REMEDIAL INVESTIGATION GE / MOREAU SITE 11 - CERCLA - 30201

prepared for:

GENERAL ELECTRIC Schenectady , New York

prepared by:

Dunn Geoscience Corporation

TURBINE BUSINESS GROUP

GENERAL ELECTRIC COMPANY SCHENECTADY, NEW YORK 12345

Building 300-1 Phone (518) 385-2211

Nott Street Plant (518) 385-9408

November 5, 1984

Mr. Norman H. Nosenchuck Director-Division of Solid Waste New York State Department of Environmental Conservation 50 Wolf Road Albany, NY 1223

Subject: 11-CERCLA-30201

Dear Mr. Nosenchuck:

I am forwarding for your information two copies of the report of the Remedial Investigation being conducted at the GE/Moreau Site under the terms of the Subject Administrative Order.

The report is incomplete in that it does not include work yet to be completed at the site. At the completion of work an Addendum to this submittal will be made.

I will provide an additional copy of the enclosed report directly to your representative at the site. If you have any questions regarding this report, please don't hesitate to call me.

Very truly yours,

T. L. COLLINS, Manager Environmental Programs

TLC/aeo

Enclosure

CC: Mr. Wayne N. Pierre

The Control of Control

HAY GOVE

DETOLORS DAME GRAD CONTRACTOR REMEDIAL INVESTIGATION
GE/MOREAU SITE
11-CERCLA-30201

Prepared For:

GENERAL ELECTRIC Schenectady, New York

Prepared By:

DUNN GEOSCIENCE CORPORATION

October 1984

TABLE OF CONTENTS

			page
1.0	Intr	oduction	1
	1.1	General	1
	1.2	Background and Site History	4
	1.3	Project Initiation	7
	1.4	Project Objectives	8
	1.5	Scope and Conditions	9
	1.6	Previous Work	11
2.0	Metho	odology	12
	2.1	General	12
	2.2	Field Investigations	12
		2.2.1 Drilling Program	12
		2.2.2 Soil Sampling and Classification	13
		2.2.3 Volatile Organic Screening · · · · · · · ·	15
		2.2.4 Vertical Hydraulic Conductivity Testing	17
		2.2.5 Monitoring Well Installation	18
		2.2.6 Well Development	19
		2.2.7 Horizontal Hydraulic Conductivity Testing	23
		2.2.8 Water Level Measurements	28
		2.2.9 Stream-Flow Measurement	29
		2.2.10 Water Quality Sampling	37
		2.2.11 Surface Soil Sampling	38
		2.2.12 Aerial Photography	40
		2.2.13 Surveying	40
		2.2.14 Cartography	41
	2 3		41
	2.5	Laboratory Testing	41
			41
		2.3.2 Triaxial Cell Testing	
		2.3.4 Chemical Analyses: Near-Surface Soils	44
		2.3.5 Chemical Analyses: Water	49
		2.5.5 Gliemical Analyses. Water	49
3.0	Geol	ogy	51
	3.1	ogy	51
	3.2	General Stratigraphy	52
	3.3	Bedrock	54
	3.4	Glacial Till	55
	3.5	Lower Glaciolacustrine Deposits	56
	3.6	Upper Glaciolacustrine Deposits	57
	3.7	Glaciodeltaic Deposits	58
4.0		ydrology	61
	4.1	Geohydrologic Units	61
		4.1.1 Semi-Confined Bedrock Aquifer	62
		4.1.2 Confining Bed	63
	, -	4.1.3 Moreau Sand Aquifer	65
	4.2	Ground-Water Regime	7 3
		4.2.1 Ground-Water Flow Network	73
		4 2 2 Ground-Water Flow Rate	75

TABL	E OF CONTENTS CONT.	page
5.0	Influence of Pumping Wells	78
6.0	Water Budget	80
7.0	Ground Water Modeling	83 84 88 91 114
8.0	Ground Water - Extent of Contamination	118
9.0	Surface Water - Extent of Contamination	130
10.0	Soils - Extent of Contamination	135
11.0	Air - Extent of Contamination	136

LIST OF FIGURES

- 1.1 Study Area
- 2.1 Example Slug Test DGC Well 10I
- 2.2 Location of weir and construction detail
- 2.3a Plot of weir head versus time
- 2.3b Plot of weir discharge versus time
- 6.1 Water budget for the area near the GE Moreau site
- 7.1 Index Scheme for Finite-Difference Grid
- 7.2 Conceptual Model
- 7.3 Computer Model Scenario 1
- 7.4 Regional perspective of simulated ground water elevations for scenario 1
- 7.5 Local perspective of simulated ground water elevations for scenario 1
- 7.6 Computer Model Scenario 2
- 7.7 Regional perspective of simulated ground water elevations for scenario 2
- 7.8 Local perspective of simulated ground water elevations for scenario 2
- 7.9 Computer Model Scenario 3
- 7.10 Regional perspective of simulated ground water elevations for scenario 3
- 7.11 Local perspective of simulated ground water elevations for scenario 3
- 7.12 Computer Model Scenario 4
- 7.13 Regional perspective of simulated ground water elevations for scenario 4
- 7.14 Local perspective of simulated ground water elevations for scenario 4
- 7.15 Computer Model Scenario 5
- 7.16 Regional perspective of simulated ground water elevations for scenario 5
- 7.17 Local perspective of simulated ground water elevations for scenario 5
- 7.18 Computer Model Scenario 6
- 7.19 Regional perspective of simulated ground water elevations for scenario 6
- 7.20 Local perspective of simulated ground water elevations for scenario 6

LIST OF TABLES

- 2.1 Well development data
- 2.2 Water level information
- 2.3 Soil borings volatile organics
- 3.1 Generalized stratigraphy and geohydrology
- 8.1 Summary of analytical results ground water monitoring
- 8.2 Summary of priority pollutant analysis ground water monitoring
- 9.1 Stream and reservoir analytical results Fort Edward, N.Y.
- 9.2 Reduction in total organics between stream sampling points

APPENDICES, PLATES, and ATTACHMENTS

(Bound Separately)

Appendix Volume 1 - Appendices A - G

Appendix Volume 2 - Appendices H - K

Plates 1 - 14, Air Photo Attachments

EXECUTIVE SUMMARY

This remedial investigation was conducted for the General Electric Company, Schenectady, New York by Dunn Geoscience Corporation, Latham, New York. The remedial investigation consisted of an in-depth geohydrologic study of the area surrounding the GE/Moreau site located in the Town of Moreau, Saratoga County, New York.

The investigation, as of October 22, 1984, included test drilling, installation of 59 monitoring wells, collection of water level measurements and ground-water samples from 80 monitoring wells, collection and analysis of surface water samples from 14 locations, and the collection and analysis of ground-water samples from approximately 160 private residential wells. Field activities were initiated in April, 1984 and all field and laboratory procedures followed prescribed protocols detailed in the Work Plan approved by the U.S. Environmental Protection Agency.

Three major types of sediments were found in the study area: fine-grained glaciolacustrine sediments, deltaic sand deposits, and till. These deposits are divided into two geohydrologic units: The Moreau sand aquifer and an underlying confining bed. The Moreau sand aquifer consists of up to 88 feet of glaciodeltaic sand underlain by up to 28 feet of upper glaciolacustrine medium to fine sand with some silt. The confining bed consists of up to 25 feet of lower glaciolacustrine varved silt and clay underlain by till. The confining bed overlies dark gray argillaceous limestone bedrock.

On the average, the upper 75 percent of the Moreau aquifer is composed of the glaciodeltaic unit and the remainder is composed of the upper glaciolacustrine deposits. The Moreau sand aquifer occurs under unconfined, or water table conditions and, on the average is about 60 feet thick, but varies significantly.

Field falling-head hydraulic conductivity tests conducted on the upper glaciolacustrine deposits resulted in measured vertical hydraulic conductivity values in the range of 4.0 to 6.2 x 10^{-6} cm/sec. Laboratory constant head triaxial tests of upper glaciolacustrine deposits resulted in values of 1.7 x 10^{-4} and 1.2 x 10^{-5} cm/sec. Horizontal hydraulic conductivity tests utilizing slug tests in completed monitoring wells resulted in a hydraulic conductivity value of about 2.0 x 10^{-3} cm/sec.

Slug tests were also performed on the glaciodeltaic deposits. Calculated horizontal hydraulic conductivity values ranged from 2.4 x 10^{-3} to 2.1 x 10^{-2} cm/sec. The average vertical hydraulic conductivity measured from field tests was 1.6 x 10^{-3} cm/sec.

Both horizontal and vertical hydraulic conductivity vary with depth. On the average, horizontal hydraulic conductivity is between three and four times greater in the upper 75 percent of the aquifer then nearer the base. The vertical hydraulic conductivity in the lower 25 percent of the aquifer is about 300 times less than in the rest of the aquifer.

A ground-water mound exists in proximity to the GE/Moreau site causing ground-water flow toward the west, southwest, south and southeast. However, ground-water gradients to the west and southwest are very slight, generally being in the range of 0.0001 to 0.002 ft/ft. The major factor influencing ground-water flow is the topographic scarp southeast of the site that marks the edge of the Moreau sand aquifer. Near this area the gradient is up to 0.035 ft/ft and directs the principal flow of ground water to the southeast.

The average linear ground-water velocity for the upper portion of the aquifer is about 0.67 feet per day and about 0.27 feet per day for the lower portion.

Pumping wells show no apparent influence on the direction of regional ground-water flow based on data collected. Data indicate that the transmissivity is high enough that the influence from pumping wells is not significant enough to alter ground-water flow patterns.

Previous work and this investigation have shown evidence of contamination by organic compounds in the Moreau sand aquifer and indicates that the contamination is stratified within the aquifer. In addition, contamination was detected in some streams that make up the Fort Edward water supply. Although observed contamination includes a variety of organic compounds, trichloroethylene (TCE) is the most prevalent.

The areal extent of contamination of TCE in concentrations greater than 100 parts per billion (ppb) occurs in an essentially southeast trending plume approximately 4800 feet long and about 2000 feet wide at its widest point. The plume has its origin at the GE/Moreau disposal site and extends southeastward to the topographic scarp. The overall orientation of the plume follows the direction of ground-water flow. The downgradient limit of the plume appears to be controlled by ground-water discharge to springs and streams having their head waters at the foot of the escarpment.

Maximum organic levels occur in a relatively narrow, essentially southeast trending band. The band of maximum contamination coincides very closely with the ground-water flow path south of the GE/Moreau site. The data further show the tendency for TCE concentrations to be highest at intermediate and deep levels within the aquifer.

During the monitoring of residential wells in the area southwest of the GE/Moreau site, encompassing Terry Drive, Cheryl Drive, and Myron Road, low levels of five organic compounds were detected. Information collected from home owners concerning the reported depths of their wells indicates the horizon of contamination is between 35 and 55 feet below grade.

None of the contaminated wells in this area show a consistent or steady pattern of contamination. The low level contamination may be present in one or two rounds of sampling but not in others. Moreover, the wells of adjacent homeowners may have different low level contaminants present or no contamination at all.

Although low level TCE has been detected in a Cheryl Drive residence and four Terry Drive homes, insufficient data is currently available for identifying its source. The ratio of TCE to other organics in the residential ground-water samples does not conform to the general pattern directly downgradient of the disposal site. Given this condition and the dilution factors seen in wells along the paths of transverse dispersion, it is unlikely that the residential organic contamination came directly from the area of the disposal site or the defined plume.

Although the data suggest that the low levels of organic contamination in the Terry, Cheryl and Myron area are not associated with the defined plume, eight additional monitoring wells are being installed in an effort to better define the relationship, if any.

During the sampling of residential supply wells, water samples were collected from 16 wells reported to have been drilled into the bedrock aquifer. Chemical analysis of these samples did not detect any organic compounds.

1.0 INTRODUCTION

1.1 General

This remedial investigation was conducted for the General Electric Company, Schenectady, New York by Dunn Geoscience Corporation, Latham, New York. The remedial investigation consisted of an in-depth geohydrologic study of the area surrounding the GE/Moreau site located in the Town of Moreau, just south of South Glens Falls, Saratoga County, New York. Figure 1.1 is a map of the site and surrounding area. investigation was conducted remedial in Administrative Order No. 11-CERCLA-30201 issued to the General Electric Company by the United States Environmental Protection Region II pursuant to Section 106(a) of Agency, Comprehensive Environmental Response. Compensation and Liability Act (CERCLA), 42 U.S.C. S9606(a). The Order was entered November 21, 1983 effective February 13, 1984.

The investigation was managed from the corporate offices of Dunn Geoscience corporation located 50 miles south of the project site. The project was conducted for Mr. T. Leo Collins, Manager, Environmental Programs and under the coordination of Dr. D. Wallace Magee, Manager, Environmental Quality Planning. The Dunn Geoscience project team consisted of the following:

- William E. Cutcliffe, President Corporate Advisor and Reviewer
- D. Theodore Clark, Senior Hydrogeologist Project Manager
 James Narkunas, Senior Hydrologist Geohydrology and
 Sample Collection

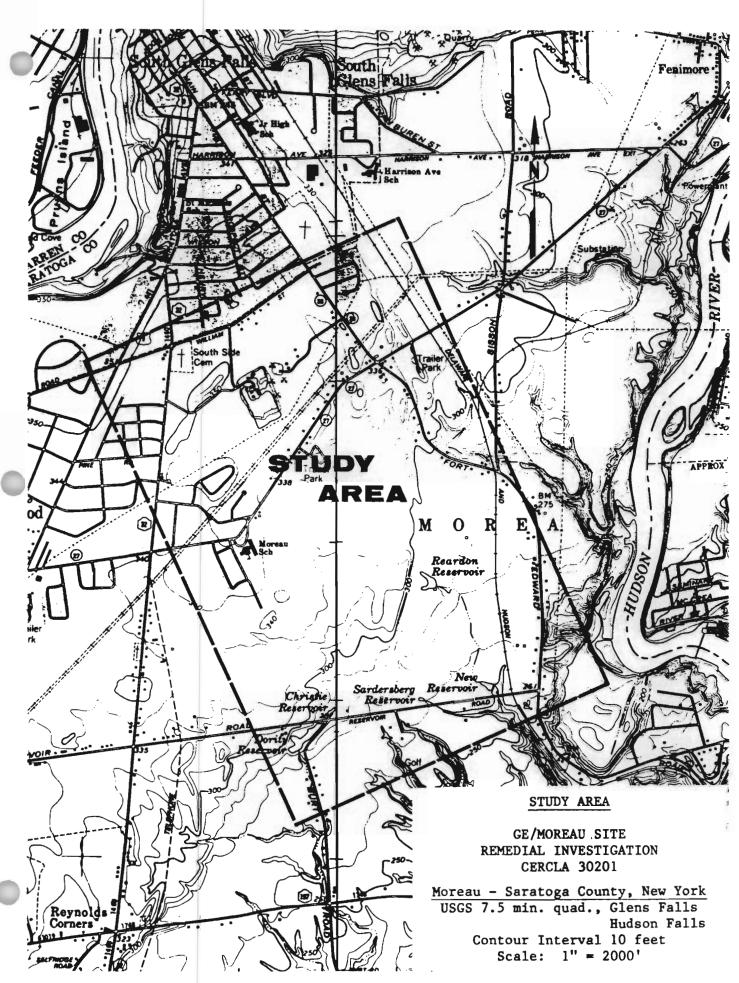


Figure 1.1

- Sander I. Bonvell, Chemist Geochemistry and Sample Collection
- William J. Miller, Hydrologist Modeling and Sample Collection
- Paul W. Hare, Hydrologist Geohydrology and Sample Collection
- Michael L. Ianniello, Geologist Drilling Supervision and
 Data Collection
- John M. Uruskyj, Geologist Drilling Supervision and Geology Rod Sutch, Geologist - Field Operations and Drilling Supervision
- Jeffrey T. Wink, Geologist Sample Collection

Additional support staff, including geologists and technicians were utilized as necessary. Surveying, cartography and drafting were done by Robert W. Shuey, Michael T. Maksymik, and Stewart Galloway.

Subcontract drilling services were provided by Warren George, Inc., Jersey City, New Jersey. Water and soil analytical laboratory services were provided by ERCO/Energy Resources Company, Inc., Cambridge, Massachusetts and Environmental Testing and Certification, Edison, New Jersey.

The report format is as follows. The introduction outlines the objectives, project scope. and conditions. This is followed by a methodology section which describes the field activities, schedules, and laboratory testing. Sections 3 and address the geologic hydrologic and conditions. respectively. These sections establish the background information necessary to evaluate the specific data developed during the investigation. Sections 5 and 6. Influence of Rumping Wells and Water Budget, provide additional site specific hydrologic information. Section 7 describes the

ground-water flow model, how it was applied, and the information it provides for further evaluation of regional and site conditions. Sections 8 through 11 describe the extent of ground water, surface water, soil and air contamination based on the results obtained from this and previous work. Sections 5, 7, 8, 10 and 11 are not yet complete in that additional data are being obtained. Once the compilation and evaluation of these data are completed an addendum to this report will be submitted.

This report consists of four items: the report text; two appendices; and a portfolio of plates.

1.2 Background and Site History

The GE Moreau Site (formerly Caputo Site) in the Town of Moreau, Saratoga County, New York was used as an industrial waste disposal site for waste materials generated by the General Electric Company reportedly from 1958 to 1968. In 1978, Town of Moreau and State officials began testing the air, surface water, ground water and soil at and near the disposal site. A plan was developed to remove some of the contaminated PCB soil and to cover the evaporation pit.

In September 1980, the site was included in an agreement between General Electric and NYSDEC whereby GE agreed to conduct remedial investigations at seven known waste disposal sites.

In the fall of 1982, it was determined that there were elevated concentrations of trichloroethylene (TCE) in the ground water. The Town of Moreau installed activated carbon filters in approximately 70 homes within the reportedly downgradient contaminated area. In the summer of 1983 after meetings with the Town of Moreau and State representatives.

the United States Environmental Protection Agency (EPA) initiated negotiations with the General Electric Company to address the off-site contamination problem. The negotiations resulted in an agreement whereby the General Electric Company would conduct a remedial investigation and take necessary corrective action pursuant to Administrative Order No. 11 CERCLA-30201.

The following background information is taken from the April 1983 Hardick/Rich report entitled "Investigation of Ground Water Contamination in the Vicinity of the GE Moreau (Caputo) Site".

The GE Moreau Site was proposed for the EPA superfund list in December, 1982 and was ranked number 141 nationally (out of 400), and number 7 in New York State (out of 26). In December, 1978 the Town of Moreau removed approximately 100 cubic yards of contaminated material from the "evaporation pit" area and had it transported to a secure landfill site in Niagara Falls, New York. In May of 1979, through a joint effort by the New York State Department of Environmental Conservation (DEC). New York State Department Transportation (DOT), and the Town of Moreau, a temporary cap was placed over the "evaporation pit" area. In March, 1982, the New York State Department of Health (DOH) tested water in private wells in the Bluebird Road area. The July report from the DOH entitled "An Assessment of Drinking Water Quality in the Area of the Caputo Inactive Hazardous Waste Site" indicated levels of contamination in some private wells.

In July, 1982, the Town of Moreau conducted water testing of private wells in residences in the vicinity of the GE Moreau site.

During July and August, 1982, 151 private wells were tested for volatile organic compounds. Test results indicated that 22 private wells had various levels of contamination of volatile organic compounds in excess of 1.0 ppb. Most of the wells tested were two-inch driven well points ranging from 26 to 87 feet in depth. The average depth of the 22 contaminated wells, (one-third of which are less than 40 feet in depth), is 44.3 feet.

In August, 1982, the Town of Moreau contracted C.A. Rich Consultants to conduct a geohydrologic investigation. The investigation was conducted to establish the extent of chemical contamination of the water in private wells and to confirm whether or not the contaminated wells were degraded due to previous dumping of liquid chemicals at the "evaporation pit".

As part of this investigation, seven shallow test wells were installed during September, 1982. These wells ranged from 24 to 37-1/2 feet deep and were used to establish a preliminary water-table contour map. In October, 1982, three deep test wells, ranging from 90 to 95 feet deep, were installed to determine soil conditions from the ground surface down to the clay layer. In December, 1982, two intermediate depth test wells were installed at depths of 53 and 58 feet. In January, 1983, FE-1, a flowing well, was installed at a spring area on land owned by the Village of Fort Edward.

The Hardick/Rich report concluded that the ground water had been degraded and contaminated with chlorinated hydrocarbon compounds throughout the designated study area. The report also concluded that the chemicals found in the "evaporation pit" are the same as those found in monitoring wells and private wells away from and downgradient from the pit. It was

further concluded in the Hardick/Rich report that "evaporation pit" area was the probable sole source of the contamination and that there was а causal/effect relationship between past reported waste disposal practices at the GE Moreau Site and subsequent detection of contaminated ground water obtained downgradient wells in the same aquifer that underlies the site.

1.3 Project Initiation

The Remedial Investigation which is the subject of this report was initiated in January, 1984 with a complete review of Administrative Order Index No. 11-CERCLA 30201.

Following the review and evaluation of the Administrative Order, numerous discussions were held with General Electric personnel and the EPA to define and discuss the specific activities required by the Order. During February and March, 1984. Dunn Geoscience aided General Electric in preparation of an interim remedial plan for Part I. Immediate Corrective Action, of the Order and prepared a detailed work plan and implementation schedule for Part II. Remedial Order. The Investigation of the Part II Remedial Investigation Work Plan and Implementation Schedule was submitted to the EPA by Dunn Geoscience Corporation on March 28, 1984 (see Appendix A). During the 30-day EPA review period of the Work Plan and Implementation Schedule. site reconnaissance and field activities were conducted. Access to the initial soil boring and monitoring well location sites was obtained during April and drilling commenced on May 2. 1984.

1.4 Project Objectives

The objective of the remedial investigation was to define the nature and extent of ground-water contamination. As outlined in the Administrative Order, the geohydrologic investigation was to include the following:

- geohydrologic setting of the site including a characterization of the soils and definition of aquifer characteristics;
- ground-water gradients, velocity, and quality within the area of concern;
- location and influence of pumping wells on the movement of ground water;
- as practical, modeling of the drinking water aquifer to predict both rate and extent of ground-water contamination;
- determination of the vertical and lateral extent of contamination in soil, air, surface water, and ground water; and,
- appropriate health and safety plans for conducting the remedial investigation.

1.5 Scope and Conditions

The scope of the remedial investigation allowed a phased approach that would identify additional investigations and the development of supplemental data. The scope of the geohydrologic investigation was designed to provide sufficient information for data evaluation and to identify those areas requiring further investigation.

The scope of work outlined in the Work Plan followed the requirements of the Administrative Order and utilized field and laboratory protocols and methodologies that equaled or exceeded required standards.

The scope of Phase I called for a drilling program of soil borings and installation of monitoring well clusters at 13 locations. These locations were positioned throughout the study area to provide an overall evaluation of geohydrologic conditions, water quality, and the direction of ground-water movement. The initial water quality analyses and evaluation of water level data from these wells defined the positions for the second phase of drilling which included an additional 22 borings and monitoring wells at 9 locations. Subsequent water level measurements and ground and surface water quality analyses were conducted to expand the data base.

Ground-water samples were also collected from approximately 160 private residential wells and analyzed for volatile organics. The residential water quality samples were used to supplement the data obtained from the 80 wells monitored during this investigation.

At the 22 locations where monitoring wells were installed, permission to drill was readily obtained through complete cooperation of the respective property owners. At two proposed locations, permission could not be obtained. An alternate location a short distance away was obtained for one of these locations; the other location was dropped because a suitable alternate location could not be obtained. Physical access preparation was necessary at nine of the sites.

Field conditions were very good and resulted in no significant delays or impairment of activities or in the quality of data obtained. Subcontract drilling services and materials were as specified and the cooperation and quality of work was excellent.

