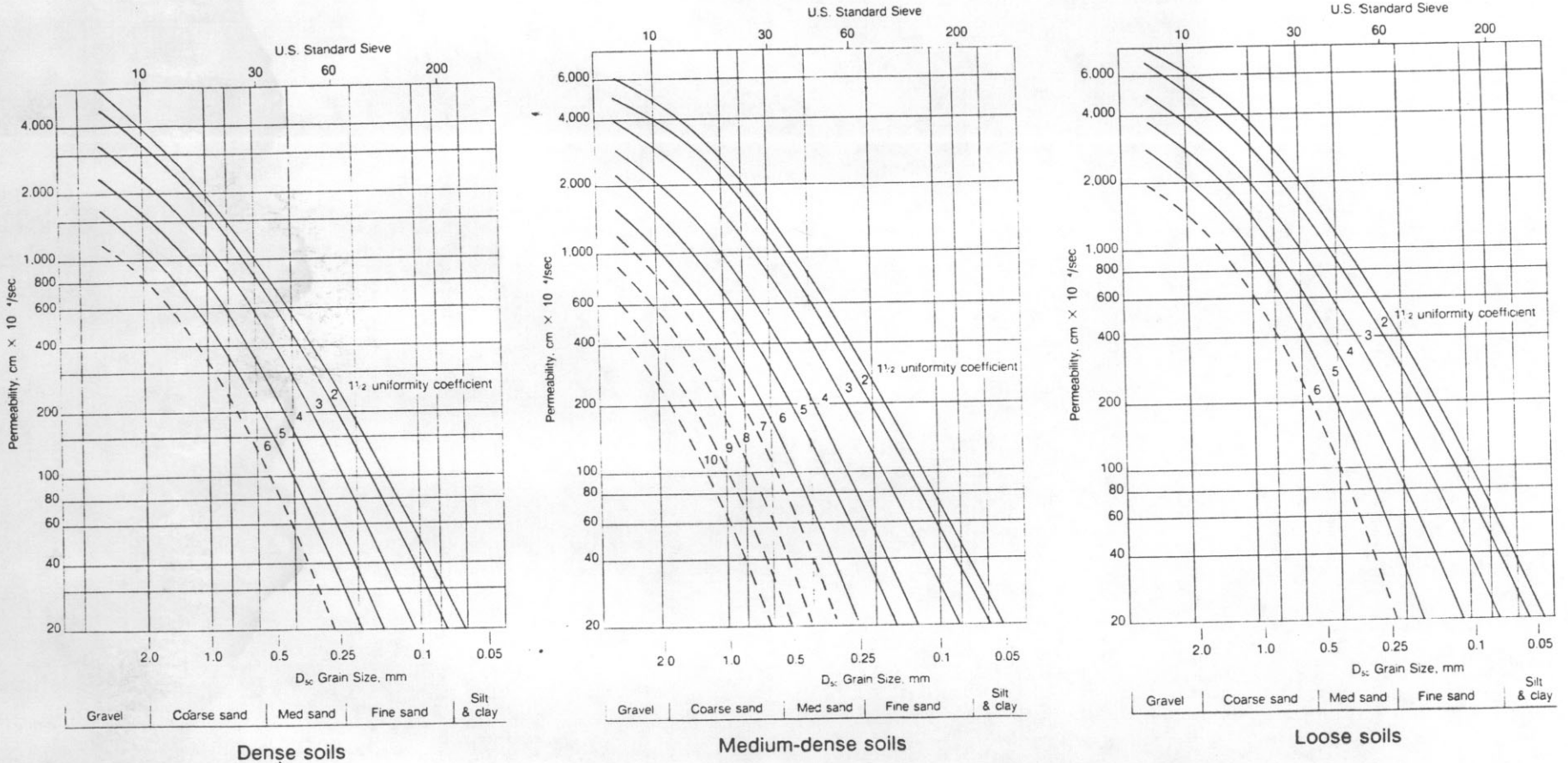


Figure 22.1. The hydraulic conductivity of materials to be dewatered can be estimated on the basis of particle size, uniformity coefficient, and density when information from pumping tests is not available. In these graphs, the D50 grain size represents the diameter of the 50-percent-retained size. To convert permeability in cm × 10^{-4}/sec to hydraulic conductivity in gpd/ft², multiply by 2.13. *(Moretrench American Corporation)*

APPENDIX F

APPENDIX D
SUMMARY OF GRAIN-SIZE ANALYSES AND HYDRAULIC CONDUCTIVITY ESTIMATES

WELL D-1

Depth Interval (ft.)	U_c	K(ft./day)	USCS Median Grain Size
60 - 61.5	5.2	82.6	Medium Sand
65 - 66.5	2.1	128.1	Find Sand
71 - 72.5	6.7	22.8	Medium Sand
75 - 76.5	7.7	-	Fine Sand
80 - 81.5	21.5	-	Medium Sand
85 - 86.5	16.0	-	Medium Sand
90 - 91.5	32.0	-	Medium Sand
95 - 96.5	45.6	-	Gravel
100 - 101.5	4.4	-	Gravel
105 - 106.5	1.5	-	Gravel
110 - 111.5	5.5	-	Gravel
115 - 116.5	3.4	-	Fine Sand
120 - 121.5	4.4	-	Fine Sand
125 - 126.5	3.5	-	Fine Sand
130 - 131.5	2.3	-	Fine Sand
135 - 136.5	2.6	-	Fine Sand
140 - 141.5	2.1	-	Fine Sand
145 - 146.5	1.6	-	Fine Sand
150 - 151.5	6.3	-	Medium Sand
155 - 156.5	3.0	12.8	Fine Sand
160 - 161.5	3.7	32.7	Fine Sand
165 - 166.5	2.3	19.9	Fine Sand
170 - 171.5	1.7	14.2	Fine Sand
175 - 176.5	1.8	17.1	Fine Sand
180 - 181.5	2.0	-	Fine Sand
185 - 186.5	1.8	-	Fine Sand
190 - 191.5	2.1	-	Fine Sand
197 - 198.5	2.1	-	Fine Sand
200 - 201.5	1.9	-	Fine Sand

APPENDIX C
SUMMARY OF GRAIN-SIZE ANALYSES AND HYDRAULIC CONDUCTIVITY ESTIMATES

WELL D-2

Depth Interval (ft.)	U_c	K(ft./day)	USCS Median Grain Size
80 - 81.5	5.0	52.7	Medium Sand
85 - 86.5	3.4	99.7	Medium Sand
90 - 91.5	6.7	18.5	Medium Sand
95 - 95.5	3.6	-	Medium Sand
100 - 101.5	7.1	-	Medium Sand
105 - 106.5	1.8	-	Gravel
118 - 119.5	5.0	-	Fine Sand
125 - 126.5	6.3	-	Fine Sand
132 - 133.5	5.6	-	Fine Sand
135 - 136.5	4.1	-	Fine Sand
140 - 141.5	4.3	-	Fine Sand
145 - 146.5	3.3	-	Fine Sand
150 - 151.5	2.9	-	Fine Sand
155 - 156.5	3.4	-	Fine Sand
160 - 161.5	2.1	-	Fine Sand
165 - 166.5	4.5	-	Fine Sand
170 - 171.5	4.1	17.0	Fine Sand
175 - 176.5*	3.3	22.8	Fine Sand
180 - 181.5*	3.3	22.8	Fine Sand
185 - 186.5	3.3	22.8	Fine Sand
190 - 191.5*	1.4	15.7	
195 - 196.5	1.4	15.7	Fine Sand
200 - 201.5	1.4	-	Fine Sand/Clay
205 - 206.5*	1.4	15.7	Fine Sand
210 - 211.5	1.6	-	Fine Sand
215 - 216.5*	1.6	-	Fine Sand

APPENDIX C
SUMMARY OF GRAIN-SIZE ANALYSES AND HYDRAULIC CONDUCTIVITY ESTIMATES

WELL D-3

Depth Interval (ft.)	U_c	K(ft./day)	USCS Median Grain Size
100 - 101.5	3.8	25.0	Medium/Fine Sand
105 - 106.5	5.7	42.7	Medium Sand
115 - 116.5	7.3	-	Medium Sand
120 - 121.5	14.4	-	Medium Sand
125 - 127.5	4.3	-	Medium/Fine Sand
130 - 131.5*	7.1	-	Medium Sand
135 -136.5	7.1	-	Medium Sand
140 - 141.5	4.0	-	Medium Sand
145 - 146.5	4.7	-	Fine Sand
155 - 156.5*	4.7	-	Fine Sand
165 - 166.5*	4.7	-	Fine Sand
170 - 171.5*	2.0	-	Fine Sand
175 - 176.5	2.0	-	Fine Sand
180 - 181.5*	2.0	-	Fine Sand
185 - 186.5*	2.0	-	Fine Sand
190 - 191.5*	2.0	-	Fine Sand
195 - 196.5	4.3	39.9	Fine Sand
200 - 201.5	2.1	19.9	Fine Sand
205 -206.5	3.0	57.0	Fine Sand
210 - 211.5*	1.9	-	Fine Sand
215 - 216.5*	1.9	-	Fine Sand
220 - 221.5	1.9	-	Fine Sand
225 - 226.5	1.5	-	Fine Sand

APPENDIX C
SUMMARY OF GRAIN-SIZE ANALYSES AND HYDRAULIC CONDUCTIVITY ESTIMATES

WELL D-4

Depth Interval (ft.)	U_c	K(ft./day)	USCS Median Grain Size
70 - 71.5	6.7	24.2	Medium Sand
75 - 76.5	10.4	28.5	Medium Sand
80 - 81.5	82.4	-	Coarse Sand
85 - 86.5	26.5	-	Coarse Sand
95 - 96.5	19.0	-	Medium Sand
100 - 101.5	8.0	-	Medium Sand
105 - 106.5	6.0	-	Gravel
110 - 111.5	5.1	-	Gravel
115 - 116.5	8.8	-	Gravel
120 - 121.5	1.8	-	Medium Sand
125 - 126.5	2.5	-	Fine Sand
130 - 131.5	2.2	-	Medium Sand
135 - 136.5	3.0	-	Fine Sand
140 - 141.5	3.4	-	Fine Sand
145 - 146.5	2.4	-	Fine Sand
150 - 151.5	2.9	-	Fine Sand
155 - 156.5	2.6	-	Fine Sand
160 - 161.5	3.2	-	Medium Sand
165 - 166.5	5.1	-	Medium Sand
170 - 171.5	3.4	19.9	Fine Sand
175 - 176.5	3.2	22.8	Fine Sand
180 - 181.5	1.4	16.5	Fine Sand
185 - 186.5	1.5	15.7	Fine Sand
190 - 191.5	1.7	10.0	Fine Sand
195 - 196.5	1.6	-	Fine Sand
200 - 201.5	1.7	-	Fine Sand
205 - 206.5	1.7	-	Fine Sand
210 - 210.5	5.0	-	Medium Sand

APPENDIX C
SUMMARY OF GRAIN-SIZE ANALYSES AND HYDRAULIC CONDUCTIVITY ESTIMATES

WELL S-5

Depth Interval (ft.)	U_c	K(ft./day)	USCS Median Grain Size
73 - 74.5	2.8	49.8	Fine Sand

APPENDIX C
SUMMARY OF GRAIN-SIZE ANALYSES AND HYDRAULIC CONDUCTIVITY ESTIMATES

WELL S-6

Depth Interval (ft.)	U_c	K(ft./day)	USCS Median Grain Size
75 - 76.5	2.5	82.6	Fine Sand
81 - 82.5	4.2	102.5	Medium Sand
86 - 87.5	4.3	135.0	Medium Sand

APPENDIX G

HZM LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9016832

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 11/26/90
DATE RECEIVED.. 11/28/90
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: SPRINGS SAMPLE ~~D-3~~ Mud

REMARKS:

TCL SEMI-VOLATILE ORGANICS - (ug/l)

PARAMETER (S)	RESULT
1,3-DICHLOROBENZENE	<20
1,4-DICHLOROBENZENE	<20
HEXACHLOROETHANE	<20
BIS(2-CHLOROETHYL)ETHER	<20
1,2-DICHLOROBENZENE	<20
BIS(2-CHL.ISOPROPYL)ETHER	<20
N-NITROSO-DIPROPYLAMINE	<20
NITROBENZENE	<20
HEXACHLOROBUTADIENE	<20
1,2,4-TRICHLOROBENZENE	<20
ISOPHORONE	<20
NAPHTHALENE	<20
BIS(2-CHL.ETHOXY)METHANE	<20
HEXACHLOROCYCLOPENTADIENE	<20
2-CHLORONAPHTHALENE	<20
ACENAPHTHYLENE	<20
ACENAPHTHENE	<20
DIMETHYLPHTHALATE	<20
2,6-DINITROTOLUENE	<20
FLUORENE	<20
4-CHL.PHENYL PHENYLETHER	<20
2,4-DINITROTOLUENE	<20
DIETHYL PHTHALATE	<20
N-NITROSODIPHENYLAMINE	<20
HEXACHLOROBENZENE	<20
4-BROMOPHENYLPHENYLETHER	<20
PHENANTHRENE	<20
ANTHRACENE	<20
DI-N-BUTYL PHTHALATE	<20
FLUORANTHENE	<20
PYRENE	<20
BUTYL BENZYL PHTHALATE	<20
BIS(2ETHYLHEXYL)PHTHALATE	<20

PARAMETER (S)	RESULT
CHRYSENE	<20
BENZO(A)ANTHRACENE	<20
3,3-DICHLOROBENZIDINE	<40
DI-N-OCTYL PHTHALATE	<20
BENZO(B)FLUORANTHENE	<20
BENZO(K)FLUORANTHENE	<20
BENZO(A)PYRENE	<20
INDENO(1,2,3-C,D)PYRENE	<20
DIBENZO(A,H)ANTHRACENE	<20
BENZO (G,H,I)PERYLENE	<20
2-CHLOROPHENOL	<20
2-NITROPHENOL	<20
PHENOL	<20
2,4-DIMETHYLPHENOL	<20
2,4-DICHLOROPHENOL	<20
2,4,6-TRICHLOROPHENOL	<20
4-CHLORO-3-METHYLPHENOL	<20
2,4-DINITROPHENOL	<100
2-METH.-4,6-DINITROPHENOL	<100
PENTACHLOROPHENOL	<100
4-NITROPHENOL	<100
2-METHYLPHENOL	<20
2,4,5-TRICHLOROPHENOL	<100
BENZOIC ACID	<100
4-METHYLPHENOL	<20
BENZYL ALCOHOL	<20
4-CHLOROANILINE	<20
2-METHYLNAPHTHALENE	<20
2-NITROANILINE	<100
3-NITROANILINE	<100
DIBENZOFURAN	<20
4-NITROANILINE	<100

DATE ISSUED 01/17/91

COPIES TO:

DATE EXTRACTED. 12/07/90
DATE RUN..... 12/07/90

Stanley Deaderick
LABORATORY DIRECTOR

JAN 29 '91 10:54
HZM LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9016832

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 11/26/90
DATE RECEIVED.. 11/28/90
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: SPRINGS SAMPLE D-3 Mud

REMARKS:

PESTICIDES AND PCB'S - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
LINDANE	<0.10		
HEPTACHLOR	<0.10		
ALDRIN	<0.10		
HEPTACHLOR EPOXIDE	<0.10		
DIELDRIN	<0.2		
ENDRIN	<0.2		
P,P'DDT	<0.2		
METHOXYCHLOR	<1.0		
TOXAPHENE	<2.0		
CHLORDANE	<1.0		
BETA-BHC	<0.2		
DELTA-BHC	<0.2		
ALPHA-BHC	<0.2		
P,P'-DDD	<0.2		
P,P'-DDE	<0.2		
ENDOSULFAN I	<0.2		
ENDOSULFAN II	<0.2		
ENDOSULFAN SULFATE	<0.2		
ENDRIN ALDEHYDE	<0.2		
O,P DDT	<0.2		
AROCLOR 1016	<1.0		
AROCLOR 1221	<1.0		
AROCLOR 1232	<1.0		
AROCLOR 1242	<1.0		
AROCLOR 1248	<1.0		
AROCLOR 1254	<2.0		
AROCLOR 1260	<2.0		

DATE ISSUED 01/17/91

COPIES TO:

DATE EXTRACTED. 12/07/90
DATE RUN..... 01/08/91

Stanley Isaacson
LABORATORY DIRECTOR

HZM LABS, INC.

575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9016832

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 11/26/90
DATE RECEIVED.. 11/28/90
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: SPRINGS SAMPLE D-3 (Aud

REMARKS:

TCL PURGEABLE ORGANICS - (ug/kg)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
CHLOROMETHANE	<50	STYRENE	<25
BROMOMETHANE	<50		
VINYL CHLORIDE	<50		
CHLOROETHANE	<50		
METHYLENE CHLORIDE	<25		
1,1-DICHLOROETHENE	<25		
1,1-DICHLOROETHANE	<25		
C/T-1/2-DICHLOROETHENE	<25		
CHLOROFORM	<25		
1,2-DICHLOROETHANE	<25		
1,1,1-TRICHLOROETHANE	<25		
CARBON TETRACHLORIDE	<25		
BROMODICHLOROMETHANE	<25		
1,2-DICHLOROPROPANE	<25		
TRANS-1,3-DICHLOROPROPENE	<25		
TRICHLOROETHENE	<25		
DIBROMOCHLOROMETHANE	<25		
1,1,2-TRICHLOROETHANE	<25		
CIS-1,3-DICHLOROPROPENE	<25		
BENZENE	<25		
BROMOFORM	<25		
1,1,2,2-TETRACHLOROETHANE	<25		
TETRACHLOROETHENE	<25		
TOLUENE	<25		
CHLOROBENZENE	<25		
ETHYLBENZENE	<25		
XYLENES (TOTAL)	<25		
ACETONE	140		
2-BUTANONE (MEK)	<50		
4-METHYL-2PENTANONE(MIBK)	<50		
CARBON DISULFIDE	<25		
VINYL ACETATE	<50		
2-HEXANONE	<50		

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DATE ISSUED 01/17/91

DATE RUN..... 11/29/90
DATE REPORTED.. 11/30/90

Stanley Deaver
LABORATORY DIRECTOR

H2M LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9100709

TYPE..... BLANK

MK

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

DATE COLLECTED. 01/08/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: FIELD BLANK #1

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
SILVER	<0.01	mg/l
ALUMINUM	<0.20	mg/l
ARSENIC	<10.0	ug/l
BORON	<0.10	mg/l
BARIUM	<0.20	mg/l
BERYLLIUM	<5.0	ug/l
BOD5	<10	mg/l
CALCIUM	<0.20	mg/l
CADMIUM	<5.0	ug/l
CHLORIDE	<2	mg/l
CYANIDE	<10	ug/l
COBALT	<0.05	mg/l
COD	<15	mg/l
COLOR	<5	units
CHROMIUM	<0.01	mg/l
COPPER	<0.02	mg/l
IRON	<0.02	mg/l
TOTAL HARDNESS	<1.32	mg/l
MERCURY	<0.2	ug/l
POTASSIUM	<0.20	mg/l
MAGNESIUM	<0.20	mg/l
MANGANESE	<0.02	mg/l
SODIUM	0.23	mg/l
AMMONIA (NH3)	<0.02	mg/l
NICKEL	<0.04	mg/l
NITRATE (AS N)	<0.1	mg/l
LEAD	<5.0	ug/l
PH	5.0	units
TOTAL PHENOLS	4.8	ug/l
ANTIMONY	<60	ug/l
SELENIUM	<5	ug/l
SULFATE	<5	mg/l
TOTAL ALKALINITY	2.1	mg/l

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Stanley Isaacson
LABORATORY DIRECTOR

ORIGINAL

H2M LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9100709

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... BLANK

DATE COLLECTED. 01/08/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: FIELD BLANK #1

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
TOTAL DISSOLVED SOLIDS	<5	mg/l
TOTAL KJELDAHL NITROGEN	<0.2	mg/l
THALLIUM	<10.0	ug/l
TOTAL ORGANIC CARBON(TOC)	<0.5	mg/l
TURBIDITY	<1	units
VANADIUM	<0.05	mg/l
ZINC	<0.02	mg/l

COPIES TO:

DATE ISSUED 01/23/91

Stanley Isaacson
LABORATORY DIRECTOR

ORIGINAL

H2M LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9100709

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... BLANK

DATE COLLECTED. 01/08/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: FIELD BLANK #1

REMARKS: SFLF SAMPLING

TCL SEMI-VOLATILE ORGANICS - (ug/l)

PARAMETER (S)	RESULT
1,3-DICHLOROBENZENE	<10
1,4-DICHLOROBENZENE	<10
HEXACHLOROETHANE	<10
BIS(2-CHLOROETHYL)ETHER	<10
1,2-DICHLOROBENZENE	<10
BIS(2-CHL.ISOPROPYL)ETHER	<10
N-NITROSO-DIPROPYLAMINE	<10
NITROBENZENE	<10
HEXACHLOROBUTADIENE	<10
1,2,4-TRICHLOROBENZENE	<10
ISOPHORONE	<10
NAPHTHALENE	<10
BIS(2-CHL.ETHOXY)METHANE	<10
HEXACHLOROCYCLOPENTADIENE	<10
2-CHLORONAPHTHALENE	<10
ACENAPHTHYLENE	<10
ACENAPHTHENE	<10
DIMETHYLPHTHALATE	<10
2,6-DINITROTOLUENE	<10
FLUORENE	<10
4-CHL.PHENYL PHENYLETHER	<10
2,4-DINITROTOLUENE	<10
DIETHYL PHTHALATE	<10
N-NITROSODIPHENYLAMINE	<10
HEXACHLOROBENZENE	<10
4-BROMOPHENYLPHENYLETHER	<10
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYL PHTHALATE	<10
FLUORANTHENE	<10
PYRENE	<10
BUTYL BENZYL PHTHALATE	<10
BIS(2ETHYLHEXYL)PHTHALATE	<10

PARAMETER (S)	RESULT
CHRYSENE	<10
BENZO(A)ANTHRACENE	<10
3,3-DICHLOROBENZIDINE	<20
DI-N-OCTYL PHTHALATE	<10
BENZO(B)FLUORANTHENE	<10
BENZO(K)FLUORANTHENE	<10
BENZO(A)PYRENE	<10
INDENO(1,2,3-C,D)PYRENE	<10
DIBENZO(A,H)ANTHRACENE	<10
BENZO (G,H,I)PERYLENE	<10
2-CHLOROPHENOL	<10
2-NITROPHENOL	<10
PHENOL	<10
2,4-DIMETHYLPHENOL	<10
2,4-DICHLOROPHENOL	<10
2,4,6-TRICHLOROPHENOL	<10
4-CHLORO-3-METHYLPHENOL	<10
2,4-DINITROPHENOL	<50
2-METH.-4,6-DINITROPHENOL	<50
PENTACHLOROPHENOL	<50
4-NITROPHENOL	<50
2-METHYLPHENOL	<10
2,4,5-TRICHLOROPHENOL	<10
BENZOIC ACID	<50
4-METHYLPHENOL	<50
BENZYL ALCOHOL	<10
4-CHLOROANILINE	<10
2-METHYLNAPHTHALENE	<10
2-NITROANILINE	<50
3-NITROANILINE	<50
DIBENZOFURAN	<10
4-NITROANILINE	<50

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DATE ISSUED 01/29/91

DATE EXTRACTED. 01/15/91
DATE RUN..... 01/24/91
DATE REPORTED.. 01/24/91

Stanley Isaacson
LABORATORY DIRECTOR

ORIGINAL

H2M LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9100709

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... BLANK

DATE COLLECTED. 01/08/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: FIELD BLANK #1

REMARKS: SFLF SAMPLING

HERBICIDES - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
2,4,-D	<0.2		
2,4,5-TP (SILVEX)	<0.05		

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DATE RUN..... 01/16/91
DATE REPORTED.. 01/17/91

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Stanley Isaacson
LABORATORY DIRECTOR

ORIGINAL

H2M LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9100709

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... BLANK

DATE COLLECTED. 01/08/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: FIELD BLANK #1

REMARKS: SFLF SAMPLING

PESTICIDES AND PCB'S - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
LINDANE	<0.05		
HEPTACHLOR	<0.05		
ALDRIN	<0.05		
HEPTACHLOR EPOXIDE	<0.05		
DIELDRIN	<0.1		
ENDRIN	<0.1		
P,P'DDT	<0.1		
METHOXYCHLOR	<0.5		
TOXAPHENE	<1.0		
CHLORDANE	<0.5		
BETA-BHC	<0.1		
DELTA-BHC	<0.1		
ALPHA-BHC	<0.1		
P,P'-DDD	<0.1		
P,P'-DDE	<0.1		
ENDOSULFAN I	<0.1		
ENDOSULFAN II	<0.1		
ENDOSULFAN SULFATE	<0.1		
ENDRIN ALDEHYDE	<0.1		
O,P DDT	<0.1		
AROCLOR 1016	<0.5		
AROCLOR 1221	<0.5		
AROCLOR 1232	<0.5		
AROCLOR 1242	<0.5		
AROCLOR 1248	<0.5		
AROCLOR 1254	<1.0		
AROCLOR 1260	<1.0		

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Stanley Pearson
LABORATORY DIRECTOR

ORIGINAL

H2M LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9100709

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... BLANK

DATE COLLECTED. 01/08/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: FIELD BLANK #1

REMARKS: SFLF SAMPLING

TCL PURGEABLE ORGANICS - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
CHLOROMETHANE	<10	STYRENE	<5
BROMOMETHANE	<10		
VINYL CHLORIDE	<10		
CHLOROETHANE	<10		
METHYLENE CHLORIDE	<5		
1,1-DICHLOPOETHENE	<5		
1,1-DICHLOROETHANE	<5		
C/T-1/2-DICHLOROETHENE	<5		
CHLOROFORM	<5		
1,2-DICHLOROETHANE	<5		
1,1,1-TRICHLOROETHANE	<5		
CARBON TETRACHLORIDE	<5		
BROMODICHLOROMETHANE	<5		
1,2-DICHLOROPROPANE	<5		
TRANS-1,3-DICHLOROPROPENE	<5		
TRICHLOROETHENE	<5		
DIBROMOCHLOROMETHANE	<5		
1,1,2-TRICHLOROETHANE	<5		
CIS-1,3-DICHLOROPROPENE	<5		
BENZENE	<5		
BROMOFORM	<5		
1,1,2,2-TETRACHLOROETHANE	<5		
TETRACHLOROETHENE	<5		
TOLUENE	<5		
CHLOROBENZENE	<5		
ETHYLBENZENE	<5		
XYLENES (TOTAL)	<5		
ACETONE	<10		
2-BUTANONE (MEK)	<10		
4-METHYL-2PENTANONE(MIBK)	<10		
CARBON DISULFIDE	<5		
VINYL ACETATE	<10		
2-HEXANONE	<10		

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DATE REPORTED.. 01/10/91

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Stanley Pearson
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575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9101021

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... BLANK
COMPLAINT

DATE COLLECTED. ~~01/09/91~~
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: FIELD BLANK #2

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
SILVER	<0.01	mg/l
ALUMINUM	<0.20	mg/l
ARSENIC	<10	ug/l
BORON	<0.10	mg/l
BARIUM	<0.20	mg/l
BERYLLIUM	<5	ug/l
BOD5	<10	mg/l
CALCIUM	0.24	mg/l
CADMIUM	<5	ug/l
CHLORIDE	<2	mg/l
CYANIDE	<10	ug/l
COBALT	<0.05	mg/l
COD	35	mg/l
COLOR	<5	units
CHROMIUM	<0.01	mg/l
COPPER	<0.02	mg/l
IRON	0.06	mg/l
TOTAL HARDNESS	.6	mg/l
MERCURY	<0.2	ug/l
POTASSIUM	<0.20	mg/l
MAGNESIUM	<0.20	mg/l
MANGANESE	<0.02	mg/l
SODIUM	0.74	mg/l
AMMONIA (NH3)	<0.02	mg/l
NICKEL	<0.04	mg/l
NITRATE (AS N)	<0.1	mg/l
LEAD	<5	ug/l
PH	6.3	units
TOTAL PHENOLS	<1	ug/l
ANTIMONY	<60	ug/l
SELENIUM	<5	ug/l
SULFATE	<5	mg/l
TOTAL ALKALINITY	2.3	mg/l

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Stanley Headrick
LABORATORY DIRECTOR

ORIGINAL

H2M LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694 3040 FAX:(516)694-4122

LAB NO: 9101021

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... BLANK
COMPLAINT

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: FIELD BLANK #2

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
TOTAL DISSOLVED SOLIDS	<5	mg/l
TOTAL KJELDAHL NITROGEN	<0.2	mg/l
THALLIUM	<10.0	ug/l
TOTAL ORGANIC CARBON(TOC)	<0.5	mg/l
TURBIDITY	<1	units
VANADIUM	<0.05	mg/l
ZINC	0.03	mg/l

