

12 METRO PARK RD. •
ALBANY, NEW YORK 12205
518/458-1313
FAX 518/458-2472

HYDROGEOLOGIC CONDITIONS AT
THE MARLEY PROPERTY

PROPOSED CAROUSEL CENTER MALL,
SYRACUSE, NEW YORK

Prepared for:

SHANLEY, SWEENEY & REILLY
Albany, New York

Prepared by:

DUNN GEOSCIENCE CORPORATION
Albany, New York

Date:

July, 1988

TABLE OF CONTENTS

	Page
1.0 INTRODUCTION	
1.1 Project Initiation	1
1.2 Site Description	1
1.3 Site History	4
1.4 Project Objectives	6
1.5 Project Scope	6
2.0 PREVIOUS INVESTIGATIONS	
2.1 Engineering Investigations	
2.2 Environmental Investigations	
3.0 METHODS AND RESULTS	
3.1 Historical Aerial Photographs	9
3.2 Surface Geophysics	9
3.3 Drilling Methodology	13
3.3.1 Subsurface Soil Sampling	15
3.3.2 Volatile Organic Screening	15
3.4 Monitoring Well Installation and Development	17
3.5 Site Survey	20
3.6 Water Level Measurements	20
3.7 Hydraulic Conductivity Testing	23
3.8 Environmental Sampling and Analysis	26
3.8.1 Surface Soils	26
3.8.2 Groundwater	40
4.0 GEOLOGIC CONDITIONS	50
4.1 Regional Geology	50
4.2 Site Geology	50
5.0 HYDROGEOLOGIC CONDITIONS	60
5.1 Regional Hydrogeology	60
5.2 Site Hydrogeology	60
5.2.1 General	60
5.2.2 Hydraulic Characteristics	61
5.2.3 Groundwater Flow System	62

TABLE OF CONTENTS (cont'd)

	Page
6.0 ENVIRONMENTAL QUALITY	69
6.1 Surface Soil	69
6.2 Surface Water	71

LIST OF TABLES

<u>Tables</u>	<u>Page</u>
3.1 Volatile Organic Screening Results for the Marley Property	17
3.2 Summary of Monitoring Well Construction Details for the Marley Property	18
3.3 Monitoring Well Elevation Measurements for the Marley Property	21
3.4 Water Level Measurements for the Marley Property	22
3.5 Hydraulic Conductivity Testing Results for the Marley Property	27
3.6 Surface Soil PCB Analytical Data for the Marley Property	30
3.7 Surface Soil PCB Analytical Data for Samples Around Point S-2 for the Marley Property	33
3.8 Surface Soil PCB Analytical Data for Samples Around Point 2R for the Marley Property	34
3.9 Surface Soil PCB Analytical Data for Samples Around Point S-2 for the Marley Property	35
3.10 Surface Soil PCB Analytical Data for Samples Around Point 2 for the Marley Property	37
3.11 Surface Soil PCB Analytical Data for Samples Around Point 2 for the Marley Property	38
3.12 Surface Soil Lead Analytical Data for the Marley Property	39
3.13 Field Measurements of Selected Properties for the Marley Property, March 21-23, 1988	41

LIST OF TABLES (cont'd)

3.14	Volatile Organic Groundwater Analytical Data for the Marley Property, March 21-23, 1988	42
3.15	Semi-Volatile Organic Groundwater Analytical Data for the Marley Property, March 21-23, 1988	46
3.16	Priority Pollutant Metals Groundwater Analytical Data for the Marley Property, March 21-23, 1988	47
3.17	Petroleum Hydrocarbon Groundwater Analytical Data for the Marley Property, March 21-23, 1988	49
5.1	Results of Three Point Calculations for the Marley Property	68

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1.1	Location map of the Carousel Center Mall site in Syracuse, New York	2
1.2	Area of current investigations	3
1.3	Approximate location of old Onondaga Creek channel	5
3.1	Location of geophysical traverses for the Marley property	11
3.2	Results of EM-31 traverses	12
3.3	Monitoring well locations for the Marley property	14
3.4	Example of water level recovery versus time for a slug test	24
3.5	Example semi-log plot of water level recovery versus time for a slug test showing a straight line relationship	25
3.6	Soil sampling locations for the Marley property	28
3.7	Detailed soil sampling in vicinity of point S-2, Marley property	31
3.8	Detailed soil sampling in vicinity of point 2, Marley property	32
4.1	Location of geologic cross-sections for the Marley property	51
4.2	Geologic cross-sections for the Marley property (AA' and BB')	53

LIST OF FIGURES
(cont'd)

4.3	Geologic cross-section for the Marley property (CC')	54
4.4	Isopach map showing thickness of fill soils on the Marley property	56
4.5	Isopach map showing thickness of Solvay fill on the Marley property	57
4.6	Contour map showing top of natural lacustrine sediments on the Marely property	59
5.1	Water level contour map for the Marley property, March 12, 1988	63
5.2	Water level contour map for the Marley property, March 21, 1988	64
5.3	Water level contour map for the Marley property, March 18, 1988	65
5.4	Three point calculations for the Marley property	67

LIST OF APPENDICES

Appendix A	Soil Boring Logs
Appendix B	HNU Logs
Appendix C	Well Construction Details
Appendix D	Hydraulic Conductivity Data
Appendix E	Surface Soil Analytical Data
Appendix F	Groundwater Analytical Data

1.0 INTRODUCTION

1.1 Project Initiation

Dunn Geoscience Corporation (DUNN), in response to a request from the law firm of Shanley, Sweeney, and Reilly, P.C., has continued subsurface investigations of the proposed site of the Carousel Center Mall. DUNN's investigative studies are a continuation of work begun by others in 1987. The proposed mall site includes: the Marley property and a portion of the Buckeye property. This report summarizes investigative results from the Marley property.

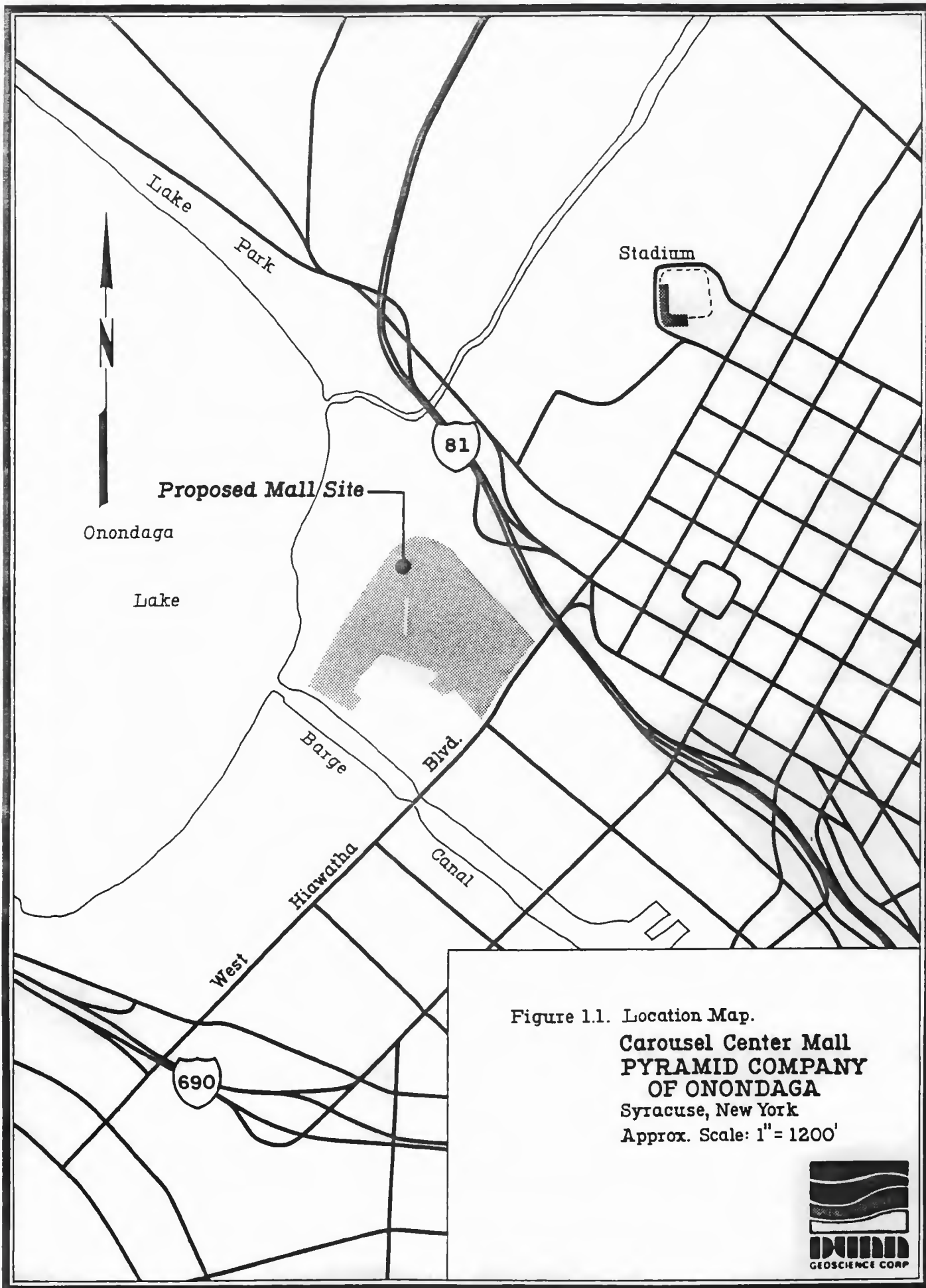
1.2 Site Description

The proposed site of the Carousel Center Mall is located within the City of Syracuse, New York just south of Onondaga Lake (Figure 1.1). The proposed mall site is generally located between Interstate 81 to the northeast, Hiawatha Boulevard to the southeast, the New York State Barge Canal to the southwest, and Onondaga Lake to the northwest.

The proposed mall site includes two parcels of land referred to herein as the Marley and Buckeye properties (Figure 1.2). This report is prepared for the Marley property. An adjacent piece of property (Clark) may be incorporated into the final plans for the mall.

The Marley property covers approximately 50 acres. It is currently a generally vacant piece of land and was formerly the site of a scrap metal recycling operation whose entrance was on Hiawatha Boulevard.

The Marley property is relatively flat. Elevations range from approximately 369 feet above mean sea level at the southwestern edge to 381 feet above sea level near the northeastern edge. This topographic range is approximately equivalent to 9 to 21 feet above the City of Syracuse datum. Generally, the topography slopes gently away from the center of the property. The steepest slopes are to the north and east but do not exceed 3% grade.



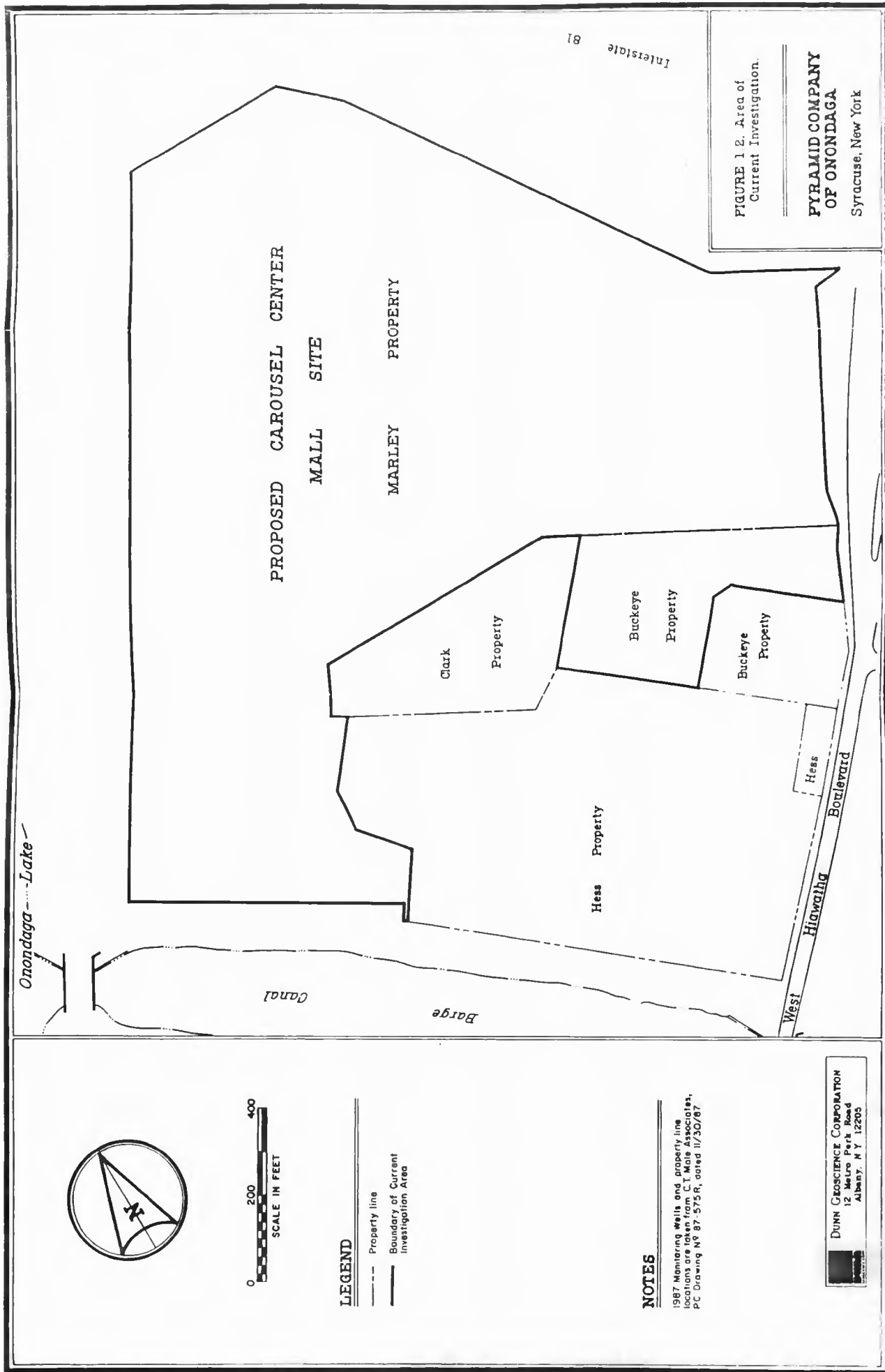


FIGURE 1 2. Area of
Current Investigation.

**PYRAMID COMPANY
OF ONONDAGA**
Syracuse, New York



0 200 400
SCALE IN FEET

LEGEND

--- Property line
--- Boundary of Current
Investigation Area

NOTES

1987 Monitoring Wells and property line
locations are taken from C.T. Mole Associates,
PC Drawing NY 87-575R, dated 11/30/67.

DUNN GEOSCIENCE CORPORATION
12 Metro Park Road
Albany, N.Y. 12205

1.3 Site History

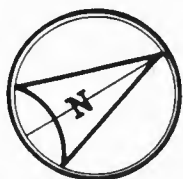
The broad, low area immediately southeast of Onondaga Lake was originally a salt marsh. Saline groundwater reportedly discharged to the marshes and formed salt springs. This natural feature was exploited for salt production as early as the mid 1600's. Salt production became Syracuse's largest industry in the early 1800's. However, salt production had declined dramatically by the end of the century.

Salt was produced by two methods: one involving boiling of the saline water via burning wood and the other involving solar evaporation of the saline water in large plots. Maps dated 1892 and 1908 show that the Marley property was being used as evaporation plots for salt production. Salt production in the Syracuse area was discontinued in the mid 1920's though production at the Marley property was evidently discontinued by 1910 as discussed below.

A number of changes occurred during the period when the Marley property was used as salt plots. Most significant, the original channel of Onondaga Creek which meandered across the southwestern portion of the property was straightened and relocated. The old channel was abandoned and its approximate position is shown in Figure 1.3. The straightened channel was later used as part of the New York State Barge Canal system which opened in 1917. The position of the Barge Canal is also shown in Figure 1.3.

The level of Onondaga Lake reportedly changed on two occasions during the 1800's. Lake level was intentionally lowered in 1822 by as much as 11 feet. This resulted in exposure of a wider portion of salt marsh for exploitation by the salt producers. Lake level was raised following the alteration of Onondaga Creek but reportedly did not return to its previous levels. The lake level rise enabled barges to navigate into the new channel via Onondaga Lake.

Use of the Marley property as salt plots apparently ended prior to 1910 when filling activities began. Annotation on a map from 1910 indicates fill emplacement with Solvay Process Company wastes on the Marley property. Solvay



0 200 400
SCALE IN FEET

LEGEND

- Property line
- Approximate location of old Onondaga Creek Channel

NOTES

1987 Monitoring Wells and property line locations are taken from C.T. Male Associates, P.C. Drawing NY 87-575 R, dated 11/30/87.
Approximate location of old Onondaga Creek channel from map provided by LA Group, Landscape Architecture & Engineering, P.C.

DUNN GEOSCIENCE CORPORATION
12 Metro Park Road
Albany, N.Y. 12205

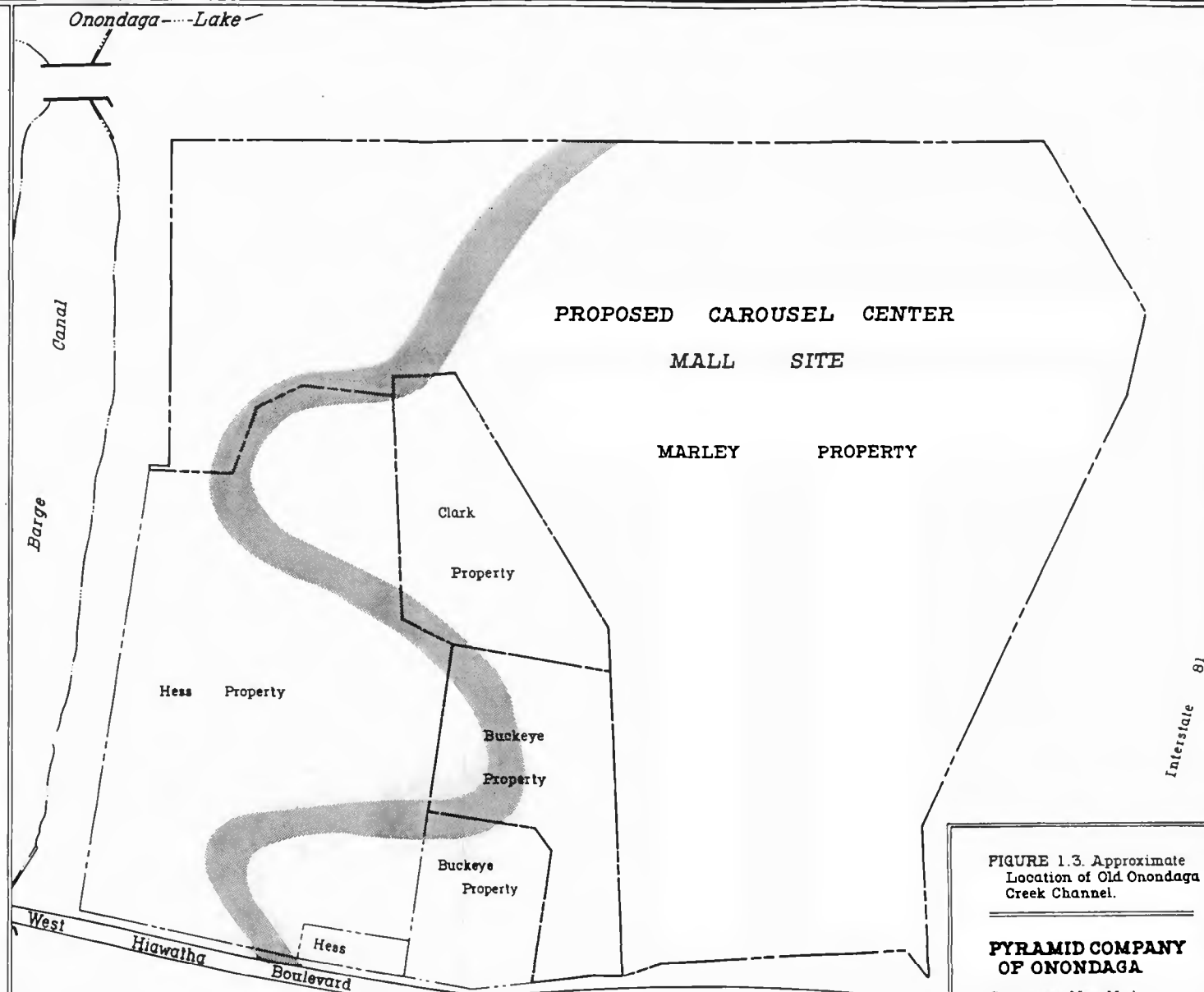


FIGURE 1.3. Approximate Location of Old Onondaga Creek Channel.

PYRAMID COMPANY
OF ONONDAGA

Syracuse, New York

wastes are a mixture of calcium carbonate (CaCO_3), calcium chloride (CaCl_2), and calcium oxide (CaO). Records reportedly indicate that Solvay wastes were disposed on the Marley property during the periods from 1907 to 1910 and 1924 to 1930.

Use of the Marley property as a metal scrapyard began by the late 1930's. This scrap metal recovery operation has continued until recently and is currently in the process of relocating.

1.4 Project Objectives

The purpose of the investigation of the Marley property was several-fold and included the following:

- o definition of the subsurface geologic conditions;
- o definition of the subsurface hydrologic conditions;
- o determination of the presence or absence of contamination in surface soil and groundwater; and,
- o if present, definition of the nature and extent of contamination in surface soil and groundwater.

1.5 Project Scope

The scope of work for DUNN included both review of available data and further investigation of the Marley property. Additional data collection activities were designed to complement and verify or refute results of previous studies and included the following:

- Use of reconnaissance surface geophysics;
- Field activities
- soil borings at eight locations including geologic logging of split

spoon samples and volatile organic screening;

3. installation and development of nine monitoring wells including one well pair;
4. site surveying;
5. water level monitoring;
6. hydraulic conductivity testing;
7. sampling and analysis of surface soil; and
8. sampling and analysis of groundwater.

This report details the methodologies employed and results of our investigation of the Marley property and incorporates the results of previous investigations where appropriate.

2.0 PREVIOUS INVESTIGATIONS

A considerable amount of information is available on the Marley property as a result of previous investigations. Some of the previous investigations have been oriented toward engineering applications (e.g., foundation and piling design) while others have dealt with environmental assessments. These previous investigations are summarized briefly below.

2.1 Engineering Investigations

Early investigations of the Marley property resulted in numerous exploratory soil borings related to engineering of various structures. Records indicate that at least three test borings were performed by Onondaga Soil Testing, Inc. in 1963. These borings penetrated to a depth of 50 feet below grade and indicated approximately 10 to 15 feet of mixed fill (e.g., wood, cinders, metal, ashes) overlying natural materials.

Onondaga Soil Testing, Inc. performed at least twelve test borings in 1967 and 1968 related to proposed metal shear facilities on the Marley property. These borings were advanced up to depths of 140 feet below grade. Boring logs generally indicate 5 to 20 feet mixed fill, including Solvay waste overlying natural materials.

Soil borings related to engineering design of the Carousel Center Mall were performed by Parrott-Wolff, Inc. under the direction of John P. Stopen Engineering Partnerships in late 1987. These activities resulted in performance of seventeen test borings, at least nine of which were performed on the Marley property. Some of these borings were advanced to depths in excess of 200 feet below grade. Logs from these test borings are used to provide information on the regional geology in Section 4.1, Regional Geology.

John P. Stopen Engineering Partnerships also excavated ten test pits in late 1987, nine of which were located on the Marley property. These test pits were excavated up to 19 feet deep and indicated mixed fill overlying natural sediments. Most of these test pits encountered Solvay wastes of variable thickness, generally at the base of the fill materials.

2.2 Environmental Investigations

JEB Consultants performed an environmental investigation of the Marley property in late 1987. The focus of this investigation was soil and groundwater contamination. The investigation included collection of composited surface soils from two areas of visible staining for subsequent laboratory analysis. Eleven soil borings were also performed on the Marley property with subsequent installation of monitoring wells (P-1 through P-11). An additional boring was performed to replace one well which was destroyed shortly after installation (P-7R). Groundwater samples were obtained from the wells on three dates for laboratory analysis.

DUNN prepared an Environmental Site Assessment (ESA) in January, 1988 based primarily on a review of available data. However, additional soil sampling was

performed. Six grab samples of surface soil were obtained for analysis in the two areas previously sampled by JEB Consultants. Eighteen additional grab samples of surface soil were obtained by C.T. Male Associates, P.C. from locations throughout the Marley property for laboratory analysis and inclusion in the ESA.

3.0 METHODS AND RESULTS

3.1 Historical Aerial Photographs

DUNN performed a search for available aerial photography of the Marley property and immediately surrounding area. Black-and-white, stereographic coverage was obtained for several dates including: October 15, 1951; October 6, 1958; June 15, 1959; July 1, 1966; April 28, 1967; April 29, 1972; and March 28, 1981. In addition, non-stereographic, black-and-white coverage was obtained for February 11, 1957.

Review of the aerial photographs supports available site history information for the Marley property (Section 1.3, Site History). The earliest photos available (October 15, 1951) indicate fill activities. Filling to approximately present grade was completed by February 11, 1957. Operation of the property as a scrapyard is clearly evident in February 11, 1957 and continues to the March 28, 1981 aerial photos.

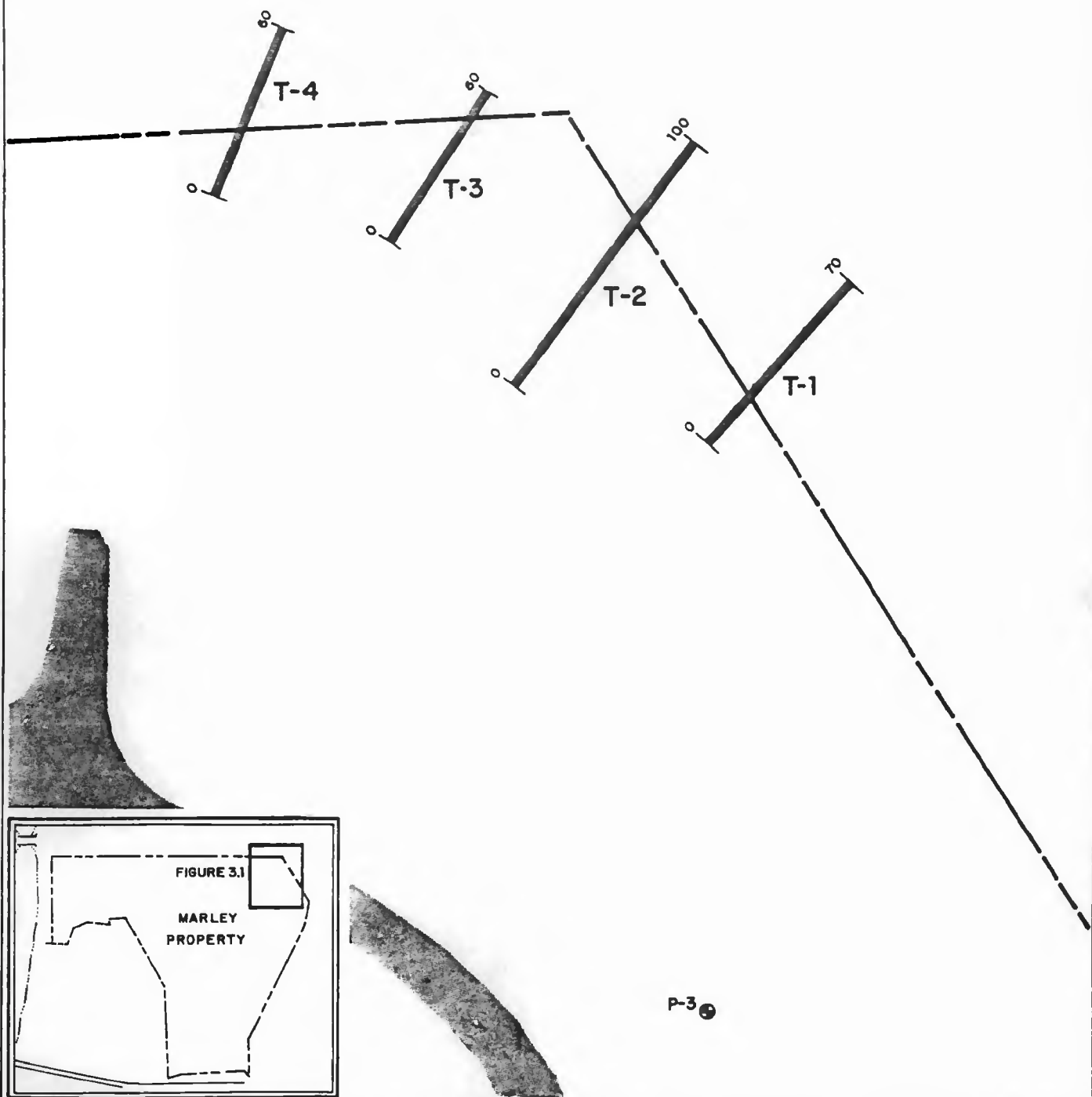
3.2 Surface Geophysics

A surface geophysical investigation was conducted in the northern corner of the Marley property on June 23, 1988. The purpose of the investigation was to assess the presence or absence of significant metallic objects such as transformers, tanks, or clusters of drums within approximately five feet of the ground surface. The geophysical investigation consisted of four north-south traverses, T-1 through T-4 (Figure 3.1), which were surveyed using a Geonics EM-31 terrain conductivity meter. The geophysical survey was performed in response to verbal allegations by others of possible buried transformers in this area.

The EM-31 instrument utilizes a non-destructive electromagnetic induction exploration technique. Surveying with the EM-31 is a rapid and effective reconnaissance method for determining lateral variations and anomalies in the conductivity of subsurface materials, with a maximum depth of investigation equal to approximately 20 feet. These variations can be interpreted to assess the nature of subsurface materials. Concentrations of metal at the ground surface or buried beneath a thin cover commonly cause anomalously low terrain conductivity (TC) values, abrupt lateral variations, or abrupt variation in the instrument's response when rotated in a horizontal plane.

TC measurements were recorded in the normal quadrature phase mode on 10-foot centers along each traverse. At each measurement station, two perpendicular readings (boom oriented parallel and perpendicular to the traverse direction) were taken to determine the directional variability of TC about the station. During the survey, no metallic objects were observed at the surface along the traverses.

The results of the traverses are presented as profiles which graph both the boom parallel and boom perpendicular TC readings (Figure 3.2). TC readings generally ranged from 100 to 200 millimhos/meter (mmhos/m), suggesting the presence of a highly conductive and variable near-surface soil, fill, or water. The highest and most variable TC values typically were coincident with water filled depressions and/or irregular topography. Low TC readings, which would typically be indicative of metallic objects close to the ground surface, were not observed along any of the four traverses. Furthermore, the two perpendicular readings recorded at each measurement station generally did not vary more than ten percent of each other. Measurement stations having the greatest difference between the two readings were typically located in close proximity to irregular topography or elongated depressions filled with water which could account for the differences in TC readings. The similarity between the two perpendicular readings and the lack of low TC readings suggest the absence of buried metallic objects.



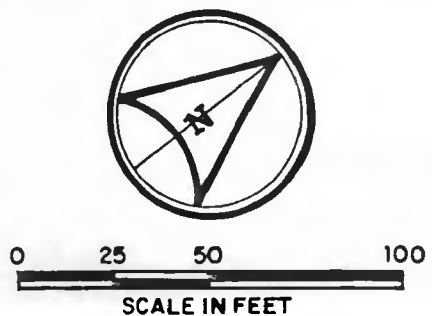
LEGEND

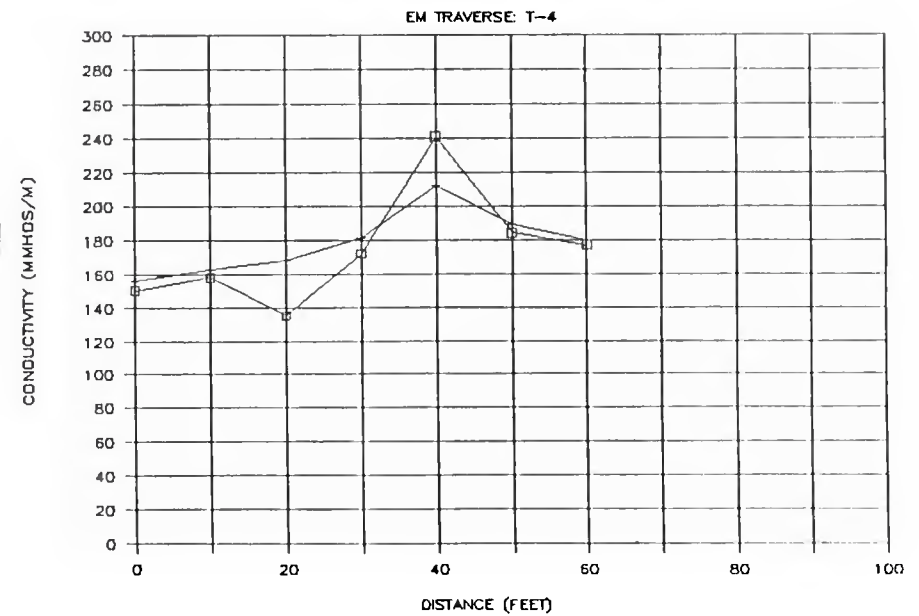
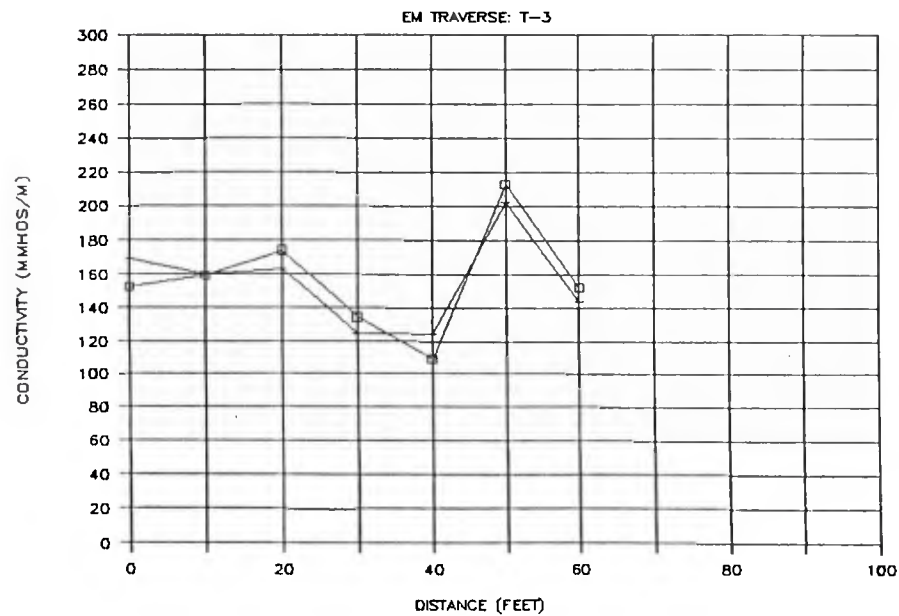
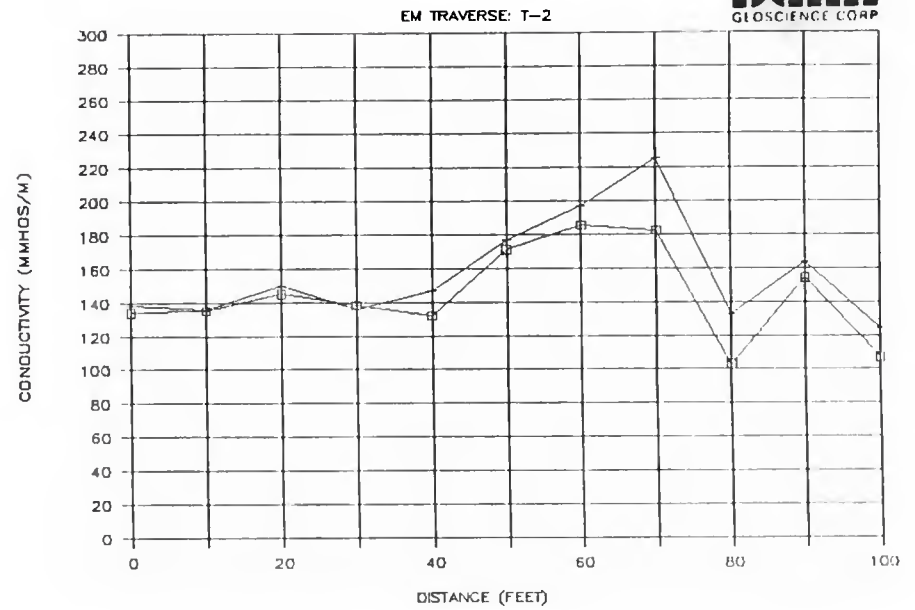
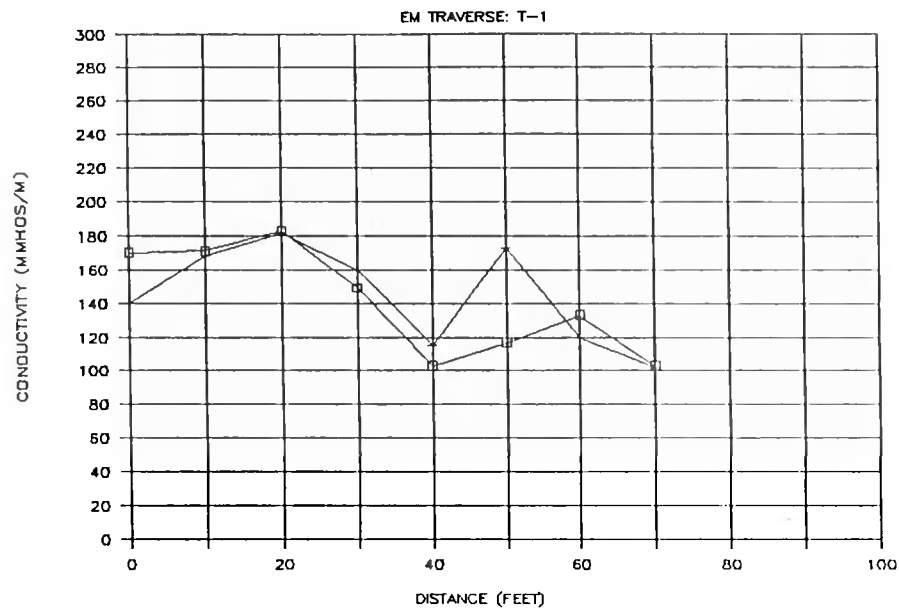
 EM Traverse and
T-1 designation

NOTE

EM Traverse locations are approx-
imate due to lack of survey
control.

FIGURE 3.1. Location of
Geophysical Traverses
on the Marley Property.





□ PARALLEL

+ PERPENDICULAR

Figure 3.2: Results of EM-31 traverses.

The four TC traverses are believed to be representative of the area surveyed. The results of each traverse are indicative of conditions along a swath approximately 10 feet wide. It is our judgement based on the geophysical data that the survey area is not characterized by shallow buried metallic objects.

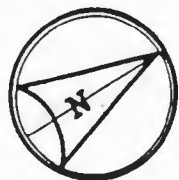
3.3 Drilling Methodology

Nine additional soil borings were drilled at the Marley property from March 7 to March 10, 1988. These borings were drilled to obtain subsurface information and to install groundwater monitoring wells. Boring locations were selected primarily to provide additional soil and groundwater data in areas not covered by the P-series of soil borings/monitoring wells installed by JEB Consultants (Section 2.2, Environmental Investigations). Locations are shown on Figure 3.3. Figure 3.3 includes the location of previously installed monitoring wells for reference.

Borings were installed at eight locations (DGC-1 through DGC-7 and DGC-9). Two borings were drilled at DGC-1 for the purpose of installing a shallow and deep monitoring well pair (DGC-1S and DGC-1D); only the deeper of the two borings was logged. At location DGC-6, the boring was grouted upon completion and a second adjacent boring was drilled without logging for shallow well installation.

Parratt-Wolff, Inc. of East Syracuse, New York drilled the borings and subsequently installed the monitoring wells (Section 3.4, Monitoring Well Installation and Development) using two truck-mounted Mobile drilling rigs equipped with 4.25-inch I.D. hollow-stem augers. A qualified DUNN hydrogeologist supervised each drilling rig at all times during the field program.

Prior to the initiation of drilling activities, the drilling rigs, augers, drill rods, split spoons, well materials, and other pertinent equipment were steam cleaned on a designated on-site decontamination area located approximately between wells DGC-2, DGC-3 and DGC-4. This cleaning procedure



0 200 400
SCALE IN FEET

LEGEND

- Monitoring Well installed by JEB Consultants (1987)
- Monitoring Well installed by Dunn Geoscience Corp. (1988)

NOTES

1987 Monitoring Wells and property line locations are taken from C.T. Mole Associates, PC Drawing NY 87-575R, dated 8/30/87.

1988 Monitoring Well locations were surveyed by Dunn Geoscience, 3/15/88.

All other locations are approximate

DUNN GEOSCIENCE CORPORATION
12 Metro Park Road
Albany, N.Y. 12205

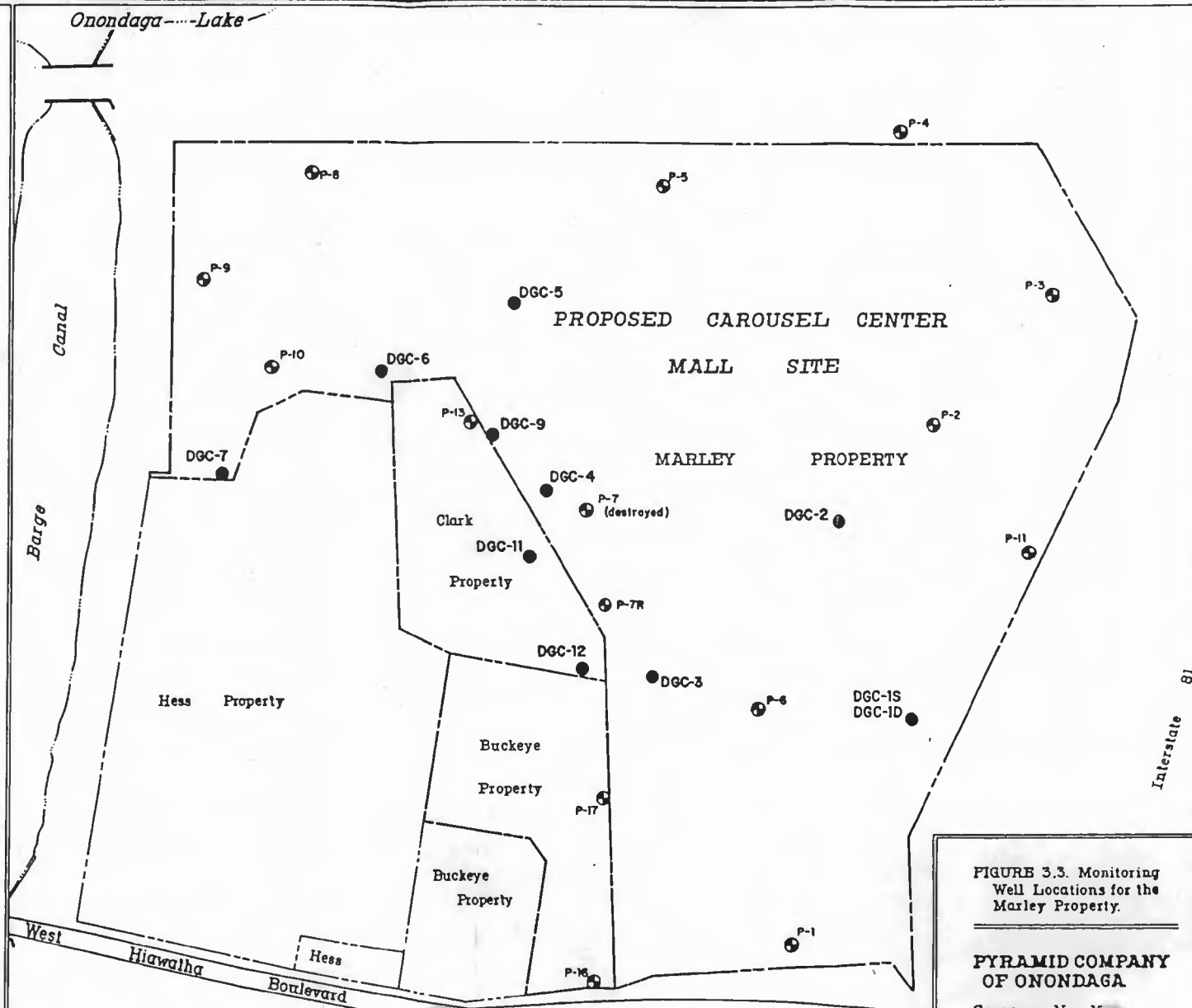


FIGURE 3.3. Monitoring Well Locations for the Marley Property.

PYRAMID COMPANY OF ONONDAGA
Syracuse, New York

was also used between each boring. Each split-spoon sampler was cleaned at the boring locations by washing in a series of three buckets containing alconox detergent solution and two tap water rinses, respectively.

*10/1/88
J. H. H.*

3.3.1 Subsurface Soil Samples

At each boring location, split-spoon soil samples were continuously sampled in advance of the hollow-stem augers following ASTM method D-1586. At each drilling rig, two 24-inch (2-inch O.D.) split-spoon samplers consisting of a drive head, split-spoon and drive shoe, were used to collect subsurface soil samples. The split-spoon samples were obtained by driving the sampler with a 140-pound hammer falling 30 inches until either 24 inches had been penetrated or 100 blows applied. The number of blows required to achieve each 6 inches of penetration was recorded.

All soil samples were geologically logged at the time of collection. Samples were examined and described using the Modified Burmister System with special emphasis on stratification of soils. Soil boring logs and an explanation of the Burmister Classification System are presented in Appendix A.

Soil boring samples were retained in glass jars sealed with aluminum foil and screw top lids, with multiple jars used for samples containing different soil strata. In accordance with ASTM methods, the sample jars were labeled with the following information: job designation, boring number, sample number, depth of sample, blow counts, length of recovery and date the sample was collected.

3.3.2 Volatile Organic Screening

As part of the drilling program at the Marley property, DUNN performed screening for volatile organic compounds on all split-spoon samples. An HNU Model PI-101 Photoionization Analyzer equipped with a 10.2 eV lamp was utilized to perform the screening. Photoionization uses ultraviolet light to ionize many trace compounds (especially organics) and the Model PI-101 employs this principle to measure the concentration of trace gases. The useful range of the

instrument is from 0.1 to 2000 ppm.

The HNU was calibrated for direct reading in ppm of calibration gas equivalents. The calibration procedure was performed daily prior to use. Calibration involves standardization of probe response using a calibration gas of known concentration.

Representative portions of all split-spoon samples obtained during the soil boring program were placed in clean, glass jars after the split-spoon sampler was opened and classified. Although split-spoon sample recoveries varied, care was taken to prepare a standard quantity of sample. Each jar was sealed with aluminum foil and a screw cap labeled with the appropriate sample information. After allowing for equilibration of the samples, the headspace in each sample was scanned with the HNU by inserting the photoionization probe tip through the aluminum foil. The maximum reading was recorded.

The results of this screening are presented in Table 3.1. At some sample depths, multiple jars were prepared to reflect layering and Table 3.1 shows the readings obtained from each jar. Plots of the maximum HNU reading versus depth at each soil boring location are shown in Appendix B. The plots also show the general stratigraphy of the soil boring. HNU readings above background were recorded in borings DGC-2, DGC-4, DGC-5, DGC-7 and DGC-9. All readings above background were recorded in fill materials.

3.4 Monitoring Well Installation and Development

Upon completion of each boring, a two-inch diameter PVC monitoring well was constructed. Well construction details are presented in Appendix C and summarized in Table 3.2.

Wells were constructed with their screened intervals primarily in fill material. Layers of Solvay waste were generally avoided for screen settings, if possible. Due to the limited thickness of fill materials encountered in borings DGC-1D, DGC-3, and DGC-4, these well screens extend slightly into the

Table 3.1
Volatile Organic Screening Results
Marley Property

Well No.	Sample No.	Sample Interval (ft)	HNu Rdg (ppm)
DGC-1D	Background = 0.4 ppm		
	S-1	0.0 - 2.0	0.6
	S-2	2.0 - 4.0	3.2
	S-3	4.0 - 6.0	1.4
	S-4	6.0 - 8.0	NS
	S-5	8.0 - 10.0	1.2
	S-6	10.0 - 12.0	0.4
	S-7	12.0 - 14.0	0.3
DGC-2	Background = 0.6 ppm		
	S-1	0.0 - 2.0	0.8
	S-2	2.0 - 4.0	68.0
	S-3	4.0 - 6.0	170.0
	S-4	6.0 - 8.0	60.0
	S-5	8.0 - 10.0	30.0
	S-6	10.0 - 12.0	57.0
	S-7	12.0 - 14.0	26.0
	S-8	14.0 - 16.0	85.0
DGC-3	Background = 0.6 ppm		
	S-1	0.0 - 2.0	19.0
	S-2	2.0 - 4.0	19.6
	S-3	4.0 - 6.0	8.0
	S-4	6.0 - 8.0	13.2
	S-5	8.0 - 10.0	10.0
	S-6	10.0 - 12.0	5.6
	S-7	12.0 - 14.0	5.2
DGC-4	Background = 0.6 ppm		
	S-1	0.0 - 2.0	0.9
	S-2	2.0 - 4.0	14.0
	S-3	4.0 - 6.0	105.0
	S-4	6.0 - 8.0	25.0
	S-5	8.0 - 10.0	11.8
	a		2.4
	b		6.2
DGC-5	Background = 0.5 ppm		
	S-1	0.0 - 2.0	2.2
	S-2	2.0 - 4.0	2.8
	S-3	4.0 - 6.0	450.0
	S-4	6.0 - 8.0	840.0
	S-5	8.0 - 10.0	30.0
	S-6	10.0 - 12.0	8.0
	S-7	12.0 - 14.0	7.0
	S-8	14.0 - 16.0	6.9
	S-9	16.0 - 18.0	4.0
	a		1.4
	b		4.3
	S-10	18.0 - 20.0	2.8
	S-11	20.0 - 22.0	5.5

NS = No Sample

Well No.	Sample No.	Sample Interval (ft)	HNu Rdg (ppm)
DGC-6	Background = 0.4 ppm		
	S-1	0.0 - 2.0	0.2
	S-2	2.0 - 4.0	0.2
	S-3	4.0 - 5.0	0.4
	S-4	6.0 - 8.0	0.5
	S-5	8.0 - 10.0	0.5
	S-6	10.0 - 12.0	0.6
	S-7	12.0 - 14.0	0.6
	S-8	14.0 - 16.0	3.4
	a		1.7
	b		1.6
	c		4.2
	S-9	16.0 - 18.0	1.6
	S-10	18.0 - 20.0	0.9
DGC-7	Background = 0.4 ppm		
	S-1	0.0 - 2.0	0.4
	S-2	2.0 - 4.0	0.4
	S-3	4.0 - 6.0	0.4
	S-4	6.0 - 8.0	0.4
	S-5	8.0 - 10.0	0.4
	S-6	10.0 - 12.0	0.4
	S-7	12.0 - 14.0	0.4
	a		138.0
	b		240.0
	S-8	14.0 - 16.0	18.8
	a		196.0
	b		0.4
	S-9	16.0 - 18.0	0.4
DGC-9	Background = 0.6 ppm		
	S-1	0.0 - 2.0	0.6
	S-2	2.0 - 4.0	3.8
	S-3	4.0 - 6.0	170.0
	S-4	6.0 - 8.0	34.0
	S-5	8.0 - 10.0	5.2
	a		7.4
	b		15.4
	S-6	10.0 - 12.0	11.4
	a		7.8
	b		4.8
	S-7	12.0 - 14.0	7.4
	a		6.0
	b		6.1
	S-8	14.0 - 16.0	5.6
	a		3.2
	S-9	16.0 - 18.0	3.5
	a		3.5

HDS:
DGC-2
DGC-4
DGC-5
DGC-7

Table 3.2
Summary of Monitoring Well Construction *
Marley Property

Well No.	Date Completed	Boring Depth (ft)	Screened Interval		Stratigraphic Unit Screened
			Depth(ft)	Elevation(ft)	
DGC-1S	3-07-88	7.5	3.0 to 7.0	7.9 to 3.9	Mixed Fill
DGC-1D	3-07-88	14.0	6.9 to 11.9	4.0 to -1.0	Mixed Fill/Natural
DGC-2	3-07-88	16.0	2.5 to 12.5	10.3 to 0.3	Mixed Fill/Solvay
DGC-3	3-07-88	14.0	5.3 to 10.3	5.9 to 0.9	Mixed Fill/Solvay/Natural
DGC-4	3-08-88	16.0	6.8 to 11.8	4.1 to -0.9	Mixed Fill/Solvay/Natural
DGC-5	3-09-88	22.0	7.0 to 17.0	10.5 to 0.5	Mixed Fill
DGC-6**	3-08-88	14.0	3.0 to 13.0	13.0 to 3.0	Mixed Fill
DGC-7	3-10-88	28.0	4.0 to 12.0	5.7 to -2.3	Mixed Fill
DGC-9	3-08-88	20.0	8.8 to 13.8	8.4 to 5.4	Mixed Fill/Solvay/Natural

Notes

* See Appendix C for full well construction details

** Boring DGC-6 was sampled to 28.0' and filled with grout; an adjacent boring was drilled to 14.0' for well installation.

top of the underlying natural lacustrine soils. Screen lengths ranged from 3 to 10 feet, also depending on fill thickness and the presence of Solvay waste. The deeper portions of borings not used for well construction were appropriately sealed.

Prior to well screen installation, a sand pack 0.2 to 1 foot thick was placed in each boring to prevent the well from sinking into the seal or below the bottom of the boring. The well screen and riser assembly was then installed. Well assemblies consisted of 0.010-inch slot, schedule 40 PVC well screen with a bottom plug, flush threaded to a schedule 40 PVC riser pipe. Once the well assembly was set, the sand pack was completed by filling the annulus around the well assembly with grade 0 silica sand to 0.5 to 1.5 feet above the top of the screen. An upper bentonite pellet seal, 0.5 to 1.5 feet thick, was placed on the sand pack. The remainder of the annulus was filled with cement. Finally, a 4-foot long, 4-inch diameter, lockable protective steel casing was cemented into place over the riser pipe.

Each monitoring well was developed shortly after installation. Wells DGC-1S, DGC-1D and DGC-3 were partially developed using a portable suction pump with dedicated polyethylene tubing. Well development was completed using dedicated PVC bailers. All other wells were developed entirely using the dedicated PVC bailers. During development, pumping water from a well induces flow of formational waters and suspended sediments toward the screen. While evacuation of turbid water via pumping removes any fine-grained sediment piped into the well, surging is necessary to loosen and remove fines lodged in the screen, sand pack, and formation. For wells that were initially pumped, therefore, a bailer was used as a surge block by rapidly raising and lowering the bailer within the well screen after pumping. The turbid water was then removed by bailing and/or pumping. For the remainder of the wells which were completely developed using dedicated bailers, the bailers serve both as water removal mechanisms and surge blocks. The PVC bailers, nylon rope, and polyethylene pump discharge tubing were dedicated for use in a single well to prevent cross-contamination of the wells. At least six well volumes of water were removed from each well.

3.5 Site Survey

The location and measuring point elevations were determined for the newly installed wells. In addition, the measuring point elevations were determined for wells installed previously by JEB Consultants. All elevations were referenced to the City of Syracuse datum.

As part of the survey, two reference points were established over the Barge Canal on the Hiawatha Boulevard and Conrail bridges (SP-1 and SP-2, respectively). These reference points are used to measure Onondaga Lake and the Barge Canal water level elevations.

Monitoring well and surface water measuring point elevations are listed in Table 3.3. Existing site maps were updated using the survey data.

3.6 Water Level Measurements

Water level measurements were obtained from monitoring wells on the Marley property on ten dates during the period of investigations. Measurements were generally obtained using electronic water level probes. The depth to water was recorded for each measurement. This information was converted to water level elevations with respect to the City of Syracuse datum using the surveyed elevations of the measuring points (either top of PVC or steel casing). Water level elevations and measuring point elevations for the Marley property are presented in Table 3.4. Water level information for the Barge Canal and Onondaga Lake are also presented in Table 3.4.

3.7 Hydraulic Conductivity Testing

Hydraulic conductivity tests, also known as slug and bail tests, were performed on the newly installed monitoring wells on the Marley property. These tests yield quantitative information on aquifer characteristics in the immediate vicinity of monitoring wells. They are useful in defining spatial and vertical variability in hydraulic conductivity.

Table 3.3

Monitoring Well Elevation Measurements
for the Marley property
(in feet above the City of Syracuse Datum)

Well or Water Elevation Reference Point	Well Elevations			Reference Point Elevation
	Top of Steel Casing	Top of PVC Riser	Ground Surface	
P-1	15.27	14.72	12.4	
P-2	17.40	16.88	14.2	
P-3	15.09	14.60	12.3	
P-4	14.05	13.55	11.3	
P-5	17.41	16.89	14.2	
P-6	14.56	14.02	11.6	
P-7R	14.89	14.79	11.2	
P-8	18.22	17.71	15.1	
P-9	16.36	15.91	13.5	
P-10	16.33	15.84	13.2	
P-11	13.66	13.15	10.6	
D6C-1s	13.55	13.39	10.9	
D6C-1d	13.28	13.14	10.9	
D6C-2	16.04	15.91	12.8	
D6C-3	13.54	13.52	11.1	
D6C-4	13.46	13.39	10.9	
D6C-5	20.01	19.97	17.5	
D6C-6	18.75	18.66	16.0	
D6C-7	12.17	12.12	9.7	
D6C-9	13.60	13.24	11.4	
SP-1 Hiawatha Blvd. canal bridge				23.14
SP-2 Conrail canal bridge				19.92

Table 3.4
Water Level Measurements
Marley Property

Well	Steel	PVC	Ground	Date of Measurement									
				10-Mar-88	11-Mar-88	12-Mar-88	14-Mar-88	15-Mar-88	21-Mar-88	18-May-88	06-Jul-88	07-Jul-88	23-Jul-88
P-1	15.27	14.72	12.4	NA	9.92	9.96	9.96	NA	9.52	9.43	NA	9.10	9.86
P-2	17.40	16.88	14.2	NA	10.04	10.49	10.49	NA	10.09	10.21	9.88	NA	10.01
P-3	15.09	14.60	12.3	NA	NA	11.45	11.45	NA	9.96	10.05	9.71	NA	9.93
P-4	14.05	13.55	11.3	NA	NA	10.96	10.96	NA	8.66	8.59	NA	8.03	8.84
P-5	17.41	16.89	14.2	NA	NA	10.34	10.34	NA	10.08	10.13	NA	9.75	9.74
P-6	14.56	14.02	11.6	NA	10.24	10.37	10.37	NA	9.91	10.07	NA	9.72	10.06
P-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-7R	14.89	14.79	11.2	NA	NA	10.33	10.33	NA	9.97	10.09	NA	NA	10.01
P-8	18.22	17.71	15.1	NA	NA	7.72	7.72	NA	7.36	7.51	NA	7.31	7.49
P-9	16.36	15.91	13.5	NA	NA	7.30	7.30	NA	7.14	7.25	NA	7.08	7.42
P-10	16.33	15.84	13.2	NA	NA	7.67	7.67	NA	7.48	7.44	NA	7.29	7.54
P-11	13.66	13.15	10.6	NA	10.14	10.25	10.25	NA	11.88	10.05	9.74	NA	9.93
D6C-15	13.55	13.39	10.9	10.34	10.24	10.39	10.39	NA	9.93	10.09	9.83	NA	10.04
D6C-19	13.28	13.14	10.9	10.35	10.22	10.34	10.34	NA	9.92	10.09	9.90	NA	10.01
D6C-2	16.04	15.91	12.8	10.48	10.34	10.49	10.49	10.47	10.08	10.21	9.91	NA	10.03
D6C-3	13.54	13.52	11.1	10.19	10.02	10.06	10.06	10.04	9.70	9.77	9.48	NA	9.94
D6C-4	13.46	13.39	10.9	10.47	10.41	10.46	10.46	10.43	10.11	10.24	NA	9.85	9.75
D6C-5	20.01	19.97	17.5	10.08	10.04	10.11	10.11	10.10	9.84	9.92	NA	9.58	9.58
D6C-6	18.75	18.66	16.0	8.16	8.07	7.99	7.99	7.93	7.77	7.87	NA	7.71	7.35
D6C-7	12.17	12.12	9.7	NA	7.38	7.44	7.44	7.30	6.84	7.13	NA	6.98	7.82
D6C-9	13.60	13.24	11.4	9.82	9.76	9.48	9.48	9.72	9.71	9.82	NA	9.66	9.56
SP-1	23.14	NA	NA	NA	NA	NA	NA	NA	NA	1.64	NA	1.49	NA
SP-2	19.92	NA	NA	NA	NA	NA	NA	NA	1.32	1.60	NA	1.37	1.78

Slug tests were performed on March 14 and 15, 1988. Wells tested included DGC-1S, DGC-1D, DGC-2, DGC-3, DGC-4, DGC-5, DGC-6, DGC-7 and DGC-9.

Slug tests involve observing the recovery of water levels toward an equilibrium level after a known volume of water has been added to, or removed from, the well casing. During slug tests, 0.5 to 1.0 gallons of deionized water (approximately 3 to 6 feet well equivalent) were quickly introduced into the well casing. A 15 psi pressure transducer set below the static water level was used to record water level recovery on a strip-chart recorder (Enviro-Labs Model DL-240 Data Logger). Thus, a chart of pressure at a specific measuring point versus time was obtained for use in calculating the hydraulic conductivity.

The rate of recovery of the water level in a well decreases exponentially with time as illustrated in Figure 3.4. On a semi-log plot, however, a straight line relationship is typically observed as shown in Figure 3.5. The slope of the straight line is related to the hydraulic conductivity of the aquifer material and well construction details such as screen length, screen diameter, and riser diameter.