The cooperation and assistance offered by the Town of Moreau, the Moreau School, and the Village of Fort Edward was excellent and aided in the successful completion of the proposed field activity. Cooperation and assistance by the DEC on-scene coordinator was also excellent and further aided in meeting the objectives of the investigation.

Time constraints precluded extensive data collection over an extended period of time. However, the amount of data collected and the frequency of data collection exceeded that required by the Order as outlined in the Work Plan. The data obtained is reasonably conclusive; it is recognized that some additional data will be advantageous to the refinement of current observations and conclusions. The gathering of additional data is ongoing.

1.6 Previous Work

Previous work of significance at the site has been reported in separate reports and include the following (listed in chronological order):

- PCB's Removed From the Caputo Site on December 18 and 20, 1978, Town of Moreau, Saratoga County, New York, Hardick Associates (1978);
- Conceptual Engineering Study of Five Disposal Sites Known to have Received PCB Wastes, Wehran Engineering (1980);
- Caputo Site Engineering Report, O'Brien & Gere (1981);
- Caputo Site Engineering Report addendum,
 O'Brien & Gere (1982);
- Caputo Site Remedial Program Final Plan-Subsurface Investigation, O'Brien & Gere (1982);
- Investigation of Ground-Water Contamination in the Vicinity of the GE Moreau (Caputo) Site, Hardick Associates and C.A. Rich Consultants, (1983).

2.0 METHODOLOGY

2.1 General

All aspects of the remedial investigation were conducted using standard or accepted methods. Techniques and methods utilized during the field investigation and laboratory testing are described within this section. Specific analytical and numerical techniques used to interpret the geohydrologic data are addressed within the respective sections of the report.

2.2 Field Investigations

2.2.1 Drilling Program

During the two phases of drilling, from May 2, 1984 to June 18, 1984, and August 1, 1984 to August 30, 1984, a total of fifty-nine monitoring wells were installed at locations surrounding the GE Moreau site. Well clusters were numbered sequentially, based on the order of their completion. Individual wells in each cluster were further identified by their relative depth: shallow (S), intermediate (I), and deep (D). The locations of the wells are shown on Plate 1.

Test borings were advanced utilizing two drilling methods: hollow stem auger and mud-rotary. A CME-55 soil boring rig utilizing a four-inch, hollow-stem auger was used to install the first well (DGC-1) However, hydraulic, or flowing, sands encountered at a depth of 34 feet, rendered the hollow-stem auger method ineffective. Consequently, a mud-rotary rig

was mobilized to the site on May 8, 1984 and, thereafter, all subsequent borings were advanced using mud-rotary techniques. To expedite the phase one drilling, a second mud-rotary rig was mobilized on May 15, 1984.

Mud-rotary drilling utilized bentonite drilling fluid and a 4-3/4-inch tri-cone roller bit. The drilling mud was mixed with water from two locations. Water was initially obtained from a well at the Town of Moreau Park and, later, from a municipal fire hydrant located on Williams Street in the Town of Moreau.

2.2.2 Soil Sampling and Classification

Standard and continuous soil samples were collected following ASTM standards for the split-barrel method. Continuous split-spoon samples were obtained from the deepest test borings at sites DGC-1, 2, 6, 11, and 15. Standard 5-foot interval samples were collected from the deepest test borings at sites DGC-3, 4, 5, 7, 8, 9, 10, 12, 13, 14, 16, 17, 18, 20, 21, 22, and boring 19S. No soil samples were obtained in borings DGC-14I, 14S, 15S, 18S, 20I, 20S, 21I, 21S, 22I, and 22S. Soil samples were obtained from a portion of the proposed screened interval in all remaining shallow and intermediate depth wells.

For all samples, blow counts were recorded for each six inches of soil penetrated by the split-spoon sampler as it was driven by a 140-pound hammer dropped from a height of 30 inches. Material recovered in the

sampler was described using a modified version of the Burmister Classification System as well as the Unified Soil Classification System.

Representative portions of each split-spoon sample were placed in glass containers and retained by Dunn Geoscience Corporation for subsequent laboratory evaluation, as necessary. Soil boring logs, describing subsurface materials encountered in the test borings, are located in Appendix B. Borings were terminated when samples indicated that a borehole had penetrated lower glaciolacustrine, varved, clayey silts.

During the second phase of drilling, thin-walled, tube samples were also used to collect undisturbed glaciolacustrine samples from the deep test holes, DGC-14 and 15. The soils were recovered using three-inch diameter brass, open-tube samplers in accordance with ASTM standard methods.

Prior to collecting the tube samples, the borehole was cleaned out to the desired sampling depth. While the water level in the boring was kept at the naturally occurring ground-water level, the tube was pushed 24 inches into the soil using a rapid continuous motion. Before the tube was pulled, it was rotated at least twice to shear the sample off at the bottom. Upon removal of the tube, the sample recovery was measured and the disturbed material from the top of the tube and at least one inch of soil from the lower end of the tube were removed, described and then discarded. Both ends of the tube were then sealed with wax and

fitted with end caps which were secured with tape. The taped end caps were then dipped in melted wax to prevent breaking the seals. Finally, the tube was labeled with the necessary information and placed in a container designed to reduce shock, vibration and disturbance during storage and shipment.

Soil samples for volatile organic analysis were collected in 40-ml vials from well clusters DGC-4 to DGC-13 and wells 1S, 1I, 2S, 3S, and 3I. The sample consist of 3 parts: a glass teflon-faced septum, and a screw cap. The samples were representative portions of split-spoon samples collected during drilling. Each split-spoon sample was cut open, using a clean knife, and representative soil sample taken from the center of the spoon. Two 40-ml vials were carefully filled approximately two-thirds full, capped, and labeled for future laboratory analysis. All samples were placed on ice and transported to the Dunn Geoscience office for refrigeration. Samples selected on a basis of preliminary field screening, described later, were then shipped in an insulated container via overnight courier to ERCO Laboratories in Cambridge. Massachusetts. Chain-of-Custody records were maintained for all samples sent to ERCO.

2.2.3 Volatile Organic Screening

As part of the drilling program for well clusters DGC-1 to DGC-13, Dunn Geoscience Corporation performed organic screening for volatile organic compounds on all split-spoon samples. An HNU Model PI-101 Photoionization Analyzer and Draeger detector tubes were used for the field screening.

The primary screening device utilized was photoionization analyzer. 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. In the PI-101, a chamber adjacent to the ultraviolet light source contains а pair of electrodes. When a positive potential is applied to one electrode, the field created drives any ions in the chamber to the collector electrode where the measured. The measured current is proportional to the concentration of organics sampled by the instrument's probe. The useful range of the instrument is from 0.1 to 2,000 ppm.

Drager detector tubes were also used on those samples in which the photoionization analyzer showed organic vapor concentrations exceeding 3.0 ppm. The Draeger tube method basically consists of a compound-specific detector tube (Trichloroethylene) and a hand-operated vacuum pump. The pump is used to draw a standard volume of air sample through the tube which undergoes a quantitative color change in the presence of the specific compound. The useful range of the detector tubes is from 2.0 to 200 ppm.

Representative portions of all split-spoon samples obtained from borings DGC-1 through DGC-13 were placed in clean, glass jars immediately after the split barrel sampler was opened. Although split-spoon sample recoveries varied, care was taken to prepare a standard quantity of sample. Each jar was sealed with metal foil and a screw cap labeled with the appropriate sample identification number. The sample was then heated to 40-degrees C. with a small portable

heater. After 30 minutes, the sample was taken from the heater, the screw cap removed, and the metal foil pierced with the eight-inch extension to the photoionization probe. The headspace was tested for the presence of organic vapors and the results recorded (Appendix C). For selected samples, the jars were resealed using new metal foil, reheated, and retested using the Draeger detector tubes.

2.2.4 Vertical Hydraulic Conductivity Testing

Vertical hydraulic conductivity tests were performed in soil borings during drilling. In the deep borings, the test depths corresponded to the anticipated screen placements. In the shallow and intermediate borings, the tests were performed at, or near, the top of the proposed screened intervals.

Test preparation included driving four or five-inch casing to the selected depth. The bottom two feet of the casing was then driven into undisturbed soil to insure that a good seal was set between soil and casing. A tricone bit was used to carefully drill down to the bottom of the casing. The hole was then flushed by pumping clean water through a tremie pipe until the return flow was clear. Finally, the tremie pipe was withdrawn and the casing refilled to the top with clean water. The actual test was run by measuring the drop in water level within the casing over a period of time, usually 15 minutes. The difference in water level with respect to time was used to calculate the vertical hydraulic conductivity as shown in Appendix D.

2.2.5 Monitoring Well Installation

Following the completion of drilling, each borehole was thoroughly flushed clean of cuttings and drilling mud. The borings were backfilled with bentonite pellets to a depth within two feet of the proposed screen bottom. Two-inch I.D., mechanical flush-threaded, schedule 40, PVC riser and 10-slot or 20-slot screen was used to construct all monitoring wells.

The deep and intermediate wells in well clusters DGC-1 to DGC-3 were installed with five-foot screens, whereas ten-foot screens, designed to monitor the entire range of water-table fluctuation were installed in the shallow wells. Well clusters DGC-4 through DGC-22 were constructed to screen the entire saturated portion of the aquifer above the basal glaciolacustrine clayey silts. Size No. 2 Morie sand was emplaced in the annulus opposite, and extending two to three feet above the top of, the screens in well clusters DGC-1 and DGC-2. Size No. 1 Morie sand was used as filter pack material in all subsequent wells utilizing 20-slot screen. Wells constructed of 10-slot screen were completed with No. 1/2 Morie sand filter pack. A five-foot bentonite pellet seal was installed above each Morie sand pack. A cement-bentonite grout was then pumped into the remainder of the annulus. Lockable, steel, protective casings were cemented over the PVC riser extending above the land surface to prevent unauthorized access into the monitoring wells. The protective casings were then primed and painted with special-purpose, non-contaminating paint developed by Sherwin Williams. Well construction details are shown in Appendix B.

2.2.6 Well Development

All monitoring wells were developed using the air-lift or bailing methods. Well development is necessary for the following reasons:

- To remove residual drilling mud and formational silts and clays, thereby preventing turbidity during sampling that could potentially interfere with chemical analysis; and.
- To increase the hydraulic conductivity immediately around the well, which in turn reduces the potential of the well yielding insufficient volume of water during the sampling procedure.

Well development took place after the completion of each series of well installation. Well clusters DGC-1 through DGC-13 were developed from June 11, 1984 to June 15, 1984, and clusters DGC-14 through DGC-22 were developed from August 16, 1984 to September 4, 1984. Three methods of well development were used and each is briefly described below. Development waters were collected for most intermediate and deep wells and for eight shallow wells. Specific dates of completion, development methods, and water collection information are tabulated in Table 2.1.

Method 1 - Air-Lift

The air-lift method involves pumping compressed air into the well forcing out water containing the undersirable fine sand and silt. The air is injected

Table 2.1.

	Method Of	Dates Of	Developmental
Well Cluster	Development	Development	Water Collected
D00 1		(11,10)	
DGC-1	1	6/11/84	
DGC-2	1	6/12/84	
DGC-3	1	6/11/84	
DGC-4	1	6/12/84	
DGC-5	1	6/8/84	
DGC-6	1,38	6/13/84	I,D
DGC-7	1,38	6/13/84	I,D
DGC-8	1,3s	6/14/84	I,D
DGC-9	1 I,D*	6/12/84	A11
DGC-10	1	6/14/84	A11
DGC-11	1	6/15/84	A11
DGC-12	1	6/14/84	A11
DGC-13	3	6/13/84	
DGC-14	3 2	8/20/84	All
DGC-15	2	8/17/84 (S,I)	A11
		8/20/84 (D)	
DGC-16	2	8/16/84	S,D
DGC-17	2	8/17/84	D
DGC-18	2 2	8/20/84 (D)	A11
		8/21/84 (S,I)	
DGC-19	3	8/23/84	
DGC-20		8/31/84	A11
DGC-21	2 2 2	8/31/84	A11
DGC-22	2	9/4/84	I,D

^{1 -} air lift method

^{2 -} modified air lift method

^{3 -} hand bailed

S - shallow well

I - intermediate well

D - deep well

^{*} The shallow well of cluster DGC-9 is dry.

into the well through a hose attached to an air compressor. The hose is cleaned with deionized water and lowered into the well until the lower end of the hose is positioned several feet above the top of the section. Positioning of the screened important to prevent air from entering the sandpack where it might become trapped and possibly induce chemical changes in the water. A back-washing action is also accomplished by releasing short bursts of air capable of momentarily raising the water column. This surging motion helps release fine sand and silt trapped in the sand pack or on the surface of the borehole. Once released, these fine particles may travel through the screen and eventually be evacuated from the well. Discharging and back-washing are alternated until the discharge is relatively free of fine-grained sediment.

Method 2 - Modified Air-Lift

This method is an adaption of the basic air-lift method and provides the following advantages over Method 1:

- No air enters the well;
- Water is removed directly from the screened portion of the well;
- The coalescer unit reduces any possibility of introducing foreign substances into the well;
 and.

 Up to three wells may be developed simultaneously using one air compressor and one coalescer.

Five-foot sections of one-inch diameter PVC pipe are screwed together and lowered into the monitoring well until the end of the bottom-most section of pipe is positioned within the screened section of the well. Attached to the bottom of the pipe are two one-way check valves separated by about three inches of one-inch PVC pipe. Both check valves close in a downward direction. Two air compressor hoses used. One connects the air compressor the coalescer, and the other hose runs from the coalescer down the one-inch PVC pipe well development assembly unit to approximately five feet above the upper check valve. The orientation of the check valves allows the pipe to fill with water. Activation of the air compressor momentarily shuts the upper check valve and forces the trapped column of water up and out of the pipe. The release of the water lowers the pressure on the top of the check valve allowing water to again pressure becomes enter the pipe until the air sufficient to blow out the column of water. This process repeats itself if the water pressure (head) is capable of balancing the air pressure created by the compressor. In wells lacking adequately long water columns, the water pressure is incapable of reopening the check valve allowing a fresh column of water to enter. Manual control of the air pressure necessary in these instances. The lower check valve assures that no air enters the monitoring well. In the majority of clusters developed using this method,

the intermediate and shallow wells were developed simultaneously while the deep well was developed independently. To prevent cross-contamination between wells, the one-inch PVC pipe was washed with water before introduction into each well.

Method 3 - Bailing

Five shallow wells were developed by hand bailing. The modified air-lift method was attempted but proved ineffective due to the limited amount of water in these wells. Teflon point-source dedicated bailers, subsequently used in ground-water sampling, were utilized. The bailer served both as a surge-block device loosening the fine-grained material from the well annulus, and as a mechanism to remove the water sediment from the well. The surging accomplished by rapidly raising and lowering the bailer within the screened section. Bailing was continued until the water had sufficiently cleared or five well volumes of water had been removed (approximately 200 bailer volumes).

2.2.7 Horizontal Hydraulic Conductivity Testing

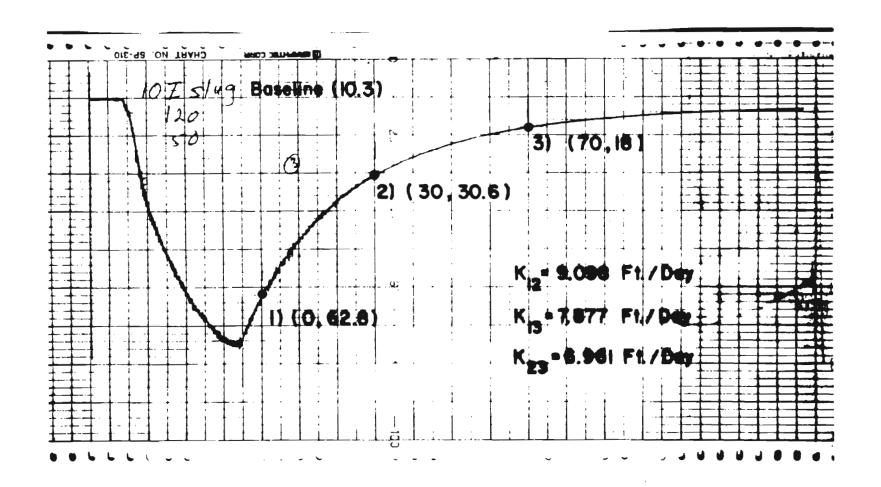
The horizontal hydraulic conductivity (K_h) of the Moreau Aquifer was estimated from the texture of its constituent deposits to range from 10^{-5} to 10^{-1} cm/sec (Freeze and Cherry, 1979, p. 29). This broad range was refined (10^{-3} to 10^{-1} cm/sec) through the use of field testing methods. Bail and slug tests performed on well clusters DGC-3, 4, 5, 8, 10, and 11 yielded quantitative information on the characteristics of the

aquifer in the study area. Pump tests were not employed due to the large transmissivity values expected, the absence of close observation wells, and the limited discharge rates of pumps available for 2-inch monitoring wells.

Both slug and bail 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, 5 gallons (30.64 feet well equivalent) of deionized water were quickly introduced (10 to 15 seconds) into the well casing. During bail tests, a 2-foot (1.35-foot well equivalent) or 3-foot (2.00-foot well equivalent) dedicated teflon bailer was rapidly removed from below the static water level. In either test, a pressure transducer set 5 to 10 feet 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 (Figure 2.1).

Calculations of horizontal hydraulic conductivity (Kh) were based on the following equation (Dept. of the Navy, 1982):

$$K_h = \frac{R^2}{2L} \ln \left(\frac{L}{R}\right) \frac{1n(H_1/H_2)}{(T_2 - T_1)}$$



EXAMPLE SLUG TEST - DGC Well IOI

Time Scale = 120 mm/min.

where: K = horizontal hydraulic conductivity (L/t)

R = inside radius of casing/screen (L)

L = length of uncased/screened portion of well
(L)

H = pressure/distance of water level from equilibrium value (chart units)

T = time expired from test start (t)

The method assumes that the aquifer tested is unconfined, homogeneous, and isotropic. The method is applicable to wells cased below the water table with uncased or screened extensions where L/R is greater than 8. It is. therefore. applicable intermediate and deep wells assuming a homogeneous and isotropic aquifer; it is not strictly applicable to shallow wells with uncased or screened portions above the water table. but it does approximation.

Results of the horizontal hydraulic conductivity testing are shown in Appendix D. As a check, the popular graphical method of Hvorslev (1951) was used to analyze the slug test data for well DGC-10I. The Hvorslev method yielded a hydraulic conductivity of 3.08×10^{-3} cm/sec (9.05 ft/day) compared to 2.82×10^{-3} cm/sec (7.98 ft/day) using the method described above.

Analysis of the results allows several generalizations:

- Although their results are within an order of magnitude, slug tests consistently yield lower hydraulic conductivity values than do bail tests. Generally, slug tests gave better estimates due to the greater volume of water displaced.
- The overall average horizontal hydraulic conductivity of the Moreau Aquifer based on all of the slug tests regardless of depth is 6.5 x 10 cm/sec (18.4 ft/day).
- The range in calculated hydraulic conductivity lies within two orders of magnitude (1.8 x 10^{-3} to 2.1 x 10^{-3} cm/sec for slug tests and 1.8 x 10^{-3} to 7.8 x 10^{-2} cm/sec for bail tests).
- The tests are repeatable.
- There is no apparent systematic spatial variation in hydraulic conductivity of the aquifer in the area tested.
- The deep wells show slightly lower hydraulic conductivity values than the intermediate wells (less than one order of magnitude difference).

A sensitivity analysis performed by varying the value used for L (screen length) showed that the method was not very sensitive to the parameter L. Therefore, silting of the well screen would not significantly alter calculated hydraulic conductivity values.

2.2.8 Water Level Measurements

Water level measurements were obtained from observation wells on five dates: July 11, July 19, July 27, August 28, and September 26. 1984. Measurements were made on Dunn Geoscience Corporation monitoring wells and GE/Moreau Site wells (O'Brien & Gere 1, 2, and 3; B-28; and Jebco wells). In addition, levels were obtained from Town of Moreau monitoring wells and a Department of Transportation well cluster when representatives were available to provide access. Data was gathered as follows:

- July 11, 1984 measurements on DGC wells 1 to 13, and Town of Moreau and GE/Moreau Site wells;
- July 19, 1984 measurements on DGC wells 1 to 12 and GE/Moreau Site wells:
- July 27, 1984 measurements on DGC wells 1 to 13, and Town of Moreau, GE/Moreau Site, and Department of Transportation wells:
- August 28, 1984 measurements on DGC wells 1 to 20, and Town of Moreau and GE/Moreau Site wells; and,

 September 26, 1984 measurements on DGC wells 1 to 22, and Town of Moreau and GE/Moreau Site wells.

Measurements were obtained using chalked а stainless-steel tape which was cleaned prior to each prevent cross-contamination. measurement to cleaning procedure involved rinsing the final four feet of the tape and weight with deionized water, then methanol, and a final deionized water rinse applied from squeeze bottles. Disposable laboratory gloves were worn by field personnel during water-level measurements.

The depth to water, indicated by a wetting line on the chalked section of the steel tape, was recorded for each measurement. This information was converted to water-level elevation with respect to mean sea level using the surveyed elevations of the measuring points (either top of PVC or steel casing). Water-level information is presented in Table 2.2.

The information in Table 2.2 was used to construct water-table contour maps and calculate hydraulic gradients discussed in a later section of this report.

2.2.9 Stream-Flow Measurement

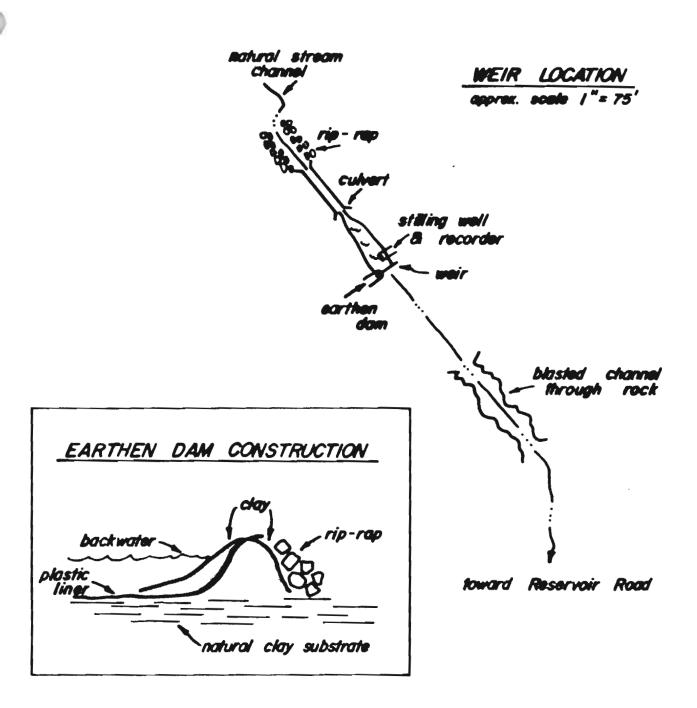
In order to measure the volume of water lost to the diversion ditch, a V-notch weir equipped with a stilling well and water-level recorder was installed in the diversion ditch (Figure 2.2). This installation provided a continuous and reliable record of stream flow discharge over a period of approximately two months.