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LABORATORY DIRECTOR

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LAB NO: 9101021

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

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COMPLAINT

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: FIELD BLANK #2

REMARKS: SFLF SAMPLING

TCL SEMI-VOLATILE ORGANICS - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
1,3-DICHLOROBENZENE	<10	CHRYSENE	<10
1,4-DICHLOROBENZENE	<10	BENZO(A)ANTHRACENE	<10
HEXACHLOROETHANE	<10	3,3-DICHLOROBENZIDINE	<20
BIS(2-CHLOROETHYL)ETHER	<10	DI-N-OCTYL PHTHALATE	<10
1,2-DICHLOROBENZENE	<10	BENZO(B)FLUORANTHENE	<10
BIS(2-CHL.ISOPROPYL)ETHER	<10	BENZO(K)FLUORANTHENE	<10
N-NITROSO-DIPROPYLAMINE	<10	BENZO(A)PYRENE	<10
NITROBENZENE	<10	INDENO(1,2,3-C,D)PYRENE	<10
HEXACHLOROBUTADIENE	<10	DIBENZO(A,H)ANTHRACENE	<10
1,2,4-TRICHLOROBENZENE	<10	BENZO (G,H,I)PERYLENE	<10
ISOPHORONE	<10	2-CHLOROPHENOL	<10
NAPHTHALENE	<10	2-NITROPHENOL	<10
BIS(2-CHL.ETHOXY)METHANE	<10	PHENOL	<10
HEXACHLOROCYCLOPENTADIENE	<10	2,4-DIMETHYLPHENOL	<10
2-CHLORONAPHTHALENE	<10	2,4-DICHLOROPHENOL	<10
ACENAPHTHYLENE	<10	2,4,6-TRICHLOROPHENOL	<10
ACENAPHTHENE	<10	4-CHLORO-3-METHYLPHENOL	<10
DIMETHYLPHTHALATE	<10	2,4-DINITROPHENOL	<50
2,6-DINITROTOLUENE	<10	2-METH.-4,6-DINITROPHENOL	<50
FLUORENE	<10	PENTACHLOROPHENOL	<50
4-CHL.PHENYL PHENYLETHER	<10	4-NITROPHENOL	<50
2,4-DINITROTOLUENE	<10	2-METHYLPHENOL	<10
DIETHYL PHTHALATE	<10	2,4,5-TRICHLOROPHENOL	<10
N-NITROSODIPHENYLAMINE	<10	BENZOIC ACID	<50
HEXACHLOROBENZENE	<10	4-METHYLPHENOL	<50
4-BROMOPHENYLPHENYLETHER	<10	BENZYL ALCOHOL	<10
PHENANTHRENE	<10	4-CHLOROANILINE	<10
ANTHRACENE	<10	2-METHYLNAPHTHALENE	<10
DI-N-BUTYL PHTHALATE	<10	2-NITROANILINE	<50
FLUORANTHENE	<10	3-NITROANILINE	<50
PYRENE	<10	DIBENZOFURAN	<10
BUTYL BENZYL PHTHALATE	<10	4-NITROANILINE	<50
BIS(2ETHYLHEXYL)PHTHALATE	<10		

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DATE EXTRACTED. 01/22/91
DATE RUN..... 01/24/91
DATE REPORTED.. 01/24/91

Stanley Headrick
LABORATORY DIRECTOR

ORIGINAL

HZM LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9101021

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... BLANK
COMPLAINT

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: FIELD BLANK #2

REMARKS: SFLF SAMPLING

HERBICIDES - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
2,4,-D	<0.2		
2,4,5-TP (SILVEX)	<0.05		

DATE ISSUED 01/30/91

COPIES TO:

DATE EXTRACTED. 01/22/91
DATE RUN..... 01/24/91
DATE REPORTED.. 01/24/91

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LAB NO: 9101021

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... BLANK
COMPLAINT

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: FIELD BLANK #2

REMARKS: SFLF SAMPLING

PESTICIDES AND PCB'S - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
LINDANE	<0.05		
HEPTACHLOR	<0.05		
ALDRIN	<0.05		
HEPTACHLOR EPOXIDE	<0.05		
DIELDRIN	<0.1		
ENDRIN	<0.1		
P,P'DDT	<0.1		
METHOXYCHLOR	<0.5		
TOXAPHENE	<1.0		
CHLORDANE	<0.5		
BETA-BHC	<0.1		
DELTA-BHC	<0.1		
ALPHA-BHC	<0.1		
P,P'-DDD	<0.1		
P,P'-DDE	<0.1		
ENDOSULFAN I	<0.1		
ENDOSULFAN II	<0.1		
ENDOSULFAN SULFATE	<0.1		
ENDRIN ALDEHYDE	<0.1		
O,P DDT	<0.1		
AROCLOR 1016	<0.5		
AROCLOR 1221	<0.5		
AROCLOR 1232	<0.5		
AROCLOR 1242	<0.5		
AROCLOR 1248	<0.5		
AROCLOR 1254	<1.0		
AROCLOR 1260	<1.0		

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Stanley Isaacson
LABORATORY DIRECTOR

ORIGINAL

H2M LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9101021

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... BLANK
COMPLAINT

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: FIELD BLANK #2

REMARKS: SFLF SAMPLING

TCL PURGEABLE ORGANICS - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
CHLOROMETHANE	<10	STYRENE	<5
BROMOMETHANE	<10		
VINYL CHLORIDE	<10		
CHLOROETHANE	<10		
METHYLENE CHLORIDE	<5		
1,1-DICHLOROETHENE	<5		
1,1-DICHLOROETHANE	<5		
C/T-1/2-DICHLOROETHENE	<5		
CHLOROFORM	<5		
1,2-DICHLOROETHANE	<5		
1,1,1-TRICHLOROETHANE	<5		
CARBON TETRACHLORIDE	<5		
BROMODICHLOROMETHANE	<5		
1,2-DICHLOROPROPANE	<5		
TRANS-1,3-DICHLOROPROPENE	<5		
TRICHLOROETHENE	<5		
DIBROMOCHLOROMETHANE	<5		
1,1,2-TRICHLOROETHANE	<5		
CIS-1,3-DICHLOROPROPENE	<5		
BENZENE	<5		
BROMOFORM	<5		
1,1,2,2-TETRACHLOROETHANE	<5		
TETRACHLOROETHENE	<5		
TOLUENE	<5		
CHLOROBENZENE	<5		
ETHYLBENZENE	<5		
XYLENES (TOTAL)	<5		
ACETONE	<10		
2-BUTANONE (MEK)	<10		
4-METHYL-2PENTANONE(MIBK)	<10		
CARBON DISULFIDE	<5		
VINYL ACETATE	<10		
2-HEXANONE	<10		

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Stanley Headley
LABORATORY DIRECTOR

ORIGINAL

H2M LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9100710

TYPE..... BLANK

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

DATE COLLECTED. 01/08/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: TRIP BLANK #1

REMARKS: SFLF SAMPLING

TCL PURGEABLE ORGANICS - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
CHLOROMETHANE	<10	STYRENE	<5
BROMOMETHANE	<10		
VINYL CHLORIDE	<10		
CHLOROETHANE	<10		
METHYLENE CHLORIDE	<5		
1,1-DICHLOROETHENE	<5		
1,1-DICHLOROETHANE	<5		
C/T-1/2-DICHLOROETHENE	<5		
CHLOROFORM	<5		
1,2-DICHLOROETHANE	<5		
1,1,1-TRICHLOROETHANE	<5		
CARBON TETRACHLORIDE	<5		
BROMODICHLOROMETHANE	<5		
1,2-DICHLOROPROPANE	<5		
TRANS-1,3-DICHLOROPROPENE	<5		
TRICHLOROETHENE	<5		
DIBROMOCHLOROMETHANE	<5		
1,1,2-TRICHLOROETHANE	<5		
CIS-1,3-DICHLOROPROPENE	<5		
BENZENE	<5		
BROMOFORM	<5		
1,1,2,2-TETRACHLOROETHANE	<5		
TETRACHLOROETHENE	<5		
TOLUENE	<5		
CHLOROBENZENE	<5		
ETHYLBENZENE	<5		
XYLENES (TOTAL)	<5		
ACETONE	<10		
2-BUTANONE (MEK)	<10		
4-METHYL-2PENTANONE(MIBK)	<10		
CARBON DISULFIDE	<5		
VINYL ACETATE	<10		
2-HEXANONE	<10		

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Stanley Deaver
LABORATORY DIRECTOR

ORIGINAL

ENVIRONMENTAL LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9101022

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

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COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: TRIP BLANK #2

REMARKS: SFLF SAMPLING

TCL PURGEABLE ORGANICS - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
CHLOROMETHANE	<10	STYRENE	<5
BROMOMETHANE	<10		
VINYL CHLORIDE	<10		
CHLOROETHANE	<10		
METHYLENE CHLORIDE	<5		
1,1-DICHLOROETHENE	<5		
1,1-DICHLOROETHANE	<5		
C/T-1/2-DICHLOROETHENE	<5		
CHLOROFORM	<5		
1,2-DICHLOROETHANE	<5		
1,1,1-TRICHLOROETHANE	<5		
CARBON TETRACHLORIDE	<5		
BROMODICHLOROMETHANE	<5		
1,2-DICHLOROPROPANE	<5		
TRANS-1,3-DICHLOROPROPENE	<5		
TRICHLOROETHENE	<5		
DIBROMOCHLOROMETHANE	<5		
1,1,2-TRICHLOROETHANE	<5		
CIS-1,3-DICHLOROPROPENE	<5		
BENZENE	<5		
BROMOFORM	<5		
1,1,2,2-TETRACHLOROETHANE	<5		
TETRACHLOROETHENE	<5		
TOLUENE	<5		
CHLOROBENZENE	<5		
ETHYLBENZENE	<5		
XYLENES (TOTAL)	<5		
ACETONE	<10		
2-BUTANONE (MEK)	<10		
4-METHYL-2PENTANONE(MIBK)	<10		
CARBON DISULFIDE	<5		
VINYL ACETATE	<10		
2-HEXANONE	<10		

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DATE RUN..... 01/14/91
DATE REPORTED.. 01/15/91

Stanley Deutsch
LABORATORY DIRECTOR

ORIGINAL

APPENDIX J

COUNTY OF SUFFOLK

PATRICK G. HALPIN
SUFFOLK COUNTY EXECUTIVE

DEPARTMENT OF HEALTH SERVICES

DAVID HARRIS, M.D., M.P.H.
COMMISSIONER

April 28, 1988

Mr. William Gilday
Bureau of Environmental Exposure, Room 205
New York State Department of Health
2 University Place
Albany, NY 12203-3313

Dear Mr. Gilday:

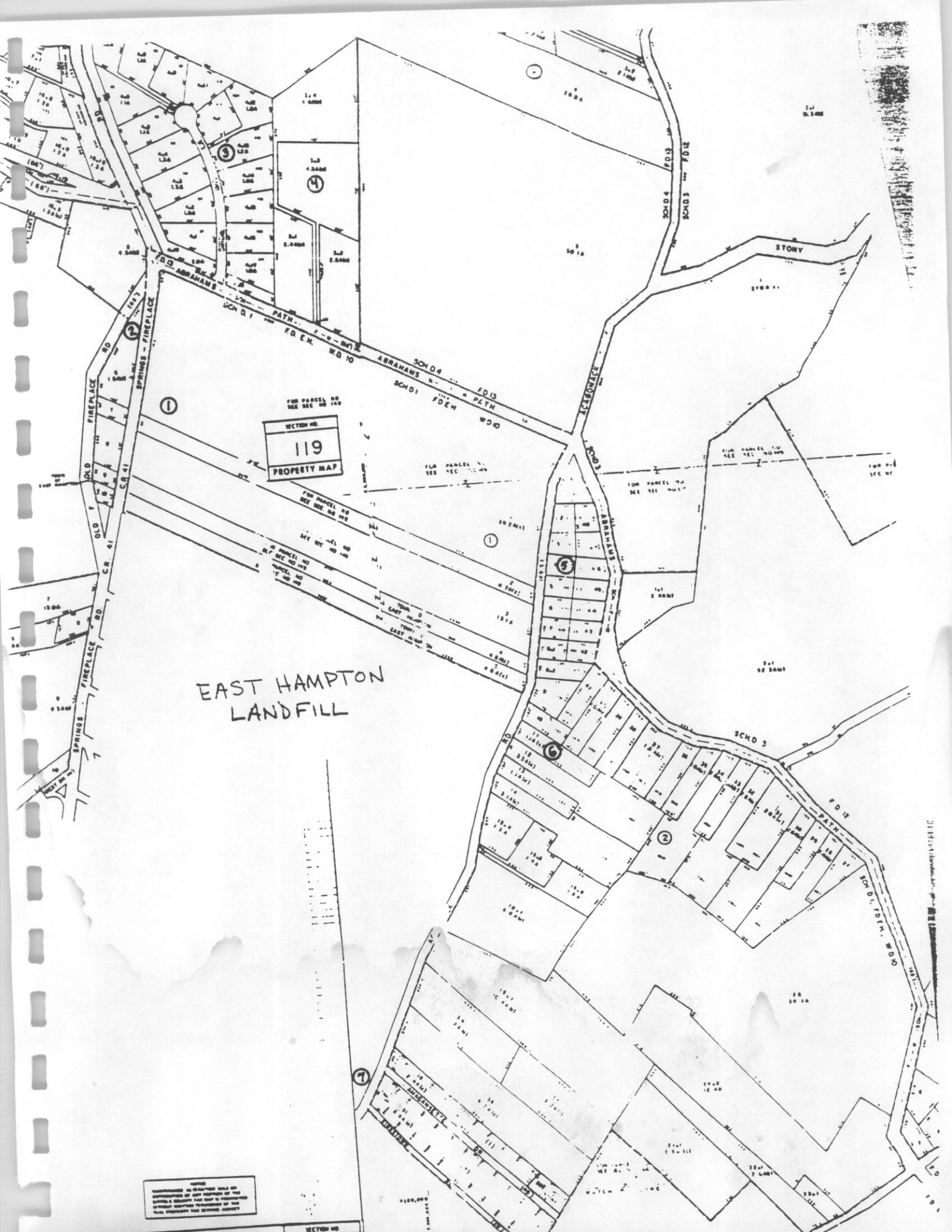
Enclosed for your information are analyses of private wells in the vicinity of the East Hampton landfill and a map depicting the locations sampled. Should you have any questions, feel free to contact this office.

Very truly yours,

Martin Trent
Associate Sanitarian
Bureau of Drinking Water

MT/jb
Enclosures (3)

225 RABRO DRIVE EAST
HAUPPAUGE, N.Y. 11788
(516) 348-2900
348-2776


119
PROPERTY MAP
EAST HAMPTON
LANDFILL
SCH D 1
PATH
F.D.E.M.
W.D.10
SCH D 4
ABRAHAMS
F.D.13
SCH D 3
F.D.12
STONY
ACKERNACK
OLD
SPRINGS - FIRE PLACE
RD.
C.R. 41

EAST HAMPTON
LANDFILL SURVEY
3-30-88

	1- East Hampton Sewage Plant	2- One Stop Market	3- Tanya Rosbin 13 Birdie La	4- Wm Scholl Abrahams Path	5- Antonio Sala 410 Accabonac R.	6- Anthony Rowe 358 Accabonac
total coliform	<1	<1	<1	<1	<1	<2.2
specific conductivity .	128.	295.	85.	73.	180.	105.
pH	6.1	6.2	6.6	6.6	6.0	6.4
nitrate ....(mg/l).....	0.7	0.2	<0.2	<0.2	<0.2	<0.2
free ammonia	0.02	<0.02	<0.02	<0.02	<0.02	0.03
chloride	22.	76.	11.	10.	38.	16.
sulfate	<4	5.	5.	<4.	<4.	<4.
iron	0.4	<0.10	<0.10	0.10	0.25	≥7.0
manganese	<0.05	<0.05	<0.05	<0.05	<0.05	0.12
copper	0.14	<0.10	<0.10	<0.10	0.11	<0.10
sodium	13.9	30.2	10.0	9.3	27.5	14.2
zinc	3.9	<0.4	0.6	1.0	<0.4	<0.4
lead (ppb)	25.	<10	<10	<10	<10	<10
vinyl chloride	<1					
methylene chloride	<1					
1,1 dichloroethane	<1					
trans dichloroethylene	<1					
chloroform	<1			1	8	
1,2 dichloroethane	<1					
1,1,1 trichloroethane .	<1					
carbon tetrachloride ..	<1					
1 bromo 2 chloroethane	<1					
1,2 dichloropropane ...	<1					
1,1,2 trichloroethylene	<1					
chlorodibromomethane ..	<1					
1,2 dibromoethane	<1					
2 bromo 1 chloropropane	<1					
bromoform	<1					
tetrachloroethylene ...	8					
cis dichloroethylene ..	<1					
freon 113	<1					
dibromomethane	<1					
1,1 dichloroethylene ..	<1					
bromodichloromethane ..	<1					
2,3 dichloropropene ...	<1					
cis dichloropropene ...	<1					
trans dichloropropene .	<1					
1,1,2 trichloroethane .	<1					
benzene	<1					
toluene	<1					
chlorobenzene	<2					
ethylbenzene	<1					
xylenes	<1					
chlorotoluenes	<1					
1,3,5 trimethylbenzene	<1					
1,2,4 trimethylbenzene	<1					
m,p dichlorobenzene ...	<2					
o dichlorobenzene	<2					
p diethylbenzene	<1					
1,2,4,5 tetrmethylbenze	<1					
1,2,4 trichlorobenzene	<2					
1,2,3 trichlorobenzene	<2					
1,1,1,2 tetrchlorethane	<1					
1,2,3 trichloropropane	<1					

Water

* only positive VOC's listed after sample #1

LANDFILL SURVEY
3-30-58

T- Lewis D...
25 Acres...

total coliform	<1					
specific conductivity .	250.					
pH	5.2					
nitrate	13.0					
free ammonia	0.05					
chloride	22.					
sulfate	24.					
iron	<0.10					
manganese	0.39					
copper	<0.10					
sodium	23.2					
zinc	0.4					
lead	<10					
vinyl chloride						
methylene chloride						
1,1 dichloroethane						
trans dichloroethylene						
chloroform						
1,2 dichloroethane						
1,1,1 trichloroethane .						
carbon tetrachloride ..						
1 bromo 2 chloroethane						
1,2 dichloropropane ...						
1,1,2 trichloroethylene						
chlorodibromomethane ..						
1,2 dibromoethane						
2 bromo 1 chloropropane						
bromoform						
tetrachloroethylene ...						
cis dichloroethylene ..						
freon 113						
dibromomethane						
1,1 dichloroethylene ..						
bromodichloromethane ..						
2,3 dichloropropene ...						
cis dichloropropene ...						
trans dichloropropene .						
1,1,2 trichloroethane .						
benzene						
toluene						
chlorobenzene						
ethylbenzene						
xylenes						
chlorotoluenes						
1,3,5 trimethylbenzene						
1,2,4 trimethylbenzene						
m,p dichlorobenzene ...						
o dichlorobenzene						
p diethylbenzene						
1,2,4,5 tetrmethylbenze						
1,2,4 trichlorobenzene						
1,2,3 trichlorobenzene						
1,1,1,2 tetrchlorethane						
1,2,3 trichloropropane						

illegible

5

WELL _____

$$K = \frac{r_c^2 \ln\left(Re/r_w\right)}{2L} \frac{1}{t} \ln\left(\frac{y_o}{y_+}\right)$$



r_c = 0.31 ++

L = 10 ++

r_w =

Re = 2.85

t =

y_o =

y_+ =

$$\ln Re/r_w = \left[\frac{1.1}{\ln(H/r_w)} + \frac{A + B\ln\left[(D-H)/r_w\right]}{L/r_w}\right]^{-1}$$

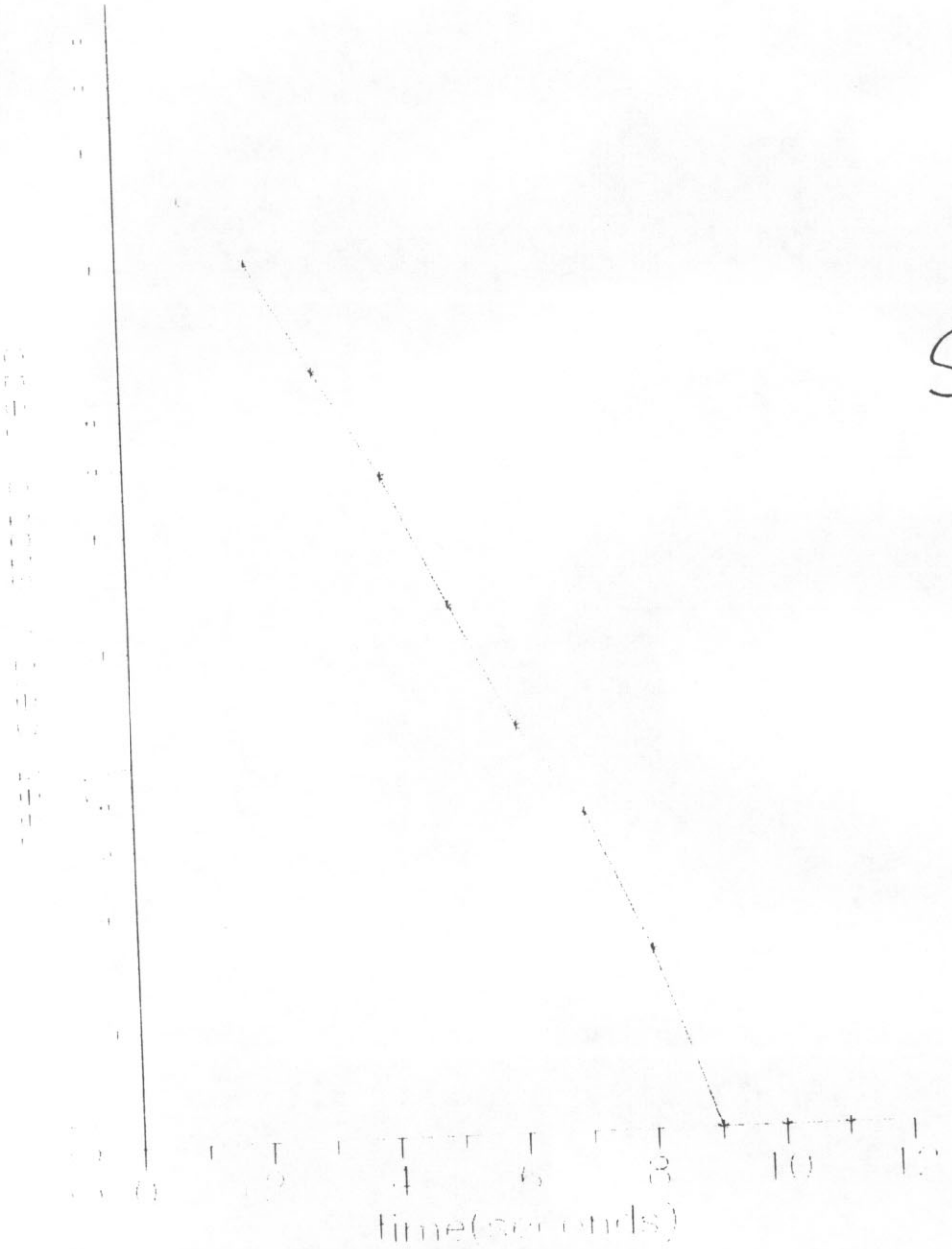
H = 10

A =

B =

D =

S-2



WELL

$$K = \frac{r_c^2 \ln\left(Re/r_w\right) \frac{1}{t} \ln\left(\frac{y_o}{y_+}\right)}{2L}$$

r_c = 0.31
L = 10 ft
r_w = .5 ft
Re = 2.8
t = 5.2 s
y_o = 3.0 ft
y_+ = 2.0 ft

$$\ln Re/r_w = \left[\frac{1.1}{\ln(H/r_w)} + \frac{A + B\ln\left((D-H)/r_w\right)}{L/r_w}\right]^{-1}$$

H = 10
A = 2.2
B = .4
D = 240

WELL

$$K = \frac{r_c^2 \ln\left(Re/r_w\right) \frac{1}{t} \ln\left(\frac{y_0}{y_+}\right)}{2L}$$

r_c =

L =

r_w =

Re =

t =

y_0 =

y_+ =

$$\ln Re/r_w = \left[\frac{1.1}{\ln(H/r_w)} + \frac{A + B\ln\left((D-H)/r_w\right)}{L/r_w}\right]^{-1}$$

H =

A =

B =

D =

WELL ____

$$K = \frac{r_c^2 \ln\left(Re/r_w\right) \frac{1}{t} \ln\left(\frac{y_o}{y^+}\right)}{2L}$$

r_c =
L =
r_w =
Re = 2.83
t =
y_o = .7 in
y_+ =

$$\ln Re/r_w = \left[\frac{1.1}{\ln(H/r_w)} + \frac{A + B\ln\left((D-H)/r_w\right)}{L/r_w}\right]^{-1}$$

H =
A =
B =
D =

WELL

$$K = \frac{r_c^2 \ln\left(Re/r_w\right) \frac{1}{t} \ln\left(\frac{y_o}{y_+}\right)}{2L}$$

15

r_c =

L =

r_w = 3

Re = 11.39

t =

y_o =

y_+ =

$$\ln Re/r_w = \left[\frac{1.1}{\ln(H/r_w)} + \frac{A + B\ln\left((D-H)/r_w\right)}{L/r_w}\right]^{-1}$$

.185 = .037

H =

A =

B =

D =

D-2

WELL _____

$$K = \frac{r_c^2 \ln\left(Re/r_w\right) \frac{1}{t} \ln\left(\frac{y_o}{y^+}\right)}{2L}$$

r_c = 0.17

L =

r_w =

Re = 11.39

t =

y_o =

y_+ = .1

$$\ln Re/r_w = \left[\frac{1.1}{\ln(H/r_w)} + \frac{A + B\ln\left((D-H)/r_w\right)}{L/r_w}\right]^{-1}$$

H = 114

A =

B =

D =

D-3



WELL

$$K = \frac{r_c^2 \ln\left(Re/r_w\right) \frac{1}{t} \ln\left(\frac{y_o}{y_+}\right)}{2L}$$

r_c =
L =
r_w =
Re =
t =
y_o =
y_+ =

$$\ln Re/r_w = \left[\frac{1.1}{\ln(H/r_w)} + \frac{A + B\ln\left((D-H)/r_w\right)}{L/r_w}\right]^{-1}$$

H =
A =
B =
D =

D-4

WELL

$$K = \frac{r_c^2 \ln\left(Re/r_w\right) \frac{1}{t} \ln\left(\frac{y_o}{y_+}\right)}{2L}$$

r_c = 0.17 ft

L =

r_w =

Re = 11.35

t =

y_o = 5.5 ft.

y_+ = 0.2

$$\ln Re/r_w = \left[\frac{1.1}{\ln(H/r_w)} + \frac{A + B\ln\left((D-H)/r_w\right)}{L/r_w}\right]^{-1}$$

H =

A =

B =

D =

APPENDIX K

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL

DATE: January 7, 1991

WEATHER: 30°F/overcast

PRESENT:

Peter Dermody	Fanning, Phillips and Molnar
Scott Stehlik	Fanning, Phillips and Molnar
Joe Gamma	Fanning, Phillips and Molnar
John Conover	NYSDEC

OBJECTIVE: To begin sampling groundwater at the Springs-Fireplace Landfill.

DETAILS: Arrived on site at approximately 10:30 a.m. and set up decontamination station near the Quonsett hut and set up the Grundfos submersible pump with a steel cable line and a clear, reinforced plastic hose. Decontamination of the pump and hose was performed by submersing the pump and hose in a plastic, thirty-two gallon garbage can with liquinox and tap water (SCWA water) and ≈ 30 gallons were pumped through the apparatus. Then, the apparatus was transferred to a second garbage can with clean tap water and ≈ 30 gallons were pumped through the apparatus. Well S-1 was pumped first. Details are as follows:

Well S-1:

Depth to water - 63.77 ft.
Depth of well - 72.60 ft.

Started pumping at 3.8 gal/min by measuring time to fill a five gallon bucket.

Stability parameters were performed after roughly one borehole volume of water had been removed. A clean glass jar was used for this purpose. The results are as follows:

Trial	Temp(F°)	pH	SC(U-siemens)
1	48	6.95	274
2	50	6.08	290
3	53	5.21	296
4	50	7.11	294

Since trials two and three did not agree within ten percent for pH, another volume was removed and stability parameters were measured.

Trials 3 and 4 did not agree within 10% for pH and a fifth volume was removed prior to sampling. A total of 110 gallons were purged prior to sampling. The submersible pump was then removed and a decontaminated 100% teflon bailer with a dedicated poly line was used to obtain the sample (decon consisted of scrubbing in a bath of liquinox and tap water, methanol followed by hexane spray, final rinse with distilled water). The bailer was acclimated by discarding one bailerful of water prior to filling the eleven laboratory-supplied sample bottles. The samples were placed in a cooler with ice packs for transport to the lab. A turbidity measurement after pumping was 0.4 NTUs. Eh measurement was 64 mV. The well was closed and locked.

After decon of all downhole equipment, we set up at D-1.