All test data were analyzed using Hvorslev's (1951) method. After a logarithmic transformation of the recovery data, a best fit line is determined using simple linear regression techniques. The slope and intercept of the line are used to calculate Hvorslev's basic time lag (T_0) which is the time required for complete recovery if the original rate of recovery could be maintained. Once the time lag value is determined, the horizontal hydraulic conductivity (K_h) is calculated as:

$$K = \frac{r^2 \ln(L/R)}{2LT_0}$$

where r is the riser radius, R is the screen radius, L is the screen length, and T_0 is Hvorslev's basic time lag. This method assumes a homogeneous, isotropic, and infinite medium under unconfined conditions. Hvorslev's method is most appropriate for shallow wells screened in clean sand below the water

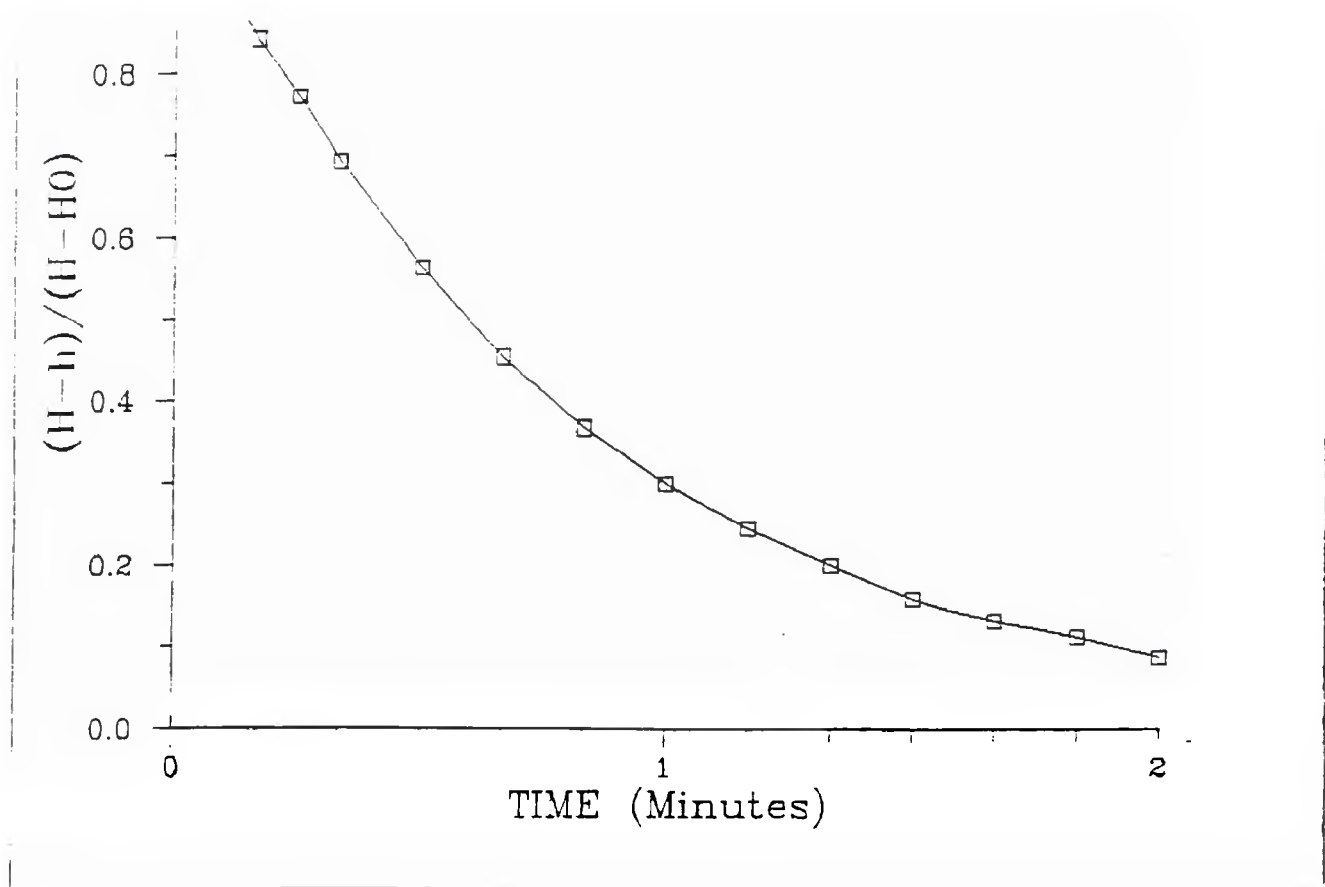


Figure 3.4: Example of water level recovery versus time for a slug test.

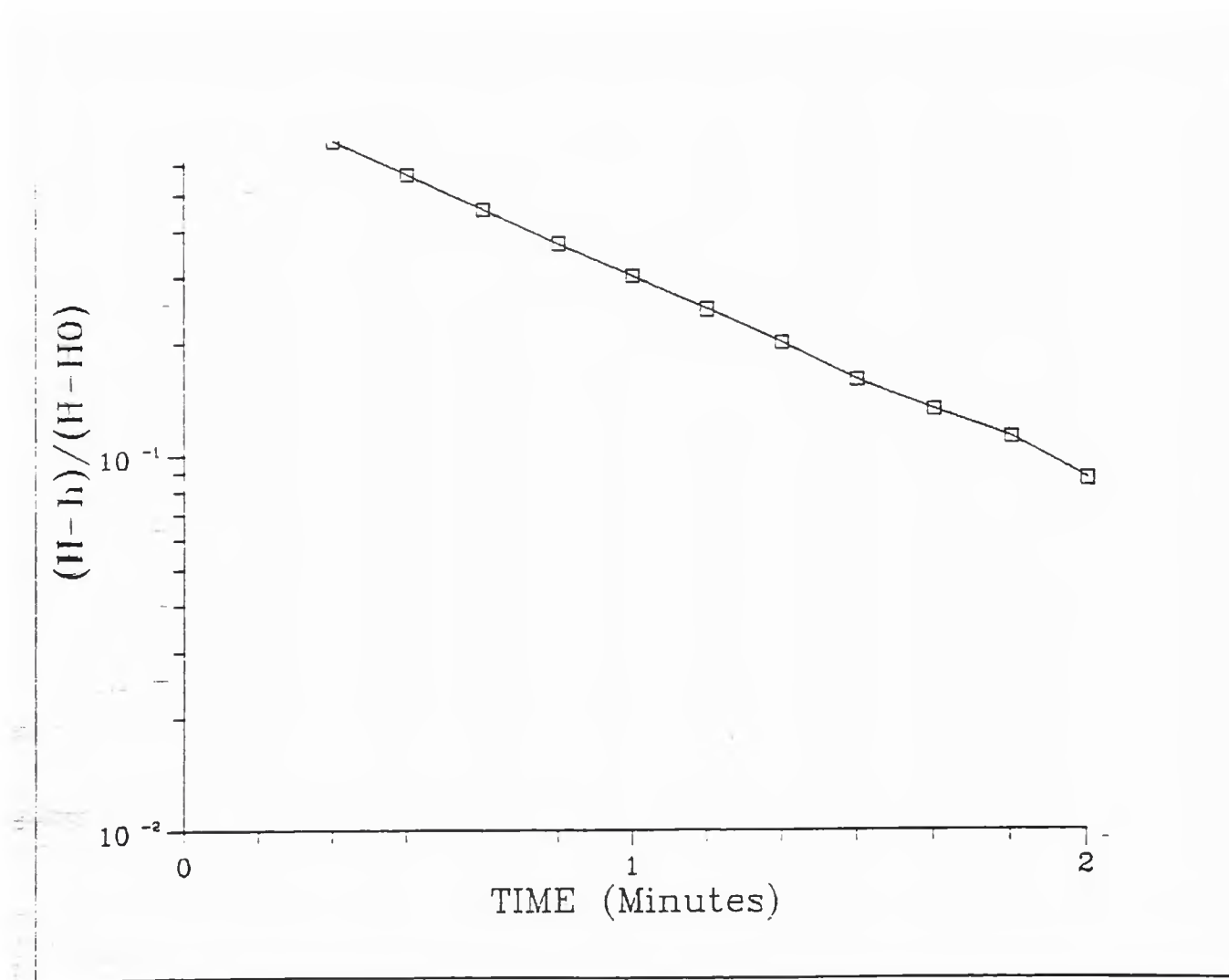


Figure 3.5: Example semi-log plot of water level recovery versus time for a slug test showing a straight line relationship.

table, but is also applicable to intermediate and deep wells screened in uniform materials. Although the method is not strictly applicable to shallow wells with screened portions above the water table or to wells screened in heterogeneous material, like some of the wells at the site, it is a useful approximation.

A summary of hydraulic conductivity test results is presented in Table 3.5. Additional information regarding the analyses, primarily output from the computer program used to aid data analysis, is presented in Appendix D.

3.8 Environmental Sampling and Analysis

3.8.1 Surface Soil Sampling

Previous investigations conducted during November and December, 1987 included surface soil sampling at twenty locations on the Marley property (Figure 3.6). Two of these locations (sampling points 2 and S-2) indicated detectable levels of PCBs. Anomalous lead levels were reported for samples from sampling points 2 and 9. Further investigations were performed to confirm or refute these findings.

During this investigation, additional grab soil samples were collected from the Marley property on four separate occasions in order to determine the extent of PCB contamination. The purpose of these samples was threefold:

1. to provide a complete area-wide sample coverage of the Marley property;
2. to provide definition of the extent of contamination around previous sample points which exhibited elevated PCB (i.e., sample points 2 and S-2); and,
3. to provide definition of the extent of contamination around previous sample points which exhibited elevated lead levels (i.e., sample

TABLE 3.5
Hydraulic Conductivity Testing Results
Marley Property

Well	Test	Hydraulic Conductivity		Material Screened
		(feet/day)	(cm/sec)	
DGC-1S	1	1.27E+01	4.47E-03	Fill
	2	1.19E+01	4.20E-03	
DGC-1D	1	8.85E+00	3.12E-03	Fill/
	2	8.30E+00	2.93E-03	Natural
DGC-2	1	9.08E+00	3.20E-03	Fill/
	2	1.17E+01	4.14E-03	Solvay
	3	1.36E+01	4.79E-03	
DGC-3	1	1.08E+02	3.80E-02	Fill/Solvay
	2	9.74E+01	3.44E-02	Natural
DGC-4	1	2.70E+01	9.54E-03	Fill/Solvay
				Natural
DGC-5	1	3.33E+01	1.17E-02	Fill
	2	3.10E+01	1.09E-02	
DGC-6	1	2.27E+01	7.99E-03	Fill
	2	2.32E+01	8.19E-03	
DGC-7	1	7.14E+00	2.52E-03	Fill
	2	8.06E+00	2.84E-03	
DGC-9	1	3.35E-01	1.18E-04	Fill/Solvay
	2	3.26E-01	1.15E-04	Natural

points 2 and 9).

On March 3 and 4, 1988, surface soil samples were collected from sampling points A through L and sampling point N (Figure 3.6) for PCB analysis to evaluate whether PCBs were present in areas of the site not previously sampled. Results of these analyses are summarized in Table 3.6 and did not reveal any additional areas of concern.

More detailed surface and shallow subsurface soil sampling was conducted on March 3 and 4, 1988 from areas around sampling point S-2 and sampling point 2R for PCB analysis (Figure 3.6). Sample locations S-2A through S-2F were sampled at depths of 0 to 0.5 feet near sampling point S-2 (Figure 3.7). Deeper samples were not obtained due to the presence of obstructions in the fill soils. Sample locations 2RA through 2RF were sampled at depths of 0 to 0.5 feet and 2.5 to 3.0 feet near sampling point 2R (Figure 3.8). To distinguish between samples obtained at different depths, samples were suffixed RS and RD for shallow and deep, respectively. Analytical results for the samples obtained on March 3 and 4, 1988 in the vicinity of sample points S-2 and 2R are summarized in Tables 3.7 and 3.8, respectively.

Sampling locations S-2A, S-2D and S-2F (Figure 3.7; Table 3.7) exhibited PCB concentrations between 10 and 50 ppm in the soil. Thus, additional samples were obtained on March 24, 1988 from S-2G through S-2N (Figure 3.7) at various depths between 0 and 3 feet and analyzed for PCBs to further delineate the extent of this area of concern. Results of these additional analyses in the vicinity of sampling point S-2 are presented in Table 3.9.

After sample collection, it was determined that sample locations 2RA through 2RF were across the dirt road from the original location of sample point 2 (Figure 3.8). Therefore, additional samples were obtained from sample locations 2A through 2F around sampling point 2 on March 24, 1988 (Figure 3.8). Samples were taken from the ground surface (0 to 0.5 feet) and from the shallow subsurface (between 1.5 and 3.0 feet) and analyzed for PCBs. Results of the shallow (RS) and deep (RD) samples are summarized in Table 3.10.

Table 3.6
Surface Soil PCB Analytical Data
Marley Property
Syracuse, New York

Dates Collected: March 3 & 4, 1988

Sample Point	Arochlor Compound						
	1016	1221	1232	1242	1248	1254	1260
A	<0.05	<0.1	<0.1	0.59	<0.05	0.78	0.68
B	<0.05	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05
C	<0.05	<0.1	<0.1	0.72	<0.05	1.5	0.35
D	<0.05	<0.1	<0.1	0.087	<0.05	0.14	<0.05
E	<0.4	<0.8	<0.8	1.2	<0.4	1.8	1.2
F	<0.4	<0.8	<0.8	1.5	<0.4	0.93	<0.4
G	<0.05	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05
H	<0.05	<0.1	<0.1	1.3	<0.05	<0.05	<0.05
I	<0.4	<0.8	<0.8	<0.4	<0.4	2.6	<0.4
J	<0.05	<0.1	<0.1	0.14	<0.05	0.32	0.18
K	<0.05	<0.1	<0.1	0.15	<0.05	0.1	<0.05
L	<0.05	<0.1	<0.1	0.097	<0.05	0.2	<0.05
N	<0.05	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05

All results in ug/g on a dry weight basis

ADD 5



LEGEND

- Surface Soil Sample, collected 12/2/87
- Grab Surface Soil Samples, used to prepare composites SS-3, collected 9/14/87
- Surface Soil Sample, collected 11/23/87
- ▲ Surface Soil Sample, collected 3/3/88
- Monitoring Well, 1987

NOTES

1987 Monitoring Wells and 12/87 Soil Sample locations are taken from C.T. Mola Associates, P.C. Drawing N° 87-575R, dated 11/30/87

All other locations are approximate

DUNN GEOSCIENCE CORPORATION
12 Metro Park Road
Albany, NY 12205

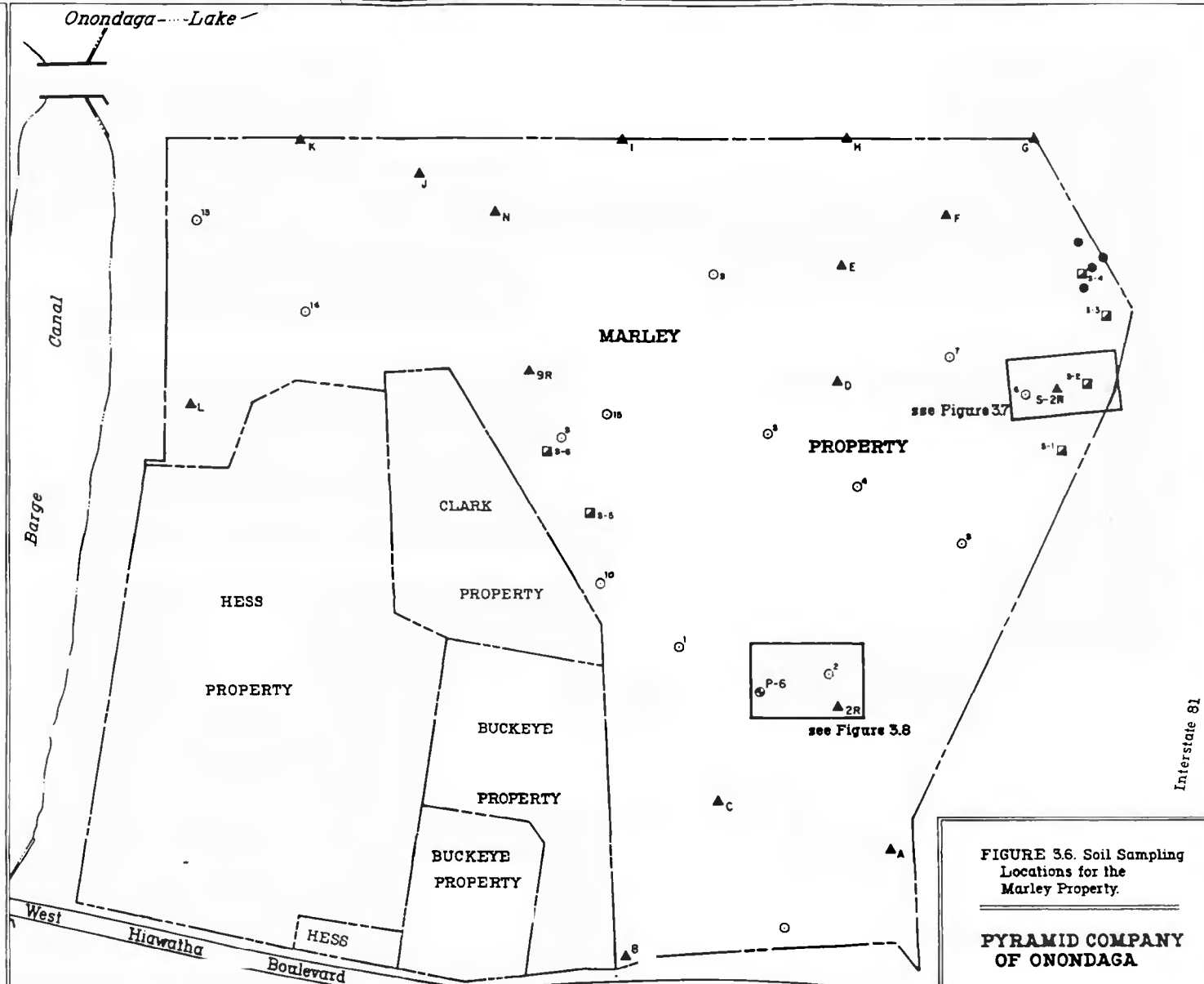
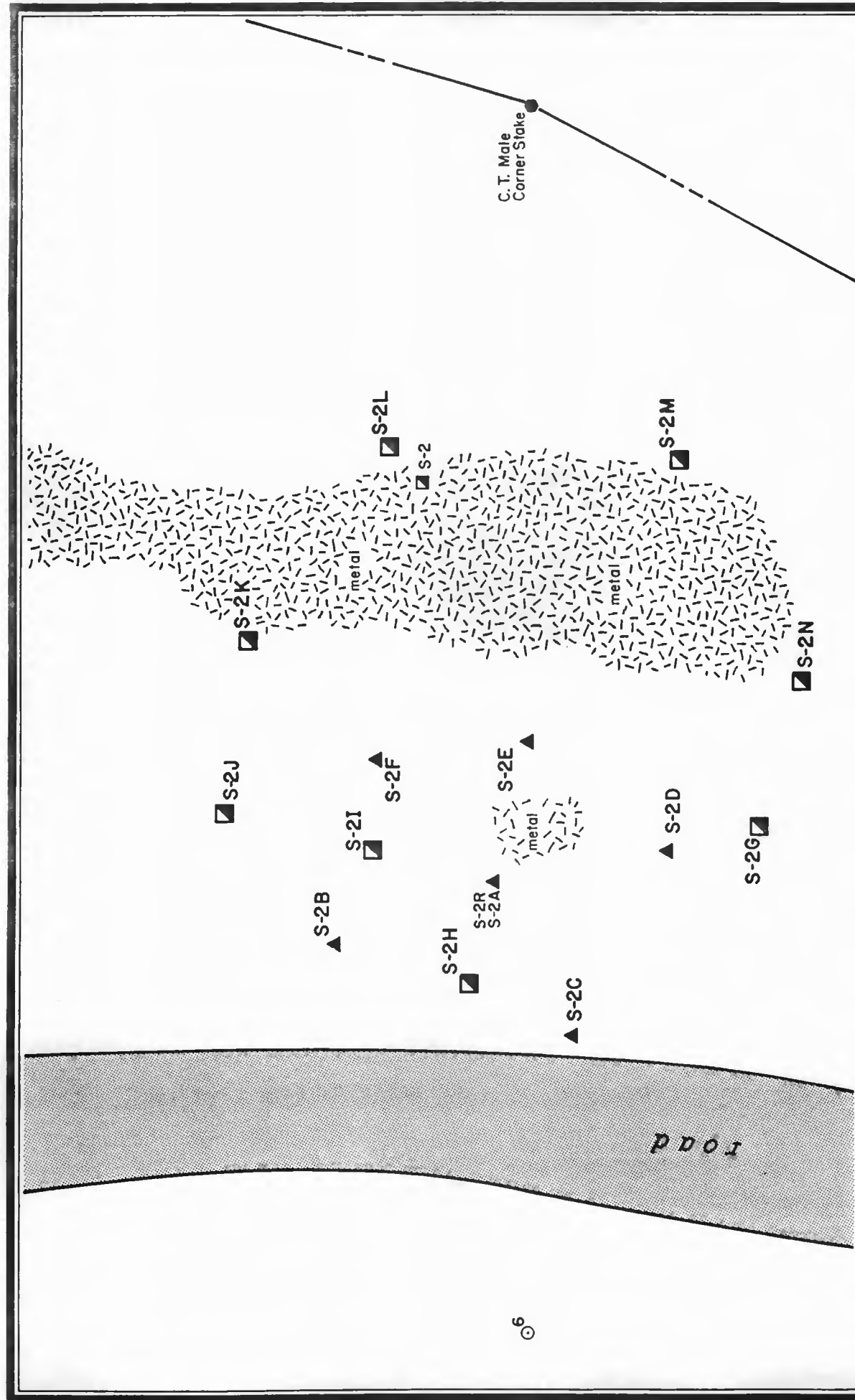


FIGURE 3.6. Soil Sampling Locations for the Marley Property.

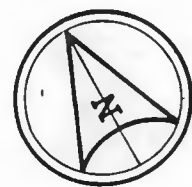
**PYRAMID COMPANY
OF ONONDAGA**

Syracuse, New York



LEGEND

- Surface Soil Sample, 12/2/87
- ◻ Surface Soil Sample, 11/23/87
- ▲ Surface Soil Sample, 3/3/88
- ◻ Soil Sample, 3/24/88



SCALE: 1" = 20'

Figure 3.7. Detailed Soil Sampling
in the S-2 and S-2R
Area, Marley Property.



LEGEND

- Monitoring Well, 1987
- Surface Soil Sample, 12/2/87
- Soil Sample, 3/24/88
- Soil Sample, 3/3/88
- Soil Sample, 3/4/88
- Soil Sample, 4/16/88

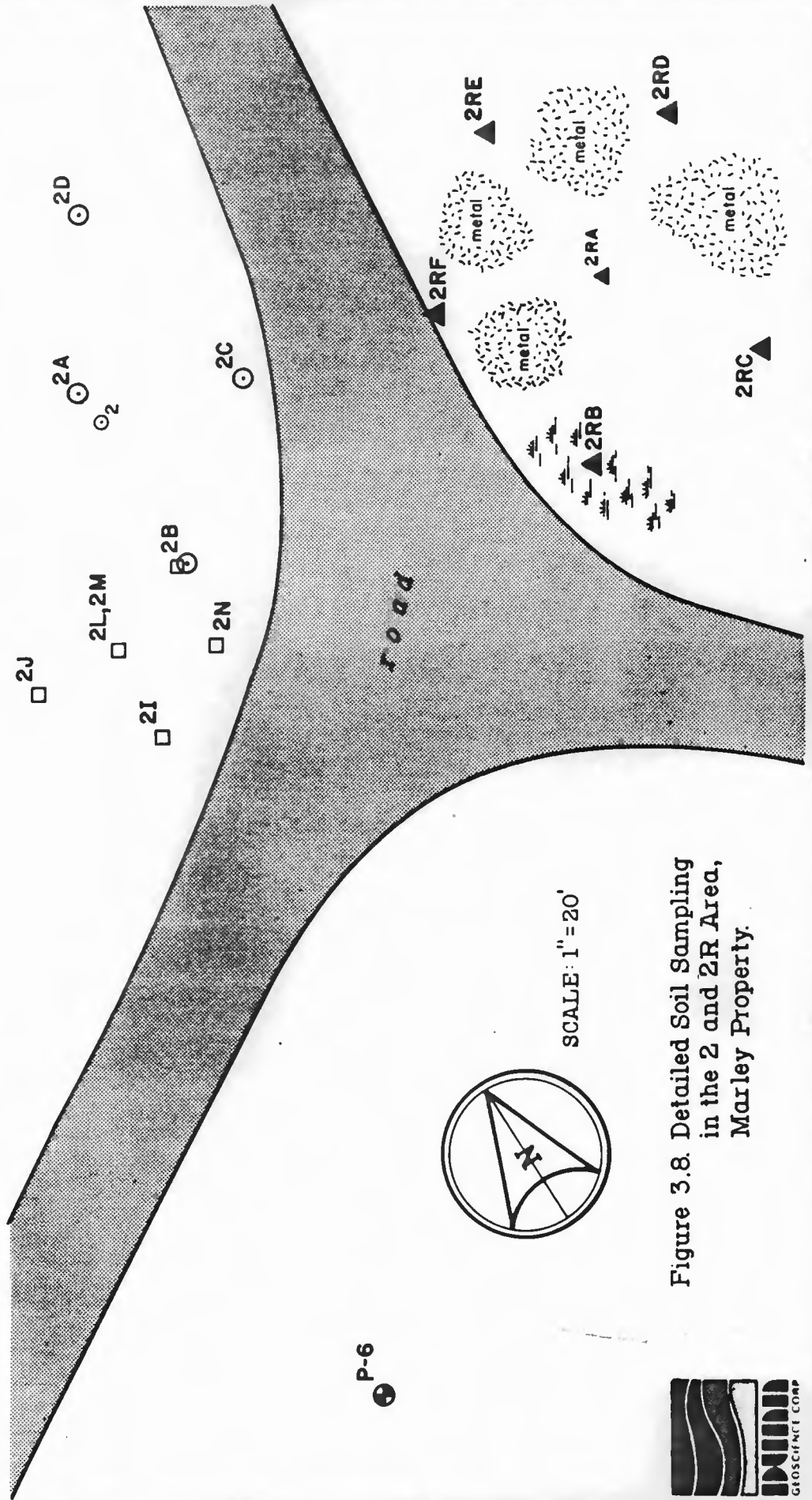


Figure 3.8. Detailed Soil Sampling in the 2 and 2R Area, Marley Property.

Table 3.7
Surface Soil PCB Analytical Data
Marley Property
Samples Around Point S-2
Syracuse, New York

Dates Collected: March 3, 1998

Sample Point	Arochlor Compound							TOTALS
	1016	1221	1232	1242	1248	1254	1260	
S-2A/0-6"	<1.0	<2.0	<2.0	11	<1.0	16	3.2	30.2
S-2B/0-6"	<0.5	<1.0	<1.0	1.5	<0.5	4.4	<0.5	
S-2C/0-6"	<0.5	<1.0	<1.0	2.4	<0.5	3.9	<0.5	
S-2D/0-6"	<0.5	<1.0	<1.0	6.0	<0.5	3.9	<0.5	
S-2E/0-6"	<0.1	<0.2	<0.2	0.42	<0.1	1.6	1.1	4.3
S-2F/0-6"	<1.0	<2.0	<2.0	14	<1.0	16	13	

All results in ug/g on a dry weight basis

Table 3.8
Surface Soil PCB Analytical Data
Marley Property
Samples Around Points 2R
Syracuse, New York

Dates Collected: March 3-4, 1988

Sample Point	Arochlor Compound						
	1016	1221	1232	1242	1248	1254	1260
2RA-RS/0-6"	<0.1	<0.2	<0.2	0.64	<0.1	2.0	1.1
2RA-RD/30-36"	<0.2	<0.4	<0.4	<0.2	<0.2	<0.2	0.33
2RB-RS/0-6"	<0.05	<0.1	<0.1	<0.05	<0.05	0.21	<0.05
2RB-RD/30-36"	<0.05	<0.1	<0.1	<0.05	<0.05	0.45	<0.05
2RC-RS/0-6"	<0.5	<1.0	<1.0	2.2	<0.5	2.4	0.78
2RC-RD/30-36"	<0.05	<0.1	<0.1	<0.05	<0.05	0.19	<0.05
2RD-RS/0-6"	<0.05	<0.1	<0.1	0.28	<0.05	0.75	0.13
2RD-RD/30-36"	<0.05	<0.1	<0.1	0.12	<0.05	<0.05	0.34
2RE-RS/0-6"	<0.05	<0.1	<0.1	0.17	<0.05	0.058	0.6
2RE-RD/30-36"	<4.0	<8.0	<8.0	<4.0	<4.0	<4.0	<4.0
2RF-RS/0-6"	<0.05	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05
2RF-RD/30-36"	<0.05	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05

All results in ug/g on a dry weight basis

Table 3.9
Surface Soil PCB Analytical Data
Marley Property
Samples Around Point S-2
Syracuse, New York

Dates Collected: March 24, 1988

Sample Point	Arochlor Compound						
	1016	1221	1232	1242	1248	1254	1260
S-2B/0-6"	<0.2	<0.4	<0.4	<0.2	2.1	<0.2	3.9
S-2B/12"	<0.05	<0.1	<0.1	<0.05	0.25	<0.05	0.39
S-2B/18"	<1.0	<2.0	<2.0	<1.0	4.6	<1.0	16.0
S-2H/0-6"	<1.0	<2.0	<2.0	<1.0	13.0	<1.0	20.0
S-2I/0-6"	<1.0	<2.0	<2.0	<1.0	18.0	<1.0	27.0
S-2I/12"	<1.0	<2.0	<2.0	<1.0	11.0	<1.0	16.0
S-2J/0-6"	<1.0	<2.0	<2.0	<1.0	11.0	<1.0	25.0
S-2K/0-6"	<1.0	<2.0	<2.0	<1.0	<1.0	6.3	<1.0
S-2K/18"	<0.05	<0.1	<0.1	<0.05	<0.05	0.083	<0.05
S-2L/0-6"	<1.0	<2.0	<2.0	<1.0	<1.0	7.3	<1.0
S-2L/24"	<0.05	<0.1	<0.1	<0.05	<0.05	0.10	<0.05
S-2M/0-6"	<0.05	<0.1	<0.1	<0.05	<0.05	0.22	<0.05
S-2M/12"	<0.05	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05
S-2N/0-6"	<1.0	<2.0	<2.0	<1.0	<1.0	6.5	<1.0
S-2N/12"	<1.0	<2.0	<2.0	<1.0	<1.0	5.3	<1.0
S-2N/24"	<1.0	<2.0	<2.0	<1.0	3.2	2.0	<1.0
S-2N/36"	<1.0	<2.0	<2.0	<1.0	1.4	<0.1	1.0

All results in ug/g on a dry weight basis

Shallow samples at locations 2A and 2B indicated PCB isomer 1248 at 33 ppm and 310 ppm, respectively. Hence, additional samples 2G through 2N (Figure 3.8) were collected on April 16, 1988 to further define the lateral and vertical extent of PCB contamination. Results are summarized in Table 3.11.

Relative to lead, composite samples were collected for lead analyses from three locations. Samples were collected at sampling points 2R and 9R on March 3, 1988, and at sampling point 2 on March 24, 1988 (Figure 3.6). Results are summarized in Table 3.12.

All surface soil samples were collected using a hand trowel. Subsurface samples were collected using an auger and/or shovel. All of the aforementioned sampling equipment was decontaminated with pesticide-grade hexane and distilled water between sampling events.

All soil samples (surface and shallow subsurface) were analyzed for PCBs employing EPA Method 8080. RECRA Environmental, Inc. of Tonawanda, New York performed all PCB analyses on all the surface and subsurface soil samples collected. In addition, RECRA Environmental, Inc. performed total (EPA Method 7000 series) and EP Toxicity lead analysis on selected soil samples. Appendix E contains the laboratory reporting forms for all surface soil samples from the Marley property and laboratory quality assurance/quality control information. Data pertaining to other properties has been deleted from Appendix E but is included in other reports.

3.8.2 Groundwater Sampling

Monitoring wells on the Marley property were sampled on March 21 through March 23, 1988. A minimum of three well volumes were evacuated from each well prior to sampling. This evacuation was accomplished using a Fuji pump and dedicated 0.5-inch I.D. polyethylene tubing. Three well volumes could not be excavated from well DGC-9; this well was pumped until dry and allowed to recover prior to sampling. Samples were obtained using clean, dedicated PVC bailers. Samples were placed in sample containers supplied by the laboratory, labeled and placed

Table 3.10
Surface Soil PCB Analytical Data
Marley Property
Samples Around Point 2
Syracuse, New York

Dates Collected: March 24, 1988

Sample Point	Arochlor Compound						
	1016	1221	1232	1242	1248	1254	1260
2A-RS/0-6"	<5.0	<10.0	<10.0	<5.0	33	<5.0	<5.0
2A-RD/30-36"	<0.05	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05
2B-RS/0-6"	<25.0	<50.0	<50.0	<25.0	310*	<25.0	<25.0
2B-RD/30-36"	<0.05	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05
2C-RS/0-6"	<0.5	<1.0	<1.0	<0.5	3.0	<0.5	1.7
2C-RD/18"	<0.05	<0.1	<0.1	<0.05	0.16	<0.05	0.31
2D-RS/0-6"	<0.5	<1.0	<1.0	<0.5	2.6	<0.5	2.5
2D-RD/30"	<0.05	<0.1	<0.1	<0.05	0.14	<0.05	0.24
2E-RS/0-6"	<1.0	<2.0	<2.0	<1.0	15.0	8.1	<1.0
2E-RD/24"	<0.05	<0.1	<0.1	<0.05	0.081	<0.05	0.08
2F-RS/0-6"	<0.2	<0.4	<0.4	<0.2	1.1	1.8	<0.2
2F-RD/30"	<0.05	<0.1	<0.1	<0.05	<0.05	<0.05	0.093

*Reanalyses 170ppm, 160ppm, 240ppm

All results in ug/g on a dry weight basis

Table 3.11
Surface Soil PCB Analytical Data
Marley Property
Samples Around Point 2
Syracuse, New York

Dates Collected: April 16, 1988

Sample Point	Arochlor Compound						
	1016	1221	1232	1242	1248	1254	1260
2B-RS/0-6"	<0.3	<0.5	<0.5	<0.3	3.8	<0.3	4.4
2G-RS/0-6"	<0.5	<0.1	<0.1	<0.05	1.5	<0.05	1.6
2G-RD/16-22"	<0.05	<0.1	<0.1	<0.05	0.43	<0.05	1.1
2H-RS/0-6"	<3.0	<5.0	<5.0	<3.0	<3.0	50.0	<3.0
2H-RD/15-21"	<0.05	<0.1	<0.1	<0.05	2.3	1.0	<0.05
2I-RS/0-6"	<0.3	<0.5	<0.5	<0.3	3.7	<0.3	3.9
2I-RD/15-13"	<0.05	<0.1	<0.1	<0.05	<0.05	<0.05	0.21
2J-RS/0-6"	<0.05	<0.1	<0.1	<0.05	1.2	<0.05	2.6
2J-RD/15-18"	<0.05	<0.1	<0.1	<0.05	<0.05	<0.05	0.11
2K-RS/0-6"	<0.05	<0.1	<0.1	<0.05	<0.05	<0.05	0.52
2K-RD/16-22"	<0.05	<0.1	<0.1	<0.05	<0.05	<0.05	0.13
2L-RS/0-6"	<1.0	<2.0	<2.0	<1.0	3.1	<1.0	22.0
2N-RS/0-6"	<3.0	<5.0	<5.0	<3.0	<3.0	<3.0	44.0
2N-RD/0-6"	<1.0	<2.0	<2.0	<0.5	1.0	<0.5	9.0

All results in ug/g on a dry weight basis

Table 3.12
 Surface Soil Lead Analytical Data
 Marley Property
 Syracuse, New York

TEST	Pt 2 3/24 ----	Pt 2R 3/4 -----	Pt 9R 3/4 -----
Total Lead	730	40	46
EP Toxicity	<0.06	0.07	0.10

All values in parts per million

on ice for transport. Chain of custody records were maintained.

Erco Laboratory (Enseco, Inc.) of Cambridge, Massachusetts performed all chemical analysis for groundwater samples obtained in March, 1988. The analytical program for this sampling event is discussed below.

All groundwater samples obtained from wells on the Marley property were measured in the field for pH, temperature, specific conductivity and turbidity. Results are summarized in Table 3.13.

Groundwater samples were also analyzed for volatile organics via EPA Method 624. Duplicate samples were analyzed for wells DGC-1S and DGC-7. Two field blanks and one trip blank were also analyzed. Results are presented in Table 3.14.

Selected groundwater samples were analyzed for pesticides and PCBs via EPA Method 608. Samples were analyzed from P-6, P-11, DGC-1S, DGC-1D, DGC-2, DGC-3, DGC-4, and DGC-7. No pesticides or PCBs were detected in any of the groundwater samples from the Marley property. No summary table is provided but laboratory reporting forms are included in Appendix F.

Selected groundwater samples were also analyzed for semi-volatile organics and base neutral extractables via EPA Method 625. Samples were analyzed from DGC-1S, DGC-1D, and DGC-4. Both filtered and unfiltered samples were analyzed from DGC-4. Results are summarized in Table 3.15.

Groundwater samples collected from P-6, DGC-1S, DGC-1D, DGC-3, and DGC-4 were also analyzed for priority pollutant metals via EPA Method 7000 series. Results are summarized in Table 3.16 which includes results from one field blank.

Finally, all of the groundwater samples from the Marley property were analyzed for petroleum hydrocarbons. The analytical procedure used was the U.S. Coast Guard Hydrocarbon Fingerprinting Spill Identification System. Results are

Table 3.13
Field Measurements of Selected Groundwater Properties
Marley Property
March 21-23, 1988

Monitoring Well Number	pH (Standard Units)		Temp (C)		Specific Conductance (umhos)		Turbidity (NTU)	
	3/21	3/23	3/21	3/23	3/21	3/23	3/21	3/23
P-1	8.9		4.0		550		>200	
P-2	6.7		6.0		1250		>200	
P-3	11.0		5.0		1700		84	
P-6	5.2		5.0		400		>200	
P-11	6.0		4.5		850		100	
D6C-1S	6.0		5.0		700		>200	
D6C-1D	6.1		5.0		700		>200	
D6C-2	6.3		6.0		700		116	
D6C-3	6.4		4.5		440		72	
D6C-4		6.7		7.0		600		5.3
D6C-5	6.2		6.0		470		192	
D6C-6	8.2		6.0		350		116	
D6C-7	6.2		6.0		600		>200	
D6C-9		7.2		7.0		1000		>200

Table 3.14
Volatile Organic Groundwater Analytical Data
Marley Property
March 21-23, 1988

Hazardous Substance List (HSL) - Volatile Organics
EPA Method 624

Compound	RL	P-1	RL	P-2	RL	P-3	RL	P-6	RL	P-11	RL	DGC-151	RL	DGC-151 (DUP.)
Chloromethane	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND
Bromomethane	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND
Vinyl Chloride	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND
Chloroethane	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND
Methylene Chloride	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND
Acetone	25	ND	25	ND	25	ND	25	ND	25	ND	25	ND	25	ND
Carbon Disulfide	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
1,1-Dichloroethylene	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
1,1-Dichloroethane	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
1,2-Trans-Dichloroethylene	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Chloroform	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
1,2-Dichloroethane	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
2-Butanone	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND
1,1,1-Trichloroethane	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Carbon Tetrachloride	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Vinyl Acetate	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND
Bromodichloromethane	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
1,2-Dichloropropane	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
1,3-Trans-Dichloropropane	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Trichloroethylene	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Dibromochloromethane	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
1,1,2 Trichloroethane	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Benzene	2	ND	2	13	2	4.5	2	11	2	ND	2	2.4	2	5.2
1,3-Cis-Dichloropropane	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
2-Chloroethyl vinyl ether	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND
Bromoforn	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
4-Methyl-2-Pentanone	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND
2-Hexanone	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND
1,1,2,2-Tetrachloroethane	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Tetrachloroethylene	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Toluene	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Chlorobenzene	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Ethyl Benzene	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Styrene	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Total Xylenes	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND

All values expressed in ug/l (ppb).

ND = Not Detected
RL = Reporting Limit
FB = Field Blank
TB = Trip Blank

Table 3.14 (continued)
Volatile Organic Groundwater Analytical Data
Marley Property
March 21-23, 1988

Hazardous Substance List (HSL) - Volatile Organics
EPA Method 624

Compound	DGC-7		RL	DGC-9		RL	FB-1	FB-2		RL	TB
	RL	(DUP.)		RL				RL			
Chloromethane	5	ND	5	ND	5	ND	5	39	5	ND	
Bromomethane	5	ND	5	ND	5	ND	5	ND	5	ND	
Vinyl Chloride	5	ND	5	ND	5	ND	5	ND	5	ND	
Chloroethane	5	ND	5	ND	5	ND	5	ND	5	ND	
Methylene Chloride	5	ND	5	ND	5	ND	5	480	5	ND	
Acetone	25	ND	25	89	25	ND	25	ND	25	ND	
Carbon Disulfide	2	ND	2	ND	2	ND	2	ND	2	ND	
1,1-Dichloroethylene	2	ND	2	ND	2	ND	2	ND	2	ND	
1,1-Dichloroethane	2	ND	2	ND	2	ND	2	ND	2	ND	
1,2-Trans-Dichloroethylene	2	ND	2	3.2	2	ND	2	ND	2	ND	
Chloroform	2	ND	2	ND	2	ND	2	ND	2	ND	
1,2-Dichloroethane	2	ND	2	ND	2	ND	2	ND	2	ND	
2-Butanone	10	ND	10	ND	10	ND	10	ND	10	ND	
1,1,1-Trichloroethane	2	ND	2	ND	2	ND	2	ND	2	ND	
Carbon Tetrachloride	2	ND	2	ND	2	ND	2	ND	2	ND	
Vinyl Acetate	10	ND	10	ND	10	ND	10	ND	10	ND	
Bromodichloromethane	2	ND	2	ND	2	ND	2	ND	2	ND	
1,2-Dichloropropane	2	ND	2	ND	2	ND	2	ND	2	ND	
1,3-Trans-Dichloropropene	2	ND	2	ND	2	ND	2	ND	2	ND	
Trichloroethylene	2	ND	2	ND	2	ND	2	ND	2	ND	
Dibromochloromethane	2	ND	2	ND	2	ND	2	ND	2	ND	
1,1,2 Trichloroethane	2	ND	2	ND	2	ND	2	ND	2	ND	
Benzene	2	ND	2	6.8	2	ND	2	ND	2	ND	
1,3-Cis-Dichloropropene	2	ND	2	ND	2	ND	2	ND	2	ND	
2-Chloroethyl vinyl ether	10	ND	10	ND	10	ND	10	ND	10	ND	
Bromoform	2	ND	2	ND	2	ND	2	ND	2	ND	
4-Methyl-2-Pentanone	10	ND	10	ND	10	ND	10	ND	10	ND	
2-Hexanone	10	ND	10	ND	10	ND	10	ND	10	ND	
1,1,2,2-Tetrachloroethane	2	ND	2	ND	2	ND	2	ND	2	ND	
Tetrachloroethylene	2	ND	2	ND	2	ND	2	ND	2	ND	
Toluene	2	ND	2	4.8	2	ND	2	ND	2	ND	
Chlorobenzene	2	ND	2	ND	2	ND	2	ND	2	ND	
Ethyl Benzene	2	ND	2	ND	2	ND	2	ND	2	ND	
Styrene	2	ND	2	ND	2	ND	2	ND	2	ND	
Total Xylenes	2	ND	2	ND	2	ND	2	ND	2	ND	

All values expressed in ug/l (ppb).

ND = Not Detected

RL = Reporting Limit

FB = Field Blank

TB = Trip Blank

Table 3.14 (continued)
Volatile Organic Groundwater Analytical Data
Marley Property
March 21-23, 1988

Hazardous Substance List (HSL) - Volatile Organics
EPA Method 624

Compound	RL	DGC-1D	RL	DGC-2	RL	DGC-3	RL	DGC-4	RL	DGC-5	RL	DGC-6	RL	DGC-7
Chloromethane	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND
Bromomethane	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND
Vinyl Chloride	5	ND	5	ND	5	ND	5	ND	5	ND	5	130	5	ND
Chloroethane	5	ND	5	ND	5	ND	5	ND	5	ND	5	4.4	5	ND
Methylene Chloride	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND
Acetone	25	ND	25	ND	25	ND	25	ND	25	ND	25	ND	25	ND
Carbon Disulfide	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
1,1-Dichloroethylene	2	ND	2	ND	2	ND	2	ND	2	ND	2	3.5	2	ND
1,1-Dichloroethane	2	ND	2	ND	2	ND	2	ND	2	ND	2	28	2	ND
1,2-Trans-Dichloroethylene	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Chloroform	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
1,2-Dichloroethane	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
2-Butanone	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND
1,1,1-Trichloroethane	2	ND	2	ND	2	ND	2	ND	2	ND	2	41	2	ND
Carbon Tetrachloride	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Vinyl Acetate	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND
Bromodichloromethane	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
1,2-Dichloropropane	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
1,3-Trans-Dichloropropene	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Trichloroethylene	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Dibromochloromethane	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
1,1,2-Trichloroethane	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Benzene	2	ND	2	3.3	2	ND	2	ND	2	ND	2	5.0	2	ND
1,3-Cis-Dichloropropene	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
2-Chloroethyl vinyl ether	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND
Bromoform	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
4-Methyl-2-Pentanone	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND
2-Hexanone	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND	10	ND
1,1,2,2-Tetrachloroethane	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Tetrachloroethylene	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Toluene	2	ND	2	ND	2	ND	2	ND	2	ND	2	4.6	2	ND
Chlorobenzene	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Ethyl Benzene	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Styrene	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND	2	ND
Total Xylenes	2	ND	2	ND	2	ND	2	ND	2	ND	2	4.2	2	ND

All values expressed in ug/l (ppb).

ND = Not Detected
RL = Reporting Limit
FB = Field Blank
TB = Trip Blank

summarized in Table 3.17.

The laboratory reporting forms for all groundwater analyses for the Marley property, including quality assurance/quality control information, are included in Appendix F. Data pertaining to other properties has been deleted from Appendix F but is included in other reports.

Table 3.15
Semi-Volatile Organic Groundwater Analytical Data
Marley Property
March 21-23, 1988

Hazardous Substance List (HSL) - Semivolatile Organics and Base Neutrals
EPA Method 625

Compound	RL	DGC-1S	RL	DGC-1D	RL	DGC-4	RL	DGC-4*
Phenol	10	26	10	ND	10	ND	10	ND
bis(2-Chloroethyl)ether	10	ND	10	ND	10	ND	10	ND
2-Chlorophenol	10	ND	10	ND	10	ND	10	ND
1,3-Dichlorobenzene	10	ND	10	ND	10	ND	10	ND
1,4-Dichlorobenzene	10	ND	10	ND	10	ND	10	ND
Benzyl Alcohol	10	ND	10	ND	10	ND	10	ND
1,2-Dichlorobenzene	10	ND	10	ND	10	ND	10	ND
2-Methylphenol	10	ND	10	ND	10	ND	10	ND
bis(2-Chloroisopropyl)ether	10	ND	10	ND	10	ND	10	ND
4-Methylphenol	10	ND	10	ND	10	ND	10	ND
N-Nitrosodi-n-propylamine	10	ND	10	ND	10	ND	10	ND
Hexachloroethane	10	ND	10	ND	10	ND	10	ND
Nitrobenzene	10	ND	10	ND	10	ND	10	ND
Isophorone	10	ND	10	ND	10	ND	10	ND
2-Nitrophenol	10	ND	10	ND	10	ND	10	ND
2,4-Dimethylphenol	10	ND	10	ND	10	ND	10	ND
Benzoic Acid	50	ND	50	ND	50	ND	50	ND
bis(2-Chloroethoxy)methane	10	ND	10	ND	10	ND	10	ND
2,4-Dichlorophenol	10	ND	10	ND	10	ND	10	ND
1,2,4-Trichlorobenzene	10	ND	10	ND	10	ND	10	ND
Naphthalene	10	ND	10	ND	10	ND	10	ND
4-Chloroaniline	10	ND	10	ND	10	ND	10	ND
Hexachlorobutadiene	10	ND	10	ND	10	ND	10	ND
4-Chloro-3-methylphenol	10	ND	10	ND	10	ND	10	ND
2-Methylnaphthalene	10	ND	10	ND	10	ND	10	ND
Hexachlorocyclopentadiene	10	ND	10	ND	10	ND	10	ND
2,4,6-Trichlorophenol	10	ND	10	ND	10	ND	10	ND
2,4,5-Trichlorophenol	50	ND	50	ND	50	ND	50	ND
2-Chloronaphthalene	10	ND	10	ND	10	ND	10	ND
2-Nitroaniline	50	ND	50	ND	50	ND	50	ND

All values expressed in ug/l (ppb).

ND = Not Detected
RL = Reporting Limit
* = Filtered Sample

Table 3.15 (continued)
Semi-Volatile Organic Groundwater Analytical Data
Marley Property
March 21-23, 1988

Hazardous Substance List (HSL) - Semivolatile Organics and Base Neutrals
EPA Method 625

Compound	RL	DGC-1S	RL	DGC-1D	RL	DGC-4	RL	DGC-4*
Dimethyl phthalate	10	ND	10	ND	10	ND	10	ND
Acenaphthylene	10	ND	10	ND	10	ND	10	ND
3-Nitroaniline	50	ND	50	ND	50	ND	50	ND
Acenaphthene	10	ND	10	ND	10	ND	10	ND
2,4-Dinitrophenol	50	ND	50	ND	50	ND	50	ND
4-Nitrophenol	50	ND	50	ND	50	ND	50	ND
Dibenzofuran	10	ND	10	ND	10	ND	10	ND
2,4-Dinitrotoluene	10	ND	10	ND	10	ND	10	ND
2,6-Dinitrotoluene	10	ND	10	ND	10	ND	10	ND
Diethyl phthalate	10	ND	10	ND	10	ND	10	ND
4-Chlorophenyl phenyl ether	10	ND	10	ND	10	ND	10	ND
Fluorene	10	ND	10	ND	10	ND	10	ND
4-Nitroaniline	50	ND	50	ND	50	ND	50	ND
4,6-Dinitro-2-methylphenol	50	ND	50	ND	50	ND	50	ND
N-Nitrosodiphenylamine	10	ND	10	ND	10	ND	10	ND
4-Bromophenyl phenyl ether	10	ND	10	ND	10	ND	10	ND
Hexachlorobenzene	10	ND	10	ND	10	ND	10	ND
Pentachlorophenol	50	ND	50	ND	50	ND	50	ND
Phenanthrene	10	ND	10	ND	10	ND	10	ND
Anthracene	10	ND	10	ND	10	ND	10	ND
Di-n-butyl phthalate	10	ND	10	ND	10	ND	10	ND
Fluoranthene	10	ND	10	ND	10	ND	10	ND
Pyrene	10	ND	10	ND	10	ND	10	ND
Butyl benzyl phthalate	10	ND	10	ND	10	ND	10	ND
3,3'-Dichlorobenzidine	20	ND	20	ND	20	ND	20	ND
Benzo(a)anthracene	10	ND	10	ND	10	ND	10	ND
bis(2-Ethylhexyl)phthalate	10	ND	10	TR	10	TR	10	TR
Chrysene	10	ND	10	ND	10	ND	10	ND
Di-n-octyl phthalate	10	ND	10	ND	10	ND	10	ND
Benzo(b)fluoroanthene	10	ND	10	ND	10	ND	10	ND
Benzo(k)fluoroanthene	10	ND	10	ND	10	ND	10	ND
Benzo(a)pyrene	10	ND	10	ND	10	ND	10	ND
Indeno(1,2,3-c,d)pyrene	10	ND	10	ND	10	ND	10	ND
Dibenzo(a,h)anthracene	10	ND	10	ND	10	ND	10	ND
Benzo(ghi)perylene	10	ND	10	ND	10	ND	10	ND

All values expressed in ug/l (ppb).

ND = Not Detected

RL = Reporting Limit

TR = Trace concentrations detected below the reporting limit
= Filtered Sample

Table 3.16
Priority Pollutant Metals Groundwater Analytical Data
Marley Property
March 21-23, 1988

Compound	RL	P-6	RL	DGC-1S	RL	DGC-1D	RL	DGC-3	RL	DGC-4	RL	FB-1
Antimony	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND
Arsenic	0.003	0.0033	0.003	0.0058	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Beryllium	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Cadmium	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Chromium	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND
Copper	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND
Lead	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Mercury	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.04	ND	0.04	ND	0.04	ND	0.04	ND	0.04	ND	0.04	ND
Selenium	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Silver	0.005	0.0052	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Thallium	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Zinc	0.01	0.016	0.01	0.012	0.01	ND	0.01	0.015	0.01	ND	0.01	0.012

All values expressed in mg/l (ppm).

ND = Not Detected

RL = Reporting Limit

FB = Field Blank

Table 3.17
 Petroleum Hydrocarbon Groundwater Analytical Data
 Marley Property
 March 21-23, 1988

Monitoring Well Number	Total Petroleum Hydrocarbon (ng/L)	Qualitative Identification *
P-1	3	LO/PAH
P-2	2.5	LO
P-3	8.6	LO
P-6	12	LO/PAH
P-11	4.8	LO/PAH
DGC-1S/X-1	23/14	LO/PAH
DGC-1D	5.4	LO
DGC-2	8.7	LO/FO
DGC-3	18	LO/PAH
DGC-4	3.8	LO
DGC-5	10	LO/FO
DGC-6	17	LO/PAH
DGC-7	2.9/3.0	LO
DGC-9	30	G/LO

X = Blind Duplicate
 LO = Lubricating Oil
 PAH = Polynuclear Aromatic Hydrocarbons
 FO = Fuel Oil
 G = Gasoline

* The sample has GC/FID characteristics that are similar to one of the above materials.

4.0 GEOLOGIC CONDITIONS

4.1 Regional Geology

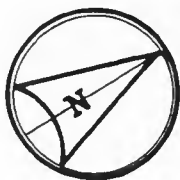
The proposed Carousel Center Mall site, including the Marley property, is located in the Erie-Ontario Lowland physiographic province. Landforms in this province are primarily the result of erosion of flat lying sedimentary rocks and subsequent Wisconsin glaciation. Onondaga Lake and the Marley property are located within a glacially-scoured trough-shaped bedrock valley which trends northwest-southeast.

The bedrock underlying the Marley property is the Vernon Formation of Late Silurian age. The Vernon Formation is a thick unit consisting predominantly of green and red silty shales and minor salt beds. Bedrock at the proposed mall site occurs at considerable depth. Previous engineering soil borings (Section 2.1, Engineering Investigations) sampled to 220 feet have failed to confirm the depth to bedrock. However, high blow counts, split-spoon refusal, and increased shale fragment content in the deeper samples suggests that bedrock ranges from approximately 100 to 225 feet below grade on the eastern and western portions of the proposed mall site, respectively. This is consistent with the expected shape of the buried glacial valley as expressed by the physiography of the area.

The unconsolidated materials overlying bedrock at the proposed mall site are lacustrine in origin. These materials are generally silt and clay. Logs from deep borings indicate progressive fining from silt to clay with increasing depth. At depths of 160 to 180 feet, however, sands and gravels are encountered beneath the clays and, presumably, overlie bedrock.

4.2 Site Geology

A series of three geologic cross-sections, located on Figure 4.1, were prepared to depict the shallow subsurface stratigraphy at the Marley property. Data from the DUNN borings (Appendix A) and from selected borings drilled under JEB



0 200 400
SCALE IN FEET

LEGEND

- Monitoring Well installed by JEB Consultants (1987)
- Monitoring Well installed by Dunn Geoscience Corp. (1988)
- A—A' Geologic Cross Section

NOTES

1987 Monitoring Wells and property line locations are taken from C.T. Mole Associates, PC Drawing No. 87-575R, dated 11/30/87.

1988 Monitoring Well locations were surveyed by Dunn Geoscience, 3/15/88.

All other locations are approximate.

DUNN GEOSCIENCE CORPORATION
12 Metro Park Road
Albany, N.Y. 12205

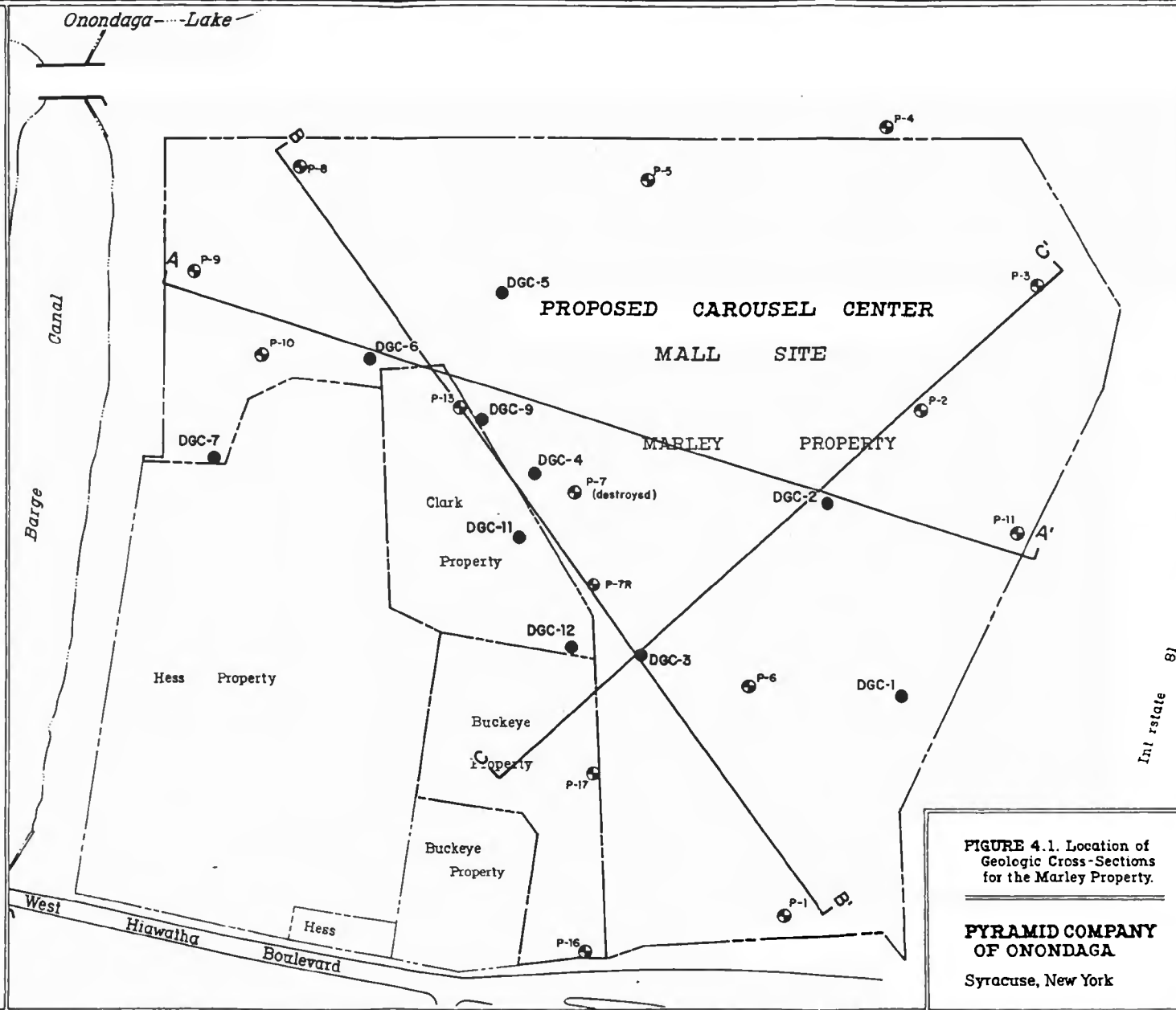


FIGURE 4.1. Location of Geologic Cross-Sections for the Marley Property.

PYRAMID COMPANY
OF ONONDAGA

Syracuse, New York

Consultants supervision (Section 2.2, Environmental Investigations) were used to prepare these sections. Section AA' (Figure 4.2) traverses the property from the southwest side to the northeast. Section BB' (Figure 4.2) traverses from the west to the east. Section CC' (Figure 4.3) extends from the Buckeye property south of the Marley property (including JEB boring P-18 on the Buckeye property) northward to the northern corner of the Marley property.

The general soil stratigraphy observed consists of man-emplaced fill materials overlying a naturally-occurring sequence of glacial lake (glaciolacustrine) and post glacial lake and marsh deposits.

Fill materials form the uppermost soil unit and cover the entire property. Fill can be classified as mixed fill and Solvay waste. The mixed fill generally overlies the Solvay waste, where it is present, although some interlayering of these materials occurs as illustrated on the cross-sections (Figures 4.2 and 4.3). The mixed fill consists of variable proportions of soil materials (gravel, sand, silt and clay) and man-made debris and rubble. The debris and rubble is typical construction and demolition waste, such as brick, concrete, scrap metal, wood and glass.

The white to gray clay, silty clay, and clayey silt referred to as "Solvay waste" was encountered beneath the mixed fill in most of the borings on the western and central parts of the Marley property. Solvay waste is a white, chalky-textured, alkaline material composed of clay-sized and silt-sized particles that is a by-product of sodium carbonate production using the Solvay process. The waste is primarily composed of mineral salts, particularly calcium chloride and calcium carbonate. The term "Solvay waste" is used herein to refer to the white and white-gray fill material having the characteristics listed above. This terminology is used to be consistent with earlier reports and subsurface investigations.

As noted in the boring logs (Appendix A) and shown on the cross-sections (Figures 4.2 and 4.3), Solvay waste occurs primarily in its "pure" form in both thick and thin layers and, less often, as a solvay-soil mixture, typically in

thin layers. Although not included in any of the cross-sections, boring DGC-7 (Appendix A) exhibited Solvay waste in four layers, ranging from 0.8 to 2.65 feet thick, interbedded with silty fill at the base of the fill section. In most borings, Solvay waste directly overlies natural lacustrine sediments. Figure 4.4 is an isopach map of total thickness of fill materials, including both the mixed fill and Solvay subunits.

Figure 4.5 is an isopach map of Solvay thickness only. Both these maps were prepared using the logs of the DGC borings (Appendix A), which were continuously sampled and logged by a DUNN hydrogeologist and the P-series borings (Section 2.2, Environmental Investigations). The P-series borings were not continuously sampled and were logged by JEB Consultants; therefore, some interpretation by DUNN hydrogeologists was necessary.