Table 2.2. Water Level Information

Dunn Geoscience					
Wells	7/11/84	<u>7/19/84</u>	7/27/84	8/28/84	9/26/84
ls	296.72	296.64	296.56	296.25	295.98
lI	296.83	296.73	296.64	296.35	296.08
lD	297.25	297.23	297.20	296.82	296.54
2S	298.56	298.23	298.06	297.30	296.86
2I	295.50	295.39	295.27	294.96	294.69
2D	295.71	295.59	295.51	294.19	294.91
3S	295.56	295.48	295.39	295.11	294.89
3I	295.79	295.70	295.61	295.30	295.02
3D	295.76	295.67	295.59	295.29	295.01
4S	292.88	292.66	292.40	292.18	292.03
4I	292.71	292.53	292.29	292.07	291.91
4D	292.62	292.43	292.19	291.97	291.83
5S	304.15	304.06	304.09	303.67	303.35
5I	304.21	304.14	304.07	303.73	303.42
5D	305.76	305.71	305.69	305.20	304.85
6S	323.93	323.94	323.91	323.55	323.30
6I	323.93	323.94	323.91	323.55	323.28
6D	323.59	323.54	323.53	323.14	322.89
7S	324.46	324.41	324.41	324.10	323.76
7I	324.47	324.44	324.42	324.07	323.78
7D	324.06	323.37	323.95	323.53	323.27
8S	324.38	324.37	324.35	324.05	323.77
8I	324.41	324.39	324.39	324.04	323.77
8D	324.00	323.94	323.93	323.54	323.28
9S	Dry	300.68	Dry	Dry	Dry
9I	300.42	300.43	300.21	299.82	299.40
9D	300.36	300.22	300.12	299.72	299.31
10S	318.15	318.02	317.92	317.59	317.22
10I	318.20	318.08	318.04	317.63	317.28
10D	317.64	317.53	317.53	317.12	316.70
11S	324.25	324.24	324.26	323.85	323.53
11I	324.14	324.13	324.12	323.71	323.40
11D	323.63	323.65	323.67	323.14	322.74
12S 12I 12D	327.08 323.15 323.13	326.96 324.73 323.08	326.89 322.91 322.97	322.53 322.62	325.95 322.17 322.22
13	382.99		281.41	281.50	281.69
14S 14I 14D				320.83 320.94 320.83	320.57 320.68 320.56
15S 15I 15D				324.25 323.99 323.67	323.99 323.74 323.45
16S				318.69	318.33
16D 17				317.76	317.37
18S				315.44 324.99	315.11 324.63
181				324.99	324.63
18D				323.64	323.27

Table 2.2 Water Level Information Page 2

Dunn Geoscience Wells	7/11/84	7/19/84	7/27/84	8/28/84	9/26/84
19				324.55	324.30
20S				325.06	324.75
201				324.74	324.65
20D				324.85	324.37
215					324.88
21I 21D					324.88 324.67
228					318.70
225					319.03
22D					319.14
Sand Pit Stake			325.08	325.01	324.63
Town of Moreau Wells					
	225 76		225 71	225 26	22/ 02
A B	325.76 324.74		325.71 324.68	325.26 324.40	324.92 324.04
C	323.44		323.44	323.08	322.85
D	322.61		322.64	322.28	322.05
E	322.71		323.70	323.29	322.99
F	322.24		322.17	321.74	321.41
G	300.16		300.00	299.56	299.32
2	323.11		323.09	322.72	322.46
3	324.06		323.92	323.37	323.11
4	323.70		323.69	323.29	322.99
5	323.41		323.39	323.03	322.79
Caputo Site Wells					
OBG-1	325.74	325.64	325.43	325.12	324.82
OBG-2	325.76	325.69	325.50	325.16	324.83
OBG-3	325.78	325.77	325.58	325.16	324.81
B-28	325.57	325.52	325.46	325.13	324.82
Jebco 1.5	325.96		325.08	325.46	324.91
Jebco 2.0	325.13		325.05	324.39	323.78
Department Of Transportation Wells					
1			323.94		
1 2			323.94		
3			323.93		
-					



LOCATION OF WEIR

8

CONSTRUCTION DETAIL



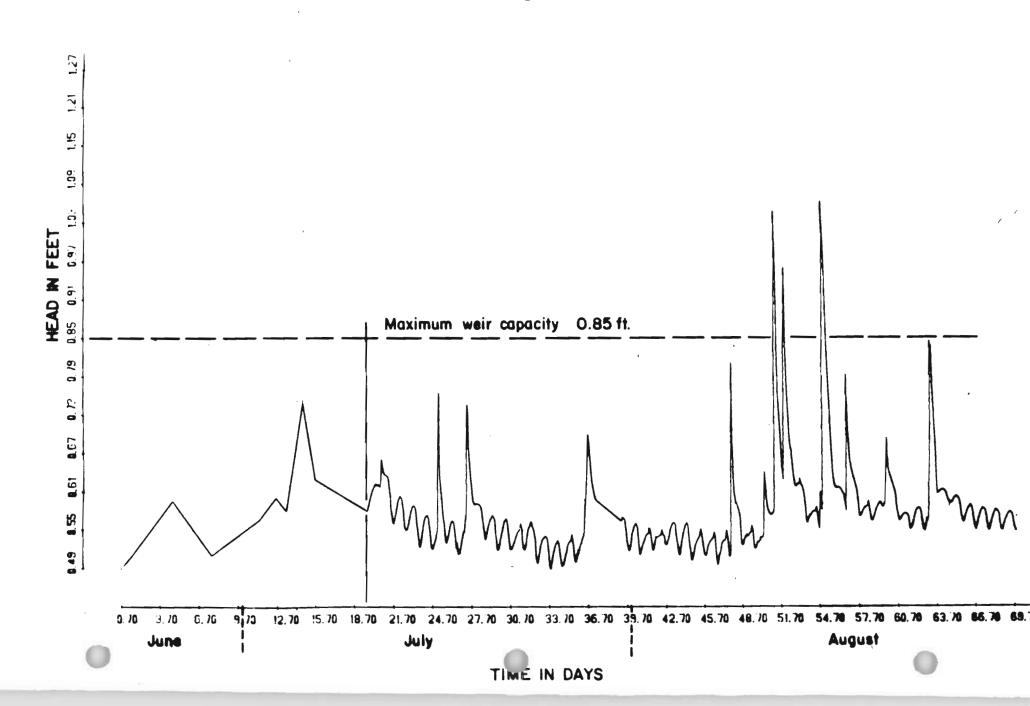
After two attempts to place the weir in the natural channel upstream from the diverted channel failed due to severe piping, the weir was successfully placed approximately 75 feet below the culvert (Figure 2.2) on June 21, 1984. The wide man-made channel at this location required the construction of an earthen dam to constrict flow. This dam was constructed using clay from the stream bank and lined with plastic sheeting to help prevent seepage. The weir, a 90-degree, V-notch cut into a 3-foot by 8-foot sheet of 3/4-inch plywood, was then entrenched into the earthen dam and semiconsolidated clay substrate. Backfilling with clay and a bentonite-sand mixture prevented seepage around and under the plywood sheet. Finally, the downstream side of the weir and earthen dam were riprapped using rock from the blasted section of the channel downstream.

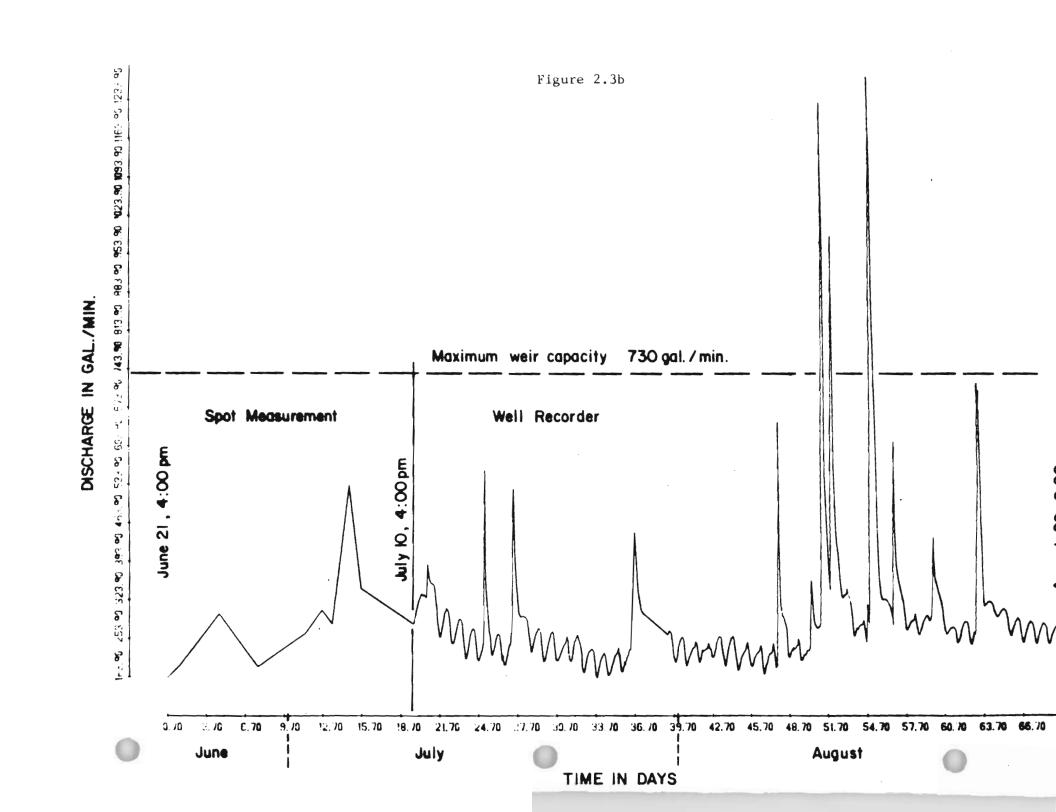
Measurements of the depth of flow (head) through the weir were gathered between June 21, 1984 and July 10, 1984. On July 10, 1984 an eight-inch stilling well and Steven's F-type water-level recorder were placed in the backwater 8 feet upstream from the weir. Head data were then collected continuously until weir failure occurred during a large storm on the evening of August 29, 1984. Head and time data, digitized from the recorder charts and corrected linearly to spot "control" measurements, were used to construct a weir hydrograph with discharge calculated as follows:

 $Q(gal/min) = 1094.17 \times H(ft)^{2.5}$

Plots of both weir head and discharge versus time are shown in Figures 2.3a and 2.3b.

Figure 2.3a





During the 69 days of weir operation, maximum and minimum flows were 1272 and 182 gallons per minute respectively. Average weir discharge was calculated as 287 gallons per minute. The hydrographs show that discharge is flashy, occurring in response to rainfall events. However, ground-water contributions to stream flow are significant and diurnal variations in flow due to evapotranspiration (ET) are apparent. Discharge is generally highest from 6:00 to 8:00 AM when ET demand is low; conversely, discharge is lowest from 4:00 to 6:00 PM when ET demand is high.

2.2.10 Water Quality Sampling

Ground water and surface water samples were collected in accordance with the protocols outlined in attachments 2 and 4, respectively, of the March 28, 1984 Remedial Investigation Work Plan and Implementation Schedule. The only modification was that surface water samples were collected by totally immersing the collection vial and capping it under water making sure to eliminate head space and air bubbles.

Two rounds of ground-water sampling and analysis were performed. The first took place between June 25 and July 9, 1984 encompassing well sites DGC-1 through DGC-13. The second round took place between September 5 and September 17, 1984 encompassing well sites DGC-1 through DGC-22, Town of Moreau wells TM-A through TM-G and TM-2 through TM-5 and Fort Edward well, FE-1.

Twelve rounds of surface water collection/analysis were performed between May 2 and October 4, 1984.

Results for both ground and surface waters will be discussed in later sections.

Residential well sampling followed the protocol presented in Appendix E.

Two major rounds of ground-water sampling from residential, domestic wells were performed during April 23 to May 8, 1984 and July 30 to August 8, 1984. More frequent periodic sampling was performed on a monthly or bi-monthly basis at selected residences.

All water samples (residential, surface, ground) were identified and given a sample number, logged into a chain-of-custody procedure, kept chilled, and subsequently shipped to the laboratory (via overnight express).

2.2.11 Surface Soil Sampling

On August 14, 1984, Dunn Geoscience Corporation recommended to General Electric Company a reconnaissance protocol to identify potential sites of PCB-contaminated soils. The protocol was modified slightly and submitted that day to EPA. The submitted protocol, with very minor additions, was accepted by EPA in a letter dated September 28, 1984. A copy of this letter and the protocol is found in Appendix E.

The soil sampling/analysis program is still in progress. The only phase totally completed is the staking of soil sampling locations, although a finished site map(s) has not been finalized. Staking the sites (according to the site map submitted to EPA) took place during the first three weeks in September, 1984. Since that time minor additions/corrections have been made to the initial map but have not altered the approved protocol.

The sites of soil sampling constitute the general areas around and to the east of the disposal site, bounded by Fort Edward Road. This was the area of access to the site during its time of operation.

The initial phase of sampling is still in progress, although as of the preparation of this report sample collection was suspended pending resolution of authorized site. This access onto the constitutes sampling all sites between a depth of four and eight inches below grade. Each site is dug with a hand shovel and the soil is transferred to glass bottles with aluminum foil-lined metal caps. Shovels are wiped clean with a paper towel, rinsed in deionized water, trisodium phosphate solution, and a final water rinse between samples. All samples are returned to Dunn Geoscience Corporation for analysis with a McGraw-Edison PCB field test kit.

It is the objective of this study to sample sites for PCBs in the soils at the grade that existed during the time of operation of the Caputo Site. In several areas this "original" grade has been disturbed by excavation or covered with "fill" materials. Sites where the original grade is not well defined or delineated were noted in the daily log and will be returned to at the completion of the 6-inch (4" to 8") sampling phase. Depths for sampling at these sites will be determined by visual inspection of excavations or soil core samples and surrounding land that does appear to be at original grade.

Field soil sampling was suspended on September 21, 1984 due to problems in obtaining access.

2.2.12 Aerial Photography

Aerial photography services were provided by Lockwood Support Services of Rochester,, New York. The study area and surrounding region was flown on April 9, 1984. A mylar manuscript, with a scale of one inch equals 200 feet and a 5-foot topographic contour was later supplied to Dunn Geoscience Corporation.

2.2.13 Surveying

Surveying of well clusters DGC-1 through DGC-13 was carried out by Dunn Geoscience Corporation during June and July, 1984. Clusters DGC-14 through DGC-22 were surveyed in September, 1984. All well elevations and locations were tied to United States Coast and Geodetic Survey bench marks. C.T. Male Associates, Latham, New York assisted Dunn Geoscience Corporation in resolving initial well elevation discrepancies created by inaccurate information on USC&GS benchmark elevations.

2.2.14 Cartography

The final base map was prepared by Dunn Geoscience Corporation from the mylar manuscript provided by Lockwood Support Services. The base map covers the entire study area shown in Figure 1.1. To produce a more functional map for purposes of the report, the original 200 feet to the inch scale was reduced to 400 feet to the inch.

2.3 Laboratory Testing

2.3.1 Grain-Size Distribution Analyses

Grain-size distribution analyses were conducted on 65 samples collected during test-hole drilling. Samples selected for analysis represent a wide range of locations and depths within the deposits. In addition, one sample of the well filter pack sand was also analyzed. All samples were analyzed according to ASTM tests C-117, C-136, and D-422 Standards.

The grain-size distribution analysis method separates the soil particles into size groups which were used to check the descriptions of the soil samples as described in the field. Mechanical separation was performed by sieving the samples through graded sieves down to a particle diameter of about 0.07 mm. Additionally, still finer particles of five samples were separated and classified using the hydrometer, or sedimentation, method. The grain-size distributions of the tested samples are included in Appendix F.

2.3.2 Triaxial Cell Testing

Empire Soils Investigations, Inc., conducted laboratory triaxial cell tests on three shelby tube samples collected during test-hole drilling. The tests were conducted to determine the vertical hydraulic conductivity $(K_{_{\rm V}})$ of the samples.

The test is performed in a triaxial cell, where the test specimen is enclosed in a latex rubber membrane, sealed at the base and cap with rubber O-rings. Filter paper, porous stones, and drainage leads facilitate the application of hydrostatic pressure to both ends of the specimen.

Pressure is generated by self-compensating mercury columns capable of delivering pressures up to about 140 pounds per square inch. Three mercury columns are used. One provides a backpressure to ensure saturation of the test specimen. The second column is set at a higher pressure to produce a hydrostatic gradient across the length of the specimen. The third column provides the cell confining pressure, which acts on the rubber membrane to prevent passage of water up along the sides of the specimen.

After the apparatus is assembled, and the triaxial cell is filled with degassed water, cell pressure, gradient pressure, and backpressure is gradually applied until the preset pressure levels on the self-compensating mercury columns are reached.

To minimize consolidation effects, net confining pressure of 10 pounds per square inch was selected for this series of tests in conjunction with a backpressure of 80 pounds per square inch. It was judged that this net confining pressure would approximate conditions in the field, while the backpressure would assure saturated conditions.

A hydrostatic gradient is established across the length of the sample by increasing the pressure at the the specimen while maintaining backpressure at the top. The rate of flow through the specimen is determined by burette readings, at timed intervals, on a volume change unit inserted in the gradient pressure line. The flow rate is routinely determined for two different gradient pressures. For this study, gradient pressures 0.4 to 10 pounds per square inch higher than the backpressure were used. At each gradient pressure, the hydraulic conductivity test stage is conducted for a sufficient period of time to accurately determine the flow rate.

The Permeability Test Report forms are located in contain all Appendix D and pertinent identification and specimen data. Graphical presentations are given of the data upon which the flow rate determination was made at the respective gradient pressures, as well as the vertical hydraulic conductivity at the respective hydraulic gradients applied during the test. Individual test results are tabulated in the Appendix.

2.3.3 Chemical Analyses: Soil Borings

Selected soil boring samples obtained during well construction were sent to the laboratory for chemical analysis of volatile (purgeable) halogenated gas hydrocarbons by chromatography. and analysis followed a procedure preparation developed by the New York State Department of Health. A copy of this procedure is included in Appendix E. The organic compounds analyzed for are listed below:

Bromodichloromethane

1,2-dichloropropane

Trans-1,3-dichloropropylene

Trichloroethylene

Dibromochloromethane

Cis-1,3-dichloropropylene

1,1,2-trichloroethane

Bromoform

1,1,2,2-tetrachloroethane
Tetrachloroethylene
Chlorobenzene
2-chloroethyl vinyl ether

Chloromethane
Bromomethane
Vinyl chloride
Chloroethane
Methylene chloride
1,1-dichloroethylene
1,2-transdichloroethylene
Chloroform
1,2-dichloroethane
1,1-trichloroethane
Carbon tetrachloride

Table 2.3 lists the individual sample site and date, pertinent location information and analytical comparisons to HNU and Draeger tube field testing. Laboratory data on all subsurface soil samples is located in Appendix J.

2.3.4 Chemical Analyses: Near-Surface Soils

A PCB Field Test Kit, manufactured by McGraw-Edison, was used to estimate the concentration of polychlorinated biphenyls (PCBs) in near-surface soil. Ten percent of these samples were rechecked by laboratory analysis.

The field kit testing procedure basically consists of the following four steps:

Extraction of PCB molecules from the soil;

SOIL BORINGS
VOLATILE ORGANICS

Table 2.3.

Sample	DGC	Depth	Sampling				Concentration,
No.	Site	(ft.)	Date	HNU	DRAEGER	Parameter	ug/L
812	5	50-52	5/24/84	29	_	ND	
828	5	60-62	**	140	_	ND	
827	5	65-67	**	130	_	ND	
820	5	70-72	u	21	_	ND	
813	5	85-87		4.0	-	ND	
879B	7	45-47	5/31/84	6.8	0	ND	
880B	7	55-57	**	56	60	1,2-trans-	530
						dichloroethylene	
						Trichloroethylene	1600
677	6	58-60	н	6.0	0	ND	
912	7	0-2	"	27	0	ND	
886	71	46-48	**	12.0	2.0	ND	
884A	6	96-98	**	4	0	ND	
913	8	25-27	6/7/84	7.6	-	ND	
915	8	55-57	**	7.2	0	ND	
918	8	45-47	н	4.2	-	ND	
920	8	35-37	*1	7.2	0	ND	
923	8	75-77	**	5.2	0	ND	
928	9	30-32	**	4.9	0	ND	
932	9	75-77	**	3.4	0	ND	
951	9	55-57	**	4.4	2.0	ND	
946	10	35-37	6/8/84	6.2	0	ND	
947	10	40-42	6/8/84	11.2	2.0	Trichloroethylene	99
114	105	26-28	6/12/84	3.2	0	ND	
862	11	28-30	6/8/84	5.3	0	Methylene Chloride	100
893	11	38-40	6/8/84	6.3	2.0	ND	
898	11	48-50	6/8/84	4.2	2.0	ND	
890B	11	58-60	6/8/84	2.3	30.0	1,1-dichloroethane	<110
						1,2-trans-dichloro-	
						ethylene	<110
						Chloroform	<110
118	11	74-76	6/8/84	2.8	20	Trichloroethylene	1100
113	111	46-48	6/11/84	3.8	0	Trichloroethylene	<76
145	12	35-37	6/13/84	3.0	0	ND	

ND - Not detected for all parameters in list

- Extraction of chloride substituents from the PCB molecules;
- Measurement of the chloride ion concentration using a specific ion electrode (probe); and,
- Relating chloride level to original PCB level in the soil.

The testing procedure is outlined for a single soil sample, although in practice groups of five samples were tested simultaneously. All testing equipment, including vials and chemicals for which trade names alone were given, were supplied by the Kit manufacturer. For the first 35 samples, calibration of the probe was carried out after each batch of five samples. Adjustments were rarely needed at this frequency, with two millivolts being the maximum correction required. Subsequently, the calibration frequency was reduced to every two batches (10 samples).

A soil sample jar is uncapped, foil top removed, and the contents emptied into a 12-inch by 9-inch by 2-inch metal baking pan. A small spatula is used to take six scoops of soil from various locations throughout the pan and fill an empty vial one-third to one-half full. The remaining soil is transferred back to the jar, fresh aluminum foil added, cap screwed on, and stored for possible further analysis. The pan is cleaned out using a paper towel in preparation for the next sample. The spatula is wiped clean with a paper towel and rinsed in deionized water. A volume of Soil

Extract Solvent, equivalent in weight to the soil in the vial, is added to the soil vial, capped, and shaken for 30 seconds. Mixing of the soil and extraction solvent will release a minimum of 25 percent of the soil's PCB molecules to the solvent.

A second vial, called a Reaction Vial, containing a premeasured amount of solvent has one milliliter (ml) of Reaction Fluid added to it. The resultant solution is capable of altering chemical bonds in PCB molecules, thereby releasing chloride ions. One ml of the PCB-containing solvent from the soil vial is transferred to the Reaction Vial using a 1-ml pipetor with a disposable tip. The reaction vial is shaken for twenty seconds. Five ml of a chloride Extraction Fluid is then added to the Reaction Vial. The vial is capped and shaken for ten seconds. After one or two minutes the liquid separates into two distinct layers, with the lower aqueous layer containing the chloride ions.

The probe is removed from a Rinse, in which it rests, and wiped with a fresh lab tissue. The probe is inserted through the top layer and into the bottom layer of the liquids in the Reaction Vial. Probe equilibration is obtained in less than two minutes at which time the response is recorded on the record sheet. The probe is wiped clean with a fresh lab tissue, swirled in a beaker of deionized water, wiped dry with another clean tissue, and replaced in the rinse until the next usage.

The recorded probe response (in millivolts) is related to PCB concentration (ppm) by a pair of measurement charts provided with the Kit. One chart is to be used when dealing with PCB as Aroclor 1242, and the other is to be used when dealing with PCB as Aroclor 1260. The method detection limit for Aroclor 1242 in soil is 36 ppm with this Kit. The results presented in Section 10 assume PCBs are present as Aroclor 1242, a reasonable assumption since Aroclor 1242 was used in capacitor manufacture. This assumption may over-estimate the actual concentration of PCBs present in a given sample. The charts demonstrate an inverse between proportionality the logarithm PCB concentration (ppm) and probe response (mV). charts are designed for direct reading when analyzing PCBs in transformer oil. Knowing that at least 25 percent of the PCB molecules are released from the soil after adding the Soil Extract Solvent, maximum PCB content is four times the value indicated on the chart. The calculated value is then recorded on the record sheet.