Well D-1

Depth to water - 63.46 ft.
Depth of well - 176.26 ft.
Pump flow rate - 8.3 gpm

Stability Parameter

Trial	Temp.	pH	SC (U-siemens)
1	51	7.12	399
2	48	8.15	441
3	48	9.09	412

It became evident that the pH meter was malfunctioning as it read 9.0 in distilled water. Therefore, pH paper (colorimetric) was used on final trial and indicated a pH of 6.

Turbidity - 33 NTU
Eh - 154 mV
Gallons Purged - 110

Samples were stored overnight in coolers with ice. We left the site at 5:30 p.m.

Respectfully Submitted,

Peter Dermody
Hydrogeologist

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL

DATE: January 8, 1991

PRESENT:

Joe Gamma	Fanning, Phillips and Molnar
Keith Robins	Fanning, Phillips and Molnar
Scott Stehlik	Fanning, Phillips and Molnar
Peter Dermody	Fanning, Phillips and Molnar

WEATHER: 25°/Flurries

OBJECTIVE: To continue groundwater sampling

DETAILS: Arrived on site at 8:00 a.m. and started sampling procedures (same procedures followed as in previous wells) at well S-4.

Depth to water - 68.30'
Depth of well - 77.88'
Pump flow rate - 7.7 gpm

Stability Parameters

Trial	Temp.	pH	SC(siemens)
1	55	6	1420
2	55	6	1590
3	55	6	1620

pH paper was for pH measurements. High specific conductivity may be due to salt-laden runoff from the Town Roads Building.

Eh - 175 mV
Turbidity - 0.9 NTU

Well D-4

Depth to water - 68.36'
Depth of well - 182.44'
Pump flow rate - 7.7 gpm

Stability Parameters

Trial	Temp.	pH	SC
1	51	6	1405
2	51	6	1520
3	51	6	1458

Turbidity - 0.5 NTU
Eh - 160 mV
Gallons purged - 110

A field blank was prepared following the sampling of Well D-4 by pouring laboratory-supplied deionized water over the decontaminated bailer and containing this water in sample bottles. Sampling concluded for the day.

Respectfully Submitted,

Peter Dermody
Hydrogeologist

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL

DATE: January 9, 1991

PRESENT:

Peter Dermody	Fanning, Phillips and Molnar
Scott Stehlik	Fanning, Phillips and Molnar
Joe Gamma	Fanning, Phillips and Molnar
Tom Doriski	Fanning, Phillips and Molnar

WEATHER: 35°/Raining

DETAILS: Arrived on site at 8:30 a.m. and prepared to sample at D-3.

Well D-3

Depth to water - 100.02'
Depth of well - Not obtained due to tape "sticking" to well wall. We will obtain at a later date.

Stability Parameter

Trial	Temp.	pH	SC
1	50	6.95	325
2	50	7.10	295
3	50	6.95	295

Used pH meter for pH measurements.

Flow rate - 6.5 gpm
Eh - 350 mV
Turbidity - >100 NTU (Turbidity did not appear to be caused by the pumping as turbidity did not appear (by visual inspection) to change during the purging procedure).

Gallons purged - 110

Well S-3

Depth to water - 100.28'
Depth of well - 109.74'
Pump flow rate - 5.5 gpm

Well S-3 was pumped "dry" after roughly ten gallons were purged. We waited 4-5 minutes for recovery and started pumping again with reduced pumping rate.

FIELD REPORT
SPRINGS-FIREPLACE LANDFILL

DATE: January 10, 1991

PRESENT:

Peter Dermody	Fanning, Phillips and Molnar
Scott Stehlik	Fanning, Phillips and Molnar
Joe Gamma	Fanning, Phillips and Molnar
Tom Doriski	Fanning, Phillips and Molnar

WEATHER: 40°/Sunny

DETAILS: Arrived on site at 9:00 a.m. to complete sampling.

Well D-2

Depth to water - 79.35
Depth of well - 192.66
Pump Flow rate - 8.6 gpm

Stability Parameters

Trial	Temp.	pH	SC
1	51	6	243
2	52	6	263
3	52	6	260

Used pH paper (colorimetric) for pH measurements as pH meter was malfunctioning.

Eh - 247 mV
Turbidity - >100 NTU (Turbidity decreased as pumping continued).

Gallons purged - 110

A duplicate sample was prepared from Well D-2 and submitted blindly to lab as sample R-1.

Well S-2

Depth to water - 79.53'
Depth of well - 87.90'
Pump flow rate - 9.4 gpm

Stability Parameters

Trial	Temp.	pH	SC

Well GP-1

Depth to water - 76.91'
Depth of well - 203.86'
Pump flow rate - 8.8 gpm

Stability Parameters

Trial	Temp.	pH	SC
1	53	-	87
2	52	-	82
3	52	-	93

Eh - (-19)mV
Turbidity - 7 NTU
Gallons purged - 55

Respectfully Submitted,

Peter Dermody
Hydrogeologist

Stability Parameters

Trial	Temp.	pH	SC
1	49	7.02	120
2	49	7.12	110
3	50	7.15	106

Eh - 325 mV
Turbidity - 6 NTU
Gallons purged - 55

Well S-5

Depth to water - 75.90'
Depth of well - 85.24'
Pump flow rate - 7.0 gpm

Stability Parameters

Trial	Temp.	pH	SC
1	51	-	170
2	51	-	170
3	51	-	170

pH meter malfunctioned again and pH readings could not be obtained.

Eh - 2.64 mV
Turbidity - 0.7 NTU
Gallons purged - 55

Well S-6

Depth to water - 77.74'
Depth of well - 88.21
Pump flow rate - 8.8 gpm
Eh - 236 mV
Turbidity - 0.8 NTU

Stability Parameters

Trial	Temp.	pH	SC
1	55	-	659
2	55	-	655
3	55	-	661

Gallons purged - 55

1	53	6.5	187
2	51	6.5	175
3	52	6.0	170

Eh - 269 mV
Turbidity - 0.22 NTU
Gallons pumped - 55

A field blank was performed using the teflon bailer and laboratory-supplied deionized water following the sampling of Well S-2. Joe Gamma and Tom Doriski then collected water levels for all wells between 11:30 a.m. and 12:30 p.m. The results are as follows:

Well	Depth to Water
S-1	63.80
D-1	63.45
S-2	79.53
D-2	79.35
GP-1	76.91
S-3	100.34
D-3	100.14
S-4	68.35
D-4	68.39
S-5	75.99
S-6	77.81

Respectfully Submitted,

Peter Dermody
Hydrogeologist

H2M LABS, INC.

Environmental and Industrial Analytical Laboratory

575 Broad Hollow Road, Melville, N.Y. 11747-5076
(516) 694-3040
FAX: 516-694-4122

Fanning, Phillips & Molnar

PROJ. NO.	PROJECT NAME
158-87-25	HPM / SFLF

SAMPLERS: (Signature) Peter D. Lee

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	TOTAL NO. OF CONTAINERS	40 ml. vial	1gt. cubie	1 liter Glass	250 ml. Glass w/ H_2SO_4	1gt. Cubie w/ NAOH	1 liter Glass w/ H_2SO_4	500 ml. Plastic w/ HNO_3			REMARKS
					MS/MSD Also	22	4	2	8	2	2	2	2			All Samples to be analyzed for a Hazard Parameter List (Trip Blank Volatiles) and by applicable methods on a Hazard sheet
						11	2	1	4	1	1	1	1			
S-1	1-7-91	AM		X	S-1	11	2	1	4	1	1	1	1			
D-1	1-7-91	PM		X	D-1	11	2	1	4	1	1	1	1			
S-4	1-8-91	AM		X	S-4	11	2	1	4	1	1	1	1			
D-4	1-8-91	PM		X	D-4	11	2	1	4	1	1	1	1			
FB-1	1-8-91	PM			Field Blank #1	11	2	1	4	1	1	1	1			
TB-1					Trip Blank #1	~~#~~ 2	2	1	4	1	1	1	1			
						11	2	1	4	1	1	1	1			
						11	2	1	4	1	1	1	1			
						11	2	1	4	1	1	1	1			
						11	2	1	4	1	1	1	1			
						11	2	1	4	1	1	1	1			

Relinquished by: (Signature)	Date	time	Received by: (Signature)	Relinquished by: (Signature)	Date	time	Received by: (Signature)
Richard Ding	1-4-91	0900	[illegible]	[illegible]	1-8-91	5:30 pm	[illegible]
[illegible]	1-9-91	10:15 am					
[illegible]	1-9-91	10:15 AM	Received for Laboratory by: (Signature) Richard Ding	Date	time	Remarks	

H2M LABS, INC.

Environmental and Industrial Analytical Laboratory

575 Broad Hollow Road, Melville, N.Y. 11747-5076
(516) 694-3040
FAX: 516-694-4122

Fanning, Phillips & Molnar

PROJ. NO.	PROJECT NAME
158-89-05	FPM / SFLF

SAMPLERS: (Signature) Richard Ring

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	TOTAL NO. OF CONTAINERS	40 ml. vial	1gt. cubie	1 liter Glass	250 ml. Glass w/H2SO4	1gt. cubie w/NaOH	1 liter Glass w/ --SO4	500 ml. Plastic w/HNO3			REMARKS
					Trip Blank Also	22	4	2	8	2	2	2	2			See Attached for parameters and methods Plus pH
	1-9	9:00A		X	D-3	11	2	1	4	1	1	1	1			
	1-9	10:30A		X	S-3	11	2	1	4	1	1	1	1			
	1-9	12:30P		X	S-5	11	2	1	4	1	1	1	1			
	1-9	1:40P		X	S-6	11	2	1	4	1	1	1	1			
	1-9	2:30		X	GP-1	11	2	1	4	1	1	1	1			
	1-10	10:00A		X	D-2	11	2	1	4	1	1	1	1			
	1-10	11:00A		X	S-2	11	2	1	4	1	1	1	1			
	1-10	10:30A		X	R-1	11	2	1	4	1	1	1	1			
	1-10	12:30P			FB-2	11	2	1	4	1	1	1	1			
					Trip Blank	#2	2	~~1~~	~~4~~	~~1~~	~~1~~	~~1~~	~~1~~			
						~~11~~	~~2~~	~~1~~	~~4~~	~~1~~	~~1~~	~~1~~	~~1~~			
						~~11~~	~~2~~	~~1~~	~~4~~	~~1~~	~~1~~	~~1~~	~~1~~			

Relinquished by: (Signature)	Date	time	Received by: (Signature)	Relinquished by: (Signature)	Date	time	Received by: (Signature)
Richard Ring	1-4-91	0900					
Relinquished by: (Signature)	Date	time	Received by: (Signature)	Relinquished by: (Signature)	Date	time	Received by: (Signature)
	1-10-91	3:30P					
Relinquished by: (Signature)	Date	time	Received for Laboratory by: (Signature)	Date	time	Remarks	
	1-10-91	3:30					

APPENDIX L

HZM LABS, INC.

(516)694-3040 FAX:(516)694-4122

LAB NO: 9100706

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/07/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-1

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
SILVER	<0.01	mg/l
ALUMINUM	1.2	mg/l
ARSENIC	<10	ug/l
BORON	<0.10	mg/l
BARIUM	<0.20	mg/l
BERYLLIUM	<5	ug/l
BOD5	<10	mg/l
CALCIUM	8.2	mg/l
CADMIUM	8	ug/l
CHLORIDE	11	mg/l
CYANIDE	<10	ug/l
COBALT	<0.05	mg/l
COD	65	mg/l
COLOR	20	units
CHROMIUM	<0.01	mg/l
COPPER	0.05	mg/l
IRON	3.1	mg/l
TOTAL HARDNESS	49.2	mg/l
MERCURY	<0.2	ug/l
POTASSIUM	2.0	mg/l
MAGNESIUM	7.0	mg/l
MANGANESE	29.7	mg/l
SODIUM	8.5	mg/l
AMMONIA (NH3)	1.5	mg/l
NICKEL	0.14	mg/l
NITRATE (AS N)	<0.1	mg/l
LEAD	6.3	ug/l
PH	5.8	units
TOTAL PHENOLS	4.0	ug/l
ANTIMONY	<60	ug/l
SELENIUM	<5	ug/l
SULFATE	32	mg/l
TOTAL ALKALINITY	90.2	mg/l

DATE ISSUED 01/25/91

COPIES TO:

Stanley Deacon
LABORATORY DIRECTOR

ORIGINAL

ELAB, INC. (516)694-3040 FAX:(516)694-4122

LAB NO: 9100706

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/07/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-1

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
TOTAL DISSOLVED SOLIDS	178	mg/l
TOTAL KJELDAHL NITROGEN	2.5	mg/l
THALLIUM	<10	ug/l
TOTAL ORGANIC CARBON(TOC)	12.5	mg/l
TURBIDITY	8.0	units
VANADIUM	<0.05	mg/l
ZINC	0.15	mg/l

COPIES TO:

DATE ISSUED 01/25/91

Stanley Deacon
LABORATORY DIRECTOR

ORIGINAL

ITZM LABS, INC.
(516)694-3040 FAX:(516)694-4122

LAB NO: 9100706

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/07/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-1

REMARKS: SFLF SAMPLING

TCL SEMI-VOLATILE ORGANICS - (ug/l)

PARAMETER (S)	RESULT
1,3-DICHLOROBENZENE	<10
1,4-DICHLOROBENZENE	<10
HEXACHLOROETHANE	<10
BIS(2-CHLOROETHYL)ETHER	<10
1,2-DICHLOROBENZENE	<10
BIS(2-CHL.ISOPROPYL)ETHER	<10
N-NITROSO-DIPROPYLAMINE	<10
NITROBENZENE	<10
HEXACHLOROBUTADIENE	<10
1,2,4-TRICHLOROBENZENE	<10
ISOPHORONE	<10
NAPHTHALENE	<10
BIS(2-CHL.ETHOXY)METHANE	<10
HEXACHLOROCYCLOPENTADIENE	<10
2-CHLORONAPHTHALENE	<10
ACENAPHTHYLENE	<10
ACENAPHTHENE	<10
DIMETHYLPHTHALATE	<10
2,6-DINITROTOLUENE	<10
FLUORENE	<10
4-CHL.PHENYL PHENYLETHER	<10
2,4-DINITROTOLUENE	<10
DIETHYL PHTHALATE	<10
N-NITROSODIPHENYLAMINE	<10
HEXACHLOROBENZENE	<10
4-BROMOPHENYLPHENYLETHER	<10
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYL PHTHALATE	<10
FLUORANTHENE	<10
PYRENE	<10
BUTYL BENZYL PHTHALATE	<10
BIS(2ETHYLHEXYL)PHTHALATE	<10

PARAMETER (S)	RESULT
CHRYSENE	<10
BENZO(A)ANTHRACENE	<10
3,3-DICHLOROBENZIDINE	<20
DI-N-OCTYL PHTHALATE	<10
BENZO(B)FLUORANTHENE	<10
BENZO(K)FLUORANTHENE	<10
BENZO(A)PYRENE	<10
INDENO(1,2,3-C,D)PYRENE	<10
DIBENZO(A,H)ANTHRACENE	<10
BENZO (G,H,I)PERYLENE	<10
2-CHLOROPHENOL	<10
2-NITROPHENOL	<10
PHENOL	<10
2,4-DIMETHYLPHENOL	<10
2,4-DICHLOROPHENOL	<10
2,4,6-TRICHLOROPHENOL	<10
4-CHLORO-3-METHYLPHENOL	<10
2,4-DINITROPHENOL	<50
2-METH.-4,6-DINITROPHENOL	<50
PENTACHLOROPHENOL	<50
4-NITROPHENOL	<50
2-METHYLPHENOL	<10
2,4,5-TRICHLOROPHENOL	<10
BENZOIC ACID	<50
4-METHYLPHENOL	<50
BENZYL ALCOHOL	<10
4-CHLOROANILINE	<10
2-METHYLNAPHTHALENE	<10
2-NITROANILINE	<50
3-NITROANILINE	<50
DIBENZOFURAN	<10
4-NITROANILINE	<50

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Stanley Deaver
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ORIGINAL

ETZM LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9100706

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/07/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-1

REMARKS: SFLF SAMPLING

HERBICIDES - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
2,4,-D	<0.2		
2,4,5-TP (SILVEX)	<0.05		

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LAB NO: 9100706

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/07/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-1

REMARKS: SFLF SAMPLING

PESTICIDES AND PCB'S - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
LINDANE	<0.05		
HEPTACHLOR	<0.05		
ALDRIN	<0.05		
HEPTACHLOR EPOXIDE	<0.05		
DIELDRIN	<0.1		
ENDRIN	<0.1		
P,P'DDT	<0.1		
METHOXYCHLOR	<0.5		
TOXAPHENE	<1.0		
CHLORDANE	<0.5		
BETA-BHC	<0.1		
DELTA-BHC	<0.1		
ALPHA-BHC	<0.1		
P,P'-DDD	<0.1		
P,P'-DDE	<0.1		
ENDOSULFAN I	<0.1		
ENDOSULFAN II	<0.1		
ENDOSULFAN SULFATE	<0.1		
ENDRIN ALDEHYDE	<0.1		
O,P DDT	<0.1		
AROCLOR 1016	<0.5		
AROCLOR 1221	<0.5		
AROCLOR 1232	<0.5		
AROCLOR 1242	<0.5		
AROCLOR 1248	<0.5		
AROCLOR 1254	<1.0		
AROCLOR 1260	<1.0		

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(516)694-3040 FAX:(516)694-4122

LAB NO: 9100706

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/07/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-1

REMARKS: SFLF SAMPLING

TCL PURGEABLE ORGANICS - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
CHLOROMETHANE	<10	STYRENE	<5
BROMOMETHANE	<10		
VINYL CHLORIDE	<10		
CHLOROETHANE	<10		
METHYLENE CHLORIDE	<5		
1,1-DICHLOROETHENE	<5		
1,1-DICHLOROETHANE	<5		
C/T-1/2-DICHLOROETHENE	<5		
CHLOROFORM	<5		
1,2-DICHLOROETHANE	<5		
1,1,1-TRICHLOROETHANE	<5		
CARBON TETRACHLORIDE	<5		
BROMODICHLOROMETHANE	<5		
1,2-DICHLOROPROPANE	<5		
TRANS-1,3-DICHLOROPROPENE	<5		
TRICHLOROETHENE	<5		
DIBROMOCHLOROMETHANE	<5		
1,1,2-TRICHLOROETHANE	<5		
CIS-1,3-DICHLOROPROPENE	<5		
BENZENE	<5		
BROMOFORM	<5		
1,1,2,2-TETRACHLOROETHANE	<5		
TETRACHLOROETHENE	<5		
TOLUENE	<5		
CHLOROBENZENE	8		
ETHYLBENZENE	<5		
XYLENES (TOTAL)	<5		
ACETONE	<10		
2-BUTANONE (MEK)	<10		
4-METHYL-2PENTANONE(MIBK)	<10		
CARBON DISULFIDE	<5		
VINYL ACETATE	<10		
2-HEXANONE	<10		

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LAB NO: 9101017

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. ~~01/09/91~~
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-2

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
SILVER	<0.01	mg/l
ALUMINUM	0.74	mg/l
ARSENIC	<10	ug/l
BORON	<0.10	mg/l
BARIUM	<0.20	mg/l
BERYLLIUM	<5	ug/l
BOD5	<10	mg/l
CALCIUM	7.4	mg/l
CADMIUM	<5	ug/l
CHLORIDE	26	mg/l
CYANIDE	<10	ug/l
COBALT	<0.05	mg/l
COD	<15	mg/l
COLOR	100	units
CHROMIUM	<0.01	mg/l
COPPER	0.03	mg/l
IRON	3.8	mg/l
TOTAL HARDNESS	28.75	mg/l
MERCURY	<0.2	ug/l
POTASSIUM	0.60	mg/l
MAGNESIUM	2.5	mg/l
MANGANESE	0.17	mg/l
SODIUM	9.1	mg/l
AMMONIA (NH3)	<0.02	mg/l
NICKEL	0.06	mg/l
NITRATE (AS N)	<0.1	mg/l
LEAD	6.1	ug/l
PH	6.4	units
TOTAL PHENOLS	<1	ug/l
ANTIMONY	<60	ug/l
SELENIUM	<5	ug/l
SULFATE	<5	mg/l
TOTAL ALKALINITY	38.5	mg/l

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LAB NO: 9101017

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-2

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
TOTAL DISSOLVED SOLIDS	102	mg/l
TOTAL KJELDAHL NITROGEN	0.2	mg/l
THALLIUM	<10.0	ug/l
TOTAL ORGANIC CARBON(TOC)	2.5	mg/l
TURBIDITY	18	units
VANADIUM	<0.05	mg/l
ZINC	0.13	mg/l

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LAB NO: 9101017

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-2

REMARKS: SFLF SAMPLING

TCL SEMI-VOLATILE ORGANICS - (ug/l)

PARAMETER (S)	RESULT
1,3-DICHLOROBENZENE	<10
1,4-DICHLOROBENZENE	<10
HEXACHLOROETHANE	<10
BIS(2-CHLOROETHYL)ETHER	<10
1,2-DICHLOROBENZENE	<10
BIS(2-CHL.ISOPROPYL)ETHER	<10
N-NITROSO-DIPROPYLAMINE	<10
NITROBENZENE	<10
HEXACHLOROBUTADIENE	<10
1,2,4-TRICHLOROBENZENE	<10
ISOPHORONE	<10
NAPHTHALENE	<10
BIS(2-CHL.ETHOXY)METHANE	<10
HEXACHLOROCYCLOPENTADIENE	<10
2-CHLORONAPHTHALENE	<10
ACENAPHTHYLENE	<10
ACENAPHTHENE	<10
DIMETHYLPHTHALATE	<10
2,6-DINITROTOLUENE	<10
FLUORENE	<10
4-CHL.PHENYL PHENYLETHER	<10
2,4-DINITROTOLUENE	<10
DIETHYL PHTHALATE	<10
N-NITROSODIPHENYLAMINE	<10
HEXACHLOROBENZENE	<10
4-BROMOPHENYLPHENYLETHER	<10
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYL PHTHALATE	<10
FLUORANTHENE	<10
PYRENE	<10
BUTYL BENZYL PHTHALATE	<10
BIS(2ETHYLHEXYL)PHTHALATE	<10

PARAMETER (S)	RESULT
CHRYSENE	<10
BENZO(A)ANTHRACENE	<10
3,3-DICHLOROBENZIDINE	<20
DI-N-OCTYL PHTHALATE	<10
BENZO(B)FLUORANTHENE	<10
BENZO(K)FLUORANTHENE	<10
BENZO(A)PYRENE	<10
INDENO(1,2,3-C,D)PYRENE	<10
DIBENZO(A,H)ANTHRACENE	<10
BENZO (G,H,I)PERYLENE	<10
2-CHLOROPHENOL	<10
2-NITROPHENOL	<10
PHENOL	<10
2,4-DIMETHYLPHENOL	<10
2,4-DICHLOROPHENOL	<10
2,4,6-TRICHLOROPHENOL	<10
4-CHLORO-3-METHYLPHENOL	<10
2,4-DINITROPHENOL	<50
2-METH.-4,6-DINITROPHENOL	<50
PENTACHLOROPHENOL	<50
4-NITROPHENOL	<50
2-METHYLPHENOL	<10
2,4,5-TRICHLOROPHENOL	<10
BENZOIC ACID	<50
4-METHYLPHENOL	<50
BENZYL ALCOHOL	<10
4-CHLOROANILINE	<10
2-METHYLNAPHTHALENE	<10
2-NITROANILINE	<50
3-NITROANILINE	<50
DIBENZOFURAN	<10
4-NITROANILINE	<50

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LAB NO: 9101017

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-2

REMARKS: SFLF SAMPLING

HERBICIDES - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
2,4,-D	<0.2		
2,4,5-TP (SILVEX)	<0.05		

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DATE REPORTED.. 01/24/91

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LAB NO: 9101017

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-2

REMARKS: SFLF SAMPLING

PESTICIDES AND PCB'S - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
LINDANE	<0.05		
HEPTACHLOR	<0.05		
ALDRIN	<0.05		
HEPTACHLOR EPOXIDE	<0.05		
DIELDRIN	<0.1		
ENDRIN	<0.1		
P,P'DDT	<0.1		
METHOXYCHLOR	<0.5		
TOXAPHENE	<1.0		
CHLORDANE	<0.5		
BETA-BHC	<0.1		
DELTA-BHC	<0.1		
ALPHA-BHC	<0.1		
P,P'-DDD	<0.1		
P,P'-DDE	<0.1		
ENDOSULFAN I	<0.1		
ENDOSULFAN II	<0.1		
ENDOSULFAN SULFATE	<0.1		
ENDRIN ALDEHYDE	<0.1		
O,P DDT	<0.1		
AROCLOR 1016	<0.5		
AROCLOR 1221	<0.5		
AROCLOR 1232	<0.5		
AROCLOR 1242	<0.5		
AROCLOR 1248	<0.5		
AROCLOR 1254	<1.0		
AROCLOR 1260	<1.0		

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LAB NO: 9101017

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-2

REMARKS: SFLF SAMPLING

TCL PURGEABLE ORGANICS - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
CHLOROMETHANE	<10	STYRENE	<5
BROMOMETHANE	<10		
VINYL CHLORIDE	<10		
CHLOROETHANE	<10		
METHYLENE CHLORIDE	<5		
1,1-DICHLOROETHENE	<5		
1,1-DICHLOROETHANE	<5		
C/T-1/2-DICHLOROETHENE	<5		
CHLOROFORM	<5		
1,2-DICHLOROETHANE	<5		
1,1,1-TRICHLOROETHANE	<5		
CARBON TETRACHLORIDE	<5		
BROMODICHLOROMETHANE	<5		
1,2-DICHLOROPROPANE	<5		
TRANS-1,3-DICHLOROPROPENE	<5		
TRICHLOROETHENE	<5		
DIBROMOCHLOROMETHANE	<5		
1,1,2-TRICHLOROETHANE	<5		
CIS-1,3-DICHLOROPROPENE	<5		
BENZENE	<5		
BROMOFORM	<5		
1,1,2,2-TETRACHLOROETHANE	<5		
TETRACHLOROETHENE	<5		
TOLUENE	<5		
CHLOROBENZENE	<5		
ETHYLBENZENE	<5		
XYLENES (TOTAL)	<5		
ACETONE	<10		
2-BUTANONE (MEK)	<10		
4-METHYL-2PENTANONE(MIBK)	<10		
CARBON DISULFIDE	<5		
VINYL ACETATE	<10		
2-HEXANONE	<10		

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Stanley Deacon
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LAB NO: 9101012

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-3

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
SILVER	<0.01	mg/l
ALUMINUM	1.8	mg/l
ARSENIC	<10	ug/l
BORON	<0.10	mg/l
BARIUM	<0.20	mg/l
BERYLLIUM	<5	ug/l
BOD5	<10	mg/l
CALCIUM	6.7	mg/l
CADMIUM	<5	ug/l
CHLORIDE	10	mg/l
CYANIDE	<10	ug/l
COBALT	<0.05	mg/l
COD	<15	mg/l
COLOR	120	units
CHROMIUM	0.02	mg/l
COPPER	<0.02	mg/l
IRON	6.8	mg/l
TOTAL HARDNESS	25.77	mg/l
MERCURY	<0.2	ug/l
POTASSIUM	1.1	mg/l
MAGNESIUM	2.2	mg/l
MANGANESE	0.09	mg/l
SODIUM	9.2	mg/l
AMMONIA (NH3)	<0.02	mg/l
NICKEL	<0.04	mg/l
NITRATE (AS N)	<0.1	mg/l
LEAD	8.7	ug/l
PH	6.7	units
TOTAL PHENOLS	<1	ug/l
ANTIMONY	<60	ug/l
SELENIUM	<5	ug/l
SULFATE	9	mg/l
TOTAL ALKALINITY	25.1	mg/l

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Stanley Isaacson
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ORIGINAL

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LAB NO: 9101012

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-3

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
TOTAL DISSOLVED SOLIDS	74	mg/l
TOTAL KJELDAHL NITROGEN	0.8	mg/l
THALLIUM	<10	ug/l
TOTAL ORGANIC CARBON(TOC)	1.6	mg/l
TURBIDITY	15	units
VANADIUM	<0.05	mg/l
ZINC	0.16	mg/l