The total fill thickness (Figure 4.4) ranges from approximately 5 feet at borings P-7R adjacent to the Clark property to over 20 feet in two areas on the Marley property. Fill thickness reaches 24 feet at boring P-2 which is situated in the vicinity of the small former pond. Fill thickness also exceeds 20 feet in the portion of the property west of boring DGC-6. The 18-foot and 20-foot fill thickness contours (Figure 4.4) roughly correspond to the former position of Onondaga Creek (Figure 1.3). Greater fill thicknesses west of this line suggest that the western streambanks and point bars of the former creek were excavated several feet below the original land surface and subsequently backfilled.

The Solvay waste is thickest along the northwest border of the Marley property (Figure 4.5). Little or no Solvay waste was observed in borings in the eastern portion of the site, covering much of the area east of boring DGC-5. Solvay waste was also not observed in boring P-10; however, sampling in this boring was not continuous (i.e., two-foot split-spoon samples were collected every five feet), so Solvay layers may have been present but not observed.

The various fill materials overly glaciolacustrine and post-glaciolacustrine sediments. The top of the glaciolacustrine sediments typically contains roots,

Onondaga Lake



LEGEND

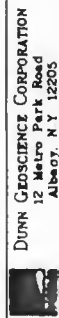
- Monitoring Well installed by JEB Consultants (1987)
- Monitoring Well installed by Dunn Geoscience Corp. (1988)
- 4.2' Thickness of fill measured in boring

NOTES

1987 Monitoring Wells and property line locations are taken from C.T. Mole Associates, P.C. Drawing N9 87-575R, dated 11/30/87.

1988 Monitoring Well locations were surveyed by Dunn Geoscience, 3/15/88.

All other locations are approximate.



DUNN GEOSCIENCE CORPORATION
12 Metro Park Road
Albany, N.Y. 12205

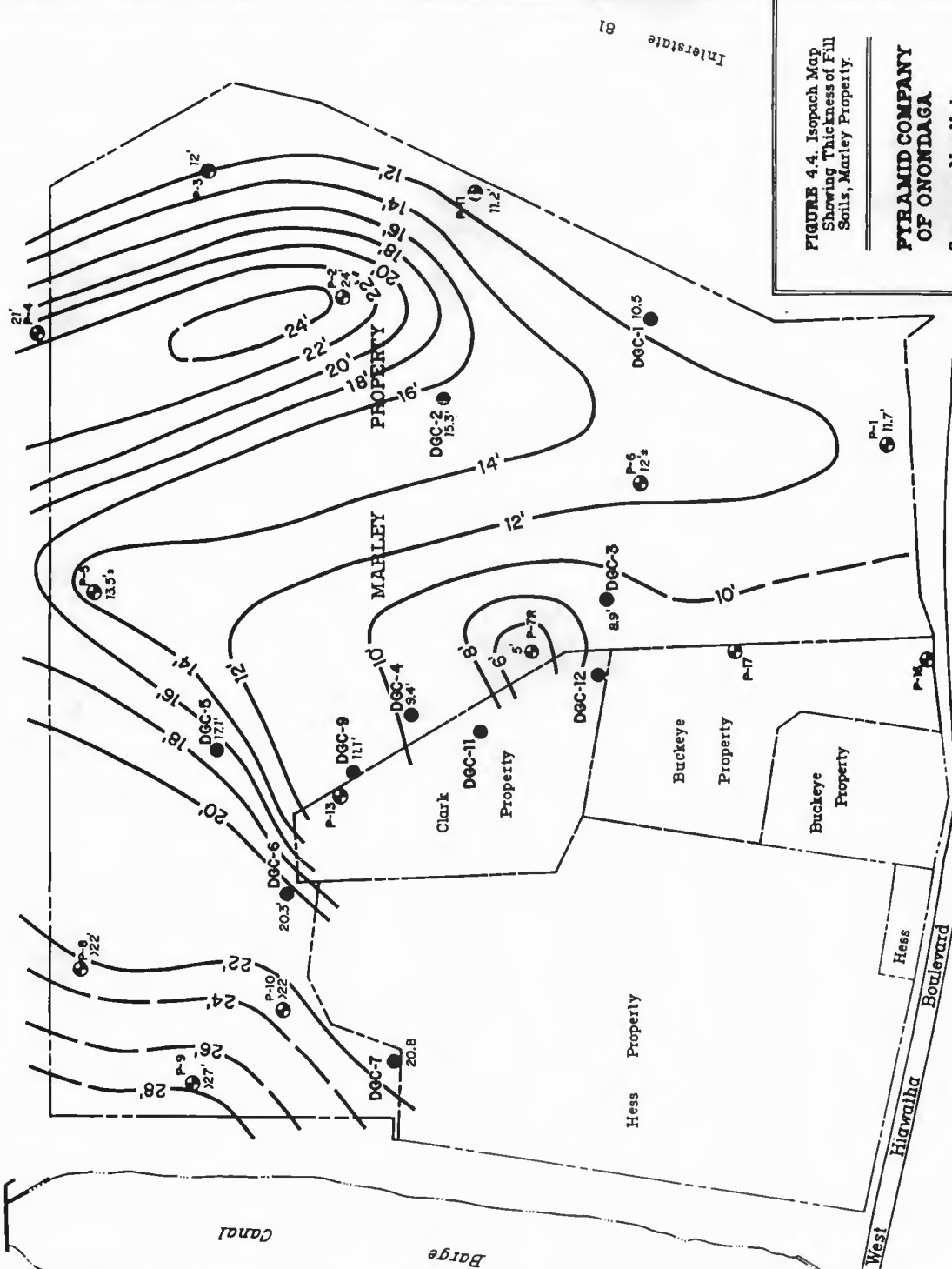


FIGURE 4.4. Isopach Map
Showing Thickness of Fill
Soils, Marley Property.

PYRAMID COMPANY
OF ONONDAGA
SYRACUSE, New York

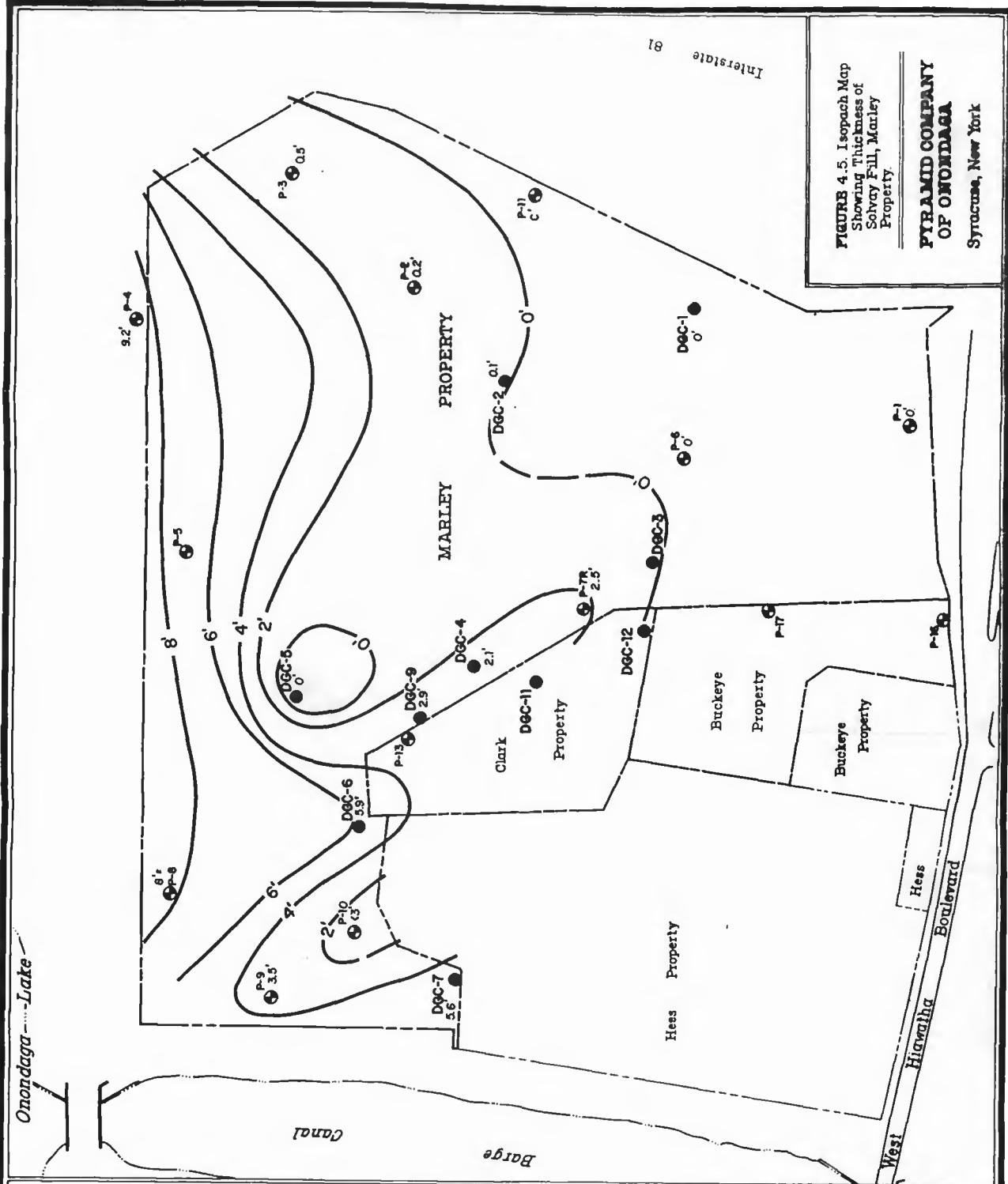
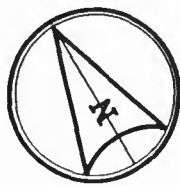


FIGURE 4.5. Isopach Map
Showing Thickness of
Solvay Fill, Marley
Property

PYRAMID COMPANY
OF ONONDAGA
Syracuse, New York



LEGEND

- Monitoring Well installed by JES Consultants (1987)
- Monitoring Well installed by Dunn Geoscience Corp. (1988)
- 4.2' Thickness of Solvay fill measured in borehole

NOTES

1987 Monitoring wells and property line locations are taken from C.T. Mole Associates, P.C. Drawing NY 87-575R, dated 11/30/87.

1988 Monitoring Well locations were surveyed by Dunn Geoscience, 3/15/88.

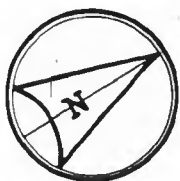
All other locations are approximate.

DUNN GEOSCIENCE CORPORATION
12 Metro Park Road
Albany, N.Y. 12205

shells or an occasional layer of brown peat. Samples of the upper lacustrine sequence generally have a marshy organic odor, indicative of decaying vegetation. Lacustrine sediments were observed in various colors, predominantly shades of gray and less often brown or green. Textures range from clayey and silty coarse to fine sands to silt and clay, in alternating layers and strata in the upper lacustrine sequence. Some of the silts and clays are varved; others are mottled. Based on sample penetration resistance, the upper lacustrine sediment consistencies range from very soft to hard.

Figure 4.6 is a contour map of the elevation of the top of the lacustrine sediments based on the City of Syracuse datum. This map reveals the location of the former pond and former east bank of Onondaga Creek in much the same fashion as Figure 4.4, as previously discussed.

The deeper engineering borings from previous investigations (Section 2.1, Engineering Investigations) indicate that most of the glaciolacustrine sequence below the top few feet sampled in this study consists of silt and clay.



0 200 400
SCALE IN FEET

LEGEND

- Monitoring Well installed by JEB Consultants (1987)
- Monitoring Well installed by Dunn Geoscience Corp. (1988)
- 4.2' Elevation of top of natural lacustrine sediment (from City of Syracuse datum) measured in boring

NOTES

1987 Monitoring Wells and property line locations are taken from C.T. Male Associates, PC Drawing N° 87-575R, dated 11/30/87.

1988 Monitoring Well locations were surveyed by Dunn Geoscience, 3/15/88.

All other locations are approximate



DUNN GEOSCIENCE CORPORATION
12 Metro Park Road
Albany, N.Y. 12205

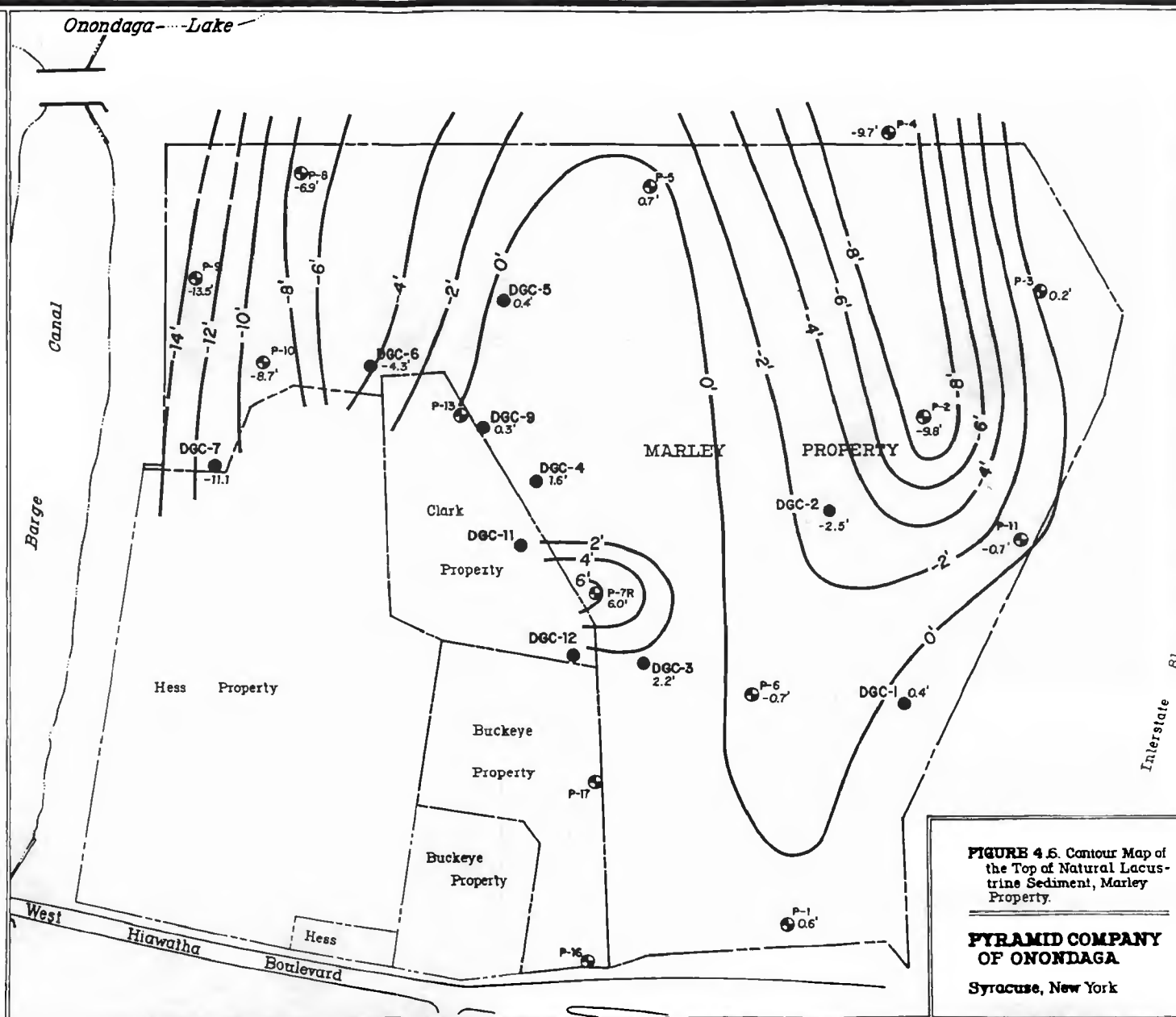


FIGURE 4.5. Contour Map of the Top of Natural Lacustrine Sediment, Marley Property.

PYRAMID COMPANY OF ONONDAGA

Syracuse, New York

5.0 HYDROGEOLOGIC CONDITIONS

5.1 Regional Hydrogeology

The proposed mall site is located in a large groundwater discharge area. Local and regional groundwater flow is toward Onondaga Lake and its major tributaries. The salt marsh and salt springs which existed at the mall site prior to filling activities are indicative of upward flow of groundwater through the lacustrine sediments toward the discharge zone.

The thick sequence of lacustrine silts and clays beneath the Marley property form an effective aquitard. The lower permeabilities of these sediments and upward hydraulic gradients preclude deep groundwater contamination problems resulting from surface activities and, therefore, limit the depth of required investigative efforts.

The sands and gravels which occur deep beneath the proposed mall site (i.e., in excess of 150 feet below grade) form a buried aquifer of unknown areal extent. Wells tapping this horizon reportedly flow indicating upward gradients and artesian conditions as expected. Groundwater from this permeable zone is reportedly saline.

Groundwater in the area is, from both unconsolidated materials and bedrock and is not used as water supply due to high salinity. The City of Syracuse uses Skaneateles Lake and Lake Ontario for its water supply.

5.2 Site Hydrogeology

5.2.1 General

As discussed in Section 4.2, Site Geology, the surficial materials at the site consist of mixed fill with Solvay wastes overlying lacustrine sands, silts, and clays. The fill is generally 10 to 25 feet thick. The underlying lacustrine deposit becomes progressively finer with depth.

Groundwater occurs at shallow depths on the Marley property. Depth to groundwater is typically less than five feet in the center of the property. The depth to groundwater increases slightly toward the eastern, southern, and western boundaries where groundwater occurs up to eight feet below grade.

Groundwater occurs under unconfined conditions with the water table surface occurring within the fill materials. Groundwater flow generally occurs within the fill and uppermost portion of the lacustrine deposit. The deeper portions of the lacustrine deposit are much less permeable and form an aquitard.

Recharge to the shallow flow system is by precipitation, augmented in areas by surface water drainage pathways. The groundwater discharges to Onondaga Lake and the Barge Canal.

5.2.2 Hydraulic Characteristics

Slug test results presented in Section 3.7, Hydraulic Conductivity Testing, indicate widely varying hydraulic conductivities in wells on the Marley property. Calculated horizontal hydraulic conductivities range from 0.33 to 107.79 feet/day. Because all of the wells tested are partially or entirely screened in fill materials, these results indicate considerable heterogeneity in the hydraulic characteristics of the fill.

Five monitoring wells are entirely screened within fill without Solvay waste layers (i.e., DGC-1S, DGC-2, DGC-5, DGC-6 and DGC-7). The hydraulic conductivities measured in these wells range from 7.14 to 33.26 feet/day.

No testing was done to specifically determine the hydraulic characteristics of the Solvay wastes. However, the clayey nature of this waste suggests that its permeability is low. Additionally, where the waste was hydraulically emplaced, permeabilities in the horizontal direction would likely be several times greater than in the vertical direction due to layering, as exhibited in the boring logs.

The lower permeability of Solvay waste is in part supported by slug test results for DGC-9. Well DGC-9 has a short screen (i.e., 3 feet), over 60% of which is in Solvay waste. The measured hydraulic conductivity in this well was 0.33 feet/day, the lowest measured in wells on the Marley property.

No wells were entirely screened in the glaciolacustrine materials. However, the composition of these materials is variable, ranging from silty sands to silty clays, and the hydraulic characteristics are expected to vary accordingly.

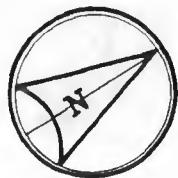
5.2.3 Groundwater Flow System

Water level elevation data were collected on several dates as presented in Table 3.4. Data were collected for the period from March to July, 1988. Data for newly constructed wells prior to March 14, 1988 predate thorough well development and may not be representative of groundwater conditions. Hydrographs prepared for these wells indicate water level changes immediately following drilling activities.

Water level data from the well cluster (i.e., DGC-1S and DGC-1D) can be used to assess vertical flow components within the fill. Both of these wells are screened primarily in fill. The water levels in each are similar. However, the water level elevation in DGC-1S is typically 0.03 to 0.05 feet above that in DGC-1D indicative of a slight downward gradient normally associated with recharge. Groundwater flow within the fill is, however, primarily horizontal.

Water level data collected from shallow wells on March 12, March 21, and May 18, 1988, were used to construct water table contour maps. These maps are presented in Figures 5.1, 5.2 and 5.3, respectively.

Assuming an isotropic medium (i.e., hydraulic properties such as hydraulic conductivity independent of direction at any given location), groundwater flow is perpendicular to the water table contours in the direction of decreasing head (i.e., water level elevation). Thus, based on Figures 5.1 to 5.3, groundwater flow is generally directed radially away from a mound located in the central portion of the Marley property toward areas of discharge. Onondaga



0 200 400
SCALE IN FEET

LEGEND

- Monitoring Well, 1987
- Monitoring Well, 1988
- Groundwater Contour

NOTES

1987 Monitoring Wells and property line locations are taken from C.T. Mole Associates, P.C. Drawing N° 87-575R, dated 11/30/87.

1988 Monitoring Well locations were surveyed by Dunn Geoscience, 3/15/88.

All other locations are approximate

DUNN GEOSCIENCE CORPORATION
12 Metro Park Road
Albany, N.Y. 12205

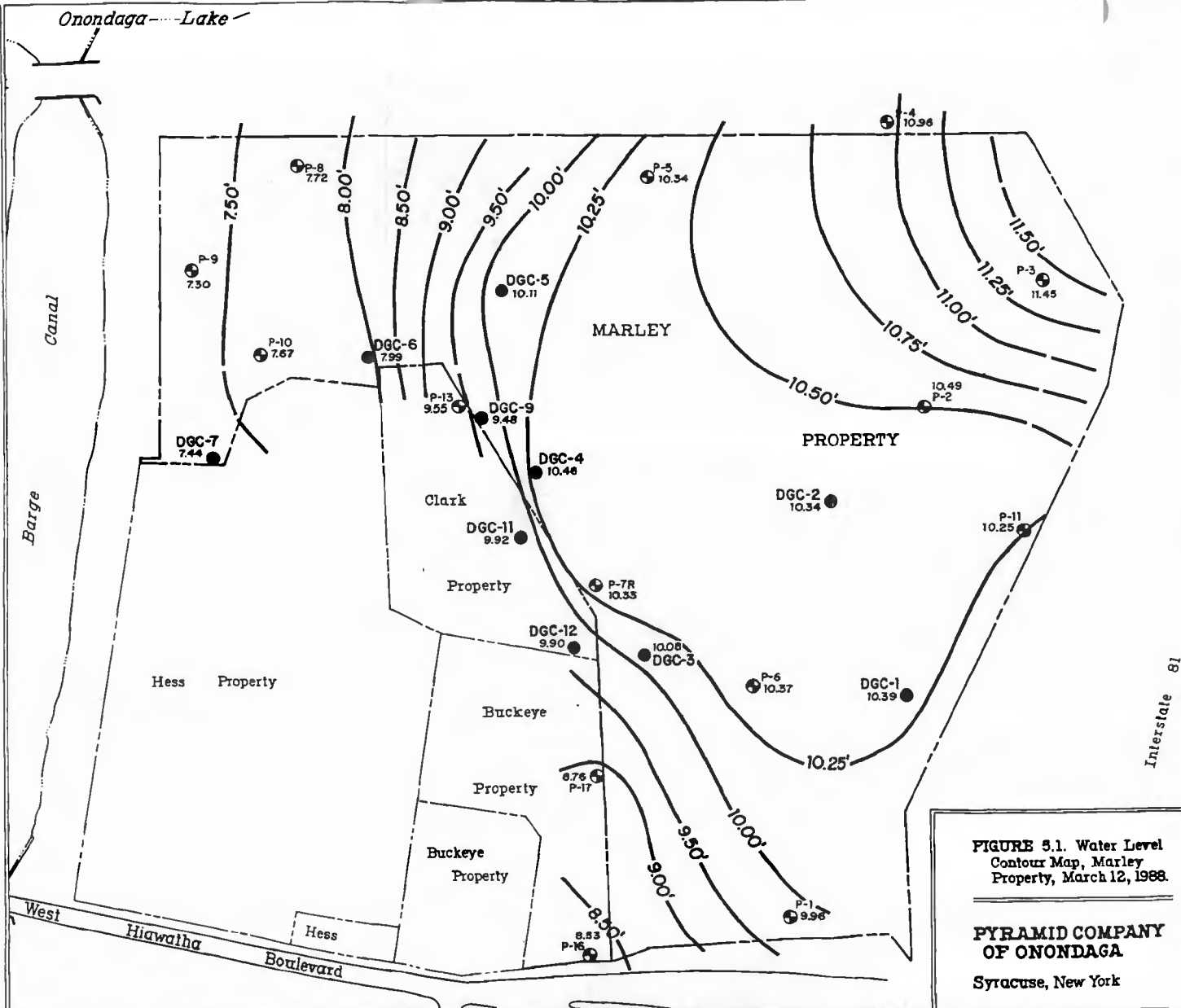
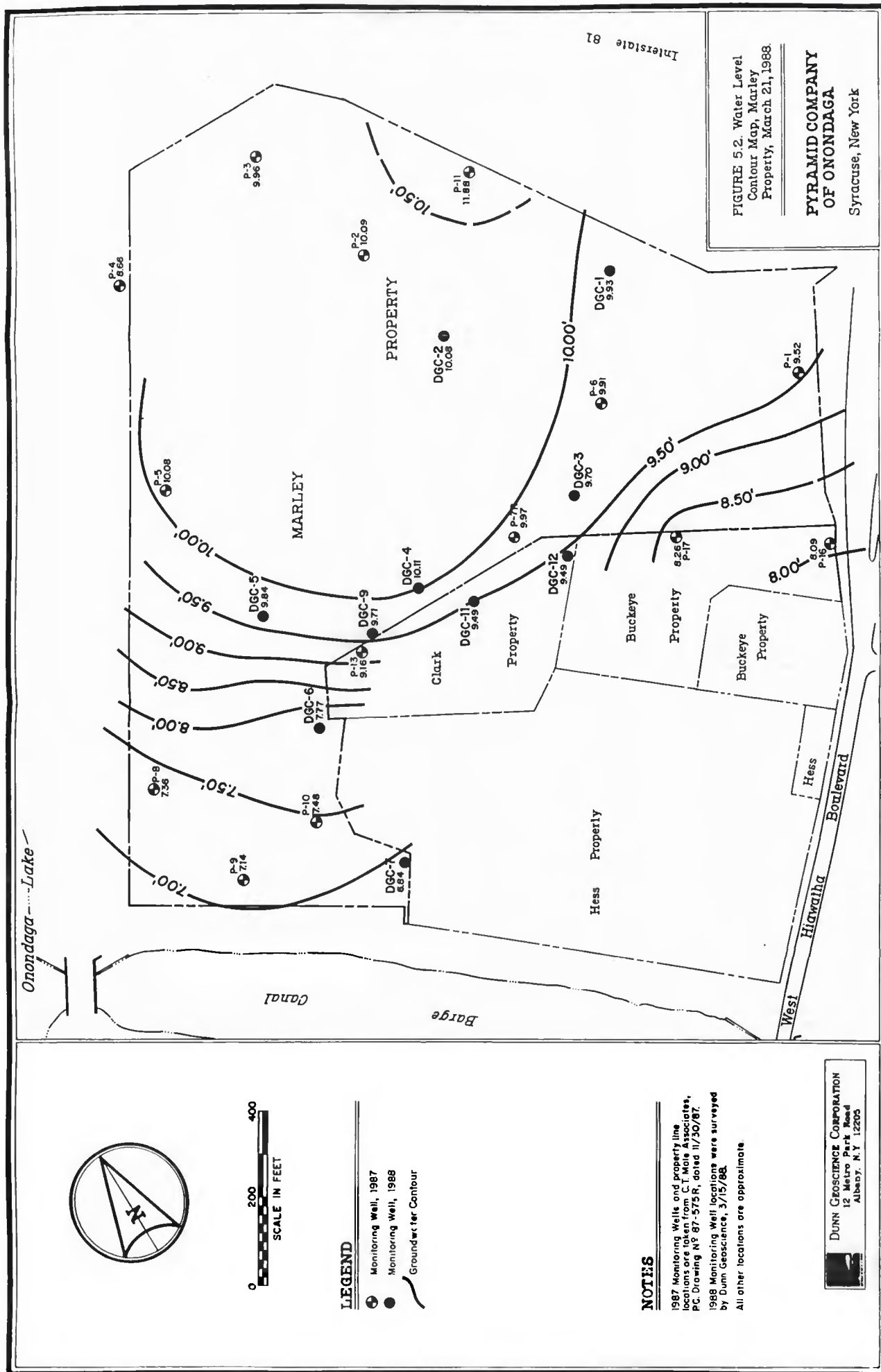


FIGURE 5.1. Water Level Contour Map, Marley Property, March 12, 1988.

PYRAMID COMPANY OF ONONDAGA
Syracuse, New York



Onondaga Lake



LEGEND

- Monitoring Well, 1987
- Monitoring Well, 1988
- Groundwater Contour

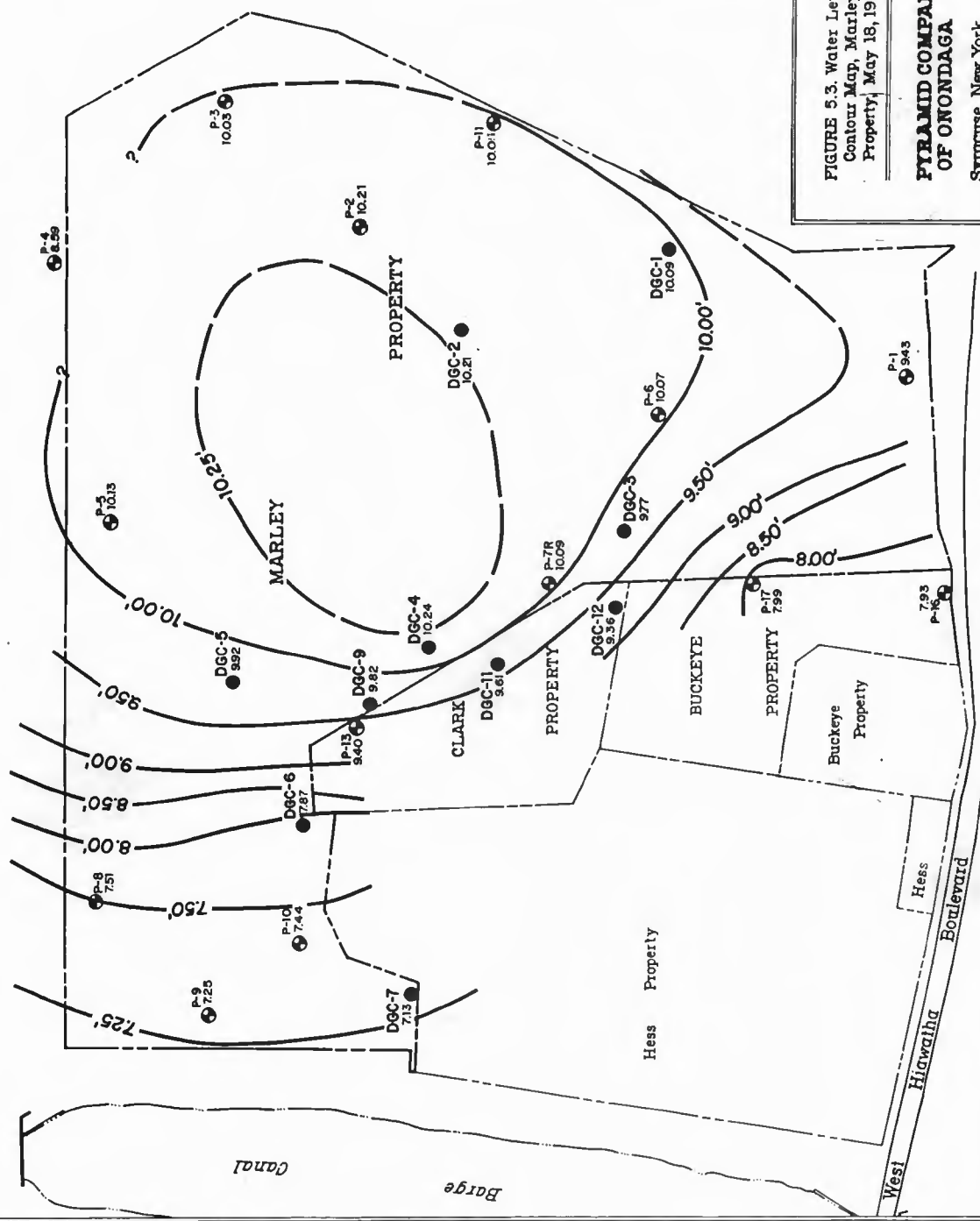
NOTES

1987 Monitoring Wells and property line locations are taken from C.T. Mole Associates, P.C. Drawing N° 87-575R, dated 11/30/87.
1988 Monitoring Well locations were surveyed by Dunn Geoscience, 3/15/88.
All other locations are approximate

DUNN GEOSCIENCE CORPORATION
12 Metro Park Road
Albany, N.Y. 12205

FIGURE 5.3. Water Level
Contour Map, Marley
Property, May 18, 1988.

PYRAMID COMPANY
OF ONONDAGA
Syracuse, New York



Onondaga Lake

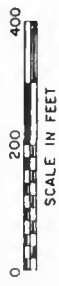
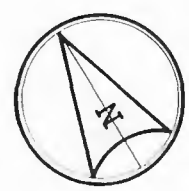
Canal

Barge

Interstate 81

FIGURE 5.4. Three Point Calculations for the Marley Property.

PYRAMID COMPANY
OF ONONDAGA
Syracuse, New York



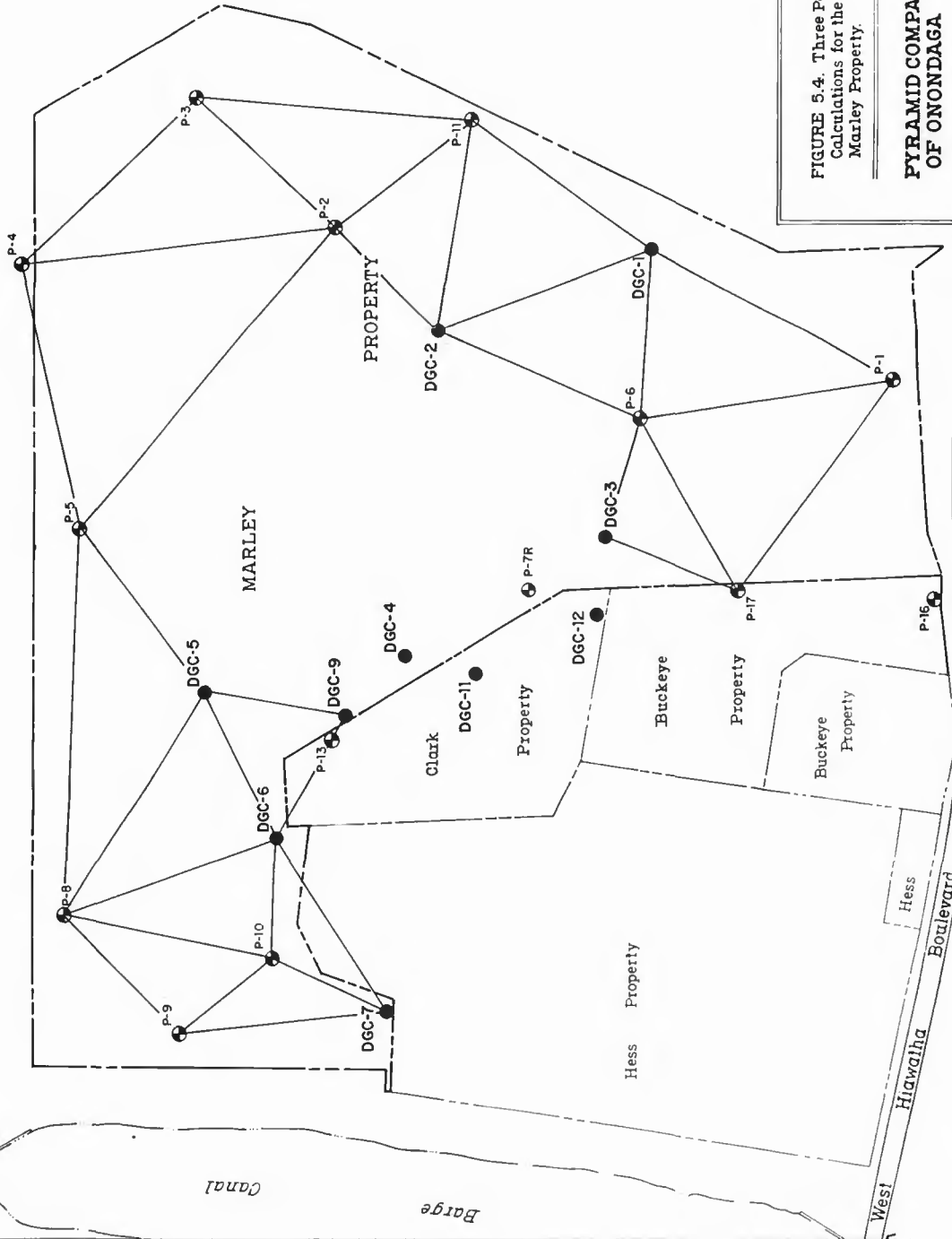
LEGEND

- Monitoring Well, 1987
- Monitoring Well, 1988

NOTES

1987 Monitoring wells and property line locations are taken from C. T. Mole Associates, P.C. Drawing N° 87-575 R, dated 11/30/87.
1988 Monitoring Well locations were surveyed by Dunn Geoscience, 3/15/88.
All other locations are approximate.

DUNN GEOSCIENCE CORPORATION
12 Metro Park Road
Albany, NY 12205



Lake to the west and the Barge Canal to the south form the primary discharge areas to which most of the groundwater at the Marley property flows. The small ditch along the northern property boundary also seems to act as a discharge zone. Groundwater contour maps from March 12, and May 18, 1988 (Figures 5.1 and 5.3, respectively) show flow to the north toward this ditch at these times.

The water table configuration on March 21, 1988 (Figure 5.2) shows groundwater flow in the northern part of the property is to the south toward the Barge Canal. The elevated water level in P-11 at this date may be due to surface water drainage off Interstate 81 which augments recharge in this area. Thus, changes in hydraulic gradient occur after rainfall events in the northern portion of the Marley property.

Three point methods were employed to quantify hydraulic gradients at the Marley property and support the water table mapping efforts. This method, whether graphical or numerical, is based on the water level elevation at three wells located in a triangular pattern and the x,y grid location of each well. The method assumed a planar water table between the three wells. Therefore, the three wells used should not be so far apart that they straddle a groundwater divide or discharge zone.

Figure 5.4 shows the wells utilized for three point calculations. Results are presented in Table 5.1.

Results of three point calculations support the water table maps presented in Figures 5.1 to 5.3. Groundwater flow is generally away from the central portion of the Marley property. A groundwater mound, albeit broad and low, is evident. Hydraulic gradients on the eastern, southern and western flanks of the groundwater mound are relatively constant based on three point results (Table 5.1). The magnitude of the hydraulic gradient in these areas is low, generally ranging from 0.001 to 0.005 feet/feet.

The hydraulic gradients in the northern and northeastern portion of the Marley property are quite variable in direction as well as magnitude. Groundwater

Table 5.1
Results of 3 Point Calculations (1,2)
Marley Property

	Dates of measurement									
	03/12/1988		03/21/1988		05/18/1988		07/06/1988		07/23/1988	
	Mag	Dir	Mag	Dir	Mag	Dir	Mag	Dir	Mag	Dir
P-1,D6C-1,P-6	0.00091	129.9	0.00086	130.1	0.00140	128.4	0.00147	139.8	0.00042	117.0
P-1,P-6,P-17	0.00452	192.0	0.00464	192.8	0.00580	189.6	0.00659	191.6	0.00400	197.0
P-2,D6C-2,P-11	0.00079	78.5	0.00588	258.1	0.00052	78.5	0.00048	65.5	0.00028	63.4
P-2,P-11,P-3	0.00282	158.3	0.00587	258.5	0.00077	37.2	0.00074	32.5	0.00038	37.2
P-2,P-3,P-4	0.00309	189.4	0.00297	262.1	0.00333	262.8	0.00383	262.2	0.00248	260.2
P-2,P-4,P-5	0.00145	170.4	0.00368	342.0	0.00406	340.6	0.00460	340.1	0.00264	334.0
P-5,P-8,D6C-5	0.00472	251.3	0.00489	251.2	0.00478	252.3	0.00453	253.2	0.00418	253.5
P-6,D6C-1,D6C-2	0.00031	138.0	0.00044	134.3	0.00036	136.2	0.00053	168.3	0.00009	353.7
P-6,D6C-3,P-17	0.00511	154.1	0.00559	148.1	0.00693	149.6	0.00818	146.0	0.00496	144.7
P-8,D6C-6,D6C-5	0.00722	196.1	0.00711	199.0	0.00701	198.1	0.00643	199.6	0.00595	199.4
P-8,P-10,D6C-6	0.00148	217.3	0.00338	227.7	0.00199	217.1	0.00195	220.9	0.00148	227.3
P-8,P-9,P-10	0.00140	168.3	0.00181	232.3	0.00130	214.4	0.00131	220.1	0.00025	184.3
P-9,D6C-7,P-10	0.00262	212.5	0.00425	193.7	0.00216	196.0	0.00224	197.7	0.00123	324.9
P-10,D6C-7,D6C-6	0.00203	135.5	0.00283	151.1	0.00209	194.4	0.00205	193.5	0.00072	94.6
P-11,D6C-2,D6C-1	0.00062	32.5	0.00555	186.0	0.00042	53.0	0.00044	35.5	0.00031	5.3
D6C-5,D6C-6,D6C-9	0.00640	217.7	0.00785	231.8	0.00787	232.6	0.00781	236.6	0.00688	234.3

Notes

- 1.Magnitude measured in feet/feet.
- 2.Direction measured in degrees relative to north.

flow in this area is typically toward the northeast except after rainfall events. Gradient changes evidently occur after rainfall events due to surface water drainage pathways off Interstate 81. During these transient periods, groundwater flow is to the south.

Darcy's Law can be utilized to estimate the rate of groundwater flow at the Marley property. Modifying to account for the porosity of the materials, Darcy's Law is stated as:

$$v = Ki/n$$

where v is the linear velocity of groundwater flow (feet/day), K is the hydraulic conductivity (feet/day), i is the hydraulic gradient (feet/feet), and n is the effective porosity.

A representative hydraulic conductivity for the fill materials, exclusive of the Solvay wastes, is 15 feet/day as determined by slug test results (Table 3.5). The hydraulic gradient averages 0.003 feet/feet as determined by three point methods (Table 5.1). An effective porosity of 0.20 (20%) is assumed. Thus, the groundwater flow velocity is calculated as approximately 0.225 feet/day.

6.0 ENVIRONMENTAL QUALITY

6.1 Surface Soils

An extensive program of surface soil sampling for PCB analysis has been conducted (Section 3.8.1, Surface Soil Sampling). The area-wide sample scheme of 14 sample locations on the Marley property (sample points A through L and N) in conjunction with previous sampling provides adequate areal coverage to conclude that widespread PCB contamination does not exist. Analytical results from the 14 additional samples (Table 3.6) did not identify any locations with

PCB concentrations in excess of 10 ppm. Sample points 2 and S-2, which were identified as PCB-contaminated in previous studies, remain the only two such locations where PCB contamination has been confirmed on the Marley property.

Samples 2RA through 2RF (Figure 3.8; Table 3.7) were planned for further definition of sample point 2, but were inadvertently placed across the dirt road from sample point 2. The dense network of shallow and deep samples at points 2RA through 2RF serves as an evaluation of the adequacy of the area-wide sampling scheme of selected points (i.e., points A through L and N) for evaluating the presence or absence of PCB contamination across the Marley property. A ring of 5 samples (2RB through 2RF) around point 2RA provide support to the contention that a randomly placed point can be representative of soil conditions within a section of the Marley property. All results of these samples were below 10 ppm total PCBs.

In the 1987 studies, sample points 2 and S-2 (Figure 3.6) exhibited PCB concentrations in soil in excess of 10 ppm. Additional samples collected for PCB analysis from these areas has provided sufficient information to design and implement a soil PCB remedial action plan.

At point S-2 (Figures 3.6 and 3.7), resampling of additional points S-2A through S-2F on March 3, 1988 (Table 3.7) revealed PCB concentrations between 10 and 50 ppm in the surface soil (0 to 0.5 feet) at points S-2A, S-2D and S-2F. Further sampling on March 24, 1988 of soil from variable depths at points S-2G through S-2N (Table 3.9) revealed PCB concentrations in the 10 to 50 ppm range in surface soils (0 to 0.5 feet) at points S-2H, S-2I and S-2J and in deeper soils at points S-2G (1.5 feet depth) and S-2I (1.0 feet depth).

At point 2 (Figures 3.6 and 3.8), resampling of soil from variable depths at additional points 2A through 2F on March 24, 1988 (Table 3.10) revealed PCB concentrations between 10 and 50 ppm in the surface soil (0 to 0.5 feet) at points 2A and 2E. The surface soil at point 2B (designated 2B-RS) exhibited 310 ppm of PCB isomer 1248. Three laboratory reanalyses of this sample exhibited concentrations of 170, 160 and 240 ppm of PCB isomer 1248,

respectively.

Further sampling around point 2 (Figures 3.6 and 3.8) was conducted on April 16, 1988, of surface soil (0 to 0.5 feet) at points 2B (resample) and 2G through 2K and of deeper samples at points 2G through 2K. The resample of point 2B was taken to confirm or refute the high concentration of PCB isomer 1248 and exhibited a low level (less than 10 ppm) of total PCB concentration. Of samples 2G through 2K, total PCB concentrations above 10 ppm were detected in shallow samples at points 2H, 2L, 2M and 2N but not in shallow samples at points 2G, 2I, 2J, or 2K or in any of the deeper samples.

Lead analyses at points 2, 2R, and 9R (Figure 3.6; Table 3.12) exhibited moderately low levels of total lead at points 2R and 9R (40 and 46 ppm, respectively) and a moderately elevated level of total lead at point 2 (730 ppm). EP Toxicity lead values for sample points 2R and 9R were well below the EP toxicity maximum concentration level of 5 ppm.

6.2 Groundwater

Results of field-measured groundwater quality parameters (Table 3.12) indicate elevated pH, specific conductance and/or turbidity in some wells on the Marley property. Well P-3 had a highly elevated pH of 11.0, while wells P-1 and DGC-6 had pH of 8.9 and 8.2, respectively. Elevated pH readings are likely due to the presence of alkaline materials in the fill, such as Solvay waste, ashes, concrete or lime.

Specific conductance reflects, in part, the quantity of dissolved solids in water. Moderately elevated levels of specific conductance (i.e., greater than 1000 micro mhos) were measured in wells P-2, P-3 and DGC-9. These values are not unusual for groundwater from fill soils or for natural waters in the Syracuse area. Onondaga Lake, for example, typically exhibits specific conductance readings of 4,000 to 8,000 micromhos (Shampine, 1973).

Measured high turbidity values in many wells on the Marley property reflects

the silty matrix of the fill materials. The presence of this suspended particulate material in the wells indicates that the samples collected for metals analyses were prone to biased results and thus field filtering prior to shipment to the laboratory was performed to minimize this interference.

The presence of volatile organic compounds in groundwater at the Marley property is not widespread. No volatiles were detected in wells P-1, P-11, DGC-1D, DGC-3, DGC-4, DGC-5 and DGC-7. Further, only low levels of the fuel-related volatile (i.e., benzene, toluene, and xylene) were detected in wells P-2, P-3, P-6, DGC-1S, and DGC-2.

Two wells on the Marley property, DGC-6 and DGC-9, exhibited low concentrations of chlorinated and non-chlorinated volatile organic compounds. Both of these wells are located immediately adjacent to the Clark property. At well DGC-9 trans-1,2-dichloroethylene was detected at low levels (3.2 ppb) in addition to the fuel-related compounds (benzene, 6.8 ppb; toluene, 4.8 ppb). Acetone, a common artifact of laboratory contamination, was detected at 89 ppb in well DGC-9.

In well DGC-6, the fuel-related compounds were again detected (benzene, 5.0 ppb; toluene, 4.6 ppb; xylenes, 4.2 ppb). Additionally, low levels of 1,1,1-trichloroethane, 1,1-dichloroethane, chloroethane, 1,1-dichloroethylene, and vinyl chloride were detected. All of these compounds are associated with organic solvents, some of which may be products of degradation. There is no overt evidence that any of these materials have been disposed of the Marley property.

Organochlorine pesticides and PCBs were not detected in any of the eight wells sampled for these parameters (Appendix F).

Semivolatile organic (acid/base/neutral extractable) compounds were not detected in any of the three wells sampled (Table 3.14), with the lone exception of 26 ppb of phenol detected in DGC-1S. Although this concentration of phenol exceeds the groundwater limit of 1 ppb, the significance of this is

minimal given the fact that the site is historically a swamp and would be expected to have naturally occurring levels of phenol, due to decomposition of vegetation.

All field filtered priority pollutant metals analyses (Table 3.15) were below the New York State groundwater standards (Title 6 NYCRR Part 703).

Analytical results for all groundwater samples indicated low levels of petroleum hydrocarbons (Table 3.16) not unexpected given use of the property as a scrapyard. The qualitative identification of these petroleum hydrocarbons includes lubricating oil for every well and polynuclear aromatic hydrocarbons in many wells. Fuel oil was also qualitatively identified in one well (DGC-2) as a low (8.7 ppm) total petroleum hydrocarbon level. Gasoline was tentatively identified in one sample (DGC-9) having the highest total petroleum hydrocarbons (30 ppm). Given the past and present land use and the distribution and concentration of petroleum hydrocarbons, remedial measures to address these compounds are not warranted.

7.0 REFERENCES

Shampine, W.J., 1973. Chemical quality of surface water in the eastern Oswego River Basin, New York: New York Department of Environmental Conservation Basin Planning Report ORB-6, 100 p.

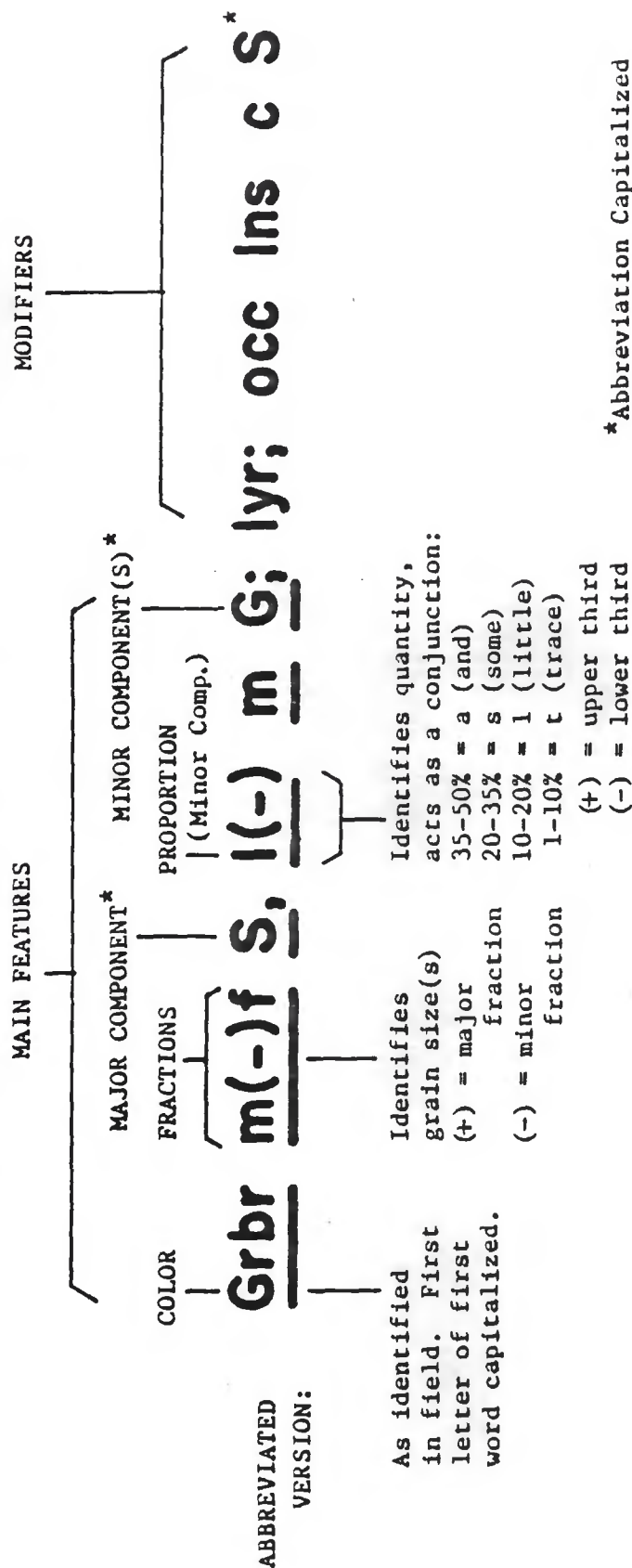
lar

APPENDIX A
SOIL BORING LOGS

address these compounds are not warranted.

TO REMAIN

MODIFIED BURMISTER SYSTEM



UNABBREVIATED VERSION:
Gray brown medium (-) to fine SAND, little (-) medium Gravel; layered; occasional lens coarse Sand (SP).

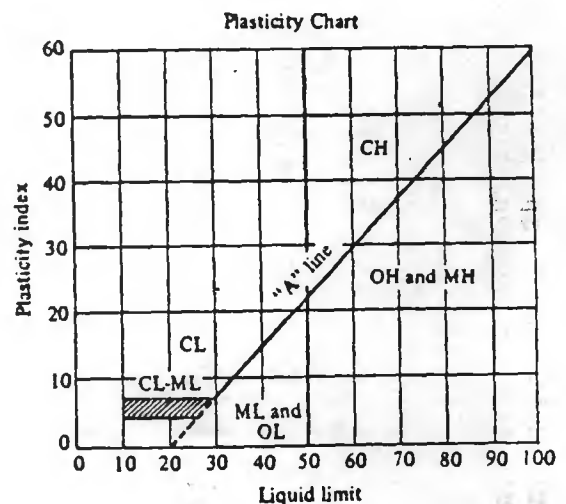
UNIFIED SOIL CLASSIFICATION:**
Adequate for a generalized stratum description.

Dunn Geoscience Corporation uses a modified BURMISTER SYSTEM for detailed identification of soil components, fractions, and proportions. The UNIFIED SOIL CLASSIFICATION,** based upon field data, is also presented.

UNIFIED SOIL CLASSIFICATION SYSTEM. (ASTM D-2487)

Major Divisions		Group Symbols	Typical Names	Laboratory Classification Criteria	
Coarse-grained soils (More than half of material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3 Not meeting all gradation requirements for GW
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	
		Gravels with fines (Appreciable amount of fines)	GM ^a	Silty gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4 Above "A" line with P.I. between 4 and 7 are <i>borderline</i> cases requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures	
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3 Not meeting all gradation requirements for SW
			SP	Poorly graded sands, gravelly sands, little or no fines	
		Sands with fines (Appreciable amount of fines)	SM ^a	Silty sands, sand-silt mixtures	Atterberg limits above "A" line or P.I. less than 4 Limits plotting in hatched zone with P.I. between 4 and 7 are <i>borderline</i> cases requiring use of dual symbols
			SC	Clayey sands, sand-clay mixtures	
	Silt and clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3 Not meeting all gradation requirements for GW
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL	Organic silts and organic silty clays of low plasticity	
Fine-grained soils (More than half material is smaller than No. 200 sieve)	Silt and clays (Liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3 Not meeting all gradation requirements for SW
			CH	Inorganic clays of high plasticity, fat clays	
			OH	Organic clays of medium to high plasticity, organic silts	
	Highly organic soils		Pt	Peat and other highly organic soils	Atterberg limits above "A" line with P.I. greater than 7 Limits plotting in hatched zone with P.I. between 4 and 7 are <i>borderline</i> cases requiring use of dual symbols

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:
 Less than 5 per cent
 More than 5 per cent
 More than 12 per cent
 5 to 12 per cent



^aDivision of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less, the suffix u used when L.L. is greater than 28.
^bBorderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC, well-graded gravel-sand mixture with clay binder.

VISUAL IDENTIFICATION OF SAMPLES

The samples were identified in accordance with the American Society for Engineering Education System of Definition.

I. Definition of Soil Components and Fractions

Material	Symbol	Fraction	Sieve Size	Definition
Boulders	Bldr	—	9" +	Material retained on 9" sieve.
Cobbles	Cbl	—	3" to 9"	Material passing the 9" sieve and retained on the 3" sieve.
Gravel	G	coarse (c) medium (m) fine (f)	1" to 3" $\frac{3}{8}$ " to 1" No. 10 to $\frac{3}{8}$ "	Material passing the 3" sieve and retained on the No. 10 sieve.
Sand	S	coarse (c) medium (m) fine (f)	No. 30 to No. 10 No. 60 to No. 30 No. 200 to No. 60	Material passing the No. 10 sieve and retained on the No. 200 sieve.
Silt	\$	—	Passing No. 200 (0.074 mm)	Material passing the No. 200 sieve that is non-plastic in character and exhibits little or no strength when air dried.

Organic Silt (OS)

Material passing the No. 200 sieve which exhibits plastic properties within a certain range of moisture content, and exhibits fine granular and organic characteristics.

		Plasticity	Plasticity Index	
Clayey SILT	Cy\$	Slight (SI)	1 to 5	Clay-Soil Material passing the No. 200 sieve which can be made to exhibit plasticity and clay qualities within a certain range of moisture content, and which exhibits considerable strength when air-dried.
SILT & CLAY	\$&C	Low (L)	5 to 10	
CLAY & SILT	C&\$	Medium (M)	10 to 20	
Silty CLAY	\$yC	High (H)	20 to 40	
CLAY	C	Very High (VH)	40 plus	

II. Definition of Component Proportions

Component	Written	Proportions	Symbol	Percentage Range by Weight *
Principal	CAPITALS	—		50 or more
Minor	Lower Case	and some little trace	a. s. l. t.	35 to 50 20 to 35 10 to 20 1 to 10

* Minus sign (—) lower limit, plus sign (+) upper limit, no sign middle range.

III. Glossary of Modifying Abbreviations

Category	Symbol	Term	Symbol	Term	Symbol	Term
A. Borings	U/D	Undisturbed	B	Exploratory	A	Auger
B. Samples	C	Casing	L	Lost	U	Undisturbed
	D	Denison	S	Spoon	W	Wash
	O.E.	Open End				
C. Colors	bk	black	gn	green	wh	white
	bl	blue	or	orange	yw	yellow
	br	brown	rd	red	dk	dark
	gr	gray	tn	tan	lt	light
D. Organic Soils	dec	decayed	o	organic	veg	vegetation
	dec'g	decaying	rts	roots	pt	peat
	lig	lignite	ts	topsoil		
E. Rocks	LS	Limestone	rk	rock	Shst	Schist
	Gns	Gneiss	SS	Sandstone	Sh	Shale
F. Fill and Miscellaneous Materials	bldr (s)	boulder (s)	cbl (s)	cobble(s)	gls	glass
	brk (s)	brick (s)	wd	wood	misc	miscellaneous
	cndr (s)	cinder (s)	dbr	debris	rbl	rubble
G. Miscellaneous Terms	do	ditto	pp	pocket	ref	refusal
	el, El	elevation		penetrometer	sm	small
	fgmt (s)	fragment(s)	P. I.	Plasticity Index	W. L.	water level
	frqt	frequent			W. H.	weight of hammer
	lrg	large	P	pushed	W. R.	weight of rods
	mtld	mottled		pressed		
	no rec	no recovery	pc (s)	piece (s)		
	pen	penetration	rec or R	recovered		
H. Stratified Soils	alt	alternating				
	thk	thick				
	thn	thin				
	w	with				
	prt	parting				
	seam	seam				
	lyr	layer				
	stra	stratum				
	vvd c	varved Clay				
	pkt	pocket				
	lns	lens				
	occ	occasional				
	freq	frequent				

- 0 to 1/16" thickness
- 1/16 to 1/2" thickness
- 1/2 to 12" thickness
- greater than 12" thickness
- alternating seams or layers of sand, silt and clay
- small, erratic deposit, usually less than 1 foot
- lenticular deposit
- one or less per foot of thickness
- more than one per foot of thickness



Dunn Geoscience Corp.
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No.

DGC-1S

PROJECT Carousell Center

SHEET 1 OF 1

CLIENT Shanley, Sweeney & Reilly

JOB No. 2371-1-455

DRILLING CONTRACTOR Parratt-Wolff, Inc.

MEAS PT ELEV 13.39'

PURPOSE Monitoring Well Installation

GROUND ELEV. 10.9'

DRILLING METHOD Hollow stem augers

SAMPLE

CORE

CASING

DATUM City of Syracuse datum

DRILL RIG TYPE Mobile B-56

TYPE

none

HSA

DATE STARTED 3/7/88

GROUNDWATER DEPTH 3.46'

DIA.