All soil samples collected have been analyzed with the PCB test kit. Duplicate analyses on ten percent of the samples are in progress. Soil samples containing detectable concentrations of PCB, as well as a number of selected samples, totaling a minimum of ten percent of all collected samples, were sent to Environmental Testing and Certification, Edison, New Jersey, for EPA SW-846 (8.08) analysis.

2.3.5 Chemical Analyses: Water

All aqueous samples - surface, ground and residential - were analyzed for volatile organic compounds by the same general chromatographic methods, either EPA Method 601 or EPA Method 624. Residential well and surface water samples were run individually or by combining several samples as a composite. Three 40 ml vials of water were collected from each sampling point. The first of these would be used to make a composite, consisting of no more than five samples. laboratory was instructed The to analyze the individual samples making up a composite if the concentration of one or more chemicals in the composite sample exceeded the trigger levels listed below:

TRIGGER LEVELS

Trichloroethylene	13.5/n ppb
Any Individual Organic	
Chemical	45.0/n ppb
Total Organic Chemicals	90.0/n ppb
Vinyl Chloride	4.5/n ppb

where n is the number of individual samples making up a composite.

If the concentration of one or more chemicals in an individual sample as measured by Method 601 falls within 10 percent of the action levels specified in the protocol, the sample was analyzed by Method 624. In this case the result of the Method 624 analysis will determine if action levels, listed below, had in fact been exceeded.

ACTION LEVELS

T	richloroethylene	15	ppb
A	ny Individual Organic		
	Chemical	50	ppb
I	Cotal Organic Chemicals	100	ppb
٧	'inyl Chloride	5	ppb

EPA Test Method 601 is a purge and trap gas chromatographic method applicable to the determination of purgeable halocarbons as provided under 40 CFR 136.1. EPA Test Method 624 is a purge and trap gas chromatographic/mass spectrometer (GC/MS) method applicable under the same 40 CFR 136.1 criteria.

Priority pollutant analyses were run on a few monitoring well samples.

The laboratory contracted to perform the analyses of all water samples was ERCO/Energy Resources Company, Inc., of Cambridge, Massachusetts. Their Quality Assurance Program plan is found in Appendix G.

3.0 GEOLOGY

3.1 Regional Description and Geomorphology

The greater Glens Falls region is an area of diverse geology and topography. Elevations range from about 1500 feet above mean sea level in the Luzerne Mountains at the western edge of the region to about 110 feet in the Hudson River floodplain south of the Village of Fort Edward. The total relief of the area is about 1400 feet.

East of the Luzerne Mountains a broad low relief plain, composed predominantly of sand, stretches east, roughly to the position of the Hudson River. The Hudson River, flowing eastward through the Luzerne Mountain gap, meanders across a relatively wide floodplain over the deltaic sandplain. To the east and northeast of the relatively flat-topped deltaic sandplain, low lying lacustrine clays deposited in glacial Lake Albany and its successors are observed. Northeast of the Glens Falls-Hudson Falls area, till hills or drumlins can be observed rising up above the lacustrine clays. The drumlins exhibit а roughly northeast-southwest orientation corresponding to the direction of glacial ice movement responsible for the till deposition.

East of the deltaic plain, lacustrine clays can be found extending out to the Taconic front, located about four miles east of the Village of Fort Edward. The Taconic Region is predominantly a till covered highland reaching elevations in excess of 1000 feet above mean sea level.

The major surface water body in the region is the Hudson River and the associated canal system. The Hudson flows primarily to the east from the Luzerne Mountain gap to Hudson Falls where a southerly flow is initiated. Clendon Brook as well as numerous unnamed intermittent streams draining the region, flow into the river.

The Hudson River flow ranges from a maximum daily discharge, as measured at the Fort Edward gauge station, of 35,000 cubic feet per second, to a minimum daily discharge of 1,000 cubic feet per second. (Note: 1 cubic foot per second equals 449 gallons per minute). The yearly mean flow of the Hudson is 4,981 cubic feet per second.

Located within the study area are four reservoirs; New, Sanderspree, Dority, and Christie. These reservoirs, located in the Town of Moreau, provide water to the Fort Edward Water District.

3.2 General Stratigraphy

Unconsolidated deposits of glacial origin overlie bedrock as shown in Table 3.1. The glacial deposits reach an observed thickness in excess of 120 feet. The vertical distributions of these deposits is shown with a vertical exaggeration of five to one in four cross-sections (Plates 3, and 4). Glacial deposits observed in the study area were deposited by or in conjunction with the Laurentide Ice sheet which covered much of northern North America during the Late Wisconsin glaciation. Three major types of sediments were found in the study area: fine-grained glaciolacustrine sediments, deltaic sand deposits. and till. Over most of the site. unconsolidated glacial deposits are overlain by solum (topsoil).

Table 3.1
GENERALIZED STRATIGRAPHY
AND GEOHYDROLOGY

THICKNESS STRATIGRAPHIC (Feet) UNIT		DESCRIPTION	GEOHYDROLOGIC UNIT	
5 to 88 Glaciodeltaic		Light brown to brown, coarse to fine sand with a trace of silt. Discontinuous layers of coarse sand and fine gravel. Occasional black-red sand seams.	Moreau Sand Aquifer	
0 to 28	Upper Glacio- lacustrine	Gray medium to fine sand with some silt. Frequent silt and clay seams.		
2 to 25+ Lower Glacio- lacustrine		Gray varved silt and clay. Frequent seams of fine sand in the upper section.	Confining Bed	
3± to ?	Lodgement Till	Dark gray sand and gravel in a clayey silt matrix		
?	Bedrock	Medium to dark gray, thinly bedded argillaceous limestone.	Bedrock Aquifer	

3.3 Bedrock

The Glens Falls region is underlain by three major bedrock types; metamorphic crystalline rocks, shelf carbonates, and basinal shales. The bedrock structure in the area is dominated by a series of roughly northeast-southwest trending high-angle normal (block) faults.

The Luzerne Mountains, which comprise the western border of the region are composed exclusively of intensely deformed high-grade Pre-Cambrian metamorphic rocks.

Late Cambrian to Late Middle Ordovician shelf carbonates are found in the area from South Glens Falls north to Glen Lake. The carbonates are composed of interbedded limestones and dolostones with occasional sandstone and siltstone members. The carbonate sequence is wholly contained in the Beekmantown, Black River, and Trenton groups. The total thickness of the carbonate sequence is in excess of one-thousand feet in some areas. The carbonates extend south of the Hudson River in the vicinity of Glens Falls, the regional dip is gentle, generally less than 5 degrees, and to the south.

Based on bedrock exposures in the Town of Moreau, the uppermost carbonate unit, Glens Falls limestone, appears to completely underlie the study area. The Glens Falls limestone is best described as a medium to dark gray, thinly-bedded limestone. Information from a local well drilling contractor indicates that the top of bedrock was encountered at a depth of 125 feet in drilling a well at the Moreau Elementary School. Below the Glens Falls limestone are other, older limestone formations which collectively form a relatively thick carbonate sequence.

In the area south of the Moreau study area, the Glens Falls limestone is overlain by Late Middle Ordovician basinal shales. Near the faulted contact with the limestone, the thickness of the shale is probably a few hundred feet. The Snake Hill shale extends south to Northern Albany County where it is up to 1300 feet thick. Unlike the underlying carbonate sequence, which is gently folded, the shale is moderately to intensely folded.

3.4 Glacial Till

The oldest unconsolidated deposit observed in the study area was a three-foot thick layer of glacial lodgement till. The till was found in the one boring, DGC-9D, which penetrated the overlying glaciolacustrine silts and clays. The dark gray till observed is composed of sand and gravel in a clayey silt matrix and overlies a relatively unweathered bedrock surface.

The lodgement till observed underlying the site is the product of deposition from a continental glacier. The till was deposited by the Hudson-Champlain lobe of the Laurentide ice sheet of Late Wisconsin Age. The Hudson-Champlain lobe represents the last of the four major North American glacial stages. As the Hudson-Champlain lobe advanced south, it scoured out older unconsolidated deposits and weathered rock down to a fresh bedrock surface. Subsequently, the dark gray till observed in DGC-9D was deposited over the relatively fresh bedrock surface.

Although the overlying glaciolacustrine silts and clays were completely penetrated by only one boring, the depositional processes, which deposited the till observed in that boring, were operating over the entire study area. Based on the mode of deposition, it is most probable that glacial till directly overlies bedrock throughout the site.

3.5 Lower Glaciolacustrine Deposits

Lower glaciolacustrine sediments observed during the drilling are primarily gray, soft, varved silt and clays. Silty seams and layers containing some fine sand are frequently encountered and are typically one-sixteenth inch to one-inch thick. The frequency of these seams and layers appear to generally decrease with depth.

Plate 5 illustrates the top of the lower glaciolacustrine clay unit beneath the study area and was developed from well log information obtained during test-hole drilling. The map indicates an irregular top of clay surface with approximately 40 feet of relief. The clay surface reaches a maximum observed elevation of 282 feet in the area of clusters DGC-10 and DGC-16. From this high point, the clay surface appears to slope down to the north, south, and west. No information for the area east of the high is available. In the region of the erosional escarpment, the clay begins to climb from a low elevation of approximately 250 feet to about 270 feet east of the escarpment. Although borings do not fully penetrate the lower lacustrine deposits, it is likely that the clay surface roughly corresponds to the buried bedrock surface.

The lower glaciolacustrine silts and clay overlie till and/or bedrock in the study area. The upper contact with the upper glaciolacustrine sediments is, by nature, gradational. The silts and clays observed are the product of predominantly vertical sedimentation in Glacial Lake Quaker Springs, the successor to Lake Albany. Fine-grained sediments introduced into the lake basin by the growing Glens Falls deltaic complex were suspended in the waters of the lake. The rhythmic nature of the sediments, varving, is probably indicative of relative lake energy due to seasonal changes. During the "summer" period, lake water was fairly agitated allowing primarily silt

to settle to the lake floor. "Winter" conditions, probable ice cover, allowed clay-sized particles to settle in the calm lake waters.

Based on data from DGC-9 and the Moreau Elementary School well, it appears that the thickness of lower glaciolacustrine silt and clay varies from at least 3 to 25 feet in the study area.

3.6 Upper Glaciolacustrine Deposits

Upper glaciolacustrine deposits of varying compositions overlie the lower glaciolacustrine silts and clays. The composition is variable but generally consists of gray medium to fine sand with some silt. Gray silt and clay seams are frequently observed in the upper glaciolacustrine deposit.

The contact with the lower glaciolacustrine deposits is gradational as is the upper contact with glaciodeltaic deposits. With the exception of DGC-9D, where no upper lacustrine deposits were observed, the thickness of the deposits range from about 28 feet in cluster DGC-15 to a minimum of 5 feet observed at cluster DGC-16. Although the thickness is quite variable, a few generalizations can be the boring information, the made. Based on glaciolacustrine deposits appear to be thickest over the northwestern portion of the study area. The southern, central portion of the study area, surrounding cluster DGC-10 appears to have the thinnest accumulation of upper lacustrine deposits. The deposit then appears to thicken both to the east toward DGC-4, and south toward cluster DGC-1. Although data are sparse to the west of DGC-9, it appears likely that the upper glaciolacustrine deposits thicken to the west as well.

The upper glaciolacustrine deposits, when present, are always found between lower glaciolacustrine silt and clay and glaciodeltaic sand deposits. The fine sand and silt which comprises this deposit owes its character and origin to both the lacustrine and deltaic environments. The glaciolacustrine environment is best thought of as transitional from deltaic to true lacustrine deposition. Deltaic fine sand and silt are interbedded with silt and clay of lacustrine origin.

3.7 Glaciodeltaic Deposits

The uppermost stratigraphic unit overlying the glaciolacustrine silts and clays consists primarily of light brown to brown, coarse to fine sand with a trace of silt. Discontinuous layers of coarse sand with a trace to some medium fine gravel are sometimes found associated with the brown sand deposits. Occasional medium and fine gravel dropstones are also found within the glaciodeltaic sand deposits. Red-black sand seams, composed predominantly of garnet and other heavy minerals are frequently encountered.

The thickness of glaciodeltaic deposits varies from a maximum of 88 feet in DGC-15 to a minimum of 5 feet in DGC-13. In glaciodeltaic deposits thicken west-northwest over the site. DGC-13 lies east of the roughly north-south trending erosional escarpment. As such, it is likely that some amount of glaciodeltaic sand has been eroded from the area. The sand reaches its lowest observed topographic position of 254 feet above mean sea level at DGC-14. The contact with the underlying upper glaciolacustrine deposits is gradational and is usually expressed as increasing silt, decreasing sand, color change from brown to gray, and the occurrence of silt and clay seams.

The glaciodeltaic deposits are part of the Glens Falls deltaic complex. The delta began forming as the Hudson-Champlain glacial lobe retreated north past the Luzerne Mountain gap. The gap is located approximately 6 miles west of the study area and separates the Luzerne Mountains and the Palmertown Range. During the northward retreat, the ice maintained the level of glacial Lake Albany at about 430 feet above sea level. Deglaciation of the Luzerne Mountain gap allowed glacial meltwaters derived from deglaciating uplands to flow through the gap into Lake Albany. During the initial stages of delta development, the study area was still ice covered.

Around the time the study area was deglaciated, Lake Albany lowered to about 350 to 360 feet in the Moreau area. Lowering of Lake Albany to Lake Quaker Springs level exposed the Luzerne Mountain gap. Delta building shifted to the east of the gap. Sand influx into the study area was minimal and lake bottom silts and clays are the major deposits. Successive progradation of the delta into the basin increased the amount of sand available for deposition over the site. The delta advanced over the site during Lake Quaker Springs time, depositing up to 88 feet of deltaic sands and gravels.

The deltaic deposits generally coarsen upward and gravel seams and lenses are confined to the upper one-half to one-third of the delta.

The generally upward coarsening of the deposit is characteristic of delta deposition. The coarsening was caused by the increasing energy available as the delta prograded and water and depositional waters became shallower.

Lowering of Lake Quaker Springs to a lower (280 feet) Lake Coveville level signaled the end of deltaic deposition over the study area. Erosion of the Glens Falls delta and the subsequent formation of the roughly North-South trending escarpment near the eastern edge of the study area occurred at this time. The escarpment is actually an erosional terrace caused by the erosive action of glacial Lake Coveville on the previously deposited glaciodeltaic deposits. To the east of the terrace, in the area of DGC-13, nearly all the deltaic sands have been removed. Sand thickness of only 5 feet was observed. Further to the south and east the sand completely disappears and glaciolacustrine deposits are exposed.

4.0 GEOHYDROLOGY

4.1 Geohydrologic Units

The stratigraphic units described in the section on geology can be grouped into three distinct geohydrologic units on the basis of hydraulic conductivity and other hydrologic properties. Their grouping into broader geohydrologic units does not suggest that the individual stratigraphic units are distinctly homogeneous. Variations in the lithology, texture, thickness and extent of the individual stratigraphic units are expected and do occur. However, the variations do not necessarily result in large differences in hydraulic characteristics, so that it is possible to combine them.

The three geohydrologic units in the study area are the Moreau sand aquifer, a semi-confined, artesian, bedrock aquifer, and a confining bed which separates them. These three units are shown opposite the corresponding stratigraphic units in Table 3.1.

Because the scope of the remedial investigation focused on the Moreau sand aquifer, neither the bedrock aquifer nor the confining bed were investigated in detail. In addition, the necessity to avoid unintentionally providing conduits through which contaminants might enter the bedrock aquifer, precluded test drilling to any significant depth below the Moreau sand aquifer. Nevertheless, brief descriptions of the bedrock aquifer and its confining bed precede the more detailed discussion of the Moreau sand aquifer below.

4.1.1 Semi-Confined Bedrock Aquifer

Not "into"

The semi-confined bedrock aguifer underlies the two other geohydrologic units present in the study area. It is composed of a sequence of carbonate rocks most of which are calcareous limestones. The aquifer lies directly beneath a confining bed which separates it from the overlying Moreau sand aquifer. Data from DGC-9, the only test boring completed into the bedrock aquifer, shows the elevation of the top of aquifer at this point is about 275 feet above sea level. Other data collected during the drilling of a well at the Moreau Elementary School indicates that the surface of the bedrock aquifer occurs approximately 125 feet below land surface, or at an elevation of about 215 feet. Very limited data from three domestic bedrock wells drilled along Fort Edward Road suggest that the top of the aquifer decreases from about 280 feet at the intersection with Bluebird Road to about 240 feet at the intersection of Sisson Road. Although these few points are too sparse to approximate configuration of the aquifer's surface, they do demonstrate that the top of the bedrock aquifer is irregular and expresses considerable relief within the study area.

Ground water within the bedrock aquifer occurs along the bedding planes and in the joints, fractures, and solution cavities of the carbonate rocks. A quarrying operation approximately 1.5 miles northeast of the GE/Moreau site has exposed carbonate rocks which comprise a portion of the bedrock aquifer. Observations made there suggest that the bedrock aquifer is generally dense and exhibits low hydraulic conductivity. However, well records from Northern Saratoga LCounty show that well yields from the

carbonate bedrock aquifer range from 4 to 300 gallons per minute with a median yield of about 22 gallons per minute. This information indicates that the bedrock aquifer, in at least some locations, has a moderate potential for development. In comparison, the yields of wells completed in a shale bedrock aquifer south of the Moreau study area range from two to six gallons per minute.

Due to the inaccessibility of the relatively few bedrock wells in the study area, no water-level measurements were made in the bedrock aquifer. However, the static water level in a Moreau Elementary School well, shortly after its completion, was reported as being above the top of the aquifer. The difference between the top of the aquifer and the reported water level indicates that the bedrock aquifer is artesian, and that water levels measured in wells completed solely within the aquifer represent a potentiometric surface.

4.1.2 Confining Bed

glaciolacustrine and lodgement till stratigraphic units described in the geology section collectively comprise a confining bed overlying the bedrock aquifer as shown in Table 3.1. Both stratigraphic units exhibit lower hydraulic conductivity than the overlying glaciodeltaic sand deposits due to their higher content of silt and clay. Therefore, the confining bed tends to retard the vertical flow of ground water through it.

Because the lower glaciolacustrine deposits comprise the upper portion of the confining bed, the clay surface illustrated on Plate 5 also depicts the top of the confining bed. As indicated on Plate 5, and as supported by the geologic depositional history of the region, the confining bed is continuous over the study area.

Based on the limited information available, the confining bed within the study area varies from about 3 to 25 feet thick. At most locations within the study area, the confining bed is presumed to include both the lower glaciolacustrine deposits and the lodgement till. However, the lodgement till is reportedly absent at the Moreau Elementary School well, whereas the lower glaciolacustrine deposits are absent at well DGC-9. Consequently, in such areas, the confining bed is comprised only of the single stratigraphic unit present.

90?

In order to preclude the introduction of contaminants into the bedrock aquifer, no test holes were drilled into the lodgement till. Consequently, no field or laboratory tests were conducted to determine the hydraulic conductivity of the till. However, the till is composed of an unsorted mixture of gravel, clay, silt, and sand-sized particles; the unsorted nature characteristic of till generally tends to make it a poor transmitter of ground water.

Laboratory triaxial testing conducted on the shelby tube samples of the lower glaciolacustrine sediments obtained in DGC-14, indicate a vertical hydraulic conductivity of about $5.1 \times 10^{-7} \, \mathrm{cm/sec}$. Field horizontal hydraulic conductivity tests were not performed on the lower lacustrine deposits. The presence of observed silt and fine sand seams, especially in the upper portion of the deposit, indicate that horizontal hydraulic conductivity is probably higher than the vertical hydraulic conductivity determined in the laboratory.

4.1.3 Moreau Sand Aquifer

The Moreau sand aquifer is the uppermost geohydrologic unit in the study area. The aquifer is comprised of the upper glaciolacustrine stratigraphic unit and the saturated portion of the glaciodeltaic unit as shown in Table 3.1. On average, the upper 75 percent of the aquifer is composed of the glaciodeltaic unit, and the remainder composed of the upper glaciolacustrine deposits.

The Moreau sand aquifer is the study area's most productive aquifer where it occurs north and west of the erosional scarp.

Ground water within the Moreau sand aquifer occurs under unconfined, or water-table, conditions. The base of the aquifer coincides with the top of the confining bed and is, therefore, depicted by Plate 5.

The top of the aquifer occurs at the water table and is free to rise or fall in response to ground-water recharge and discharge. The top of the aquifer was determined during the remedial investigation by measuring water levels in shallow wells located within the study area. Its position between July and September, 1984 is shown on Plates 6, 7, and 8. The three maps show that the elevation of the Moreau sand aquifer ranged from about 325 feet near the GE/Moreau site to about 285 feet at the erosional escarpment. The configuration of the aquifer surface was nearly constant during that time as evidenced by only slight changes in the contour lines on the plates.

On average, the aquifer is about 60 feet thick, but varies significantly. The aquifer is thickest in the northern and western portions of the study area reaching between 81 and 89 feet at wells DGC-14, 15, 20, and 21. Although data is unavailable, the history of geologic deposition in the area would suggest the aquifer may be thicker to the northwest. Aquifer thickness declines steadily toward the southeast, until the aguifer is only about 40 feet thick immediately north and west of the erosional scarp. The scarp represents the southeastern boundary of the aquifer in the study area since the thickness of sand decreases abruptly east of this position. Although section A-A' on Plate 3 shows that stratigraphic units comprising the Moreau sand aquifer extend beyond the scarp, their combined thickness has been reduced significantly such that their ability to store and transmit water has been greatly diminished. The decreasing aquifer thickness is not unexpected and reflects the processes of deposition and subsequent erosion described in Section 3.0.

In one isolated area west of the erosional escarpment, the aquifer thickness lessens to between 36 and 38 feet. This area is located near wells DGC-10, 16, and 17 and coincides with the mound in the underlying confining bed shown on Plate 5.

Field falling-head hydraulic conductivity tests were conducted on upper glaciolacustrine material in two boreholes, DGC-8D and DGC-6D. Results show that observed vertical hydraulic conductivity values are in the range of 4.0 to 6.2 x 10 cm/sec. Laboratory constant head triaxial tests were also performed on the shelby tube samples submitted from boring DGC-15D. The tube contained two types of upper glaciolacustrine material, gray fine sand, and gray silt. Laboratory testing indicates upper glaciolacustrine hydraulic conductivity from 1.7 x 10^{-4} cm/sec for fine sand to 1.2×10^{-5} cm/sec for upper glaciolacustrine silt. Horizontal hydraulic conductivity was measured for upper glaciolacustrine sediments in DGC-11D DGC-5D. Utilizing the slug method. a horizontal hydraulic conductivity value of about 2.0 x 10^{-3} cm/sec (5.7 ft/day) was obtained. Based on the field and laboratory testing, horizontal hydraulic conductivity appears to be greater than vertical hydraulic conductivity by approximately three orders magnitude. This large difference in conductivity is not unexpected. Silt and clay seams, occur sporadically within the upper reduce vertical glaciolacustrine hydraulic conductivity while having little or no effect on horizontal hydraulic conductivity.

Field horizontal hydraulic conductivity tests were performed on the glaciodeltaic deposits in well clusters DGC-3, 4, 5, 8, 10, and 11. The calculated horizontal hydraulic conductivities range from 2.4 x 10^{-3} to 2.1 x 10^{-2} cm/sec. with an average of 7.4 x 10^{-3} cm/sec (21 ft/day). A total of 25 field falling head hydraulic conductivity tests were conducted on glaciodeltaic deposits. The range of calculated values lies from 4.4 x 10^{-6} to 2.0 x 10^{-2} cm/sec. calculated average vertical hydraulic conductivity for glaciodeltaic sediments is 1.6×10^{-3} cm/sec. Based on calculations. the horizontal hydraulic the conductivity is approximately 4.5 times greater than the vertical hydraulic conductivity. This relationship is not unusual in stratified deposits such as the glaciodeltaic sands.