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LAB NO: 9101012

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-3

REMARKS: SFLF SAMPLING

TCL SEMI-VOLATILE ORGANICS - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
1,3-DICHLOROBENZENE	<10	CHRYSENE	<10
1,4-DICHLOROBENZENE	<10	BENZO(A)ANTHRACENE	<10
HEXACHLOROETHANE	<10	3,3-DICHLOROBENZIDINE	<20
BIS(2-CHLOROETHYL)ETHER	<10	DI-N-OCTYL PHTHALATE	<10
1,2-DICHLOROBENZENE	<10	BENZO(B)FLUORANTHENE	<10
BIS(2-CHL.ISOPROPYL)ETHER	<10	BENZO(K)FLUORANTHENE	<10
N-NITROSO-DIPROPYLAMINE	<10	BENZO(A)PYRENE	<10
NITROBENZENE	<10	INDENO(1,2,3-C,D)PYRENE	<10
HEXACHLOROBUTADIENE	<10	DIBENZO(A,H)ANTHRACENE	<10
1,2,4-TRICHLOROBENZENE	<10	BENZO (G,H,I)PERYLENE	<10
ISOPHORONE	<10	2-CHLOROPHENOL	<10
NAPHTHALENE	<10	2-NITROPHENOL	<10
BIS(2-CHL.ETHOXY)METHANE	<10	PHENOL	<10
HEXACHLOROCYCLOPENTADIENE	<10	2,4-DIMETHYLPHENOL	<10
2-CHLORONAPHTHALENE	<10	2,4-DICHLOROPHENOL	<10
ACENAPHTHYLENE	<10	2,4,6-TRICHLOROPHENOL	<10
ACENAPHTHENE	<10	4-CHLORO-3-METHYLPHENOL	<10
DIMETHYLPHTHALATE	<10	2,4-DINITROPHENOL	<50
2,6-DINITROTOLUENE	<10	2-METH.-4,6-DINITROPHENOL	<50
FLUORENE	<10	PENTACHLOROPHENOL	<50
4-CHL.PHENYL PHENYLETHER	<10	4-NITROPHENOL	<50
2,4-DINITROTOLUENE	<10	2-METHYLPHENOL	<10
DIETHYL PHTHALATE	<10	2,4,5-TRICHLOROPHENOL	<10
N-NITROSODIPHENYLAMINE	<10	BENZOIC ACID	<50
HEXACHLOROBENZENE	<10	4-METHYLPHENOL	<50
4-BROMOPHENYLPHENYLETHER	<10	BENZYL ALCOHOL	<10
PHENANTHRENE	<10	4-CHLOROANILINE	<10
ANTHRACENE	<10	2-METHYLNAPHTHALENE	<10
DI-N-BUTYL PHTHALATE	<10	2-NITROANILINE	<50
FLUORANTHENE	<10	3-NITROANILINE	<50
PYRENE	<10	DIBENZOFURAN	<10
BUTYL BENZYL PHTHALATE	<10	4-NITROANILINE	<50
BIS(2ETHYLHEXYL)PHTHALATE	<10		

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DATE RUN..... 01/24/91
DATE REPORTED.. 01/24/91

Stanley Treadwell
LABORATORY DIRECTOR

ORIGINAL

(516)694-3040 FAX:(516)694-4122

LAB NO: 9101012

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-3

REMARKS: SFLF SAMPLING

HERBICIDES - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
2,4,-D	<0.2		
2,4,5-TP (SILVEX)	<0.05		

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DATE RUN..... 01/21/91
DATE REPORTED.. 01/22/91

Stanley Isaacson
LABORATORY DIRECTOR

ORIGINAL

575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9101012

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-3

REMARKS: SFLF SAMPLING

PESTICIDES AND PCB'S - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
LINDANE	<0.05		
HEPTACHLOR	<0.05		
ALDRIN	<0.05		
HEPTACHLOR EPOXIDE	<0.05		
DIELDRIN	<0.1		
ENDRIN	<0.1		
P,P'DDT	<0.1		
METHOXYCHLOR	<0.5		
TOXAPHENE	<1.0		
CHLORDANE	<0.5		
BETA-BHC	<0.1		
DELTA-BHC	<0.1		
ALPHA-BHC	<0.1		
P,P'-DDD	<0.1		
P,P'-DDE	<0.1		
ENDOSULFAN I	<0.1		
ENDOSULFAN II	<0.1		
ENDOSULFAN SULFATE	<0.1		
ENDRIN ALDEHYDE	<0.1		
O,P DDT	<0.1		
AROCLOR 1016	<0.5		
AROCLOR 1221	<0.5		
AROCLOR 1232	<0.5		
AROCLOR 1242	<0.5		
AROCLOR 1248	<0.5		
AROCLOR 1254	<1.0		
AROCLOR 1260	<1.0		

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DATE EXTRACTED. 01/22/91
DATE RUN..... 01/21/91
DATE REPORTED.. 01/23/91

Stanley Isaacson
LABORATORY DIRECTOR

ORIGINAL

[illegible] LABS, INC.
(516)694-3040 FAX:(516)694-4122

LAB NO: 9101012

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-3

REMARKS: SFLF SAMPLING

TCL PURGEABLE ORGANICS - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
CHLOROMETHANE	<10	STYRENE	<5
BROMOMETHANE	<10		
VINYL CHLORIDE	<10		
CHLOROETHANE	<10		
METHYLENE CHLORIDE	<5		
1,1-DICHLOROETHENE	<5		
1,1-DICHLOROETHANE	<5		
C/T-1/2-DICHLOROETHENE	<5		
CHLOROFORM	<5		
1,2-DICHLOROETHANE	<5		
1,1,1-TRICHLOROETHANE	<5		
CARBON TETRACHLORIDE	<5		
BROMODICHLOROMETHANE	<5		
1,2-DICHLOROPROPANE	<5		
TRANS-1,3-DICHLOROPROPENE	<5		
TRICHLOROETHENE	<5		
DIBROMOCHLOROMETHANE	<5		
1,1,2-TRICHLOROETHANE	<5		
CIS-1,3-DICHLOROPROPENE	<5		
BENZENE	<5		
BROMOFORM	<5		
1,1,2,2-TETRACHLOROETHANE	<5		
TETRACHLOROETHENE	<5		
TOLUENE	<5		
CHLOROBENZENE	<5		
ETHYLBENZENE	<5		
XYLENES (TOTAL)	<5		
ACETONE	96		
2-BUTANONE (MEK)	<10		
4-METHYL-2PENTANONE(MIBK)	<10		
CARBON DISULFIDE	<5		
VINYL ACETATE	<10		
2-HEXANONE	<10		

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DATE RUN..... 01/14/91
DATE REPORTED.. 01/15/91

Stanley Deaucon
LABORATORY DIRECTOR

ORIGINAL

HZM LABS, INC.

(516)694-3040 FAX:(516)694-4122

LAB NO: 9100708

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/08/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-4

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
SILVER	0.02	mg/l
ALUMINUM	1.6	mg/l
ARSENIC	<10	ug/l
BORON	<0.10	mg/l
BARIUM	<0.20	mg/l
BERYLLIUM	<5	ug/l
BOD5	<10	mg/l
CALCIUM	5.3	mg/l
CADMIUM	<5	ug/l
CHLORIDE	540	mg/l
CYANIDE	<10	ug/l
COBALT	<0.05	mg/l
COD	90	mg/l
COLOR	40	units
CHROMIUM	<0.01	mg/l
COPPER	<0.02	mg/l
IRON	12.8	mg/l
TOTAL HARDNESS	18.99	mg/l
MERCURY	<0.2	ug/l
POTASSIUM	1.8	mg/l
MAGNESIUM	1.4	mg/l
MANGANESE	1.9	mg/l
SODIUM	276	mg/l
AMMONIA (NH3)	0.41	mg/l
NICKEL	<0.04	mg/l
NITRATE (AS N)	0.1	mg/l
LEAD	8.1	ug/l
PH	5.4	units
TOTAL PHENOLS	4.2	ug/l
ANTIMONY	<60	ug/l
SELENIUM	<5	ug/l
SULFATE	27	mg/l
TOTAL ALKALINITY	37.2	mg/l

DATE ISSUED 01/25/91

COPIES TO:

Stanley Deacon
LABORATORY DIRECTOR

ORIGINAL

H2M LABS, INC.

(516)694-3040 FAX:(516)694-4122

LAB NO: 9100708

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/08/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-4

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
TOTAL DISSOLVED SOLIDS	956	mg/l
TOTAL KJELDAHL NITROGEN	5.2	mg/l
THALLIUM	<10	ug/l
TOTAL ORGANIC CARBON(TOC)	4.8	mg/l
TURBIDITY	10	units
VANADIUM	<0.05	mg/l
ZINC	0.06	mg/l

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Stanley Deaver
LABORATORY DIRECTOR

ORIGINAL

NYM LABS, INC.

(516)694-3040 FAX:(516)694-4122

LAB NO: 9100708

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/08/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-4

REMARKS: SFLF SAMPLING

TCL SEMI-VOLATILE ORGANICS - (ug/l)

PARAMETER (S)	RESULT
1,3-DICHLOROBENZENE	<10
1,4-DICHLOROBENZENE	<10
HEXACHLOROETHANE	<10
BIS(2-CHLOROETHYL)ETHER	<10
1,2-DICHLOROBENZENE	<10
BIS(2-CHL.ISOPROPYL)ETHER	<10
N-NITROSO-DIPROPYLAMINE	<10
NITROBENZENE	<10
HEXACHLOROBUTADIENE	<10
1,2,4-TRICHLOROBENZENE	<10
ISOPHORONE	<10
NAPHTHALENE	<10
BIS(2-CHL.ETHOXY)METHANE	<10
HEXACHLOROCYCLOPENTADIENE	<10
2-CHLORONAPHTHALENE	<10
ACENAPHTHYLENE	<10
ACENAPHTHENE	<10
DIMETHYLPHTHALATE	<10
2,6-DINITROTOLUENE	<10
FLUORENE	<10
4-CHL.PHENYL PHENYLETHER	<10
2,4-DINITROTOLUENE	<10
DIETHYL PHTHALATE	<10
N-NITROSODIPHENYLAMINE	<10
HEXACHLOROBENZENE	<10
4-BROMOPHENYLPHENYLETHER	<10
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYL PHTHALATE	<10
FLUORANTHENE	<10
PYRENE	<10
BUTYL BENZYL PHTHALATE	<10
BIS(2ETHYLHEXYL)PHTHALATE	<10

PARAMETER (S)	RESULT
CHRYSENE	<10
BENZO(A)ANTHRACENE	<10
3,3-DICHLOROBENZIDINE	<20
DI-N-OCTYL PHTHALATE	<10
BENZO(B)FLUORANTHENE	<10
BENZO(K)FLUORANTHENE	<10
BENZO(A)PYRENE	<10
INDENO(1,2,3-C,D)PYRENE	<10
DIBENZO(A,H)ANTHRACENE	<10
BENZO (G,H,I)PERYLENE	<10
2-CHLOROPHENOL	<10
2-NITROPHENOL	<10
PHENOL	<10
2,4-DIMETHYLPHENOL	<10
2,4-DICHLOROPHENOL	<10
2,4,6-TRICHLOROPHENOL	<10
4-CHLORO-3-METHYLPHENOL	<10
2,4-DINITROPHENOL	<50
2-METH.-4,6-DINITROPHENOL	<50
PENTACHLOROPHENOL	<50
4-NITROPHENOL	<50
2-METHYLPHENOL	<10
2,4,5-TRICHLOROPHENOL	<10
BENZOIC ACID	<50
4-METHYLPHENOL	<50
BENZYL ALCOHOL	<10
4-CHLOROANILINE	<10
2-METHYLNAPHTHALENE	<10
2-NITROANILINE	<50
3-NITROANILINE	<50
DIBENZOFURAN	<10
4-NITROANILINE	<50

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DATE RUN..... 01/24/91
DATE REPORTED.. 01/24/91

Stanley Isaacson
LABORATORY DIRECTOR

ORIGINAL

HZM LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9100708

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/08/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-4

REMARKS: SFLF SAMPLING

HERBICIDES - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
2,4,-D	<0.2		
2,4,5-TP (SILVEX)	<0.05		

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DATE RUN..... 01/21/91
DATE REPORTED.. 01/23/91

Stanley Deacon
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ORIGINAL

H2M LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9100708

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/08/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: S-4

REMARKS: SFLF SAMPLING

PESTICIDES AND PCB'S - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
LINDANE	<0.05		
HEPTACHLOR	<0.05		
ALDRIN	<0.05		
HEPTACHLOR EPOXIDE	<0.05		
DIELDRIN	<0.1		
ENDRIN	<0.1		
P,P'DDT	<0.1		
METHOXYCHLOR	<0.5		
TOXAPHENE	<1.0		
CHLORDANE	<0.5		
BETA-BHC	<0.1		
DELTA-BHC	<0.1		
ALPHA-BHC	<0.1		
P,P'-DDD	<0.1		
P,P'-DDE	<0.1		
ENDOSULFAN I	<0.1		
ENDOSULFAN II	<0.1		
ENDOSULFAN SULFATE	<0.1		
ENDRIN ALDEHYDE	<0.1		
O,P DDT	<0.1		
AROCLOR 1016	<0.5		
AROCLOR 1221	<0.5		
AROCLOR 1232	<0.5		
AROCLOR 1242	<0.5		
AROCLOR 1248	<0.5		
AROCLOR 1254	<1.0		
AROCLOR 1260	<1.0		

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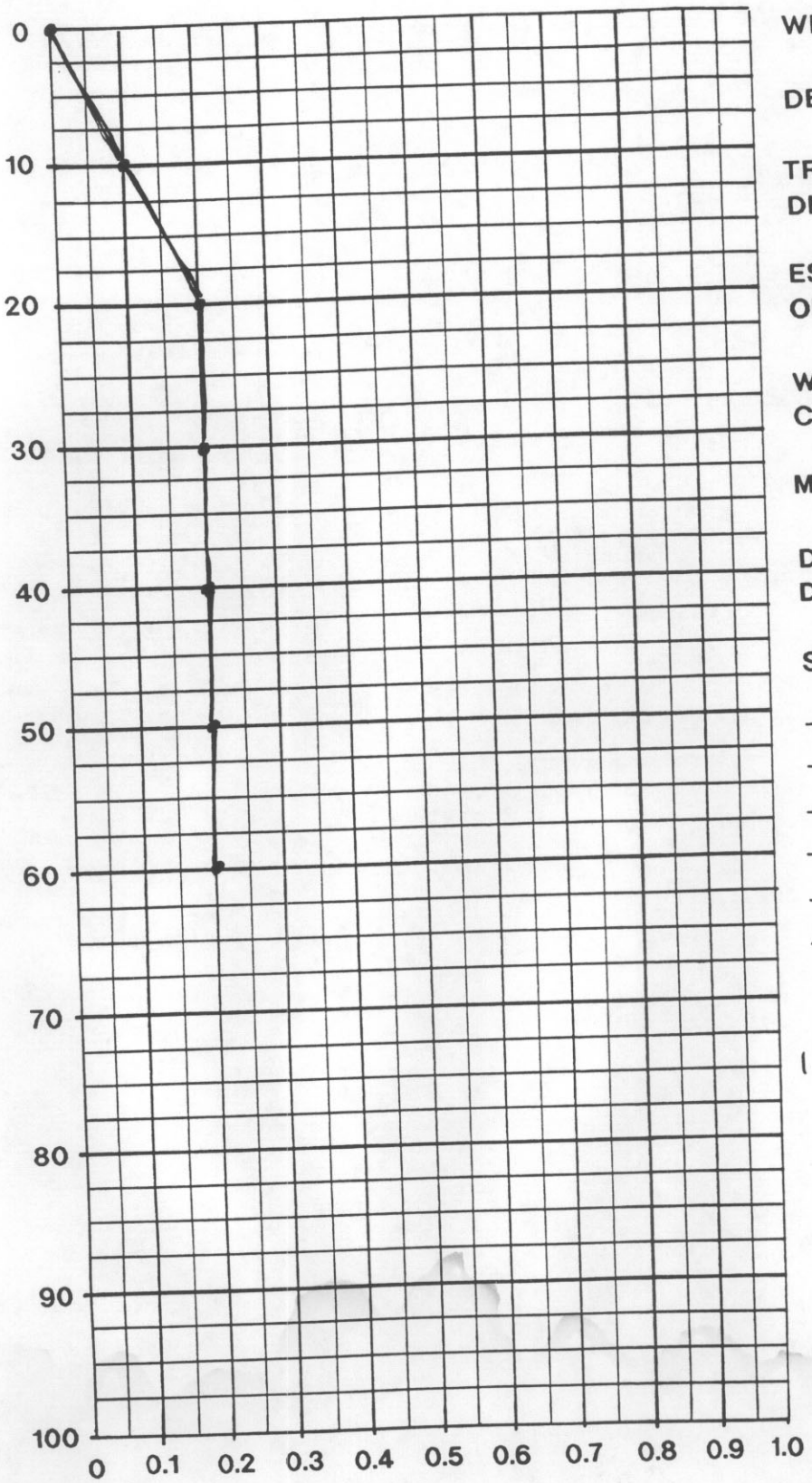
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DATE RUN..... 01/21/91
DATE REPORTED.. 01/23/91

Stanley Jacobson
LABORATORY DIRECTOR

ORIGINAL

WELL PLUMBNESS DATA



WELL NUMBER: D-4

DEPTH TO WATER: 68'

TRIPOD TO CASING DISTANCE: 1.67'

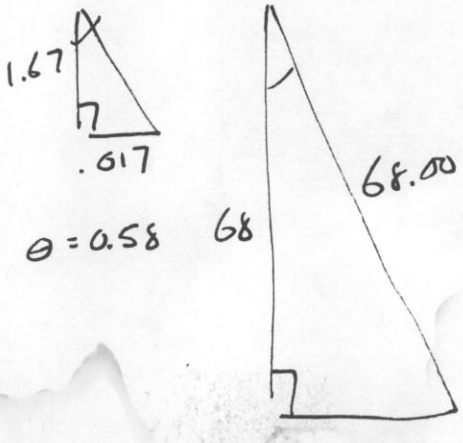
ESTIMATED ANGLE OF DEVIATION: 0.58°

WATER TABLE CORRECTION FACTOR: 0

MAXIMUM DEVIATION: 0.2"

DEPTH OF MAX. DEVIATION: 20'

STRAIGHTNESS COMMENTS:
Straight to 36'



,P&M

APPENDIX I

HZM LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9100705

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/07/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-1

REMARKS: SFLF SAMPLING

HERBICIDES - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
2,4,-D	<0.2		
2,4,5-TP (SILVEX)	<0.05		

DATE ISSUED 01/25/91

COPIES TO:

DATE EXTRACTED. 01/16/91
DATE RUN..... 01/21/91
DATE REPORTED.. 01/23/91

Stanley Isaacson
LABORATORY DIRECTOR

ORIGINAL

HZM LABS, INC.
(516)694-3040 FAX:(516)694-4122

LAB NO: 9100705

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/07/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-1

REMARKS: SFLF SAMPLING

PESTICIDES AND PCB'S - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
LINDANE	<0.05		
HEPTACHLOR	<0.05		
ALDRIN	<0.05		
HEPTACHLOR EPOXIDE	<0.05		
DIELDRIN	<0.1		
ENDRIN	<0.1		
P,P'DDT	<0.1		
METHOXYCHLOR	<0.5		
TOXAPHENE	<1.0		
CHLORDANE	<0.5		
BETA-BHC	<0.1		
DELTA-BHC	<0.1		
ALPHA-BHC	<0.1		
P,P'-DDD	<0.1		
P,P'-DDE	<0.1		
ENDOSULFAN I	<0.1		
ENDOSULFAN II	<0.1		
ENDOSULFAN SULFATE	<0.1		
ENDRIN ALDEHYDE	<0.1		
O,P DDT	<0.1		
AROCLOR 1016	<0.5		
AROCLOR 1221	<0.5		
AROCLOR 1232	<0.5		
AROCLOR 1242	<0.5		
AROCLOR 1248	<0.5		
AROCLOR 1254	<1.0		
AROCLOR 1260	<1.0		

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DATE EXTRACTED. 01/22/91
DATE RUN..... 01/21/91
DATE REPORTED.. 01/23/91

Stanley Deaucon
LABORATORY DIRECTOR

ORIGINAL

- LAB'S, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 910(

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/07/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-1

REMARKS: SFLF SAMPLING

TCL PURGEABLE ORGANICS - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
CHLOROMETHANE	<10	STYRENE	<5
BROMOMETHANE	<10		
VINYL CHLORIDE	<10		
CHLOROETHANE	<10		
METHYLENE CHLORIDE	<5		
1,1-DICHLOROETHENE	<5		
1,1-DICHLOROETHANE	<5		
C/T-1/2-DICHLOROETHENE	<5		
CHLOROFORM	<5		
1,2-DICHLOROETHANE	<5		
1,1,1-TRICHLOROETHANE	<5		
CARBON TETRACHLORIDE	<5		
BROMODICHLOROMETHANE	<5		
1,2-DICHLOROPROPANE	<5		
TRANS-1,3-DICHLOROPROPENE	<5		
TRICHLOROETHENE	<5		
DIBROMOCHLOROMETHANE	<5		
1,1,2-TRICHLOROETHANE	<5		
CIS-1,3-DICHLOROPROPENE	<5		
BENZENE	<5		
BROMOFORM	<5		
1,1,2,2-TETRACHLOROETHANE	<5		
TETRACHLOROETHENE	<5		
TOLUENE	<5		
CHLOROBENZENE	<5		
ETHYLBENZENE	<5		
XYLENES (TOTAL)	<5		
ACETONE	<10		
2-BUTANONE (MEK)	<10		
4-METHYL-2PENTANONE(MIBK)	<10		
CARBON DISULFIDE	<5		
VINYL ACETATE	<10		
2-HEXANONE	<10		

COPIES TO:

DATE RUN..... 01/09/91
DATE REPORTED.. 01/10/91

DATE ISSUED 01/25/91

Stanley Pearson

ORIGINAL

LABORATORY DIRECTOR

[illegible] INC.
[illegible] Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9101016

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. ~~01/09/91~~
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-2

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
SILVER	<0.01	mg/l
ALUMINUM	16.9	mg/l
ARSENIC	<10	ug/l
BORON	<0.10	mg/l
BARIUM	<0.20	mg/l
BERYLLIUM	<5	ug/l
BOD5	<10	mg/l
CALCIUM	9.4	mg/l
CADMIUM	<5	ug/l
CHLORIDE	17	mg/l
CYANIDE	<10	ug/l
COBALT	<0.05	mg/l
COD	<15	mg/l
COLOR	120	units
CHROMIUM	0.02	mg/l
COPPER	0.02	mg/l
IRON	15.2	mg/l
TOTAL HARDNESS	50.56	mg/l
MERCURY	<0.2	ug/l
POTASSIUM	1.8	mg/l
MAGNESIUM	6.6	mg/l
MANGANESE	0.27	mg/l
SODIUM	27.5	mg/l
AMMONIA (NH3)	0.32	mg/l
NICKEL	<0.04	mg/l
NITRATE (AS N)	2.6	mg/l
LEAD	23.3	ug/l
PH	8.3	units
TOTAL PHENOLS	1.5	ug/l
ANTIMONY	<60	ug/l
SELENIUM	<5	ug/l
SULFATE	14.5	mg/l
TOTAL ALKALINITY	40.1	mg/l

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Stanley Isaacson
LABORATORY DIRECTOR

ORIGINAL

(516)694-3040 FAX:(516)694-4122

LAB NO: 9101016

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-2

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
TOTAL DISSOLVED SOLIDS	168	mg/l
TOTAL KJELDAHL NITROGEN	1.4	mg/l
THALLIUM	<10.0	ug/l
TOTAL ORGANIC CARBON(TOC)	2.5	mg/l
TURBIDITY	100	units
VANADIUM	<0.05	mg/l
ZINC	0.13	mg/l

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Stanley Headrick
LABORATORY DIRECTOR

ORIGINAL

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(516)694-3040 FAX:(516)694-4122

LAB NO: 9101016

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-2

REMARKS: SFLF SAMPLING

TCL SEMI-VOLATILE ORGANICS - (ug/l)

PARAMETER (S)	RESULT
1,3-DICHLOROBENZENE	<10
1,4-DICHLOROBENZENE	<10
HEXACHLOROETHANE	<10
BIS(2-CHLOROETHYL)ETHER	<10
1,2-DICHLOROBENZENE	<10
BIS(2-CHL.ISOPROPYL)ETHER	<10
N-NITROSO-DIPROPYLAMINE	<10
NITROBENZENE	<10
HEXACHLOROBUTADIENE	<10
1,2,4-TRICHLOROBENZENE	<10
ISOPHORONE	<10
NAPHTHALENE	<10
BIS(2-CHL.ETHOXY)METHANE	<10
HEXACHLOROCYCLOPENTADIENE	<10
2-CHLORONAPHTHALENE	<10
ACENAPHTHYLENE	<10
ACENAPHTHENE	<10
DIMETHYLPHTHALATE	<10
2,6-DINITROTOLUENE	<10
FLUORENE	<10
4-CHL.PHENYL PHENYLETHER	<10
2,4-DINITROTOLUENE	<10
DIETHYL PHTHALATE	<10
N-NITROSODIPHENYLAMINE	<10
HEXACHLOROBENZENE	<10
4-BROMOPHENYLPHENYLETHER	<10
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYL PHTHALATE	<10
FLUORANTHENE	<10
PYRENE	<10
BUTYL BENZYL PHTHALATE	<10
BIS(2ETHYLHEXYL)PHTHALATE	<10

PARAMETER (S)	RESULT
CHRYSENE	<10
BENZO(A)ANTHRACENE	<10
3,3-DICHLOROBENZIDINE	<20
DI-N-OCTYL PHTHALATE	<10
BENZO(B)FLUORANTHENE	<10
BENZO(K)FLUORANTHENE	<10
BENZO(A)PYRENE	<10
INDENO(1,2,3-C,D)PYRENE	<10
DIBENZO(A,H)ANTHRACENE	<10
BENZO (G,H,I)PERYLENE	<10
2-CHLOROPHENOL	<10
2-NITROPHENOL	<10
PHENOL	<10
2,4-DIMETHYLPHENOL	<10
2,4-DICHLOROPHENOL	<10
2,4,6-TRICHLOROPHENOL	<10
4-CHLORO-3-METHYLPHENOL	<10
2,4-DINITROPHENOL	<50
2-METH.-4,6-DINITROPHENOL	<50
PENTACHLOROPHENOL	<50
4-NITROPHENOL	<50
2-METHYLPHENOL	<10
2,4,5-TRICHLOROPHENOL	<10
BENZOIC ACID	<50
4-METHYLPHENOL	<50
BENZYL ALCOHOL	<10
4-CHLOROANILINE	<10
2-METHYLNAPHTHALENE	<10
2-NITROANILINE	<50
3-NITROANILINE	<50
DIBENZOFURAN	<10
4-NITROANILINE	<50

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DATE REPORTED.. 01/24/91

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LABORATORY DIRECTOR

ORIGINAL

(516)694-3040 FAX:(516)694-4122

LAB NO: 9101016

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-2

REMARKS: SFLF SAMPLING

HERBICIDES - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
2,4,-D	<0.4		
2,4,5-TP (SILVEX)	<0.10		

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(516)694-3040 FAX:(516)694-4122

LAB NO: 9101016

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-2

REMARKS: SFLF SAMPLING

PESTICIDES AND PCB'S - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
LINDANE	<0.05		
HEPTACHLOR	<0.05		
ALDRIN	<0.05		
HEPTACHLOR EPOXIDE	<0.05		
DIELDRIN	<0.1		
ENDRIN	<0.1		
P,P'DDT	<0.1		
METHOXYCHLOR	<0.5		
TOXAPHENE	<1.0		
CHLORDANE	<0.5		
BETA-BHC	<0.1		
DELTA-BHC	<0.1		
ALPHA-BHC	<0.1		
P,P'-DDD	<0.1		
P,P'-DDE	<0.1		
ENDOSULFAN I	<0.1		
ENDOSULFAN II	<0.1		
ENDOSULFAN SULFATE	<0.1		
ENDRIN ALDEHYDE	<0.1		
O,P DDT	<0.1		
AROCLOR 1016	<0.5		
AROCLOR 1221	<0.5		
AROCLOR 1232	<0.5		
AROCLOR 1242	<0.5		
AROCLOR 1248	<0.5		
AROCLOR 1254	<1.0		
AROCLOR 1260	<1.0		

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DATE RUN..... 01/27/91
DATE REPORTED.. 01/30/91

Stanley Isaacson
LABORATORY DIRECTOR

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(516)694-3040 FAX:(516)694-4122

LAB NO: 9101016

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-2

REMARKS: SFLF SAMPLING

TCL PURGEABLE ORGANICS - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
CHLOROMETHANE	<10	STYRENE	<5
BROMOMETHANE	<10		
VINYL CHLORIDE	<10		
CHLOROETHANE	<10		
METHYLENE CHLORIDE	<5		
1,1-DICHLOROETHENE	<5		
1,1-DICHLOROETHANE	<5		
C/T-1/2-DICHLOROETHENE	<5		
CHLOROFORM	<5		
1,2-DICHLOROETHANE	<5		
1,1,1-TRICHLOROETHANE	<5		
CARBON TETRACHLORIDE	<5		
BROMODICHLOROMETHANE	<5		
1,2-DICHLOROPROPANE	<5		
TRANS-1,3-DICHLOROPROPENE	<5		
TRICHLOROETHENE	<5		
DIBROMOCHLOROMETHANE	<5		
1,1,2-TRICHLOROETHANE	<5		
CIS-1,3-DICHLOROPROPENE	<5		
BENZENE	<5		
BROMOFORM	<5		
1,1,2,2-TETRACHLOROETHANE	<5		
TETRACHLOROETHENE	<5		
TOLUENE	<5		
CHLOROBENZENE	<5		
ETHYLBENZENE	<5		
XYLENES (TOTAL)	<5		
ACETONE	<10		
2-BUTANONE (MEK)	<10		
4-METHYL-2PENTANONE(MIBK)	<10		
CARBON DISULFIDE	<5		
VINYL ACETATE	<10		
2-HEXANONE	<10		