4 1/2" ID

DATE FINISHED 3/7/88

MEASURING POINT Top of PVC

WEIGHT

DRILLER Paul LeClair

DATE OF MEASUREMENT 3/21/88

FALL

INSPECTOR Mau Lawler

DEPTH FEET	SAMPLE NUMBER	BLOWS OR SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS

No samples taken
See boring No. 1D

Water @ 1.5'

End of Boring
Total Depth = 7.5'



Dunn Geoscience Corp.
Albany, NY 12205 (518)458-1313

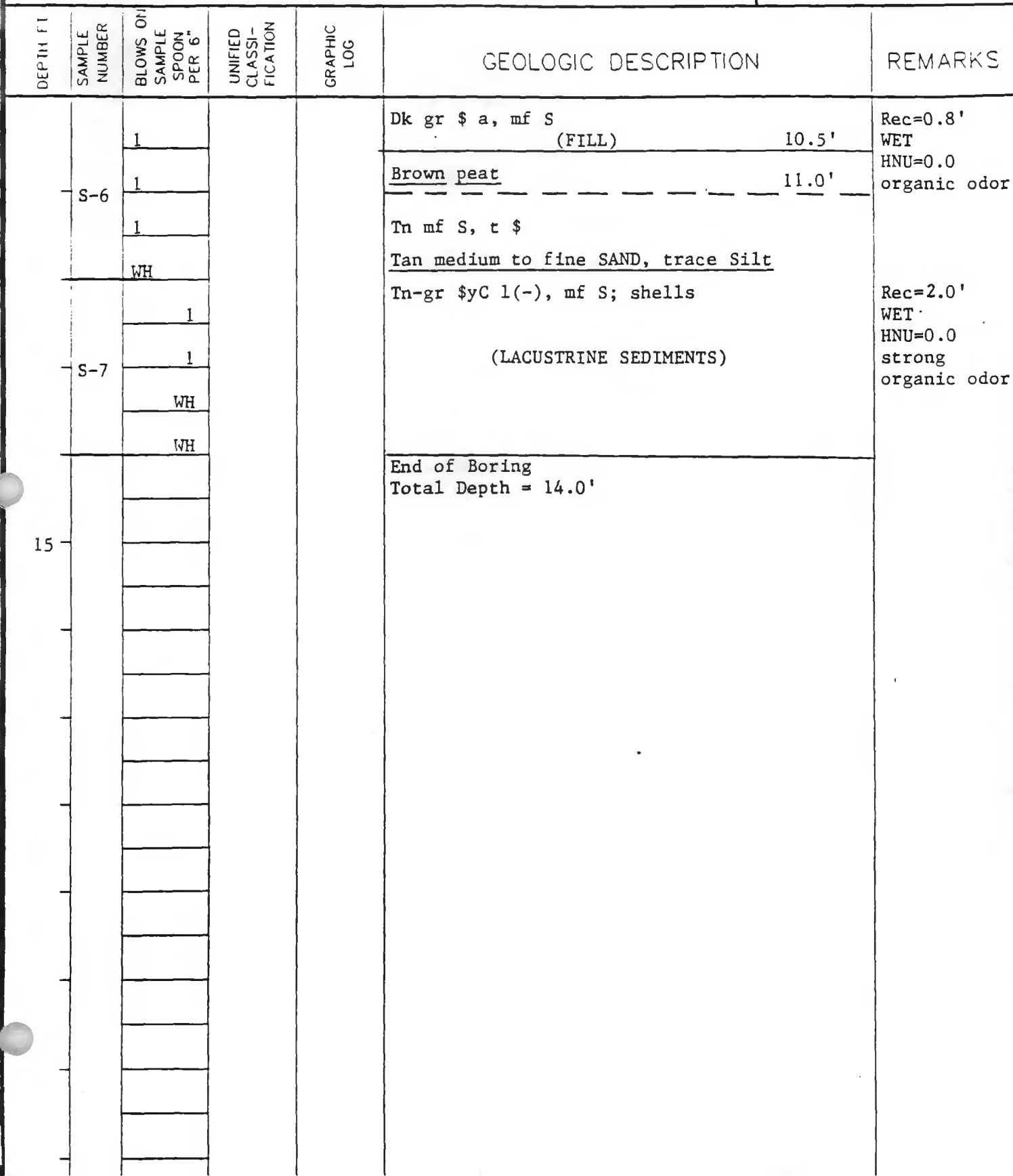
TEST BORING LOG

BORING No. DGC-1D

PROJECT	Carousel Center				SHEET 1 OF 2
CLIENT	Shanley, Sweeney & Reilly				JOB No. 2371-1-455
DRILLING CONTRACTOR	Parratt-Wolff, Inc.				MEAS. PT. ELEV. 13.14'
PURPOSE	Monitoring Well Installation				GROUND ELEV. 10.9'
DRILLING METHOD	Hollow stem augers	SAMPLE	CORE	CASING	DATUM City of Syracuse datum
DRILL RIG TYPE	Mobile B-56	TYPE	SS	HSA	DATE STARTED 3/7/88
GROUNDWATER DEPTH	3.22'	DIA.	2"	4 1/2" ID	DATE FINISHED 3/7/88
MEASURING POINT	Top of PVC	WEIGHT	140#	HNU background = 0.0	DRILLER Paul Le Clair
DATE OF MEASUREMENT	3/21/88	FALL	30"		INSPECTOR Mau Lawler

DEPTH FT.	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
	S-1	18			Dk br Cy\$ a, cmf S, s f G; wd fgmts	Rec=0.7' Moist/WET
		13			<u>Dark brown CLAYEY SILT and, coarse to fine Sand, some fine Gravel; wood fragments</u>	
		12				
		12			----- 2.0' -----	
	S-2	6			Dk gr & wh cmf S, a Cy\$, s f G	Rec=0.7' WET
		4			<u>Dark gray and white coarse to fine SAND, and Clayey Silt, some fine Gravel</u>	
		4				
		4			----- 4.0' -----	
5	S-3	1			Dk gr Cy\$ s, mf G, 1 cmf S	Rec=0.3' WET HNU=0.1
		1				
		1				
		1				
	S-4	WH			No recovery	Rec=0.0
		WH				
		WH				
		WH				
	S-5	WH			Dk gr Cy\$ a(+), c(-)mf S, t f G; gls	Rec=0.2' WET
		WH			<u>Dark gray CLAYEY SILT and (+), coarse (-) to fine Sand, trace fine Gravel; glass, metal</u>	
		WH				
		WH				

(FILL)





Dunn Geoscience Corp.
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No. DGC-6

PROJECT	Carousel Center				SHEET 1 OF 3
CLIENT	Shanley, Sweeney & Reilly				JOB No. 2371-1-455
DRILLING CONTRACTOR	Parratt-Wolff, Inc.				MEAS. PT. ELEV. 18.66'
PURPOSE	Monitoring Well Installation				GROUND ELEV. 16.0'
DRILLING METHOD	Hollow stem augers	SAMPLE	CORE	CASING	DATUM City of Syracuse datum
DRILL RIG TYPE	Mobile B-56	TYPE	SS	HSA	DATE STARTED 3/8/88
GROUNDWATER DEPTH	104.89'	DIA.	2"	4½" ID	DATE FINISHED 3/8/88
MEASURING POINT	Top of PVC	WEIGHT	140#		DRILLER Paul LeClair
DATE OF MEASUREMENT	3/21/88	FALL	30"		INSPECTOR Mau Lawler

DEPTH FT	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
		4			Dk br-or br \$yC l, mf(+) S, l(-) cmf G; rts, veg	Rec=0.9' Dry
	- S-1	5				
		6				
		8				
		6			Dk br \$yC s, cmf(+) S, s cm(+)f G; veg; brk fgmts; mtd	Rec=0.9' Dry
	- S-2	8			Dark brown SILTY CLAY some, coarse to fine (+) Sand, some coarse to fine (+) Gravel; vegetation; brick fragments; mottled	
		9			(FILL)	
		10				
	S-3	6			Dk br \$yC a, cmf S, l cmf(-) G; rts	Rec=0.6' Moist
5		25/0.2'				
						Auger refusal @ 5.1'
						Backfilled hole with soil - bentonite mix. Started new boring.
	- S-4	4			Dk br \$yC a, cmf S, l cmf G; rts	Rec=0.9' Moist
		7				
		11				
		21				
					8.0'	
	- S-5	6			Dk br cmf G s, cmf S, s(-) \$ & C; rts	Rec=0.9' WET
		10				
		22				
		22				

 Dunn Geoscience Corp. Albany, NY 12205 (518)458-1313			TEST BORING LOG		BORING No. DGC-6	
PROJECT Carousal Center					SHEET 2 OF 3	
CLIENT Shanley, Sweeney & Reilly					JOB No. 2371-1-455	
DEPTH	SAMPLE NUMBER	BLOWS (or SAMPLE SPOON) PER 6"	UNITED CLASSIFICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
		11			Dk gr-br cm(+)f G s, cmf S, 1 C & \$	Rec=1.0' WET
	-S-6	15				Easier drilling @ 11.5'
		6				
		3				
		2			Dk gr-br & rd-br mf(+) G s, cmf S, s(-) \$yC	Rec=0.0' WET
	-S-7	2				Washed-in soil (?) slight odor
		6				
		2			Same	Rec=2.0' WET/Moist
15	-S-8	1			Wh C; tn, rd, & or seams	Solvay waste top 0.4'
		1			<u>White CLAY, tan, red and orange seams</u>	grayish chemical odor
		1			(FILL)	
		1			Wh C; mtld dk gr	Rec=0.3' WET
	-S-9	1				Chalky texture
		1				
		1				
		WR			Wh C; gr & or prt	Rec=0.4' WET
	-S-10	WR				
		WR				
20		1			Wh C	Rec=1.8' WET
		1			Dk br cmf S, a \$ & C, t(+) f G; wd; rts; pt seams	
	-S-11	1			<u>Dark brown coarse to fine SAND, and Silt & Clay, trace (+) fine Gravel; wood; roots; peat seams</u>	
		1				
		1			(LACUSTRINE)	

Dunn Geoscience Corp.
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No. DGC-6

PROJECT Carousel Center

SHEET 3 OF 3

CLIENT Shanley, Sweeney & Reilly

JCS No. 2371-1-455

[illegible]



Dunn Geoscience Corp.
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No. DGC-7

PROJECT				Carousel Center		SHEET 1 OF 3		
CLIENT				Shanley, Sweeney & Reilly		JOB No. 2371-1-455		
DRILLING CONTRACTOR				Parratt-Wolff, Inc.		MEAS. PT. ELEV. 12.12'		
PURPOSE				Monitoring Well Installation		GROUND ELEV. 9.72'		
DRILLING METHOD			Hollow Stem Augers		SAMPLE	CORE	CASING	DATUM City of Syracuse datum
DRILL RIG TYPE			Mobile B-57		TYPE	SS	HSA	DATE STARTED 3/10/88
GROUNDWATER DEPTH			5.28'		DIA.	2"	4½" ID	DATE FINISHED 3/10/88
MEASURING POINT			Top of PVC		WEIGHT	140#		DRILLER Brian Waters
DATE OF MEASUREMENT			3/21/88		FALL	30"		INSPECTOR Alan Hall

DEPTH FT	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
		1			Br Cy\$ 1, cmf S, s mf G; rts, brk	Rec=1.25'
	S-1	7			<u>Brown CLAYEY SILT little, coarse to fine Sand, some medium to fine Gravel; roots; brick</u>	Moist
		6				
		4			(FILL)	
		8			Same	
	S-2	12			2.95'	Rec=1.05'
		6			Gn-gr Cy\$	Damp
		6			<u>Green-gray CLAYEY SILT</u>	
					(FILL)	
		12			Concrete fragment	Rec=0.9'
		2			Dk gr Cy\$ 1, f S	Damp
5	S-3	1			4.65'	
		1			Lt gr-br f S, l \$	
		3			<u>Light gray-brown fine SAND, little Silt</u>	
					(FILL)	
		2			6.20'	Rec=1.05'
		1			Dk gr-br Cy\$ 1, f S, s f G; veg	WET
	S-4	1			6.80'	
		WH			Br-gr \$ 1, f S, t f G	
		1				
		3			Concrete fragment	Rec=0.1'; WET
		2				spoon plugged
	S-5	1			(FILL)	



Dunn Geoscience Corp.
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No. DGC-7

PROJECT Carousal Center

SHEET 2 OF 3

CLIENT Shanley, Sweeney & Reilly

JOB No. 2371-1-455

DEPTH	SAMPLE NUMBER	BLOWS ON SAMPLE SPOOR PER 6"	UNIFIED CLASSIFICATION	GRAVEL LOG	GEOLOGIC DESCRIPTION	REMARKS
		1			Br cmf S, s \$, t f G; shells	10.3'
					Gr \$ t, f S, t(-) f G	
					Gray SILT trace, fine Sand, trace (-) fine Gravel	
					(FILL)	11.3'
					Dk gr Cy\$	
					Dark gray CLAYEY SILT	
					(FILL)	12.0'
					Br cmf S, s \$; sh	
					Brown coarse to fine SAND, some Silt; shells	
						13.0'
					Wh C t, \$	
					White CLAY trace, Silt	
					(FILL)	
					Same	
						15.65'
					Dk gn gr \$ l, f S; sh	
						16.4'
					Wh C	
						17.55'
					Dk gr Cy\$ s, cmf S	
						18.0'
					Wh C	
						19.0'
					Dk gr \$ l, f S	
						20.0'
					Wh C	
					(FILL)	20.8'
					Dk gr-br \$ s, f S; veg	
						21.3'
					Dk br \$ a, cmf S	
					Dark brown SILT and fine Sand	

Rec=1.7'
WET

Rec=2.0'
WET

Solvay waste

Rec=2.0'
WET

Rec=2.0'
Moist/WET

Solvay waste

Rec=1.7'
WET

Rec=2.0'
WET/Moist

Dunn Geoscience Corp.
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No. DGC-7

Carousel Center

SHEET 3 OF 3

Shanley, Sweeney & Reilly

JCE No. 2371-1-455

DEPTH	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNITED CLASSIFICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
	- S-12	1 WH WH 1			Dk gr-br cmf S, a \$; rts Lt br f S, a \$; sh	Rec=1.85' WET
	25 - S-13	WH WH WH WH			Lt br \$ a, f S; sh <u>Light brown SILT and, fine Sand; shells</u> (LACUSTRINE)	Rec=0.4' WET
	S-14	1 1 1 1			Same	Rec=1.2' WET
					End of Boring Total Depth = 28.0'	
30						



Dunn Geoscience Corp.
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No. DGC-9

PROJECT	Carousel Center			SHEET	1 OF 2
CLIENT	Shanley, Sweeney & Reilly			JOB No.	2371-1-455
DRILLING CONTRACTOR	Parratt-Wolff, Inc.			MEAS. PT. ELEV	13.24'
PURPOSE	Monitoring Well Installation			GROUND ELEV.	11.4'
DRILLING METHOD	Hollow stem augers	SAMPLE	CORE	CASING	DATUM City of Syracuse datum
DRILL RIG TYPE	Mobile B-57	TYPE	SS	HSA	DATE STARTED 3/9/88
GROUNDWATER DEPTH	3.53'	DIA.	2"	4 1/4" ID	DATE FINISHED 3/9/88
MEASURING POINT	Top of PVC	WEIGHT	140#		DRILLER Brian Waters
DATE OF MEASUREMENT	3/21/88	FALL	30"		INSPECTOR Alan Hall

DEPTH FT	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
- S-1	3				Gr br-rd br cmf S, s \$, s f G; wd; rts	Rec=0.95'
	4				<u>Grayish brown to reddish brown coarse to fine SAND, some Silt, some fine Gravel; wood; roots</u>	Moist
	4					
	4					
- S-2	2				Br Cy\$, s f G	Rec=1.0'
	2					WET
	1				Dk br Dec Veg, 1 \$	
	1					
5 - S-3	2				Gr Cy\$, t f G; occ wh C	Rec=0.85'; WET
	1				<u>Gray CLAYEY SILT, trace fine Gravel; occasional white Clay</u>	soil with solvay waste
	1					
	WH					
- S-4	WH				Dk br Dec Veg & Rts 1, Cy\$, 1 f G	Rec=0.6'
	WH				<u>Dark brown Decaying Vegetation (leaves) and roots little, Clayey Silt, little fine Gravel</u>	WET
	WH					fuel odor; sheen on spoon
	WH					
- S-5	WH				Wh C	Rec=0.75'
	WH				<u>White CLAY</u>	WET
	1				Br Cy\$; veg	Solvay waste



Dunn Geoscience Corp.
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No. DGC-9

PROJECT Carousal Center

SHEET 2 OF 2

CLIENT Shanley, Sweeney & Reilly

JCB No. 2371-1-455

DEPTH	SAMPLE THIMBLE	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
		WH			Gr-wh Cy\$ t, f G	10.35'
		WH			Wh C	11.1'
S-6	2				Gn br Cy\$; mtd; rts	
	2				Green brown CLAYEY SILT; mottled, roots	Rec=1.7'
					(LACUSTRINE)	Moist/WET
		1				
S-7	1					12.8'
	3				Dk gr cmf S, l(+) Cy\$; sh	
	4				Dark gray coarse to fine SAND, little (+)	
					Clayey Silt; shells	
	3				Same	Rec=1.7'
	2					WET
15 S-8	1					15.45'
	1				Br f S, a Cy\$; veg	
					Brown fine SAND, and Clayey Silt; vegetation	Rec=1.3'
	1					Moist
	WH					
S-9	WH					
	1					
	1				Br gr c(+)mf S	Rec=2.0'
	1					18.65'
S-10	3				Gr br Cy\$ l, cmf S	
					Grayish brown CLAYEY SILT little, coarse to	
	3				Fine Sand (LACUSTRINE)	19.5'
	3				Gr cmf S, t Cy\$	
20					End of Boring	
					Total Depth = 20.0'	

APPENDIX B

HNU LOGS

HNU SOIL SCREENING RESULTS

Boring Location: DGC-1D

Lithology

Depth Below
Ground Surface
(feet)

HNU LOG (ppm)

100

200

300

Fill

Glaciolacustrine
Sediments

End of
Boring

0

2

4

6

8

10

12

14

16

18

20

22

24

26

28

30

HNU SOIL SCREENING RESULTS

Boring Location: DGC-2

Lithology

Depth Below
Ground Surface
(feet)

HNU LOG (ppm)

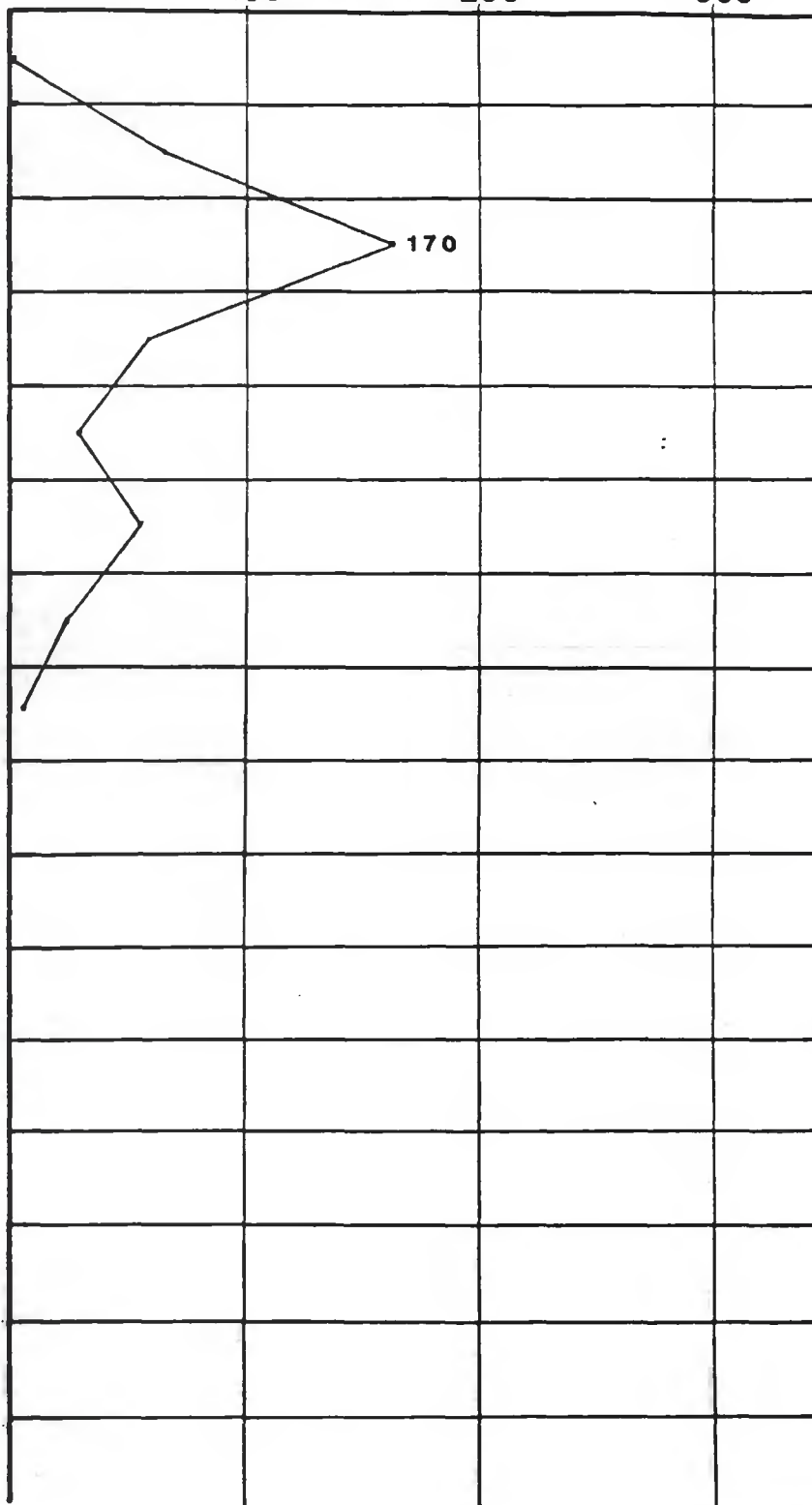
100 200 300

Fill

Glaciolacustrine
Sediments

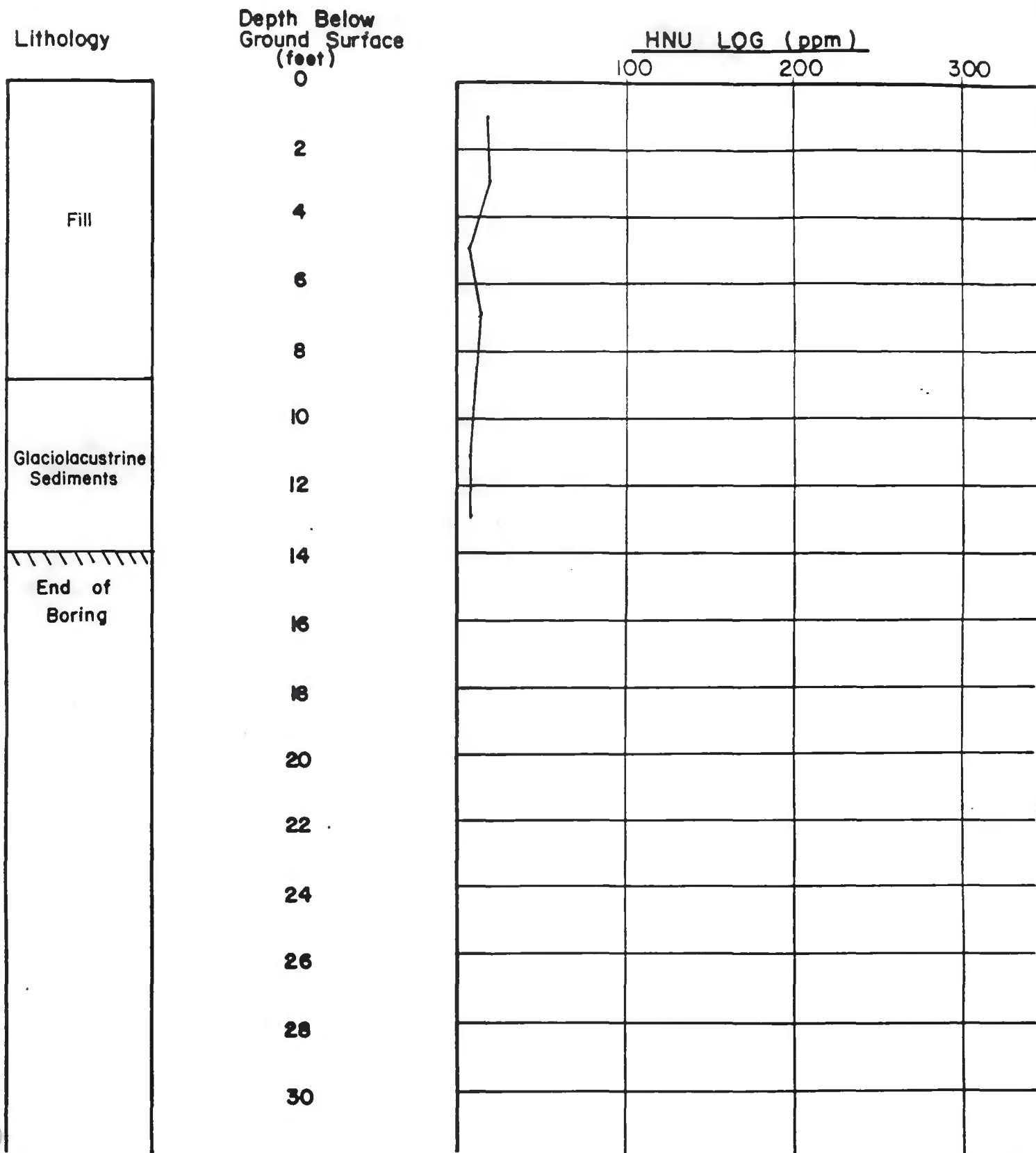
End of
Boring

0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30



HNU SOIL SCREENING RESULTS

Boring Location: DGC-3



HNU SOIL SCREENING RESULTS

Boring Location: DGC-4

Lithology

Depth Below
Ground Surface
(feet)

HNU LOG (ppm)

100

200

300

Fill

Glaciolacustrine
Sediments

End of
Boring

2

4

6

8

10

12

14

16

18

20

22

24

26

28

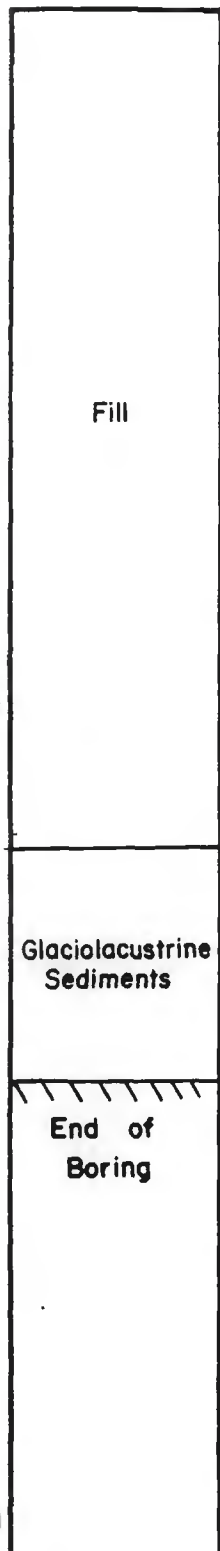
30

105

HNU SOIL SCREENING RESULTS

Boring Location: DGC-5

Lithology

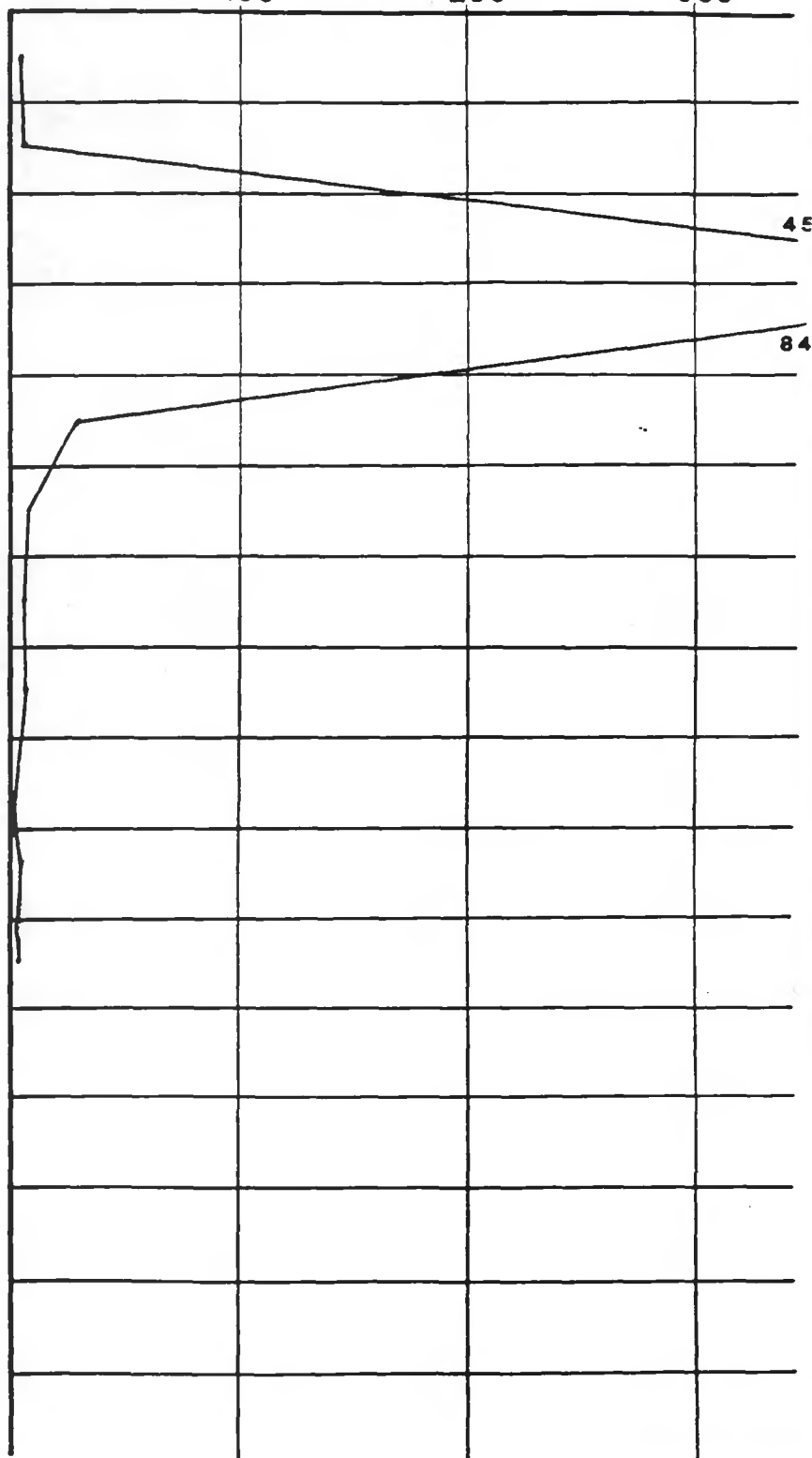


Depth Below
Ground Surface
(feet)

0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30

HNU LOG (ppm)

100 200 300



HNU SOIL SCREENING RESULTS

Boring Location: DGC-6

Lithology

Depth Below
Ground Surface
(feet)

HNU LOG (ppm)

100

200

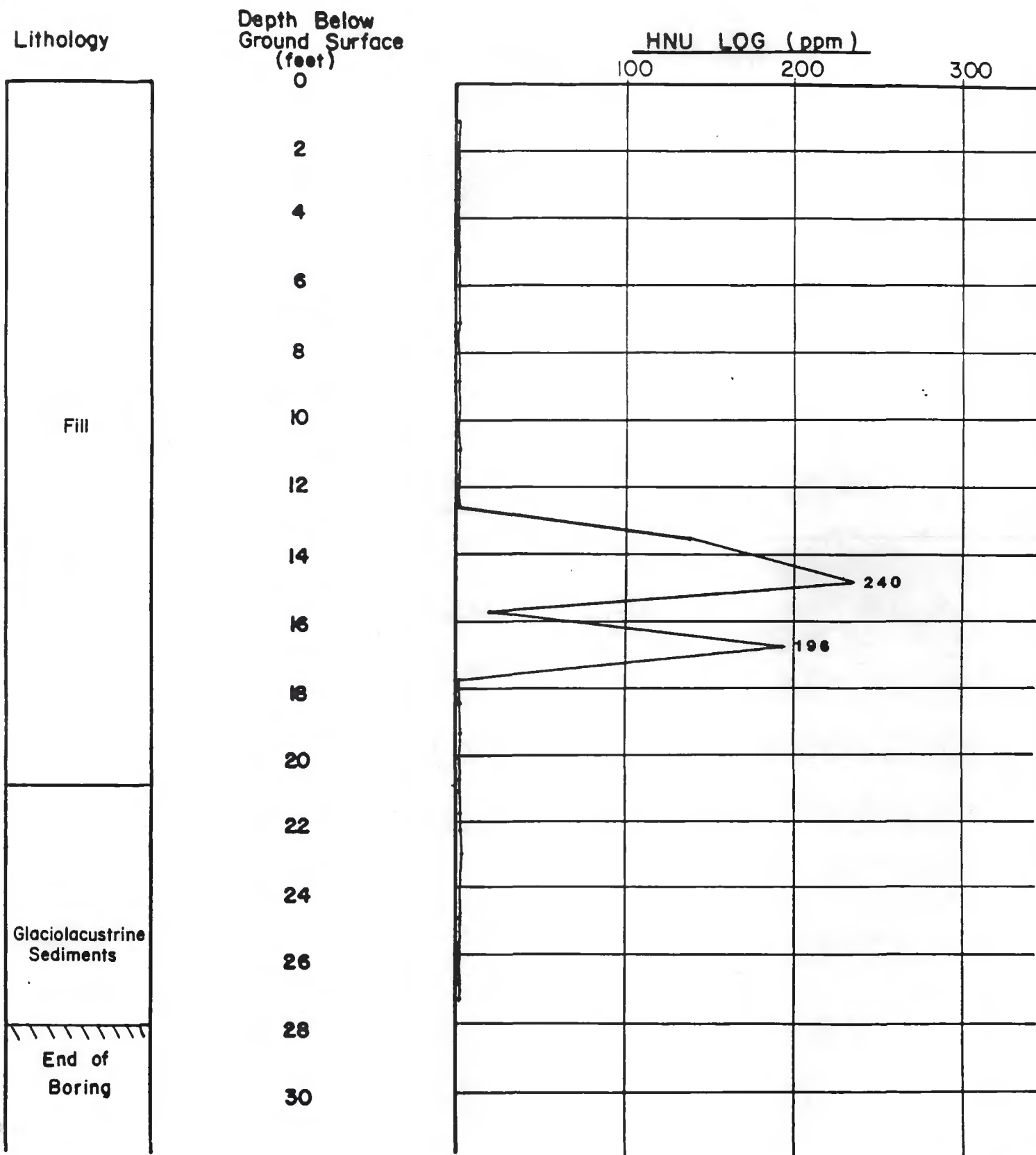
300

Fill	0			
	2			
	4			
	6			
	8			
	10			
	12			
	14			
	16			
	18			
Glaciolacustrine Sediments	20			
	22			
	24			
	26			
	28			
	30			
End of Boring				

	100	200	300
0			
2			
4			
6			
8			
10			
12			
14			
16			
18			
20			
22			
24			
26			
28			
30			

HNU SOIL SCREENING RESULTS

Boring Location: DGC-7



HNU SOIL SCREENING RESULTS

Boring Location: DGC-9

Lithology

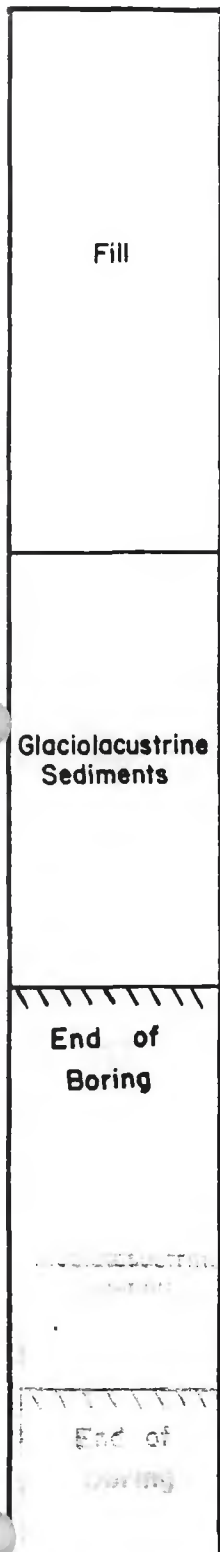
Depth Below
Ground Surface
(feet)

HNU LOG (ppm)

100

200

300



0

2

4

6

8

10

12

14

16

18

20

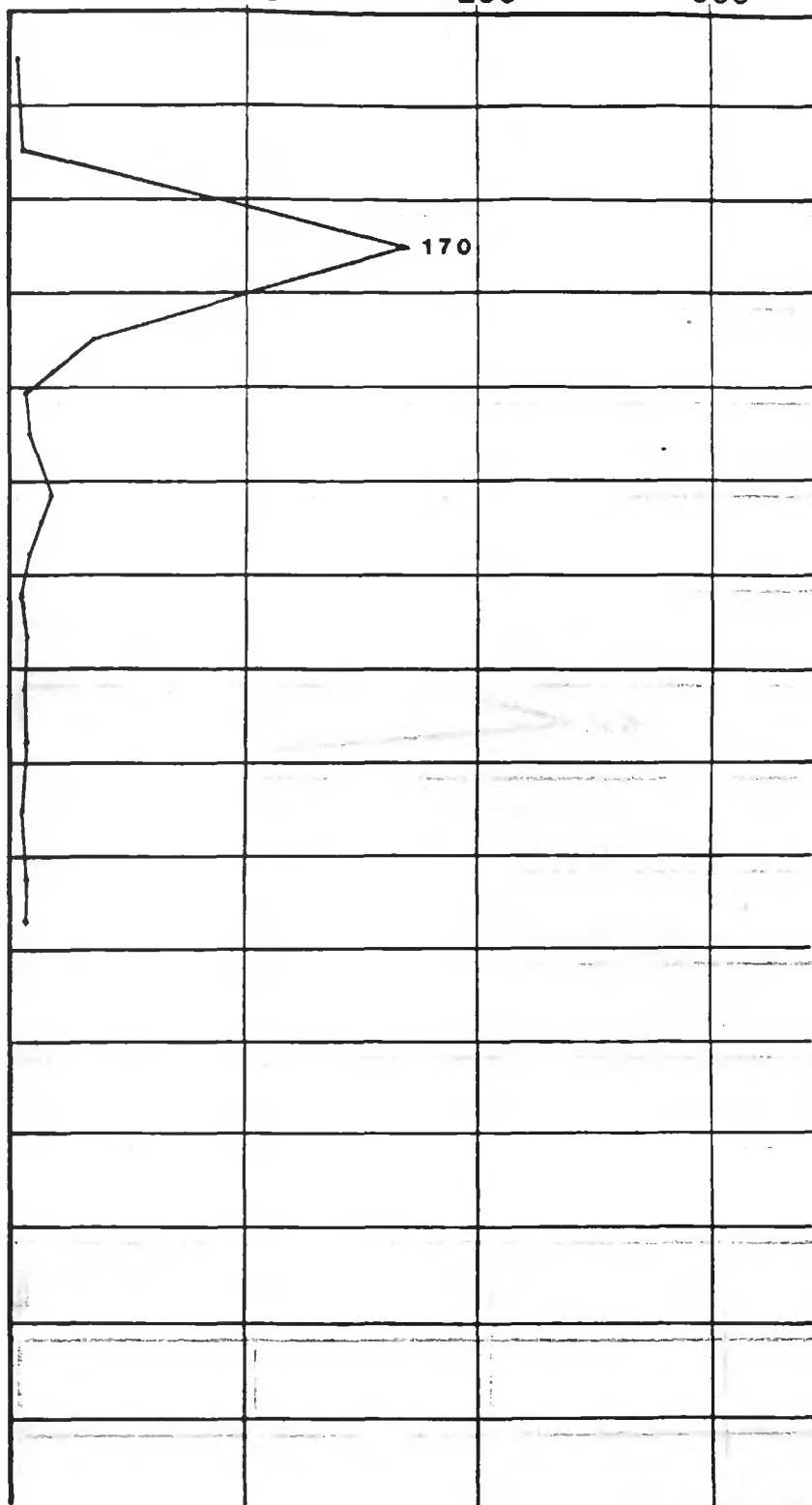
22

24

26

28

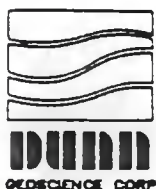
30



APPENDIX C
WELL CONSTRUCTION DETAILS

MONITORING WELL COMPLETION LOG

WELL NO. DGC-15



DUNN GEOSCIENCE CORPORATION

12 Metro Park Road

Albany, NY 12205

(518)458-1313

Project Carousel Center

Client Shanley, Sweeney & Reilly

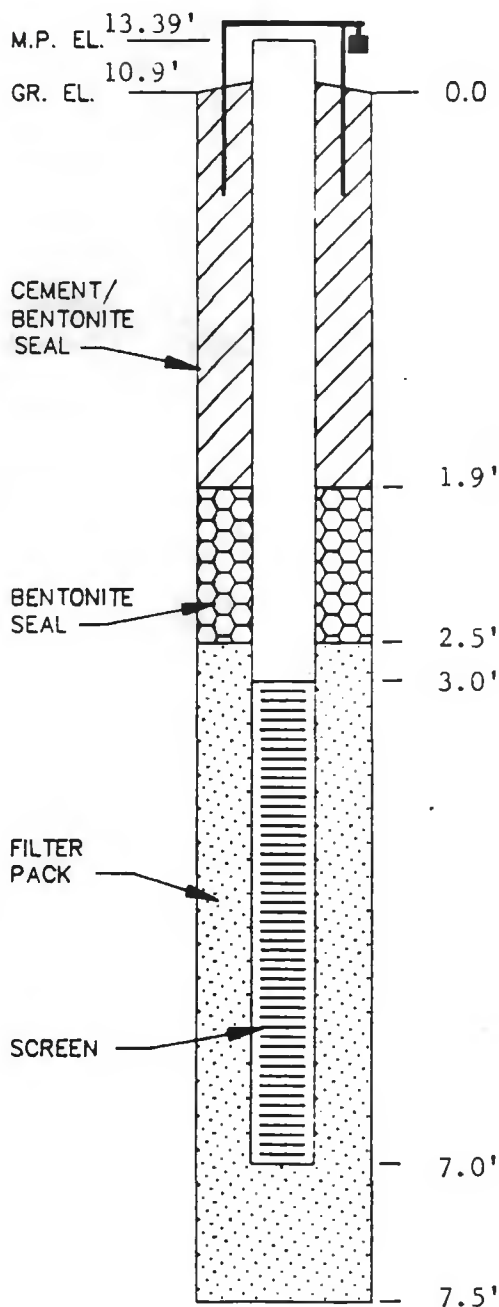
Location Marley Site

Project No. 2371-1-455

Date Drilled 3/7/88

Date Developed 3/11/88

WELL CONSTRUCTION DETAIL



NOT TO SCALE

Inspector Maureen Lawler

Drilling Contractor Parratt-Wolff, Inc.

Type of Well Monitoring

Static Water Level 3.46' Date 3/21/88

Measuring Point (M.P.) Top of PVC

Total Depth of Well 7.0'

Total Depth of Boring 7.5'

Drilling Method

Type Hollow-Stem Auger Diameter 4 1/4" I.D.

Casing

Sampling Method

Type _____ Diameter _____

Weight _____ Fall _____

Interval _____

Riser Pipe Left in Place

Material PVC Diameter 2" I.D.

Length 5.49' Joint Type Flush

Screen

Material PVC Diameter 2" I.D.

Slot Size .010" Length 4.0'

Stratigraphic Unit Screened Fill

Filter Pack

Sand X Gravel _____ Natural _____

Grade 0

Amount 150 lb. Interval 2.5' - 7.5'

Seal(s)

Type Bentonite Pellets Interval 1.9' - 2.5'

Type _____ Interval _____

Type _____ Interval _____

Locking Casing

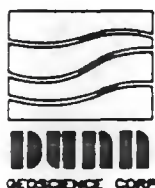
☒ Yes

☐ No

Notes:

MONITORING WELL COMPLETION LOG

WELL NO. DGC-1D

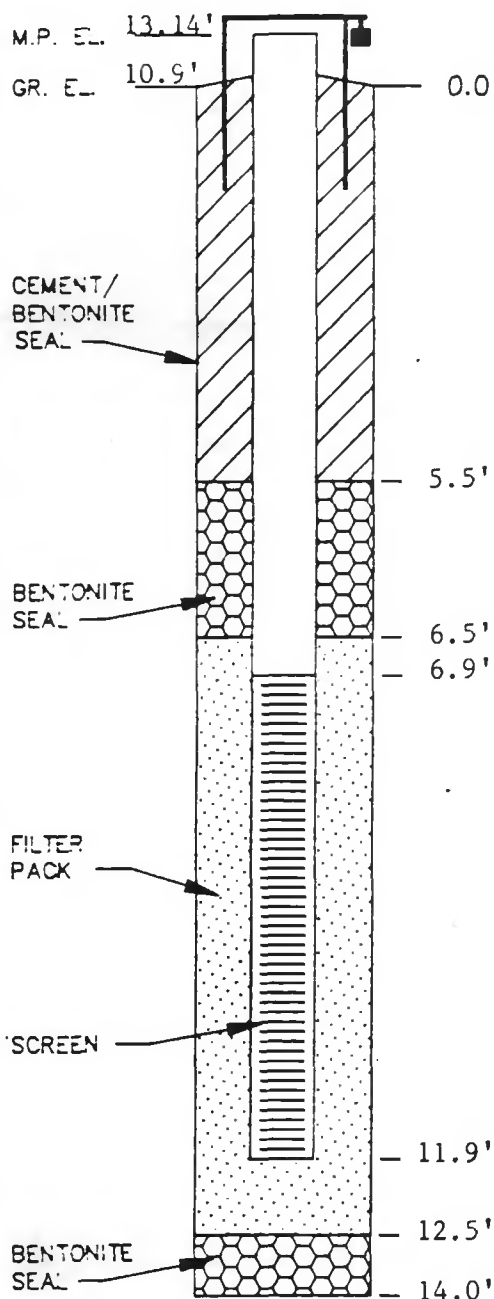


DUNN GEOSCIENCE CORPORATION

12 Metro Park Road
Albany, NY 12205
(518)458-1313

Project Carousel Center
Client Shanley, Sweeney & Reilly
Location Marley Site
Project No. 2371-1-455
Date Drilled 3/7/88
Date Developed 3/11/88

WELL CONSTRUCTION DETAIL



NOT TO SCALE

Inspector Maureen Lawler
Drilling Contractor Parratt-Wolff, Inc.

Type of Well Monitoring
Static Water Level 3.22' Date 3/21/88
Measuring Point (M.P.) Top of PVC
Total Depth of Well 11.9'
Total Depth of Boring 14.0'

Drilling Method
Type Hollow-Stem Auger Diameter 4 1/4" I.D.
Casing _____

Sampling Method
Type Split-Spoon Diameter 2" O.D.
Weight 140# Fall 30"
Interval Continuous 0.0' - 14.0'

Riser Pipe Left in Place
Material PVC Diameter 2" I.D.
Length 9.14' Joint Type Flush

Screen
Material PVC Diameter 2" I.D.
Slot Size .010" Length 5.0'
Stratigraphic Unit Screened Fill/Natural

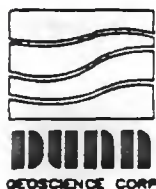
Filter Pack
Sand X Gravel _____ Natural _____
Grade 0
Amount 160 lb. Interval 6.5' - 12.5'

Seal(s)
Type Bentonite Pellets Interval 5.5' - 6.5'
Type Bentonite Pellets Interval 12.5' - 14.0'
Type _____ Interval _____

Locking Casing ☒ Yes ☐ No
Notes:

MONITORING WELL COMPLETION LOG

WELL NO. DGC-2

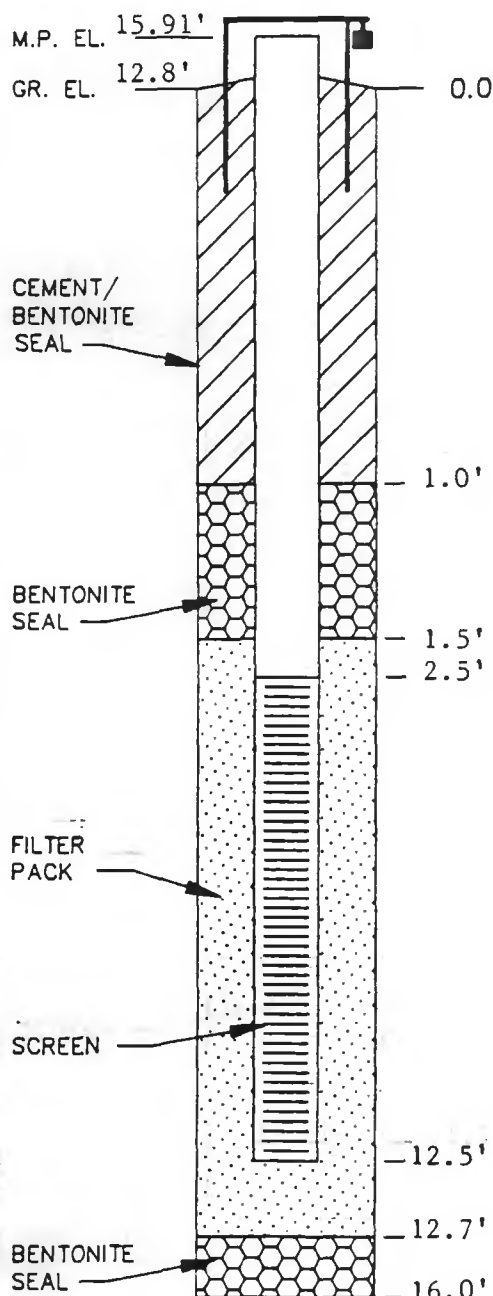


DUNN GEOSCIENCE CORPORATION

12 Metro Park Road
Albany, NY 12205
(518)458-1313

Project Carousel Center
Client Shanley, Sweeney & Reilly
Location Marley Site
Project No. 2371-1-455
Date Drilled 3/7/88
Date Developed 3/12/88

WELL CONSTRUCTION DETAIL



NOT TO SCALE

Inspector Alan Hall
Drilling Contractor Parratt-Wolff, Inc.

Type of Well Monitoring
Static Water Level 5.83' Date 3/21/88
Measuring Point (M.P.) Top of PVC
Total Depth of Well 12.5'
Total Depth of Boring 16.0'

Drilling Method
Type Hollow-Stem Auger Diameter 4 1/4" I.D.
Casing _____

Sampling Method
Type Split-Spoon Diameter 2" O.D.
Weight 140# Fall 30"
Interval Continuous 0.0' - 16.0'

Riser Pipe Left in Place
Material PVC Diameter 2" I.D.
Length 5.61' Joint Type Flush

Screen
Material PVC Diameter 2" I.D.
Slot Size .010" Length 10.0'
Stratigraphic Unit Screened Fill/Solvay

Filter Pack
Sand X Gravel _____ Natural _____
Grade 0
Amount 350 lb. Interval 1.5' - 12.7'

Seal(s)
Type Bentonite Pellets Interval 1.0' - 1.5'
Type Bentonite Pellets Interval 12.7' - 16.0'
Type _____ Interval _____

Locking Casing ☒ Yes ☐ No
Notes:

MONITORING WELL COMPLETION LOG

WELL NO. DGC-3

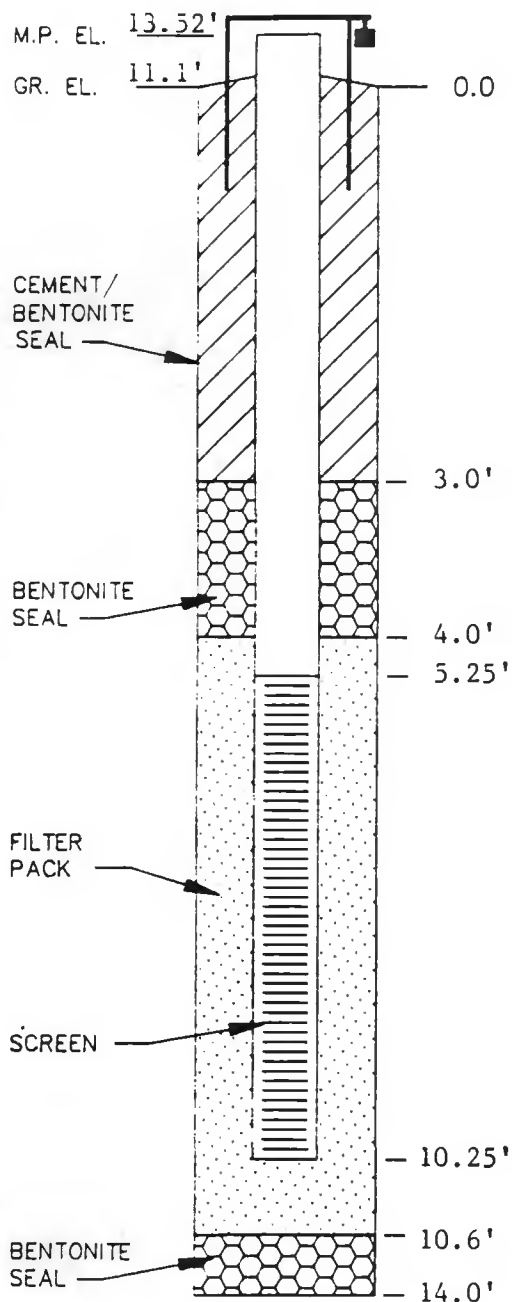


DUNN GEOSCIENCE CORPORATION

12 Metro Park Road
Albany, NY 12205
(518)458-1313

Project Carousel Center
Client Shanley, Sweeney & Reilly
Location Marley Site
Project No. 2371-1-455
Date Drilled 3/7/88
Date Developed 3/14/88

WELL CONSTRUCTION DETAIL



NOT TO SCALE

Inspector Alan Hall
Drilling Contractor Parratt-Wolff, Inc.

Type of Well Monitoring
Static Water Level 3.82' Date 3/21/88
Measuring Point (M.P.) Top of PVC
Total Depth of Well 10.25'
Total Depth of Boring 14.0'

Drilling Method
Type Hollow-Stem Auger Diameter 4 1/4" I.D.
Casing _____

Sampling Method
Type Split-Spoon Diameter 2" O.D.
Weight 140# Fall 30"
Interval Continuous 0.0' - 14.0'

Riser Pipe Left in Place
Material PVC Diameter 2" I.D.
Length 7.67' Joint Type Flush

Screen
Material PVC Diameter 2" I.D.
Slot Size .010" Length 5.0'
Stratigraphic Unit Screened Fill/Solvay/Natural

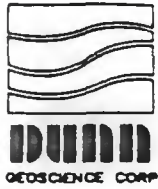
Filter Pack
Sand X Gravel _____ Natural _____
Grade 0
Amount 250 lb. Interval 4.0' - 10.6'

Seal(s)
Type Bentonite Pellets Interval 3.0' - 4.0'
Type Bentonite Pellets Interval 10.6' - 14.0'
Type _____ Interval _____

Locking Casing ☒ Yes ☐ No
Notes:

MONITORING WELL COMPLETION LOG

WELL NO. DGC-4

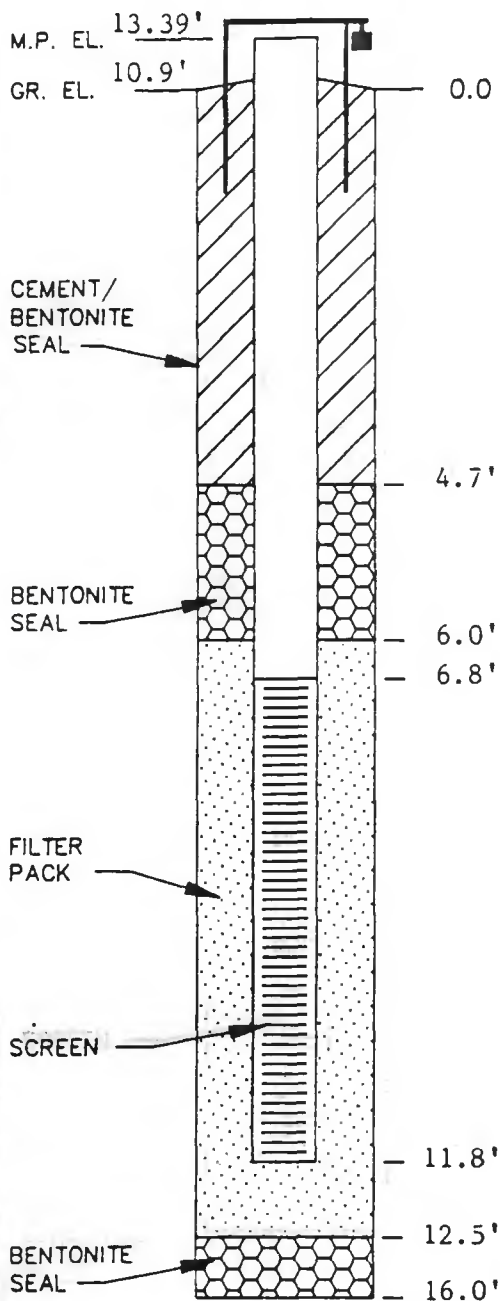


DUNN GEOSCIENCE CORPORATION

12 Metro Park Road
Albany, NY 12205
(518)458-1313

Project Carousel Center
Client Shanley, Sweeney & Reilly
Location Marley Site
Project No. 2371-1-455
Date Drilled 3/8/88
Date Developed 3/12/88

WELL CONSTRUCTION DETAIL



NOT TO SCALE

Inspector Alan Hall
Drilling Contractor Parratt-Wolff, Inc.

Type of Well Monitoring
Static Water Level 3.28' Date 3/21/88
Measuring Point (M.P.) Top of PVC
Total Depth of Well 11.8'
Total Depth of Boring 16.0'

Drilling Method
Type Hollow-Stem Auger Diameter 4 1/4" I.D.
Casing _____

Sampling Method
Type Split-Spoon Diameter 2" O.D.
Weight 140# Fall 30"
Interval Continuous 0.0' - 16.0'

Riser Pipe Left in Place
Material PVC Diameter 2" I.D.
Length 9.29' Joint Type Flush

Screen
Material PVC Diameter 2" I.D.
Slot Size .010" Length 5.0'
Stratigraphic Unit Screened Fill/Solvay/Natural

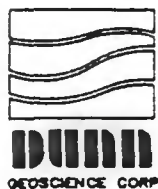
Filter Pack
Sand X Gravel _____ Natural _____
Grade 0
Amount 250 lb. Interval 6.0' - 12.5'

Seal(s)
Type Bentonite Pellets Interval 4.7' - 6.0'
Type Bentonite Pellets Interval 12.5' - 16.0'
Type _____ Interval _____

Locking Casing ☒ Yes ☐ No
Notes:

MONITORING WELL COMPLETION LOG

WELL NO. DGC-5

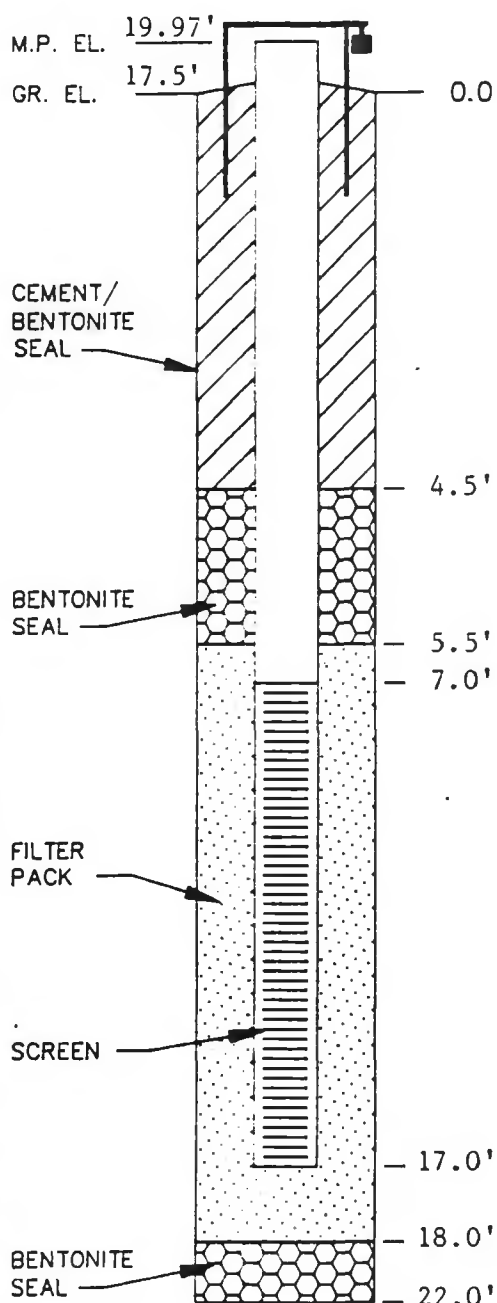


DUNN GEOSCIENCE CORPORATION

12 Metro Park Road
Albany, NY 12205
(518)458-1313

Project Carousel Center
Client Shanley, Sweeney & Reilly
Location Marley Site
Project No. 2371-1-455
Date Drilled 3/9/88
Date Developed 3/11/88

WELL CONSTRUCTION DETAIL



NOT TO SCALE

Inspector Alan Hall
Drilling Contractor Parratt-Wolff, Inc.

Type of Well Monitoring
Static Water Level 10.13' Date 3/21/88
Measuring Point (M.P.) Top of PVC
Total Depth of Well 17.0'
Total Depth of Boring 22.0'

Drilling Method
Type Hollow-Stem Auger Diameter 4 1/2" I.D.
Casing _____

Sampling Method
Type Split-Spoon Diameter 2" O.D.
Weight 140# Fall 30"
Interval Continuous 0.0' - 22.0'

Riser Pipe Left in Place
Material PVC Diameter 2" I.D.
Length 9.47' Joint Type Flush

Screen
Material PVC Diameter 2" I.D.
Slot Size .010" Length 10.0'
Stratigraphic Unit Screened Fill

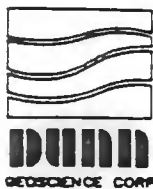
Filter Pack
Sand X Gravel _____ Natural _____
Grade 0
Amount 300 lb. Interval 5.5' - 18.0'

Seal(s)
Type Bentonite Pellets Interval 4.5' - 5.5'
Type Bentonite Pellets Interval 18.0' - 22.0'
Type _____ Interval _____

Locking Casing ☒ Yes ☐ No
Notes:

MONITORING WELL COMPLETION LOG

WELL NO. DGC-6

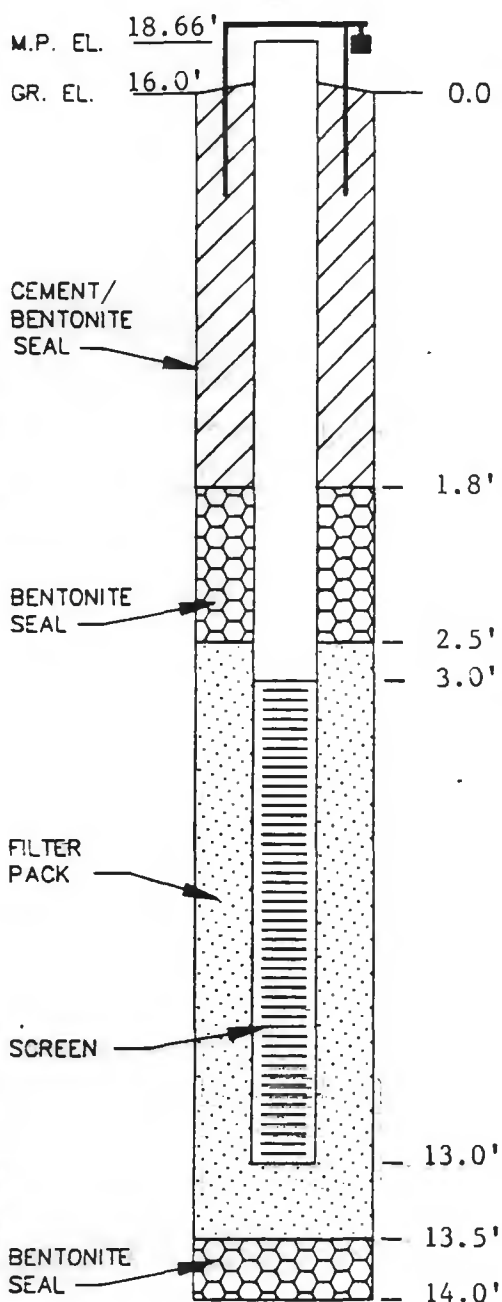


DUNN GEOSCIENCE CORPORATION

12 Metro Park Road
Albany, NY 12205
(518)458-1313

Project Carousel Center
Client Shanley, Sweeney & Reilly
Location Marley Site
Project No. 2371-1-455
Date Drilled 3/8/88
Date Developed 3/11 - 12/88

WELL CONSTRUCTION DETAIL



NOT TO SCALE

Inspector Maureen Lawler
Drilling Contractor Parratt-Wolff, Inc.