These test results indicate that both horizontal and vertical hydraulic conductivity vary with depth, coinciding with the two stratigraphic units which aquifer. On comprise the average. horizontal hydraulic conductivity is between three and four times greater in the upper 75 percent of the aquifer than nearer the base. However, the largest difference between the upper portion of the aquifer and near its base occurs with respect to vertical hydraulic conductivity. In this regard, the vertical hydraulic conductivity in the lower 25 percent of the aquifer is more then 300 times less than in the rest of the aquifer.

These differences are attributed to the increased percentage of fine-grained sediments, and greater degree of stratification that occurs closer to the aquifer base.

The short period of time allowed to complete the remedial investigation prevented collection water-level measurements for more than three months. In addition, the irregular and infrequent measurements available from documented sources prevents construction of a hydrograph for even one complete year. Nevertheless. enough previous data available to recognize that ground-water levels in the Moreau sand aquifer follow the classic annual cycle common to much of the northeast.

Ground-water level fluctuations in the Moreau sand aquifer are due to a net change in the amount of water stored within the deposits. The storage change results from the interaction of ground-water recharge and discharge in the study area.

Recharge to the Moreau sand aquifer is derived primarily from the downward seepage of rain or melted snow which occurs throughout the area. The main components of recharge in the study area are infiltration and percolation of part of the area's total precipitation. A detailed analysis of recharge is the subject of the water budget presented in Section 6.0. The three processes involved in recharge to the aquifer are as follows:

- infiltration of the water from the ground surface into the soil:
- percolation or downward movement of the water through the vadose zone; and,
- arrival of the water at the water table where it enters the aquifer.

The relationship between recharge and total precipitation at the site is governed by many factors which are type of precipitation. characteristics, soil cover, soil moisture conditions, and vegetative cover. These factors topography, determine how much precipitation will infiltrate the soil to move downward as percolation or return to the atmosphere by evapotranspiration. Therefore, since recharge is clearly a residual value, the amount of precipitation falling on the study area is not, by itself, an accurate indication of ground-water level changes. Only a portion of the water infiltrating the soil, for example, actually reaches the water table and enters the aquifer.

Once in the aquifer, ground water moves towards the erosional escarpment where it seeps out as springs or into streams in a process called discharge. Movement of the water in this process occurs under the influence of gravity and is in the direction of the hydraulic gradient.

The relationship between recharge and discharge in the study area can be considered generally in the context of the equation of hydrologic equilibrium. The equation is a statement of the fundamental principle of ground-water hydrology that recharge is equal to discharge plus or minus changes in ground-water storage. In symbolic form, it is:

 $R = D \pm \Delta S$

where: R is ground-water recharge

D is ground-water discharge

 ΔS is the change in ground-water storage

Under natural conditions, the aquifer storage as represented by the zone of saturation, tends to remain in balance with recharge and discharge. Recharge occurs intermittently during and immediately following periods of precipitation. Discharge, on the other hand, occurs continuously as long as the water table stands at a higher level than the discharge area which, in this case, is at the erosional escarpment. Since the aguifer is unconfined. the zone of saturation is free to expand during periods of recharge and to contract during the intervening periods. During periods when recharge discharge, water is added to storage in the void spaces of the deposits; consequently, the zone of saturation expands, and the water table rises. During the remainder of the time. discharge at escarpment, which occurs more or less continuously, depletes the water in storage; gravity drainage of the interstices occurs causing the zone of saturation to contract, and water levels to decrease.

This process operates in the study area as previous data suggests that water levels in the aquifer follow a fairly rhythmic seasonal pattern reflecting the net change of water stored in the aquifer due to the interaction of recharge and discharge. During the summer, the first part of precipitation absorbed from each rainfall event replaces the soil moisture previously depleted by plant growth. Consequently, as water levels fall, little, if any, excess water moves downward through the vadose zone to the water table to offset discharge to the springs and streams. During the winter and early spring, there is relatively little moisture deficiency in the soil zone so that most precipitation absorbed by the soil ultimately reaches the zone of saturation. Since the amount of water reaching the aquifer is greater than that being discharged there is a rise in the water table as storage increases and the zone of saturation becomes thicker. The high water levels are normally maintained months throughout the spring until increased evapotranspiration results in percolation accompanied by falling water levels during the summer. This cycle is repeated each year with only slight variations in the range of water level.

A first-cut analysis of the ground-water balance in the Moreau aquifer was made by utilizing the steady-state equation of hydrologic equilibrium. Ground-water discharge on August 28, 1984 was calculated for a cross-sectional area of the aquifer between well clusters DGC-1 and DGC-4, a lineal distance of about 2700 feet. Based on the local hydraulic gradient on that day (0.03 ft/ft), the average thickness of the aquifer (48 ft), and average

hydraulic conductivity values for the upper and lower portions of the aquifer (21 ft/day and 5.7 ft/day, respectively), the daily discharge was estimated at about 500,000 gpd.

The average daily volume of recharge was determined by applying the recharge rate (.0029 ft/day) calculated by the water budget described in Section 6.0 to the area (256A.) overlying that portion of the aquifer thought to discharge between wells DGC-1 and DGC-4. The calculated volume was about 243,000 gpd.

For the 48-day period leading up to the August 28 water-level measurements, the average decline in the water-table throughout the aquifer was 0.53 feet. Assuming an effective porosity of 30 percent, this decline represented about 0.16 feet of water per square foot of aquifer, or an average change in storage of about 278,000 gpd over the area of interest. Applying the equation of hydrologic equilibrium, the total volume represented by recharge and change in storage is about 520,000 gpd compared to 500,000 gpd for ground-water discharge. Given the inherent variability common to the three terms in the equation, the balance is very close.

4.2 Ground-Water Regime

4.2.1 Ground-Water Flow Network

Water levels measured on July 27, August 28, and September 26, 1984 were used to construct water-table contour maps presented as Figures 6, 7, and 8. Because only wells screened at the water table can be considered representative, only water-level elevations

from shallow wells were used (total of 34 wells). Over the three months of observations, water levels have declined nearly one foot.

The data indicate that a ground-water mound exists in proximity to the GE/Moreau Site causing flow toward the west, southwest, south, and southeast. However, gradients to the west and southwest are very slight, generally being in the range of 0.0001 to 0.002 ft/ft. Moreover, the major factor influencing ground-water flow in the study area is the northeast-southwest trending topographic marking the edge of the Moreau Aquifer and located approximately two-thirds of a mile south of the GE/Moreau Site. Consequently, flow lines toward the west and southwest change direction to the south and southeast. The ground-water gradients near the scarp are high -- up to 0.035 ft/ft -- and direct ground waters to the southeast. Thus, the principal gradients from the GE/Moreau Site are toward thd south and southeast.

Wells comprising each well cluster are screened at different depths. This construction enables the evaluation of vertical, as well as horizontal. flow direction. In general, the area surrounding the GE/Moreau Site is a zone of ground-water recharge as indicated by lower water elevations in progressively deeper wells at any one cluster. In contrast, the areas next to, and south of, the topographic scarp are ground-water discharge areas as indicated by higher water levels in the deeper wells than associated shallower wells. Discharge is further indicated by numerous seeps and springs at the scarp base and the presence of a flowing well (FE-1).

With the exception of well clusters DGC-2, 5, 12, and 18, water levels in shallow, intermediate, and deep wells do not differ greatly (generally less than 0.60 feet difference). This condition suggests nearly horizontal flow in the aguifer. At well cluster DGC-12, however, the water level in the shallow well is 4 feet higher than in the intermediate and deep wells, indicating an anomalous ground-water mound. It is important to note that this mound does not alter the flow of ground water in the intermediate and deep zones of the aquifer which is to the southeast. One possible explanation for the high water level in the shallow well is the existence of a layer of less permeable material in the 30 to 40-foot depth range. Withdrawal of ground water by the trailer park well at this location is from the intermediate and deep zones of the aquifer while recharge via the septic systems would be at the surface. A less permeable layer would allow the ground-water table in this area to rise under these conditions.

4.2.2 Ground-Water Flow Rate

Recognizing the differences in horizontal hydraulic conductivity within the Moreau sand aquifer, separate flow rates are calculated for the upper and lower portions of the aquifer. In both cases, however, the rate of ground-water flow is estimated by modifying Darcy's Law to account for the porosity of the aquifer:

V = KI/n;

where: V = average linear velocity of ground water

K = average horizontal hydraulic conductivity

I = average hydraulic gradient

n = effective porosity

The hydraulic conductivity values are the averages of the values determined by field testing and are 21 feet per day and 5.7 feet per day for the upper and lower portions of the aquifer, respectively.

The hydraulic gradient is the difference in water-table elevation between two points on a flow line divided by the length of the flow line separating the points. The gradient used in both estimates disregards vertical flow components, if any, and is calculated based on a flow line interpreted from equipotentials illustrated on the August 28. 1984 water-level contour map (Plate 7). It represents a decline in head from 325 feet to 285 feet over a distance of 4200 feet.

The effective porosity is assumed, on the basis of sample descriptions, to be 30 percent in the upper portion of the aquifer and 20 percent in the lower portion. The lower portion of the aquifer was assigned a lesser effective porosity due to a higher percentage of silt and clay at this level.

Based on these values, the average linear velocity is about 0.67 feet per day for the upper portion of the aquifer and about 0.27 feet per day for the lower portion. Therefore, the time of travel is about 18 years for ground water flowing entirely within the upper portion of the aquifer from the GE/Moreau site to a discharge point at the erosional escarpment near well DGC-3, a distance of approximately 4400 feet. Similarly, the time of travel is about 45 years for ground water following the same flow line primarily within the lower portion of the aquifer. In actuality, some flow would occur in the upper portion of the aquifer.

It should be noted that these results represent average values for the study area. Actual velocities are likely to vary throughout the aquifer due to heterogeneities within the system. Consequently, the results presented here should be recognized as reasonable estimates, based on a necessarily generalized model of the aquifer, and around which actual values will most likely be distributed.

5.0 INFLUENCE OF PUMPING WELLS

With the exception of the properties to the north served by South Glens Falls water districts, all the residential properties surrounding the site are supplied with water from individual, private wells. Major single well pumping centers within the study area include the Bluebird Terrace Trailer Park and the Moreau Elementary School. The trailer park draws its supply from a 2-inch well screened in the intermediate to deep sections of the unconsolidated aquifer. The Moreau Elementary School well is a deep bedrock well that draws its supply from the underlying bedrock aquifer.

To determine the influence of pumping wells on the movement of ground water, a continuous recording water level recorder was installed on monitoring well DGC-12S, which is located in the center of the trailer park approximately 100 feet from the supply well. For a period of one week, water levels in the shallow portion of the aquifer were continuously recorded. The straight-line trend data suggest that the trailer park pumping well has no influence on the surrounding shallow aquifer. The recorder was checked and found to be operating properly.

The recorder was transferred to the intermediate well adjacent to DGC-12S. Water levels monitored for a period of one week exhibited a slightly decreasing straight-line trend, attributed to anticipated seasonal water level decline.

Preparations were made to install the recorder on monitoring well TM-C, which is completed in the shallow upper portion of the unconsolidated aquifer. Well TM-C and adjacent intermediate and deep wells TM-5 and TM-2 are located adjacent to the Terry and Cheryl Drive residential area. Due to the number of homes (58), the area was considered as a center of pumping that could influence ground water

flow. The significant difference between this area and the trailer park is that the water supply is drawn from individual wells distributed throughout the area, each with an average estimated yield of 150 gallons per day.

Observed activities at the well sites raised questions as to the security of the well and water level recorder. It was decided not to install the recorder on any of the wells at this site until modifications could be made to the recorder housing to provide better security for the well. The modifications were in progress at the time of the preparation of this report.

Evaluation of the data obtained over the two week period at DGC-12S and DGC-12I indicates that the transmissivity of the aquifer material is high enough that the influence of pumping the trailer park production well does not extend far enough to reach the DGC-12 well cluster. Supporting this observation is the description of the aquifer material logged at DGC-12 and the short term pumping periods that may preclude the formation of a significant cone of depression around the production well.

6.0 WATER BUDGET

Mean annual precipitation in the area near the GE/Moreau Site is 35.21 inches. This figure represents a volume of 612 million gallons of water per square mile per year. As shown in Figure 6.1, the distribution of mean monthly precipitation is relatively uniform throughout the year. Mean monthly precipitation is approximately three inches per month except in January and February when it is slightly lower.

Potential evapotranspiration (PET), as calculated by the Hamon (1961) Equation is 24.61 inches annually. The concept of PET differs from actual evapotranspiration (ET) in that PET assumes an unlimited availability of water for the evapotranspiration nevertheless. PET values serve as reasonable approximations of ET in most instances. Figure 6.1 also shows the variation of PET calculated from weather data collected at the Glens Falls FAA Airport, located approximately four miles northeast of the GE/Moreau Site. This graph is representative of PET at the GE/Moreau Site. Because PET is primarily a function of air temperature, the shape of the PET curve bears a close resemblance to a graph of mean monthly temperature.

The interaction of the various components operating within the hydrologic cycle may be summarized by a water budget of the study area. In a water budget, mean monthly PET and overland runoff, if any, are subtracted from mean monthly precipitation to obtain a water surplus or water deficit value, and ultimately, a ground-water recharge estimate.

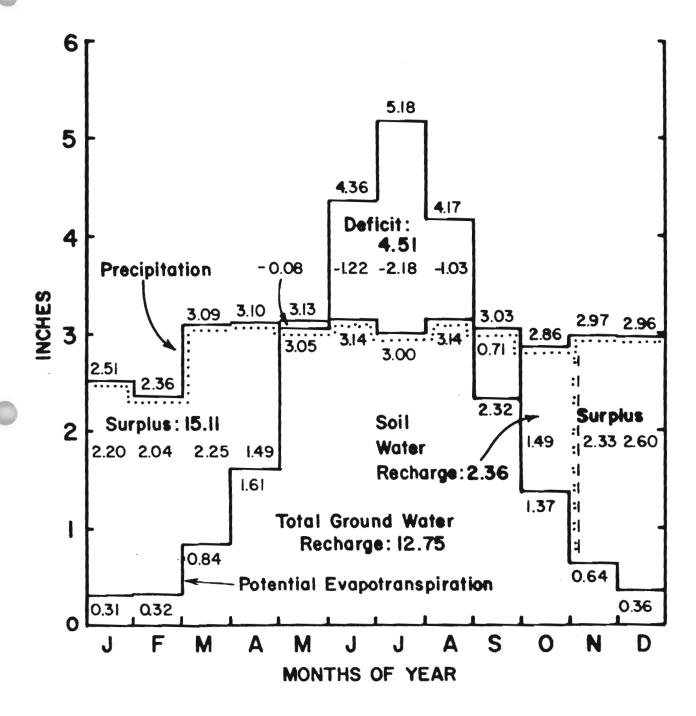


Figure 6.1 WATER BUDGET FOR THE AREA NEAR THE GE MOREAU SITE

Figure 6.1 illustrates a water budget for the area near the GE/Moreau Site. Examination of the graph reveals that a water surplus exists from January through April and from September through December and during which times ground-water recharge occurs. During the warmer summer months, PET is high due to increased insulation and vegetative demands, and recharge ceases.

During this period of high PET, the moisture content of the soil drops below field capacity, creating a soil moisture deficit. Before recharge can occur following the summer months, the soil must be returned to its field capacity. Only when this condition has been met will surplus water be available as recharge.

In this example, 35.21 inches of water enters the hydrologic system annually. At the site, the absence of streams indicates that overland flow rarely occurs in important quantities. Therefore, overland flow is assumed to be negligible for the purposes of this calculation. The streams that are present south of the site are assumed to represent baseflow from the ground-water reservoir and are assigned to total ground-water discharge which occurs primarily as seeps and springs at the foot of the topographic scarp. Consequently. PET alone removes much of the water entering the study area, resulting in an annual water surplus of 15.11 inches. The soil moisture deficit of the soil at this site was determined to be about 2.36 inches. Therefore, subtracting this value from the annual surplus leaves 12.75 inches of water available as ground-water recharge to the water-table aquifer. This estimate of ground-water recharge represents 36 percent of the area's annual precipitation or about 222 million gallons of water per square mile per year.

7.0 GROUND WATER MODELING

7.1 Introduction

A ground-water model was developed to aid the geohydrologic investigation in the vicinity of the GE/Moreau site. The model was used as a tool to help interpret and predict ground-water flow and contaminant movement. It was developed to simulate ground-water flow in the Moreau aquifer on a regional scale. The model calculates ground-water elevations within the Hudson River meander north of Reservoir Road (see Plate 9 and 10). This area is larger than that covered on the Dunn Geoscience field investigation base map. This regional perspective, however, is necessary for the following reasons:

- to locate the position of a regional ground-water divide that should exist in the Moreau aquifer in proximity to the site;
- to include the true aquifer boundaries in the model;
 and.
- allow an evaluation of the influence of distant aquifer boundaries on the ground-water flow in proximity to the GE/Moreau site.

In general, a ground-water model is designed to represent reality by quantitatively and qualitatively mimicking the physical and hydraulic aspects of the actual aquifer system. The modeling provides a powerful quantitative tool that is used to synthesize existing data, indicate data gaps, assess site geohydrology, and evaluate proposed corrective actions by predicting their effect on the movement of ground-water contaminants. Models, however, will always be less complex than the real systems they represent.

The results of a model are constrained by the quality of field data necessary as model input. As such, emphasis on model assumptions, field conditions, and data limitations is essential. In this report, emphasis has been placed on defining the regional ground-water flow pattern while at the same time scrutinizing model assumptions and data limitations.

7.2 The Numerical Model

The two-dimensional numerical model, as applied in this study, simulates the drainage of water through the water-table aquifer surrounding the GE/Moreau Site. The boundaries for the modeled aquifer system are the prescribed head and the prescribed flux. The information gained from the model is the distribution of hydraulic head.

The model used is the United States Geological Survey (USGS) two-dimensional (2D) finite-difference ground-water flow model. It was written and documented by Trescott, Pinder, and Larson (1976). It is used to solve the two-dimensional ground-water flow equation. The flow equation is a form of the continuity equation (principle of conservation of mass) which states that:

Inflow - Outflow = Rate of Accumulation or Depletion

For a water-table aquifer with two-dimensional flow and assuming alignment of the coordinate axes with the principal components of the hydraulic conductivity (k) tensor, the flow equation may be expressed as:

$$\frac{\partial}{\partial x} \left(K_{xx} b \frac{\partial h}{\partial x} \right) + \frac{\partial}{\partial y} \left(K_{yy} b \frac{\partial h}{\partial y} \right) = S_{y} \frac{\partial h}{\partial t} + W(x,y,t) \tag{1}$$

where:

Most aquifer systems have variable properties and complex boundary conditions, and the aquifer analyzed in this study is no exception. Due to the variability of the aquifer materials as well as the non-linearity of equation 1, an exact analytical solution to the partial differential ground-water equation cannot be obtained directly. Therefore, approximate numerical methods were employed. In this case, the numerical methods involve the substitution of finite-difference approximations for the partial derivatives in the flow equation. To do this, the area of interest is subdivided into a number of smaller subareas in which the aquifer properties are assumed uniform.

In this study, a variably spaced finite difference grid is used to subdivide the project area into rectangular blocks (shown in Plate 9). The point at the center of each block is called the node, and the nodes are located by the (i,j) indices (see Figure 7.1). The hydraulic head at a given node is assumed to be the average head over the area of the block. Time dependence of the hydraulic head is handled by dividing time into increments or steps; the head at a given node is treated as constant within each time step, and it is assumed to vary in stepwise fashion from one time step to the next.

Using this pattern, the continuous partial derivatives in equation 1 are replaced by finite-difference approximations for the derivatives at each node for a given time step. The result is N equations and N unknowns, where N is the number of blocks representing the aquifer, and the unknowns are the head values at the nodes per time step. The finite-difference equation for unconfined ground-water flow at node (i,j) is:

$$\frac{1}{\Delta x_{j}} \left[K_{xx(i,j+i_{2})} b \frac{(h_{i,j+1,k}^{-h}i,j,k)}{\Delta x_{j+i_{2}}} - K_{xx(i,j-i_{2})} b \frac{(h_{i,j,k}^{-h}i,j-1,k)}{\Delta x_{j-i_{2}}} \right] + \frac{1}{\Delta y_{i}} \left[K_{yy(i+i_{2},j)} b \frac{(h_{i+1,j,k}^{-h}i,j,k)}{\Delta y_{i+i_{2}}} - K_{yy(i-i_{2},j)} b \frac{(h_{i,j,k}^{-h}i,j,k)}{\Delta y_{i-i_{2}}} \right]$$

$$= \frac{S_{y(i,j)}}{\Delta t} (h_{i,j,k}^{-h}i,j,k-1) + W_{i,j,k}$$
(2)

where

hi,j,k is the hydraulic head at time-level k for node (i,j)
(L);

 $yy(i+i_2,j)$ is the hydraulic conductivity in the y-direction between node (i,j) and (i+1,j) (L/t);

 $S_{_{_{f V}}}$ is the specific yield at node (i,j) (dimensionless);

b is the saturated thickness of the aquifer at node (i, j) (L);

 Δx_j , Δy_i are the space increment in the appropriate direction (L):

At is the time increment (t);

 Δx is the distance between node (i,j) and node (i,j+1) (L);

i is the index in the y-direction;

j is the index in the x direction;

k is the time index.

In this model application, the source term W(x,y,t) includes both evapotranspiration and precipitation.

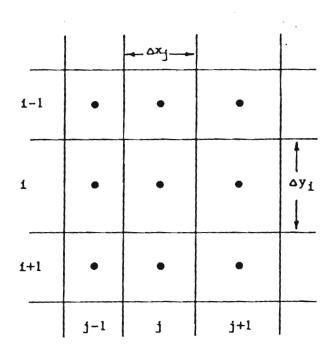


FIGURE 7.1

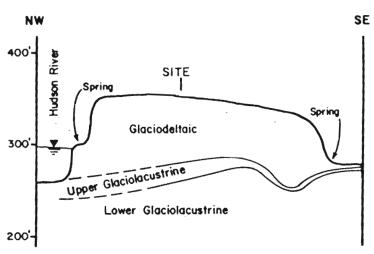
Index Scheme for Finite-Difference Grid Written for Node (1,j) (Trescott, Pinder, and Larson, 1976)

7.3 Conceptual Model, Boundary Conditions, and Data Requirements

The application of ground-water models involves three main phases: 1) system conceptualization, 2) history matching or calibration. and 3) prediction. The model conceptualization involves organizing available information on the hydrogeology and the site engineering design into an internally consistent framework. This framework the backbone of the conceptual model that qualitatively describes the behavior of the hydrogeologic ground-water system. This conceptualization is then translated into mathematical terms such as boundary conditions and hydraulic coefficients.

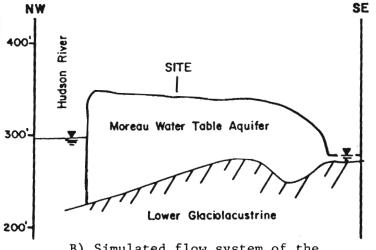
The conceptual model of the ground-water flow system in the vicinity of the GE/Moreau Site is illustrated in Figure 7.2. In order to represent this flow system as shown, a number of simplifying assumptions had to be made. The site specific assumptions inherent in this conceptual model are:

- the shallow ground-water system comprises the glaciodeltaic and upper glaciolacustrine deposits and it is a water-table aquifer;
- the hydraulic properties of the shallow aquifer are isotropic and homogeneous;
- all ground-water flow in the zone of saturation is horizontal, that is, two-dimensional;
- the shallow water-table aquifer is bounded by constant head boundaries to the west, north, and east of the study area. These constant head boundaries correspond with the ground-water elevations at the base of the sand cliffs along the Hudson River (west and north of



A) Natural flow system in the Moreau water table aquifer.