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DATE REPORTED.. 01/15/91

DATE ISSUED 02/04/91

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LAB NO: 9101011

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

RECEIVED FEB 6 1991

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-3

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
SILVER	<0.01	mg/l
ALUMINUM	11.5	mg/l
ARSENIC	<10	ug/l
BORON	<0.10	mg/l
BARIUM	<0.20	mg/l
BERYLLIUM	<5	ug/l
BOD5	<10	mg/l
CALCIUM	16.8	mg/l
CADMIUM	<5	ug/l
CHLORIDE	13	mg/l
CYANIDE	<10	ug/l
COBALT	<0.05	mg/l
COD	20	mg/l
COLOR	150	units
CHROMIUM	0.02	mg/l
COPPER	0.03	mg/l
IRON	10.0	mg/l
TOTAL HARDNESS	70.7	mg/l
MERCURY	<0.2	ug/l
POTASSIUM	2.6	mg/l
MAGNESIUM	7.0	mg/l
MANGANESE	0.38	mg/l
SODIUM	43.9	mg/l
AMMONIA (NH3)	0.65	mg/l
NICKEL	<0.04	mg/l
NITRATE (AS N)	0.2	mg/l
LEAD	16.4	ug/l
PH	6.8	units
TOTAL PHENOLS	<1	ug/l
ANTIMONY	<60	ug/l
SELENIUM	<5	ug/l
SULFATE	20	mg/l
TOTAL ALKALINITY	114.0	mg/l

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Stanley Isaacson
LABORATORY DIRECTOR

ORIGINAL

(516)694-3040 FAX:(516)694-4122

LAB NO: 9101011

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-3

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
TOTAL DISSOLVED SOLIDS	281	mg/l
TOTAL KJELDAHL NITROGEN	1.0	mg/l
THALLIUM	<10	ug/l
TOTAL ORGANIC CARBON(TOC)	4.1	mg/l
TURBIDITY	100	units
VANADIUM	<0.05	mg/l
ZINC	0.51	mg/l

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Stanley Pearson
LABORATORY DIRECTOR

ORIGINAL

NEMA LABS, INC.
(516)694-3040 FAX:(516)694-4122

LAB NO: 9101011

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-3

REMARKS: SFLF SAMPLING

TCL SEMI-VOLATILE ORGANICS - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
1,3-DICHLOROBENZENE	<10	CHRYSENE	<10
1,4-DICHLOROBENZENE	<10	BENZO(A)ANTHRACENE	<10
HEXACHLOROETHANE	<10	3,3-DICHLOROBENZIDINE	<20
BIS(2-CHLOROETHYL)ETHER	<10	DI-N-OCTYL PHTHALATE	<10
1,2-DICHLOROBENZENE	<10	BENZO(B)FLUORANTHENE	<10
BIS(2-CHL.ISOPROPYL)ETHER	<10	BENZO(K)FLUORANTHENE	<10
N-NITROSO-DIPROPYLAMINE	<10	BENZO(A)PYRENE	<10
NITROBENZENE	<10	INDENO(1,2,3-C,D)PYRENE	<10
HEXACHLOROBUTADIENE	<10	DIBENZO(A,H)ANTHRACENE	<10
1,2,4-TRICHLOROBENZENE	<10	BENZO (G,H,I)PERYLENE	<10
ISOPHORONE	<10	2-CHLOROPHENOL	<10
NAPHTHALENE	<10	2-NITROPHENOL	<10
BIS(2-CHL.ETHOXY)METHANE	<10	PHENOL	<10
HEXACHLOROCYCLOPENTADIENE	<10	2,4-DIMETHYLPHENOL	<10
2-CHLORONAPHTHALENE	<10	2,4-DICHLOROPHENOL	<10
ACENAPHTHYLENE	<10	2,4,6-TRICHLOROPHENOL	<10
ACENAPHTHENE	<10	4-CHLORO-3-METHYLPHENOL	<10
DIMETHYLPHTHALATE	<10	2,4-DINITROPHENOL	<50
2,6-DINITROTOLUENE	<10	2-METH.-4,6-DINITROPHENOL	<50
FLUORENE	<10	PENTACHLOROPHENOL	<50
4-CHL.PHENYL PHENYLETHER	<10	4-NITROPHENOL	<50
2,4-DINITROTOLUENE	<10	2-METHYLPHENOL	<10
DIETHYL PHTHALATE	<10	2,4,5-TRICHLOROPHENOL	<10
N-NITROSODIPHENYLAMINE	<10	BENZOIC ACID	<50
HEXACHLOROBENZENE	<10	4-METHYLPHENOL	<50
4-BROMOPHENYLPHENYLETHER	<10	BENZYL ALCOHOL	<10
PHENANTHRENE	<10	4-CHLOROANILINE	<10
ANTHRACENE	<10	2-METHYLNAPHTHALENE	<10
DI-N-BUTYL PHTHALATE	<10	2-NITROANILINE	<50
FLUORANTHENE	<10	3-NITROANILINE	<50
PYRENE	<10	DIBENZOFURAN	<10
BUTYL BENZYL PHTHALATE	<10	4-NITROANILINE	<50
BIS(2ETHYLHEXYL)PHTHALATE	<10		

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DATE EXTRACTED. 01/22/91
DATE RUN..... 01/26/91
DATE REPORTED.. 01/24/91

Stanley Isaacson
LABORATORY DIRECTOR

ORIGINAL

(516)694-3040 FAX:(516)694-4122

LAB NO: 9101011

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-3

REMARKS: SFLF SAMPLING

HERBICIDES - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
2,4,-D	<0.4		
2,4,5-TP (SILVEX)	<0.10		

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DATE RUN..... 01/31/91
DATE REPORTED.. 02/04/91

DATE ISSUED 02/04/91

Stanley Pearson
LABORATORY DIRECTOR

ORIGINAL

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LAB NO: 9101011

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-3

REMARKS: SFLF SAMPLING

PESTICIDES AND PCB'S - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
LINDANE	<0.05		
HEPTACHLOR	<0.05		
ALDRIN	<0.05		
HEPTACHLOR EPOXIDE	<0.05		
DIELDRIN	<0.1		
ENDRIN	<0.1		
P,P'DDT	<0.1		
METHOXYCHLOR	<0.5		
TOXAPHENE	<1.0		
CHLORDANE	<0.5		
BETA-BHC	<0.1		
DELTA-BHC	<0.1		
ALPHA-BHC	<0.1		
P,P'-DDD	<0.1		
P,P'-DDE	<0.1		
ENDOSULFAN I	<0.1		
ENDOSULFAN II	<0.1		
ENDOSULFAN SULFATE	<0.1		
ENDRIN ALDEHYDE	<0.1		
O,P DDT	<0.1		
AROCLOR 1016	<0.5		
AROCLOR 1221	<0.5		
AROCLOR 1232	<0.5		
AROCLOR 1242	<0.5		
AROCLOR 1248	<0.5		
AROCLOR 1254	<1.0		
AROCLOR 1260	<1.0		

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DATE RUN..... 01/21/91
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LAB NO: 9101011

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-3

REMARKS: SFLF SAMPLING

TCL PURGEABLE ORGANICS - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
CHLOROMETHANE	<10	STYRENE	<5
BROMOMETHANE	<10		
VINYL CHLORIDE	<10		
CHLOROETHANE	<10		
METHYLENE CHLORIDE	<5		
1,1-DICHLOROETHENE	<5		
1,1-DICHLOROETHANE	<5		
C/T-1/2-DICHLOROETHENE	<5		
CHLOROFORM	<5		
1,2-DICHLOROETHANE	<5		
1,1,1-TRICHLOROETHANE	<5		
CARBON TETRACHLORIDE	<5		
BROMODICHLOROMETHANE	<5		
1,2-DICHLOROPROPANE	<5		
TRANS-1,3-DICHLOROPROPENE	<5		
TRICHLOROETHENE	<5		
DIBROMOCHLOROMETHANE	<5		
1,1,2-TRICHLOROETHANE	<5		
CIS-1,3-DICHLOROPROPENE	<5		
BENZENE	<5		
BROMOFORM	<5		
1,1,2,2-TETRACHLOROETHANE	<5		
TETRACHLOROETHENE	110		
TOLUENE	<5		
CHLOROBENZENE	<5		
ETHYLBENZENE	<5		
XYLENES (TOTAL)	<5		
ACETONE	<10		
2-BUTANONE (MEK)	<10		
4-METHYL-2PENTANONE(MIBK)	<10		
CARBON DISULFIDE	<5		
VINYL ACETATE	<10		
2-HEXANONE	<10		

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DATE RUN..... 01/14/91
DATE REPORTED.. 01/15/91

Stanley Isaacson
LABORATORY DIRECTOR

ORIGINAL

[illegible] (516)694-3040 FAX:(516)694-4122

LAB NO: 9100707

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/08/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-4

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
SILVER	<0.01	mg/l
ALUMINUM	0.62	mg/l
ARSENIC	<10	ug/l
BORON	<0.10	mg/l
BARIUM	<0.20	mg/l
BERYLLIUM	<5	ug/l
BOD5	<10	mg/l
CALCIUM	8.6	mg/l
CADMIUM	<5	ug/l
CHLORIDE	280	mg/l
CYANIDE	<10	ug/l
COBALT	<0.05	mg/l
COD	90	mg/l
COLOR	10	units
CHROMIUM	<0.01	mg/l
COPPER	<0.02	mg/l
IRON	0.37	mg/l
TOTAL HARDNESS	45.69	mg/l
MERCURY	<0.2	ug/l
POTASSIUM	2.9	mg/l
MAGNESIUM	5.9	mg/l
MANGANESE	0.05	mg/l
SODIUM	242	mg/l
AMMONIA (NH3)	0.05	mg/l
NICKEL	<0.04	mg/l
NITRATE (AS N)	2.2	mg/l
LEAD	<5	ug/l
PH	7.1	units
TOTAL PHENOLS	1.7	ug/l
ANTIMONY	<60	ug/l
SELENIUM	<5	ug/l
SULFATE	45	mg/l
TOTAL ALKALINITY	201	mg/l

COPIES TO:

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Stanley Pearson
LABORATORY DIRECTOR

ORIGINAL

H2M LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694 3040 FAX:(516)694 4122

LAB NO: 9100707

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/08/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-4

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
TOTAL DISSOLVED SOLIDS	774	mg/l
TOTAL KJELDAHL NITROGEN	0.9	mg/l
THALLIUM	<10	ug/l
TOTAL ORGANIC CARBON(TOC)	3.3	mg/l
TURBIDITY	2.5	units
VANADIUM	<0.05	mg/l
ZINC	0.09	mg/l

COPIES TO:

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Stanley Deaderick
LABORATORY DIRECTOR

ORIGINAL

HZM LABS, INC.
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LAB NO: 9100707

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/08/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-4

REMARKS: SFLF SAMPLING

TCL SEMI-VOLATILE ORGANICS - (ug/l)

PARAMETER (S)	RESULT
1,3-DICHLOROBENZENE	<10
1,4-DICHLOROBENZENE	<10
HEXACHLOROETHANE	<10
BIS(2-CHLOROETHYL)ETHER	<10
1,2-DICHLOROBENZENE	<10
BIS(2-CHL.ISOPROPYL)ETHER	<10
N-NITROSO-DIPROPYLAMINE	<10
NITROBENZENE	<10
HEXACHLOROBUTADIENE	<10
1,2,4-TRICHLOROBENZENE	<10
ISOPHORONE	<10
NAPHTHALENE	<10
BIS(2-CHL.ETHOXY)METHANE	<10
HEXACHLOROCYCLOPENTADIENE	<10
2-CHLORONAPHTHALENE	<10
ACENAPHTHYLENE	<10
ACENAPHTHENE	<10
DIMETHYLPHTHALATE	<10
2,6-DINITROTOLUENE	<10
FLUORENE	<10
4-CHL.PHENYL PHENYLETHER	<10
2,4-DINITROTOLUENE	<10
DIETHYL PHTHALATE	<10
N-NITROSODIPHENYLAMINE	<10
HEXACHLOROBENZENE	<10
4-BROMOPHENYLPHENYLETHER	<10
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYL PHTHALATE	<10
FLUORANTHENE	<10
PYRENE	<10
BUTYL BENZYL PHTHALATE	<10
BIS(2ETHYLHEXYL)PHTHALATE	<10

PARAMETER (S)	RESULT
CHRYSENE	<10
BENZO(A)ANTHRACENE	<10
3,3-DICHLOROBENZIDINE	<20
DI-N-OCTYL PHTHALATE	<10
BENZO(B)FLUORANTHENE	<10
BENZO(K)FLUORANTHENE	<10
BENZO(A)PYRENE	<10
INDENO(1,2,3-C,D)PYRENE	<10
DIBENZO(A,H)ANTHRACENE	<10
BENZO (G,H,I)PERYLENE	<10
2-CHLOROPHENOL	<10
2-NITROPHENOL	<10
PHENOL	<10
2,4-DIMETHYLPHENOL	<10
2,4-DICHLOROPHENOL	<10
2,4,6-TRICHLOROPHENOL	<10
4-CHLORO-3-METHYLPHENOL	<10
2,4-DINITROPHENOL	<50
2-METH.-4,6-DINITROPHENOL	<50
PENTACHLOROPHENOL	<50
4-NITROPHENOL	<50
2-METHYLPHENOL	<10
2,4,5-TRICHLOROPHENOL	<10
BENZOIC ACID	<50
4-METHYLPHENOL	<50
BENZYL ALCOHOL	<10
4-CHLOROANILINE	<10
2-METHYLNAPHTHALENE	<10
2-NITROANILINE	<50
3-NITROANILINE	<50
DIBENZOFURAN	<10
4-NITROANILINE	<50

COPIES TO:

DATE EXTRACTED. 01/15/91
DATE RUN..... 01/16/91
DATE REPORTED.. 01/16/91

DATE ISSUED 01/25/91

Stanley Isaacson
LABORATORY DIRECTOR

ORIGINAL

ZMI LABS, INC. (516)694-3040 FAX:(516)694-4122

LAB NO: 9100707

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/08/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-4

REMARKS: SFLF SAMPLING

HERBICIDES - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
2,4,-D	<0.2		
2,4,5-TP (SILVEX)	<0.05		

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DATE EXTRACTED. 01/16/91
DATE RUN..... 01/24/91
DATE REPORTED.. 01/24/91

Stanley Pearson
LABORATORY DIRECTOR

ORIGINAL

HZM LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9100707

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/08/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-4

REMARKS: SFLF SAMPLING

PESTICIDES AND PCB'S - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
LINDANE	<0.05		
HEPTACHLOR	<0.05		
ALDRIN	<0.05		
HEPTACHLOR EPOXIDE	<0.05		
DIELDRIN	<0.1		
ENDRIN	<0.1		
P,P'DDT	<0.1		
METHOXYCHLOR	<0.5		
TOXAPHENE	<1.0		
CHLORDANE	<0.5		
BETA-BHC	<0.1		
DELTA-BHC	<0.1		
ALPHA-BHC	<0.1		
P,P'-DDD	<0.1		
P,P'-DDE	<0.1		
ENDOSULFAN I	<0.1		
ENDOSULFAN II	<0.1		
ENDOSULFAN SULFATE	<0.1		
ENDRIN ALDEHYDE	<0.1		
O,P DDT	<0.1		
AROCLOR 1016	<0.5		
AROCLOR 1221	<0.5		
AROCLOR 1232	<0.5		
AROCLOR 1242	<0.5		
AROCLOR 1248	<0.5		
AROCLOR 1254	<1.0		
AROCLOR 1260	<1.0		

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DATE RUN..... 01/21/91
DATE REPORTED.. 01/23/91

Stanley Isaacson
LABORATORY DIRECTOR

ORIGINAL

H2M LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
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LAB NO: 9100707

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 01/08/91
DATE RECEIVED.. 01/09/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: D-4

REMARKS: SFLF SAMPLING

TCL PURGEABLE ORGANICS - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
CHLOROMETHANE	<10	STYRENE	<5
BROMOMETHANE	<10		
VINYL CHLORIDE	<10		
CHLOROETHANE	<10		
METHYLENE CHLORIDE	<5		
1,1-DICHLOROETHENE	<5		
1,1-DICHLOROETHANE	<5		
C/T-1/2-DICHLOROETHENE	<5		
CHLOROFORM	<5		
1,2-DICHLOROETHANE	<5		
1,1,1-TRICHLOROETHANE	<5		
CARBON TETRACHLORIDE	<5		
BROMODICHLOROMETHANE	<5		
1,2-DICHLOROPROPANE	<5		
TRANS-1,3-DICHLOROPROPENE	<5		
TRICHLOROETHENE	<5		
DIBROMOCHLOROMETHANE	<5		
1,1,2-TRICHLOROETHANE	<5		
CIS-1,3-DICHLOROPROPENE	<5		
BENZENE	<5		
BROMOFORM	<5		
1,1,2,2-TETRACHLOROETHANE	<5		
TETRACHLOROETHENE	<5		
TOLUENE	<5		
CHLOROBENZENE	<5		
ETHYLBENZENE	<5		
XYLENES (TOTAL)	<5		
ACETONE	<10		
2-BUTANONE (MEK)	<10		
4-METHYL-2PENTANONE(MIBK)	<10		
CARBON DISULFIDE	<5		
VINYL ACETATE	<10		
2-HEXANONE	<10		

DATE ISSUED 01/25/91

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DATE RUN..... 01/09/91
DATE REPORTED.. 01/10/91

Stanley Deaderick
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ORIGINAL

H2M LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9101015

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: GP-1

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
SILVER	<0.01	mg/l
ALUMINUM	1.2	mg/l
ARSENIC	<10	ug/l
BORON	<0.10	mg/l
BARIUM	<0.20	mg/l
BERYLLIUM	<5	ug/l
BOD5	<10	mg/l
CALCIUM	4.6	mg/l
CADMIUM	5	ug/l
CHLORIDE	11	mg/l
CYANIDE	<10	ug/l
COBALT	<0.05	mg/l
COD	25	mg/l
COLOR	100	units
CHROMIUM	<0.01	mg/l
COPPER	0.05	mg/l
IRON	2.1	mg/l
TOTAL HARDNESS	16.83	mg/l
MERCURY	<0.2	ug/l
POTASSIUM	1.1	mg/l
MAGNESIUM	1.3	mg/l
MANGANESE	0.19	mg/l
SODIUM	6.5	mg/l
AMMONIA (NH3)	<0.02	mg/l
NICKEL	<0.04	mg/l
NITRATE (AS N)	0.2	mg/l
LEAD	8.2	ug/l
PH	6.8	units
TOTAL PHENOLS	4.5	ug/l
ANTIMONY	<60	ug/l
SELENIUM	<5	ug/l
SULFATE	5.5	mg/l
TOTAL ALKALINITY	18.3	mg/l

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Stanley Isaacson

(516)694-3040 FAX:(516)694-4122

LAB NO: 9101015

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: GP-1

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
TOTAL DISSOLVED SOLIDS	61	mg/l
TOTAL KJELDAHL NITROGEN	1.0	mg/l
THALLIUM	<10.0	ug/l
TOTAL ORGANIC CARBON(TOC)	3.6	mg/l
TURBIDITY	10	units
VANADIUM	<0.05	mg/l
ZINC	0.11	mg/l

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Stanley Isaacson
LABORATORY DIRECTOR

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575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9101015

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: GP-1

REMARKS: SFLF SAMPLING

TCL SEMI-VOLATILE ORGANICS - (ug/l)

PARAMETER (S)	RESULT
1,3-DICHLOROBENZENE	<10
1,4-DICHLOROBENZENE	<10
HEXACHLOROETHANE	<10
BIS(2-CHLOROETHYL)ETHER	<10
1,2-DICHLOROBENZENE	<10
BIS(2-CHL.ISOPROPYL)ETHER	<10
N-NITROSO-DIPROPYLAMINE	<10
NITROBENZENE	<10
HEXACHLOROBUTADIENE	<10
1,2,4-TRICHLOROBENZENE	<10
ISOPHORONE	<10
NAPHTHALENE	<10
BIS(2-CHL.ETHOXY)METHANE	<10
HEXACHLOROCYCLOPENTADIENE	<10
2-CHLORONAPHTHALENE	<10
ACENAPHTHYLENE	<10
ACENAPHTHENE	<10
DIMETHYLPHTHALATE	<10
2,6-DINITROTOLUENE	<10
FLUORENE	<10
4-CHL.PHENYL PHENYLETHER	<10
2,4-DINITROTOLUENE	<10
DIETHYL PHTHALATE	<10
N-NITROSODIPHENYLAMINE	<10
HEXACHLOROBENZENE	<10
4-BROMOPHENYLPHENYLETHER	<10
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYL PHTHALATE	<10
FLUORANTHENE	<10
PYRENE	<10
BUTYL BENZYL PHTHALATE	<10
BIS(2ETHYLHEXYL)PHTHALATE	<10

PARAMETER (S)	RESULT
CHRYSENE	<10
BENZO(A)ANTHRACENE	<10
3,3-DICHLOROBENZIDINE	<20
DI-N-OCTYL PHTHALATE	<10
BENZO(B)FLUORANTHENE	<10
BENZO(K)FLUORANTHENE	<10
BENZO(A)PYRENE	<10
INDENO(1,2,3-C,D)PYRENE	<10
DIBENZO(A,H)ANTHRACENE	<10
BENZO (G,H,I)PERYLENE	<10
2-CHLOROPHENOL	<10
2-NITROPHENOL	<10
PHENOL	<10
2,4-DIMETHYLPHENOL	<10
2,4-DICHLOROPHENOL	<10
2,4,6-TRICHLOROPHENOL	<10
4-CHLORO-3-METHYLPHENOL	<10
2,4-DINITROPHENOL	<50
2-METH.-4,6-DINITROPHENOL	<50
PENTACHLOROPHENOL	<50
4-NITROPHENOL	<50
2-METHYLPHENOL	<10
2,4,5-TRICHLOROPHENOL	<10
BENZOIC ACID	<50
4-METHYLPHENOL	<50
BENZYL ALCOHOL	<10
4-CHLOROANILINE	<10
2-METHYLNAPHTHALENE	<10
2-NITROANILINE	<50
3-NITROANILINE	<50
DIBENZOFURAN	<10
4-NITROANILINE	<50

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DATE EXTRACTED. 01/22/91
DATE RUN..... 01/24/91
DATE REPORTED.. 01/24/91

Stanley Isaacson
LABORATORY DIRECTOR

ORIGINAL

(516)694-3040 FAX:(516)694-4122

LAB NO: 9101015

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: GP-1

REMARKS: SFLF SAMPLING

HERBICIDES - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
2,4,-D	<0.2		
2,4,5-TP (SILVEX)	<0.05		

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DATE EXTRACTED. 01/18/91
DATE RUN..... 01/21/91
DATE REPORTED.. 01/22/91

Stanley Pearson
LABORATORY DIRECTOR

ORIGINAL

(516)694-3040 FAX:(516)694-4122

LAB NO: 9101015

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: GP-1

REMARKS: SFLF SAMPLING

PESTICIDES AND PCB'S - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
LINDANE	<0.06		
HEPTACHLOR	<0.06		
ALDRIN	<0.06		
HEPTACHLOR EPOXIDE	<0.06		
DIELDRIN	<0.13		
ENDRIN	<0.13		
P,P'DDT	<0.13		
METHOXYCHLOR	<0.6		
TOXAPHENE	<1.3		
CHLORDANE	<0.6		
BETA-BHC	<0.13		
DELTA-BHC	<0.13		
ALPHA-BHC	<0.13		
P,P'-DDD	<0.13		
P,P'-DDE	<0.13		
ENDOSULFAN I	<0.13		
ENDOSULFAN II	<0.13		
ENDOSULFAN SULFATE	<0.13		
ENDRIN ALDEHYDE	<0.13		
O,P DDT	<0.13		
AROCLOR 1016	<0.6		
AROCLOR 1221	<0.6		
AROCLOR 1232	<0.6		
AROCLOR 1242	<0.6		
AROCLOR 1248	<0.6		
AROCLOR 1254	<1.3		
AROCLOR 1260	<1.3		

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DATE RUN..... 01/27/91
DATE REPORTED.. 01/30/91

DATE ISSUED 02/04/91

Stanley Isaacson
LABORATORY DIRECTOR

ORIGINAL

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(516)694-3040 FAX:(516)694-4122

LAB NO: 9101015

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: GP-1

REMARKS: SFLF SAMPLING

TCL PURGEABLE ORGANICS - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
CHLOROMETHANE	<10	STYRENE	<5
BROMOMETHANE	<10		
VINYL CHLORIDE	<10		
CHLOROETHANE	<10		
METHYLENE CHLORIDE	<5		
1,1-DICHLOROETHENE	<5		
1,1-DICHLOROETHANE	<5		
C/T-1/2-DICHLOROETHENE	<5		
CHLOROFORM	<5		
1,2-DICHLOROETHANE	<5		
1,1,1-TRICHLOROETHANE	<5		
CARBON TETRACHLORIDE	<5		
BROMODICHLOROMETHANE	<5		
1,2-DICHLOROPROPANE	<5		
TRANS-1,3-DICHLOROPROPENE	<5		
TRICHLOROETHENE	<5		
DIBROMOCHLOROMETHANE	<5		
1,1,2-TRICHLOROETHANE	<5		
CIS-1,3-DICHLOROPROPENE	<5		
BENZENE	<5		
BROMOFORM	<5		
1,1,2,2-TETRACHLOROETHANE	<5		
TETRACHLOROETHENE	<5		
TOLUENE	<5		
CHLOROBENZENE	<5		
ETHYLBENZENE	<5		
XYLENES (TOTAL)	<5		
ACETONE	<10		
2-BUTANONE (MEK)	<10		
4-METHYL-2PENTANONE(MIBK)	<10		
CARBON DISULFIDE	<5		
VINYL ACETATE	<10		
2-HEXANONE	<10		

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DATE ISSUED 02/04/91

DATE RUN..... 01/14/91
DATE REPORTED.. 01/15/91

Stanley Deaderick
LABORATORY DIRECTOR

ORIGINAL

(516)694-3040 FAX:(516)694-4122

LAB NO: 9101018

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: R-1

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
SILVER	<0.01	mg/l
ALUMINUM	17.9	mg/l
ARSENIC	<10	ug/l
BORON	<0.10	mg/l
BARIUM	<0.20	mg/l
BERYLLIUM	<5	ug/l
BOD5	<10	mg/l
CALCIUM	9.9	mg/l
CADMIUM	<5	ug/l
CHLORIDE	12	mg/l
CYANIDE	<10	ug/l
COBALT	<0.05	mg/l
COD	<15	mg/l
COLOR	150	units
CHROMIUM	0.02	mg/l
COPPER	0.03	mg/l
IRON	13.9	mg/l
TOTAL HARDNESS	50.58	mg/l
MERCURY	<0.2	ug/l
POTASSIUM	1.9	mg/l
MAGNESIUM	6.3	mg/l
MANGANESE	0.24	mg/l
SODIUM	25.7	mg/l
AMMONIA (NH3)	0.21	mg/l
NICKEL	0.06	mg/l
NITRATE (AS N)	2.5	mg/l
LEAD	22.1	ug/l
PH	8.1	units
TOTAL PHENOLS	<1	ug/l
ANTIMONY	<60	ug/l
SELENIUM	<5	ug/l
SULFATE	17.5	mg/l
TOTAL ALKALINITY	39.2	mg/l

COPIES TO:

DATE ISSUED 02/04/91

Stanley Deacon
LABORATORY DIRECTOR

ORIGINAL

575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9101018

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: R-1

REMARKS: SFLF SAMPLING

PARAMETER (S)	RESULTS	UNITS
TOTAL DISSOLVED SOLIDS	135	mg/l
TOTAL KJELDAHL NITROGEN	1.1	mg/l
THALLIUM	<10.0	ug/l
TOTAL ORGANIC CARBON(TOC)	1.7	mg/l
TURBIDITY	80	units
VANADIUM	<0.05	mg/l
ZINC	0.15	mg/l

COPIES TO:

DATE ISSUED 02/04/91

Stanley Pearson
LABORATORY DIRECTOR

ORIGINAL

ITEN LABS, INC.
(516)694-3040 FAX:(516)694-4122

LAB NO: 9101018

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: R-1

REMARKS: SFLF SAMPLING

TCL SEMI-VOLATILE ORGANICS - (ug/l)

PARAMETER (S)	RESULT
1,3-DICHLOROBENZENE	<10
1,4-DICHLOROBENZENE	<10
HEXACHLOROETHANE	<10
BIS(2-CHLOROETHYL)ETHER	<10
1,2-DICHLOROBENZENE	<10
BIS(2-CHL.ISOPROPYL)ETHER	<10
N-NITROSO-DIPROPYLAMINE	<10
NITROBENZENE	<10
HEXACHLOROBUTADIENE	<10
1,2,4-TRICHLOROBENZENE	<10
ISOPHORONE	<10
NAPHTHALENE	<10
BIS(2-CHL.ETHOXY)METHANE	<10
HEXACHLOROCYCLOPENTADIENE	<10
2-CHLORONAPHTHALENE	<10
ACENAPHTHYLENE	<10
ACENAPHTHENE	<10
DIMETHYLPHTHALATE	<10
2,6-DINITROTOLUENE	<10
FLUORENE	<10
4-CHL.PHENYL PHENYLETHER	<10
2,4-DINITROTOLUENE	<10
DIETHYL PHTHALATE	<10
N-NITROSODIPHENYLAMINE	<10
HEXACHLOROBENZENE	<10
4-BROMOPHENYLPHENYLETHER	<10
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYL PHTHALATE	<10
FLUORANTHENE	<10
PYRENE	<10
BUTYL BENZYL PHTHALATE	<10
BIS(2ETHYLHEXYL)PHTHALATE	<10