Type of Well Monitoring
Static Water Level 10.89' Date 3/21/88
Measuring Point (M.P.) Top of PVC
Total Depth of Well 13.0'
Total Depth of Boring 14.0'

Drilling Method
Type Hollow-Stem Auger Diameter 4 1/2" I.D.
Casing _____

Sampling Method
Type _____ Diameter _____
Weight _____ Fall _____
Interval _____

Riser Pipe Left in Place
Material PVC Diameter 2" I.D.
Length 5.66' Joint Type Flush

Screen
Material PVC Diameter 2" I.D.
Slot Size .010" Length 10.0'
Stratigraphic Unit Screened Fill

Filter Pack
Sand X Gravel _____ Natural _____
Grade 0
Amount 300 lb. Interval 2.5' - 13.5'

Seal(s)
Type Bentonite Pellets Interval 1.8' - 2.5'
Type Bentonite Pellets Interval 13.5' - 14.0'
Type _____ Interval _____

Locking Casing ☒ Yes ☐ No
Notes:

MONITORING WELL COMPLETION LOG

WELL NO. DGC-7

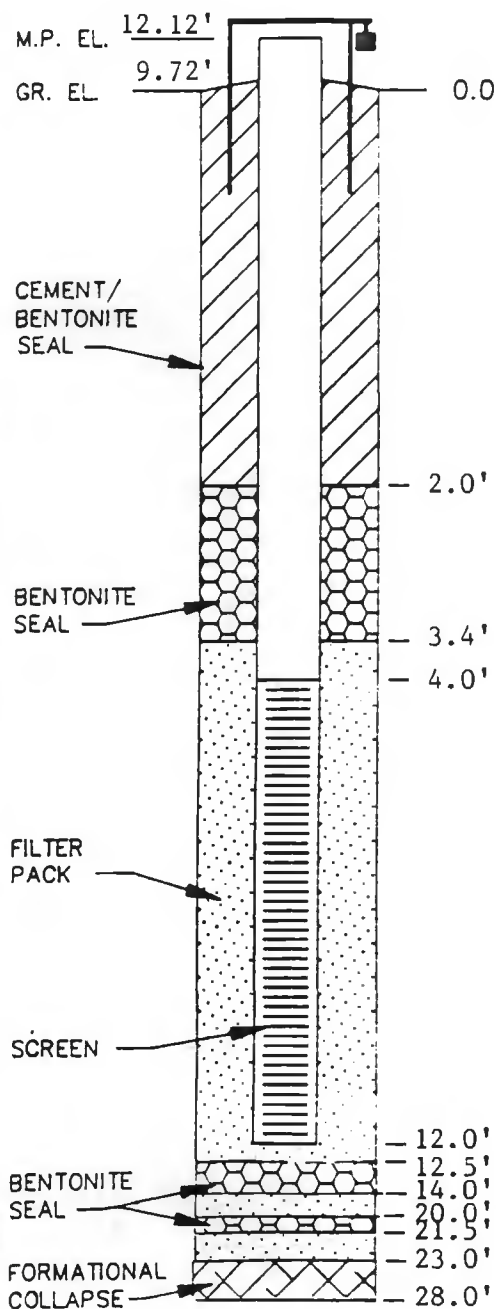


DUNN GEOSCIENCE CORPORATION

12 Metro Park Road
Albany, NY 12205
(518)458-1313

Project Carousel Center
Client Shanley, Sweeney & Reilly
Location Marley Site
Project No. 2371-1-455
Date Drilled 3/10/88
Date Developed 3/11/88

WELL CONSTRUCTION DETAIL



NOT TO SCALE

Inspector Alan Hall

Drilling Contractor Parratt-Wolff, Inc.

Type of Well Monitoring

Static Water Level 5.28' Date 3/21/88

Measuring Point (M.P.) Top of PVC

Total Depth of Well 12.0'

Total Depth of Boring 28.0'

Drilling Method

Type Hollow-Stem Auger Diameter 4 1/2" I.D.

Casing

Sampling Method

Type Split-Spoon Diameter 2" O.D.

Weight 140# Fall 30"

Interval Continuous 0.0' - 28.0'

Riser Pipe Left in Place

Material PVC Diameter 2" I.D.

Length 6.4' Joint Type Flush

Screen

Material PVC Diameter 2"

Slot Size .010" Length 8.0'

Stratigraphic Unit Screened Fill

Filter Pack

Sand X Grave: Natural

Grade 0

Amount 450 lb. Interval 3.4' - 12.5'

Seal(s)

Type Bentonite Pellets Interval 2.0' - 3.4'

Type Bentonite Pellets Interval 12.5' - 14.0'

Type Bentonite Pellets Interval 20.0' - 21.5'

Locking Casing

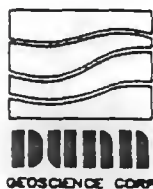
☒ Yes

☐ No

Notes:

MONITORING WELL COMPLETION LOG

WELL NO. DGC-9



DUNN GEOSCIENCE CORPORATION

12 Metro Park Road

Albany, NY 12205

(518)458-1313

Project Carousel Center

Client Shanley, Sweeney & Reilly

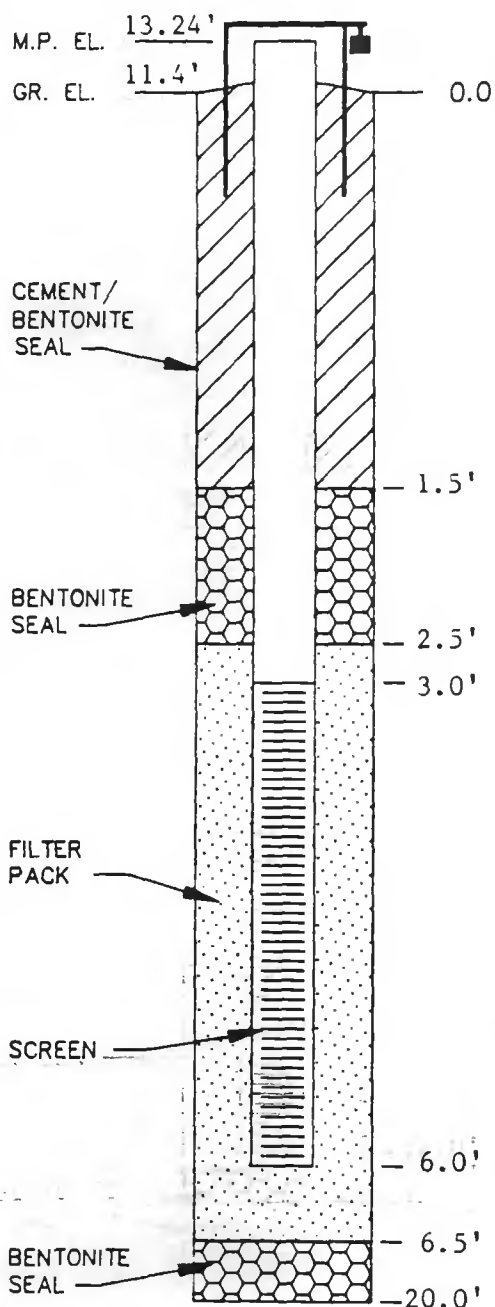
Location Clark Site

Project No. 2371-1-455

Date Drilled 3/8/88

Date Developed 3/11-14/88

WELL CONSTRUCTION DETAIL



Inspector Alan Hall

Drilling Contractor Parratt-Wolff, Inc.

Type of Well Monitoring

Static Water Level 3.53' Date 3/21/88

Measuring Point (M.P.) Top of PVC

Total Depth of Well 6.0'

Total Depth of Boring 20.0'

Drilling Method

Type Hollow-Stem Auger Diameter 4 1/4" I.D.

Casing

Sampling Method

Type Split-Spoon Diameter 2" O.D.

Weight 140# Fall 30"

Interval Continuous 0.0' - 20.0'

Riser Pipe Left in Place

Material PVC Diameter 2" I.D.

Length 4.84' Joint Type Flush

Screen

Material PVC Diameter 2" I.D.

Slot Size .010" Length 3.0'

Stratigraphic Unit Screened Fill/Solvay/Natural

Filter Pack

Sand X Gravel Natural

Grade 0

Amount 150 lb. Interval 2.5' - 6.5'

Seal(s)

Type Bentonite Pellets Interval 1.5' - 2.5'

Type Bentonite Pellets Interval 6.5' - 8.0'

Type Bentonite Slurry Interval 8.0' - 20.0'

Locking Casing

☒ Yes

☐ No

Notes:



Dunn Geoscience Corp.
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No. DGC-2

PROJECT	Carousel Center				SHEET 1 OF 2
CLIENT	Shanley, Sweeney & Reilly				JOB No. 2371-1-455
DRILLING CONTRACTOR	Paratt-Wolff, Inc.				MEAS. PT. ELEV. 15.91'
PURPOSE	Monitoring Well Installation				GROUND ELEV. 12.8'
DRILLING METHOD	Hollow stem augers	SAMPLE	CORE	CASING	DATUM City of Syracuse datum
DRILL RIG TYPE	Mobile B-57	TYPE	SS	HSA	DATE STARTED 3/7/88
GROUNDWATER DEPTH	5.83'	DIA.	2"	4 1/2" ID	DATE FINISHED 3/7/88
MEASURING POINT	Top of PVC	WEIGHT	140#		DRILLER Brian Waters
DATE OF MEASUREMENT	3/21/88	FALL	30"		INSPECTOR Alan Hall

DEPTH FT.	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
	S-1	13			Br Cy\$ t, f S, t f G; wd, gls	Rec=1.05'
		5			<u>Brown CLAYEY SILT trace, fine Sand,</u>	Dry
		5			<u>trace fine Gravel; wood, glass</u>	
		7			(FILL)	
	S-2	6				
		12			2.65'	Rec=1.0'
		8			Dk gr mf S, l \$, t f G; gls, wd	Dry; Oil odor
		6				
5	S-3	4			Br gr f S, l Cy\$, s mf G; gls, wd	Rec=0.6'
		3				WET
		6				
		2				
	S-4	6			Dk gr mf S, t \$, s mf G; gls; wd	Rec=0.75'
		1			<u>Dark gray medium to fine SAND, trace</u>	WET
		2			<u>Silt, some medium to fine Gravel;</u>	
		4			<u>glass, wood</u>	
					(FILL)	
	S-5	1			Dk gr mf S, l \$ & C, 1 f G; gls, wd	Rec=1.0'
		1				WET
		WH				





Dunn Geoscience Corp.
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No. DGC-3

PROJECT	Carousel Center				SHEET 1 OF 2
CLIENT	Shanley, Sweeney & Reilly				JOB No. 2371-1-455
DRILLING CONTRACTOR	Parratt-Wolff, Inc.				MEAS. PT ELEV 13.52'
PURPOSE	Monitoring Well Installation				GROUND ELEV. 11.1'
DRILLING METHOD	Hollow stem augers	SAMPLE	CORE	CASING	DATUM City of Syracuse datum
DRILL RIG TYPE	Mobile B-57	TYPE	SS	HSA	DATE STARTED 3/7/88
GROUNDWATER DEPTH	3.82'	DIA.	2"	4 1/2" ID	DATE FINISHED 3/7/88
MEASURING POINT	Top of PVC	WEIGHT	140#		DRILLER Brian Waters
DATE OF MEASUREMENT	3/21/88	FALL	30"		INSPECTOR Alan Hall

DEPTH FT.	SAMPLE NUMBER	BLOWS ON SAMPLE SP/100 PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
		5			Br Cy\$ t, f S, s mf G 0.6'	Rec=1.0'; Moist
	-S-1	12			Dk gr cmf G t, f S, 1 Cy\$	coal or tar
		7				
		3				
		4			Dk gr f G l, cmf S, t \$	Rec=0.05'; WET fuel odor
	-S-2	1				
		3				
		2				
		1			Dk gr f G l, cmf S, t \$; wd; cndrs	Rec=1.05'; WET
5	-S-3	2			Dark gray fine GRAVEL little, coarse to fine Sand, trace Silt; wood; cinders (ash)	
		1			(FILL)	
		6			6.0'	
		25			Dk gr wd l, \$	Rec=0.55'; WET
					Dark gray WOOD little, Silt 6.6(±)	
	-S-4	4				
		3				
		2				
		2			Dk gr mf S, t \$, 1 f G; wd 8.7'	Rec=1.2'; WET
		1			Gr \$yC Gray SILTY CLAY (FILL) 8.9'	Solvay waste mix
	-S-5				Br Cy\$; pt	
		WH			Brown CLAYEY SILT; peat	



Dunn Geoscience Corp.
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No. DGC-3

PROJECT Carousal Center

SHEET 2 OF 2

CLIENT Shanley, Sweeney & Reilly

JOB No. 2371-1-455

DEPTH FT	SAMPLE NUMBER	BLOWS ON SAMPLE SPOUT PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
		1			Br \$ & C; mtld blk	Rec=1.5' Moist
		3			10.85'	
S-6		4			Dk br f S, a Cy\$; sh	
		4			Dark brown fine SAND, a Clayey Silt; shells	
					(LACUSTRINE)	
		4			12.0' (±)	
		1			Gr br Cy\$	Rec=1.2' WET
S-7		3			12.25'	
		4			Dk br O \$ Dark brown ORGANIC SILT	
		5			12.65'	
					Gr f S, l \$; sh	
					Gray fine SAND, little Silt; shells	
					(LACUSTRINE)	
15					End of Boring	
					Total Depth = 14.0'	



Dunn Geoscience Corp.
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No. DGC-4

PROJECT	Carousel Center				SHEET 1 OF 2
CLIENT	Shanley, Sweeney & Reilly				JOB No. 2371-1-455
DRILLING CONTRACTOR	Parratt-Wolff, Inc.				MEAS. PT ELEV. 3.39'
PURPOSE	Monitoring Well Installation				GROUND ELEV. 10.9'
DRILLING METHOD	Hollow stem augers	SAMPLE	CORE	CASING	DATUM City of Syracuse datum
DRILL RIG TYPE	Mobile B-57	TYPE	SS	HSA	DATE STARTED 3/8/88
GROUNDWATER DEPTH	3.28'	DIA.	2"	4 1/2" ID	DATE FINISHED 3/8/88
MEASURING POINT	Top of PVC	WEIGHT	140#		DRILLER Brian Waters
DATE OF MEASUREMENT	3/21/88	FALL	30"		INSPECTOR Alan Hall

DEPTH	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
		10			Dk br cmf S, s \$, 1 f G; rts	Rec=0.65' Damp
	S-1	8				
		5				
		4			2.0' (±)	
		3			Dk gr Cy\$ s, cmf S, 1 f G	Rec=1.55' Moist fuel oil odor
	S-2	5				
		13				
		14			4.0' (±)	
		3			Dk br-dk gr wd l, \$, s f G, t cmf S	Rec=0.7' WET
5	S-3	5			Dark brown to dark gray WOOD little, Silt, some fine Gravel, trace coarse to fine Sand	
		4				
		3			(FILL)	
					6.0' (±)	
		1			Gr-wh Cy\$	Rec=1.1' WET
	S-4	WH			7.0' (±)	solway waste mix
		1			Dk br wd l, \$	
		1				
		1			Gr-wh \$yC	Rec=2.0' WET/Moist
	S-5	1			Gray to white SILTY CLAY	solway waste
		2			(FILL)	
					9.05'	
					Dk br f G l, cmf S, 1 \$ (FILL) 9.35'	
					Gr br Cy\$; mtd	
					Gray brown CLAYEY SILT, mottled	

Dunn Geoscience Corp.
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No. DGC-4

PROJECT Carousal Center

SHEET 2 OF 2

Shanley, Sweeney & Reilly

JCE No. 2371-1-455

[illegible]



Dunn Geoscience Corp.
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No. DGC-5

PROJECT Carousal Center

SHEET 2 OF 2

CLIENT Shanley, Sweeney & Reilly

JOB No. 2371-1-455

DEPTH	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
		4			Dk br wd 1, mf S, 1 \$; bk; gls	Rec=0.6' WET
		4				
	-S-6	8				
		6				
		4			Dk br wd	Rec=0.1' WET
		2			<u>Dark brown WOOD</u>	plugged
	-S-7	3			(FILL)	split-spoon
		2				
		2				14.0' (±)
		2			Gr Cy\$ 1, f S; bk wd	Rec=0.4' WET
		1			<u>Gray CLAYEY SILT little, fine Sand, black wood</u>	
15	-S-8	1			(FILL)	
		2				
		2			Same	Rec=1.9' WET/Moist
		1				
	-S-9	2				17.1'
		2			Gr br \$ & C; sh; wd fgmts	Rec=2.0' Moist
		2			<u>Grayish brown SILT and CLAY; shells; wood fragments</u>	
		2			(LACUSTRINE)	
		2				
	-S-10	2				
		2				
		2				
20		2			Gr br \$ & C t, f S; mtld	Rec=1.75' Moist
		2				20.05'
		1			Br C & \$ s, mf S; sh	
		1				20.75'
	-S-11	1			Gr cmf S, 1 \$; sh	
		1				21.5'
		2			Br C & \$ s, mf S; sh	
					End of Boring	

APPENDIX D
HYDRAULIC CONDUCTIVITY DATA

HYDROSLV HYDRAULIC CONDUCTIVITY PROGRAM

PROJECT NUMBER: 0771-01-0455
 USER NAME: A. G. HALL
 RUN DATE: 4/27/1999

WELL IDENTIFICATION: 080-13
 DATE OF TEST: 7-15-99
 TEST DESCRIPTION: SLUG
 CASE METHOD: WELL TEST IN UNIFORM SOIL

TEST PARAMETERS:

STANDPIPE/ RISER DIAMETER = 2.00000E+00 INCHES
 INTAKE (SCREEN/PACK) DIAMETER = 2.00000E+00 INCHES
 LENGTH OF INTAKE (SCREEN/PACK) = 4.00000E+00 FEET

MATERIAL ASSUMPTION:

KH/KV RATIO = 1.00000E+00

TEST CONDITIONS:

EQUILIBRIUM HEAD/PRESSURE = 0.00000E-01
 INITIAL HEAD/PRESSURE = 3.11000E+01
 TIME SCALE CONVERSION = 1.20000E+02

TIME	HEAD/PRESSURE	LNCH(I)/HOI	REGRESSION	RESIDUALS
0.00000E-01	3.11000E+01	0.00000E-01	-7.38768E-02	7.38768E-02
1.00000E+01	2.37000E+01	-2.71733E-01	-2.75778E-01	4.04546E-01
2.00000E+01	1.91000E+01	-4.87519E-01	-4.77680E-01	-9.83983E-03
3.00000E+01	1.53000E+01	-7.09355E-01	-6.79581E-01	-2.97739E-02
4.00000E+01	1.24000E+01	-9.19511E-01	-8.81483E-01	-3.80289E-02
5.00000E+01	1.01000E+01	-1.12467E+00	-1.08338E+00	-4.12885E-02
6.00000E+01	8.40000E+00	-1.30898E+00	-1.28529E+00	-2.36908E-02
7.00000E+01	7.00000E+00	-1.49130E+00	-1.48719E+00	-4.11076E-03
8.00000E+01	5.90000E+00	-1.66226E+00	-1.68909E+00	2.68309E-02
1.00000E+02	4.00000E+00	-2.05091E+00	-2.09289E+00	4.19775E-02

STATISTICAL INFORMATION:

B0 (Y INTERCEPT) = -7.38768E-02
 B1 (SLOPE) = -2.42282E+00
 GOODNESS OF FIT (R**2) = 9.96648E-01
 NUMBER OF POINTS = 10

HYDROSLV'S BASIC TIME LAG = 2.29350E+01 SECONDS

CALCULATED HYDRAULIC CONDUCTIVITY INFORMATION:

BASED ON ASSUMED KH/KV RATIO (1.00000E+00) ...

HORIZONTAL HYDRAULIC CONDUCTIVITY = 1.26592E+01 FEET/DAY
 HORIZONTAL HYDRAULIC CONDUCTIVITY = 4.46590E-03 CM/SEC
 VERTICAL HYDRAULIC CONDUCTIVITY = 1.26592E+01 FEET/DAY
 VERTICAL HYDRAULIC CONDUCTIVITY = 4.46590E-03 CM/SEC
 MEAN HYDRAULIC CONDUCTIVITY = 1.26592E+01 FEET/DAY
 MEAN HYDRAULIC CONDUCTIVITY = 4.46590E-03 CM/SEC

Hvorslev HYDRAULIC CONDUCTIVITY PROGRAM

PROJECT NUMBER: 2071-01-0455
 USER NAME: A. G. HALL
 RUN DATE: 4/27/1998

WELL IDENTIFICATION: D3C-15
 DATE OF TEST: 7-15-88
 TEST DESCRIPTION: SLUG
 CASE/METHOD: WELL TEST IN UNIFORM SOIL

TEST PARAMETERS:

STANDPIPE/RISER DIAMETER = 2.00000E+00 INCHES
 INTAKE (SCREEN/PAK) DIAMETER = 2.00000E+00 INCHES
 LENGTH OF INTAKE (SCREEN/PAK) = 4.00000E+00 FEET

MATERIAL ASSUMPTION:

Kh/Kv RATIO = 1.00000E+00

TEST CONDITIONS:

EQUILIBRIUM HEAD/PRESSURE = 0.00000E-01
 INITIAL HEAD/PRESSURE = 1.55000E+01
 TIME SCALE CONVERSION = 6.00000E+01

TIME	HEAD/PRESSURE	LN(H(I)/H0)	REGRESSION	RESIDUALS
0.00000E-01	1.55000E+01	0.00000E-01	-3.30482E-02	3.30482E-02
5.00000E+00	1.20000E+01	-2.55933E-01	-2.31339E-01	-2.45948E-02
1.00000E+01	9.90000E+00	-4.48305E-01	-4.29629E-01	-1.86765E-02
1.50000E+01	8.10000E+00	-6.48976E-01	-6.27919E-01	-2.10568E-02
2.00000E+01	7.00000E+00	-7.94930E-01	-8.26209E-01	3.12796E-02

STATISTICAL INFORMATION:

B0 (Y INTERCEPT) = -3.30482E-02
 B1 (SLOPE) = -2.37948E+00
 GOODNESS OF FIT (R**2) = 9.91258E-01
 NUMBER OF POINTS = 5

Hvorslev's BASIC TIME LAG = 2.43822E+01 SECONDS

CALCULATED HYDRAULIC CONDUCTIVITY INFORMATION:

BASED ON ASSUMED Kh/Kv RATIO (1.00000E+00) ...

HORIZONTAL HYDRAULIC CONDUCTIVITY = 1.19079E+01 FEET/DAY
 HORIZONTAL HYDRAULIC CONDUCTIVITY = 4.20083E-03 CM/SEC
 VERTICAL HYDRAULIC CONDUCTIVITY = 1.19079E+01 FEET/DAY
 VERTICAL HYDRAULIC CONDUCTIVITY = 4.20083E-03 CM/SEC
 MEAN HYDRAULIC CONDUCTIVITY = 1.19079E+01 FEET/DAY
 MEAN HYDRAULIC CONDUCTIVITY = 4.20083E-03 CM/SEC

HYDROSLV HYDRAULIC CONDUCTIVITY PROGRAM

PROJECT NUMBER: 2371-01-0455
 USER NAME: A. G. HALL
 RUN DATE: 4/26/1988

WELL IDENTIFICATION: 06C-10
 DATE OF TEST: 3-14-88
 TEST DESCRIPTION: SLUG
 CASE/METHOD: WELL TEST IN UNIFORM SOIL

TEST PARAMETERS:

STANDPIPE/RISER DIAMETER = 2.00000E+00 INCHES
 INTAKE (SCREEN/PAK) DIAMETER = 2.00000E+00 INCHES
 LENGTH OF INTAKE (SCREEN/PAK) = 5.00000E+00 FEET

MATERIAL ASSUMPTION:

Kh/Kv RATIO = 1.00000E+00

TEST CONDITIONS:

EQUILIBRIUM HEAD/PRESSURE = 0.00000E-01
 INITIAL HEAD/PRESSURE = 1.84000E+01
 TIME SCALE CONVERSION = 1.20000E+02

TIME	HEAD/PRESSURE	LNCH(I)/H01	REGRESSION	RESIDUALS
0.00000E-01	1.84000E+01	0.00000E-01	-6.24599E-03	6.24599E-03
1.50000E+01	1.39000E+01	-2.80462E-01	-2.74609E-01	-5.85321E-03
3.00000E+01	1.07000E+01	-5.42107E-01	-5.42971E-01	-8.64291E-04
4.50000E+01	8.10000E+00	-8.20487E-01	-8.11334E-01	-9.15272E-03
6.00000E+01	6.30000E+00	-1.07180E+00	-1.07970E+00	7.89549E-03

STATISTICAL INFORMATION:

B0 (Y INTERCEPT) = -6.24599E-03
 B1 (SLOPE) = -2.14690E+00
 GOODNESS OF FIT (R**2) = 9.99694E-01
 NUMBER OF POINTS = 5

HYDROSLV'S BASIC TIME LAG = 2.77727E+01 SECONDS

CALCULATED HYDRAULIC CONDUCTIVITY INFORMATION:

BASED ON ASSUMED Kh/Kv RATIO (1.00000E+00) ...

HORIZONTAL HYDRAULIC CONDUCTIVITY = 8.84540E+00 FEET/DAY
 HORIZONTAL HYDRAULIC CONDUCTIVITY = 3.12046E-03 CM/SEC
 VERTICAL HYDRAULIC CONDUCTIVITY = 8.84540E+00 FEET/DAY
 VERTICAL HYDRAULIC CONDUCTIVITY = 3.12046E-03 CM/SEC
 MEAN HYDRAULIC CONDUCTIVITY = 8.84540E+00 FEET/DAY
 MEAN HYDRAULIC CONDUCTIVITY = 3.12046E-03 CM/SEC

HVORSLEV HYDRAULIC CONDUCTIVITY PROGRAM

PROJECT NUMBER: 2371-01-0455
 USER NAME: A. G. HALL
 RUN DATE: 4/26/1988

WELL IDENTIFICATION: 060-10
 DATE OF TEST: 3-14-88
 TEST DESCRIPTION: SLUG
 CASE/METHOD: WELL TEST IN UNIFORM SOIL

TEST PARAMETERS:

STANDPIPE/RISER DIAMETER = 2.00000E+00 INCHES
 INTAKE (SCREEN/PAK) DIAMETER = 2.00000E+00 INCHES
 LENGTH OF INTAKE (SCREEN/PAK) = 5.00000E+00 FEET

MATERIAL ASSUMPTION:

Kh/Kv RATIO = 1.00000E+00

TEST CONDITIONS:

EQUILIBRIUM HEAD/PRESSURE = 0.00000E-01
 INITIAL HEAD/PRESSURE = 2.34000E+01
 TIME SCALE CONVERSION = 1.20000E+02

TIME	HEAD/PRESSURE	LNCH(I)/H01	REGRESSION	RESIDUALS
0.00000E-01	2.34000E+01	0.00000E-01	-1.50101E-02	1.50101E-02
1.50000E+01	1.78000E+01	-2.73538E-01	-2.64627E-01	-8.91073E-03
3.00000E+01	1.38000E+01	-5.28067E-01	-5.14244E-01	-1.38238E-02
5.00000E+01	1.00000E+01	-8.50151E-01	-8.47066E-01	-3.08496E-03
6.50000E+01	7.90000E+00	-1.08587E+00	-1.09668E+00	1.08096E-02

STATISTICAL INFORMATION:

B0 (Y INTERCEPT) = -1.50101E-02
 B1 (SLOPE) = -1.99693E+00
 GOODNESS OF FIT (R**2) = 9.99178E-01
 NUMBER OF POINTS = 5

HVORSLEV'S BASIC TIME LAG = 2.95951E+01 SECONDS

CALCULATED HYDRAULIC CONDUCTIVITY INFORMATION:

BASED ON ASSUMED Kh/Kv RATIO (1.00000E+00) ...

HORIZONTAL HYDRAULIC CONDUCTIVITY = 8.30073E+00 FEET/DAY
 HORIZONTAL HYDRAULIC CONDUCTIVITY = 2.92831E-03 CM/SEC
 VERTICAL HYDRAULIC CONDUCTIVITY = 8.30073E+00 FEET/DAY
 VERTICAL HYDRAULIC CONDUCTIVITY = 2.92831E-03 CM/SEC
 MEAN HYDRAULIC CONDUCTIVITY = 8.30073E+00 FEET/DAY
 MEAN HYDRAULIC CONDUCTIVITY = 2.92831E-03 CM/SEC

HYDROSLIP HYDRAULIC CONDUCTIVITY PROGRAM

PROJECT NUMBER: 2371-01-0455
 USER NAME: A. G. HALL
 RUN DATE: 4/26/1988

WELL IDENTIFICATION: DGC-2
 DATE OF TEST: 3-14-88
 TEST DESCRIPTION: SLUG
 CASE/METHOD: WELL TEST IN UNIFORM SOIL

TEST PARAMETERS:

STANDPIPE/RISE DIAMETER = 2.00000E+00 INCHES
 INTAKE (SCREEN/PAK) DIAMETER = 2.00000E+00 INCHES
 LENGTH OF INTAKE (SCREEN/PAK) = 1.00000E+01 FEET

MATERIAL ASSUMPTION:

Kh/Kv RATIO = 1.00000E+00

TEST CONDITIONS:

EQUILIBRIUM HEAD/PRESSURE = 0.00000E-01
 INITIAL HEAD/PRESSURE = 3.90000E+01
 TIME SCALE CONVERSION = 3.00000E+02

TIME	HEAD/PRESSURE	LN[H(I)/H0]	REGRESSION	RESIDUALS
0.00000E-01	3.90000E+01	0.00000E-01	-1.01257E-01	1.01257E-01
1.00000E+01	3.22000E+01	-1.91595E-01	-2.14910E-01	2.33146E-02
2.00000E+01	2.73000E+01	-3.56675E-01	-3.28563E-01	-2.81122E-02
3.00000E+01	2.39000E+01	-4.89683E-01	-4.42216E-01	-4.74674E-02
4.50000E+01	1.87000E+01	-7.35038E-01	-6.12695E-01	-1.22343E-01
6.50000E+01	1.64000E+01	-8.66280E-01	-8.40001E-01	-2.62790E-02
9.00000E+01	1.40000E+01	-1.02450E+00	-1.12413E+00	9.96296E-02

STATISTICAL INFORMATION:

B0 (Y INTERCEPT) = -1.01257E-01
 B1 (SLOPE) = -3.40959E+00
 GOODNESS OF FIT (R**2) = 9.52296E-01
 NUMBER OF POINTS = 7

HYDROSLIP'S BASIC TIME LAG = 1.58156E+01 SECONDS

CALCULATED HYDRAULIC CONDUCTIVITY INFORMATION:

BASED ON ASSUMED Kh/Kv RATIO (1.00000E+00) ...

HORIZONTAL HYDRAULIC CONDUCTIVITY = 9.08123E+00 FEET/DAY
 HORIZONTAL HYDRAULIC CONDUCTIVITY = 3.20366E-03 CM/SEC
 VERTICAL HYDRAULIC CONDUCTIVITY = 9.08123E+00 FEET/DAY
 VERTICAL HYDRAULIC CONDUCTIVITY = 3.20366E-03 CM/SEC
 MEAN HYDRAULIC CONDUCTIVITY = 9.08123E+00 FEET/DAY
 MEAN HYDRAULIC CONDUCTIVITY = 3.20366E-03 CM/SEC

HYDROLEV HYDRAULIC CONDUCTIVITY PROGRAM

PROJECT NUMBER: 2071-01-0455
 USER NAME: A. G. HALL
 RUN DATE: 4/26/1988

WELL IDENTIFICATION: DSC-2
 DATE OF TEST: 3-14-88
 TEST DESCRIPTION: SLUG
 CASE/METHOD: WELL TEST IN UNIFORM SOIL

TEST PARAMETERS:

STANDPIPE/RISE DIAMETER = 2.00000E+00 INCHES
 INTAKE (SCREEN/PAK) DIAMETER = 2.00000E+00 INCHES
 LENGTH OF INTAKE (SCREEN/PAK) = 1.00000E+01 FEET

MATERIAL ASSUMPTION:

KH/KV RATIO = 1.00000E+00

TEST CONDITIONS:

EQUILIBRIUM HEAD/PRESSURE = 0.00000E-01
 INITIAL HEAD/PRESSURE = 3.90000E+01
 TIME SCALE CONVERSION = 3.00000E+02

TIME	HEAD/PRESSURE	LN(H(I)/H0)	REGRESSION	RESIDUALS
0.00000E-01	3.90000E+01	0.00000E-01	-1.74993E-02	1.74993E-02
1.00000E+01	3.22000E+01	-1.91595E-01	-1.78023E-01	-1.35726E-02
2.00000E+01	2.73000E+01	-3.56675E-01	-3.38546E-01	-1.81290E-02
3.00000E+01	2.39000E+01	-4.89683E-01	-4.99069E-01	9.38604E-03
4.50000E+01	1.87000E+01	-7.35038E-01	-7.39854E-01	4.81615E-03

STATISTICAL INFORMATION:

B0 (Y INTERCEPT) = -1.74993E-02
 B1 (SLOPE) = -4.81570E+00
 GOODNESS OF FIT (R**2) = 9.97049E-01
 NUMBER OF POINTS = 5

HYDROLEV'S BASIC TIME LAG = 1.22412E+01 SECONDS

CALCULATED HYDRAULIC CONDUCTIVITY INFORMATION:

BASED ON ASSUMED KH/KV RATIO (1.00000E+00) ...

HORIZONTAL HYDRAULIC CONDUCTIVITY = 1.17329E+01 FEET/DAY
 HORIZONTAL HYDRAULIC CONDUCTIVITY = 4.13910E-03 CM/SEC
 VERTICAL HYDRAULIC CONDUCTIVITY = 1.17329E+01 FEET/DAY
 VERTICAL HYDRAULIC CONDUCTIVITY = 4.13910E-03 CM/SEC
 MEAN HYDRAULIC CONDUCTIVITY = 1.17329E+01 FEET/DAY
 MEAN HYDRAULIC CONDUCTIVITY = 4.13910E-03 CM/SEC

HVORSLEV HYDRAULIC CONDUCTIVITY PROGRAM

PROJECT NUMBER: 0371-01-0455
 USER NAME: A. G. HALL
 RUN DATE: 4/26/1988

WELL IDENTIFICATION: DGC-2
 DATE OF TEST: 3-14-88
 TEST DESCRIPTION: SLUG
 CASE/METHOD: WELL TEST IN UNIFORM SOIL

TEST PARAMETERS:

STANDPIPE/RISER DIAMETER = 2.00000E+00 INCHES
 INTAKE (SCREEN/PAK) DIAMETER = 2.00000E+00 INCHES
 LENGTH OF INTAKE (SCREEN/PAK) = 1.00000E+01 FEET

MATERIAL ASSUMPTION:

Kh/Kv RATIO = 1.00000E+00

TEST CONDITIONS:

EQUILIBRIUM HEAD/PRESSURE = 0.00000E-01
 INITIAL HEAD/PRESSURE = 2.15000E+01
 TIME SCALE CONVERSION = 3.00000E+02

TIME	HEAD/PRESSURE	LN[H(I)/H0]	REGRESSION	RESIDUALS
0.00000E-01	2.15000E+01	0.00000E-01	-8.81518E-02	8.81518E-02
1.00000E+01	1.70000E+01	-2.34840E-01	-2.60623E-01	2.57833E-02
2.00000E+01	1.39000E+01	-4.36164E-01	-4.33094E-01	-3.07013E-03
3.50000E+01	1.00000E+01	-7.65468E-01	-6.91801E-01	-7.36673E-02
6.00000E+01	6.10000E+00	-1.25976E+00	-1.12298E+00	-1.36786E-01
8.00000E+01	4.80000E+00	-1.49944E+00	-1.46792E+00	-3.15166E-02
1.00000E+02	4.00000E+00	-1.68176E+00	-1.81286E+00	1.31104E-01

STATISTICAL INFORMATION:

B0 (Y INTERCEPT) = -8.81518E-02
 B1 (SLOPE) = -5.17413E+00
 GOODNESS OF FIT (R**2) = 9.80171E-01
 NUMBER OF POINTS = 7

HVORSLEV'S BASIC TIME LAG = 1.05739E+01 SECONDS

CALCULATED HYDRAULIC CONDUCTIVITY INFORMATION:

BASED ON ASSUMED Kh/Kv RATIO (1.00000E+00) ...

HORIZONTAL HYDRAULIC CONDUCTIVITY = 1.35829E+01 FEET/DAY
 HORIZONTAL HYDRAULIC CONDUCTIVITY = 4.79175E-03 CM/SEC
 VERTICAL HYDRAULIC CONDUCTIVITY = 1.35829E+01 FEET/DAY
 VERTICAL HYDRAULIC CONDUCTIVITY = 4.79175E-03 CM/SEC
 MEAN HYDRAULIC CONDUCTIVITY = 1.35829E+01 FEET/DAY
 MEAN HYDRAULIC CONDUCTIVITY = 4.79175E-03 CM/SEC

HYDROSLV HYDRAULIC CONDUCTIVITY PROGRAM

PROJECT NUMBER: 0371-01-0455
 USER NAME: A. G. HALL
 RUN DATE: 4/25/1988

WELL IDENTIFICATION: DGC-3
 DATE OF TEST: 3-14-88
 TEST DESCRIPTION: SLUG
 CASE/METHOD: WELL TEST IN UNIFORM SOIL

TEST PARAMETERS:

STANDPIPE/ RISER DIAMETER = 2.00000E+00 INCHES
 INTAKE (SCREEN/PACK) DIAMETER = 2.00000E+00 INCHES
 LENGTH OF INTAKE (SCREEN/PACK) = 5.00000E+00 FEET

MATERIAL ASSUMPTION:

Kh/Kv RATIO = 1.00000E+00

TEST CONDITIONS:

EQUILIBRIUM HEAD/PRESSURE = 0.00000E-01
 INITIAL HEAD/PRESSURE = 2.57000E+01
 TIME SCALE CONVERSION = 3.00000E+02

TIME	HEAD/PRESSURE	LN(H(I)/H01)	REGRESSION	RESIDUALS
0.00000E-01	2.57000E+01	0.00000E-01	-2.13697E-01	2.13697E-01
5.00000E+00	1.60000E+01	-4.73902E-01	-5.58712E-01	8.48102E-02
1.00000E+01	1.03000E+01	-9.14347E-01	-9.03727E-01	-1.06196E-02
1.50000E+01	6.70000E+00	-1.34438E+00	-1.24874E+00	-9.56410E-02
2.00000E+01	4.80000E+00	-1.67788E+00	-1.59376E+00	-8.41175E-02
3.00000E+01	2.00000E+00	-2.55334E+00	-2.28379E+00	-2.69556E-01
4.00000E+01	1.20000E+00	-3.06417E+00	-2.97382E+00	-9.03517E-02
5.00000E+01	7.00000E-01	-3.60317E+00	-3.66385E+00	6.06818E-02
6.00000E+01	4.00000E-01	-4.16278E+00	-4.35388E+00	1.91096E-01

STATISTICAL INFORMATION:

B0 (Y INTERCEPT) = -2.13697E-01
 B1 (SLOPE) = -2.07009E+01
 GOODNESS OF FIT (R**2) = 9.88625E-01
 NUMBER OF POINTS = 9

HYDROSLV'S BASIC TIME LAG = 2.27904E+00 SECONDS

CALCULATED HYDRAULIC CONDUCTIVITY INFORMATION:

BASED ON ASSUMED Kh/Kv RATIO (1.00000E+00)

HORIZONTAL HYDRAULIC CONDUCTIVITY = 1.07791E+02 FEET/DAY
 HORIZONTAL HYDRAULIC CONDUCTIVITY = 3.80264E-02 CM/SEC
 VERTICAL HYDRAULIC CONDUCTIVITY = 1.07791E+02 FEET/DAY
 VERTICAL HYDRAULIC CONDUCTIVITY = 3.80264E-02 CM/SEC
 MEAN HYDRAULIC CONDUCTIVITY = 1.07791E+02 FEET/DAY
 MEAN HYDRAULIC CONDUCTIVITY = 3.80264E-02 CM/SEC

HYDROSLV HYDRAULIC CONDUCTIVITY PROGRAM

PROJECT NUMBER: 2771-01-0455
 USER NAME: A. G. HALL
 RUN DATE: 4/26/1988

WELL IDENTIFICATION: DGC-3
 DATE OF TEST: 7-14-88
 TEST DESCRIPTION: SLUG
 CASE/METHOD: WELL TEST IN UNIFORM SOIL

TEST PARAMETERS:

STANDPIPE/RISER DIAMETER = 2.00000E+00 INCHES
 INTAKE (SCREEN/PACK) DIAMETER = 2.00000E+00 INCHES
 LENGTH OF INTAKE (SCREEN/PACK) = 5.00000E+00 FEET

MATERIAL ASSUMPTION:

Kh/Kv RATIO = 1.00000E+00

TEST CONDITIONS:

EQUILIBRIUM HEAD/PRESSURE = 0.00000E+01
 INITIAL HEAD/PRESSURE = 4.23000E+01
 TIME SCALE CONVERSION = 3.00000E+02

TIME	HEAD/PRESSURE	LN[H(I)/H0]	REGRESSION	RESIDUALS
0.00000E+01	4.23000E+01	0.00000E+01	-1.08142E-01	1.08142E-01
5.00000E+00	2.62000E+01	-4.79028E-01	-4.61662E-01	-1.73661E-02
1.00000E+01	1.76000E+01	-9.76888E-01	-8.15181E-01	-6.17073E-02
1.50000E+01	1.23000E+01	-1.23519E+00	-1.16870E+00	-6.64876E-02
2.00000E+01	8.70000E+00	-1.58146E+00	-1.52222E+00	-5.92445E-02
2.50000E+01	6.50000E+00	-1.87298E+00	-1.87574E+00	2.75797E-03
3.00000E+01	5.00000E+00	-2.13535E+00	-2.22926E+00	9.39089E-02

STATISTICAL INFORMATION:

B0 (Y INTERCEPT) = -1.08142E-01
 B1 (SLOPE) = -2.12112E+01
 GOODNESS OF FIT (R**2) = 9.90781E-01
 NUMBER OF POINTS = 7

HYDROSLV'S BASIC TIME LAG = 2.52280E+00 SECONDS

CALCULATED HYDRAULIC CONDUCTIVITY INFORMATION:

BASED ON ASSUMED Kh/Kv RATIO (1.00000E+00) ...

HORIZONTAL HYDRAULIC CONDUCTIVITY = 9.73763E+01 FEET/DAY
 HORIZONTAL HYDRAULIC CONDUCTIVITY = 3.43522E-02 CM/SEC
 VERTICAL HYDRAULIC CONDUCTIVITY = 9.73763E+01 FEET/DAY
 VERTICAL HYDRAULIC CONDUCTIVITY = 3.43522E-02 CM/SEC
 MEAN HYDRAULIC CONDUCTIVITY = 9.73763E+01 FEET/DAY
 MEAN HYDRAULIC CONDUCTIVITY = 3.43522E-02 CM/SEC



HVORSLEV HYDRAULIC CONDUCTIVITY PROGRAM

PROJECT NUMBER: 2371-01-0455
 USER NAME: A. G. HALL
 RUN DATE: 4/26/1988

WELL IDENTIFICATION: DGC-5
 DATE OF TEST: 3-14-88
 TEST DESCRIPTION: SLUG
 CASE/METHOD: WELL TEST IN UNIFORM SOIL

TEST PARAMETERS:

STANDPIPE/RISE DIAMETER = 2.00000E+00 INCHES
 INTAKE (SCREEN/PAK) DIAMETER = 2.00000E+00 INCHES
 LENGTH OF INTAKE (SCREEN/PAK) = 9.60000E+00 FEET

MATERIAL ASSUMPTION:

KH/KV RATIO = 1.00000E+00

TEST CONDITIONS:

EQUILIBRIUM HEAD/PRESSURE = 0.00000E-01
 INITIAL HEAD/PRESSURE = 3.60000E+01
 TIME SCALE CONVERSION = 3.00000E+02

TIME	HEAD/PRESSURE	LN[H(I)/H0]	REGRESSION	RESIDUALS
0.00000E-01	3.60000E+01	0.00000E-01	-1.35728E-01	1.35728E-01
5.00000E+00	2.60000E+01	-3.25422E-01	-3.29524E-01	4.10185E-03
1.00000E+01	2.01000E+01	-5.82799E-01	-5.23320E-01	-5.94786E-02
1.50000E+01	1.60000E+01	-8.10930E-01	-7.17117E-01	-9.38136E-02
2.50000E+01	1.12000E+01	-1.16761E+00	-1.10471E+00	-6.28961E-02
3.50000E+01	8.00000E+00	-1.50408E+00	-1.49230E+00	-1.17760E-02
4.50000E+01	6.00000E+00	-1.79176E+00	-1.87989E+00	8.81343E-02

STATISTICAL INFORMATION:

B0 (Y INTERCEPT) = -1.35728E-01
 B1 (SLOPE) = -1.16278E+01
 GOODNESS OF FIT (R**2) = 9.82796E-01
 NUMBER OF POINTS = 7

HVORSLEV'S BASIC TIME LAG = 4.45970E+00 SECONDS

CALCULATED HYDRAULIC CONDUCTIVITY INFORMATION:

BASED ON ASSUMED KH/KV RATIO (1.00000E+00) ...

HORIZONTAL HYDRAULIC CONDUCTIVITY = 3.32609E+01 FEET/DAY
 HORIZONTAL HYDRAULIC CONDUCTIVITY = 1.17337E-02 CM/SEC
 VERTICAL HYDRAULIC CONDUCTIVITY = 3.32609E+01 FEET/DAY
 VERTICAL HYDRAULIC CONDUCTIVITY = 1.17337E-02 CM/SEC
 MEAN HYDRAULIC CONDUCTIVITY = 3.32609E+01 FEET/DAY
 MEAN HYDRAULIC CONDUCTIVITY = 1.17337E-02 CM/SEC

HVORSLEV HYDRAULIC CONDUCTIVITY PROGRAM

PROJECT NUMBER: 2371-01-0455
USER NAME: A. G. HALL
RUN DATE: 4/26/1988

WELL IDENTIFICATION: DGC-4
DATE OF TEST: 3-14-88
TEST DESCRIPTION: SLUG
CASE/METHOD: WELL TEST IN UNIFORM SOIL

TEST PARAMETERS:

STANDPIPE/RISER DIAMETER = 2.00000E+00 INCHES
INTAKE (SCREEN/PAK) DIAMETER = 2.00000E+00 INCHES
LENGTH OF INTAKE (SCREEN/PAK) = 5.00000E+00 FEET

MATERIAL ASSUMPTION:

Kh/Kv RATIO = 1.00000E+00

TEST CONDITIONS:

EQUILIBRIUM HEAD/PRESSURE = 0.00000E-01
INITIAL HEAD/PRESSURE = 2.89000E+01
TIME SCALE CONVERSION = 1.20000E+02

TIME	HEAD/PRESSURE	LNCH(I)/H0J	REGRESSION	RESIDUALS
0.00000E-01	2.89000E+01	0.00000E-01	-1.09747E-01	1.09747E-01
5.00000E+00	2.06000E+01	-3.38550E-01	-3.54682E-01	1.61317E-02
1.50000E+01	1.18000E+01	-8.95742E-01	-8.44553E-01	-5.11894E-02
2.50000E+01	7.00000E+00	-1.41793E+00	-1.33442E+00	-8.35083E-02
3.50000E+01	4.20000E+00	-1.92876E+00	-1.82429E+00	-1.04464E-01
4.50000E+01	2.80000E+00	-2.33422E+00	-2.31416E+00	-2.00580E-02
5.50000E+01	2.00000E+00	-2.67069E+00	-2.80403E+00	1.33340E-01

STATISTICAL INFORMATION:

B0 (Y INTERCEPT) = -1.09747E-01
B1 (SLOPE) = -5.87845E+00
GOODNESS OF FIT (R**2) = 9.91643E-01
NUMBER OF POINTS = 7

HVORSLEV'S BASIC TIME LAG = 9.08662E+00 SECONDS

CALCULATED HYDRAULIC CONDUCTIVITY INFORMATION:

BASED ON ASSUMED Kh/Kv RATIO (1.00000E+00) ...

HORIZONTAL HYDRAULIC CONDUCTIVITY = 2.70354E+01 FEET/DAY
HORIZONTAL HYDRAULIC CONDUCTIVITY = 9.53750E-03 CM/SEC
VERTICAL HYDRAULIC CONDUCTIVITY = 2.70354E+01 FEET/DAY
VERTICAL HYDRAULIC CONDUCTIVITY = 9.53750E-03 CM/SEC
MEAN HYDRAULIC CONDUCTIVITY = 2.70354E+01 FEET/DAY
MEAN HYDRAULIC CONDUCTIVITY = 9.53750E-03 CM/SEC

HYDROSLV HYDRAULIC CONDUCTIVITY PROGRAM

PROJECT NUMBER: 2371-01-0455
 USER NAME: A. G. HALL
 RUN DATE: 4/26/1998

WELL IDENTIFICATION: DGC-5
 DATE OF TEST: 3-14-88
 TEST DESCRIPTION: SLUG
 CASE/METHOD: WELL TEST IN UNIFORM SOIL

TEST PARAMETERS:

STANDPIPE/RISER DIAMETER = 2.00000E+00 INCHES
 INTAKE (SCREEN/PACK) DIAMETER = 2.00000E+00 INCHES
 LENGTH OF INTAKE (SCREEN/PACK) = 9.60000E+00 FEET

MATERIAL ASSUMPTION:

KH/KV RATIO = 1.00000E+00

TEST CONDITIONS:

EQUILIBRIUM HEAD/PRESSURE = 0.00000E-01
 INITIAL HEAD/PRESSURE = 3.68000E+01
 TIME SCALE CONVERSION = 3.00000E+02

TIME	HEAD/PRESSURE	LNCH(I)/H01	REGRESSION	RESIDUALS
0.00000E-01	3.68000E+01	0.00000E-01	-4.96889E-02	4.96889E-02
5.00000E+00	2.85000E+01	-2.55594E-01	-2.48168E-01	-7.42552E-03
1.00000E+01	2.26000E+01	-4.87548E-01	-4.46648E-01	-4.09004E-02
1.50000E+01	1.84000E+01	-6.93147E-01	-6.45127E-01	-4.80204E-02
2.50000E+01	1.36000E+01	-9.95428E-01	-1.04209E+00	4.66574E-02

STATISTICAL INFORMATION:

B0 (Y INTERCEPT) = -4.96889E-02
 B1 (SLOPE) = -1.19088E+01
 GOODNESS OF FIT (R**2) = 9.85331E-01
 NUMBER OF POINTS = 5

HYDROSLV'S BASIC TIME LAG = 4.78796E+00 SECONDS

CALCULATED HYDRAULIC CONDUCTIVITY INFORMATION:

BASED ON ASSUMED KH/KV RATIO (1.00000E+00)...

HORIZONTAL HYDRAULIC CONDUCTIVITY = 3.09805E+01 FEET/DAY
 HORIZONTAL HYDRAULIC CONDUCTIVITY = 1.09292E-02 CM/SEC
 VERTICAL HYDRAULIC CONDUCTIVITY = 3.09805E+01 FEET/DAY
 VERTICAL HYDRAULIC CONDUCTIVITY = 1.09292E-02 CM/SEC
 MEAN HYDRAULIC CONDUCTIVITY = 3.09805E+01 FEET/DAY
 MEAN HYDRAULIC CONDUCTIVITY = 1.09292E-02 CM/SEC

DUNN SCIENCE CORPORATION

Hvorslev HYDRAULIC CONDUCTIVITY PROGRAM

PROJECT NUMBER: 2371-01-0455
 USER NAME: A. G. HALL
 RUN DATE: 4/26/1998

WELL IDENTIFICATION: DGC-6
 DATE OF TEST: 3-14-88
 TEST DESCRIPTION: SLUG
 CASE/METHOD: WELL TEST IN UNIFORM SOIL

TEST PARAMETERS:

STANDPIPE/RISER DIAMETER = 2.00000E+00 INCHES
 INTAKE (SCREEN/PAK) DIAMETER = 2.00000E+00 INCHES
 LENGTH OF INTAKE (SCREEN/PAK) = 4.93000E+00 FEET

MATERIAL ASSUMPTION:

Kh/Kv RATIO = 1.00000E+00

TEST CONDITIONS:

EQUILIBRIUM HEAD/PRESSURE = 0.00000E-01
 INITIAL HEAD/PRESSURE = 1.20000E+01
 TIME SCALE CONVERSION = 1.20000E+02

TIME	HEAD/PRESSURE	LN(H(1)/H0)	REGRESSION	RESIDUALS
0.00000E-01	1.20000E+01	0.00000E-01	-6.20057E-02	6.20057E-02
5.00000E+00	8.90000E+00	-2.98855E-01	-2.75958E-01	-2.28972E-02
1.00000E+01	6.80000E+00	-3.67984E-01	-4.89911E-01	-7.80731E-02
1.50000E+01	5.80000E+00	-7.27049E-01	-7.03863E-01	-2.31853E-02
2.00000E+01	5.10000E+00	-8.55666E-01	-9.17816E-01	6.21499E-02

STATISTICAL INFORMATION:

B0 (Y INTERCEPT) = -6.20057E-02
 B1 (SLOPE) = -5.13486E+00
 GOODNESS OF FIT (R**2) = 9.68549E-01
 NUMBER OF POINTS = 5

Hvorslev's BASIC TIME LAG = 1.09603E+01 SECONDS

CALCULATED HYDRAULIC CONDUCTIVITY INFORMATION:

BASED ON ASSUMED Kh/Kv RATIO (1.00000E+00) ...

HORIZONTAL HYDRAULIC CONDUCTIVITY = 2.26536E+01 FEET/DAY
 HORIZONTAL HYDRAULIC CONDUCTIVITY = 7.99170E-03 CM/SEC
 VERTICAL HYDRAULIC CONDUCTIVITY = 2.26536E+01 FEET/DAY
 VERTICAL HYDRAULIC CONDUCTIVITY = 7.99170E-03 CM/SEC
 MEAN HYDRAULIC CONDUCTIVITY = 2.26536E+01 FEET/DAY
 MEAN HYDRAULIC CONDUCTIVITY = 7.99170E-03 CM/SEC

HYVORSLEV HYDRAULIC CONDUCTIVITY PROGRAM

PROJECT NUMBER: 2371-01-0455
USER NAME: A. G. HALL
RUN DATE: 4/26/1988

WELL IDENTIFICATION: DGC-6
DATE OF TEST: 3-14-88
TEST DESCRIPTION: SLUG
CASE/METHOD: WELL TEST IN UNIFORM SOIL

TEST PARAMETERS:

STANDPIPE/RISE DIAMETER = 2.00000E+00 INCHES
INTAKE (SCREEN/PAK) DIAMETER = 2.00000E+00 INCHES
LENGTH OF INTAKE (SCREEN/PAK) = 4.93000E+00 FEET

MATERIAL ASSUMPTION:

Kh/Kv RATIO = 1.00000E+00

TEST CONDITIONS:

EQUILIBRIUM HEAD/PRESSURE = 0.00000E-01
INITIAL HEAD/PRESSURE = 1.27000E+01
TIME SCALE CONVERSION = 1.20000E+02

TIME	HEAD/PRESSURE	LN[H(I)/H0]	REGRESSION	RESIDUALS
0.00000E-01	1.27000E+01	0.00000E-01	-1.47279E-01	1.47279E-01
5.00000E+00	8.80000E+00	-3.66850E-01	-3.46539E-01	-2.03117E-02
1.00000E+01	6.80000E+00	-6.24679E-01	-5.45798E-01	-7.88811E-02
1.50000E+01	5.40000E+00	-8.55203E-01	-7.45058E-01	-1.10145E-01
2.50000E+01	3.90000E+00	-1.18063E+00	-1.14358E+00	-3.70480E-02
3.50000E+01	3.00000E+00	-1.44299E+00	-1.54210E+00	9.91072E-02

STATISTICAL INFORMATION:

B0 (Y INTERCEPT) = -1.47279E-01
B1 (SLOPE) = -4.78223E+00
GOODNESS OF FIT (R**2) = 9.63148E-01
NUMBER OF POINTS = 6

HYVORSLEV'S BASIC TIME LAG = 1.06986E+01 SECONDS

CALCULATED HYDRAULIC CONDUCTIVITY INFORMATION:

BASED ON ASSUMED Kh/Kv RATIO (1.00000E+00) ...

HORIZONTAL HYDRAULIC CONDUCTIVITY = 2.32078E+01 FEET/DAY
HORIZONTAL HYDRAULIC CONDUCTIVITY = 8.18718E-03 CM/SEC

VERTICAL HYDRAULIC CONDUCTIVITY = 2.32078E+01 FEET/DAY
VERTICAL HYDRAULIC CONDUCTIVITY = 8.18718E-03 CM/SEC

MEAN HYDRAULIC CONDUCTIVITY = 2.32078E+01 FEET/DAY
MEAN HYDRAULIC CONDUCTIVITY = 8.18718E-03 CM/SEC

Hvorslev HYDRAULIC CONDUCTIVITY PROGRAM

PROJECT NUMBER: 2371-01-0455
 USER NAME: A. G. HALL
 RUN DATE: 4/26/1988

WELL IDENTIFICATION: DGC-7
 DATE OF TEST: 3-14-88
 TEST DESCRIPTION: SLUG
 CASE/METHOD: WELL TEST IN UNIFORM SOIL

TEST PARAMETERS:

STANDPIPE/RISER DIAMETER = 2.00000E+00 INCHES
 INTAKE (SCREEN/PACK) DIAMETER = 2.00000E+00 INCHES
 LENGTH OF INTAKE (SCREEN/PACK) = 8.00000E+00 FEET

MATERIAL ASSUMPTION:

Kh/Kv RATIO = 1.00000E+00

TEST CONDITIONS:

EQUILIBRIUM HEAD/PRESSURE = 0.00000E-01
 INITIAL HEAD/PRESSURE = 4.54000E+01
 TIME SCALE CONVERSION = 1.20000E+02

TIME	HEAD/PRESSURE	LNCH(I)/HOI	REGRESSION	RESIDUALS
0.00000E-01	4.54000E+01	0.00000E-01	-1.88168E-02	1.88168E-02
5.00000E+00	4.00000E+01	-1.26633E-01	-1.21161E-01	-5.47172E-03
1.50000E+01	3.21000E+01	-3.46656E-01	-3.25849E-01	-2.08068E-02
2.50000E+01	2.65000E+01	-5.38367E-01	-5.30538E-01	-7.82973E-03
3.50000E+01	2.21000E+01	-7.19935E-01	-7.35226E-01	1.52915E-02

STATISTICAL INFORMATION:

B0 (Y INTERCEPT) = -1.88168E-02
 B1 (SLOPE) = -2.45626E+00
 GOODNESS OF FIT (R**2) = 9.96773E-01
 NUMBER OF POINTS = 5

Hvorslev's BASIC TIME LAG = 2.39677E+01 SECONDS

CALCULATED HYDRAULIC CONDUCTIVITY INFORMATION:

BASED ON ASSUMED Kh/Kv RATIO (1.00000E+00) ...

HORIZONTAL HYDRAULIC CONDUCTIVITY = 7.14140E+00 FEET/DAY
 HORIZONTAL HYDRAULIC CONDUCTIVITY = 2.51933E-03 CM/SEC
 VERTICAL HYDRAULIC CONDUCTIVITY = 7.14140E+00 FEET/DAY
 VERTICAL HYDRAULIC CONDUCTIVITY = 2.51933E-03 CM/SEC
 MEAN HYDRAULIC CONDUCTIVITY = 7.14140E+00 FEET/DAY
 MEAN HYDRAULIC CONDUCTIVITY = 2.51933E-03 CM/SEC

HVORSLEV HYDRAULIC CONDUCTIVITY PROGRAM

PROJECT NUMBER: 0371-01-0455
 USER NAME: A. G. HALL
 RUN DATE: 4/25/1988

WELL IDENTIFICATION: DGC-7
 DATE OF TEST: 3-14-88
 TEST DESCRIPTION: SLUG
 CASE/METHOD: WELL TEST IN UNIFORM SOIL

TEST PARAMETERS:

STANDPIPE/RISER DIAMETER = 2.00000E+00 INCHES
 INTAKE (SCREEN/PAK) DIAMETER = 2.00000E+00 INCHES
 LENGTH OF INTAKE (SCREEN/PAK) = 8.00000E+00 FEET

MATERIAL ASSUMPTION:

Kh/Kv RATIO = 1.00000E+00

TEST CONDITIONS:

EQUILIBRIUM HEAD/PRESSURE = 0.00000E-01
 INITIAL HEAD/PRESSURE = 4.99000E+01
 TIME SCALE CONVERSION = 1.20000E+02

TIME	HEAD/PRESSURE	LN[H(I)/H0]	REGRESSION	RESIDUALS
0.00000E-01	4.99000E+01	0.00000E-01	-1.62641E-02	1.62641E-02
5.00000E+00	4.32000E+01	-1.44181E-01	-1.32033E-01	-1.21477E-02
1.00000E+01	3.85000E+01	-2.59363E-01	-2.47802E-01	-1.15612E-02
1.50000E+01	3.45000E+01	-3.69062E-01	-3.63570E-01	-5.49142E-03
2.00000E+01	3.13000E+01	-4.66403E-01	-4.79339E-01	1.29361E-02

STATISTICAL INFORMATION:

B0 (Y INTERCEPT) = -1.62641E-02
 B1 (SLOPE) = -2.77845E+00
 GOODNESS OF FIT (R**2) = 9.94485E-01
 NUMBER OF POINTS = 5

HVORSLEV'S BASIC TIME LAG = 2.12436E+01 SECONDS

CALCULATED HYDRAULIC CONDUCTIVITY INFORMATION:

BASED ON ASSUMED Kh/Kv RATIO (1.00000E+00) ...