- Glaciodeltaic seidments; precipitation infiltrates vertically to recharge water table; ground-water discharges as springs eventually reaching the Hudson River and the Ft. Edward Reservoirs.
- Upper Glaciolacustrine sediments; groundwater flows to discharge as springs eventually reaching the Hudson River and the Ft. Edward Reservoirs. These sediments are 3 to 4 times less permeable than the glaciodeltaic sediments.
- Lower Glaciolacustrine sediments; semipermeable sediments



B) Simulated flow system of the Moreau water table aquifer.

- Glaciodeltaic and Upper Glaciolacustrine sediments comprise water table aquifer with ground-water flowing horizontally and discharging as springs; the groundwater head in the vicinity of the springs is constant.
- Lower Glaciolacustrine sediments comprise the impermeable basal boundary of the aquifer.

Figure 7.2 - Conceptual Model of the Moreau water table aquifer.

the site) and at the base of the small scarp along the 300-foot land surface elevation contour east and southeast of the site. The southwestern model boundary does not correspond with the true aquifer limit. This boundary was first represented as a no-flow boundary (zero flux) then it was represented as a constant head boundary. The shape of the ground-water contours in the southwest portion of the modeled area changes depending on the choice of the southern boundary condition. However, since this boundary is over a mile away from the primary area of interest, its impact on the ground-water flow patterns within the study area is minimal;

- the lower glaciolacustrine deposit and lodgement till underlying the glaciodeltaic sediments serve as an impermeable boundary, that is, no-flow;
- water in the shallow water-table aquifer is derived from precipitation and aquifer storage; and,
- water in the shallow water-table aquifer is discharged
 as springs and through evapotranspiration.

Modeling this conceptualized ground-water flow system requires certain hydrogeologic information in order to simulate the observed water-level distributions and the effects of proposed remedial measures. The data arrays used to simulate the ground-water flow in the shallow water-table aquifer in the vicinity of the GE/Moreau Site are as follows:

- a 42 x 43 rectangular finite difference grid; the upper elevation of the lower glaciolacustrine sediments;
- an initial water-level distribution;
- the water-bearing zone hydraulic conductivity;
- precipitation and evapotranspiration rates;
- land surface elevation.

7.4 Model Calibration

The goal of model calibration is to adjust model input until a reasonable match between observed and computed water levels are achieved. During calibration it is imperative to constrain the input parameters to realistic values which are best if derived from site specific field testing. Another important guideline for calibration is to never make input more complex than available data warrant; the model can always be updated as new data become available. These general guidelines were followed in calibrating the numerical model of the shallow ground-water flow in the vicinity of the GE/Moreau site.

The ground-water flow model was preliminarily calibrated under steady state conditions. The calibration involved adjusting the hydraulic conductivity, precipitation, evapotranspiration, and the boundary conditions. As yet, an exact match to the observed ground-water elevation contours has not been achieved. However, the general trend of the observed contours has been simulated. Plate 11 compares the ground-water elevations simulated in scenario six to the observed 9/26/84

ground-water elevations. A more refined calibration is possible but not necessary until further data is available.

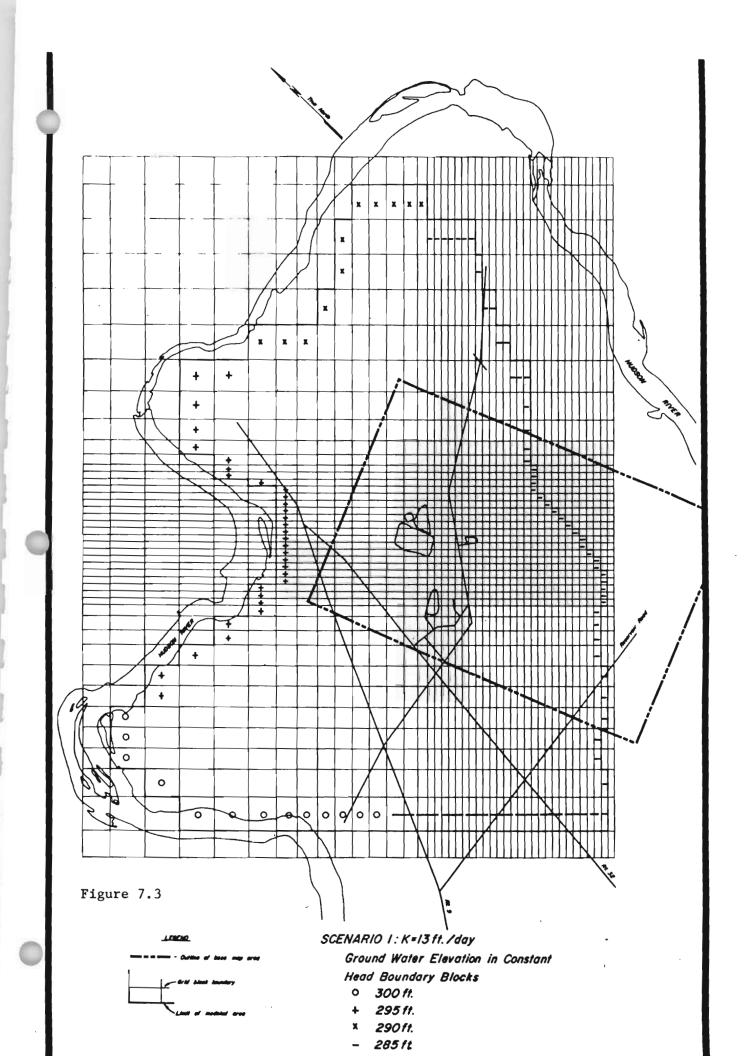
During calibration, a variety of simulations were made using hydraulic conductivity values ranging from 5.6 to 22.4 ft/day to calculate ground-water elevations. Precipitation was adjusted in each simulation until ground-water elevations in the vicinity of the site were in the range of 325 feet above the mean sea level. In some simulations the boundary conditions were altered to evaluate impacts on the water table configuration in the immediate vicinity of the site.

In every simulation two important features in the shape of the water table are encountered. First, a ground-water divide trending northeast-southwest occurs northwest of the site. In every scenario modeled, this divide persists and remains northwest of the site. Second, ground-water mounds exist both northeast and southwest of the site. Thus, according to model the site overlies a saddle shaped portion of the water table surface. This saddle shape is important because it indicates a ground-water mound exists south of the Myron Road area and trends to the southwest. This mound inhibits ground-water movement to the southwest. Similarly, the mound northeast of the site inhibits ground-water movement in that direction. table highs inhibit Thus, the model indicates water movement from the GE/Moreau ground-water site to southwest, west, north, and northeast. This conclusion is in accord with the observed movement of contaminants as can be seen by the shape and orientation of the plume shown in Plate 12.

Model calibration was focused where water level data was available; that is, downgradient and in proximity to the site. As such, calibration of the entire modeled area was not attempted. Some specific calibration simulations will be discussed next. The model results are presented both in the regional (total grid) point of view and locally, i.e., illustrating only the area covered by the Dunn Geoscience field investigation base map.

The first two scenarios (1 and 2) would be identical except the northeast boundary of the model was changed in scenario 2. Approximately 40 grid blocks were added to the model thus enlarging the size of the simulated aquifer. In both scenarios uniform values of hydraulic conductivity. precipitation, and evapotranspiration were used. These values were K = 13 ft/day, P = 20 inches/year, and ET = 9.8inches/year. The south-southwest boundary condition was zero flux (no flow). All other boundary blocks were constant head. These constant head boundaries varied from 300 to 295 to 290 to 285 feet going around the model grid clockwise from the southwest. These boundaries were assumed to correspond with ground-water elevations along the Hudson River and along the of the erosional scarp east of the northeastern constant head boundary that was expanded, in scenario 2, was set at 285 feet in both scenario 1 and 2. The simulated ground-water elevations and the boundary conditions for scenarios 1 and 2 are shown in Figures 7.3 through 7.8. As can be seen, no change in the ground-water contours is perceptible in the vicinity of the GE/Moreau site (compare Figures 7.5 and 7.8).

In the next two scenarios (3 and 4), the hydraulic conductivity and the precipitation rate were increased. Also, the southeastern constant head boundaries were lowered to an



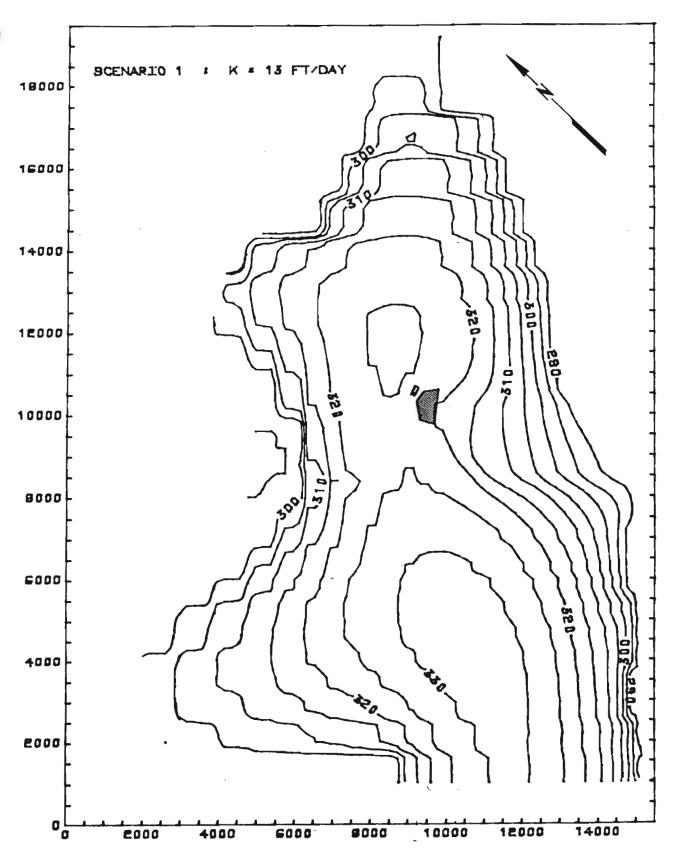


Figure 7.4 - Regional perspective of simulated ground water elevations for scenario 1; P = 20 inches/year, ET = 9.8 inches/year, K = 13 ft/day; stipled pattern illustrates the site location; coordinate units are feet.

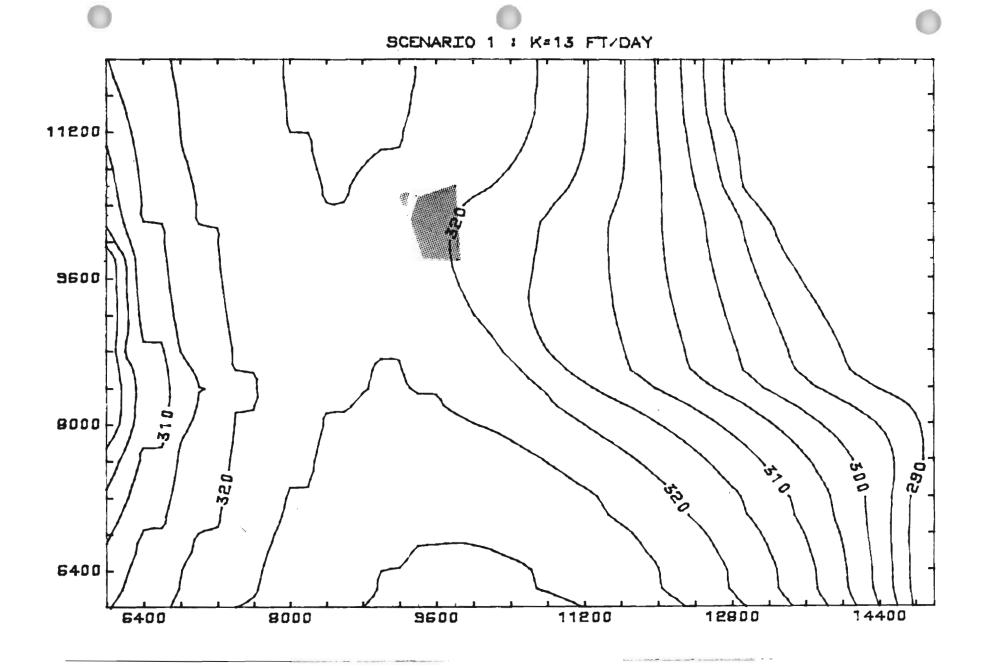
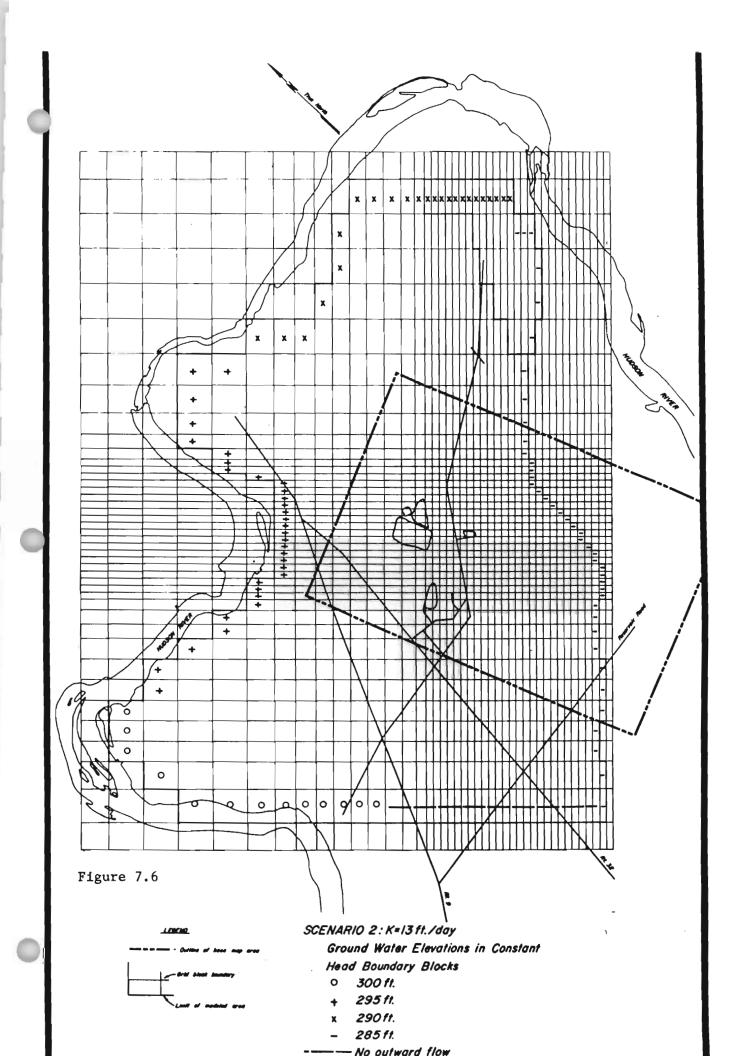


Figure 7.5 - Local perspective of simulated ground water elevations; stipled pattern illustrates site location; the coordinates are in feet.



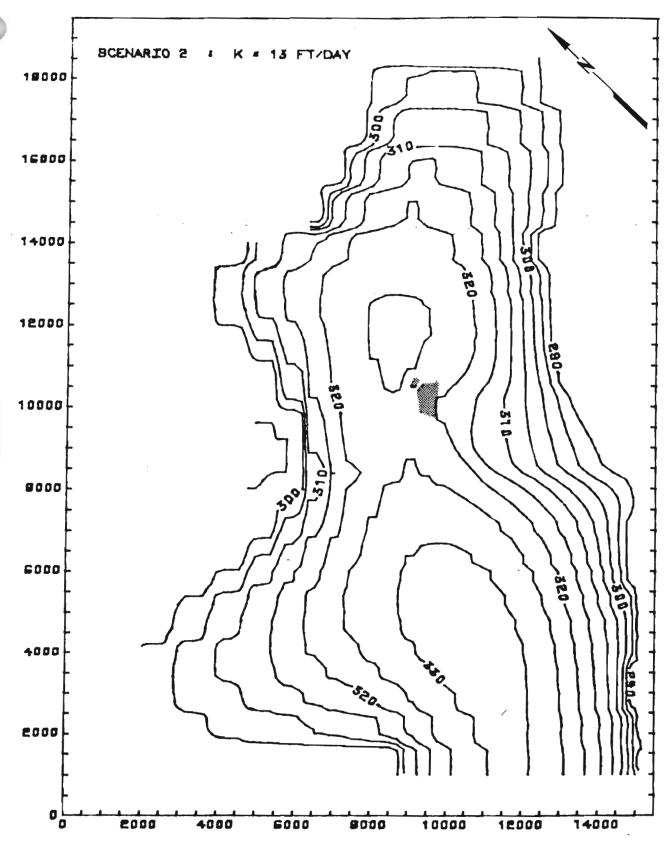


Figure 7.7 - Regional perspective of simulated ground water elevations for scenario 2 P = 20 inches/year, ET = 9.8 inches/year, K = 13 ft/day.

Note the change in contours in northeast corner of plot when compared with Figure 7.4.

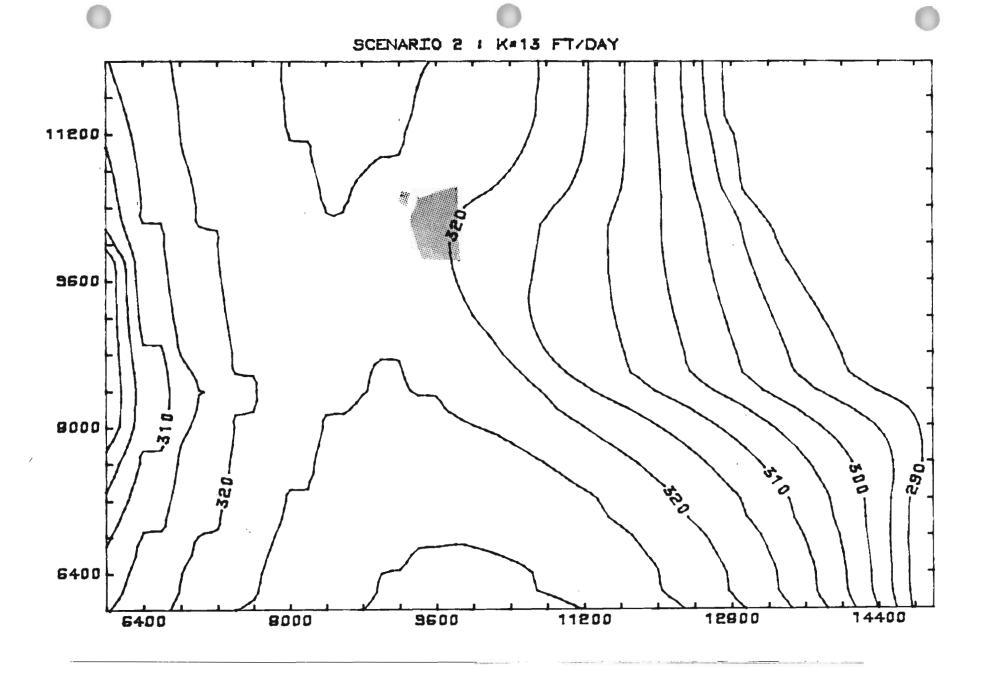
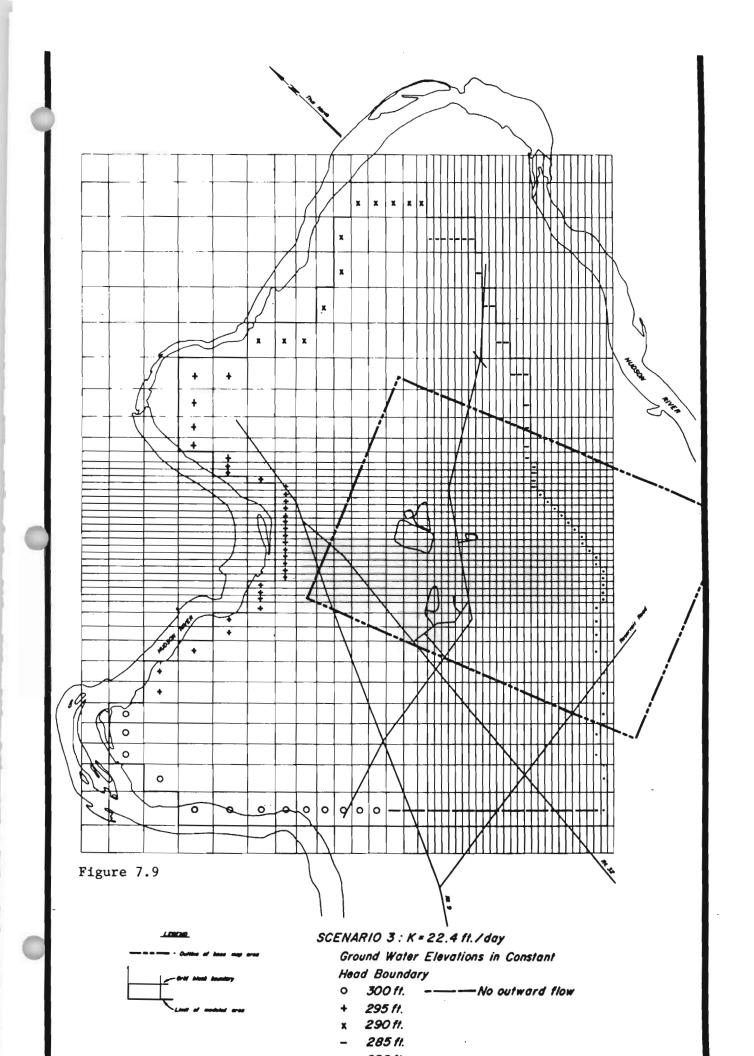


Figure 7.8 - Local perspective of ground-water elevations for scenario 2.

Note the lack of change in the contours when compared to Figure 7.5



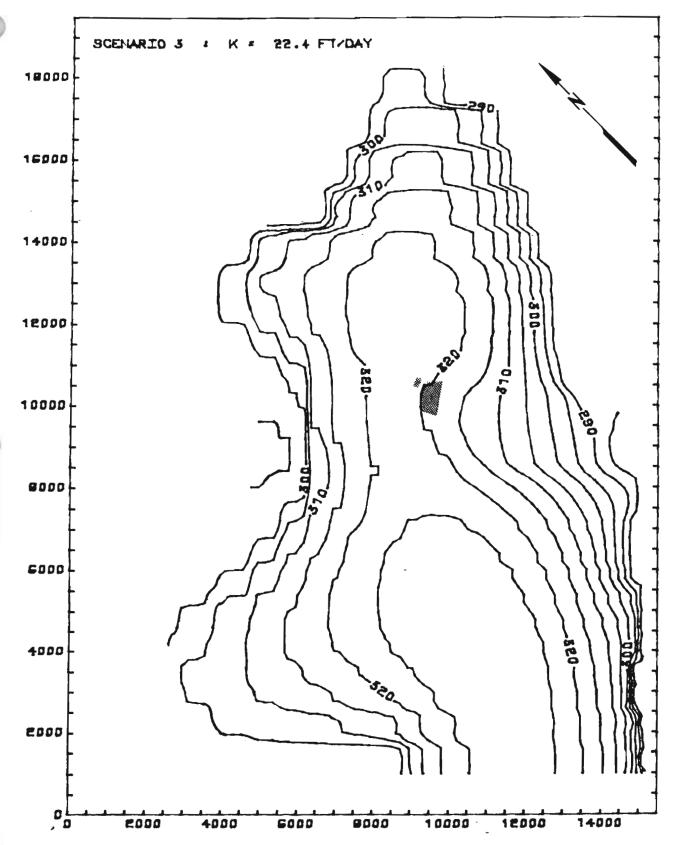


Figure 7.10 - Regional perspective of simulated ground water elevations for scenario 3; P = 30 inches/year, ET = 9.8 inches/year, K = 22.4 ft/day.