PARAMETER (S)	RESULT
CHRYSENE	<10
BENZO(A)ANTHRACENE	<10
3,3-DICHLOROBENZIDINE	<20
DI-N-OCTYL PHTHALATE	<10
BENZO(B)FLUORANTHENE	<10
BENZO(K)FLUORANTHENE	<10
BENZO(A)PYRENE	<10
INDENO(1,2,3-C,D)PYRENE	<10
DIBENZO(A,H)ANTHRACENE	<10
BENZO (G,H,I)PERYLENE	<10
2-CHLOROPHENOL	<10
2-NITROPHENOL	<10
PHENOL	<10
2,4-DIMETHYLPHENOL	<10
2,4-DICHLOROPHENOL	<10
2,4,6-TRICHLOROPHENOL	<10
4-CHLORO-3-METHYLPHENOL	<10
2,4-DINITROPHENOL	<50
2-METH.-4,6-DINITROPHENOL	<50
PENTACHLOROPHENOL	<50
4-NITROPHENOL	<50
2-METHYLPHENOL	<10
2,4,5-TRICHLOROPHENOL	<10
BENZOIC ACID	<50
4-METHYLPHENOL	<50
BENZYL ALCOHOL	<10
4-CHLOROANILINE	<10
2-METHYLNAPHTHALENE	<10
2-NITROANILINE	<50
3-NITROANILINE	<50
DIBENZOFURAN	<10
4-NITROANILINE	<50

DATE ISSUED 02/04/91

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Stanley Deacon
LABORATORY DIRECTOR

ORIGINAL

(516)694-3040 FAX:(516)694-4122

LAB NO: 9101018

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: R-1

REMARKS: SFLF SAMPLING

HERBICIDES - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
2,4,-D	<0.2		
2,4,5-TP (SILVEX)	<0.05		

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DATE RUN..... 01/25/91
DATE REPORTED.. 01/28/91

DATE ISSUED 02/04/91

Stanley Pearson
LABORATORY DIRECTOR

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LAB NO: 9101018

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: R-1

REMARKS: SFLF SAMPLING

PESTICIDES AND PCB'S - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
LINDANE	<0.05		
HEPTACHLOR	<0.05		
ALDRIN	<0.05		
HEPTACHLOR EPOXIDE	<0.05		
DIELDRIN	<0.1		
ENDRIN	<0.1		
P,P'DDT	<0.1		
METHOXYCHLOR	<0.5		
TOXAPHENE	<1.0		
CHLORDANE	<0.5		
BETA-BHC	<0.1		
DELTA-BHC	<0.1		
ALPHA-BHC	<0.1		
P,P'-DDD	<0.1		
P,P'-DDE	<0.1		
ENDOSULFAN I	<0.1		
ENDOSULFAN II	<0.1		
ENDOSULFAN SULFATE	<0.1		
ENDRIN ALDEHYDE	<0.1		
O,P DDT	<0.1		
AROCLOR 1016	<0.5		
AROCLOR 1221	<0.5		
AROCLOR 1232	<0.5		
AROCLOR 1242	<0.5		
AROCLOR 1248	<0.5		
AROCLOR 1254	<1.0		
AROCLOR 1260	<1.0		

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Stanley Deaderick
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LAB NO: 9101018

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
ROUTINE

DATE COLLECTED. 01/09/91
DATE RECEIVED.. 01/10/91
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: R-1

REMARKS: SFLF SAMPLING

TCL PURGEABLE ORGANICS - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
CHLOROMETHANE	<10	STYRENE	<5
BROMOMETHANE	<10		
VINYL CHLORIDE	<10		
CHLOROETHANE	<10		
METHYLENE CHLORIDE	<5		
1,1-DICHLOROETHENE	<5		
1,1-DICHLOROETHANE	<5		
C/T-1/2-DICHLOROETHENE	<5		
CHLOROFORM	<5		
1,2-DICHLOROETHANE	<5		
1,1,1-TRICHLOROETHANE	<5		
CARBON TETRACHLORIDE	<5		
BROMODICHLOROMETHANE	<5		
1,2-DICHLOROPROPANE	<5		
TRANS-1,3-DICHLOROPROPENE	<5		
TRICHLOROETHENE	<5		
DIBROMOCHLOROMETHANE	<5		
1,1,2-TRICHLOROETHANE	<5		
CIS-1,3-DICHLOROPROPENE	<5		
BENZENE	<5		
BROMOFORM	<5		
1,1,2,2-TETRACHLOROETHANE	<5		
TETRACHLOROETHENE	<5		
TOLUENE	<5		
CHLOROBENZENE	<5		
ETHYLBENZENE	<5		
XYLENES (TOTAL)	<5		
ACETONE	<10		
2-BUTANONE (MEK)	<10		
4-METHYL-2PENTANONE(MIBK)	<10		
CARBON DISULFIDE	<5		
VINYL ACETATE	<10		
2-HEXANONE	<10		

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Stanley Deutsch
LABORATORY DIRECTOR

ORIGINAL

JAN 29 '91 10:52

H2M LABS, INC.

575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)694-4122

LAB NO: 9016832

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 11/26/90
DATE RECEIVED.. 11/28/90
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: SPRINGS SAMPLE D-3 Mud

REMARKS:

PARAMETER (S)	RESULTS	UNITS
SILVER	<0.01	mg/l
ALUMINUM	62.7	mg/l
ARSENIC	121	ug/l
BORON	<0.1	mg/l
BARIUM	1.0	mg/l
BERYLLIUM	17	ug/l
BOD5	<40	mg/l
CALCIUM	93.2	mg/l
CADMIUM	13	ug/l
CHLORIDE	260	mg/l
CYANIDE	<10	ug/l
COBALT	<0.05	mg/l
COD	80	mg/l
CHROMIUM	0.01	mg/l
COPPER	0.04	mg/l
IRON	95.2	mg/l
TOTAL HARDNESS	367.48	mg/l
MERCURY	2.0	ug/l
POTASSIUM	9.2	mg/l
MAGNESIUM	32.8	mg/l
MANGANESE	3.8	mg/l
SODIUM	152	mg/l
AMMONIA (NH3)	11.2	mg/l
NICKEL	0.07	mg/l
NITRATE (AS N)	18.0	mg/l
LEAD	458	ug/l
TOTAL PHENOLS	30	ug/l
ANTIMONY	<60	ug/l
SELENIUM	<5.0	ug/l
SULFATE	380	mg/l
TOTAL ALKALINITY	740	mg/l
TOTAL DISSOLVED SOLIDS	7358	mg/l
TOTAL KJELDAHL NITROGEN	12.0	mg/l

DATE ISSUED 01/17/91

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Stanley Isaacson
LABORATORY DIRECTOR

HZM LABS, INC.
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LAB NO: 9016832

FANNING, PHILLIPS & MOLNAR
909 MARCONI AVENUE
RONKONKOMA, NY 11779

TYPE..... MISCELLANEOUS LIQUID
SPECIAL

DATE COLLECTED. 11/26/90
DATE RECEIVED.. 11/28/90
COLLECTED BY... CL99
PROJECT NO..... 158-89-05

POINT NO:
LOCATION: SPRINGS SAMPLE ~~D-3~~ mud

REMARKS:

PARAMETER (S)	RESULTS	UNITS
THALLIUM	<10	ug/l
TOTAL ORGANIC CARBON(TOC)	56.0	mg/l
VANADIUM	<0.05	mg/l
ZINC	0.79	mg/l

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Stanley Pearson
LABORATORY DIRECTOR

D-1 145-146 Fine Sand	Quartz 90-95% Feldspar (Na 0-10%) Trace biotite (quite abundant) Trace muscovite Trace magnetite	None
D-1 155-~~56.5~~ 156.5 Fine Sand	Quartz 90-95% (in some cases purple colored) Feldspar (Na,K) 0-10% Trace biotite Trace muscovite Trace amphibole Trace magnetite Trace garnet	Rare subrounded quartz. ~~(time guard).~~
D-1 160-161.5 Fine Sand	Quartz Feldspar (K,Na) 5-15% Trace muscovite (up to 1%) Trace biotite Trace magnetite Trace garnet (red-brown) Trace amphibole	Dominantly subrounded to rounded mostly white (also light brown, gray); also subangular white to pink granite clasts.
D-1 165-166.5 Fine Sand	Quartz 90-95% Feldspar (K,Na) 5-10% Muscovite 0-1% Biotite (some chloritized) 0-1% Trace magnetite Trace red-brown garnet Trace amphibole	None
D-1 170-171 Fine Sand	Quartz 90-95% Feldspar (sodium feldspar dominant) 5-10% Trace amphibole (pyroxene) Trace biotite Trace red-brown garnet Trace epidote Trace muscovite Trace magnetite (quite abundant)	None
D-1 180-181.5 Fine Silty Sand	Quartz 85-95% Feldspar 0-10% Biotite 0-1% Trace amphibole (pyroxene) Trace garnet Trace muscovite Trace magnetite	None

MINERALOGY OF SELECTED SPLIT SPOON SAMPLES
SPRINGS-FIREPLACE ROAD LANDFILL

SAMPLE	MINERALOGY	CLASTS
D-1 60-61.5 Medium Sand	Quartz - 90-95% Feldspar(K,Na)0-10% Trace amphibole (pyroxene) Trace biotite Trace magnetite Trace muscovite	Subrounded white to yellow quartz (dominant) fine-grained black dioritic clast.
D-1 75-76.5 Fine Sand	Quartz 90-95% Feldspar (K,Na) 5% Trace muscovite Trace amphibole (pyroxene) Trace magnetite	White subrounded to subangular quartz dominate.
D-1 90-91 Medium Sand	Quartz 90-95% Feldspar(K) 0-10% Muscovite 0-1% Trace amphibole (pyroxene) Trace biotite Trace magnetite	Subrounded to subangular white quartz (also light brown),fine-grained white granite.
D-1 110-111 Gravel	Quartz 90-95% Feldspar (K) 5-10% Trace muscovite Trace biotite Trace magnetite	Gravel dominantly white subrounded to rounded quartz (also light brown).
D-1 125-126.5 Fine Sand	Quartz 90-95% Feldspar (K,Na) 0-10% Trace biotite (maybe up to 1%) Trace amphibole (pyroxene) Trace muscovite Trace red-brown garnet Trace magnetite	
D-1 130-131.5 Fine Sand	Quartz 90-95% Feldspar (K,Na) 0-10% Trace biotite (may contain slightly more biotite than usual) Trace muscovite Chloritized biotite Trace amphibole (pyroxene) Trace magnetite	Subangular fine-grained black mafic.

D-1 197-198.3 Fine Sand	Quartz 85-95% Feldspar (Na) 5-15% Muscovite 2-3% Biotite 0-1% (some chloritized) Trace garnet Trace magnetite	Subangular white quartz.
D-2 80-81.5 Medium Sand	Quartz 90-95% Feldspar (K,Na) 0-5% Trace garnet Trace biotite Trace amphibole (pyroxene) Trace magnetite	Subangular to subrounded, dominantly quartz, also subangular K-feldspar (granitic), quartzite.
D-2 85-86.5 Medium Sand	Quartz 90-95% Feldspar(K,Na) 5% Trace garnet Trace amphibole (pyroxene) Trace biotite Trace muscovite Trace magnetite	Dominantly subrounded to subangular quartz, flat fine-grained mafic clast, subrounded K-feldspar clast.
D-2 95-95.8 Medium Sand	Quartz 90-95% Feldspar (K,Na) 0-5% Trace amphibole Trace biotite Trace magnetite Trace epidote	Rare subrounded quartz.
D-2 105-106.5 Gravel		Subrounded to subangular quartz dominant also subrounded granitic and some fine-grained dark clasts.
D-2 118-119.5 Fine Sand	Quartz 90-95% Feldspar (K,Na) 0-5% Trace muscovite Trace biotite Trace garnet Trace amphibole Trace magnetite	Subrounded to subangular quartz.
D-2 140-141.5 Fine Sand	Quartz 90-95% Feldspar (K,Na) 0-5% 0-1% muscovite Trace chlorite Trace biotite Trace amphibole Trace magnetite	Rare subrounded to subangular quartz

D-2 155-156 Fine Silty Sand	Quartz 90-95% Feldspar (Na) 0-10% Biotite 1-2% Trace magnetite	Rare
D-2 175-176.5 Fine Sand	Quartz 90-95% Feldspar (Na,K) 0-10% Trace muscovite Trace amphibole Trace epidote Trace garnet Trace magnetite	Rare subangular quartz and granitic (mostly feldspar).
D-2 185-186 Fine Sand	Quartz 90-95% Feldspar (Na, K) 5-10% Amphibole 0-1% Trace biotite Trace red-brown garnet Trace magnetite	Predominantly subrounded to subangular white quartz also are flat fine-grained mafic clasts.
D-2 190-191.5 Fine Sand	Quartz 90-95% Feldspar 0-10% Muscovite 2-3% Trace biotite Trace amphibole Trace magnetite	Rare subrounded to subangular quartz clasts.
D-2 190-191.5 Fine Sand	Quartz 85-95% Feldspar 0-10% Biotite 3-5% Muscovite 1-3% Trace garnet Trace magnetite	
D-2 215-216.4 Fine Sand	Quartz 90-95% Feldspar 0-10% Muscovite 1-3% Biotite 1-3% Trace magnetite (very little) Trace amphibole (pyroxene)	
D-3 100-101.5 Medium/Fine Sand	90-95% quartz 5-10% feldspar Trace biotite Trace muscovite Trace magnetite 0-1% amphibole (pyroxene) Trace garnet	Subrounded predominantly quartz also garnet~~itours~~ grains metamorphic.

D-3 105-106.5 Medium Sand	90-95% quartz 5-10% feldspar Trace muscovite Trace biotite Trace amphibole (pyroxene) Trace garnet Trace pyrite ?	Subrounded (dominant) to subangular quartz clasts also garnetferous metamorphic clasts.
D-3 115-116.5 Medium Sand	90-95% quartz 5-10% feldspar Trace magnetite Trace garnet Trace amphibole (pyroxene) Trace biotite	Subrounded to subangular predominantly quartz also granitic.
D-3 120-121.5 Medium Sand	90-95% quartz 5-10% feldspar Trace magnetite Trace biotite Trace muscovite Trace garnet Trace amphibole (pyroxene)	Subrounded to subangular predominantly quartz, also ~~figure~~ fine-grained granitic.
D-3 125-127.5 Medium/Fine Sand	Quartz 90-95% Feldspar 0-10% Trace magnetite Trace garnet Trace amphibole (pyroxene) Trace muscovite	Subangular to subrounded predominantly quartz, also granitic.
D-3 130-131.5 Medium Sand	Quartz 90-95% Feldspar 0-10% Magnetite trace Trace biotite Trace muscovite Trace garnet	Subangular to subrounded predominantly quartz.
D-3 135-137.5 Medium Sand	Quartz 90-95% Feldspar (K, Na) 0-10% Trace magnetite Trace biotite Trace muscovite Trace garnet Trace amphibole (pyroxene)	Subrounded to angular mixture of quartz, granitic and probable fine-grained metamorphic clasts, some are flat.
D-3 140-141.5 Medium Sand	Quartz 90-95% Feldspar (Na,K) 0-10% Trace muscovite Trace garnet Trace biotite Trace magnetite Trace amphibole	Rare subrounded quartz.

D-3 145-146.5 Fine Sand	Quartz 90-95% Feldspar 0-10% Trace amphibole Trace muscovite Trace garnet Trace magnetite	Broken quartz fragments.
D-3 155-156.5 Fine Sand	Quartz 90-95% Feldspar (K,Na) 0-10% Trace muscovite Trace biotite Trace amphibole (pyroxene) Trace magnetite	Subrounded to rounded quartz clasts.
D-3 165-166.5 Fine Sand	Quartz 90-95% Feldspar (K) 0-10% Trace muscovite Trace magnetite Trace amphibole (pyroxene) Trace biotite Trace garnet Trace epidote	Rare subrounded to rounded quartz.
D-3 170-171.5 Fine Sand	Quartz 90-95% Feldspar 0-10% Muscovite 0-1% Trace biotite Trace magnetite Trace garnet	Subrounded to rounded quartz clasts.
D-3 175-176.5 Fine Sand	Quartz 90-95% Feldspar (K, Na) 0-10% Biotite 0-1% Trace muscovite Trace magnetite Trace garnet Trace amphibole (pyroxene)	Rare subrounded to subangular quartz.
D-3 180-181.5 Fine Sand	Quartz 90-95% Feldspar (K, Na) 0-10% Trace biotite Trace magnetite Trace muscovite Trace amphibole (pyroxene) Trace garnet	Rare subrounded quartz clasts.
D-3 185-186 Fine Sand	Quartz 90-95% Feldspar (K, Na) 0-10% Trace biotite Trace garnet Trace muscovite	Subrounded quartz clasts dominate.

D-3 190-191.5 Fine Sand	Quartz 90-95% Feldspar (K) 0-10% Trace garnet Trace biotite Trace muscovite Trace magnetite Trace amphibole (pyroxene)	Rare subrounded to subangular quartz and granite clasts.
D-3 195-196.5 Fine Sand	Quartz 90-95% Feldspar (Na) 5-10% Trace amphibole (pyroxene) Trace muscovite Trace garnet Epidote ? Trace magnetite (elongate fragments up to 3 to 4 mm of crystal)	Rare subrounded quartz clasts.
D-3 200-201.5 Fine Sand	Quartz 90-95% Feldspar (K, Na) 0-10% Trace biotite Trace garnet Trace amphibole (pyroxene) Trace muscovite Trace magnetite Trace epidote	Rare
D-3 205-205.7 Fine Sand	Quartz 90-95% Feldspar (Na, K) 5-10% Trace biotite Trace garnet Trace magnetite Trace amphibole (pyroxene)	Subangular quartz clasts.
D-3 210-211.5 Fine Sand	Quartz 90-95% Feldspar (K) 0-10% 1-2% biotite 0-1% muscovite Trace garnet Trace magnetite	
D-3 215-216.5 Fine Sand	Quartz 90-95% Feldspar (Na) 0-10% Trace muscovite Trace biotite Trace garnet (relatively abundant) Trace magnetite	

D-3 220-221.5 Fine silty sand	Quartz 90-95% Feldspar 0-10% Trace biotite Trace muscovite Trace magnetite Trace garnet	No clasts
D-3 225-225.9 Fine Silty Sand	Quartz 90-95% Feldspar 0-10% Biotite 0-1% Trace muscovite Trace amphibole (pyroxene) Trace magnetite	No clasts
D-3 225-225.9 Fine Sand	Quartz 90-95% Feldspar 5-10% Trace biotite Trace amphibole (pyroxene) Trace muscovite Trace garnet Trace magnetite (including elongate crystals up to 5-6 mm)	
D-4 70-71.5 Medium Sand	Quartz 90-95% Feldspar (K, Na) 5-10% Trace biotite Trace magnetite Trace muscovite Trace amphibole (pyroxene) Trace garnet	Dominantly subrounded to subangular white (also gray and light brown) quartz, also subrounded pink granite and probable garnetiferous metamorphic clasts.
D-4 80-81.5 Coarse Sand	Quartz 90-95% Feldspar (Na, K) 5-10% Trace amphibole (pyroxene) Trace magnetite (including elongated crystals 3-4 mm long) Trace red-brown garnet Trace muscovite Trace biotite	Subrounded to subangular white quartz, also sub-angular granite and probable metamorphic clasts.
D-4 95-96.5 Medium Sand	Quartz 90-95% (some rose or purple quartz) Feldspar (Na, K) 5-10% Trace amphibole (pyroxene) Trace red-brown garnet Trace biotite Trace magnetite	Subrounded white to light brown quartz dominates, also fine-grained gray flattened clasts (igneous).

D-4 100-101.5 Medium Sand	Quartz 90-95% Feldspar (K, Na) 5-10% Trace biotite Trace muscovite Trace red-brown garnet Trace amphibole (pyroxene) Trace magnetite	Subrounded to subangular white quartz, also granitic and fine matic to intermediate (plagioclase phenocrysts) volcanic
D-4 110-111 Gravel	Quartz 90-95% Feldspar (Na) 0-10% Trace magnetite Trace muscovite Trace biotite	Dominantly subrounded to subangular white (also light brown, gray) quartz, also subrounded to subangular granitic and diorite clasts, probable metamorphic clasts.
D-4 120-121.5 Medium Sand	Quartz 90-95% (some rose or purple colored) Feldspar (Na, K) 5-10% Trace biotite Trace muscovite Trace magnetite Trace amphibole (pyroxene)	Rare quartz
D-4 135-136.5 Fine Sand	Quartz 90-95% Feldspar (Dominantly Na) 5-10% Muscovite 0-1% Biotite 0-1% Chlorite Trace amphibole (pyroxene) Magnetite	None
D-4 145-146 Fine Sand	Quartz 90-95% Feldspar (Dominantly Na) 5-10% Trace biotite Trace magnetite Amphibole (pyroxene) 0-1% Trace garnet	None
D-4 155-156 Fine Sand	Quartz (includes rose or purple quartz) 90-95% Feldspar (Na, dominant, K) 5-10% Trace biotite Trace amphibole (pyroxene) Trace muscovite Trace magnetite	Rare subangular white or brown quartz
D-4 160-161.5 Medium Sand	Quartz 90-95% Feldspar (Na, K) 5-10% Trace muscovite Trace biotite (chloritized) Trace amphibole (pyroxene) Trace magnetite	Subrounded to subangular white quartz, also a subrounded granite and probable metamorphic clasts.

D-4 170-171.3 Fine Sand	Quartz (some rose quartz) 90-95% Feldspar (Na, K) 5-10% Trace muscovite Trace biotite (chloritized) Trace red-brown garnet Trace amphibole (pyroxene) Trace magnetite	Rare quartz clasts.
D-4 180-181 Fine Sand	Quartz 90-95% Feldspar (Na, K) 0-10% Muscovite 1-2% Biotite (chloritized) 0-1% Trace amphibole (pyroxene) Trace magnetite	None
D-4 190-191.5 Fine Silty Sand	Quartz 85-95% Feldspar 0-10% Biotite 1-2% Muscovite 1% Trace magnetite	None
D-4 200-201.5 Fine Silty Sand	Quartz 80-90% Feldspar (Na, K) 0-10% Biotite 1-2% Trace chlorite Muscovite 0-1% Trace magnetite Trace amphibole (pyroxene) Trace garnet	None
D-4 205-206 Fine Sand	Quartz 80-90% Feldspar (K, Na) 0-10% Muscovite 3-5% Biotite 1-3% Trace amphibole (pyroxene) Trace red-brown garnet Trace magnetite	None
D-4 210-210.9 Medium Sand	Quartz 80-90% Feldspar (Na, dominant, K) 5-15% Trace muscovite Trace red-brown garnet Trace amphibole (pyroxene) Trace biotite Trace magnetite	Rare subangular white quartz, probable feldspar.

S-5 73-74.5 Fine Sand	Quartz 90-95% Feldspar (Na, K) 1-10% Trace muscovite Trace biotite Trace garnet Trace magnetite	No large clasts with only rare small quartz clasts.
S-6 75-76 Fine Sand	Quartz 85-95% Feldspar (K, Na) 5-15% Trace biotite (chloritized) Trace muscovite Trace magnetite Trace amphibole (pyroxene)	Rare subrounded to subangular quartz clasts.
S-6 81-81.75 Medium Sand	Quartz (some purple) 85-95% Feldspar (K, Na) 5-15% Trace muscovite Trace magnetite Trace biotite Trace amphibole (pyroxene)	Subrounded to subangular quartz, feldspar and fine-grained mafic clasts.
S-6 86-86.7 Medium Sand	Quartz (some purple) 90-95% Feldspar (Na, K) 5-10% Trace muscovite Trace biotite Trace garnet Trace magnetite Trace amphibole (pyroxene)	No large clasts.

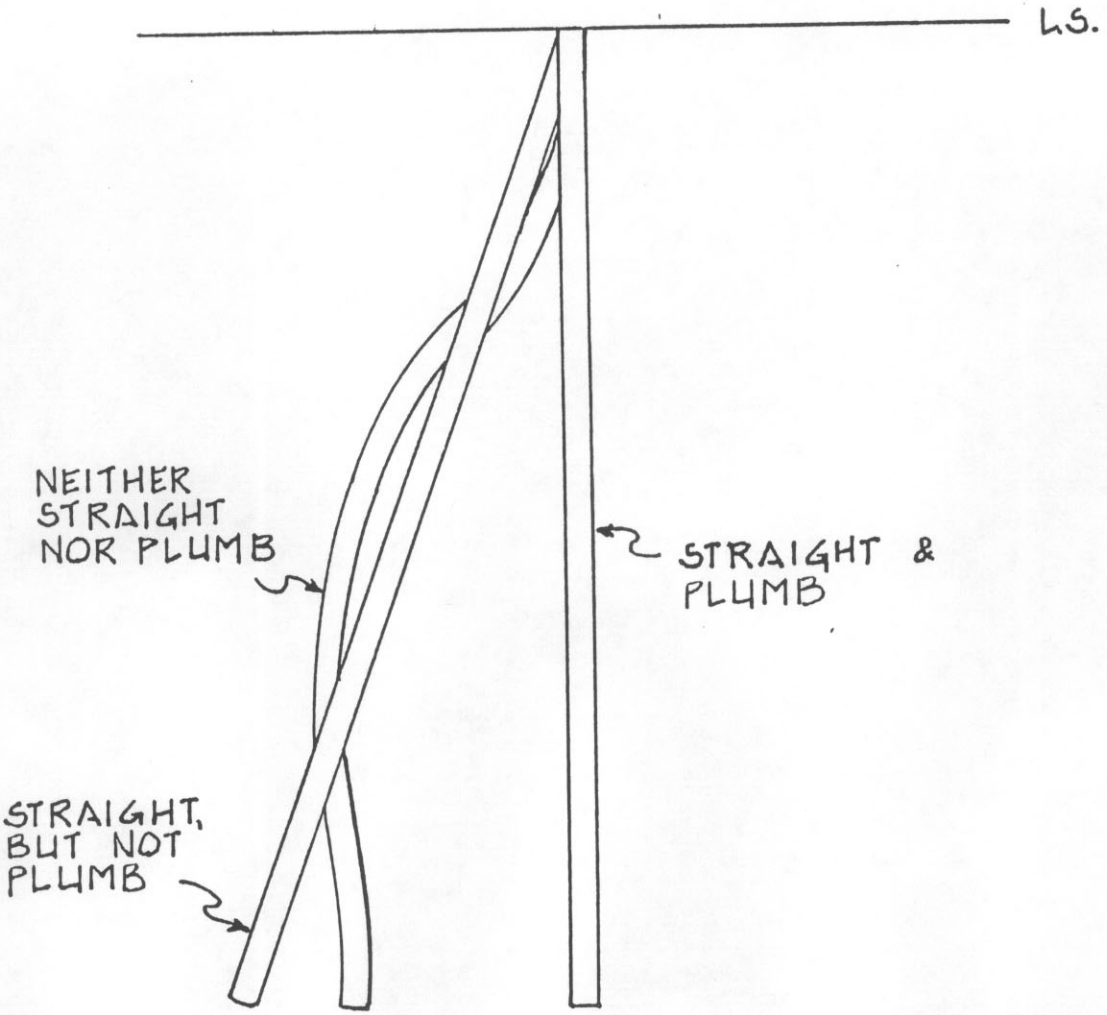
APPENDIX H

PLUMBNESS AND STRAIGHTNESS MEASUREMENTS OF GROUNDWATER MONITORING WELLS

Plumbness measurements are performed on groundwater monitoring wells to determine deviation of a well from an imaginary vertical line which extends from the point where the well intersects the land surface to the center of the earth. Any deviation from vertical will increase the length of well pipe needed to intersect the water table which will increase the measured depth to water and, consequently, introduce error into water table elevation calculations. Straightness is measured to determine if a well contains a bend which, if sufficiently large, will not allow downhole equipment (such as submersible pumps and bailers) to reach the proper depth.