HORIZONTAL HYDRAULIC CONDUCTIVITY = 8.05717E+00 FEET/DAY
 HORIZONTAL HYDRAULIC CONDUCTIVITY = 2.84239E-03 CM/SEC
 VERTICAL HYDRAULIC CONDUCTIVITY = 8.05717E+00 FEET/DAY
 VERTICAL HYDRAULIC CONDUCTIVITY = 2.84239E-03 CM/SEC
 MEAN HYDRAULIC CONDUCTIVITY = 8.05717E+00 FEET/DAY
 MEAN HYDRAULIC CONDUCTIVITY = 2.84239E-03 CM/SEC

DUNN SEDIMENTARY CORPORATION

Hvorslev HYDRAULIC CONDUCTIVITY PROGRAM

PROJECT NUMBER: 2371-01-0455
USER NAME: A. G. HALL
RUN DATE: 4/26/1988

WELL IDENTIFICATION: DGC-9
DATE OF TEST: 3-15-88
TEST DESCRIPTION: SLUG
CASE/METHOD: WELL TEST IN UNIFORM SOIL

TEST PARAMETERS:

STANDPIPE/RISER DIAMETER = 2.00000E+00 INCHES
INTAKE (SCREEN/PAK) DIAMETER = 2.00000E+00 INCHES
LENGTH OF INTAKE (SCREEN/PAK) = 3.00000E+00 FEET

MATERIAL ASSUMPTION:

Kh/Kv RATIO = 1.00000E+00

TEST CONDITIONS:

EQUILIBRIUM HEAD/PRESSURE = 0.00000E-01
INITIAL HEAD/PRESSURE = 2.84000E+01
TIME SCALE CONVERSION = 3.00000E+01

TIME	HEAD/PRESSURE	LN(H(I)/H01	REGRESSION	RESIDUALS
0.00000E-01	2.84000E+01	0.00000E-01	-2.41024E-02	2.41024E-02
3.50000E+01	2.60000E+01	-8.82926E-02	-8.78811E-02	-4.11483E-04
8.00000E+01	2.40000E+01	-1.68335E-01	-1.69882E-01	1.54696E-03
1.25000E+02	2.20000E+01	-2.55347E-01	-2.51883E-01	-3.46329E-03
1.75000E+02	2.00000E+01	-3.50657E-01	-3.42996E-01	-7.66107E-03
2.35000E+02	1.79000E+01	-4.61588E-01	-4.52331E-01	-9.25778E-03
3.00000E+02	1.60000E+01	-5.73800E-01	-5.70777E-01	-3.02363E-03
3.75000E+02	1.40000E+01	-7.07332E-01	-7.07445E-01	1.13562E-04
4.55000E+02	1.20000E+01	-8.61483E-01	-8.53225E-01	-8.25733E-03
5.55000E+02	1.00000E+01	-1.04380E+00	-1.03545E+00	-8.35412E-03
6.80000E+02	8.00000E+00	-1.26695E+00	-1.26323E+00	-3.71677E-03
8.50000E+02	6.00000E+00	-1.55463E+00	-1.57301E+00	1.83834E-02

STATISTICAL INFORMATION:

B0 (Y INTERCEPT) = -2.41024E-02
B1 (SLOPE) = -5.46674E-02
GOODNESS OF FIT (R**2) = 9.99531E-01
NUMBER OF POINTS = 12

Hvorslev's BASIC TIME LAG = 1.07109E+03 SECONDS

CALCULATED HYDRAULIC CONDUCTIVITY INFORMATION:

BASED ON ASSUMED Kh/Kv RATIO (1.00000E+00) ...

HORIZONTAL HYDRAULIC CONDUCTIVITY = 3.34567E-01 FEET/DAY
HORIZONTAL HYDRAULIC CONDUCTIVITY = 1.18028E-04 CM/SEC
VERTICAL HYDRAULIC CONDUCTIVITY = 3.34567E-01 FEET/DAY
VERTICAL HYDRAULIC CONDUCTIVITY = 1.18028E-04 CM/SEC
MEAN HYDRAULIC CONDUCTIVITY = 3.34567E-01 FEET/DAY
MEAN HYDRAULIC CONDUCTIVITY = 1.18028E-04 CM/SEC

HYDROSLV HYDRAULIC CONDUCTIVITY PROGRAM

PROJECT NUMBER: 2371-01-0455
USER NAME: A. G. HALL
RUN DATE: 4/26/1998

WELL IDENTIFICATION: D3C-2
DATE OF TEST: 3-14-88
TEST DESCRIPTION: SLUG
CASE/METHOD: WELL TEST IN UNIFORM SOIL

TEST PARAMETERS:

STANDPIPE/RISER DIAMETER = 2.00000E+00 INCHES
INTAKE (SCREEN/PACK) DIAMETER = 2.00000E+00 INCHES
LENGTH OF INTAKE (SCREEN/PACK) = 3.00000E+00 FEET

MATERIAL ASSUMPTION:

KH/KV RATIO = 1.00000E+00

TEST CONDITIONS:

EQUILIBRIUM HEAD/PRESSURE = 0.00000E-01
INITIAL HEAD/PRESSURE = 3.84000E+01
TIME SCALE CONVERSION = 3.00000E+01

TIME	HEAD/PRESSURE	LNCH(I)/HOI	REGRESSION	RESIDUALS
0.00000E-01	3.84000E+01	0.00000E-01	-2.45541E-02	2.45541E-02
1.00000E+01	3.71000E+01	-3.44406E-02	-4.23042E-02	7.86360E-03
3.00000E+01	3.54000E+01	-8.13456E-02	-7.78043E-02	-3.54135E-03
5.00000E+01	3.41000E+01	-1.18760E-01	-1.13304E-01	-5.45577E-03
7.00000E+01	3.30000E+01	-1.51550E-01	-1.48805E-01	-2.74544E-03
9.00000E+01	3.18000E+01	-1.88591E-01	-1.84305E-01	-4.28662E-03
1.20000E+02	3.00000E+01	-2.46860E-01	-2.37555E-01	-9.30534E-03
1.60000E+02	2.80000E+01	-3.15853E-01	-3.08555E-01	-7.29800E-03
2.00000E+02	2.60000E+01	-3.89961E-01	-3.79555E-01	-1.04058E-02
2.50000E+02	2.40000E+01	-4.70004E-01	-4.68305E-01	-1.69820E-03
3.55000E+02	2.00000E+01	-6.52325E-01	-6.54681E-01	2.35583E-03
4.85000E+02	1.60000E+01	-8.75469E-01	-8.95432E-01	9.96294E-03

STATISTICAL INFORMATION:

B0 (Y INTERCEPT) = -2.45541E-02
B1 (SLOPE) = -5.32502E-02
GOODNESS OF FIT (R**2) = 9.98587E-01
NUMBER OF POINTS = 12

HYDROSLV'S BASIC TIME LAG = 1.09909E+03 SECONDS

CALCULATED HYDRAULIC CONDUCTIVITY INFORMATION:

BASED ON ASSUMED KH/KV RATIO (1.00000E+00) ...

HORIZONTAL HYDRAULIC CONDUCTIVITY = 3.26044E-01 FEET/DAY
HORIZONTAL HYDRAULIC CONDUCTIVITY = 1.15021E-04 CM/SEC

VERTICAL HYDRAULIC CONDUCTIVITY = 3.26044E-01 FEET/DAY
VERTICAL HYDRAULIC CONDUCTIVITY = 1.15021E-04 CM/SEC

MEAN HYDRAULIC CONDUCTIVITY = 3.26044E-01 FEET/DAY
MEAN HYDRAULIC CONDUCTIVITY = 1.15021E-04 CM/SEC

APPENDIX E
SURFACE SOIL ANALYTICAL DATA

**E.1: Analytical Results for Surface Soil Samples Obtained
on March 3-4, 1988.**

ANALYTICAL RESULTS

Prepared For

Dunn Geoscience Corporation
12 Metro Park Road
Albany, NY 12205

Prepared By

Recra Environmental, Inc.
10 Hazelwood Drive, Suite 106
Amherst, New York 14150

METHODOLOGIES

The specific methodologies employed in obtaining the enclosed analytical results are indicated on the specific data table. The method numbers presented refer to the following U.S. Environmental Protection Agency reference.

- o U.S. Environmental Protection Agency "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods". Office of Solid Waste and Emergency Response. July 1982, SW-846, Second Edition.

COMMENTS

Comments pertain to data on one or all pages of this report.

The values reported as "less than" (<) indicate the working detection limit for the particular sample and/or parameter.

The value reported as "less than or equal to" (≤) indicates the compound may be present at trace levels relative to the detection limit but not subject to accurate quantification.

Results of analyses for Method 8080 (PCB's) are corrected for moisture content and reported on a dry weight basis.



SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION		
	A	B	C
Aroclor 1016	<0.05	<0.05	<0.05
Aroclor 1221	<0.1	<0.1	<0.1
Aroclor 1232	<0.1	<0.1	<0.1
Aroclor 1242	0.59	<0.05	0.72
Aroclor 1248	<0.05	<0.05	<0.05
Aroclor 1254	0.78	<0.05	1.5
Aroclor 1260	0.68	<0.05	0.35
Extraction Date	3/8/88	3/8/88	3/8/88
Analysis Date	3/10/88	3/10/88	3/12/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION		
	D	E	F
Aroclor 1016	<0.05	<0.4	<0.4
Aroclor 1221	<0.1	<0.8	<0.8
Aroclor 1232	<0.1	<0.8	<0.8
Aroclor 1242	0.087	1.2	1.5
Aroclor 1248	<0.05	<0.4	<0.4
Aroclor 1254	0.14	1.8	0.93
Aroclor 1260	<0.05	1.2	<0.4
Extraction Date	3/8/88	3/8/88	3/8/88
Analysis Date	3/11/88	3/11/88	3/11/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION		
	G	H	I
Aroclor 1016	<0.05	<0.05	<0.4
Aroclor 1221	<0.1	<0.1	<0.8
Aroclor 1232	<0.1	<0.1	<0.8
Aroclor 1242	<0.05	1.3	<0.4
Aroclor 1248	<0.05	<0.05	<0.4
Aroclor 1254	<0.05	0.55	2.6
Aroclor 1260	<0.05	<0.05	<0.4
Extraction Date	3/8/88	3/8/88	3/8/88
Analysis Date	3/10/88	3/10/88	3/11/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION		
	J	K	L
Aroclor 1016	<0.05	<0.05	<0.05
Aroclor 1221	<0.1	<0.1	<0.1
Aroclor 1232	<0.1	<0.1	<0.1
Aroclor 1242	0.14	0.15	0.097
Aroclor 1248	<0.05	<0.05	<0.05
Aroclor 1254	0.32	0.10	0.20
Aroclor 1260	0.18	<0.05	<0.05
Extraction Date	3/8/88	3/8/88	3/8/88
Analysis Date	3/10/88	3/11/88	3/10/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION	
		N
Aroclor 1016		<0.05
Aroclor 1221		<0.1
Aroclor 1232		<0.1
Aroclor 1242		<0.05
Aroclor 1248		<0.05
Aroclor 1254		<0.05
Aroclor 1260		<0.05
Extraction Date		3/8/88
Analysis Date		3/10/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION		
	Pt-2A/0-6"	Pt-2A/30-36"	Pt-2B/0-6"
Aroclor 1016	<0.1	<0.2	<0.05
Aroclor 1221	<0.2	<0.4	<0.1
Aroclor 1232	<0.2	<0.4	<0.1
Aroclor 1242	0.64	<0.2	0.31
Aroclor 1248	<0.1	<0.2	<0.05
Aroclor 1254	2.0	<0.2	0.21
Aroclor 1260	1.1	0.33	<0.05
Extraction Date	3/8/88	3/8/88	3/8/88
Analysis Date	3/12/88	3/14/88	3/11/88



SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION		
	Pt-2B/30-36"	Pt-2C/0-6"	Pt-2C/30-36"
Aroclor 1016	<0.05	<0.5	<0.05
Aroclor 1221	<0.1	<1	<0.1
Aroclor 1232	<0.1	<1	<0.1
Aroclor 1242	<0.05	2.2	<0.05
Aroclor 1248	<0.05	<0.5	<0.05
Aroclor 1254	0.45	2.4	0.19
Aroclor 1260	<0.05	0.78	<0.05
Extraction Date	3/8/88	3/8/88	3/8/88
Analysis Date	3/13/88	3/11/88	3/13/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION		
	Pt-2D/0-6"	Pt-2D/30-36"	Pt-2E/0-6"
Aroclor 1016	<0.05	<0.05	<0.05
Aroclor 1221	<0.1	<0.1	<0.1
Aroclor 1232	<0.1	<0.1	<0.1
Aroclor 1242	0.28	0.12	0.17
Aroclor 1248	<0.05	<0.05	<0.05
Aroclor 1254	0.75	<0.05	0.058
Aroclor 1260	0.13	0.34	0.60
Extraction Date	3/8/88	3/8/88	3/8/88
Analysis Date	3/11/88	3/14/88	3/11/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION		
	Pt-2E/30-36"	Pt-2F/0-6"	Pt-2F/30-36"
Aroclor 1016	<4	<0.5	<0.05
Aroclor 1221	<8	<1	<0.1
Aroclor 1232	<8	<1	<0.1
Aroclor 1242	<4	3.8	<0.05
Aroclor 1248	<4	<0.5	<0.05
Aroclor 1254	<4	3.6	0.095
Aroclor 1260	<4	1.4	<0.05
Extraction Date	3/8/88	3/8/88	3/8/88
Analysis Date	3/13/88	3/11/88	3/13/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION		
	S-2A/0-6"	S-2B/0-6"	S-2C/0-6"
Aroclor 1016	<1	<0.5	<0.5
Aroclor 1221	<2	<1	<1
Aroclor 1232	<2	<1	<1
Aroclor 1242	11	1.5	2.4
Aroclor 1248	<1	<0.5	<0.5
Aroclor 1254	16	4.4	3.9
Aroclor 1260	3.2	<0.5	<0.5
Extraction Date	3/8/88	3/8/88	3/8/88
Analysis Date	3/14/88	3/13/88	3/13/88



SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION		
	S-2D/O-6"	S-2E/O-6"	S-2F/O-6"
Aroclor 1016	<0.5	<0.1	<1
Aroclor 1221	<1	<0.2	<2
Aroclor 1232	<1	<0.2	<2
Aroclor 1242	6.0	0.42	14
Aroclor 1248	<0.5	<0.1	<1
Aroclor 1254	7.5	1.6	16
Aroclor 1260	0.93	1.1	13
Extraction Date	3/8/88	3/8/88	3/8/88
Analysis Date	3/13/88	3/14/88	3/14/88

SOIL MATRIX
TOTAL METALS

PARAMETER (Units of Measure = $\mu\text{g/g}$)	METHOD NUMBER	ANALYSIS DATE	SAMPLE IDENTIFICATION	
			Pt-2Pb	Pt-9
Total Lead	7420	3/15/88	40	46

QUALITY CONTROL INFORMATION - ACCURACY
SOIL MATRIX
METHOD 8080 - PCB'S

SAMPLE IDENTIFICATION Method Blank Spike

COMPOUND	NANOGRAMS OF SPIKE	PERCENT RECOVERY
Aroclor 1016	1.0	108
Aroclor 1260	1.0	115
Extraction Date	3/8/88	
Analysis Date	3/12/88	





7957

QUALITY CONTROL INFORMATION - PRECISION
SOIL MATRIX
TOTAL METALS

PARAMETER (Units of Measure = $\mu\text{g/g}$)	METHOD NUMBER	SAMPLE IDENTIFICATION	VALUE 1	VALUE 2	MEAN	STANDARD DEVIATION
Total Lead	7420	Pt-9	55	37	46	13

QUALITY CONTROL INFORMATION - ACCURACY
EP TOXICITY TEST EXTRACT - METALS

SAMPLE IDENTIFICATION Pt-2Pb

PARAMETER	$\mu\text{g OF}$ SPIKE	% RECOVERY
Total Lead	2,500 5,000	95 96

QUALITY CONTROL INFORMATION - ACCURACY
EP TOXICITY TEST EXTRACT - METALS

SAMPLE IDENTIFICATION Pt-9

PARAMETER	$\mu\text{g OF}$ SPIKE	% RECOVERY
Total Lead	2,500 5,000	96 93

I.D. #88-333

**E.2: Analytical Results from Surface Soil Samples Obtained
on March 3-4, 1988.**

ANALYTICAL RESULTS

Prepared For

Dunn Geoscience Corporation
12 Metro Park Road
Albany, New York 12205

Prepared By

Recra Environmental, Inc.
10 Hazelwood Drive, Suite 106
Amherst, New York 14150

COMMENTS

Comments pertain to data on one or all pages of this report.

The values reported as "less than" (<) indicate the working detection limit for the particular sample and/or parameter.

Methods used for the EP Toxicity Test procedure as well as the analysis of the resulting extract are presented in U.S. Environmental Protection Agency publication, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods". July 1982, SW-846, Second Edition.



METHOD 7420 - EP TOXICITY TEST EXTRACT - METALS

PARAMETER (Units of Measure = mg/l)	ANALYSIS DATE	EPA MAX. CONC.	SAMPLE IDENTIFICATION
			PT.-2Pb
Total Lead	3/23/88	5.0	0.07

☒ Standard Addition
☐ Non-Standard Addition

METHOD 7420 - EP TOXICITY TEST EXTRACT - METALS

PARAMETER (Units of Measure = mg/l)	ANALYSIS DATE	EPA MAX. CONC.	SAMPLE IDENTIFICATION
			PT.-9
Total Lead	3/23/88	5.0	0.10

☒ Standard Addition
☐ Non-Standard Addition

QUALITY CONTROL INFORMATION - PRECISION
METHOD 7420 - EP TOXICITY TEST EXTRACT - METALS

SAMPLE IDENTIFICATION _____ *

PARAMETER (Units of Measure = mg/l)	VALUE 1	VALUE 2	MEAN	STANDARD DEVIATION
Total Lead	<0.02	<0.02	<0.02	-

 X Standard Addition
 Non-Standard Addition

*Quality control results were generated from a sample of similar matrix at the time of analysis.

QUALITY CONTROL INFORMATION - ACCURACY
METHOD 7240 - EP TOXICITY TEST EXTRACT - METALS

SAMPLE IDENTIFICATION Pt.-2Pb

PARAMETER	µg OF SPIKE	% RECOVERY
Total Lead	2,500	103
	5,000	104

QUALITY CONTROL INFORMATION - ACCURACY
METHOD 7240 - EP TOXICITY TEST EXTRACT - METALS

SAMPLE IDENTIFICATION Pt.-9

PARAMETER	µg OF SPIKE	% RECOVERY
Total Lead	2,500	102
	5,000	104

**E.3: Analytical Results from Surface Soil Samples Obtained
on March 24, 1988.**

ANALYTICAL RESULTS

Prepared For

Dunn Geoscience Corporation
12 Metro Park Road
Albany, New York 12205

Prepared By

Recra Environmental, Inc.
10 Hazelwood Drive, Suite 106
Amherst, New York 14150

METHODOLOGIES

The specific methodologies employed in obtaining the enclosed analytical results are indicated on the specific data table. The method numbers presented refer to the following U.S. Environmental Protection Agency reference.

- o U.S. Environmental Protection Agency "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods". Office of Solid Waste and Emergency Response. July 1982, SW-846, Second Edition.

COMMENTS

Comments pertain to data on one or all pages of this report.

The values reported as "less than" (<) indicate the working detection limit for the particular sample and/or parameter.

The values reported as "less than or equal to" (<=) indicate the compound may be present at trace levels relative to the detection limit but not subject to accurate quantification.

Results of the analysis of soils are corrected for moisture content and reported on a dry weight basis.



AQUEOUS MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/l}$)	SAMPLE IDENTIFICATION (DATE)
	BOTTOM LAYER-S.W. NEAR PT. 8 (3/24/88)
Aroclor 1016	<0.8
Aroclor 1221	<2
Aroclor 1232	<2
Aroclor 1242	<0.8
Aroclor 1248	<0.8
Aroclor 1254	<0.8
Aroclor 1260	<0.8
Extraction Date	3/29/88
Analysis Date	4/1/88

OIL MATRIX
PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g}$)	SAMPLE IDENTIFICATION (DATE)
	TOP LAYER-S.W. NEAR PT. 8 (3/24/88)
Aroclor 1016	<2
Aroclor 1221	<4
Aroclor 1232	<4
Aroclor 1242	<2
Aroclor 1248	<2
Aroclor 1254	<2
Aroclor 1260	4.1
Extraction Date	3/29/88
Analysis Date	3/30/88

reported on a dry weight basis

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = µg/g dry)	SAMPLE IDENTIFICATION (DATE)		
	S-2G/0-6" (3/24/88)	S-2G/12" (3/24/88)	S-2G/18" (3/24/88)
Aroclor 1016	<0.2	<0.05	<1
Aroclor 1221	<0.4	<0.1	<2
Aroclor 1232	<0.4	<0.1	<2
Aroclor 1242	<0.2	<0.05	<1
Aroclor 1248	2.1	0.25	4.6
Aroclor 1254	<0.2	<0.05	<1
Aroclor 1260	3.9	0.39	16
Extraction Date	3/28/88	3/28/88	3/28/88
Analysis Date	3/30/88	3/31/88	3/30/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = µg/g dry)	SAMPLE IDENTIFICATION (DATE)		
	S-2H/0-6" (3/24/88)	S-2I/0-6" (3/24/88)	S-2I/12" (3/24/88)
Aroclor 1016	<1	<1	<1
Aroclor 1221	<2	<2	<2
Aroclor 1232	<2	<2	<2
Aroclor 1242	<1	<1	<1
Aroclor 1248	13	18	11
Aroclor 1254	<1	<1	<1
Aroclor 1260	20	27	16
Extraction Date	3/28/88	3/28/88	3/28/88
Analysis Date	3/30/88	3/30/88	3/30/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION (DATE)		
	S-2J/0-6" (3/24/88)	S-2K/0-6" (3/24/88)	S-2K/18" (3/24/88)
Aroclor 1016	<1	<1	<0.05
Aroclor 1221	<2	<2	<0.1
Aroclor 1232	<2	<2	<0.1
Aroclor 1242	<1	<1	<0.05
Aroclor 1248	11	<1	<0.05
Aroclor 1254	<1	6.3	0.083
Aroclor 1260	25	<1	<0.05
Extraction Date	3/28/88	3/28/88	3/28/88
Analysis Date	3/31/88	3/31/88	3/31/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION (DATE)		
	S-2L/0-6" (3/24/88)	S-2L/24" (3/24/88)	S-2M/0-6" (3/24/88)
Aroclor 1016	<1	<0.05	<0.05
Aroclor 1221	<2	<0.1	<0.1
Aroclor 1232	<2	<0.1	<0.1
Aroclor 1242	<1	<0.05	<0.05
Aroclor 1248	<1	<0.05	<0.05
Aroclor 1254	7.3	0.10	0.22
Aroclor 1260	<1	<0.05	<0.05
Extraction Date	3/28/88	3/28/88	3/28/88
Analysis Date	3/31/88	4/1/88	4/1/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION (DATE)		
	S-2M/12" (3/24/88)	S-2N/0-6" (3/24/88)	S-2N/12" (3/24/88)
Aroclor 1016	<0.05	<1	<1
Aroclor 1221	<0.1	<2	<2
Aroclor 1232	<0.1	<2	<2
Aroclor 1242	<0.05	<1	<1
Aroclor 1248	<0.05	<1	<1
Aroclor 1254	<0.05	6.5	5.3
Aroclor 1260	<0.05	<1	<1
Extraction Date	3/28/88	3/28/88	3/28/88
Analysis Date	4/1/88	3/31/88	3/31/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION (DATE)	
	S-2N/24" (3/24/88)	S-2N/36" (3/24/88)
Aroclor 1016	<1	<0.1
Aroclor 1221	<2	<0.2
Aroclor 1232	<1	<0.2
Aroclor 1242	<1	<0.1
Aroclor 1248	3.2	1.4
Aroclor 1254	2.0	<0.1
Aroclor 1260	<1	1.0
Extraction Date	3/28/88	3/28/88
Analysis Date	3/31/88	3/31/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION (DATE)		
	PT.2A-RS/O-6" (3/24/88)	PT.2B-RS/O-6" (3/24/88)	PT.2C-RS/O-6" (3/24/88)
Aroclor 1016	<5	<25	<0.5
Aroclor 1221	<10	<50	<1
Aroclor 1232	<10	<50	<1
Aroclor 1242	<5	<25	<0.5
Aroclor 1248	33	310	3.0
Aroclor 1254	<5	<25	<0.5
Aroclor 1260	<5	<25	1.7
Extraction Date	3/28/88	3/28/88	3/28/88
Analysis Date	4/1/88	4/1/88	4/1/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION (DATE)		
	PT.2D-RS/O-6" (3/24/88)	PT.2E-RS/O-6" (3/24/88)	PT.2F-RS/O-6" (3/24/88)
Aroclor 1016	<0.5	<1	<0.2
Aroclor 1221	<1	<2	<0.4
Aroclor 1232	<1	<2	<0.4
Aroclor 1242	<0.5	<1	<0.2
Aroclor 1248	2.6	15	1.1
Aroclor 1254	<0.5	8.1	1.8
Aroclor 1260	2.5	<1	<0.2
Extraction Date	3/28/88	3/28/88	3/28/88
Analysis Date	4/1/88	4/1/88	4/1/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION (DATE)		
	PT. 2A-RD/30-36" (3/24/88)	PT. 2B-RD/30-36" (3/24/88)	PT. 2C-RD/18" (3/24/88)
Aroclor 1016	<0.05	<0.05	<0.05
Aroclor 1221	<0.1	<0.1	<0.1
Aroclor 1232	<0.1	<0.1	<0.1
Aroclor 1242	<0.05	<0.05	<0.05
Aroclor 1248	<0.05	<0.05	0.16
Aroclor 1254	<0.05	<0.05	<0.05
Aroclor 1260	<0.05	<0.05	0.31
Extraction Date	3/28/88	3/28/88	3/28/88
Analysis Date	4/1/88	3/31/88	3/31/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION (DATE)		
	PT. 2D-RD/30" (3/24/88)	PT. 2E-RD/24" (3/24/88)	PT. 2F-RD/30" (3/24/88)
Aroclor 1016	<0.05	<0.05	<0.05
Aroclor 1221	<0.1	<0.1	<0.1
Aroclor 1232	<0.1	<0.1	<0.1
Aroclor 1242	<0.05	<0.05	<0.05
Aroclor 1248	0.14	0.081	<0.05
Aroclor 1254	<0.05	<0.05	<0.05
Aroclor 1260	0.24	0.080	0.093
Extraction Date	3/28/88	3/28/88	3/28/88
Analysis Date	3/31/88	3/31/88	3/31/88

SOIL MATRIX
TOTAL METALS

PARAMETER (Units of Measure = µg/g dry)	METHOD NUMBER	ANALYSIS DATE	SAMPLE IDENTIFICATION (DATE)
			PT.2R/0-6" (3/24/88)
Total Lead	7420	4/9/88	730

SOIL MATRIX

SAMPLE IDENTIFICATION	SAMPLE DATE	PARAMETER (UNITS OF MEASURE)
		DRY WEIGHT (103°C) (%)
S-2G/0-6"	3/24/88	83.0
S-2G/12"	3/24/88	87.4
S-2G/18"	3/24/88	85.1
S-2H/0-6"	3/24/88	86.5
S-2I/0-6"	3/24/88	84.5
S-2I/12"	3/24/88	87.3
S-2J/0-6"	3/24/88	80.5
S-2K/0-6"	3/24/88	80.2
S-2K/18"	3/24/88	83.1
S-2L/0-6"	3/24/88	89.9
S-2L/24"	3/24/88	75.5
S-2M/0-6"	3/24/88	81.9
S-2M/12"	3/24/88	88.5
S-2N/0-6"	3/24/88	84.8
S-2N/12"	3/24/88	82.1

SOIL MATRIX

SAMPLE IDENTIFICATION	SAMPLE DATE	PARAMETER (UNITS OF MEASURE)
		DRY WEIGHT (103°C) (%)
S-2N/24"	3/24/88	83.6
S-2N/36"	3/24/88	83.0
PT.2A-RS/0-6"	3/24/88	82.6
PT.2B-RS/0-6"	3/24/88	79.4
PT.2C-RS/0-6"	3/24/88	81.8
PT.2D-RS/0-6"	3/24/88	86.1
PT.2E-RS/0-6"	3/24/88	71.4
PT.2F-RS/0-6"	3/24/88	69.4
PT.2A-RD/30-36"	3/24/88	79.7
PT.2B-RD/30-36"	3/24/88	84.6
PT.2C-RD/18"	3/24/88	87.9
PT.2D-RD/30"	3/24/88	84.3
PT.2E-RD/24"	3/24/88	81.3
PT.2F-RD/30"	3/24/88	75.2
PT.2R/0-6"	3/24/88	83.0

QUALITY CONTROL INFORMATION - ACCURACY
SOIL MATRIX
METHOD 8080 - PCB'S

SAMPLE IDENTIFICATION Method Blank Spike

COMPOUND	NANOGRAMS OF SPIKE	PERCENT RECOVERY
Aroclor 1260	1.0	94
Extraction Date Analysis Date	3/28/88 3/31/88	

QUALITY CONTROL INFORMATION - ACCURACY
SOIL MATRIX
TOTAL METALS

SAMPLE IDENTIFICATION PT.2R/0-6"

PARAMETER	µg OF SPIKE	% RECOVERY
Total Lead	1,000	86
	2,000	96
	5,000	97
	10,000	98

E.4: Analytical Results of Reanalysis of Surface Soil Samples
Obtained March 24, 1988.

ANALYTICAL RESULTS

Prepared For

Dunn Geoscience Corporation
12 Metro Park Road
Albany, New York 12205

Prepared By

Recra Environmental, Inc.
10 Hazelwood Drive, Suite 106
Amherst, New York 14150

METHODOLOGIES

The specific methodology employed in obtaining the enclosed analytical results is indicated on the specific data table. The method number presented refers to the following U.S. Environmental Protection Agency reference.

- o U.S. Environmental Protection Agency "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods". Office of Solid Waste and Emergency Response. July 1982, SW-846, Second Edition.

COMMENTS

Comments pertain to data on one or all pages of this report.

The values reported as "less than" (<) indicate the working detection limit for the particular sample and/or parameter.

Results of the analysis of soils are corrected for moisture content and reported on a dry weight basis.

The dry weight (103°C) for sample Pt. 2B-RS/O-6" was 79.6%.

SOIL MATRIX
MET-00 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION		
	PT. 2B-RS/0-6"	PT. 2B-RS/0-6" DUPLICATE 1	PT. 2B-RS/0-6" DUPLICATE 2
Aroclor 1016	<25	<25	<25
Aroclor 1221	<50	<50	<50
Aroclor 1232	<50	<50	<50
Aroclor 1242	<25	<25	<25
Aroclor 1248	170	160	240
Aroclor 1254	<25	<25	<25
Aroclor 1260	<25	<25	<25
Extraction Date	4/8/88	4/8/88	4/8/88
Analysis Date	4/11/88	4/11/88	4/11/88

QUALITY CONTROL INFORMATION - ACCURACY
SOIL MATRIX
METHOD 8080 - PCB'S

SAMPLE IDENTIFICATION Method Blank Spike

COMPOUND	NANOGRAMS OF SPIKE	PERCENT RECOVERY
Aroclor 1016	1.0	97
Aroclor 1260	1.0	101
Extraction Date	4/8/88	
Analysis Date	4/11/88	

E.5: Analytical Results from Surface Soil Samples Obtained
 on April 16, 1988.

ANALYTICAL RESULTS

Prepared For

Dunn Geoscience Corporation
12 Metro Park Road
Albany, New York 12205

Prepared By

Recra Environmental, Inc.
10 Hazelwood Drive, Suite 106
Amherst, New York 14150

METHODOLOGIES

The specific methodology employed in obtaining the enclosed analytical results is indicated on the specific data table. The method number presented refers to the following U.S. Environmental Protection Agency reference.

- o U.S. Environmental Protection Agency "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods". Office of Solid Waste and Emergency Response. July 1982, SW-846, Second Edition.

COMMENTS

Comments pertain to data on one or all pages of this report.

The values reported as "less than" (<) indicate the working detection limit for the particular sample and/or parameter.

The values reported as "less than or equal to" (≤) indicate the compound may be present at trace levels relative to the detection limit but not subject to accurate quantification.

Results of the analysis of soils are corrected for moisture content and reported on a dry weight basis.

The dry weights (103°C) are as follows:

2B-RS/0-6"	-	82.9%
2G-RS/0-6"	-	79.6%
2G-RD/16-22"	-	74.7%
2H-RS/0-6"	-	80.5%
2H-RD/15-21"	-	81.8%
2I-RS/0-6"	-	84.2%
2I-RD/15-18"	-	80.4%
2J-RS/0-6"	-	77.8%
2J-RD/15-18"	-	83.6%
2K-RS/0-6"	-	78.6%
2K-RD/16-22"	-	83.4%
2L-RS/0-6"	-	79.8%
2M-RS/0-6"	-	77.4%
2N-RS/0-6"	-	90.6%



SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION (DATE)	
	2B-RS/0-6" (4/16/88)	2G-RS/0-6" (4/16/88)
Aroclor 1016	<0.3	<0.05
Aroclor 1221	<0.5	<0.1
Aroclor 1232	<0.5	<0.1
Aroclor 1242	<0.3	<0.05
Aroclor 1248	3.8	1.5
Aroclor 1254	<0.3	<0.05
Aroclor 1260	4.4	1.6
Extraction Date	4/20/88	4/20/88
Analysis Date	4/23/88	4/23/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION (DATE)	
	2G-RD/16-22" (4/16/88)	2H-RS/0-6" (4/16/88)
Aroclor 1016	<0.05	<3
Aroclor 1221	<0.1	<5
Aroclor 1232	<0.1	<5
Aroclor 1242	<0.05	<3
Aroclor 1248	0.43	<3
Aroclor 1254	<0.05	50
Aroclor 1260	1.1	<3
Extraction Date	4/20/88	4/20/88
Analysis Date	4/23/88	4/23/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION (DATE)	
	2H-RD/15-21" (4/16/88)	2I-RS/0-6" (4/16/88)
Aroclor 1016	<0.05	<0.3
Aroclor 1221	<0.1	<0.5
Aroclor 1232	<0.1	<0.5
Aroclor 1242	<0.05	<0.3
Aroclor 1248	2.3	3.7
Aroclor 1254	1.0	<0.3
Aroclor 1260	<0.05	3.9
Extraction Date	4/20/88	4/20/88
Analysis Date	4/23/88	4/23/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION (DATE)	
	2I-RD/15-18" (4/16/88)	2J-RS/0-6" (4/16/88)
Aroclor 1016	<0.05	<0.05
Aroclor 1221	<0.1	<0.1
Aroclor 1232	<0.1	<0.1
Aroclor 1242	<0.05	<0.05
Aroclor 1248	<0.05	1.2
Aroclor 1254	<0.05	<0.05
Aroclor 1260	0.21	2.6
Extraction Date	4/20/88	4/20/88
Analysis Date	4/27/88	4/23/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION (DATE)	
	2J-RD/15-18" (4/16/88)	2K-RS/0-6" (4/16/88)
Aroclor 1016	<0.05	<0.05
Aroclor 1221	<0.1	<0.1
Aroclor 1232	<0.1	<0.1
Aroclor 1242	<0.05	<0.05
Aroclor 1248	<0.05	<0.05
Aroclor 1254	<0.05	<0.05
Aroclor 1260	0.11	0.52
Extraction Date	4/20/88	4/20/88
Analysis Date	4/23/88	4/23/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION (DATE)	
	2K-RD/16-22" (2/16/88)	2L-RS/0-6" (2/16/88)
Aroclor 1016	<0.05	<1
Aroclor 1221	<0.1	<2
Aroclor 1232	<0.1	<2
Aroclor 1242	<0.05	<1
Aroclor 1248	<0.05	3.1
Aroclor 1254	<0.05	<1
Aroclor 1260	0.13	22
Extraction Date	4/20/88	4/20/88
Analysis Date	4/23/88	4/23/88

SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION (DATE)	
	2M-RS/0-6" (4/16/88)	2N-RS/0-6" (4/16/88)
Aroclor 1016	<3	<1
Aroclor 1221	<5	<2
Aroclor 1232	<5	<2
Aroclor 1242	<3	<0.5
Aroclor 1248	<3	1.0
Aroclor 1254	<3	<0.5
Aroclor 1260	44	9.0
Extraction Date	4/20/88	4/20/88
Analysis Date	4/23/88	4/23/88

QUALITY CONTROL INFORMATION - PRECISION
SOIL MATRIX
METHOD 8080 - PCB'S

SAMPLE IDENTIFICATION 2N-RS/O-6"

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	VALUE 1	VALUE 2	MEAN	STANDARD DEVIATION
Aroclor 1016	<1	<1	<1	-
Aroclor 1221	<2	<2	<2	-
Aroclor 1232	<2	<2	<2	-
Aroclor 1242	<0.5	<0.5	<0.5	-
Aroclor 1248	1.3	0.72	1.0	0.41
Aroclor 1254	<0.5	<0.5	<0.5	-
Aroclor 1260	12	5.9	9.0	4.3
Extraction Date	4/20/88	4/20/88	-	-
Analysis Date	4/23/88	4/23/88	-	-

QUALITY CONTROL INFORMATION - ACCURACY
SOIL MATRIX
METHOD 8080 - PCB'S

SAMPLE IDENTIFICATION Method Blank Spike

COMPOUND	NANOGRAMS OF SPIKE	PERCENT RECOVERY
Aroclor 1016	1.0	99
Aroclor 1260	1.0	117
Extraction Date	4/20/88	
Analysis Date	4/22/88	

APPENDIX F
GROUNDWATER ANALYTICAL DATA

F.1: Volatile Organics for Groundwater Samples Obtained
on March 21-23, 1988.

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation
 Client ID: P-1
 Laboratory ID: 7180-01
 Matrix: Aqueous Sampled: 03/21/88 Received: 03/24/88
 Authorized: 03/24/88 Prepared: 03/27/88 Analyzed: 03/27/88

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride	ND	µg/L	5.0
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene	ND	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS Approved by Am

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience CorporationClient ID: P-2Laboratory ID: 7180-06Matrix: AqueousSampled: 03/22/88Received: 03/24/88Authorized: 03/24/88Prepared: 03/27/88Analyzed: 03/27/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride	ND	µg/L	5.0
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene -----	13	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS Approved by CB

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation
 Client ID: P-3
 Laboratory ID: 7180-07
 Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
 Authorized: 03/24/88 Prepared: 03/29/88 Analyzed: 03/29/88

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride	ND	µg/L	5.0
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene -----	4.5	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS Approved by CB

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation
 Client ID: P-6
 Laboratory ID: 7180-02
 Matrix: Aqueous Sampled: 03/21/88 Received: 03/24/88
 Authorized: 03/24/88 Prepared: 03/27/88 Analyzed: 03/27/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride	ND	µg/L	5.0
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene -----	11	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS Approved by CB

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation
 Client ID: P-11
 Laboratory ID: 7180-04
 Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
 Authorized: 03/24/88 Prepared: 03/27/88 Analyzed: 03/27/88

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride	ND	µg/L	5.0
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene	ND	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS Approved by CB

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation
 Client ID: DGC-1S
 Laboratory ID: 7180-10
 Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
 Authorized: 03/24/88 Prepared: 03/28/88 Analyzed: 03/28/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride	ND	µg/L	5.0
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene -----	2.4	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS Approved by CB

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation
 Client ID: DGC-1D
 Laboratory ID: 7180-11
 Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
 Authorized: 03/24/88 Prepared: 03/28/88 Analyzed: 03/28/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride	ND	µg/L	5.0
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene	ND	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS Approved by CB

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation
 Client ID: DGC-2
 Laboratory ID: 7180-05
 Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
 Authorized: 03/24/88 Prepared: 03/27/88 Analyzed: 03/27/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride	ND	µg/L	5.0
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene	3.3	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS Approved by th

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation
 Client ID: DGC-3
 Laboratory ID: 7180-03
 Matrix: Aqueous Sampled: 03/21/88 Received: 03/24/88
 Authorized: 03/24/88 Prepared: 03/27/88 Analyzed: 03/27/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride	ND	µg/L	5.0
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene	ND	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS Approved by CB

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation
 Client ID: DGC-4
 Laboratory ID: 7180-25
 Matrix: Aqueous Sampled: 03/23/88 Received: 03/24/88
 Authorized: 03/24/88 Prepared: 03/31/88 Analyzed: 03/31/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride	ND	µg/L	5.0
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene	ND	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS Approved by CB

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation
Client ID: DGC-5
Laboratory ID: 7180-08
Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
Authorized: 03/24/88 Prepared: 03/29/88 Analyzed: 03/29/88

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride	ND	µg/L	5.0
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene	ND	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS Approved by CB

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation
 Client ID: DGC-6
 Laboratory ID: 7180-09
 Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
 Authorized: 03/24/88 Prepared: 03/28/88 Analyzed: 03/28/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride -----	130	µg/L	5.0
Chloroethane -----	4.4	µg/L	5.0
Methylene chloride	ND	µg/L	5.0
Acetone	ND	µg/L	50
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene -----	3.5	µg/L	2.0
1,1-Dichloroethane -----	28	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane -----	41	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene -----	5.0	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene -----	4.6	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes -----	4.2	µg/L	2.0

ND = Not detected.

Reported by LS Approved by CB

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation
 Client ID: DGC-7
 Laboratory ID: 7180-13
 Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
 Authorized: 03/24/88 Prepared: 03/30/88 Analyzed: 03/30/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride	ND	µg/L	5.0
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene	ND	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS Approved by CB

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation
Client ID: X-2
Laboratory ID: 7180-15
Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
Authorized: 03/24/88 Prepared: 03/30/88 Analyzed: 03/30/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride	ND	µg/L	5.0
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene	ND	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS Approved by CB

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation
 Client ID: DGC-9
 Laboratory ID: 7180-26
 Matrix: Aqueous Sampled: 03/23/88 Received: 03/24/88
 Authorized: 03/24/88 Prepared: 03/30/88 Analyzed: 03/30/88

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride	ND	µg/L	5.0
Acetone -----	89	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene -----	3.2	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene -----	6.8	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene -----	4.8	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS Approved by CB

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience CorporationClient ID: FB-1Laboratory ID: 7180-27Matrix: AqueousSampled: 03/23/88Received: 03/24/88Authorized: 03/24/88Prepared: 03/30/88Analyzed: 03/30/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride	ND	µg/L	5.0
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene	ND	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LSApproved by CB

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

Enseco

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation
Client ID: FB-2
Laboratory ID: 7180-28
Matrix: Aqueous Sampled: 03/23/88 Received: 03/24/88
Authorized: 03/24/88 Prepared: 03/30/88 Analyzed: 03/30/88

Parameter	Result	Units	Reporting Limit
Chloromethane -----	39	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride -----	480	µg/L	5.0
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene	ND	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS Approved by CB

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation
Client ID: TB
Laboratory ID: 7180-29
Matrix: Aqueous Sampled: 03/23/88 Received: 03/24/88
Authorized: 03/24/88 Prepared: 03/30/88 Analyzed: 03/30/88

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride	ND	µg/L	10
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene	ND	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS Approved by CB

PRIORITY POLLUTANT VOLATILE ORGANICS

EPA Method 624 + 624/HSL List

QUALITY CONTROLClient Name: Dunn Geoscience CorporationClient ID: Laboratory Control SpikeLaboratory ID: P454LCSMatrix: Aqueous Prepared: 03/30/88 Analyzed: 03/30/88

<u>Parameter</u>	<u>% Recovery</u>	<u>QC Advisory Limits</u>
1,1-Dichloroethene	88	61 - 145%
Trichloroethene	75	71 - 120%
Benzene	85	76 - 127%
Toluene	87	76 - 125%
Chlorobenzene	88	75 - 130%

Reported by LS Approved by CB

PRIORITY POLLUTANT VOLATILE ORGANICS

EPA Method 624 + 624/HSL List

QUALITY CONTROLClient Name: Dunn Geoscience CorporationClient ID: Laboratory Control Spike Dup.Laboratory ID: P465LCSDMatrix: AqueousPrepared: 03/30/88Analyzed: 03/30/88

<u>Parameter</u>	<u>% Recovery</u>	<u>QC Advisory Limits</u>
1,1-Dichloroethene	92	61 - 145%
Trichloroethene	80	71 - 120%
Benzene	90	76 - 127%
Toluene	93	76 - 125%
Chlorobenzene	91	75 - 130%

Reported by LS Approved by CB

VOLATILE ORGANICS

Surrogate Recovery Summary

Client Name: Dunn Geoscience CorporationMatrix: AqueousAuthorized: 03/24/88Received: 03/24/88

Erco ID	Client ID	Surrogate Compound (%)		
		d ₄ -1,2,-Dichloro-ethane	d ₈ -Toluene	p-Bromofluoro-benzene
7180-01	P-1	117	92	111
7180-02	P-6	114	89	116
7180-03	DGC-3	121	89	113
7180-04	P-11	106	110	94
7180-05	DGC-2	119	89	116
7180-06	P-2	128	91	111
7180-07	P-3	92	102	102
7180-08	DGC-5	94	102	99
7180-09	DGC-6	102	97	103
7180-10	DGC-1S	104	96	99
7180-11	DGC-1D	107	97	100
7180-13	DGC-7	93	101	101
7180-15	X-2	98	104	101

QC Advisory Limits:

76-114%

61-110%

74-115%

(continued on following page)

VOLATILE ORGANICS (CONT.)

Surrogate Recovery Summary

Client Name: Dunn Geoscience CorporationMatrix: AqueousAuthorized: 03/24/88Received: 03/24/88

Erco ID	Client ID	Surrogate Compound (%)		
		d ₄ -1,2,-Dichloro-ethane	d ₆ -Toluene	p-Bromofluoro-benzene
7180-25	DGC-4	96	119	82
7180-26	DGC-9	95	96	96
7180-27	FB-1	106	96	96
7180-28	FB-2	97	98	95
7180-29	TB	101	96	95

QC Advisory Limits:

76-114%

61-110%

74-115%

Reported by LSApproved by JB

**F.2: Organochlorine Pesticides and PCBs for Groundwater Samples
Obtained on March 21-23, 1988.**

PRIORITY POLLUTANT ORGANOCHLORINE PESTICIDES/PCBs

EPA Method 608

Client Name: Dunn Geoscience Corporation
Client ID: P-6
Laboratory ID: 7191-01
Matrix: Aqueous Sampled: 03/21/88 Received: 03/24/88
Authorized: 03/25/88 Prepared: 03/28/88 Analyzed: 04/05/88

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	µg/L	0.05
beta-BHC	ND	µg/L	0.05
delta-BHC	ND	µg/L	0.05
gamma-BHC (Lindane)	ND	µg/L	0.05
Heptachlor	ND	µg/L	0.05
Aldrin	ND	µg/L	0.05
Heptachlor epoxide	ND	µg/L	0.05
Endosulfan I	ND	µg/L	0.05
Dieldrin	ND	µg/L	0.10
4,4'-DDE	ND	µg/L	0.10
Endrin	ND	µg/L	0.10
Endosulfan II	ND	µg/L	0.10
4,4'-DDD	ND	µg/L	0.10
Endosulfan sulfate	ND	µg/L	0.10
4,4'-DDT	ND	µg/L	0.10
Endrin aldehyde	ND	µg/L	0.10
Methoxychlor	ND	µg/L	0.50
Chlordane	ND	µg/L	0.50
Toxaphene	ND	µg/L	1.0
Aroclor-1016	ND	µg/L	0.50
Aroclor-1221	ND	µg/L	0.50
Aroclor-1232	ND	µg/L	0.50
Aroclor-1242	ND	µg/L	0.50
Aroclor-1248	ND	µg/L	0.50
Aroclor-1254	ND	µg/L	0.50
Aroclor-1260	ND	µg/L	0.50

ND = Not detected.

Reported by Ek Approved by MEF

PRIORITY POLLUTANT ORGANOCHLORINE PESTICIDES/PCBs

EPA Method 608

Client Name: Dunn Geoscience Corporation
 Client ID: P-11
 Laboratory ID: 7191-03
 Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
 Authorized: 03/25/88 Prepared: 03/28/88 Analyzed: 04/05/88

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	µg/L	0.05
beta-BHC	ND	µg/L	0.05
delta-BHC	ND	µg/L	0.05
gamma-BHC (Lindane)	ND	µg/L	0.05
Heptachlor	ND	µg/L	0.05
Aldrin	ND	µg/L	0.05
Heptachlor epoxide	ND	µg/L	0.05
Endosulfan I	ND	µg/L	0.05
Dieldrin	ND	µg/L	0.10
4,4'-DDE	ND	µg/L	0.10
Endrin	ND	µg/L	0.10
Endosulfan II	ND	µg/L	0.10
4,4'-DDD	ND	µg/L	0.10
Endosulfan sulfate	ND	µg/L	0.10
4,4'-DDT	ND	µg/L	0.10
Endrin aldehyde	ND	µg/L	0.10
Methoxychlor	ND	µg/L	0.50
Chlordane	ND	µg/L	0.50
Toxaphene	ND	µg/L	1.0
Aroclor-1016	ND	µg/L	0.50
Aroclor-1221	ND	µg/L	0.50
Aroclor-1232	ND	µg/L	0.50
Aroclor-1242	ND	µg/L	0.50
Aroclor-1248	ND	µg/L	0.50
Aroclor-1254	ND	µg/L	0.50
Aroclor-1260	ND	µg/L	0.50

ND = Not detected.

Reported by EX Approved by MEF

PRIORITY POLLUTANT ORGANOCHLORINE PESTICIDES/PCBS

EPA Method 608

Client Name: Dunn Geoscience Corporation
Client ID: DGC-1S
Laboratory ID: 7191-05
Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
Authorized: 03/25/88 Prepared: 03/28/88 Analyzed: 04/05/88

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	µg/L	0.05
beta-BHC	ND	µg/L	0.05
delta-BHC	ND	µg/L	0.05
gamma-BHC (Lindane)	ND	µg/L	0.05
Heptachlor	ND	µg/L	0.05
Aldrin	ND	µg/L	0.05
Heptachlor epoxide	ND	µg/L	0.05
Endosulfan I	ND	µg/L	0.05
Dieldrin	ND	µg/L	0.10
4,4'-DDE	ND	µg/L	0.10
Endrin	ND	µg/L	0.10
Endosulfan II	ND	µg/L	0.10
4,4'-DDD	ND	µg/L	0.10
Endosulfan sulfate	ND	µg/L	0.10
4,4'-DDT	ND	µg/L	0.10
Endrin aldehyde	ND	µg/L	0.10
Methoxychlor	ND	µg/L	0.50
Chlordane	ND	µg/L	0.50
Toxaphene	ND	µg/L	1.0
Aroclor-1016	ND	µg/L	0.50
Aroclor-1221	ND	µg/L	0.50
Aroclor-1232	ND	µg/L	0.50
Aroclor-1242	ND	µg/L	0.50
Aroclor-1248	ND	µg/L	0.50
Aroclor-1254	ND	µg/L	0.50
Aroclor-1260	ND	µg/L	0.50

ND = Not detected.

Reported by EK Approved by MEF

PRIORITY POLLUTANT ORGANOCHLORINE PESTICIDES/PCBs

EPA Method 608

Client Name: Dunn Geoscience Corporation
Client ID: DGC-10
Laboratory ID: 7191-06
Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
Authorized: 03/25/88 Prepared: 03/28/88 Analyzed: 04/05/88

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	µg/L	0.05
beta-BHC	ND	µg/L	0.05
delta-BHC	ND	µg/L	0.05
gamma-BHC (Lindane)	ND	µg/L	0.05
Heptachlor	ND	µg/L	0.05
Aldrin	ND	µg/L	0.05
Heptachlor epoxide	ND	µg/L	0.05
Endosulfan I	ND	µg/L	0.05
Dieldrin	ND	µg/L	0.10
4,4'-DDE	ND	µg/L	0.10
Endrin	ND	µg/L	0.10
Endosulfan II	ND	µg/L	0.10
4,4'-DDD	ND	µg/L	0.10
Endosulfan sulfate	ND	µg/L	0.10
4,4'-DDT	ND	µg/L	0.10
Endrin aldehyde	ND	µg/L	0.10
Methoxychlor	ND	µg/L	0.50
Chlordane	ND	µg/L	0.50
Toxaphene	ND	µg/L	1.0
Aroclor-1016	ND	µg/L	0.50
Aroclor-1221	ND	µg/L	0.50
Aroclor-1232	ND	µg/L	0.50
Aroclor-1242	ND	µg/L	0.50
Aroclor-1248	ND	µg/L	0.50
Aroclor-1254	ND	µg/L	0.50
Aroclor-1260	ND	µg/L	0.50

ND = Not detected.

Reported by Ek Approved by MEF

PRIORITY POLLUTANT ORGANOCHLORINE PESTICIDES/PCBs

EPA Method 608

Client Name: Dunn Geoscience Corporation
Client ID: DGC-2
Laboratory ID: 7191-04
Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
Authorized: 03/25/88 Prepared: 03/28/88 Analyzed: 04/05/88

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	µg/L	0.05
beta-BHC	ND	µg/L	0.05
delta-BHC	ND	µg/L	0.05
gamma-BHC (Lindane)	ND	µg/L	0.05
Heptachlor	ND	µg/L	0.05
Aldrin	ND	µg/L	0.05
Heptachlor epoxide	ND	µg/L	0.05
Endosulfan I	ND	µg/L	0.05
Dieldrin	ND	µg/L	0.10
4,4'-DDE	ND	µg/L	0.10
Endrin	ND	µg/L	0.10
Endosulfan II	ND	µg/L	0.10
4,4'-DDD	ND	µg/L	0.10
Endosulfan sulfate	ND	µg/L	0.10
4,4'-DDT	ND	µg/L	0.10
Endrin aldehyde	ND	µg/L	0.10
Methoxychlor	ND	µg/L	0.50
Chlordane	ND	µg/L	0.50
Toxaphene	ND	µg/L	1.0
Aroclor-1016	ND	µg/L	0.50
Aroclor-1221	ND	µg/L	0.50
Aroclor-1232	ND	µg/L	0.50
Aroclor-1242	ND	µg/L	0.50
Aroclor-1248	ND	µg/L	0.50
Aroclor-1254	ND	µg/L	0.50
Aroclor-1260	ND	µg/L	0.50

ND = Not detected.

Reported by EK Approved by MEF

PRIORITY POLLUTANT ORGANOCHLORINE PESTICIDES/PCBs

EPA Method 608

Client Name: Dunn Geoscience Corporation
 Client ID: DGC-3
 Laboratory ID: 7191-02
 Matrix: Aqueous Sampled: 03/21/88 Received: 03/24/88
 Authorized: 03/25/88 Prepared: 03/28/88 Analyzed: 04/05/88

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	µg/L	0.05
beta-BHC	ND	µg/L	0.05
delta-BHC	ND	µg/L	0.05
gamma-BHC (Lindane)	ND	µg/L	0.05
Heptachlor	ND	µg/L	0.05
Aldrin	ND	µg/L	0.05
Heptachlor epoxide	ND	µg/L	0.05
Endosulfan I	ND	µg/L	0.05
Dieldrin	ND	µg/L	0.10
4,4'-DDE	ND	µg/L	0.10
Endrin	ND	µg/L	0.10
Endosulfan II	ND	µg/L	0.10
4,4'-DDD	ND	µg/L	0.10
Endosulfan sulfate	ND	µg/L	0.10
4,4'-DDT	ND	µg/L	0.10
Endrin aldehyde	ND	µg/L	0.10
Methoxychlor	ND	µg/L	0.50
Chlordane	ND	µg/L	0.50
Toxaphene	ND	µg/L	1.0
Aroclor-1016	ND	µg/L	0.50
Aroclor-1221	ND	µg/L	0.50
Aroclor-1232	ND	µg/L	0.50
Aroclor-1242	ND	µg/L	0.50
Aroclor-1248	ND	µg/L	0.50
Aroclor-1254	ND	µg/L	0.50
Aroclor-1260	ND	µg/L	0.50

ND = Not detected.

Reported by Ek Approved by MEF

PRIORITY POLLUTANT ORGANOCHLORINE PESTICIDES/PCBs

EPA Method 608

Client Name: Dunn Geoscience Corporation
Client ID: DGC-4
Laboratory ID: 7191-11
Matrix: Aqueous Sampled: 03/23/88 Received: 03/24/88
Authorized: 03/25/88 Prepared: 03/28/88 Analyzed: 04/05/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
alpha-BHC	ND	µg/L	0.05
beta-BHC	ND	µg/L	0.05
delta-BHC	ND	µg/L	0.05
gamma-BHC (Lindane)	ND	µg/L	0.05
Heptachlor	ND	µg/L	0.05
Aldrin	ND	µg/L	0.05
Heptachlor epoxide	ND	µg/L	0.05
Endosulfan I	ND	µg/L	0.05
Dieldrin	ND	µg/L	0.10
4,4'-DDE	ND	µg/L	0.10
Endrin	ND	µg/L	0.10
Endosulfan II	ND	µg/L	0.10
4,4'-DDD	ND	µg/L	0.10
Endosulfan sulfate	ND	µg/L	0.10
4,4'-DDT	ND	µg/L	0.10
Endrin aldehyde	ND	µg/L	0.10
Methoxychlor	ND	µg/L	0.50
Chlordane	ND	µg/L	0.50
Toxaphene	ND	µg/L	1.0
Aroclor-1016	ND	µg/L	0.50
Aroclor-1221	ND	µg/L	0.50
Aroclor-1232	ND	µg/L	0.50
Aroclor-1242	ND	µg/L	0.50
Aroclor-1248	ND	µg/L	0.50
Aroclor-1254	ND	µg/L	0.50
Aroclor-1260	ND	µg/L	0.50

ND = Not detected.

Reported by EK Approved by MEF

PRIORITY POLLUTANT ORGANOCHLORINE PESTICIDES/PCBs

EPA Method 608

Client Name: Dunn Geoscience Corporation
Client ID: DGC-7
Laboratory ID: 7191-07
Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
Authorized: 03/25/88 Prepared: 03/28/88 Analyzed: 04/05/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
alpha-BHC	ND	µg/L	0.05
beta-BHC	ND	µg/L	0.05
delta-BHC	ND	µg/L	0.05
gamma-BHC (Lindane)	ND	µg/L	0.05
Heptachlor	ND	µg/L	0.05
Aldrin	ND	µg/L	0.05
Heptachlor epoxide	ND	µg/L	0.05
Endosulfan I	ND	µg/L	0.05
Dieldrin	ND	µg/L	0.10
4,4'-DDE	ND	µg/L	0.10
Endrin	ND	µg/L	0.10
Endosulfan II	ND	µg/L	0.10
4,4'-DDD	ND	µg/L	0.10
Endosulfan sulfate	ND	µg/L	0.10
4,4'-DDT	ND	µg/L	0.10
Endrin aldehyde	ND	µg/L	0.10
Methoxychlor	ND	µg/L	0.50
Chlordane	ND	µg/L	0.50
Toxaphene	ND	µg/L	1.0
Aroclor-1016	ND	µg/L	0.50
Aroclor-1221	ND	µg/L	0.50
Aroclor-1232	ND	µg/L	0.50
Aroclor-1242	ND	µg/L	0.50
Aroclor-1248	ND	µg/L	0.50
Aroclor-1254	ND	µg/L	0.50
Aroclor-1260	ND	µg/L	0.50

ND = Not detected.

Reported by EX Approved by MEF

PRIORITY POLLUTANT ORGANOCHLORINE PESTICIDES/PCBs

EPA Method 608

Client Name: Dunn Geoscience Corporation
Client ID: Erco Blank
Laboratory ID: 7191-11B
Matrix: Aqueous Sampled: NA Received: NA
Authorized: NA Prepared: 03/28/88 Analyzed: 04/05/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
alpha-BHC	ND	µg/L	0.05
beta-BHC	ND	µg/L	0.05
delta-BHC	ND	µg/L	0.05
gamma-BHC (Lindane)	ND	µg/L	0.05
Heptachlor	ND	µg/L	0.05
Aldrin	ND	µg/L	0.05
Heptachlor epoxide	ND	µg/L	0.05
Endosulfan I	ND	µg/L	0.05
Dieldrin	ND	µg/L	0.10
4,4'-DDE	ND	µg/L	0.10
Endrin	ND	µg/L	0.10
Endosulfan II	ND	µg/L	0.10
4,4'-DDD	ND	µg/L	0.10
Endosulfan sulfate	ND	µg/L	0.10
4,4'-DDT	ND	µg/L	0.10
Endrin aldehyde	ND	µg/L	0.10
Methoxychlor	ND	µg/L	0.50
Chlordane	ND	µg/L	0.50
Toxaphene	ND	µg/L	1.0
Aroclor-1016	ND	µg/L	0.50
Aroclor-1221	ND	µg/L	0.50
Aroclor-1232	ND	µg/L	0.50
Aroclor-1242	ND	µg/L	0.50
Aroclor-1248	ND	µg/L	0.50
Aroclor-1254	ND	µg/L	0.50
Aroclor-1260	ND	µg/L	0.50

NA = Not applicable.

ND = Not detected.

Reported by ER Approved by MEF

PRIORITY POLLUTANT ORGANOCHLORINE PESTICIDES/PCBs

EPA Method 608

Client Name: Dunn Geoscience CorporationClient ID: Laboratory Control SpikeLaboratory ID: 7191-05BSMatrix: AqueousSampled: NAReceived: NAAuthorized: NAPrepared: 03/28/88Analyzed: 04/05/88

Parameter	Result**	Units	Reporting Limit
alpha-BHC	ND	µg/L	0.05
beta-BHC	ND	µg/L	0.05
delta-BHC	ND	µg/L	0.05
gamma-BHC (Lindane) -----	0.23 (115)	µg/L	0.05
Heptachlor -----	0.21 (105)	µg/L	0.05
Aldrin -----	0.21 (105)	µg/L	0.05
Heptachlor epoxide	ND	µg/L	0.05
Endosulfan I	ND	µg/L	0.05
Dieldrin -----	0.65 (130)	µg/L	0.10
4,4'-DDE	ND	µg/L	0.10
Endrin -----	0.55 (110)	µg/L	0.10
Endosulfan II	ND	µg/L	0.10
4,4'-DDD	ND	µg/L	0.10
Endosulfan sulfate	ND	µg/L	0.10
4,4'-DDT -----	0.62 (124)	µg/L	0.10
Endrin aldehyde	ND	µg/L	0.10
Methoxychlor	ND	µg/L	0.50
Chlordane	ND	µg/L	0.50
Toxaphene	ND	µg/L	1.0
Aroclor-1016	ND	µg/L	0.50
Aroclor-1221	ND	µg/L	0.50
Aroclor-1232	ND	µg/L	0.50
Aroclor-1242	ND	µg/L	0.50
Aroclor-1248	ND	µg/L	0.50
Aroclor-1254	ND	µg/L	0.50
Aroclor-1260	ND	µg/L	0.50

**Value in parentheses represents percent spike recovery.

NA = Not applicable.