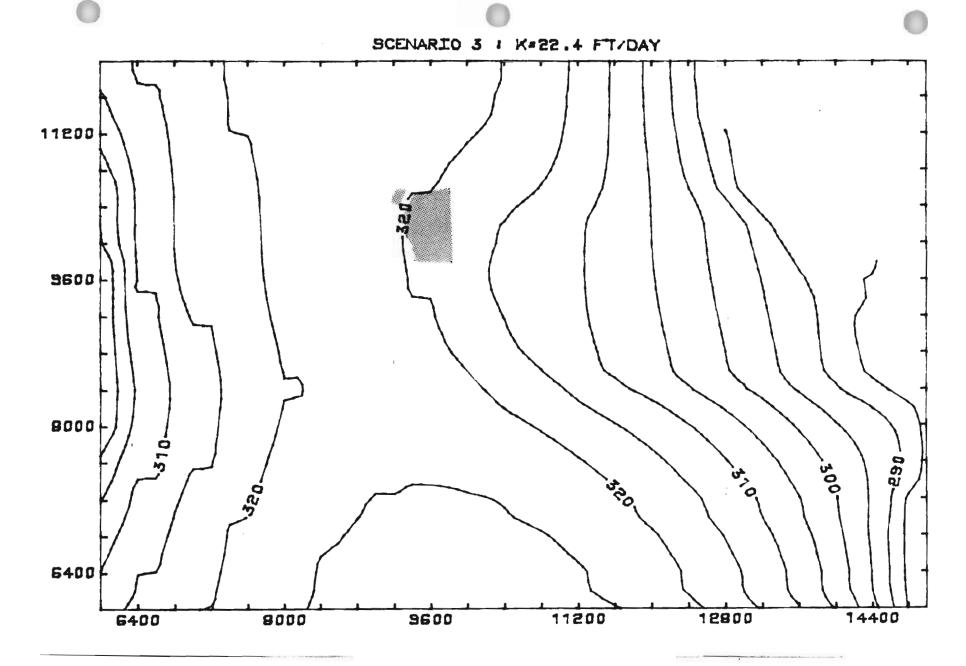
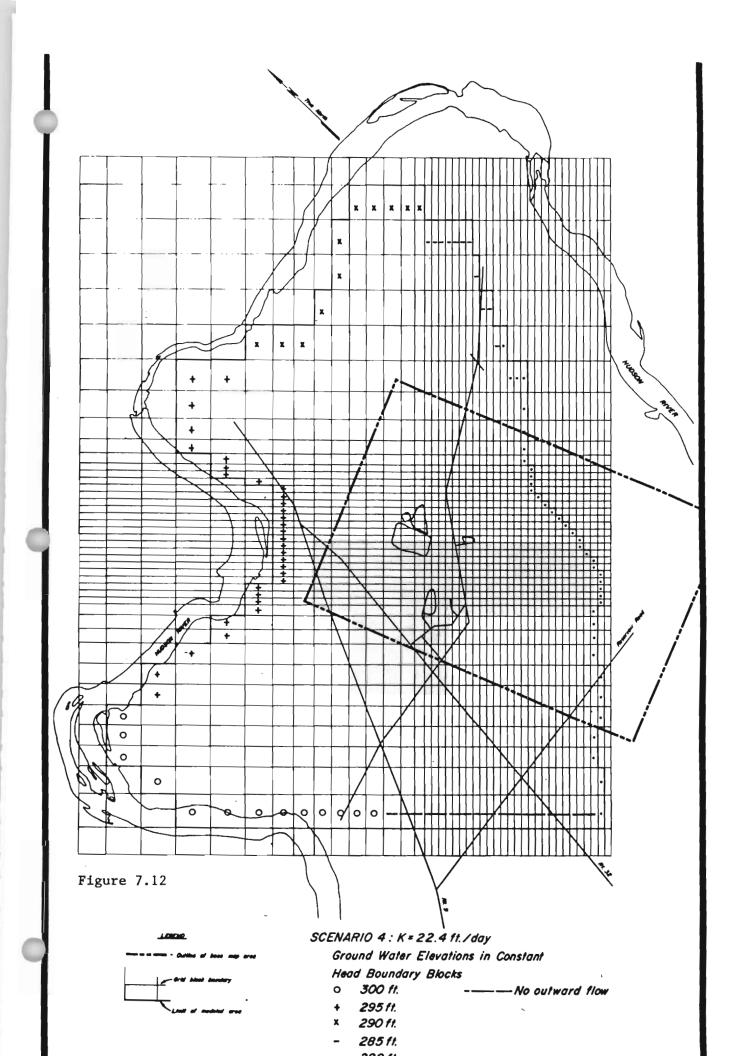


Figure 7.11 - Local perspective of simulated ground-water elevations for scenario 3.



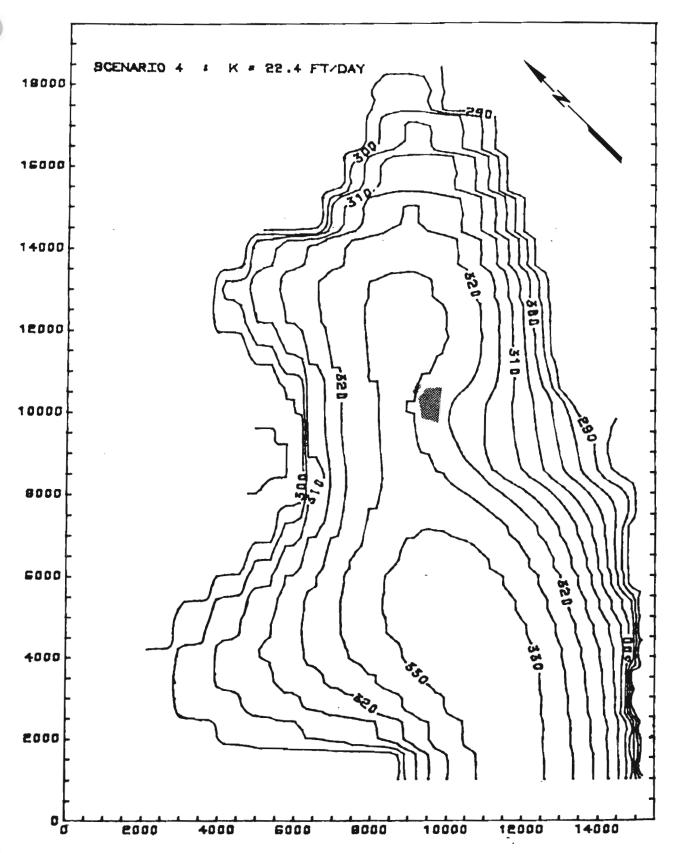


Figure 7.13 - Regional perspective of simulated groundwater elevations for scenario 4; P = 35 inches/year, ET = 9.8 inches/year, K = 22.4 ft/day. Note the increased mounding when compared to Figure 7.10.

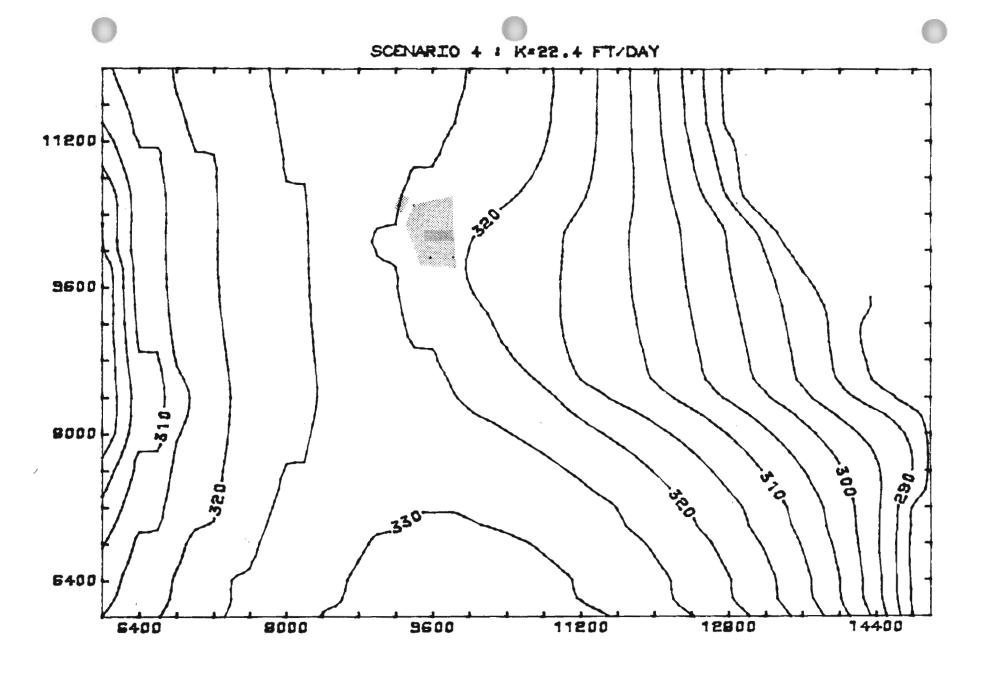
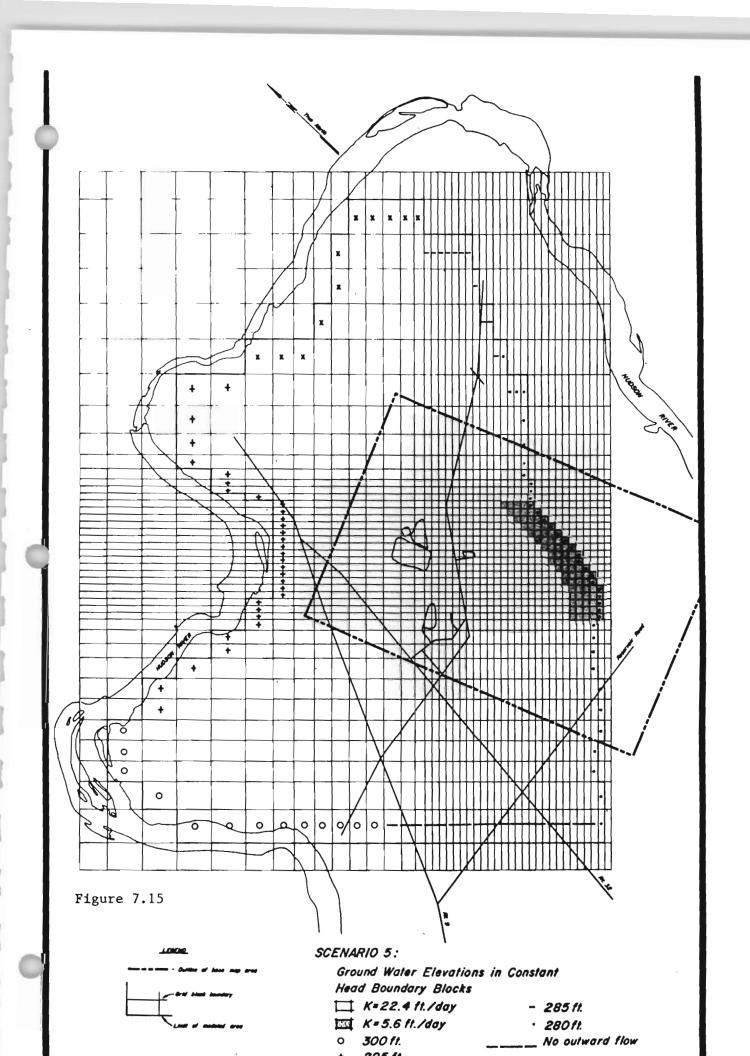


Figure 7.14 - Local perspective of simulated ground water elevations for scenario 4. Note the increased ground water elevation and the consistancy in the ground-water divide location when compared to Figure 7.11 (scenario 3).

elevation 280 feet. Again hydraulic of conductivity, precipitation, and evapotranspiration are maintained uniform across the model grid. In scenario 3, these values are K = 22.4 ft/day, P = 30 inches/year, and ET = 9.8 inches/year. In scenario 4, the precipitation is increased to 35 inches/year. The constant head boundary values for both scenarios range from 300 to 295 to 290 to 285 to 280 going clockwise around the model grid from the southwest. The south-southwest boundary is zero flux (no flow). The simulated ground-water contours and boundary condition descriptions for scenarios 3 and 4 are shown in Figures 7.9 through 7.14. As can be seen, the extra 5 inches/year in scenario 4 causes increased mounding of the water table but it does not change the location or shape of the ground-water divide or the ground-water mounds.

The last two scenarios (5 and 6) discussed are almost identical. In both, precipitation and evapotranspiration are uniform over the model grid (P = 35 inches/year and ET = 9.8 inches/year). In addition, two values of hydraulic conductivity (K = 22.4 ft/day and K = 5.6 ft/day) were used. The lower value was assigned to the 5 blocks bordering the southeastern portion of the model grid. The higher value was assigned to all the other blocks. This caused the contours along the scarp to get close together providing a better match to observed contours. As in scenarios 3 and 4, the constant head boundaries varied from 300 to 295 to 290 to 285 to 280 going clockwise around the model grid from the southwest. The only difference between scenario 5 and scenario 6 is the south-southwest boundary condition which is no flow scenario 5 but is constant head (parabolic distribution) in scenario 6. Quite a difference exists between contour plots of scenario 5 and scenario 6 but again the ground-water divide and the presence of ground-water mounds still persist in location and shape.



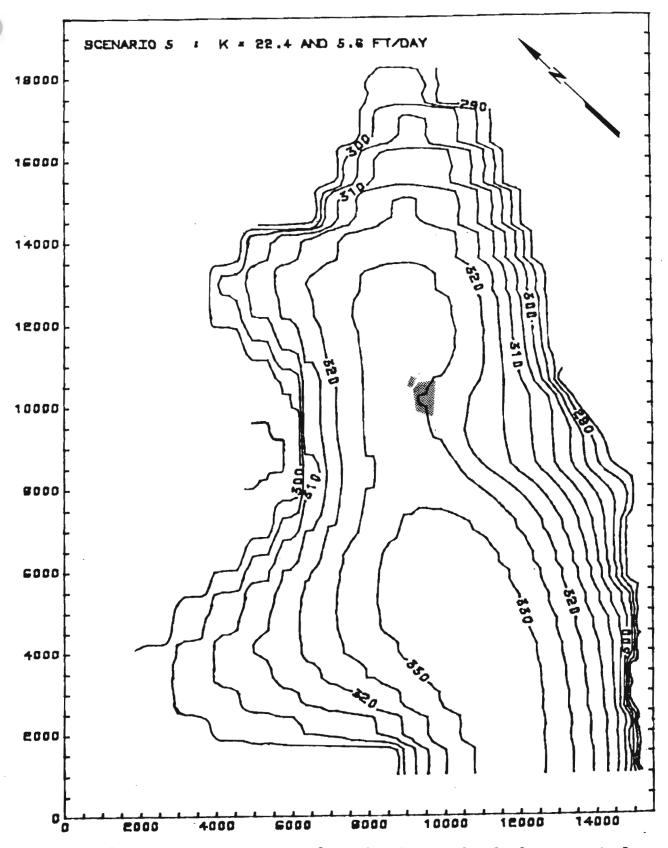


Figure 7.16 - Regional perspective of simulated water levels for scenario 5; P = 35 inches/year, ET = 9.8 inches/year, K = 22.4 and 5.6 ft/day.

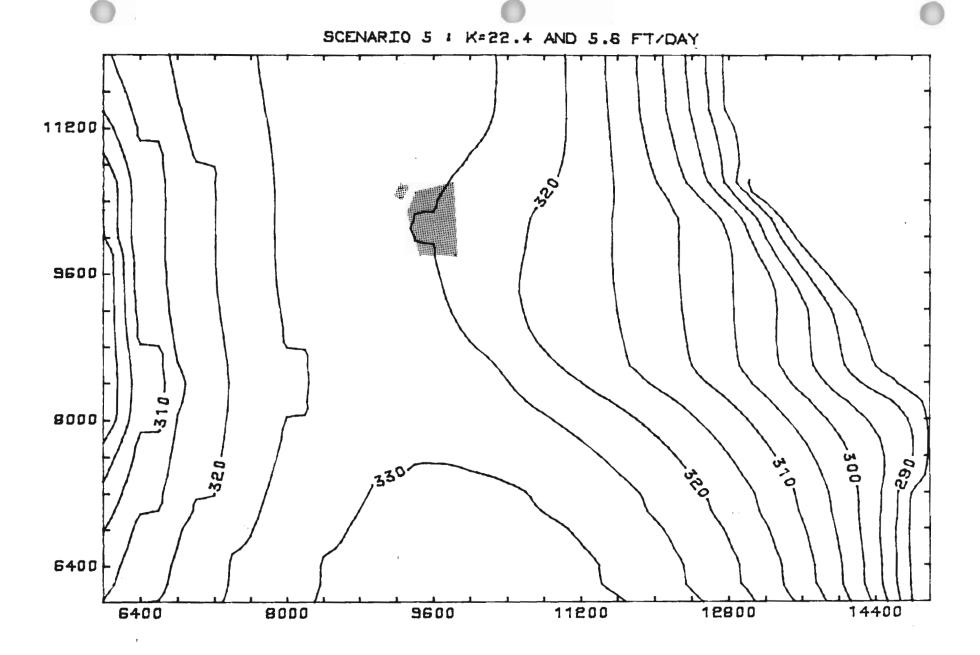
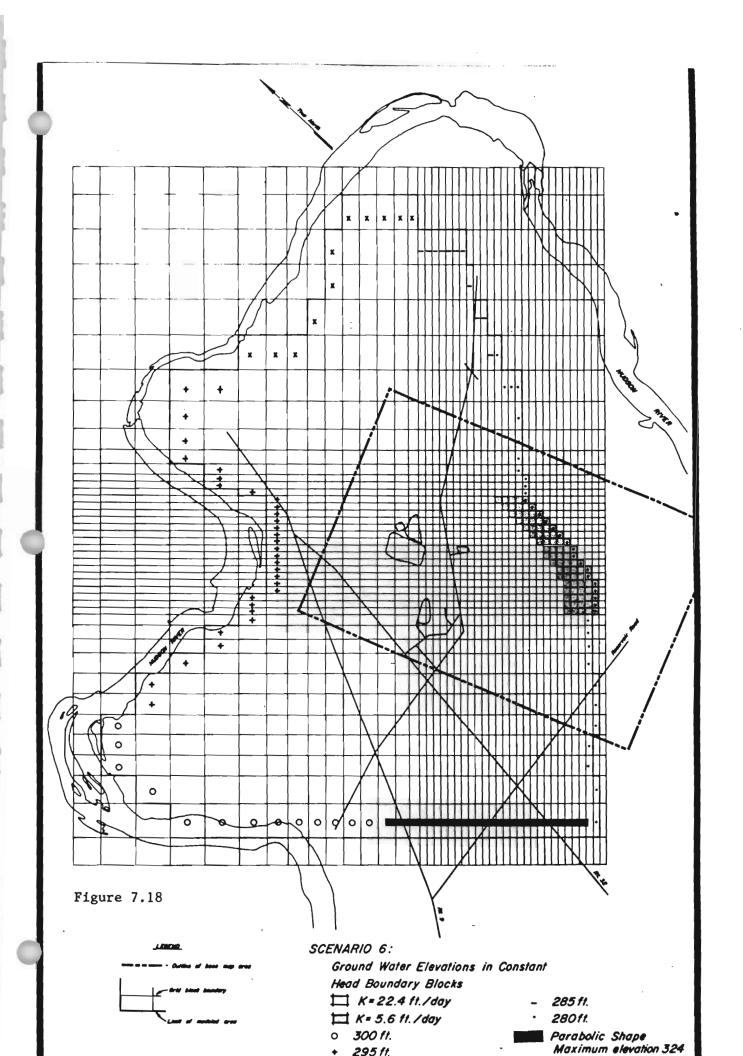


Figure 7.17 - Local perspective of simulated ground water elevations for scenario 5. Note the contours (300 to 295) southeast of the site (right of the site on plot) are closer together when compared to the previous scenarios (1-4).



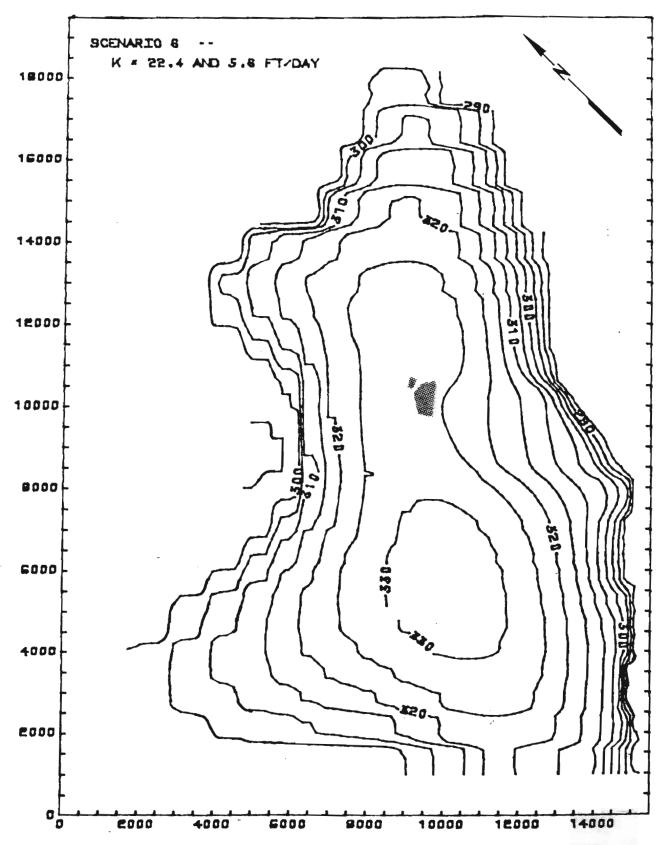
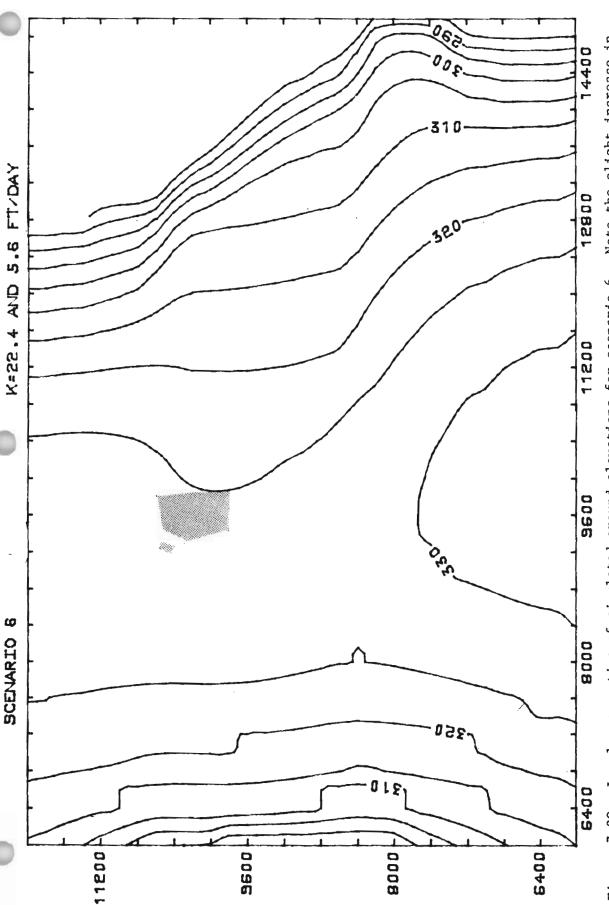


Figure 7.19 - Regional perspective of the simulated ground water elevations for scenario 6. P = 35 inches/year, ET = 9.8 inches/year, K = 22.4 and 5.6 ft/day. Note change in the southwestern mound when compared to figure 7.16.



Note the slight increase in Figure 7.20 - Local perspective of simulated ground elevations for scenario 6. mounding when compared to Figure 7.14 (scenario 5).