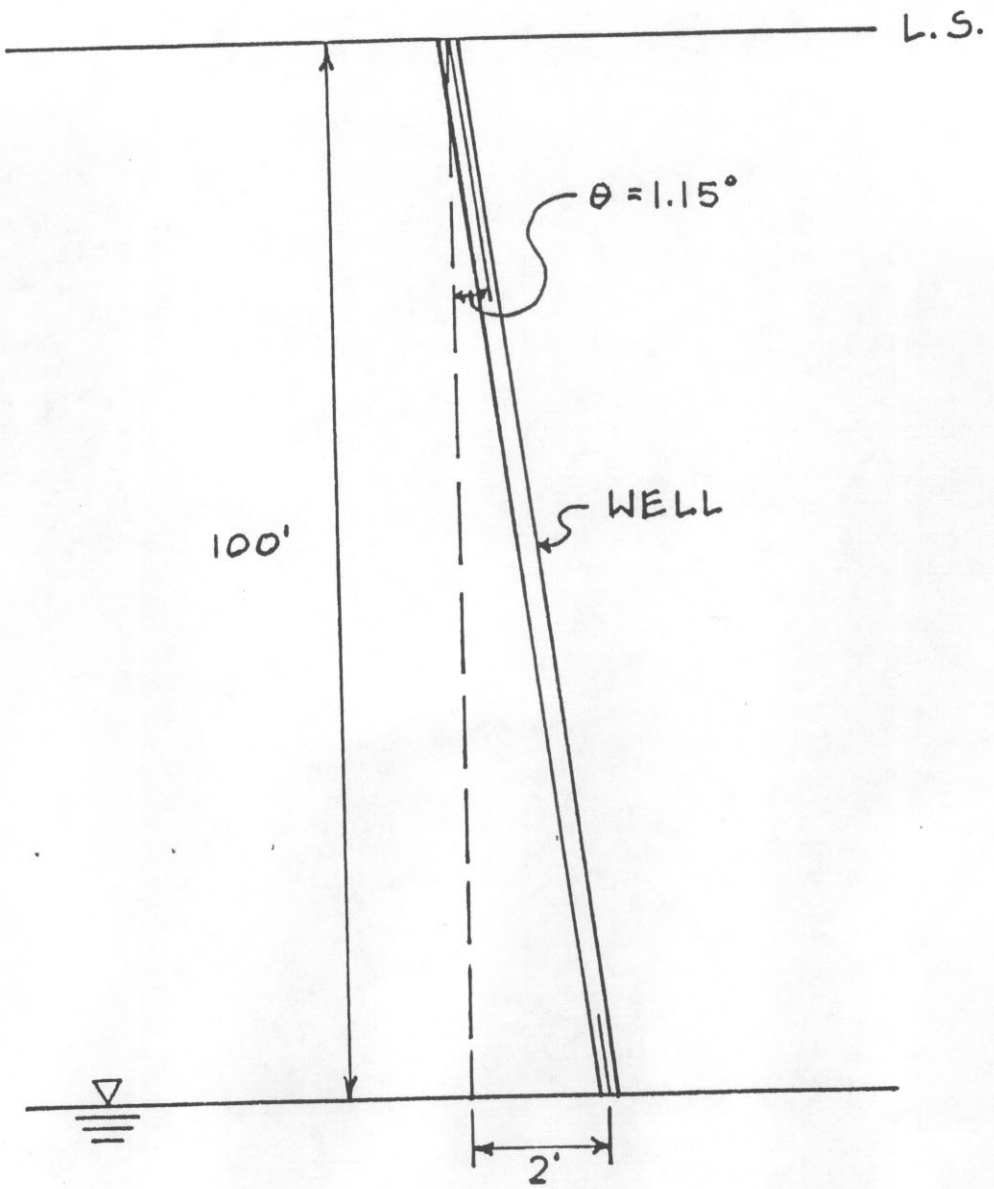
Ideally, a well should be both straight and plumb. If a well is not straight, it cannot be plumb. However, a well may be straight and yet not plumb (see Figure 1).

To illustrate the error in water table elevation measurement that may be introduced by not considering plumbness, consider a well drilled in an area where the true depth to water is 100 foot and the well has been drilled straight but deviates from vertical such that at the water table, a 2-foot deviation from vertical occurs (see Figure 2). For this well, a 2-foot deviation is caused by drilling a borehole at an angle of 1.15 degrees off plumb. As a result of this deviation, the well installed in this borehole must travel an additional 0.02 feet before intersecting the water table (calculated by utilizing the Pythagorean theorem). Therefore, this 0.02 feet represents an inherent measurement error. If the well deviation is investigated and known prior to obtaining depth-to-water measurements,


L.S.
NEITHER STRAIGHT NOR PLUMB
STRAIGHT & PLUMB
STRAIGHT, BUT NOT PLUMB

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FIGURE 1



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FIGURE 2

the accuracy of the measurement can be increased by adding 0.02 feet to the water table elevation.

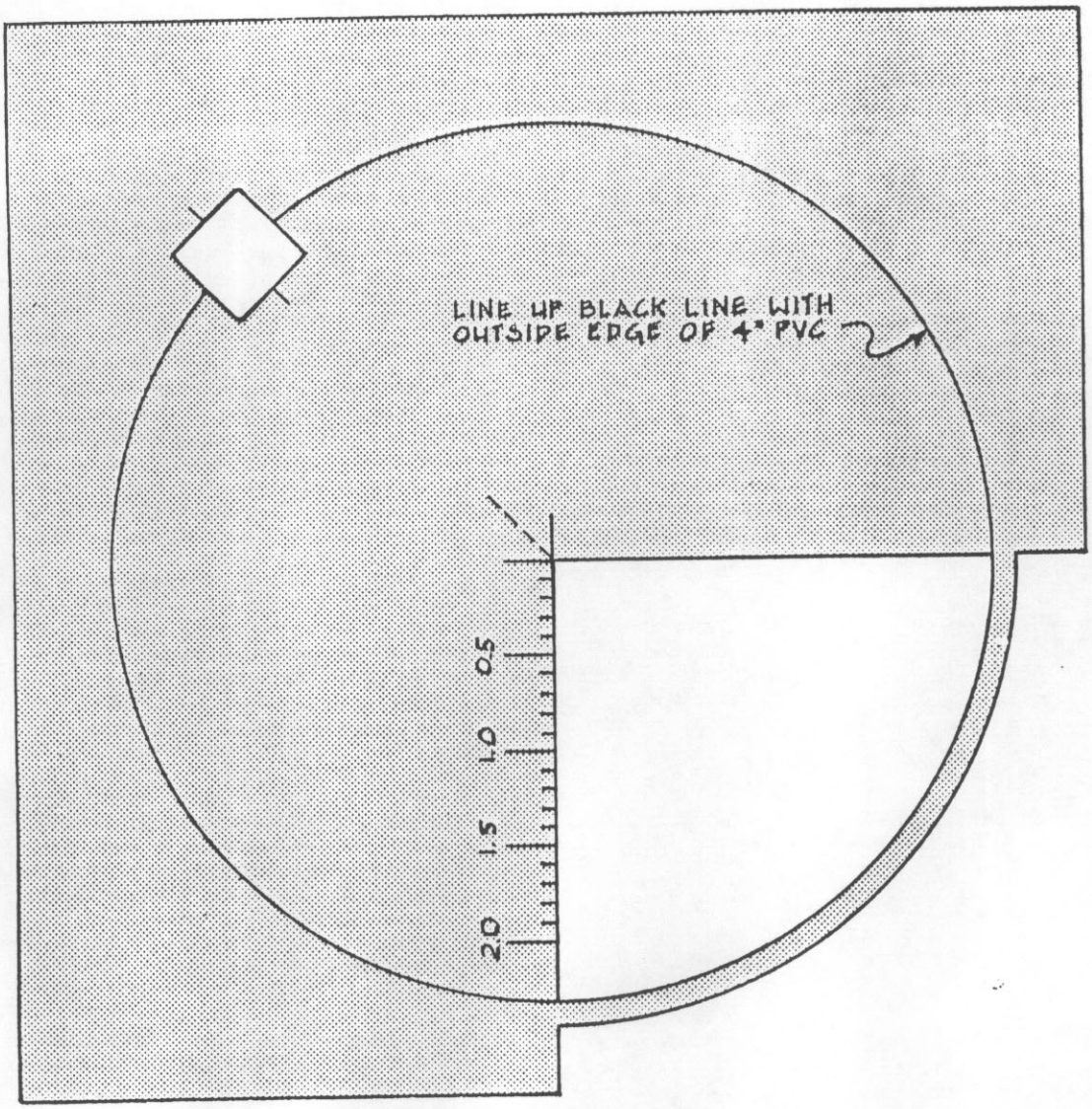
Most water table elevations are measured to the nearest 0.01 foot and in areas where the hydraulic gradient is small, water table measurement errors resulting from plumbness deviations can considerably alter results and lead to erroneous groundwater flow direction determinations.

Simple methods can be employed to increase the accuracy of depth-to-water measurements (plumbness determination) and determine if a well is straight.

The method for plumbness measurement consists of utilizing a plumb bob, a line attached to the plumb bob graduated in 10-foot increments, a tripod (which need not consist of anything more complex than three reasonably-rigid strips of wood joined at the top with screws), and a plumbness deviation disc (see Figure 3).

The plumbness deviation disc is placed over the well and aligned so that the arrow which indicates the center of the disc also marks the center of the well pipe. The tripod is then placed over the disc and the plumb bob is aligned over the disc's center with a roughly 2 to 3 foot distance (the exact distance must be measured and recorded) between the top of the disc and the point on the tripod from which the plumb bob is suspended.

Now that all components are aligned, the plumb bob is lowered into the well at 10 foot increments through the open wedge portion of the disc. At each increment, the disc is rotated about the well casing edge until the plumb bob line rests against the graduated edge of the open wedge portion of the disc and the value is recorded. The



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FIGURE 3 – PLUMBNESS DEVIATION DISC

values are recorded for all increments until the water table is reached (it is not necessary to obtain measurements beyond the water table as deviation beyond the water table will not affect water table measurement accuracy).

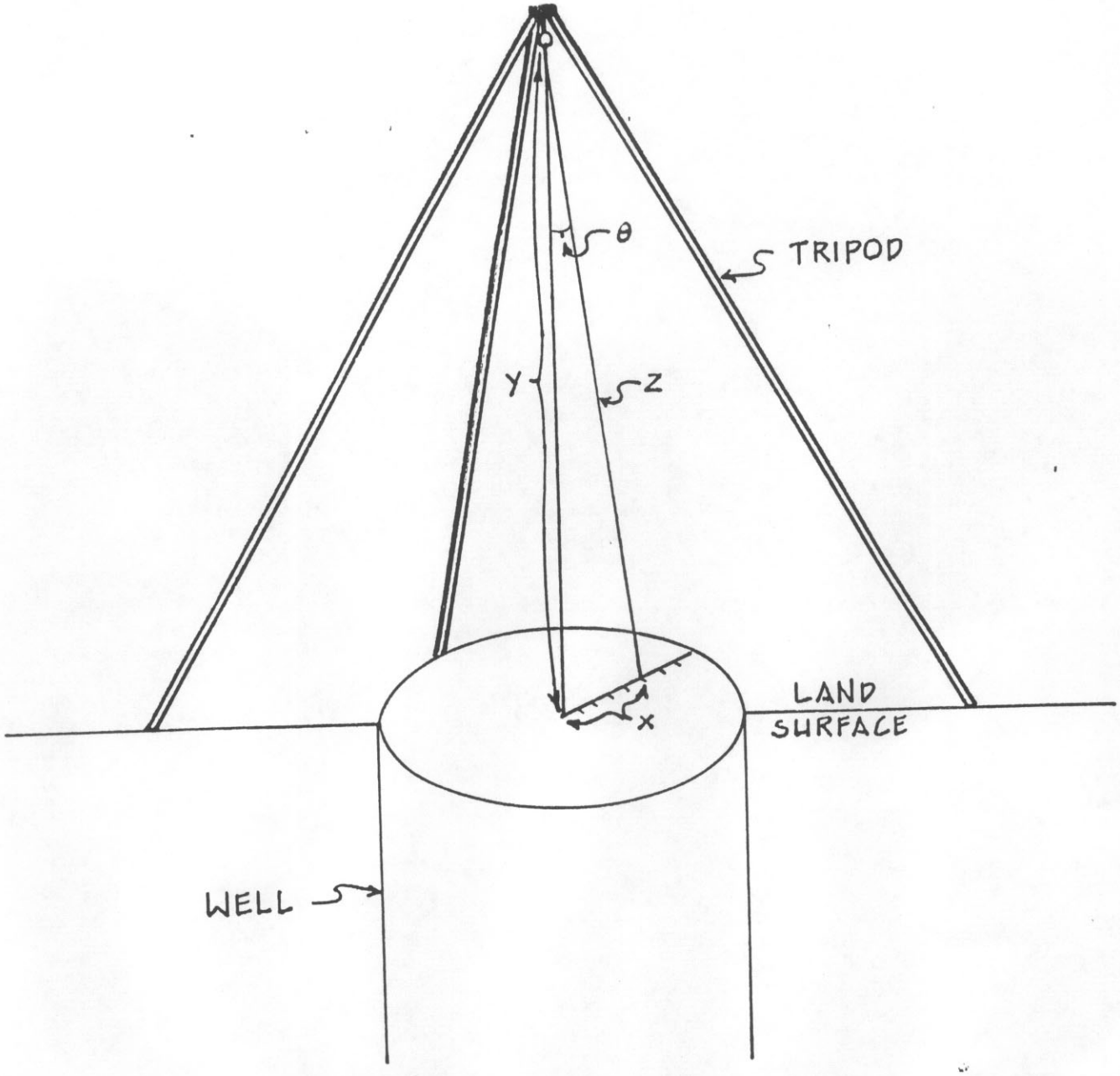
The limitation of this method is that if a well is not plumb, the plumb bob and disc will usually achieve a maximum-measurable deviation and at some point above the water table the method will not measure deviations beyond this point.

This method makes the assumption that where the deviation is at a maximum, the well will continue down to the water table at the same angle of deviation which will improve the accuracy of the true depth to water (compared to no plumbness correction), but may not be the actual depth to water. However, if the non-plumb well is also straight, then the measurements will be accurate to the water table.

Once the deviation vs. depth has been plotted, the maximum deviation is obtained. Generally, the maximum deviation is obtained after three consecutive steady readings are obtained following a rise in deviation. The magnitude of the maximum deviation is a function of the depth at which the maximum occurred and the degree to which the well is off plumb.

To calculate the estimated deviation from plumb at the water table, the angle of deviation must be derived from the right triangle above the well formed by the distance from the point of plumb bob suspension to the disc (height) and the deviation from vertical (base) (see Figure 4).

Using the relationship that the $\tan \theta = x/y$, the angle is derived. Then applying the rule of similar triangles, the y value is



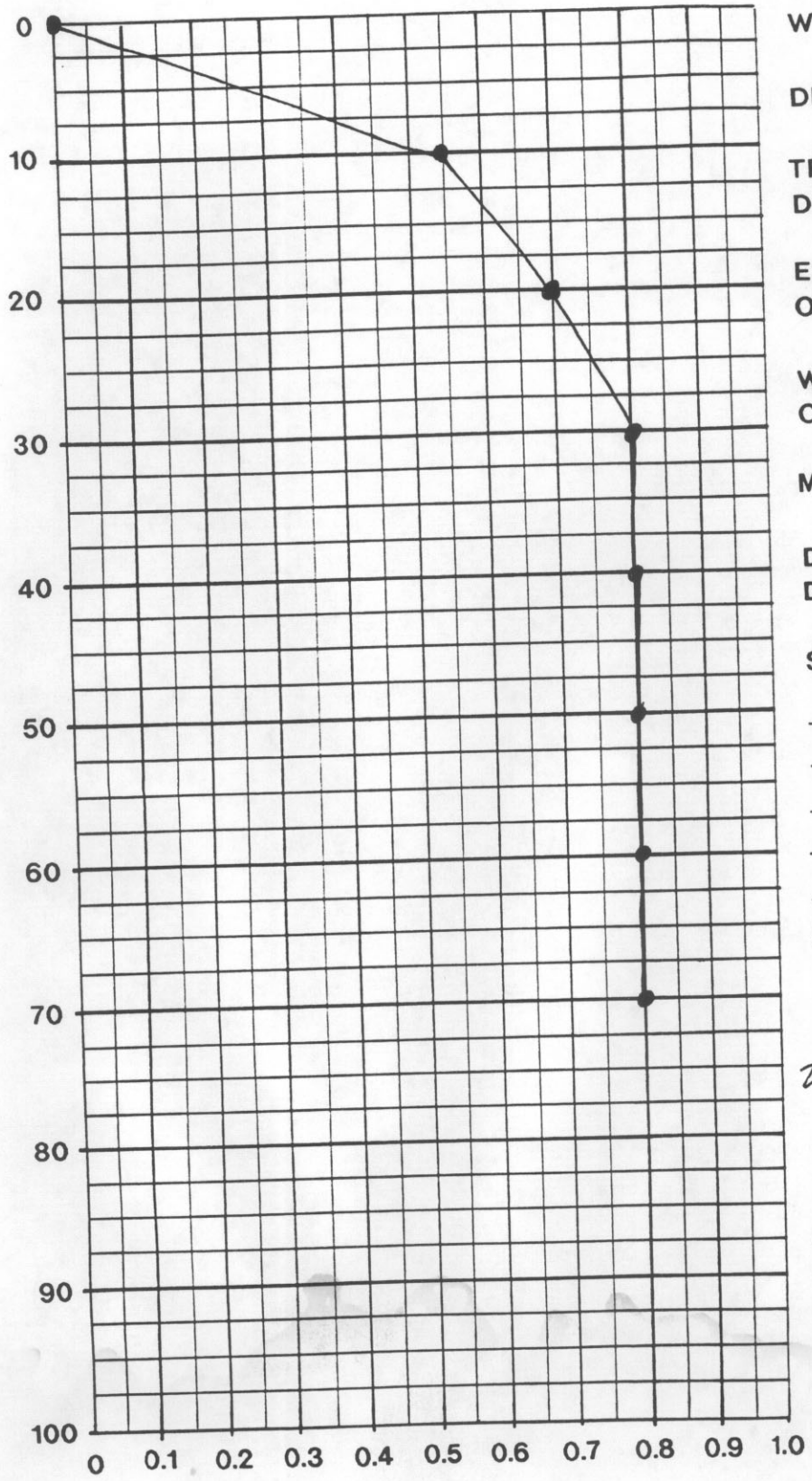
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FIGURE 4

replaced with the measured depth to water and the cos θ is used to obtain the value of the hypotenuse which represents the estimated length of the well. The y value is then subtracted from the hypotenuse value which equals the correction factor (which is the extra distance the well travels when it deviates from vertical). Finally, this value is added to the water table elevation values.

To determine straightness, traditionally, a straight pipe has been lowered into the well and if the straight pipe could not advance down the well, the well was considered not straight. However, this method is limited, for practical reasons, to shallow wells. An alternative method can be used which utilizes illumination-signal water level indicators, altered to illuminate constantly. Lowered into a four-inch well on a graduated tape, this light can be discerned to depths of roughly 75 feet (deeper in low ambient light). A bend in the well will be apparent as the circular illuminated area will begin to wane as it is eclipsed by the bend. At the point where the light is totally eclipsed, the well is now considered non-straight as it has a bend greater than four inches (in a four-inch well). A straight well will have visible illumination down to the water table.

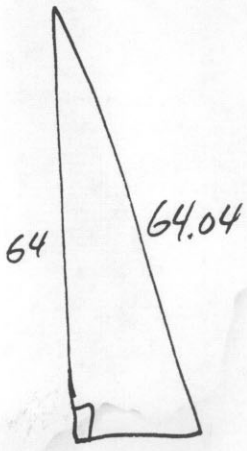
WELL PLUMBNESS DATA



WELL NUMBER	S-1
DEPTH TO WATER	64'
TRIPOD TO CASING DISTANCE	2.01'
ESTIMATED ANGLE OF DEVIATION	1.91°
WATER TABLE CORRECTION FACTOR	Elev. +0.04'
MAXIMUM DEVIATION	0.08"
DEPTH OF MAX. DEVIATION	30'

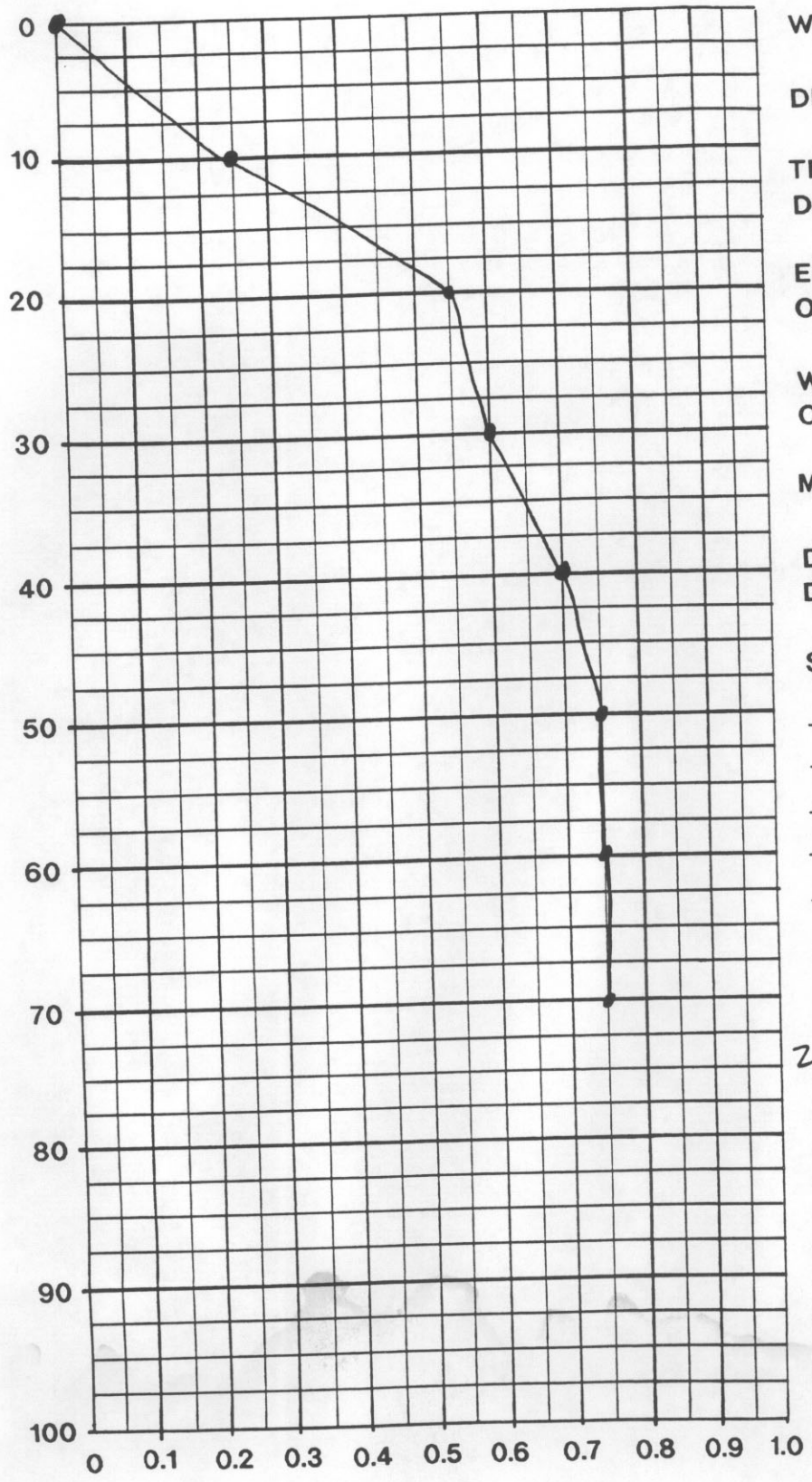
STRAIGHTNESS COMMENTS:
Straight to 45'





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WELL PLUMBNESS DATA



WELL NUMBER: S-2

DEPTH TO WATER: 79'

TRIPOD TO CASING DISTANCE: 2.19'

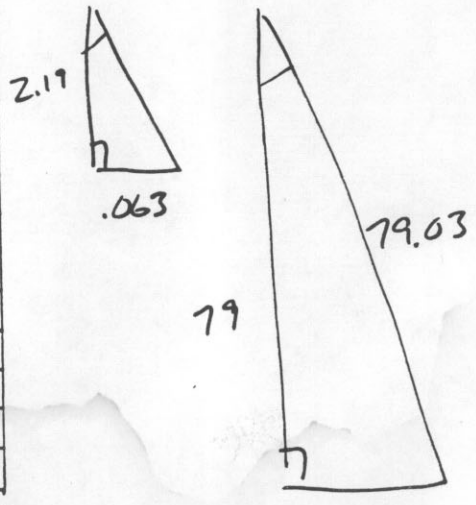
ESTIMATED ANGLE OF DEVIATION: 1.65°

WATER TABLE CORRECTION FACTOR: Elev. +0.03'

MAXIMUM DEVIATION: 0.75

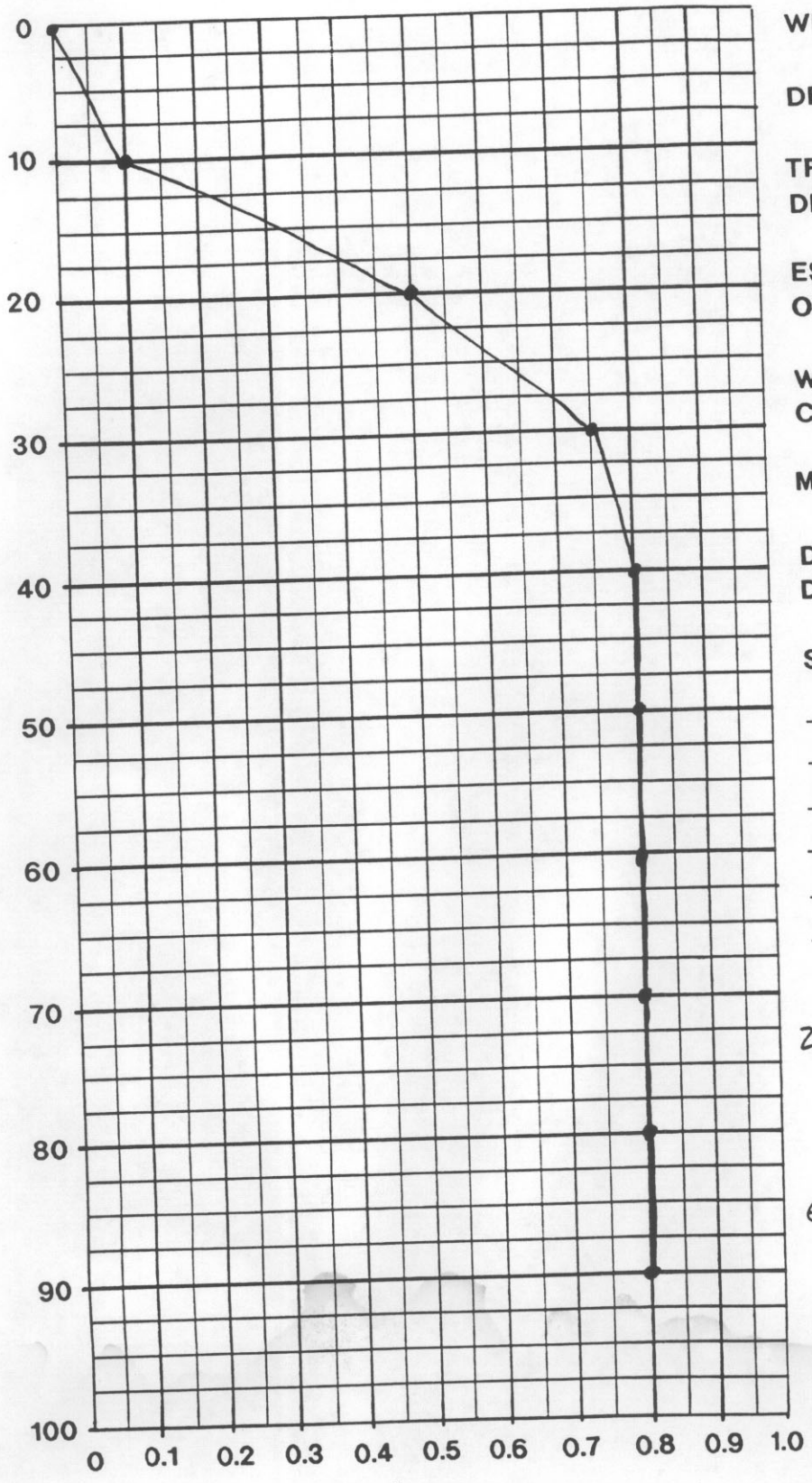
DEPTH OF MAX. DEVIATION: 50'

STRAIGHTNESS COMMENTS:
Straight to 55'



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WELL PLUMBNESS DATA



WELL NUMBER: S-3

DEPTH TO WATER: 100

TRIPOD TO CASING DISTANCE: 2.75'

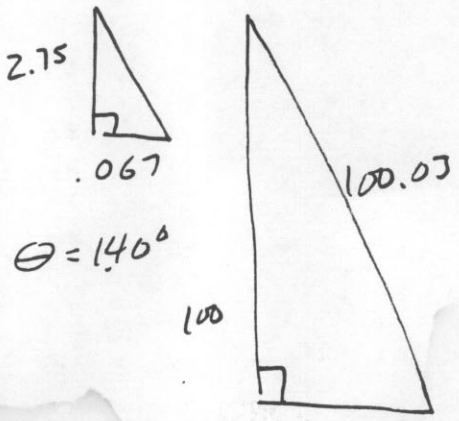
ESTIMATED ANGLE OF DEVIATION: 1.40°

WATER TABLE CORRECTION FACTOR: Elev. +0.03

MAXIMUM DEVIATION: 0.8"