ND = Not detected.

Reported by ELApproved by MEF

PRIORITY POLLUTANT ORGANOCHLORINE PESTICIDES/PCBs

EPA Method 608

Client Name: Dunn Geoscience Corporation
Client ID: Laboratory Control Spike Dup.
Laboratory ID: 7191-05BSD
Matrix: Aqueous Sampled: NA Received: NA
Authorized: NA Prepared: 03/28/88 Analyzed: 04/05/88

Parameter	Result**	Units	Reporting Limit
alpha-BHC	ND	µg/L	0.05
beta-BHC	ND	µg/L	0.05
delta-BHC	ND	µg/L	0.05
gamma-BHC (Lindane) -----	0.22 (110)	µg/L	0.05
Heptachlor -----	0.20 (100)	µg/L	0.05
Aldrin -----	0.20 (100)	µg/L	0.05
Heptachlor epoxide	ND	µg/L	0.05
Endosulfan I	ND	µg/L	0.05
Dieldrin -----	0.61 (122)	µg/L	0.10
4,4'-DDE	ND	µg/L	0.10
Endrin -----	0.58 (116)	µg/L	0.10
Endosulfan II	ND	µg/L	0.10
4,4'-DDD	ND	µg/L	0.10
Endosulfan sulfate	ND	µg/L	0.10
4,4'-DDT -----	0.58 (116)	µg/L	0.10
Endrin aldehyde	ND	µg/L	0.10
Methoxychlor	ND	µg/L	0.50
Chlordane	ND	µg/L	0.50
Toxaphene	ND	µg/L	1.0
Aroclor-1016	ND	µg/L	0.50
Aroclor-1221	ND	µg/L	0.50
Aroclor-1232	ND	µg/L	0.50
Aroclor-1242	ND	µg/L	0.50
Aroclor-1248	ND	µg/L	0.50
Aroclor-1254	ND	µg/L	0.50
Aroclor-1260	ND	µg/L	0.50

**Value in parentheses represents percent spike recovery.

NA = Not applicable.

ND = Not detected.

Reported by Ek Approved by MEF

PRIORITY POLLUTANT PESTICIDES/PCB

EPA Method 608

QUALITY CONTROLClient Name: Dunn Geoscience CorporationClient ID: Laboratory Control Spike Oup.Laboratory ID: 7191-05BSDMatrix: AqueousSampled: NAReceived: NAAuthorized: NAPrepared: 03/28/88Analyzed: 04/05/88

<u>Parameter</u>	<u>% Recovery</u>	<u>QC Advisory Limits</u>
Lindane	110	58 - 123%
Heptachlor	100	40 - 131%
Aldrin	100	40 - 120%
Dieldrin	122	52 - 126%
Endrin	116	56 - 121%
P.P.'-DDT	116	38 - 127%

NA = Not applicable.

Reported by

Ek

Approved by

MEF

PRIORITY POLLUTANT PESTICIDES/PCB

EPA Method 608

QUALITY CONTROL

Client Name: Dunn Geoscience Corporation
Client ID: Laboratory Control Spike
Laboratory ID: 7191-05BS
Matrix: Aqueous Sampled: NA Received: NA
Authorized: NA Prepared: 03/28/88 Analyzed: 04/05/88

<u>Parameter</u>	<u>% Recovery</u>	<u>QC Advisory Limits</u>
Lindane	115	58 - 123%
Heptachlor	105	40 - 131%
Aldrin	105	40 - 120%
Dieldrin	130	52 - 126%
Endrin	110	56 - 121%
P.P.'-DDT	124	38 - 127%

NA = Not applicable.

Reported by EK Approved by MEF

**F.3: Semivolatile Organics for Groundwater Samples Obtained
on March 21-23, 1988.**

HAZARDOUS SUBSTANCE LIST (HSL)
SEMIVOLATILE ORGANICS

EPA Method 625/HSL List

Client Name: Dunn Geoscience Corporation
Client ID: DGC-1S
Laboratory ID: 7191-05
Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
Authorized: 03/25/88 Prepared: 03/28/88 Analyzed: 04/04/88

Parameter	Result	Units	Reporting Limit
Phenol -----	26	µg/L	10
bis(2-Chloroethyl)ether	ND	µg/L	10
2-Chlorophenol	ND	µg/L	10
1,3-Dichlorobenzene	ND	µg/L	10
1,4-Dichlorobenzene	ND	µg/L	10
Benzyl alcohol	ND	µg/L	10
1,2-Dichlorobenzene	ND	µg/L	10
2-Methylphenol	ND	µg/L	10
bis(2-Chloroisopropyl)ether	ND	µg/L	10
4-Methylphenol	ND	µg/L	10
N-Nitroso-di-n-propylamine	ND	µg/L	10
Hexachloroethane	ND	µg/L	10
Nitrobenzene	ND	µg/L	10
Isophorone	ND	µg/L	10
2-Nitrophenol	ND	µg/L	10
2,4-Dimethylphenol	ND	µg/L	10
Benzoic acid	ND	µg/L	50
bis(2-Chloroethoxy)methane	ND	µg/L	10
2,4-Dichlorophenol	ND	µg/L	10
1,2,4-Trichlorobenzene	ND	µg/L	10
Naphthalene	ND	µg/L	10
4-Chloroaniline	ND	µg/L	10
Hexachlorobutadiene	ND	µg/L	10
4-Chloro-3-methylphenol	ND	µg/L	10
2-Methylnaphthalene	ND	µg/L	10
Hexachlorocyclopentadiene	ND	µg/L	10
2,4,6-Trichlorophenol	ND	µg/L	10
2,4,5-Trichlorophenol	ND	µg/L	50
2-Chloronaphthalene	ND	µg/L	10
2-Nitroaniline	ND	µg/L	50
Dimethyl phthalate	ND	µg/L	10
Acenaphthylene	ND	µg/L	10
3-Nitroaniline	ND	µg/L	50
Acenaphthene	ND	µg/L	10

(continued on following page)

ND = Not detected.

HAZARDOUS SUBSTANCE LIST (HSL)
SEMIVOLATILE ORGANICS (CONT.)

EPA Method 625/HSL List

Client Name: Dunn Geoscience Corporation
Client ID: DGC-1S
Laboratory ID: 7191-05
Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
Authorized: 03/25/88 Prepared: 03/28/88 Analyzed: 04/04/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
2,4-Dinitrophenol	ND	µg/L	50
4-Nitrophenol	ND	µg/L	50
Dibenzofuran	ND	µg/L	10
2,4-Dinitrotoluene	ND	µg/L	10
2,6-Dinitrotoluene	ND	µg/L	10
Diethyl phthalate	ND	µg/L	10
4-Chlorophenyl phenyl ether	ND	µg/L	10
Fluorene	ND	µg/L	10
4-Nitroaniline	ND	µg/L	50
4,6-Dinitro-2-methylphenol	ND	µg/L	50
N-Nitrosodiphenylamine	ND	µg/L	10
4-Bromophenyl phenyl ether	ND	µg/L	10
Hexachlorobenzene	ND	µg/L	10
Pentachlorophenol	ND	µg/L	50
Phenanthrene	ND	µg/L	10
Anthracene	ND	µg/L	10
Di-n-butyl phthalate	ND	µg/L	10
Fluoranthene	ND	µg/L	10
Pyrene	ND	µg/L	10
Butyl benzyl phthalate	ND	µg/L	10
3,3'-Dichlorobenzidine	ND	µg/L	20
Benzo(a)anthracene	ND	µg/L	10
bis(2-Ethylhexyl)phthalate	ND	µg/L	10
Chrysene	ND	µg/L	10
Di-n-octyl phthalate	ND	µg/L	10
Benzo(b)fluoranthene	ND	µg/L	10
Benzo(k)fluoranthene	ND	µg/L	10
Benzo(a)pyrene	ND	µg/L	10
Indeno(1,2,3-c,d)pyrene	ND	µg/L	10
Dibenzo(a,h)anthracene	ND	µg/L	10
Benzo(g,h,i)perylene	ND	µg/L	10

ND = Not detected.

Reported by NCG Approved by AVL

HAZARDOUS SUBSTANCE LIST (HSL)
SEMIVOLATILE ORGANICS

EPA Method 625/HSL List

Client Name: Dunn Geoscience Corporation
Client ID: DGC-1D
Laboratory ID: 7191-06
Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
Authorized: 03/25/88 Prepared: 03/28/88 Analyzed: 04/04/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Phenol	ND	µg/L	10
bis(2-Chloroethyl)ether	ND	µg/L	10
2-Chlorophenol	ND	µg/L	10
1,3-Dichlorobenzene	ND	µg/L	10
1,4-Dichlorobenzene	ND	µg/L	10
Benzyl alcohol	ND	µg/L	10
1,2-Dichlorobenzene	ND	µg/L	10
2-Methylphenol	ND	µg/L	10
bis(2-Chloroisopropyl)ether	ND	µg/L	10
4-Methylphenol	ND	µg/L	10
N-Nitroso-di-n-propylamine	ND	µg/L	10
Hexachloroethane	ND	µg/L	10
Nitrobenzene	ND	µg/L	10
Isophorone	ND	µg/L	10
2-Nitrophenol	ND	µg/L	10
2,4-Dimethylphenol	ND	µg/L	10
Benzoic acid	ND	µg/L	50
bis(2-Chloroethoxy)methane	ND	µg/L	10
2,4-Dichlorophenol	ND	µg/L	10
1,2,4-Trichlorobenzene	ND	µg/L	10
Naphthalene	ND	µg/L	10
4-Chloroaniline	ND	µg/L	10
Hexachlorobutadiene	ND	µg/L	10
4-Chloro-3-methylphenol	ND	µg/L	10
2-Methylnaphthalene	ND	µg/L	10
Hexachlorocyclopentadiene	ND	µg/L	10
2,4,6-Trichlorophenol	ND	µg/L	10
2,4,5-Trichlorophenol	ND	µg/L	50
2-Chloronaphthalene	ND	µg/L	10
2-Nitroaniline	ND	µg/L	50
Dimethyl phthalate	ND	µg/L	10
Acenaphthylene	ND	µg/L	10
3-Nitroaniline	ND	µg/L	50
Acenaphthene	ND	µg/L	10

(continued on following page)

ND = Not detected.

HAZARDOUS SUBSTANCE LIST (HSL)
SEMIVOLATILE ORGANICS (CONT.)

EPA Method 625/HSL List

Client Name: Dunn Geoscience Corporation
Client ID: DGC-10
Laboratory ID: 7191-06
Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
Authorized: 03/25/88 Prepared: 03/28/88 Analyzed: 04/04/88

Parameter	Result	Units	Reporting Limit
2,4-Dinitrophenol	ND	µg/L	50
4-Nitrophenol	ND	µg/L	50
Dibenzofuran	ND	µg/L	10
2,4-Dinitrotoluene	ND	µg/L	10
2,6-Dinitrotoluene	ND	µg/L	10
Diethyl phthalate	ND	µg/L	10
4-Chlorophenyl phenyl ether	ND	µg/L	10
Fluorene	ND	µg/L	10
4-Nitroaniline	ND	µg/L	50
4,6-Dinitro-2-methylphenol	ND	µg/L	50
N-Nitrosodiphenylamine	ND	µg/L	10
4-Bromophenyl phenyl ether	ND	µg/L	10
Hexachlorobenzene	ND	µg/L	10
Pentachlorophenol	ND	µg/L	50
Phenanthrene	ND	µg/L	10
Anthracene	ND	µg/L	10
Di-n-butyl phthalate	ND	µg/L	10
Fluoranthene	ND	µg/L	10
Pyrene	ND	µg/L	10
Butyl benzyl phthalate	ND	µg/L	10
3,3'-Dichlorobenzidine	ND	µg/L	20
Benzo(a)anthracene	ND	µg/L	10
bis(2-Ethylhexyl)phthalate ----- *		µg/L	10
Chrysene	ND	µg/L	10
Di-n-octyl phthalate	ND	µg/L	10
Benzo(b)fluoranthene	ND	µg/L	10
Benzo(k)fluoranthene	ND	µg/L	10
Benzo(a)pyrene	ND	µg/L	10
Indeno(1,2,3-c,d)pyrene	ND	µg/L	10
Dibenzo(a,h)anthracene	ND	µg/L	10
Benzo(g,h,i)perylene	ND	µg/L	10

*Trace concentrations detected below the reporting limit.

ND = Not detected.

Reported by NCA Approved by AVL

HAZARDOUS SUBSTANCE LIST (HSL)
SEMIVOLATILE ORGANICS

EPA Method 625/HSL List

Client Name: Dunn Geoscience Corporation
 Client ID: DGC-4
 Laboratory ID: 7191-11
 Matrix: Aqueous Sampled: 03/23/88 Received: 03/24/88
 Authorized: 03/25/88 Prepared: 03/28/88 Analyzed: 04/04/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Phenol	ND	µg/L	10
bis(2-Chloroethyl)ether	ND	µg/L	10
2-Chlorophenol	ND	µg/L	10
1,3-Dichlorobenzene	ND	µg/L	10
1,4-Dichlorobenzene	ND	µg/L	10
Benzyl alcohol	ND	µg/L	10
1,2-Dichlorobenzene	ND	µg/L	10
2-Methylphenol	ND	µg/L	10
bis(2-Chloroisopropyl)ether	ND	µg/L	10
4-Methylphenol	ND	µg/L	10
N-Nitroso-di-n-propylamine	ND	µg/L	10
Hexachloroethane	ND	µg/L	10
Nitrobenzene	ND	µg/L	10
Isophorone	ND	µg/L	10
2-Nitrophenol	ND	µg/L	10
2,4-Dimethylphenol	ND	µg/L	10
Benzoic acid	ND	µg/L	50
bis(2-Chloroethoxy)methane	ND	µg/L	10
2,4-Dichlorophenol	ND	µg/L	10
1,2,4-Trichlorobenzene	ND	µg/L	10
Naphthalene	ND	µg/L	10
4-Chloroaniline	ND	µg/L	10
Hexachlorobutadiene	ND	µg/L	10
4-Chloro-3-methylphenol	ND	µg/L	10
2-Methylnaphthalene	ND	µg/L	10
Hexachlorocyclopentadiene	ND	µg/L	10
2,4,6-Trichlorophenol	ND	µg/L	10
2,4,5-Trichlorophenol	ND	µg/L	50
2-Chloronaphthalene	ND	µg/L	10
2-Nitroaniline	ND	µg/L	50
Dimethyl phthalate	ND	µg/L	10
Acenaphthylene	ND	µg/L	10
3-Nitroaniline	ND	µg/L	50
Acenaphthene	ND	µg/L	10

(continued on following page)

ND = Not detected.

HAZARDOUS SUBSTANCE LIST (HSL)
SEMIVOLATILE ORGANICS (CONT.)

EPA Method 625/HSL List

Client Name: Dunn Geoscience Corporation

Client ID: DGC-4

Laboratory ID: 7191-11

Matrix: Aqueous Sampled: 03/23/88 Received: 03/24/88

Authorized: 03/25/88 Prepared: 03/28/88 Analyzed: 04/04/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
2,4-Dinitrophenol	ND	µg/L	50
4-Nitrophenol	ND	µg/L	50
Dibenzofuran	ND	µg/L	10
2,4-Dinitrotoluene	ND	µg/L	10
2,6-Dinitrotoluene	ND	µg/L	10
Diethyl phthalate	ND	µg/L	10
4-Chlorophenyl phenyl ether	ND	µg/L	10
Fluorene	ND	µg/L	10
4-Nitroaniline	ND	µg/L	50
4,6-Dinitro-2-methylphenol	ND	µg/L	50
N-Nitrosodiphenylamine	ND	µg/L	10
4-Bromophenyl phenyl ether	ND	µg/L	10
Hexachlorobenzene	ND	µg/L	10
Pentachlorophenol	ND	µg/L	50
Phenanthrene	ND	µg/L	10
Anthracene	ND	µg/L	10
Di-n-butyl phthalate	ND	µg/L	10
Fluoranthene	ND	µg/L	10
Pyrene	ND	µg/L	10
Butyl benzyl phthalate	ND	µg/L	10
3,3'-Dichlorobenzidine	ND	µg/L	20
Benzo(a)anthracene	ND	µg/L	10
bis(2-Ethylhexyl)phthalate ----- *		µg/L	10
Chrysene	ND	µg/L	10
Di-n-octyl phthalate	ND	µg/L	10
Benzo(b)fluoranthene	ND	µg/L	10
Benzo(k)fluoranthene	ND	µg/L	10
Benzo(a)pyrene	ND	µg/L	10
Indeno(1,2,3-c,d)pyrene	ND	µg/L	10
Dibenzo(a,h)anthracene	ND	µg/L	10
Benzo(g,h,i)perylene	ND	µg/L	10

*Trace concentrations detected below the reporting limit.

ND = Not detected.

Reported by WCM Approved by AVL

HAZARDOUS SUBSTANCE LIST (HSL)
SEMIVOLATILE ORGANICS

EPA Method 625/HSL List

Client Name: Dunn Geoscience Corporation
Client ID: DGC-4 Filtered
Laboratory ID: 7191-13
Matrix: Aqueous Sampled: 03/23/88 Received: 03/24/88
Authorized: 03/25/88 Prepared: 03/28/88 Analyzed: 04/04/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Phenol	ND	µg/L	10
bis(2-Chloroethyl)ether	ND	µg/L	10
2-Chlorophenol	ND	µg/L	10
1,3-Dichlorobenzene	ND	µg/L	10
1,4-Dichlorobenzene	ND	µg/L	10
Benzyl alcohol	ND	µg/L	10
1,2-Dichlorobenzene	ND	µg/L	10
2-Methylphenol	ND	µg/L	10
bis(2-Chloroisopropyl)ether	ND	µg/L	10
4-Methylphenol	ND	µg/L	10
N-Nitroso-di-n-propylamine	ND	µg/L	10
Hexachloroethane	ND	µg/L	10
Nitrobenzene	ND	µg/L	10
Isophorone	ND	µg/L	10
2-Nitrophenol	ND	µg/L	10
2,4-Dimethylphenol	ND	µg/L	10
Benzoic acid	ND	µg/L	50
bis(2-Chloroethoxy)methane	ND	µg/L	10
2,4-Dichlorophenol	ND	µg/L	10
1,2,4-Trichlorobenzene	ND	µg/L	10
Naphthalene	ND	µg/L	10
4-Chloroaniline	ND	µg/L	10
Hexachlorobutadiene	ND	µg/L	10
4-Chloro-3-methylphenol	ND	µg/L	10
2-Methylnaphthalene	ND	µg/L	10
Hexachlorocyclopentadiene	ND	µg/L	10
2,4,6-Trichlorophenol	ND	µg/L	10
2,4,5-Trichlorophenol	ND	µg/L	50
2-Chloronaphthalene	ND	µg/L	10
2-Nitroaniline	ND	µg/L	50
Dimethyl phthalate	ND	µg/L	10
Acenaphthylene	ND	µg/L	10
3-Nitroaniline	ND	µg/L	50
Acenaphthene	ND	µg/L	10

(continued on following page)

ND = Not detected.

HAZARDOUS SUBSTANCE LIST (HSL)
SEMIVOLATILE ORGANICS (CONT.)

EPA Method 625/HSL List

Client Name: Dunn Geoscience Corporation

Client ID: DGC-4 Filtered

Laboratory ID: 7191-13

Matrix: Aqueous Sampled: 03/23/88 Received: 03/24/88

Authorized: 03/25/88 Prepared: 03/28/88 Analyzed: 04/04/88

Parameter	Result	Units	Reporting Limit
2,4-Dinitrophenol	ND	µg/L	50
4-Nitrophenol	ND	µg/L	50
Dibenzofuran	ND	µg/L	10
2,4-Dinitrotoluene	ND	µg/L	10
2,6-Dinitrotoluene	ND	µg/L	10
Diethyl phthalate	ND	µg/L	10
4-Chlorophenyl phenyl ether	ND	µg/L	10
Fluorene	ND	µg/L	10
4-Nitroaniline	ND	µg/L	50
4,6-Dinitro-2-methylphenol	ND	µg/L	50
N-Nitrosodiphenylamine	ND	µg/L	10
4-Bromophenyl phenyl ether	ND	µg/L	10
Hexachlorobenzene	ND	µg/L	10
Pentachlorophenol	ND	µg/L	50
Phenanthrene	ND	µg/L	10
Anthracene	ND	µg/L	10
Di-n-butyl phthalate	ND	µg/L	10
Fluoranthene	ND	µg/L	10
Pyrene	ND	µg/L	10
Butyl benzyl phthalate	ND	µg/L	10
3,3'-Dichlorobenzidine	ND	µg/L	20
Benzo(a)anthracene	ND	µg/L	10
bis(2-Ethylhexyl)phthalate ----- *		µg/L	10
Chrysene	ND	µg/L	10
Di-n-octyl phthalate	ND	µg/L	10
Benzo(b)fluoranthene	ND	µg/L	10
Benzo(k)fluoranthene	ND	µg/L	10
Benzo(a)pyrene	ND	µg/L	10
Indeno(1,2,3-c,d)pyrene	ND	µg/L	10
Dibenzo(a,h)anthracene	ND	µg/L	10
Benzo(g,h,i)perylene	ND	µg/L	10

*Trace concentrations detected below the reporting limit.

ND = Not detected.

Reported by slc Approved by AVL

HAZARDOUS SUBSTANCE LIST (HSL)
SEMIVOLATILE ORGANICS

EPA Method 625/HSL List

Client Name: Dunn Geoscience Corporation

Client ID: Erco Blank

Laboratory ID: 7191-14B

Matrix: Aqueous Sampled: NA Received: NA

Authorized: NA Prepared: 03/28/88 Analyzed: 04/04/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Phenol	ND	µg/L	10
bis(2-Chloroethyl)ether	ND	µg/L	10
2-Chlorophenol	ND	µg/L	10
1,3-Dichlorobenzene	ND	µg/L	10
1,4-Dichlorobenzene	ND	µg/L	10
Benzyl alcohol	ND	µg/L	10
1,2-Dichlorobenzene	ND	µg/L	10
2-Methylphenol	ND	µg/L	10
bis(2-Chloroisopropyl)ether	ND	µg/L	10
4-Methylphenol	ND	µg/L	10
N-Nitroso-di-n-propylamine	ND	µg/L	10
Hexachloroethane	ND	µg/L	10
Nitrobenzene	ND	µg/L	10
Isophorone	ND	µg/L	10
2-Nitrophenol	ND	µg/L	10
2,4-Dimethylphenol	ND	µg/L	10
Benzoic acid	ND	µg/L	50
bis(2-Chloroethoxy)methane	ND	µg/L	10
2,4-Dichlorophenol	ND	µg/L	10
1,2,4-Trichlorobenzene	ND	µg/L	10
Naphthalene	ND	µg/L	10
4-Chloroaniline	ND	µg/L	10
Hexachlorobutadiene	ND	µg/L	10
4-Chloro-3-methylphenol	ND	µg/L	10
2-Methylnaphthalene	ND	µg/L	10
Hexachlorocyclopentadiene	ND	µg/L	10
2,4,6-Trichlorophenol	ND	µg/L	10
2,4,5-Trichlorophenol	ND	µg/L	50
2-Chloronaphthalene	ND	µg/L	10
2-Nitroaniline	ND	µg/L	50
Dimethyl phthalate	ND	µg/L	10
Acenaphthylene	ND	µg/L	10
3-Nitroaniline	ND	µg/L	50
Acenaphthene	ND	µg/L	10

(continued on following page)

NA = Not applicable.

ND = Not detected.

HAZARDOUS SUBSTANCE LIST (HSL)
SEMIVOLATILE ORGANICS (CONT.)

EPA Method 625/HSL List

Client Name: Dunn Geoscience Corporation

Client ID: Erco Blank

Laboratory ID: 7191-14B

Matrix: Aqueous Sampled: NA Received: NA

Authorized: NA Prepared: 03/28/88 Analyzed: 04/04/88

Parameter	Result	Units	Reporting Limit
2,4-Dinitrophenol	ND	µg/L	50
4-Nitrophenol	ND	µg/L	50
Dibenzofuran	ND	µg/L	10
2,4-Dinitrotoluene	ND	µg/L	10
2,6-Dinitrotoluene	ND	µg/L	10
Diethyl phthalate	ND	µg/L	10
4-Chlorophenyl phenyl ether	ND	µg/L	10
Fluorene	ND	µg/L	10
4-Nitroaniline	ND	µg/L	50
4,6-Dinitro-2-methylphenol	ND	µg/L	50
N-Nitrosodiphenylamine	ND	µg/L	10
4-Bromophenyl phenyl ether	ND	µg/L	10
Hexachlorobenzene	ND	µg/L	10
Pentachlorophenol	ND	µg/L	50
Phenanthrene	ND	µg/L	10
Anthracene	ND	µg/L	10
Di-n-butyl phthalate	ND	µg/L	10
Fluoranthene	ND	µg/L	10
Pyrene	ND	µg/L	10
Butyl benzyl phthalate	ND	µg/L	10
3,3'-Dichlorobenzidine	ND	µg/L	20
Benzo(a)anthracene	ND	µg/L	10
bis(2-Ethylhexyl)phthalate	ND	µg/L	10
Chrysene	ND	µg/L	10
Di-n-octyl phthalate	ND	µg/L	10
Benzo(b)fluoranthene	ND	µg/L	10
Benzo(k)fluoranthene	ND	µg/L	10
Benzo(a)pyrene	ND	µg/L	10
Indeno(1,2,3-c,d)pyrene	ND	µg/L	10
Dibenzo(a,h)anthracene	ND	µg/L	10
Benzo(g,h,i)perylene	ND	µg/L	10

NA = Not applicable.

ND = Not detected.

Reported by UCA Approved by AVL

PRIORITY POLLUTANT SEMIVOLATILE ORGANICS

EPA Method 625 + 625/HSL List

QUALITY CONTROL

Client Name: Dunn Geoscience Corporation
Client ID: Laboratory Control Spike
Laboratory ID: 7191-148S
Matrix: Aqueous Sampled: NA Received: NA
Authorized: NA Prepared: 03/28/88 Analyzed: 04/05/88

<u>Parameter</u>	<u>% Recovery</u>	<u>QC Advisory Limits</u>
2-Chlorophenol	80	27 - 123%
Phenol	28	12 - 89%
4-Chloro-3-methylphenol	74	23 - 97%
4-Nitrophenol	18	10 - 80%
Pentachlorophenol	88	9 - 103%
1,4-Dichlorobenzene	76	36 - 97%
N-Nitroso-di-n-propylamine	82	41 - 116%
1,2,4-Trichlorobenzene	92	39 - 98%
Acenaphthene	87	46 - 118%
2,4-Dinitrotoluene	75	24 - 96%
Pyrene	118	26 - 127%

NA = Not applicable.

Reported by NCA Approved by NL

PRIORITY POLLUTANT SEMIVOLATILE ORGANICS

EPA Method 625 + 625/HSL List

QUALITY CONTROL

Client Name: Dunn Geoscience Corporation
Client ID: Laboratory Control Spike Dup.
Laboratory ID: 7191-14BSD
Matrix: Aqueous Sampled: NA Received: NA
Authorized: NA Prepared: 03/28/88 Analyzed: 04/05/88

<u>Parameter</u>	<u>% Recovery</u>	<u>QC Advisory Limits</u>
2-Chlorophenol	78	27 - 123%
Phenol	25	12 - 89%
4-Chloro-3-methylphenol	71	23 - 97%
4-Nitrophenol	16	10 - 80%
Pentachlorophenol	92	9 - 103%
1,4-Dichlorobenzene	74	36 - 97%
N-Nitroso-di-n-propylamine	79	41 - 116%
1,2,4-Trichlorobenzene	91	39 - 98%
Acenaphthene	85	46 - 118%
2,4-Dinitrotoluene	78	24 - 96%
Pyrene	126	26 - 127%

NA = Not applicable.

Reported by NCA Approved by AVL

SEMIVOLATILE ORGANICS

Surrogate Recovery Summary

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: 03/25/88

Received: 03/24/88

Erco ID	Client ID	Surrogate Compound (%)					
		2-Fluoro-phenol	d ₆ -Phenol	2,4,6-Tribromophenol	d ₆ -Nitrobenzene	2-Fluoro-biphenyl	d ₁₄ -p-Terphenyl
7191-05	DGC-1S	32	19	77	70	74	74
7191-06	DGC-1D	37	25	73	63	68	55
7191-11	DGC-4	34	25	68	66	66	57
7191-13	DGC-4 Filtered	40	25	70	69	73	61
7191-14B	Erco Blank	43	25	78	70	76	81
7191-14BS	Laboratory Control Spike	41	29	64	68	71	72
7191-14BSD	Laboratory Control Spike Dup.	32	24	76	67	74	67

QC Advisory Limits: 21-100% 10-94% 35-114% 43-116% 33-114% 18-137%

Reported by NCA Approved by AVL

F.4: Priority Pollutant Metals for Groundwater Samples Obtained on March 21-23, 1988.

PRIORITY POLLUTANT METALS

Client Name: Dunn Geoscience Corporation
Client ID: P-6
Laboratory ID: 7191-01
Matrix: Aqueous Sampled: 03/21/88 Received: 03/24/88
Authorized: 03/25/88 Prepared: 03/30/88 Analyzed: 03/31/88

Parameter	Result	Units	Reporting Limit	Analytical Method
Antimony	ND	mg/L	0.05	200.7
Arsenic -----	0.0033	mg/L	0.003	206.2
Beryllium	ND	mg/L	0.001	200.7
Cadmium	ND	mg/L	0.005	200.7
Chromium	ND	mg/L	0.01	200.7
Copper	ND	mg/L	0.006	200.7
Lead	ND	mg/L	0.005	239.2
Mercury	ND	mg/L	0.0002	245.1
Nickel	ND	mg/L	0.04	200.7
Selenium	ND	mg/L	0.005	270.2
Silver -----	0.0052	mg/L	0.005	200.7
Thallium	ND	mg/L	0.004	279.2
Zinc -----	0.016	mg/L	0.01	200.7

ND = Not detected.

Reported by VLP Approved by CAK

PRIORITY POLLUTANT METALS

Client Name: Dunn Geoscience Corporation
Client ID: DGC-1S
Laboratory ID: 7191-05
Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
Authorized: 03/25/88 Prepared: 03/30/88 Analyzed: 03/31/88

Parameter	Result	Units	Reporting Limit	Analytical Method
Antimony	ND	mg/L	0.05	200.7
Arsenic -----	0.0058	mg/L	0.003	206.2
Beryllium	ND	mg/L	0.001	200.7
Cadmium	ND	mg/L	0.005	200.7
Chromium	ND	mg/L	0.01	200.7
Copper	ND	mg/L	0.006	200.7
Lead	ND	mg/L	0.005	239.2
Mercury	ND	mg/L	0.0002	245.1
Nickel	ND	mg/L	0.04	200.7
Selenium	ND	mg/L	0.005	270.2
Silver	ND	mg/L	0.005	200.7
Thallium	ND	mg/L	0.004	279.2
Zinc -----	0.012	mg/L	0.01	200.7

ND = Not detected.

Reported by VLP Approved by CM

PRIORITY POLLUTANT METALS

Client Name: Dunn Geoscience Corporation
Client ID: DGC-1D
Laboratory ID: 7191-06
Matrix: Aqueous Sampled: 03/22/88 Received: 03/24/88
Authorized: 03/25/88 Prepared: 03/30/88 Analyzed: 03/31/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>	<u>Analytical Method</u>
Antimony	ND	mg/L	0.05	200.7
Arsenic	ND	mg/L	0.003	206.2
Beryllium	ND	mg/L	0.001	200.7
Cadmium	ND	mg/L	0.005	200.7
Chromium	ND	mg/L	0.01	200.7
Copper	ND	mg/L	0.006	200.7
Lead	ND	mg/L	0.002	239.2
Mercury	ND	mg/L	0.0002	245.1
Nickel	ND	mg/L	0.04	200.7
Selenium	ND	mg/L	0.002	270.2
Silver	ND	mg/L	0.005	200.7
Thallium	ND	mg/L	0.004	279.2
Zinc	ND	mg/L	0.01	200.7

ND = Not detected.

Reported by MLP Approved by CMR

PRIORITY POLLUTANT METALS

Client Name: Dunn Geoscience Corporation
 Client ID: DGC-3
 Laboratory ID: 7191-02
 Matrix: Aqueous Sampled: 03/21/88 Received: 03/24/88
 Authorized: 03/25/88 Prepared: 03/30/88 Analyzed: 03/31/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>	<u>Analytical Method</u>
Antimony	ND	mg/L	0.05	200.7
Arsenic	ND	mg/L	0.003	206.2
Beryllium	ND	mg/L	0.001	200.7
Cadmium	ND	mg/L	0.005	200.7
Chromium	ND	mg/L	0.01	200.7
Copper	ND	mg/L	0.006	200.7
Lead	ND	mg/L	0.005	239.2
Mercury	ND	mg/L	0.0002	245.1
Nickel	ND	mg/L	0.04	200.7
Selenium	ND	mg/L	0.005	270.2
Silver	ND	mg/L	0.005	200.7
Thallium	ND	mg/L	0.004	279.2
Zinc -----	0.015	mg/L	0.01	200.7

ND = Not detected.

Reported by RLP Approved by CM

PRIORITY POLLUTANT METALS

Client Name: Dunn Geoscience Corporation
Client ID: DGC-4
Laboratory ID: 7191-11
Matrix: Aqueous Sampled: 03/23/88 Received: 03/24/88
Authorized: 03/25/88 Prepared: 03/30/88 Analyzed: 03/31/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>	<u>Analytical Method</u>
Antimony	ND	mg/L	0.05	200.7
Arsenic	ND	mg/L	0.003	206.2
Beryllium	ND	mg/L	0.001	200.7
Cadmium	ND	mg/L	0.005	200.7
Chromium	ND	mg/L	0.01	200.7
Copper	ND	mg/L	0.006	200.7
Lead	ND	mg/L	0.002	239.2
Mercury	ND	mg/L	0.0002	245.1
Nickel	ND	mg/L	0.04	200.7
Selenium	ND	mg/L	0.002	270.2
Silver	ND	mg/L	0.005	200.7
Thallium	ND	mg/L	0.004	279.2
Zinc	ND	mg/L	0.01	200.7

ND = Not detected.

Reported by VLP Approved by CM

PRIORITY POLLUTANT METALS

Client Name: Dunn Geoscience Corporation
Client ID: FB-1
Laboratory ID: 7191-12
Matrix: Aqueous Sampled: 03/23/88 Received: 03/24/88
Authorized: 03/25/88 Prepared: 03/30/88 Analyzed: 03/31/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>	<u>Analytical Method</u>
Antimony	ND	mg/L	0.05	200.7
Arsenic	ND	mg/L	0.003	206.2
Beryllium	ND	mg/L	0.001	200.7
Cadmium	ND	mg/L	0.005	200.7
Chromium	ND	mg/L	0.01	200.7
Copper	ND	mg/L	0.006	200.7
Lead	ND	mg/L	0.002	239.2
Mercury	ND	mg/L	0.0002	245.1
Nickel	ND	mg/L	0.04	200.7
Selenium	ND	mg/L	0.002	270.2
Silver	ND	mg/L	0.005	200.7
Thallium	ND	mg/L	0.004	279.2
Zinc -----	0.012	mg/L	0.01	200.7

ND = Not detected.

Reported by VLP Approved by CM

METALS QC

Laboratory ID: Erco Blank

Matrix: Aqueous

Received: With Box 325

Prepared: 03/30/88

Analyzed: 03/31/88

Parameter	Result	Units	Reporting Limit	Analytical Method
Aluminum	ND	mg/L	0.05	200.7
Antimony	ND	mg/L	0.05	200.7
Arsenic	ND	mg/L	0.003	206.2
Barium	ND	mg/L	0.005	200.7
Beryllium	ND	mg/L	0.001	200.7
Cadmium	ND	mg/L	0.005	200.7
Calcium	ND	mg/L	0.1	200.7
Chromium	ND	mg/L	0.01	200.7
Cobalt	ND	mg/L	0.01	200.7
Copper	ND	mg/L	0.006	200.7
Iron	ND	mg/L	0.05	200.7
Lead	ND	mg/L	0.005	239.2
Magnesium	ND	mg/L	0.1	200.7
Manganese	ND	mg/L	0.005	200.7
Mercury	ND	mg/L	0.0002	245.1
Nickel	ND	mg/L	0.04	200.7
Potassium	NO	mg/L	5	200.7
Selenium	ND	mg/L	0.005	270.2
Silver	ND	mg/L	0.005	200.7
Sodium	ND	mg/L	0.50	200.7
Thallium	ND	mg/L	0.004	271.2
Tin	ND	mg/L	0.03	200.7
Vanadium	ND	mg/L	0.01	200.7
Zinc	ND	mg/L	0.01	200.7

ND = Not detected.

Reported by VLP

Approved by CM

METALS QC

Laboratory ID: Laboratory Control SpikeMatrix: AqueousReceived: With Box 325Prepared: 03/30/88Analyzed: 03/31/88

<u>Parameter</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Units</u>	<u>Reporting Limit</u>	<u>Analytical Method</u>
Aluminum	2.0	100	mg/L	0.05	200.7
Antimony	0.60	98	mg/L	0.05	200.7
Arsenic	0.020	100	mg/L	0.003	206.2
Barium	2.0	106	mg/L	0.005	200.7
Beryllium	0.050	102	mg/L	0.001	200.7
Cadmium	0.050	104	mg/L	0.005	200.7
Calcium	100	109	mg/L	0.1	200.7
Chromium	0.200	100	mg/L	0.01	200.7
Cobalt	0.500	100	mg/L	0.01	200.7
Copper	0.250	103	mg/L	0.006	200.7
Iron	1.0	101	mg/L	0.05	200.7
Lead	0.020	105	mg/L	0.005	239.2
Magnesium	50	102	mg/L	0.1	200.7
Manganese	0.200	101	mg/L	0.005	200.7
Mercury	0.0025	103	mg/L	0.0002	245.1
Nickel	0.400	99	mg/L	0.04	200.7
Potassium	50	105	mg/L	5	200.7
Selenium	0.010	100	mg/L	0.005	270.2
Silver	0.040	83	mg/L	0.005	200.7
Sodium	100	106	mg/L	0.50	200.7
Thallium	0.050	102	mg/L	0.004	271.2
Tin	0.400	97	mg/L	0.03	200.7
Vanadium	0.500	88	mg/L	0.01	200.7
Zinc	0.200	106	mg/L	0.01	200.7

Reported by MLPApproved by CAR

METALS QC

Laboratory ID: Laboratory Control Spike Dup.

Matrix: Aqueous

Received: With Box 325

Prepared: 03/30/88

Analyzed: 03/31/88

<u>Parameter</u>	<u>Spike Added</u>	<u>% Recovery</u>	<u>Units</u>	<u>Reporting Limit</u>	<u>Analytical Method</u>
Aluminum	2.0	97	mg/L	0.05	200.7
Antimony	0.60	95	mg/L	0.05	200.7
Arsenic	0.020	105	mg/L	0.003	206.2
Barium	2.0	104	mg/L	0.005	200.7
Beryllium	0.050	100	mg/L	0.001	200.7
Cadmium	0.050	100	mg/L	0.005	200.7
Calcium	100	105	mg/L	0.1	200.7
Chromium	0.200	99	mg/L	0.01	200.7
Cobalt	0.500	99	mg/L	0.01	200.7
Copper	0.250	103	mg/L	0.006	200.7
Iron	1.0	99	mg/L	0.05	200.7
Lead	0.02	105	mg/L	0.005	239.2
Magnesium	50	102	mg/L	0.1	200.7
Manganese	0.200	100	mg/L	0.005	200.7
Mercury	0.0025	103	mg/L	0.0002	245.1
Nickel	0.400	100	mg/L	0.04	200.7
Potassium	50	101	mg/L	5	200.7
Selenium	0.010	87	mg/L	0.005	270.2
Silver	0.040	88	mg/L	0.005	200.7
Sodium	100	102	mg/L	0.50	200.7
Thallium	0.050	106	mg/L	0.004	271.2
Tin	0.400	92	mg/L	0.03	200.7
Vanadium	0.500	87	mg/L	0.01	200.7
Zinc	0.200	104	mg/L	0.01	200.7

Reported by

MLP

Approved by

CMR

**F.5: Petroleum Hydrocarbons for Groundwater Samples Obtained
on March 21-23, 1988.**

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience CorporationMatrix: AqueousAuthorized: 03/25/88Sampled: 03/21/88Received: 03/24/88Concentration Units: mg/L (ppm)Prepared: 03/25/88Analyzed: 03/27/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-01	P-1	3.0	0.01	0.25	NA

Qualitative Identification: This sample has GC/FID characteristics that are similar to lubricating oil and polynuclear aromatic hydrocarbons.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 96%.

Reported by BAApproved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: 03/25/88

Sampled: 03/22/88

Received: 03/24/88

Concentration Units: mg/L (ppm)

Prepared: 03/25/88

Analyzed: 03/26/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-06	P-2	2.5	0.01	0.25	NA

Qualitative Identification: This sample has GC/FID characteristics that are similar to lubricating oil.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 105%.

Internal standard recovery

Reported by AH

Approved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience CorporationMatrix: AqueousAuthorized: 03/25/88Sampled: 03/22/88Received: 03/24/88Concentration Units: mg/L (ppm)Prepared: 03/25/88Analyzed: 03/27/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-07	P-3	8.6	0.01	0.25	NA

Qualitative Identification: This sample has GC/FID characteristics that are similar to lubricating oil.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 105%.

Reported by AHApproved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: 03/25/88

Sampled: 03/21/88

Received: 03/24/88

Concentration Units: mg/L (ppm)

Prepared: 03/25/88

Analyzed: 03/27/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-02	P-6	12	0.01	0.25	NA

Qualitative Identification: This sample has GC/FID characteristics that are similar to lubricating oil and polynuclear aromatic hydrocarbons.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 92%.

Reported by IAH

Approved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: 03/25/88

Sampled: 03/22/88

Received: 03/24/88

Concentration Units: mg/L (ppm)

Prepared: 03/25/88

Analyzed: 03/27/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-04	P-11	4.8	0.01	0.25	NA

Qualitative Identification: This sample has GC/FID characteristics that are similar to lubricating oil and polynuclear aromatic hydrocarbons.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 99%.

Reported by AN

Approved by GO

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: 03/25/88

Sampled: 03/22/88

Received: 03/24/88

Concentration Units: mg/L (ppm)

Prepared: 03/25/88

Analyzed: 03/27/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-10	DGC-1S	23	0.1	2.5	NA

Qualitative Identification: This sample has GC/FID characteristics that are similar to a high molecular weight petroleum product in the lubricating oil range and four- and five-ring polynuclear aromatic hydrocarbons.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery was diluted out.

Reported by AH

Approved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: 03/25/88

Sampled: 03/22/88

Received: 03/24/88

Concentration Units: mg/L (ppm)

Prepared: 03/25/88

Analyzed: 03/26/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-11	DGC-1D	5.4	0.01	0.25	NA

Qualitative Identification: This sample has GC/FID characteristics that are similar to lubricating oil.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 99%.

Reported by AH

Approved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: 03/25/88

Sampled: 03/22/88

Received: 03/24/88

Concentration Units: mg/L (ppm)

Prepared: 03/25/88

Analyzed: 03/27/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-05	DGC-2	8.7	0.01	0.25	NA

Qualitative Identification: This sample has GC/FID characteristics that are similar to lubricating oil and fuel oil.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 92%.

Reported by AH

Approved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: 03/25/88

Sampled: 03/21/88

Received: 03/24/88

Concentration Units: mg/L (ppm)

Prepared: 03/25/88

Analyzed: 03/27/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-03	DGC-3	18	0.01	0.25	NA

Qualitative Identification: This sample has GC/FID characteristics that are similar to lubricating oil and polynuclear aromatic hydrocarbons.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 92%.

Reported by AH

Approved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: 03/25/88

Sampled: 03/23/88

Received: 03/24/88

Concentration Units: mg/L (ppm)

Prepared: 03/28/88

Analyzed: 03/30/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-25	DGC-4	3.8	0.01	0.25	NA

Qualitative Identification: This sample has GC/FID characteristics that are similar to lubricating oil.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 81%.

Reported by IAH

Approved by GO

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: 03/25/88

Sampled: 03/22/88

Received: 03/24/88

Concentration Units: mg/L (ppm)

Prepared: 03/25/88

Analyzed: 03/28/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-08	DGC-5	10	0.01	0.25	NA

Qualitative Identification: This sample has GC/FID characteristics that are similar to lubricating oil and fuel oil.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 72%.

Reported by AH

Approved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: 03/25/88

Sampled: 03/22/88

Received: 03/24/88

Concentration Units: mg/L (ppm)

Prepared: 03/25/88

Analyzed: 03/27/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-09	DGC-6	17	0.1	2.5	NA

Qualitative Identification: This sample has GC/FID characteristics that are similar to a high molecular weight petroleum product in the lubricating oil range and four- and five-ring polynuclear aromatic hydrocarbons.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery was diluted out.

Reported by AH

Approved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: 03/25/88

Sampled: 03/22/88

Received: 03/24/88

Concentration Units: mg/L (ppm)

Prepared: 03/28/88

Analyzed: 03/29/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-13	DGC-7	2.9	0.01	0.25	NA

Qualitative Identification: This sample has GC/FID characteristics that are similar to lubricating oil.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 96%.

Reported by AH

Approved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: 03/25/88

Sampled: 03/22/88

Received: 03/24/88

Concentration Units: mg/L (ppm)

Prepared: 03/28/88

Analyzed: 03/29/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-15	X-2	3.0	0.01	0.25	NA

Qualitative Identification: This sample has GC/FID characteristics that are similar to lubricating oil.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 93%.

Reported by AH

Approved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: 03/25/88

Sampled: 03/23/88

Received: 03/24/88

Concentration Units: mg/L (ppm)

Prepared: 03/28/88

Analyzed: 03/29/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-26	DGC-9	30	0.01	0.25	NA

Qualitative Identification: This sample has GC/FID characteristics that are similar to gasoline and lubricating oil.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 83%.

Reported by AH

Approved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience CorporationMatrix: AqueousAuthorized: 03/25/88Sampled: 03/23/88Received: 03/24/88Concentration Units: mg/L (ppm)Prepared: 03/28/88Analyzed: 03/30/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-27	FB-1	0.10	0.01	0.25	NA

Qualitative Identification: NA

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 87%.

Reported by

AH

Approved by

GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: 03/25/88

Sampled: 03/23/88

Received: 03/24/88

Concentration Units: mg/L (ppm)

Prepared: 03/28/88

Analyzed: 03/30/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-28	FB-2	0.09	0.01	0.25	NA

Qualitative Identification: NA

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 88%.

Reported by AH Approved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: NA

Sampled: NA

Received: NA

Concentration Units: mg/L (ppm)

Prepared: 03/25/88

Analyzed: 03/26/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-11B	Erco Blank	ND	0.01	0.25	NA

Qualitative Identification: NA

NA = Not applicable.

ND = Not detected.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 53%.

Reported by AH

Approved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: NA

Sampled: NA

Received: NA

Concentration Units: mg/L (ppm)

Prepared: 03/28/88

Analyzed: 03/28/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-26B	Erco Blank	ND	0.01	0.25	NA

Qualitative Identification: NA

ND = Not detected.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 92%.

Reported by AH

Approved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Solid

Authorized: NA

Sampled: NA

Received: NA

Concentration Units: µg/g (dry wt)

Prepared: 03/29/88

Analyzed: 03/31/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-30B	Erco Blank	0.22	0.2	5.0	NA

Qualitative Identification: NA

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.2 µg/g (dry wt).

Minimum reporting limit for total products = 5.0 µg/g (dry wt).

Internal standard recovery = 96%.

Internal standard recovery:

Reported by AH

Approved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: NA

Sampled: NA

Received: NA

Concentration Units: mg/L (ppm)

Prepared: 03/28/88

Analyzed: 03/30/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7154-01B	Erco Blank	ND	0.01	0.25	NA

Qualitative Identification: NA

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 89%.

Reported by AH

Approved by GD



DUNN
GEOSCIENCE CORP

12 METRO PARK RD. •
ALBANY, NEW YORK 12205
518/458-1313
FAX 518/458-2472

HYDROGEOLOGIC CONDITIONS AT
THE BUCKEYE PROPERTY
PROPOSED CAROUSEL CENTER MALL,
SYRACUSE, NEW YORK

Prepared for:

SHANLEY, SWEENEY & REILLY
Albany, New York

Prepared by:

DUNN GEOSCIENCE CORPORATION
Albany, New York

Date:

August, 1988

RECEIVED
Division of
ENVIRONMENTAL ENFORCEMENT
JUL 14 1988

SEP 9 1988

TABLE OF CONTENTS

	Page
1.0 INTRODUCTION	1
1.1 Project Initiation	1
1.2 Site Description	1
1.3 Site History	4
1.4 Project Objectives	5
1.5 Project Scope	5
2.0 PREVIOUS INVESTIGATIONS	6
2.1 Engineering Investigations	6
2.2 Environmental Investigations	6
3.0 METHODS AND RESULTS	9
3.1 Historical Aerial Photographs	9
3.2 Site Survey	10
3.3 Water Level Measurements	10
3.4 Environmental Sampling and Analysis	10
3.4.1 Surface Soils	10
3.4.2 Groundwater	13
4.0 GEOLOGIC CONDITIONS	20
4.1 Regional Geology	20
4.2 Site Geology	20
5.0 HYDROGEOLOGIC CONDITIONS	24
5.1 Regional Hydrogeology	24
5.2 Site Hydrogeology	24
5.2.1 General	24
5.2.2 Groundwater Flow System	25
6.0 ENVIRONMENTAL QUALITY	32
6.1 Surface Soil	32
6.2 Groundwater	33
6.3 Discussion of Findings	34

TABLE OF CONTENTS
(cont'd)

LIST OF TABLES		Page
<u>Tables</u>		<u>Page</u>
2.1	Summary of Monitoring Well Construction Details for the Buckeye Property	8
3.1	Monitoring Well Elevation Measurements for the Buckeye Property	11
3.2	Water Level Measurements for the Buckeye Property	12
3.3	Surface Soil PCB Analytical Data for the Buckeye Property	15
3.4	Field Measurements of Selected Groundwater Properties for the Buckeye Property, March 21-23, 1988	17
3.5	Volatile Organic Groundwater Analytical Data for the Buckeye Property, March 21-23, 1988	18
3.6	Petroleum Hydrocarbon Groundwater Analytical Data for the Buckeye Property, March 21-23, 1988	19
5.1	Results of Three Point Calculations for the Buckeye Property	31

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1.1	Location map of the Carousel Center Mall site in Syracuse, New York	2
1.2	Area of current investigations	3
2.1	Monitoring well locations for the Buckeye property	7
3.1	Soil sampling locations for the Buckeye property	14
4.1	Isopach map showing thickness of fill soils on the Buckeye property	22
4.2	Isopach map showing thickness of Solvay fill on the Buckeye property	23
5.1	Water level contour map for the Buckeye property, March 12, 1988	26

LIST OF FIGURES
(cont'd)

		Page
5.2	Water level contour map for the Buckeye property, March 21, 1988	27
5.3	Water level contour map for the Buckeye property, March 18, 1988	28
5.4	Three point calculations for the Buckeye property	30

LIST OF APPENDICES

Appendix A	Surface Soil Analytical Data
Appendix B	Groundwater Analytical Data

1.0 INTRODUCTION

1.1 Project Initiation

Dunn Geoscience Corporation (DUNN), in response to a request from the law firm of Shanley, Sweeney, and Reilly, P.C., has continued subsurface investigations of the proposed site of the Carousel Center Mall. DUNN's investigative studies are a continuation of work begun by others in 1987. The proposed mall site presently includes the Marley property and a portion of the Buckeye property. This report summarizes investigative results from the Buckeye property.

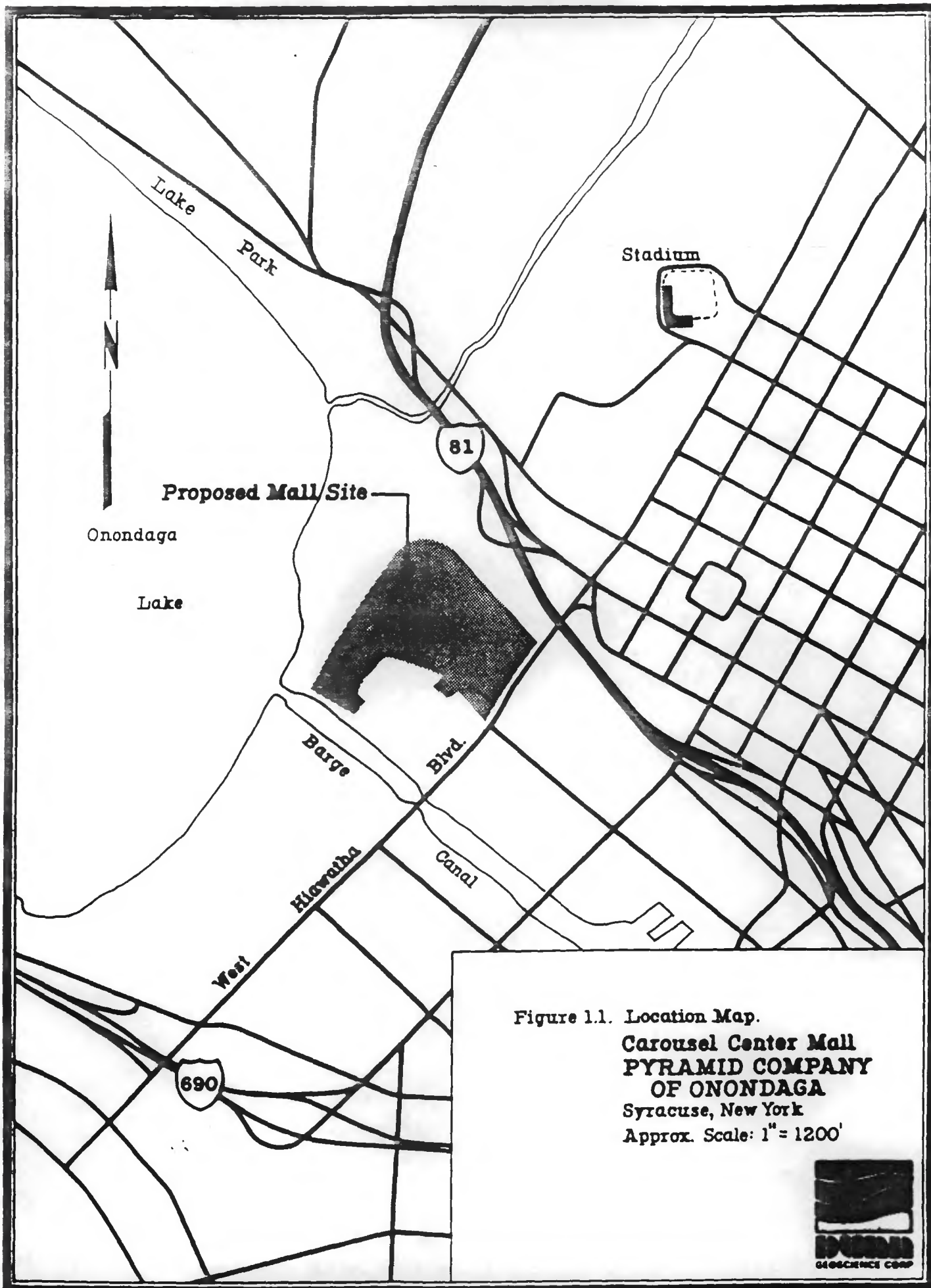
1.2 Site Description

The proposed site of the Carousel Center Mall is located within the City of Syracuse, New York just south of Onondaga Lake (Figure 1.1). The proposed mall site is located generally between Interstate 81 to the northeast, Hiawatha Boulevard to the southeast, the New York State Barge Canal to the southwest, and Onondaga Lake to the northwest.

The proposed mall site includes two parcels of land referred to herein as the Marley and Buckeye properties (Figure 1.2). This report is prepared for the Buckeye property. An adjacent piece of property (Clark) may be incorporated into the final plans for the mall as well as an additional parcel owned by Buckeye.

The Buckeye property covers approximately 3.5 acres. It is currently an undeveloped piece of land with dense phreatophytic vegetation.

The Buckeye property is relatively flat. Elevations range from approximately 369 feet above mean sea level at the western corner near the Clark property to 375 feet above sea level near the eastern corner adjacent to Hiawatha Boulevard. This topographic range is approximately equivalent to 9 to 15 feet above the City of Syracuse datum. The topography is subtle but a depression generally runs from east to west across the Buckeye property. A low area also exists along the western portion of the Buckeye-Hess boundary line.





LEGEND

- Property line
- Boundary of Current Investigation Area

NOTES

1987 Monitoring Wells and property line locations are taken from C. T. Mole Associates, PC Drawing No. 87-575R, dated 11/30/87.

DURN GEOSCIENCE CORPORATION
12 Metro Park Road
Albany, N.Y. 12205

Onondaga Lake

Canal

Barge

Hess Property

Clark Property

PROPOSED CAROUSEL CENTER

MALL SITE

MARLEY PROPERTY

Buckeye Property

Buckeye Property

Hess

Boat yard

Hiawatha

West

Interstate 81

FIGURE 1.2. Area of Investigation.

PIRAUD COMPANY
OF ONONDAGA
Syracuse, New York

1.3 Site History

The broad, low area immediately southeast of Onondaga Lake was originally a salt marsh. Saline groundwater reportedly discharged to the marshes and formed salt springs. This natural feature was exploited for salt production as early as the mid 1600's. Salt production became Syracuse's largest industry in the early 1800's. However, salt production had declined dramatically by the end of the century.

Salt was produced by two methods: one involving boiling of the saline water via burning wood and the other involving solar evaporation of the saline water in large plots. Maps dated 1892 and 1908 show that the Buckeye property was being used as evaporation plots for salt production. Salt production in the Syracuse area was discontinued in the mid 1920's though production at the mall site was evidently discontinued by 1910 as discussed below.

A number of changes occurred during the period when the Buckeye property was used as salt plots. Most significant, the original channel of Onondaga Creek which flowed across the southern portion of the Buckeye property was straightened and relocated. The straightened channel was later used as part of the New York State Barge Canal system which opened in 1917.

The level of Onondaga Lake reportedly changed on two occasions during the 1800's. The lake level was intentionally lowered in 1822 by as much as 11 feet. This resulted in exposure of a wider portion of salt marsh for exploitation by the salt producers. The lake level was raised following the alteration of Onondaga Creek but reportedly did not return to its previous levels. The lake level rise enabled barges to navigate into the new channel via Onondaga Lake.

Use of the Buckeye property as salt plots apparently ended prior to 1910 when filling activities began. Annotations on a map from 1910 indicates fill emplacement with Solvay Process Company wastes on the Buckeye property. Solvay wastes are a mixture of calcium carbonate (CaCO_3), calcium chloride

(CaCl_2), and calcium oxide (CaO). Records reportedly indicate that Solvay wastes were disposed on the Buckeye property during the periods from 1907 to 1910 and 1924 to 1930.

The Buckeye property has remained undeveloped. The placement of fill is the only activity known to have occurred on the Buckeye property.

1.4 Project Objectives

The purpose of the investigation was to characterize environmental conditions on the Buckeye property, specifically including:

- o definition of the subsurface geologic conditions;
- o definition of the subsurface hydrologic conditions;
- o determination of the presence or absence of chemical constituents in surface soil and groundwater; and,
- o if present, definition of the nature and extent of constituents in surface soil and groundwater.

1.5 Project Scope

The scope of work for DUNN included both analysis of available data and further investigation of the Buckeye property. Additional data collection activities were designed to complement and verify or refute results of previous studies and included the following:

1. site surveying;
2. water level monitoring;
3. sampling and analysis of surface soil; and,
4. sampling and analysis of groundwater.

Previous available data and land use history did not justify additional soil borings or monitoring wells.

This report details the methodologies employed and results of our investigation of the Buckeye property and incorporates the results of previous investigations where appropriate.

2.0 PREVIOUS INVESTIGATIONS

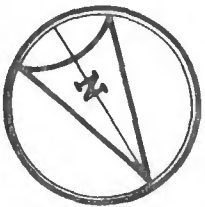
Information is available on the Buckeye property as a result of previous investigations. Some of the previous investigations have been oriented toward engineering applications (e.g., foundation and piling design) while others have dealt with environmental assessments. These previous investigations are summarized briefly below.

2.1 Engineering Investigations

Soil borings related to engineering design of the Carousel Center Mall were performed by Parrott-Wolff, Inc. under the direction of John P. Stopen Engineering Partnership in late 1987. These activities resulted in drilling seventeen test borings, two of which were drilled on the Buckeye property. Some of these borings were advanced to depths in excess of 200 feet below grade. Logs from these test borings are used to provide information on the regional geology in Section 4.1, Regional Geology.

2.2 Environmental Investigations

JEB Consultants performed an environmental investigation of the Buckeye property in late 1987. The focus of this investigation was to evaluate groundwater conditions. Four soil borings were performed on the Buckeye property with subsequent installation of monitoring wells (P-16 through P-19). The locations of these monitoring wells are shown in Figure 2.1. Table 2.1 summarizes well construction details. Additionally, JEB Consultants collected groundwater samples from these wells for subsequent laboratory analysis.



LEGEND

- Monitoring Well installed by JEB Consultants (1987)

NOTES

1987 Monitoring Wells and property line locations are taken from C. T. Mole Associates, PC Drawing N° 87-575R, dated 11/30/87.

All other locations are approximate

DENN GEOSCIENCE CORPORATION
12 Main Park Road
Albany, N.Y. 12203

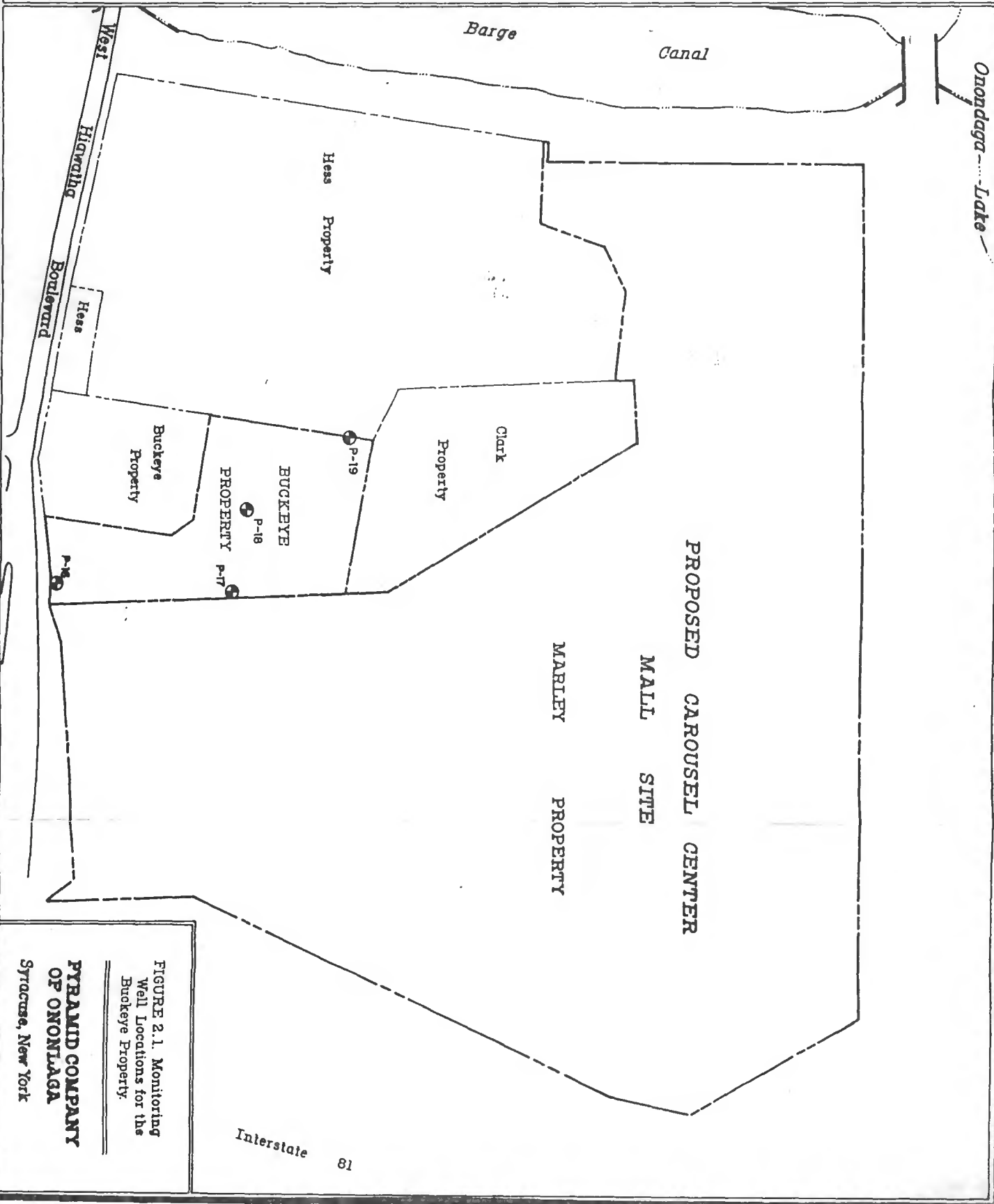


Table 2.1
Summary of Monitoring Well Construction *
Buckeye Property

Well No.	Date Completed	Boring Depth (ft)	Screened Interval		Stratigraphic Unit Screened
			Depth(ft)	Elevation(ft)	
P-16	12-04-87	15.7	5.0 to 10.0	9.5 to 4.5	Mixed Fill/Natural
P-17	12-04-87	13.0	6.2 to 11.2	5.6 to 0.6	Natural
P-18	12-04-87	12.3	6.0 to 11.0	5.9 to 0.9	Mixed Fill/Solvay/Natural
P-19	12-05-87	12.5 **	7.3 to 12.3	2.2 to -2.8	Solvay/Natural

Notes

* All wells drilled and completed under the supervision of JNB Consultants.

** Split spoon sample obtained from 12.5 to 14.5 feet depth.

Target Environmental Services, Inc. conducted a soil gas survey of the Buckeye property in early November, 1987 for JEB Consultants, Inc. Soil gas samples were obtained at 31 locations for subsequent laboratory analysis. Results indicated no significant levels of volatile organics over most of the Buckeye property; a small area was noted in the westernmost corner of the Buckeye property immediately adjacent to the Clark property was identified as containing slightly elevated levels of volatile organics.

DUNN prepared an Environmental Site Assessment (ESA) in January, 1988 utilizing available data. Soil sampling was also performed at two selected locations.

3.0 METHODS AND RESULTS

3.1 Historical Aerial Photographs

DUNN performed a search for available aerial photography of the Buckeye property. Black-and-white, stereographic coverage was obtained for several dates including: October 15, 1951; October 6, 1958; June 15, 1959; July 1, 1966; April 28, 1967; April 29, 1972; and March 28, 1981. In addition, non-stereographic, black-and-white coverage was obtained for February 11, 1957.

Review of the aerial photographs supports available site history information for the Buckeye property (Section 1.3, Site History). The earliest photos available (October 15, 1951) indicate that filling to present grade had been completed by this time including filling of the abandoned Onondaga Creek channel. The position of the old channel is marked by vegetation patterns, especially noticeable on the April 29, 1972 photos.

Aerial photographs confirm that the Buckeye property has remained undeveloped. However, air photos obtained on several dates (i.e., July 1, 1966; April 28, 1967; and April 29, 1972) seemingly indicate use of the extreme northeastern edge of the Buckeye property for parking. Some minor filling or regrading seems associated with this use based on photo review, especially near the northeastern corner of the property.

3.2 Site Survey

The measuring point elevations were determined for all wells located on the Buckeye property. These wells had been installed previously by JEB Consultants. All elevations were referenced to the City of Syracuse datum.

As part of the survey DUNN also established two reference points over the Barge Canal on the Hiawatha Boulevard and Conrail bridges (SP-1 and SP-2, respectively). These reference points are used to measure Onondaga Lake and the Barge Canal water level elevations.

Monitoring well and surface water measuring point elevations are listed in Table 3.1. Existing site maps were updated using the survey data.

3.3 Water Level Measurements

Water level measurements were obtained from monitoring wells on the Buckeye property on six dates during the period of investigations. Measurements were generally obtained using electronic water level probes. The depth to water was recorded for each measurement. This information was converted to water level elevations with respect to the City of Syracuse datum using the surveyed elevations of the measuring points (either top of PVC or steel casing). Water level elevations and measuring point elevations for the Buckeye property are presented in Table 3.2. Water level information for the Barge Canal and Onondaga Lake are also presented in Table 3.2.

3.4 Environmental Sampling and Analysis

3.4.1 Surface Soil Sampling

Previous investigations conducted during November and December, 1987 included surface soil sampling at two locations on the Buckeye property (Figure 3.1). Those samples were analyzed for the following: pesticides and PCBs (EPA Method 8080); metals (EPA Method 7000 series); volatile organics (EPA Method 624); and

Table 3.1

Monitoring Well Elevation Measurements
for the Buckeye property
(in feet above the City of Syracuse Datum)

Well or Water Elevation Reference Point	Well Elevations			Reference Point Elevation
	Top of Steel Casing	Top of PVC Riser	Ground Surface	
P-16	16.87	16.77	14.5	
P-17	13.93	13.81	11.8	
P-18 *	14.34	14.24	11.9	
P-19 *	12.30	12.18	9.5	
SP-1 Hiawatha Blvd. canal bridge				23.14
SP-2 Conrail canal bridge				19.92

Notes

- * Top of steel and ground surface elevations supplied by C.T. Male Associates, P.C.; top of PVC elevations calculated from top of steel elevations and measured separation between top of steel and PVC.

Table 3.2
Water Level Measurements
Buckeye Property

Well	Steel	PVC	Ground	Date of Measurement									
				10-Mar-88	11-Mar-88	12-Mar-88	14-Mar-88	15-Mar-88	21-Mar-88	18-May-88	06-Jul-88	07-Jul-88	23-Jul-88
P-16	16.87	16.77	14.5	NA	8.41	8.53	NA	NA	8.09	7.93	NA	7.59	8.47
P-17	13.93	13.81	11.8	NA	8.71	8.76	NA	NA	8.26	7.99	NA	7.37	8.66
P-18	14.34	14.24	11.9	NA	9.09	9.07	NA	NA	8.64	8.24	NA	7.29	8.73
P-19	12.30	12.18	9.5	NA	8.98	9.11	NA	NA	8.47	8.29	NA	7.68	8.99
SP-1	23.14	NA	NA	NA	NA	NA	NA	NA	NA	1.64	NA	1.49	NA
SP-2	19.92	NA	NA	NA	NA	NA	NA	NA	1.32	1.60	NA	1.37	1.78

semi-volatile organics (EPA Method 625). Results were presented in the Environmental Site Assessment (Section 2.2, Environmental Investigations).

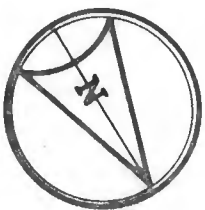
The above samples indicated no detectable levels of pesticides or PCBs. Methylene chloride, a volatile organic, was detected in one sample via EPA Method 624 at an extremely low level for soil (41 ppb). It was actually only detected in the test sample at 4.1 ppb with a multiplier factor of 10 to account for extraction into the aqueous analytical medium. Such a level is a commonly reported laboratory contamination level and is not environmentally significant. No other volatile organics were detected in the surface soil samples. Thus, environmental conditions are not deemed significant on the undeveloped Buckeye property.

During this present investigation, one additional grab sample was collected from the Buckeye property to provide better areal coverage. The location of this sample (M) is shown in Figure 3.1. The surface soil sample was collected on March 4, 1988 using a hand trowel. All sampling equipment was decontaminated with pesticide-grade hexane and distilled water. This sample was analyzed for PCBs using EPA Method 8080 by RECRA Environmental, Inc. of Tonawanda, New York.

Results of the PCB analysis of surface soil sample M are summarized in Table 3.3; Appendix A contains the laboratory reporting forms and quality assurance/quality control information.

3.4.2 Groundwater Sampling

Monitoring wells P-17 and P-19 on the Buckeye property were sampled on March 21 through March 23, 1988. A minimum of three well volumes were evacuated from each well prior to sampling, using a Fuji pump and dedicated 0.5-inch I.D. polyethylene tubing. Samples were obtained using clean, dedicated bottom filling, check-valved, PVC bailers. Samples were placed in sample containers supplied by the laboratory, labeled and placed on ice for transport. Chain of custody records were maintained.



LEGEND

- Surface Soil Sample, collected 12/2/87
- ▲ Surface Soil Sample, collected 3/3/88

NOTES

1987 Soil Sampling and Property line locations are taken from C.T. Mole Associates, PC. Drawing N° 87-575R, dated 11/30/87. All other locations are approximate.

DUNN GEOSCIENTIFIC CORPORATION
12 Metro Park Road
Albany, N.Y. 12206



FIGURE 3.1. Soil Sampling Locations for the Buckeye Property.

PTBAKID COMPANY
OF ONONDAGA
Syracuse, New York

Table 3.3
Surface Soil PCB Analytical Data
Buckeye Property
Syracuse, New York

Date Collected: March 3, 1988

Sample Point	Arochlor Compound						
	1016	1221	1232	1242	1248	1254	1260
M	<0.05	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05

All results in ug/g on a dry weight basis

Groundwater samples obtained from wells on the Buckeye property were measured in the field for pH, temperature, specific conductance and turbidity. Results are summarized in Table 3.4.

Erco Laboratory (Enseco, Inc.) of Cambridge, Massachusetts performed the chemical analyses for groundwater samples obtained in March, 1988. The analytical program for this sampling event is discussed below.

Groundwater samples were analyzed for volatile organics via EPA Method 624. Quality assurance/quality control included analysis of two field blanks and one trip blank. Results for the groundwater samples are presented in Table 3.5.

The groundwater samples from the Buckeye property were also analyzed for petroleum hydrocarbons. The analytical procedure used by Erco was the U.S. Coast Guard Hydrocarbon Fingerprinting Spill Identification System. Results are summarized in Table 3.6.

The laboratory reporting forms for all groundwater analyses for the Buckeye property, including quality assurance/quality control information, are included in Appendix B.

Table 3.4
Field Measurements of Selected Groundwater Properties
Buckeye Property
March 23, 1988

Monitoring Well Number	pH (Standard Units)	Temp (C)	Specific Conductance (umhos)	Turbidity (NTU)
P-17	6.7	10.0	700	>200
P-19	12.8	8.0	7000	>200

Table 3.5
Volatile Organic Groundwater Analytical Data
Buckeye Property
March 23, 1988

Hazardous Substance List (HSL) - Volatile Organics
EPA Method 824

Compound	RL	P-17	RL	P-19
Chloromethane	5	ND	5	ND
Bromomethane	5	ND	5	ND
Vinyl Chloride	5	ND	5	83
Chloroethane	5	ND	5	42
Methylene Chloride	5	ND	5	ND
Acetone	25	ND	25	ND
Carbon Disulfide	2	ND	2	ND
1,1-Dichloroethylene	2	ND	2	ND
1,1-Dichloroethane	2	ND	2	24
1,2-Trans-Dichloroethylene	2	ND	2	110
Chloroform	2	ND	2	ND
1,2-Dichloroethane	2	ND	2	ND
2-Butanone	10	ND	10	ND
1,1,1-Trichloroethane	2	ND	2	ND
Carbon Tetrachloride	2	ND	2	ND
Vinyl Acetate	10	ND	10	ND
Bromodichloromethane	2	ND	2	ND
1,2-Dichloropropane	2	ND	2	ND
1,3-Trans-Dichloropropene	2	ND	2	ND
Trichloroethylene	2	ND	2	ND
Dibromochloromethane	2	ND	2	ND
1,1,2 Trichloroethane	2	ND	2	ND
Benzene	2	ND	2	ND
1,3-Cis-Dichloropropene	2	ND	2	ND
2-Chloroethyl vinyl ether	10	ND	10	ND
Bromoform	2	ND	2	ND
4-Methyl-2-Pentanone	10	ND	10	ND
2-Hexanone	10	ND	10	ND
1,1,2,2-Tetrachloroethane	2	ND	2	ND
Tetrachloroethylene	2	ND	2	ND
Toluene	2	ND	2	21
Chlorobenzene	2	ND	2	ND
Ethyl Benzene	2	ND	2	ND
Styrene	2	ND	2	ND
Total Xylenes	2	ND	2	ND

All values expressed in ug/l (ppb).

ND = Not Detected
RL = Reporting Limit

Table 3.6
 Petroleum Hydrocarbon Groundwater Analytical Data
 Buckeye Property
 March 23, 1988

Monitoring Well Number	Total Petroleum Hydrocarbon(mg/L)	Qualitative Identification *
P-17	4.4	LO
P-19	2.4	LO

LO = Lubricating Oil
 PAH = Polynuclear Aromatic Hydrocarbons
 FO = Fuel Oil
 G = Gasoline

* The sample has GC/FID characteristics that are similar to one of the above materials.

4.0 GEOLOGIC CONDITIONS

4.1 Regional Geology

The proposed Carousel Center Mall site, including the Buckeye property, is located in the Erie-Ontario Lowland physiographic province. Landforms in this province are primarily the result of erosion of flat lying sedimentary rocks and subsequent Wisconsin glaciation. Onondaga Lake and the Buckeye property are located within a glacially-scoured trough-shaped bedrock valley which trends northwest-southeast.

The bedrock underlying the Buckeye property is the Vernon Formation of Late Silurian age. The Vernon Formation is a thick unit consisting predominantly of green and red silty shales and minor salt beds. Bedrock at the proposed mall site occurs at considerable depth. Two previous engineering soil borings on the Buckeye property (Section 2.1, Engineering Investigations) sampled to 162 and 196 feet, respectively, have failed to determine the depth to bedrock.

The unconsolidated materials overlying bedrock at the Buckeye property are predominantly lacustrine in origin. These materials are generally silt and clay. Logs from deep borings indicate progressive fining from silt to clay with increasing depth. At depths of approximately 120 to 150 feet, however, sands and gravels (possibly glacial till or compact outwash) are encountered beneath the clays and, presumably, overlie bedrock.

4.2 Site Geology

Four shallow borings (P-16 through P-19) drilled on the Buckeye property were logged by JEB Consultants primarily by visual examination of auger cuttings, rather than split-spoon soil samples. For this reason, exact details of the subsurface soil stratigraphy are not available; however, a general description can be prepared from information presented in JEB Consultants' boring logs which is geologically reasonable and consistent with stratigraphies for adjacent parcels.

The general soil stratigraphy at the Buckeye property consists of man-emplaced fill materials overlying a naturally-occurring sequence of glacial lake (glaciolacustrine) and post glacial lake and marsh deposits. Fill materials form the uppermost soil unit and cover the entire property. Fill can be classified as mixed fill and Solvay waste. The mixed fill was found throughout the Buckeye property. The Solvay waste was found only in borings P-18 and P-19 and was encountered at the base of the fill section. Figure 4.1 is an isopach map of total thickness of fill materials, including both the mixed fill and the Solvay waste where present. Fill thickness is generally 5 to 10 feet at the Buckeye property.

The mixed fill consists primarily of gray silty, clayey or sandy soil with admixed gravel and man-made rubble such as wood, brick and ceramic materials.

The white to gray clay, silty clay, and clayey silt referred to as "Solvay waste" was encountered beneath the mixed fill in two borings on the the Buckeye property. Solvay waste is a white, chalky-textured, alkaline material composed of clay-sized and silt-sized particles that is a by-product of sodium carbonate production using the Solvay process. The waste is primarily composed of mineral salts, particularly calcium chloride and calcium carbonate. The term "Solvay waste" is used herein to refer to the white and white-gray fill material having the characteristics listed above. This terminology is used to be consistent with earlier reports and subsurface investigations. Figure 4.2 is an isopach map of Solvay waste thickness.

The various fill materials overlay glaciolacustrine and post-glaciolacustrine sediments. The top of the glaciolacustrine sediments typically contains roots, or shells. Lacustrine sediments are predominantly gray in color, with textures ranging from medium to fine sand to clayey sand or sandy clay.

The deeper engineering borings from previous investigations (Section 2.1, Engineering Investigations) indicate that most of the glaciolacustrine sequence below the sandier, upper section, consists of varved silt and clay.



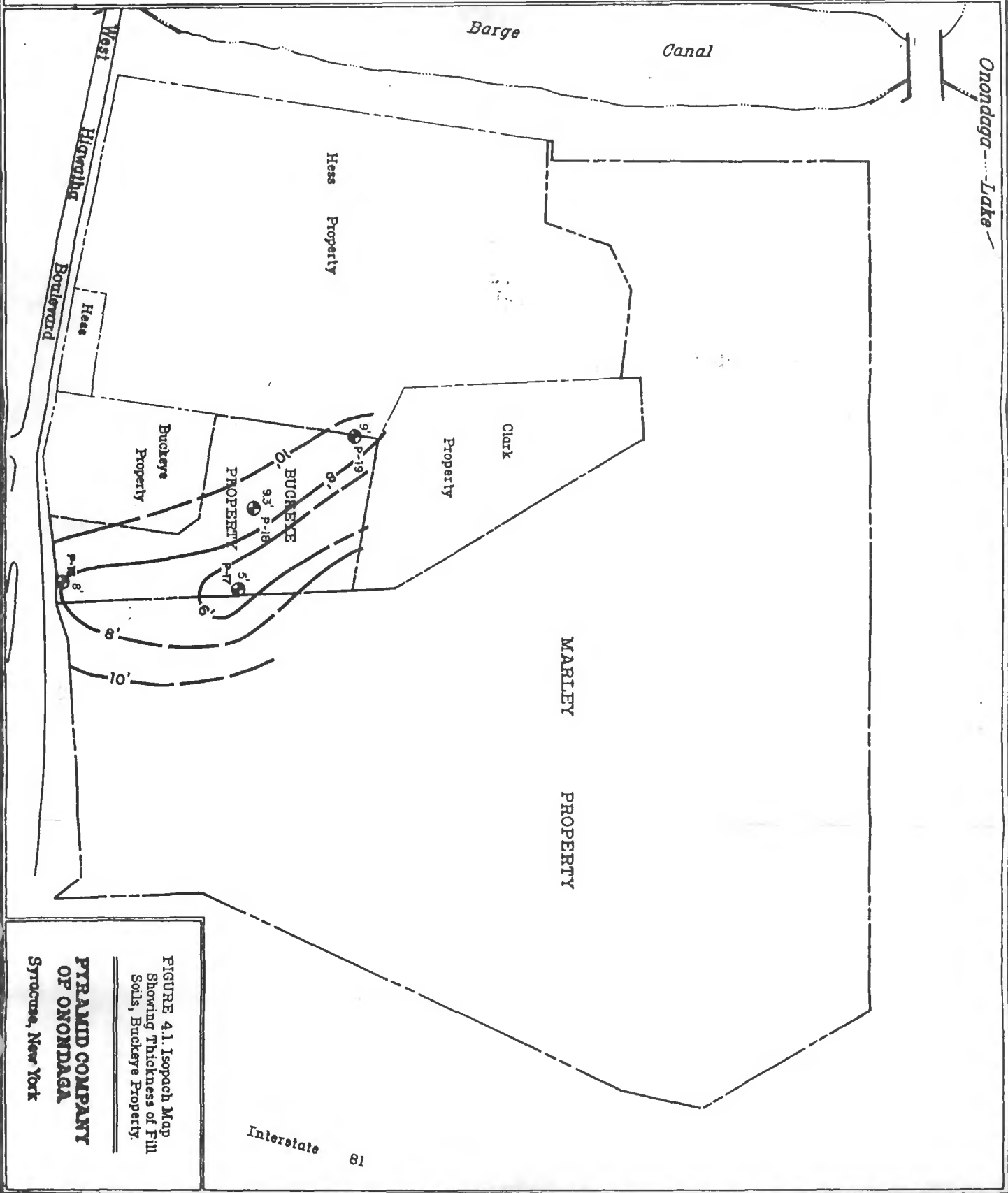
Monitoring Well installed by JEB Consultants (1987)

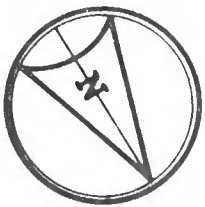
9.3' Thickness of fill measured in boring

Contour line of equal fill thickness

1987 Monitoring Wells and property line locations are taken from C. T. Mele Associates, P.C. Drawing N° 87-575R, dated 8/30/87. All other locations are approximate.

Down Construction Corporation
12 Metro Park Road
Albany, N.Y. 12205





LEGEND

- Monitoring well installed by JEB Consultants (1987)
- 1.3' Thickness of Solvay fill measured in boring
- 2' Contour line of equal Solvay fill thickness

NOTES

1987 Monitoring wells and property line locations are taken from C.T. Male Associates, PC Drawing N° 87-575R, dated 11/30/87. All other locations are approximate.

DUNN GEOSCIENCE CORPORATION
12 Metro Park Road
Albany, N.Y. 12205

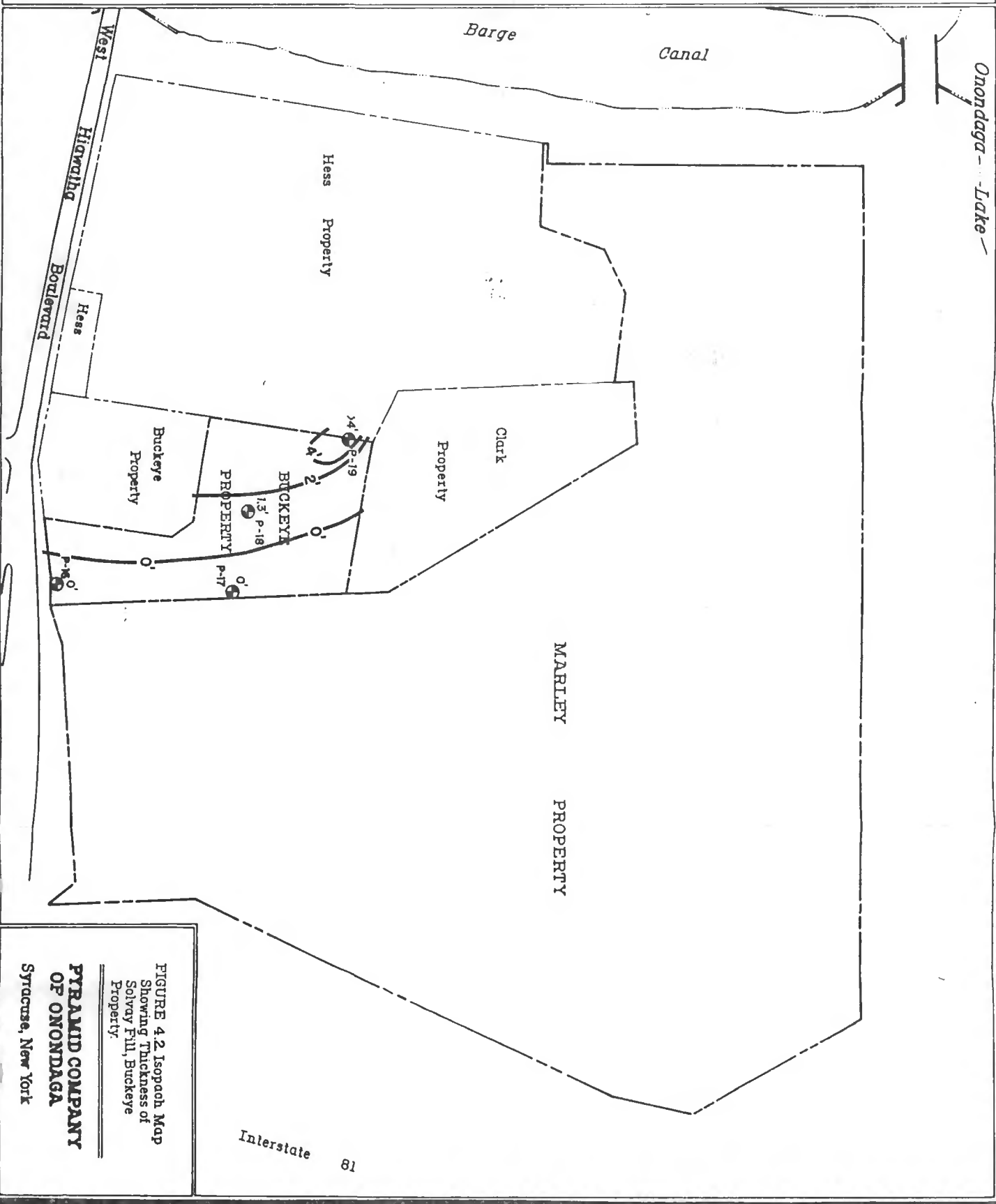


FIGURE 4.2. Isopaoh Map
Showing Thickness of
Solvay Fill, Buckeye
Property.

**PYRAUD COMPANY
OF ONONDAGA**
Syracuse, New York

5.0 HYDROGEOLOGIC CONDITIONS

5.1 Regional Hydrogeology

The proposed mall site is located in a large groundwater discharge area. Local and regional groundwater flow is toward Onondaga Lake and its major tributaries. The salt marsh and salt springs which existed at the mall site prior to filling activities are indicative of upward flow of groundwater through the lacustrine sediments toward the discharge zone.

The thick sequence of lacustrine silts and clays beneath the Buckeye property form an effective aquitard. The lower permeabilities of these sediments and upward hydraulic gradients preclude deep groundwater contamination problems resulting from surface activities and, therefore, limit the depth of required investigative efforts.

The sands and gravels which occur deep beneath the proposed mall site (i.e., in excess of 150 feet below grade) form a buried aquifer of unknown areal extent. Wells tapping this horizon reportedly flow indicating upward gradients and artesian conditions as expected. Groundwater from this permeable zone is reportedly saline.

Groundwater in the area is, from both unconsolidated materials and bedrock and is not used as water supply due to high salinity. The City of Syracuse uses Skaneateles Lake and Lake Ontario for its water supply.

5.2 Site Hydrogeology

5.2.1 General

As discussed in Section 4.2, Site Geology, the surficial materials at the site consist of mixed fill with Solvay wastes overlying lacustrine sands, silts, and clays. The fill in the Buckeye property ranges up to 10 feet in thickness based on available data. The underlying lacustrine deposit becomes

progressively finer with depth.

Groundwater occurs at shallow depths on the Buckeye property. Depth to groundwater is greatest in the western corner of the Buckeye site but is typically less than five feet. After significant rainfall events, the water table surface is coincident with the ground surface over large portions of the Buckeye property.

Groundwater occurs under unconfined conditions with the water table surface occurring within the fill materials. Groundwater flow generally occurs within the fill and uppermost portion of the lacustrine deposit. The deeper portions of the lacustrine deposit are much less permeable and form an aquitard.

Recharge to the shallow flow system is by precipitation, augmented in areas by surface water drainage pathways. The groundwater discharges to Onondaga Lake and the Barge Canal. Groundwater losses to evapotranspiration may be significant given the shallow water table and thick phreatophytic vegetative cover.

5.2.2 Groundwater Flow System

Water level elevation data were collected on several dates as presented in Table 3.2. Data were collected for the period from March to July, 1988.

Water level data collected from wells on March 12, March 21, and May 18, 1988 were used to construct water table contour maps. These maps are presented in Figures 5.1, 5.2 and 5.3, respectively. As shown, the configuration of the water table on the Buckeye property is relatively consistent during the period of observation.

Assuming an isotropic medium (i.e., hydraulic properties such as hydraulic conductivity are independent of direction at any given location), groundwater flow is perpendicular to the water table contours in the direction of decreasing head (i.e., water level elevation). Thus, based on Figures 5.1 to



LEGEND

- Monitoring Well installed by JEB Consultants (1987)
- Monitoring Well installed by Dunn Geoscience Corp. (1988)
- Water level contour

NOTES

1987 Monitoring Wells and property line locations are taken from C. T. Mole Associates, P.C. Drawing N° 87-575R, dated 11/30/87.

1988 Monitoring Well locations were surveyed by Dunn Geoscience, 3/15/88.

All other locations are approximate.

DUNN GEOSCIENCE CORPORATION
12 Metro Park Road
Albany, N.Y. 12206

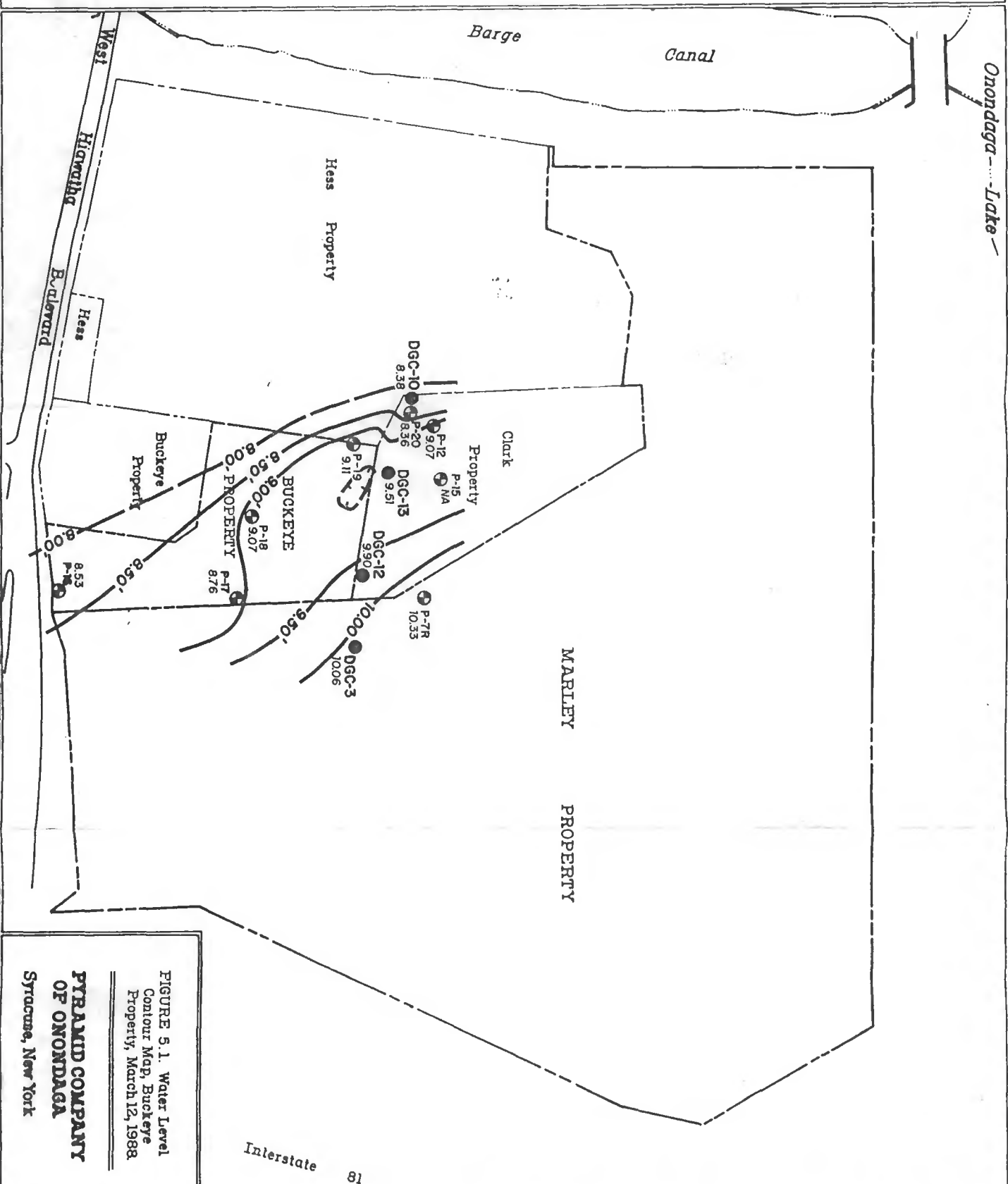
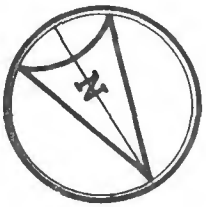


FIGURE 5.1. Water Level
Contour Map, Buckeye
Property, March 12, 1988.

**PYRAMID COMPANY
OF ONONDAGA
Syracuse, New York**



LEGEND

- Monitoring Well installed by JEB Consultants (1987)
- Monitoring Well installed by Dunn Geoscience Corp. (1988)
- Water level contour

NOTES

1987 Monitoring wells and property line locations are taken from C.T. Mada Associates, P.C. Drawing N° 87-575-N, dated 11/30/87.
1988 Monitoring Well locations were surveyed by Dunn Geoscience, 3/15/88.
All other locations are approximate.

DUNN GEOSCIENCE CORPORATION
12 Metro Park Road
Albany, N.Y. 12205

Onondaga Lake

Canal

Barge

MARLEY

PROPERTY

Hess Property

Clark Property

Buckeye Property

West
Highting
Boulevard

Hess

Interstate 81

FIGURE 5.2. Water Level
Contour Map, Buckeye
Property, March 21, 1988.

PTRAUID COMPANY
OF ONONDAGA
Syracuse, New York



LEGEND

- Monitoring Well installed by JEB
Consultants (1987)
- Monitoring Well installed by Dunn
Geoscience Corp. (1988)
- Water level contour

NOTES

1987 Monitoring Wells and property line locations are taken from C. I. Mott Associates, P.C. Drawing No. 87-575-R, dated 11/30/87.

1988 Monitoring Well locations were surveyed by Dunn Geosience, 3/15/88.

All other locations are approximate.

DUNN GEOSCIENCE CORPORATION
12 Metro Park Road
Albany, N.Y. 12206

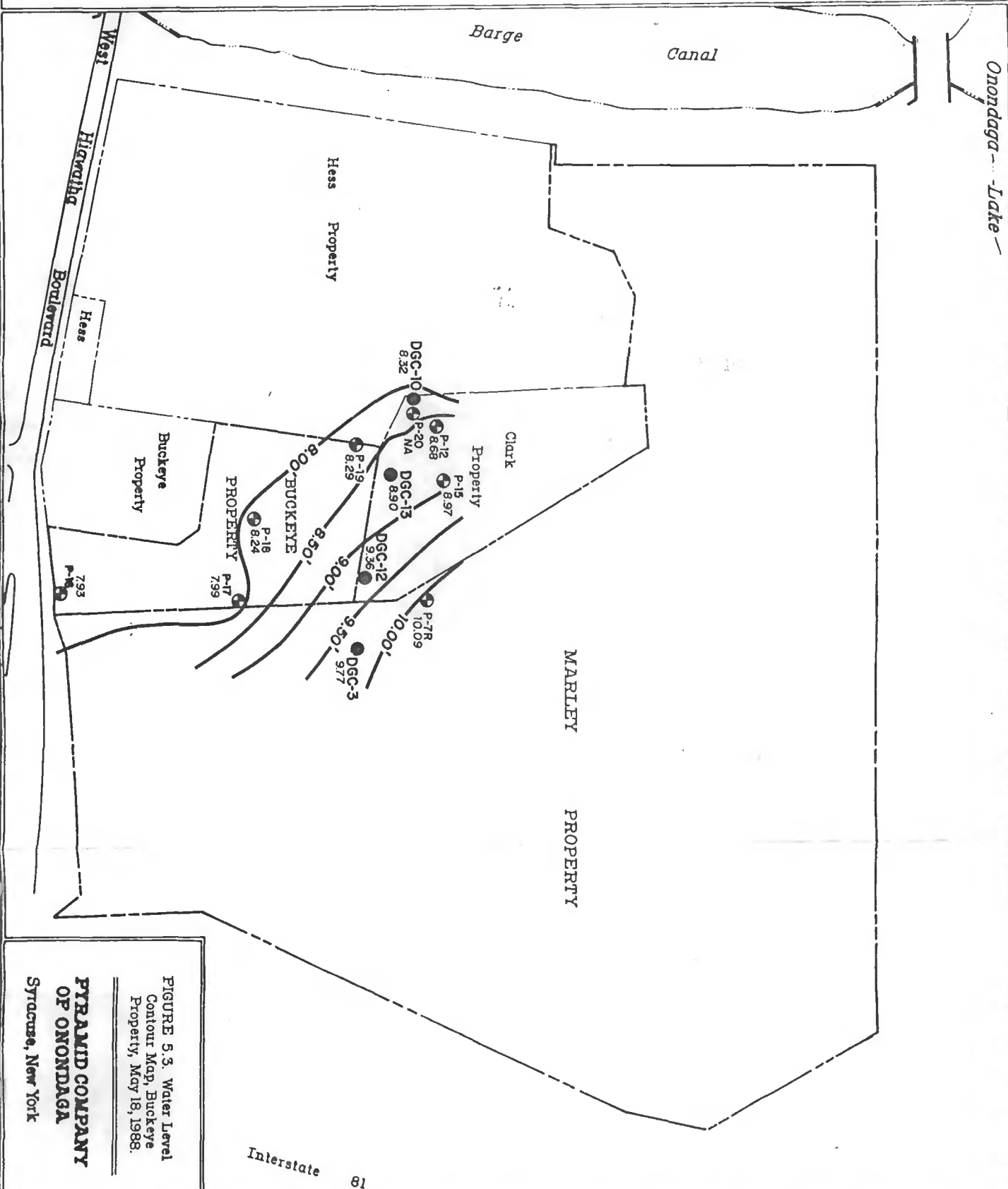


FIGURE 5.3. Water Level
Contour Map, Buckeye
Property, May 18, 1988.

**PYRAMID COMPANY
OF ONONDAGA
SYRACUSE, New York**

5.3, groundwater flow is generally directed to the south toward areas of discharge. The Barge Canal to the south forms the primary discharge area to which most of the groundwater at the Buckeye property eventually flows. Some shallow groundwater in the extreme western part of the Buckeye property discharges to the surface water drainage ditch/swale. This ditch continues in a westward direction along the Clark-Hess property boundary.

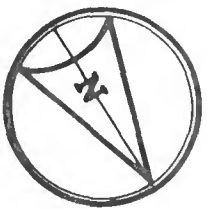
Three point methods were employed to quantify hydraulic gradients at the Buckeye property and support the water table mapping efforts. This method, whether graphical or numerical, is based on the water level elevation at three wells located in a triangular pattern and the x, y grid location of each well. The method assumed a planar water table between the three wells. Therefore, the three wells used should not be so far apart that they straddle a groundwater divide or discharge zone.

Figure 5.4 shows the wells utilized for three point calculations. Some of the wells used are on adjacent parcels and associated information is contained in other reports. Results are presented in Table 5.1.

Results of three point calculations support water table maps presented in Figures 5.1 to 5.3. Groundwater flow is generally to the south toward the Barge Canal. Both the magnitude and direction of the gradient are relatively consistent through time with one exception as discussed below.

Calculated flow directions support the swing in the water table contours in the vicinity of P-17 and P-18. Flow directions for the three point problems involving P-17 are generally more to the southeast. Further, the three point problems involving P-16, P-17 and P-18 shows significant variability in both the magnitude and direction of gradient. The cause of variability is probably similar to that of the shift in water table contours.

Darcy's Law can be utilized to estimate the rate of groundwater flow at the Buckeye property. Modifying to account for the porosity of the materials, Darcy's Law is stated as:



LEGEND

- Monitoring well installed by JEB Consultants (1987)
- Monitoring well installed by Dunn Geoscience Corp. (1988)

NOTES

1987 Monitoring wells and property line locations are taken from C.T. Mele Associates, P.C. Drawing NY 87-575R, dated 4/30/87.
1988 Monitoring well locations were surveyed by Dunn Geoscience, 3/15/88.
All other locations are approximate.

DUNN GEOSCIENCE CORPORATION
12 Metro Park Road
Albany, N.Y. 12205

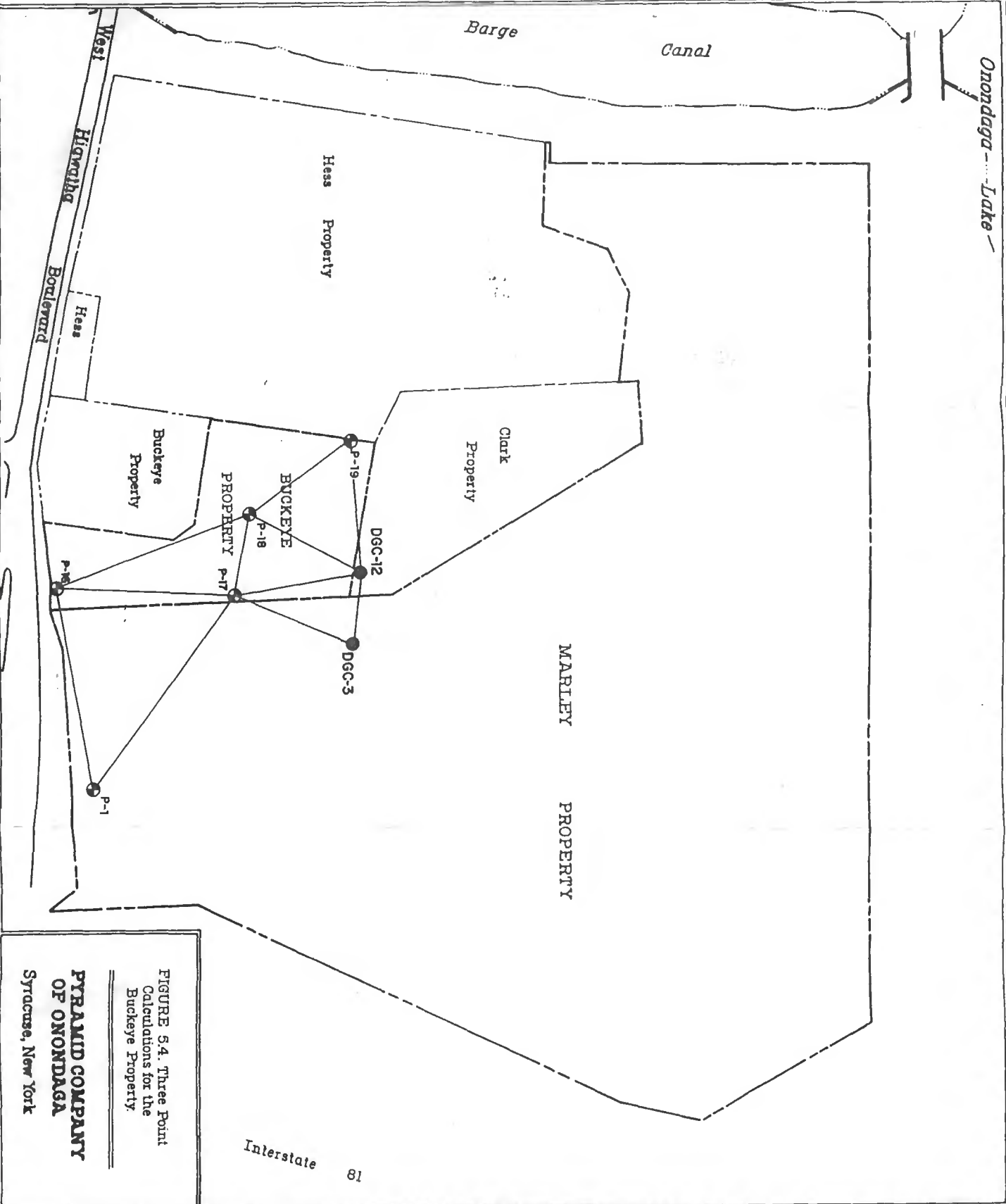


FIGURE 5.4. Three Point Calculations for the Buckeye Property

PYRAMID COMPANY
OF ONONDAGA
Syracuse, New York

Table 5.1
Results of Three Point Calculations (1,2)
Buckeye Property

Three Point Calculation	Dates of Measurement									
	03/12/1988		03/21/1988		05/18/1988		07/06/1988		07/23/1988	
	Mag	Dir	Mag	Dir	Mag	Dir	Mag	Dir	Mag	Dir
P-1,P-17,P-16	0.00365	207.4	0.00366	210.0	0.00390	215.0	0.00417	225.9	0.00355	208.9
P-16,P-17,P-18	0.00186	57.5	0.00224	49.6	0.00147	43.9	0.00072	275.2	0.00063	94.8
P-17,DGC-3,DGC-12	0.00494	138.7	0.00545	141.2	0.00677	150.5	NA	NA	0.00488	137.2
P-17,DGC-12,P-18	0.00441	111.5	0.00478	108.0	0.00535	120.0	0.00572	140.7	0.00466	130.9
P-18,DGC-12,P-19	0.00368	174.8	0.00422	186.4	0.00497	175.0	0.00571	161.7	0.00446	164.1

Notes

1. Magnitude measured in feet/feet.
2. Direction measured in degrees relative to north.

$$v = Ki/n$$

where v is the linear velocity of groundwater flow (feet/day), K is the hydraulic conductivity (feet/day), i is the hydraulic gradient (feet/feet), and n is the effective porosity.

A representative hydraulic conductivity for the fill materials, exclusive of the Solvay wastes, is 15 feet/day as determined by slug test results on the Marley property. The hydraulic gradient averages approximately 0.0047 feet/feet as determined by three point methods (Table 5.1). An effective porosity of 0.20 (20%) is assumed. Thus, the groundwater flow velocity is calculated as approximately 0.35 feet/day.

6.0 ENVIRONMENTAL QUALITY

6.1 Surface Soils

Laboratory results from the soil sampling performed in late 1987 at points 16 and 17 (Figure 3.1) on the Buckeye property indicated no detectable levels of any PCBs. The surface soil sample obtained at point M (Figure 3.1) on the Buckeye property during this present study also showed no detectable levels of PCB isomers (Table 3.3). Thus, surface soil samples obtained on the Buckeye property show no detectable levels of PCBs. It is concluded that PCBs are not of environmental concern on the Buckeye property.

As stated previously (Section 2.2, Environmental Investigations), soil samples from points 16 and 17 (Figure 3.1) on the Buckeye property each exhibited total lead concentrations of 110 ppm during a previous study. EP Toxicity values, which represent extractable concentrations which might be leachable into the groundwater, were not obtained. However, EP Toxicity lead values from the adjacent Marley property were very low for the few samples which exhibited elevated total lead concentrations. Therefore, it was concluded to be unnecessary to run the EP Toxicity test for this property because there does not appear to be a toxic lead problem in the local soils.

6.2 Groundwater

Monitoring wells P-16 and P-18 (Figure 2.1) on the Buckeye property showed no detectable levels of volatile organic compounds, including the fuel-related compounds (i.e., benzene, toluene, and xylene), in samples reported by JEB Consultants. For this reason, these wells were not resampled during this investigation. Only wells P-17 (which showed only very low concentrations of methylene chloride, a common lab contaminant) and P-19 were sampled.

Results of field measurements of groundwater quality (Table 3.4) indicated high pH and specific conductance in monitoring well P-19. These elevated values are likely due to the presence of alkaline materials in the fill such as Solvay waste, ashes, concrete, or lime. The soil boring for P-19 encountered more than 5 feet of Solvay waste. Further, the well screen of P-19 is situated partly in Solvay waste. The soil boring at P-17 did not encounter Solvay waste and groundwater from this well exhibited much lower pH and specific conductance as compared to well P-19.

High turbidity was measured in both wells P-17 and P-19. These values probably reflect the silt and clay content of the screened materials.

Volatile organic compounds were not detected in monitoring well P-17 (Figure 3.5). Evidence supports the conclusion that the methylene chloride detected during previous sampling at 8 ppb was indeed due to common laboratory background contamination rather than groundwater quality conditions.

Based on the above, P-19 is the only monitoring well on the Buckeye property which has exhibited the presence of volatile organic compounds and only at low levels. Compounds detected in P-19 were: trans-1,2-dichloroethylene (110 ppb), vinyl chloride (83 ppb), chloroethane (42 ppb), 1,1-dichloroethane (24 ppb), and toluene (21 ppb). These compounds are typically associated with organic solvents; some of these species such as vinyl chloride and trans-1,2-dichloroethylene are known degradation products of trichloroethylene (TCE).

Monitoring well P-19 is located in the western corner of the Buckeye property adjacent to the Clark property. The volatile organic species detected at low levels in this well are also detected at higher concentrations in several wells on Clark property. Other volatile organic species such as TCE were also detected in groundwater from some of the Clark property wells. There is no evidence that any of these materials have been disposed on the Buckeye property.

Groundwater samples from P-17 and P-19 were also analyzed for petroleum hydrocarbons (Table 3.6). Low levels were detected in both wells (4.4 ppm and 2.4 ppm, respectively). The petroleum hydrocarbons were tentatively identified as lubricating oils. The very low levels detected do not pose any environmental hazards.

6.3 Discussion of Findings

The surface soil investigation for the Buckeye property establishes that there is no cause for concern. The accompanying groundwater investigation establishes that there is no cause for concern, except for evidence of low level volatile organic chemicals in a small portion of the property located in the western corner. The species found and the concentrations detected in such area support the conclusion that the source of these organic chemicals is occurring, not on Buckeye, but on the adjacent Clark property.

lar

APPENDIX A
SURFACE SOIL ANALYTICAL DATA

**Analytical Results for Surface Soil Sample M
Obtained on March 3, 1988**

ANALYTICAL RESULTS

Prepared For

Dunn Geoscience Corporation
12 Metro Park Road
Albany, NY 12205

Prepared By

Recra Environmental, Inc.
10 Hazelwood Drive, Suite 106
Amherst, New York 14150

METHODOLOGIES

The specific methodologies employed in obtaining the enclosed analytical results are indicated on the specific data table. The method numbers presented refer to the following U.S. Environmental Protection Agency reference.

- o U.S. Environmental Protection Agency "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods". Office of Solid Waste and Emergency Response. July 1982, SW-846, Second Edition.

COMMENTS

Comments pertain to data on one or all pages of this report.

The values reported as "less than" (<) indicate the working detection limit for the particular sample and/or parameter.

The value reported as "less than or equal to" (<=) indicates the compound may be present at trace levels relative to the detection limit but not subject to accurate quantification.

Results of analyses for Method 8080 (PCB's) are corrected for moisture content and reported on a dry weight basis.



SOIL MATRIX
METHOD 8080 - PCB'S

COMPOUND (Units of Measure = $\mu\text{g/g dry}$)	SAMPLE IDENTIFICATION	
	M	
Aroclor 1016	<0.05	
Aroclor 1221	<0.1	
Aroclor 1232	<0.1	
Aroclor 1242	<0.05	
Aroclor 1248	<0.05	
Aroclor 1254	<0.05	
Aroclor 1260	<0.05	
Extraction Date	3/8/88	
Analysis Date	3/10/88	

I.D. #88-333



QUALITY CONTROL INFORMATION - ACCURACY
SOIL MATRIX
METHOD 8080 - PCB'S

SAMPLE IDENTIFICATION Method Blank Spike

COMPOUND	NANOGRAMS OF SPIKE	PERCENT RECOVERY
Aroclor 1016	1.0	108
Aroclor 1260	1.0	115
Extraction Date	3/8/88	
Analysis Date	3/12/88	



I.D. #88-333

APPENDIX B

GROUNDWATER ANALYTICAL DATA

Location	1.0	115
Sample Date	1/12/80	

**BI: Volatile Organics for Groundwater Samples Obtained
on March 23, 1988**

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation
 Client ID: P-17
 Laboratory ID: 7180-33
 Matrix: Aqueous Sampled: 03/23/88 Received: 03/24/88
 Authorized: 03/24/88 Prepared: 03/30/88 Analyzed: 03/30/88

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride	ND	µg/L	5.0
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene	ND	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS Approved by CB

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience CorporationClient ID: P-19Laboratory ID: 7180-37Matrix: AqueousSampled: 03/23/88Received: 03/24/88Authorized: 03/24/88Prepared: 03/30/88Analyzed: 03/30/88

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride -----	83	µg/L	5.0
Chloroethane -----	42	µg/L	5.0
Methylene chloride	ND	µg/L	5.0
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane -----	24	µg/L	2.0
trans-1,2-Dichloroethene -----	110	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene	ND	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene -----	21	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by

LS

Approved by

CB

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation

Client ID: FB-1

Laboratory ID: 7180-27

Matrix: Aqueous

Sampled: 03/23/88

Received: 03/24/88

Authorized: 03/24/88

Prepared: 03/30/88

Analyzed: 03/30/88

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Reporting Limit</u>
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride	ND	µg/L	5.0
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene	ND	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS

Approved by CB

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation
 Client ID: FB-2
 Laboratory ID: 7180-28
 Matrix: Aqueous Sampled: 03/23/88 Received: 03/24/88
 Authorized: 03/24/88 Prepared: 03/30/88 Analyzed: 03/30/88

Parameter	Result	Units	Reporting Limit
Chloromethane -----	39	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride -----	480	µg/L	5.0
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene	ND	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS Approved by CB

HAZARDOUS SUBSTANCE LIST (HSL) VOLATILE ORGANICS

EPA Method 624/HSL List

Client Name: Dunn Geoscience Corporation
 Client ID: TB
 Laboratory ID: 7180-29
 Matrix: Aqueous Sampled: 03/23/88 Received: 03/24/88
 Authorized: 03/24/88 Prepared: 03/30/88 Analyzed: 03/30/88

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	µg/L	5.0
Bromomethane	ND	µg/L	5.0
Vinyl chloride	ND	µg/L	5.0
Chloroethane	ND	µg/L	5.0
Methylene chloride	ND	µg/L	10
Acetone	ND	µg/L	25
Carbon disulfide	ND	µg/L	2.0
1,1-Dichloroethene	ND	µg/L	2.0
1,1-Dichloroethane	ND	µg/L	2.0
trans-1,2-Dichloroethene	ND	µg/L	2.0
Chloroform	ND	µg/L	2.0
1,2-Dichloroethane	ND	µg/L	2.0
2-Butanone	ND	µg/L	10
1,1,1-Trichloroethane	ND	µg/L	2.0
Carbon tetrachloride	ND	µg/L	2.0
Vinyl acetate	ND	µg/L	10
Bromodichloromethane	ND	µg/L	2.0
1,2-Dichloropropane	ND	µg/L	2.0
trans-1,3-Dichloropropene	ND	µg/L	2.0
Trichloroethene	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	2.0
1,1,2-Trichloroethane	ND	µg/L	2.0
Benzene	ND	µg/L	2.0
cis-1,3-Dichloropropene	ND	µg/L	2.0
2-Chloroethyl vinyl ether	ND	µg/L	10
Bromoform	ND	µg/L	2.0
4-Methyl-2-pentanone	ND	µg/L	10
2-Hexanone	ND	µg/L	10
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene	ND	µg/L	2.0
Toluene	ND	µg/L	2.0
Chlorobenzene	ND	µg/L	2.0
Ethylbenzene	ND	µg/L	2.0
Styrene	ND	µg/L	2.0
Total xylenes	ND	µg/L	2.0

ND = Not detected.

Reported by LS Approved by CB

PRIORITY POLLUTANT VOLATILE ORGANICS

EPA Method 624 + 624/HSL List

QUALITY CONTROL

Client Name: Dunn Geoscience Corporation

Client ID: Laboratory Control Spike

Laboratory ID: P454LCS

Matrix: Aqueous

Prepared: 03/30/88

Analyzed: 03/30/88

<u>Parameter</u>	<u>% Recovery</u>	<u>QC Advisory Limits</u>
1,1-Dichloroethene	88	61 - 145%
Trichloroethene	75	71 - 120%
Benzene	85	76 - 127%
Toluene	87	76 - 125%
Chlorobenzene	88	75 - 130%

Reported by LS Approved by CB



PRIORITY POLLUTANT VOLATILE ORGANICS

EPA Method 624 + 624/HSL List

QUALITY CONTROL

Client Name: Dunn Geoscience Corporation

Client ID: Laboratory Control Spike Dup.

Laboratory ID: P465LCSD

Matrix: Aqueous

Prepared: 03/30/88

Analyzed: 03/30/88

<u>Parameter</u>	<u>% Recovery</u>	<u>QC Advisory Limits</u>
1,1-Dichloroethene	92	61 - 145%
Trichloroethene	80	71 - 120%
Benzene	90	76 - 127%
Toluene	93	76 - 125%
Chlorobenzene	91	75 - 130%

Reported by LS Approved by CB

VOLATILE ORGANICS (CONT.)

Surrogate Recovery Summary

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: 03/24/88

Received: 03/24/88

Erco ID	Client ID	Surrogate Compound (%)		
		d ₄ -1,2,-Dichloro-ethane	d ₄ -Toluene	p-Bromofluoro-benzene

7180-33	P-17	102	97	98

7180-37	P-19	104	101	97

QC Advisory Limits:	76-114%	61-110%	74-115%

Reported by LS Approved by CB

B2: Petroleum Hydrocarbons for Groundwater Sample# Obtained
on March 23, 1988



HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: 03/25/88

Sampled: 03/23/88

Received: 03/24/88

Concentration Units: mg/L (ppm)

Prepared: 03/28/88

Analyzed: 03/30/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-33	P-17	4.4	0.01	0.25	NA

Qualitative Identification: This sample has GC/FID characteristics that are similar to lubricating oil.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 75%.

Reported by AH

Approved by GO

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience CorporationMatrix: AqueousAuthorized: 03/25/88Sampled: 03/23/88Received: 03/24/88Concentration Units: mg/L (ppm)Prepared: 03/28/88Analyzed: 03/30/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-37	P-19	2.4	0.01	0.25	NA

Qualitative Identification: This sample has GC/FID characteristics that are similar to lubricating oil.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 91%.

Reported by AHApproved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience CorporationMatrix: AqueousAuthorized: 03/25/88Sampled: 03/23/88Received: 03/24/88Concentration Units: mg/L (ppm)Prepared: 03/28/88Analyzed: 03/30/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-27	FB-1	0.10	0.01	0.25	NA

Qualitative Identification: NA

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 87%.

Reported by

AH

Approved by

GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: 03/25/88

Sampled: 03/23/88

Received: 03/24/88

Concentration Units: mg/L (ppm)

Prepared: 03/28/88

Analyzed: 03/30/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-28	FB-2	0.09	0.01	0.25	NA

Qualitative Identification: NA

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 88%.

Reported by AH Approved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORYClient Name: Dunn Geoscience CorporationMatrix: AqueousAuthorized: NASampled: NAReceived: NAConcentration Units: mg/L (ppm)Prepared: 03/25/88Analyzed: 03/26/88

Enseco ID	Client ID	Total Petroleum Hydrocarbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-11B	Erco Blank	ND	0.01	0.25	NA

Qualitative Identification: NA

NA = Not applicable.

ND = Not detected.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 53%.

Reported by AHApproved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORYClient Name: Dunn Geoscience CorporationMatrix: AqueousAuthorized: NASampled: NAReceived: NAConcentration Units: mg/L (ppm)Prepared: 03/28/88Analyzed: 03/28/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-26B	Erco Blank	ND	0.01	0.25	NA

Qualitative Identification: NA

ND = Not detected.

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 92%.

Reported by AHApproved by GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Solid

Authorized: NA

Sampled: NA

Received: NA

Concentration Units: µg/g (dry wt)

Prepared: 03/29/88

Analyzed: 03/31/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7180-30B	Erco Blank	0.22	0.2	5.0	NA

Qualitative Identification: NA

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.2 µg/g (dry wt).

Minimum reporting limit for total products = 5.0 µg/g (dry wt).

Internal standard recovery = 96%.

Reported by

AH

Approved by

GD

HYDROCARBON FINGERPRINTING
U.S. COAST GUARD OIL SPILL IDENTIFICATION SYSTEM
MARINE ORGANICS LABORATORY

Client Name: Dunn Geoscience Corporation

Matrix: Aqueous

Authorized: NA

Sampled: NA

Received: NA

Concentration Units: mg/L (ppm)

Prepared: 03/28/88

Analyzed: 03/30/88

Enseco ID	Client ID	Total Petroleum Hydro- carbons	Reporting Limits for Individual Hydrocarbons	Reporting Limits for Total Product	% Solids
7154-01B	Erco Blank	ND	0.01	0.25	NA

Qualitative Identification: NA

NA = Not applicable.

All samples are corrected for Method Blank.

Minimum reporting limit for individual hydrocarbons = 0.01 mg/L.

Minimum reporting limit for total products = 0.25 mg/L.

Internal standard recovery = 89%.

Reported by AH

Approved by 6D