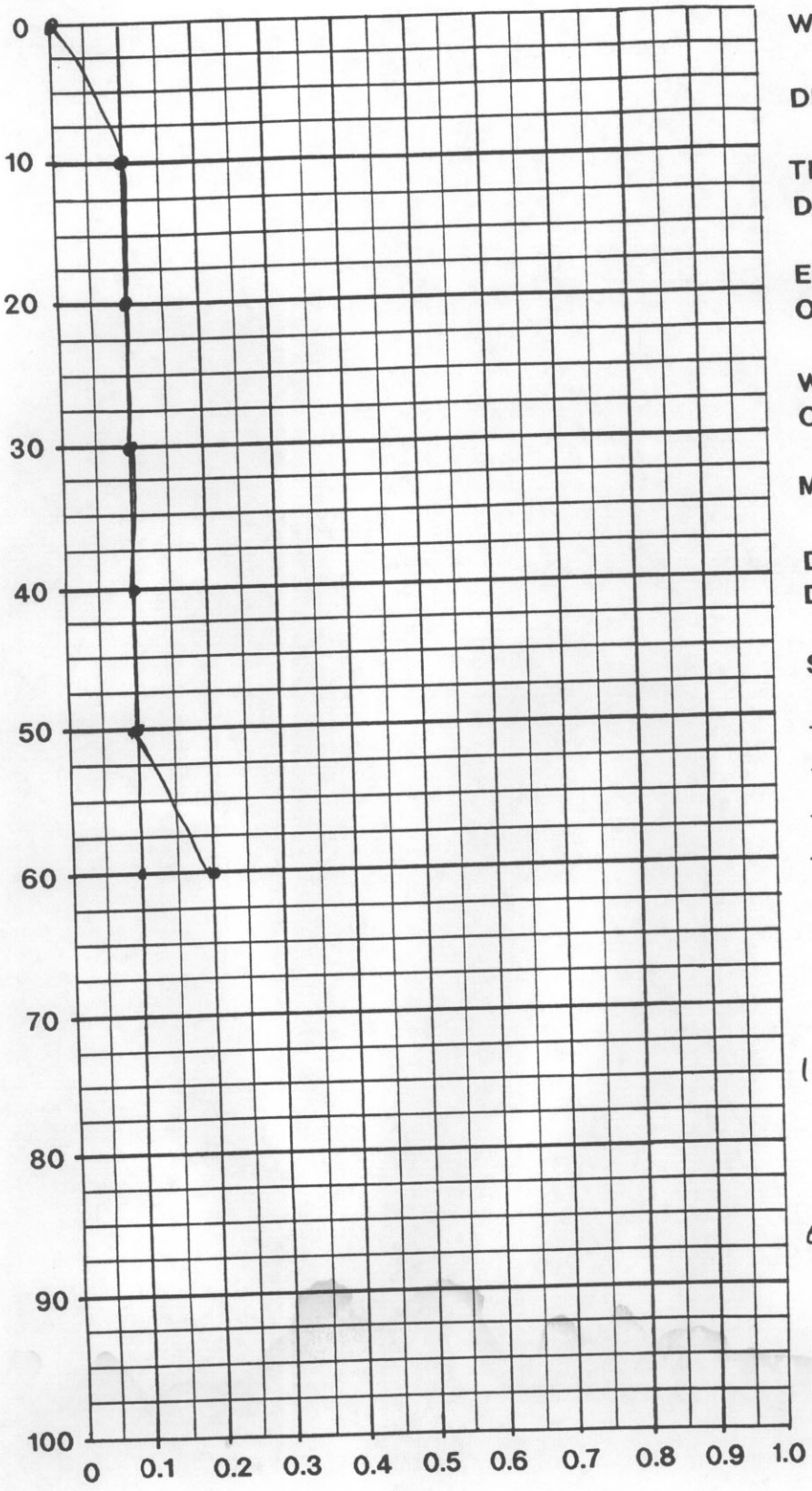
DEPTH OF MAX. DEVIATION: 40'

STRAIGHTNESS COMMENTS:
Straight to 38'



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WELL PLUMBNESS DATA



WELL NUMBER: S-4

DEPTH TO WATER: 68'

TRIPOD TO CASING DISTANCE: 1.92'

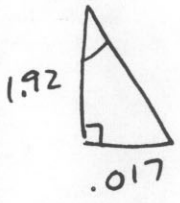
ESTIMATED ANGLE OF DEVIATION: 0.51°

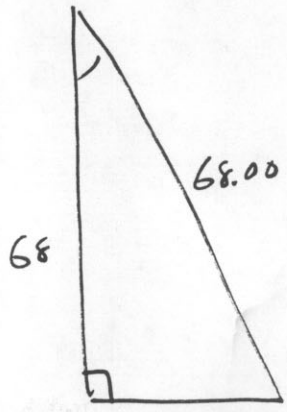
WATER TABLE CORRECTION FACTOR: 0

MAXIMUM DEVIATION: 0.2"

DEPTH OF MAX. DEVIATION: 60

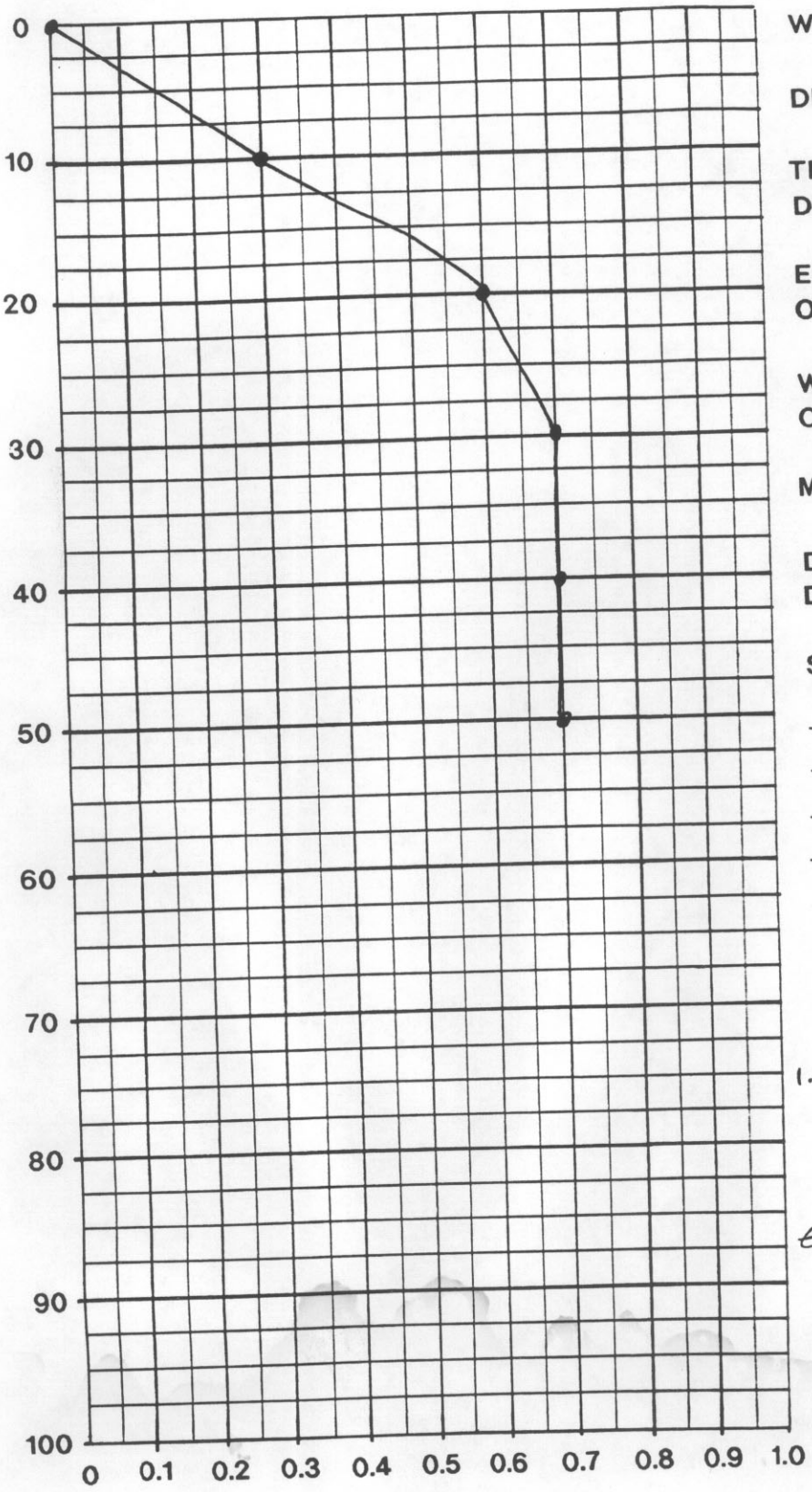
STRAIGHTNESS COMMENTS:
Straight to Water Table
68'





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WELL PLUMBNESS DATA



WELL NUMBER: S-5

DEPTH TO WATER: 76'

TRIPOD TO CASING DISTANCE: 1.23'

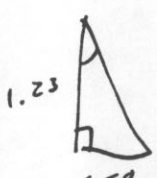
ESTIMATED ANGLE OF DEVIATION: 2.70°

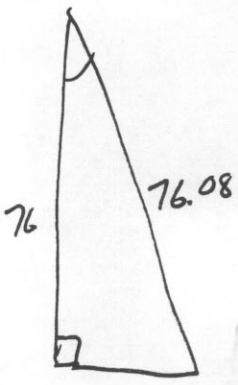
WATER TABLE CORRECTION FACTOR: Elev. +0.08

MAXIMUM DEVIATION: 0.7"

DEPTH OF MAX. DEVIATION: 36'

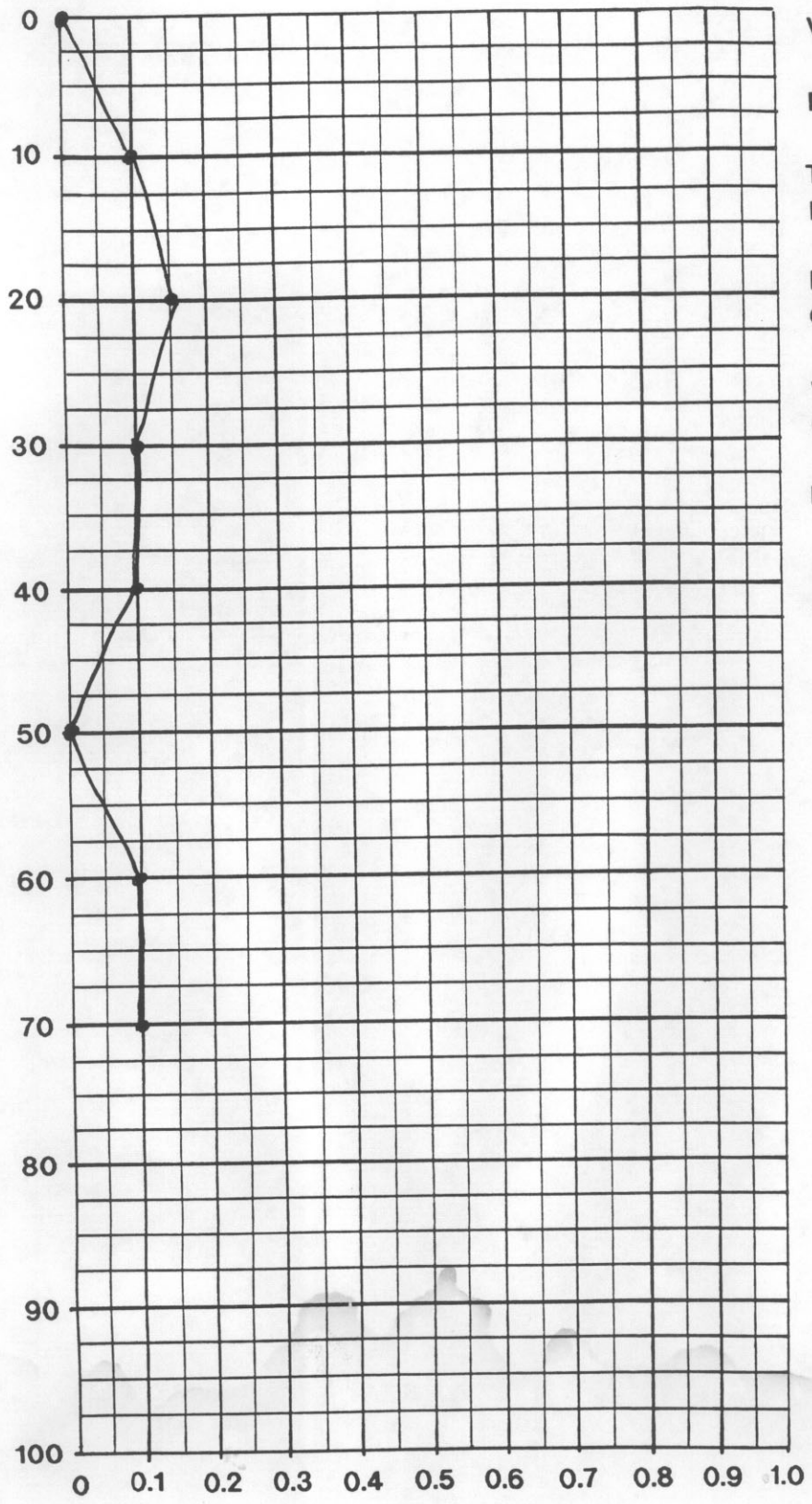
STRAIGHTNESS COMMENTS:
Straight to 34'





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WELL PLUMBNESS DATA



WELL NUMBER: S-6

DEPTH TO WATER: 78'

TRIPOD TO CASING DISTANCE: 1.67'

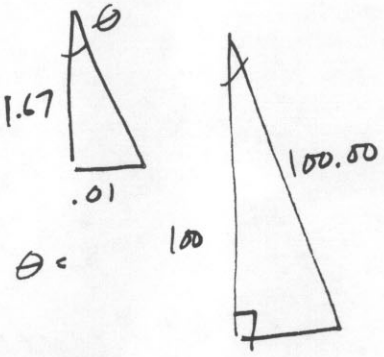
ESTIMATED ANGLE OF DEVIATION: 0.34°

WATER TABLE CORRECTION FACTOR: 0

MAXIMUM DEVIATION: 0.1"

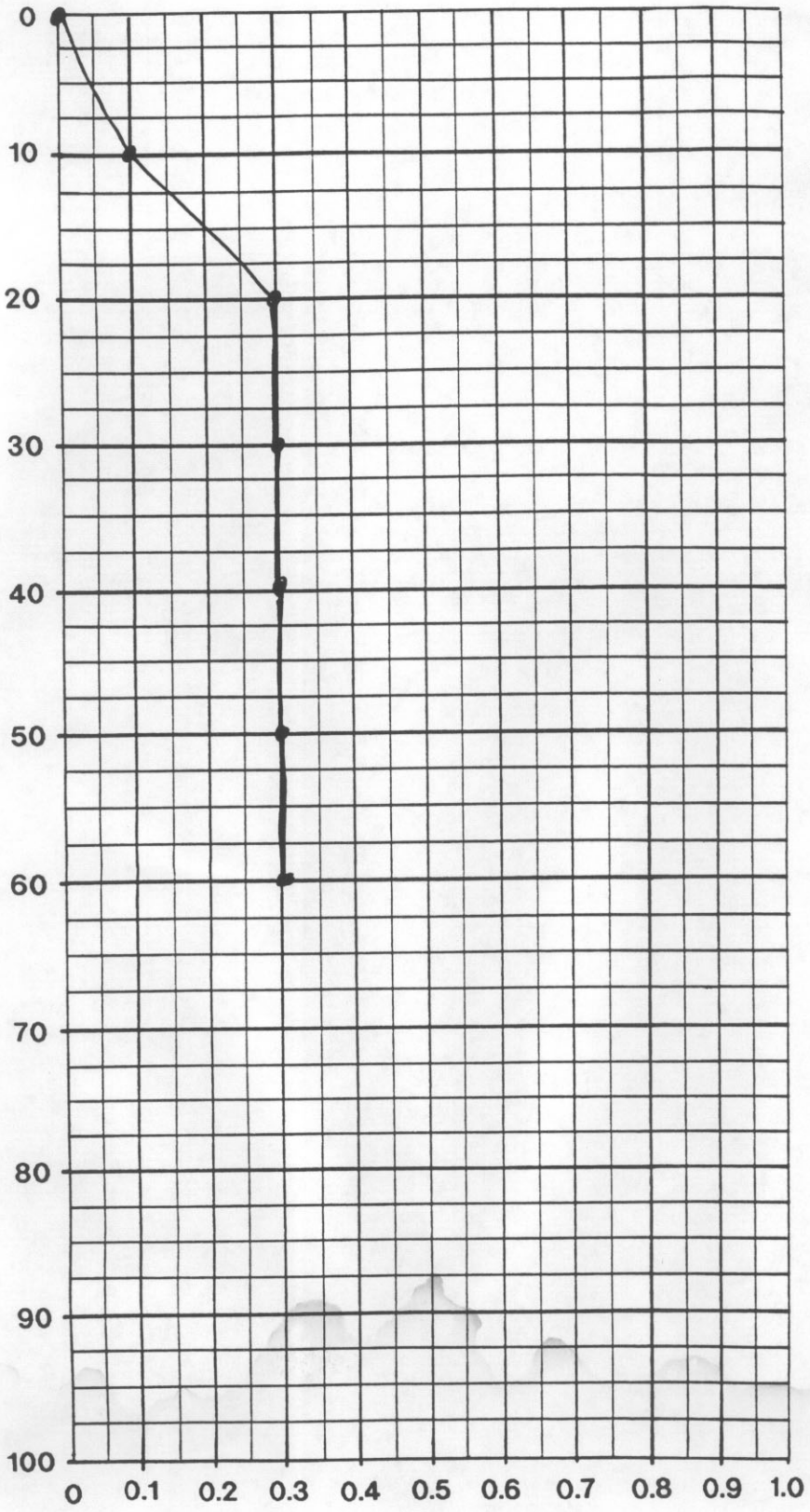
DEPTH OF MAX. DEVIATION: 10'

STRAIGHTNESS COMMENTS:
Straight to the Water Table (78')



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WELL PLUMBNESS DATA



WELL NUMBER: D-1

DEPTH TO WATER: 63'

TRIPOD TO CASING DISTANCE: 2.75'

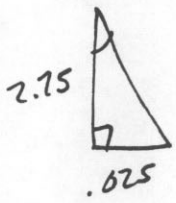
ESTIMATED ANGLE OF DEVIATION: 0.52°

WATER TABLE CORRECTION FACTOR: 0

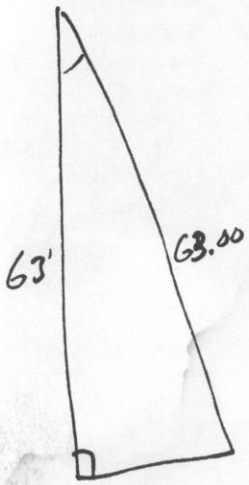
MAXIMUM DEVIATION: 0.3"

DEPTH OF MAX. DEVIATION: 20'

STRAIGHTNESS COMMENTS:
Straight to 58'

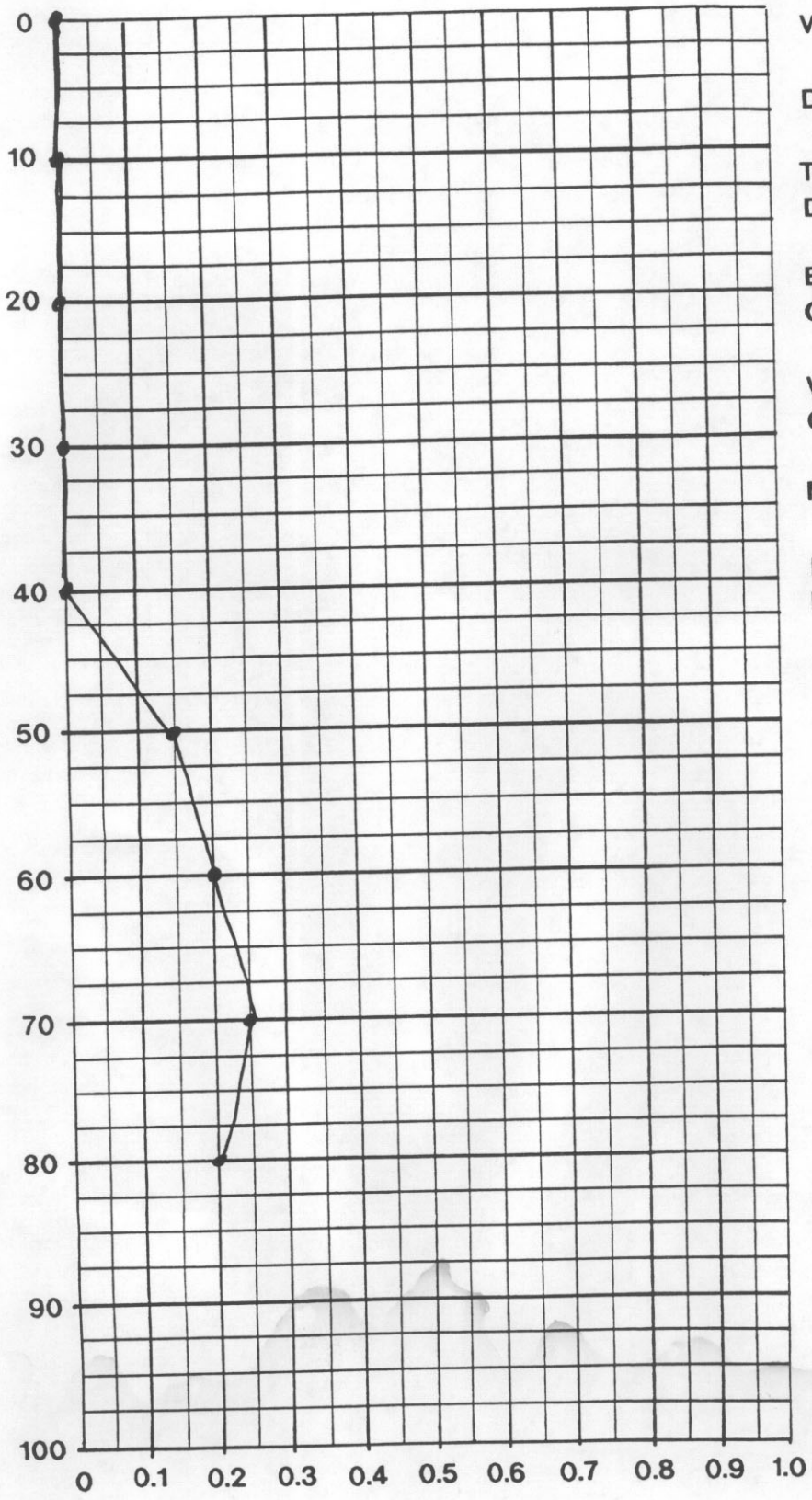


$\theta = 0.52°$



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WELL PLUMBNESS DATA



WELL NUMBER: D-2

DEPTH TO WATER: 79'

TRIPOD TO CASING DISTANCE: 3.17'

ESTIMATED ANGLE OF DEVIATION: 0.3

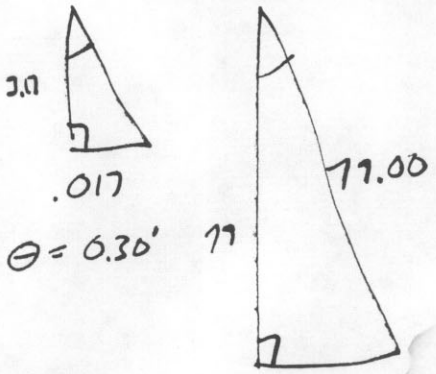
WATER TABLE CORRECTION FACTOR: 0

MAXIMUM DEVIATION: 0.2"

DEPTH OF MAX. DEVIATION: 60'

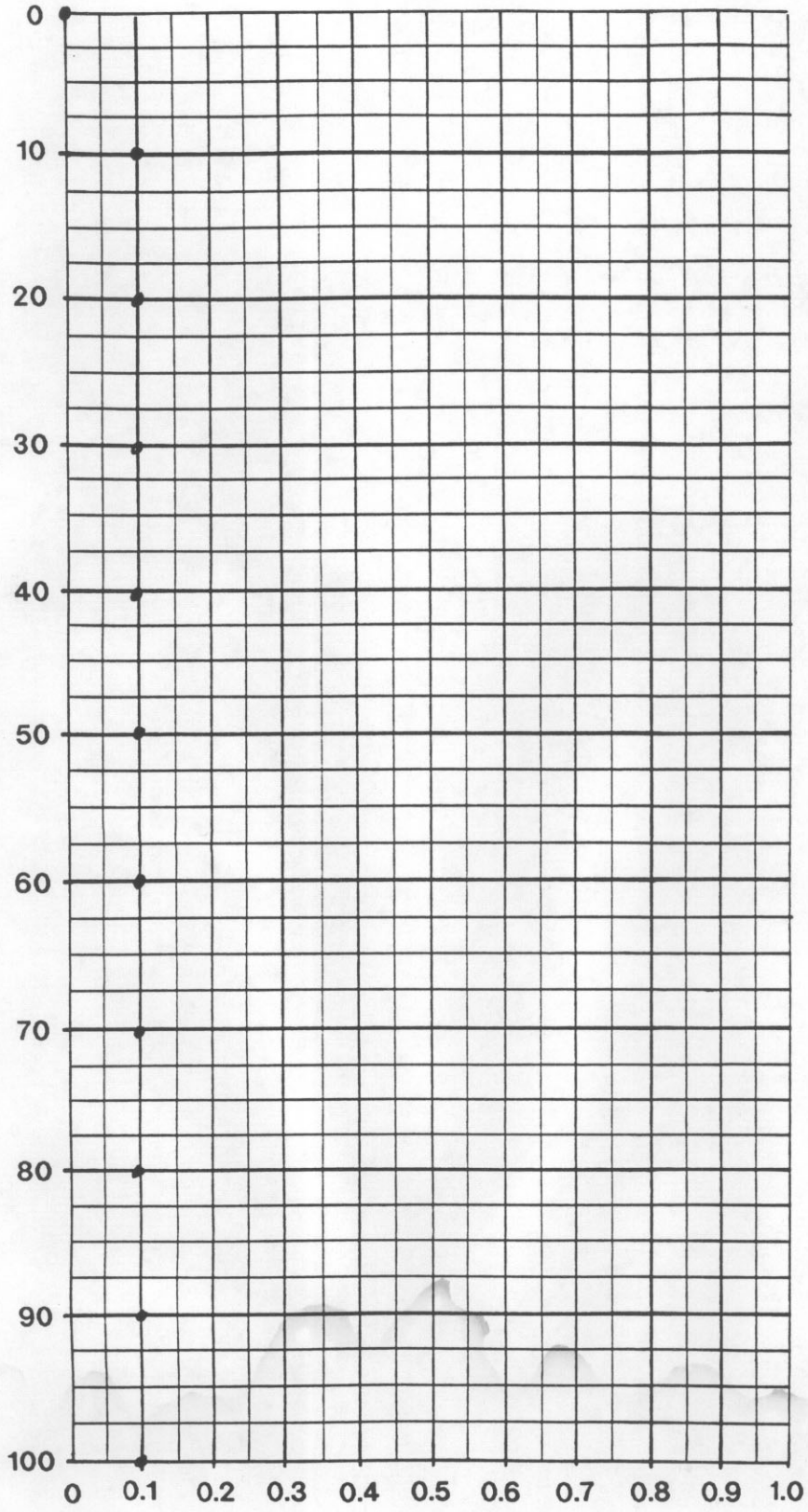
STRAIGHTNESS COMMENTS:

Straight to 72'



F,P&M

WELL PLUMBNESS DATA



WELL NUMBER: D-3

DEPTH TO WATER: 100

TRIPOD TO CASING DISTANCE: 1.67'

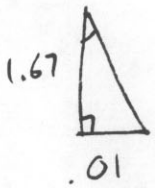
ESTIMATED ANGLE OF DEVIATION: 0.34°

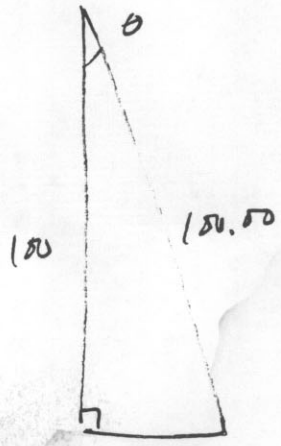
WATER TABLE CORRECTION FACTOR: 0

MAXIMUM DEVIATION: 0.1"

DEPTH OF MAX. DEVIATION: 10'

STRAIGHTNESS COMMENTS:
Straight to 55'





E,P&M