As mentioned earlier, the calibration of this model is not completed. Despite the incomplete calibration, the model has proven very useful as a tool in understanding the ground-water flow system in the Moreau aquifer. Considering the shape of the Moreau aguifer (see Plates 3 and 4, and Figure 7.2, the conceptual model), it is apparent a ground-water divide exists in proximity to the site. The model indicates that a divide occurs northwest of the site. Unfortunately, the observed ground-water elevation data are not sufficient to locate the divide. But the location and shape of the observed contaminant plume (Plate 12) supports the model results; a northwest divide ofthe site ground-water and any entrained contaminants from moving to the west and northwest.

The model also exhibits two ground-water elevation "highs" or mounds located on the ground-water divide northeast and southwest of the site. Again, ground-water elevation data are not sufficient to substantiate this mounding, the model calibration is considered incomplete because the observed ground-water elevations in DGC-14 and the DOT well at Myron and Gansevoort Roads do not indicate mounding. Changing the hydraulic conductivity values and precipitation rates did not appreciably alter the shape or position of the ground-water divide or mounds in any model run. Altering the boundary conditions did not change the model results either. The scenarios just discussed describe a broad spectrum of geohydrologic conditions. The hydraulic parameters used in those scenarios span the range of conditions expected for the Moreau aquifer.

This model is intended as a guidance tool to indicate general flow paths and to highlight data deficiencies. It should be considered as a precursor to a local scale model which should include solute transport. The southwestern geohydrologic conditions would need further definition in order to prescribe boundary conditions for a local model. The modeling work performed to date positively supports the existence of ground-water elevation highs on three sides of the site; northeast, northwest, and southwest. These highs will only allow ground-water movement to the southeast. This is supported by the observed contaminant plume.

7.5 Model Limitations

As stated earlier, a model attempts to represent reality to the extent possible when dealing with a complex aquifer system. The proper application of this model is strongly dependent upon the user's knowledge of the model limitations and the implications of such limitations. The limitations associated with this model are as follows:

- possible inaccuracies in the conceptualization of the shallow water table flow system, especially the physical shape and extent of the aquifer;
- the lack of hydrogeologic data north, south, and west of the site;
- the inherent mathematical errors associated with the numerical solution scheme (Strongly Implicit Method SIP) utilized in the USGS two-dimensional flow model.

Limitations of Conceptual Model

The limitations of our conceptualization of the ground-water flow in the shallow water table aquifer lie in our simplifying assumptions and choice of boundary conditions, specifically, the assumptions of horizontal flow, isotropy and homogeneity. The aquifer was modeled as a single-layered two-dimensional porous medium. In reality, the glaciodeltaic and the upper glaciolacustrine sediments have substantially different hydraulic conductivities (K = 21 ft/day vs. K = 5.7 ft/day, respectively). Also, the southern and basal boundary conditions may not exactly depict the real aquifer boundaries. However, given the lack of data to describe the system, these assumptions and boundary conditions are reasonable.

Limitations Due to Lack of Data

The lack of data on the extent of the aquifer system north, south, and west of the GE/Moreau site prevents detailed model input concerning the base of the aquifer, the aquifer hydraulic properties and water levels. The hydrogeologic investigation was a localized study in the immediate vicinity of the site. The model was a regional perspective of the ground-water flow in the Moreau aquifer. Thus, detailed geohydrologic data was only available for the immediate site vicinity (where the model grid was finer and more detail was used for model input). The lack of physical aquifer data forces the use of assumed aquifer base elevations and hydraulic properties anywhere beyond the Dunn Geoscience field area. In investigation project addition, a long historical water level record is not available. This limits the model calibration to conditions recorded at several recent points in time.

Despite the data deficiencies, the model is very useful for predicting the general configuration of the water table in the Moreau aquifer. This provides insight to conditions controlling ground-water flow directions.

Limitations Due to the Numerical Solution Procedure

Finite difference techniques, as used in the model, are subject to two major types of error. The first is the error due to replacing the differential equations describing ground-water flow by a set of algebraic equations. The exact solution of the algebraic equations differs somewhat from the solution of the original differential equations. This is termed truncation error.

The second error associated with a numerical solution scheme is round-off error. This error is a result of the finite accuracy of computer calculations, i.e., numbers are rounded-off. Both of these errors are usually negligible compared to the error associated with system conceptualization.

7.6 Ground Water Modeling Summary-to-Date

The task of modeling the ground-water flow has not been completed. The model still needs calibration work. As illustrated in Plate 11, the simulated water levels indicate a ground-water mound should exist beneath the Myron Road area and extend southward. In that area, the observed data (DOT and DGC-14) does not support the simulated results. As such, calibration focused on a boundary condition evaluation is being continued. Specifically, an evaluation of lowering the elevations of the constant head boundaries west and northwest of the site is underway. Also, in light of the water balance

calculations, precipitation and evapotranspiration rates will be further evaluated. The continued modeling and calibration process will be enhanced by data collected in the continuing geohydrologic field study. The modeling work performed to date supports the existence of ground-water elevation highs on three sides of the GE/Moreau site; northeast, northwest, and southwest. These highs limit ground-water movement to the southeast, as exemplified in the observed water quality data.

8.0 GROUND WATER - EXTENT OF CONTAMINATION

Prior to commencing the remedial investigation, only three monitoring wells, TMF, TMG, and FE-1 were located south of Bluebird Road. Each well, on at least one occasion, had shown evidence of contamination by organic compounds. The various depths at which the wells were completed and in which organic compounds were detected, suggested that contamination was stratified within the aquifer. In addition, contamination was detected in streams which flow into the Fort Edward water system reservoirs.

Previous investigations had concluded that ground water flowed in a general southward direction from the GE/Moreau waste disposal site. Examination of USGS 7.5-minute topographic maps and field inspection of the area's topography supported this conclusion.

Based on these limited water quality results and on a general knowledge of ground-water flow, a first phase monitoring well network for the remedial investigation was designed. The purpose of the network was to provide information for a preliminary assessment of the areal and vertical extent of contamination, and subsequently for the location of additional wells.

The first phase of drilling resulted in the installation of 37 wells. At 12 locations, the wells were installed as three-well clusters. Site 13 is a single well. Clusters were utilized to determine to what degree the contaminants varied with depth within the aquifer. Clusters DGC-1 to DGC-5 were drilled first in a line parallel to, and just west of, the erosional escarpment. The clusters' function was to aid in determining whether contaminants had reached the downgradient limit of the Moreau sand aquifer. If so, the well spacing along the length of the scarp would indicate the width of any contamination at the aquifer boundary.

The second series of wells to be installed during this phase included well clusters DGC-6 to DGC-8. These wells were located southwest of the GE/Moreau site to monitor ground-water levels and quality between the site and the private residences on Cheryl and Terry Drives.

The third series of cluster wells in the first phase of drilling were located at sites DGC-9 to DGC-13. This series of wells was oriented in the general direction of ground-water flow and extended from just south of the GE/Moreau site to southeast of the Moreau sand aquifer boundary. After this series of wells had been completed, the first round of water quality samples were collected.

In the second phase of drilling, 22 wells were installed. The wells included six three-well clusters, one well pair, and two individual wells. Two well clusters were installed on each side of well cluster DGC-10. They served as sampling points for determining the width of the contaminated zone at its longitudinal midpoint. Two other clusters were installed east and west of the existing wells just south of the site. These wells were installed to determine the width of the contaminated zone near the GE/Moreau site. The remaining wells were installed north of the site to determine if there was any ground-water flow towards the north from the site and, if so, whether organic compounds had migrated to these locations.

Table 8.1 includes only those sites where organics were detected; results are given for both the June/July and September, 1984 rounds of sampling. The second round of water samples was collected after the phase two wells had been completed.

Plate 12 shows the approximate areal extent of ground-water contamination based on the analyses of ground-water samples collected in September, 1984. The map was prepared by considering the highest level of trichloroethylene (TCE) found in any well cluster or in any

Table 8.1

Summary of Analytical Results
Ground Water Monitoring

Purgeable Halocarbons, EPA Method 601

Well No.	Trichloroethylene	Trans-1,2- dichloroethylene	Vinyl Chloride	1,1,1-trichloroethane	1,1-dichloroethylene	Tetrachloroethylene	Methylene Chloride	Chloroform	Chlorobenzene	Dichlorobromomethane
DGC 1S 1I 1D	ND/ND ND/4.3 ND/4.6			ND/ND ND/<1 ND/<1		ND/ND ND/ND ND/3.3				
3s 3I 3D	ND/ND 54/250 2700/ 16000	ND/ND ND/1.0 11/2.2					ND/ND ND/ND 39/ND	ND/ND ND/<1 6.1/1.9		
*3D 4S 4I 4D	1400 ND/ND 4.0/<1 ND/ND	6.6					6.5	3.6 ND/ND ND/ 1 ND/1.4		
5s 5I 5D								ND/ND ND/4.2 ND/ND		
6S 6I 6D	31/120 69/30 ND/ND	ND/2.7 ND/1.4 ND/ND						ND/<1 ND/<1 ND/ND		
7S	800/ 1400	130/81	4.3/ND		4	<1/ND		ND/10		
**7I 7D	/12000 3700/ 3200	/5000 480/ 550	/ND		/13	/5.5		/2.6 ND/<1		6.9/ ND
8S 8I 8D	13/56 290/450 1.3,1.8 3.8									
***9S 9I	47/32	ND/1.2								
9D	1300/ 1200	450/450								
108	110/ 1200	ND/8.9		ND/ND				ND/1.7		
101	700/ 1300	81/52		ND/ND		ND/2.6		ND/6.7		
1 OD	81/2300	<1/56		ND/9.3		ND/47		ND/12		
11S **11I	3400/970 /28000	0 70/11 /1500	5.8/ND /41	ND/3.8 /4.1	/6.4	<1/32 /80	/20	ND/2.1 /4.8	/93	
11D	8300/ 22000	160/730	ND/ND	ND/1.3	ND/3.1	1.7/9.8	19/25	1.8/4.9		

Well No.	Trichloroethylene	Trans-1,2- dichloroethylene	Vinyl Chloride	l,l,l-trichloroethane	1,1-dichloroethylene	Tetrachloroethylene	Methylene Chloride	Chloroform	Chlorobenzene	Dichlorobromomethane
12S	ND/ND									
121	ND/ND									
12D	2.2/310	0								
13	ND/<1									
15S	ND	ND						ND		
151	ND	ND						ND		
15D	35	1.6						<1		
19	2.4					1.2		<1		
218	120	<1		1		12				
211	4.4	ND		ND		ND				
21D	9.3	ND		ND		ND				
22S	22	ND						<1		
221	7600	180					93	<1		
22D	15000	320					220	<1		
TM-A	5.8	<1								
TM-B	8.5	1.2								
TM-D								2.3		
TM-F	690	8.8			E					
TM-G	120	5.4								
TM-3	52	2.3								
TM-4	81000	46000	510		140	11	200	750		
FE-1	600	6.9					16	3.6		

Legend to Table

All results in ug/L (ppb).

ND None detected.

Values for wells DGC-1 - DGC-13 are given for both rounds of sampling, 6/25/84 - 7/9/84 and 9/5/84 - 9/17/84 as XYZ/ABC, respectively.

- * Results of a second sample in the first round of sampling.
- ** Purgeable organic compounds in first round were determined by EPA Method 624. See Table $8.2\,$
- *** Well 9S contains insufficient water for sampling.

Contaminants were not detected in wells 2S, 2I, 2D (both rounds) nor in 14S, 14I, 14D; 16S, 16D; 17: 18S, 18I, 18D; 2OS, 20 I, 2OD; TM-C; TM-E; TM2; TM5 (second round).

individual well if it is not part of a cluster. Although observed ground-water contamination includes a variety of organic compounds, TCE is most prevalent and, therefore, was chosen to be an indicator of overall contamination.

Table 8.2 lists the results of the wells (DGC-3D, 7I, 11I) analyzed for priority pollutants.

Isopleths showing concentrations of 100, 500, and 10,000 ppb of TCE are illustrated on Plate 12. However, since the plate shows the maximum concentration of TCE detected at each single well or well cluster regardless of depth, or length of sampling interval, the isopleths cannot represent strict interpolations between data points. Nevertheless, this does not diminish the usefulness of the isopleths in depicting the relative degree of aquifer contamination. Reported concentrations of TCE less than 100 ppb were not contoured, but are included on the map for completeness.

The areal extent of contamination representing TCE concentrations greater than 100 ppb occur in an essentially southeast trending plume approximately 4800 feet long and about 2000 feet wide at its widest point. The plume has its origin at the GE/Moreau disposal site and extends southward to the erosional escarpment. The downgradient limit of the plume appears to be controlled by ground-water discharge to springs and streams having their head waters at the foot of the escarpment.

The overall orientation of the plume follows the general direction of ground-water flow indicating that advection is the primary mechanism of contaminant migration. Maximum organic levels occur in a relatively narrow, essentially southeast trending band that includes within it wells or clusters DGC-7, DGC-11, TM4, DGC-22, and DGC-3. Similar to the overall plume the orientation of this band of high TCE

Table 8.2

Results Summary

Priority Pollutant Analysis*

Ground Water Monitoring

<u>Parameter</u>	DGC 11I	DGC 7I	DGC 3D**
Nickel	6	<5	<5
Aroclor 1242	1.0	0.3	ND
Trichloroethylene Trans-1,2-dichloroethylene Vinyl Chloride 1,1-Dichloroethylene 1,2-Dichloroethane Benzene Toluene Chloroform Acetone 1,2,4-Trichlorobenzene 1,2-Dichlorobenzene 1,4-Dichlorobenzene Benzofluoranthene	4100/4300 1300/1800 190/ND ND/ND ND/ND 12/ND 7/ND ND/ND 2000/220 <10 <10 <10 ND/ND	5300 3000 31 6 5 31 7 77 72 <10 ND ND	ND ND ND <10

Priority pollutant compounds not included in the above table were not detected. All results in ug/L (ppb).

^{*} Purgeable organic compounds by Method 624/results are on first round samples except 11I which includes results of a second round analysis for purgeables.

^{**} A Method 624 analysis was not run on this sample. Refer to Table 8.1 for purgeable halocarbons determined by Method 601.

levels coincides very closely with ground-water flow paths south of the GE Moreau site.

The extent of contamination is also affected to a lesser degree by dispersion as indicated by the detection of lower-level organics in wells east and west of the band of highest TCE concentrations. Dispersion is responsible for lateral spreading of the contaminants as they migrate in response to ground-water flow; however, its influence on the migration of contaminants is much less than that of advection This conclusion is supported by the length-to-width ratio of the plume, the relative concentrations of TCE in the central versus outer portions of the plume, and the sharp decrease in concentration over a relatively short transverse distance.

Plate 12 shows a cross-section line drawn through the most contaminated portion of the plume. The corresponding cross-section, E-E', illustrates the vertical distribution of TCE in the Moreau sand aquifer and is shown on Plate 13. It extends from well TM3 southeastward to well DGC-3, located near the aquifer's boundary. The cross-section includes wells located within the zone of high TCE concentrations and other selected wells which have been projected onto the line. The GE/Moreau site is not shown on the cross-section, but is located generally northward of well TM3.

The water table on the section slopes from northwest to southeast and represents the general direction of ground-water flow in this area. Consequently, TCE and any associated organic compounds introduced into the sand aquifer at the GE/Moreau site will be transported in this direction by advection.

The most significant aspect of contaminant distribution illustrated by the section is the tendency for TCE concentrations to be highest at intermediate and deep levels within the aquifer. The most likely scenario depicted by the distribution of TCE in the cross-section is as follows: Chemicals disposed of at the GE/Moreau site infiltrated the unsaturated soil beneath the site and percolated to the water table. Since TCE has a low solubility and is heavier than water, the separate TCE phase continued to sink under the influence of gravity. Upon entering the aquifer, low concentrations of dissolved chemicals were transported in the general direction of ground-water flow by advection. Simultaneous to its migration toward ground-water discharge points at the erosional escarpment, the plume may have moved downward following a flow path characteristic of recharge areas. Since the hydraulic gradient near the GE/Moreau site is very slight, horizontal ground-water flow occurred slowly and sufficient time was available for the chemicals to sink to intermediate or deep levels at the site. As it migrated southeastward, the plume continued to sink until it encountered the underlying confining bed. The low Vertical hydraulic conductivity of the confining bed retarded further downward movement and, at this point, the plume flowed along the base of the aquifer in the direction of ground-water movement.

Insufficient ground-water flow and water quality data have been generated to define the area outside the plume which comprises sites TMD, DGC-14, Moreau Elementary School, and DGC-5. The first and last of these contained anomalous chloroform traces; however, the school and well cluster 14 directly adjacent to it, have been clean.

Four "upgradient" monitoring wells showed the presence of TCE at low to significant levels (2.4 - 120 ppb). These sites (DGC-15, 19, 21, TMA) are located either on or adjacent to, a ground-water mound or divide situated at the GE/Moreau site and the sand pit adjacent to the site with its bodies of surface water. Not enough hydrologic information has been obtained to define ground-water flow in a northerly direction. As of the writing of this report, resampling of

the upgradient wells is in progress and the installation of additional upgradient monitoring wells has been scheduled.

During the monitoring of residential wells in the area southwest of the GE/Moreau site, encompassing Terry Drive, Cheryl Drive, and Myron Road, low levels of five organic compounds were detected: 1,1,1-trichloroethane, tetrachloroethylene, chloroform, trichloroethylene, and methylene chloride.* Information collected from home owners concerning the reported depths of their wells indicates the horizon of contamination is between 35 and 55 feet below grade. Documented well construction information is not available for a more accurate delineation of the vertical extent of residential well contamination.

None of the contaminated wells in this area shows a consistent or steady pattern of contamination. Low level contamination of a given well may be detected in one or two rounds of sampling but not in others. Moreover, it is not unusual to obtain results which show that at a given time the wells of adjacent homeowners have different low level contaminants present.

One of the contaminants in the residential wells is 1,1,1-trichloroethane, which showed concentrations of 9.4 and 5.0 ppb at a Myron Road residence and 1 to 10 ppb at two Cheryl Drive residences. However, transverse dispersion from the center line of the defined plume (Plate 12) shows great attenuation over a very short distance. No well sampled within the defined plume had a concentration of 1,1,1-trichloroethane high enough to make it likely

^{*}A trace (less than 1 ppb) of 1,1-dichloroethane was also reported in one residential well sample in one of the sampling rounds.

that the 1,1,1-trichloroethane found in a few residential wells is a result of dispersion from the plume. In addition, equipotential lines showing ground-water flow due south/southeast of the GE/Moreau site indicate no flow component to the west. Given this condition and the dilution factors seen in wells along the path(s) of transverse dispersion, it is unlikely that the 1,1,1-trichloroethane found in residential wells comes from the area of the disposal site or the defined plume.

The same reasoning can be applied to tetrachloroethylene which also was detected in the residential wells at the 1-2 ppb level. Monitoring wells in the defined plume which contained significant levels of tetrachloroethylene (e.g. DGC-10D, 11I; 47 and 80 ppb, respectively) also contained very high levels of TCE, which were not detected at the expected significant level in the residential wells. Given the dilution necessary to cause a concentration gradient of tetrachloroethylene from, say, 80 ppb at DGC-11I to 1 ppb at the residential wells, we would expect to see TCE in the residential wells show a corresponding drop in concentration. Since DGC-11I contained 28000 ppb TCE we would expect accordingly about 350 ppb TCE in the residential wells. However, of the three residential wells where tetrachloroethylene was detected in any of the sampling events (1.3 and 2.4 ppb; 1 ppb; 1 and 1.4 ppb), TCE was only detected at one home at very low levels (3.1 and 1.8 ppb, corresponding to the home with 1.3 and 2.4 ppb tetrachloroethylene).

The fact that elevated TCE levels have never been found, combined with knowledge of the general ground-water flow and the flow path and dimensions of the plume, make it unlikely that the plume is the cause of the low level organic contaminants found in these residential wells.

Only one residence (Cheryl Drive) had a trace of chloroform (1.1 ppb). However, as mentioned, downgradient of the homes, wells TM-D and DGC-5I also showed traces of chloroform as the only organic contaminant present (2.3 and 4.2 ppb, respectively). The same considerations of transverse dispersion of contaminants from the plume to these wells applies to chloroform as well as to those organic compounds just mentioned. TM-4 is the only well that contains a high concentration of chloroform. TM-4 also contains high concentrations of other contaminants, including trichloroethylene. Since the only contaminant present in the residential well on Cheryl Drive, in TM-D and in DGC-5I is chloroform, it is unlikely that the plume is the cause.

Although low level TCE has been detected in a Cheryl Drive residence and four Terry Drive homes, insufficient data is available for identifying its source. The ratio of TCE to other organics in the residential waters does not conform to the general pattern of contamination in wells directly downgradient of the disposal site.

No significance is attached to the finding of methylene chloride (1 ppb) in one Myron Road residence due to its relative absence everywhere else and its notoriety as a ubiquitous laboratory contaminant. Also, the absence of TCE in this well rules out the plume as the probable cause.

In addition to the evidence cited above, the absence of contamination in the Town of Moreau cluster TM-2, TM-5 and TM-C suggests that the low levels of organic contamination in the Terry, Cheryl and Myron area are not associated with the plume. Eight additional monitoring wells will soon be installed in an effort to confirm this. The eight additional wells will sample pathways to that area not fully covered by the existing network.

During the sampling of residential water supplies, water samples were collected from 16 wells reported to have been drilled into the bedrock aquifer. Chemical analysis of these samples failed to detect any organic compounds. These results indicate that the bedrock aquifer is uncontaminated in those general areas where the samples were collected. Plate 14 shows the locations of these wells along with their reported depths.

9.0 SURFACE WATER - EXTENT OF CONTAMINATION

The stream surface water contamination in the wooded area downgradient of the topographic escarpment leading from Moreau into Fort Edward is extremely consistent and nearly constant. The data in Table 9.1 support this contention. Of the twelve sampling rounds undertaken, results from nine are available and tabulated.

The two collection boxes and the four reservoirs have never had organic contaminants detected in them since monitoring began. The pump house located at the Fort Edward Water Treatment Plant was sampled four times (May 2 to June 13) and chloroform and dichlorobromomethane were detected. The pump house was dropped from the sampling program since it was thought that chlorination of the water generated these trihalomethanes. The two compounds were never detected at the stream sites (X-4 to X-7), where trichloroethylene and trans-1,2-dichloroethylene were found.

The clear well located at the Water Treatment Plant was added to the sampling program on June 27, 1984. Water at the clear well is only slightly chlorinated and the results indicate that contamination is non-existent at this point.

Trans-1,2-dichloroethylene may be present in the water as an impurity formed during the manufacture of trichloroethylene or as a result of the degradation of trichloroethylene.

Table 9.2 lists the ratios of trichloroethylene plus trans-1,2-dichloroethylene concentrations at different sites along the major stream path (X6 + X7, X4, X5) to portray the concentration decrease that occurs downstream due to dilution, turbulent flow, evaporation, etc.

Table 9.1

Stream and Reservoir Analytical Results
Fort Edward, New York

Site		May 2	May 16	June 4	June 13	June 27	July 12	July 25	August 8	August 22	Range	Mean	Standard Deviation
New Reservoir		ND		ND	ND	ND	ND	ND	ND	ND			
Collection Box	1	ND	TCE,*	ND	ND	ND	ND	ND	ND	ND			
Collection Box		ND	<1	ND	ND	ND	ND	ND	ND	ND			
Christie Reser		ND	-	ND	ND,ND	ND	ND	ND	ND	ND			
Sanderspree Re		ND		ND	ND	ND	ND	ND	ND	ND			
Dority Reservo						ND	ND	ND	ND	ND			
•	Code												
X-4	Α	130	140	140	120	140	170	120	150	140	120-170	138.9	14.5
	В	4.5	5.3	8.2	4.0	7.5	11	ND	5.9	8.6	4.0-11	6.3	3.1
X~5	Α	46	51	57	45	59	63	38	63	69	38 - 69	54.6	9.6
	В	1.2	<1	1.6	<1	1.8	3.8	ND	ND	8.5	ND -8.5	4.22	3.3
X-6	A	260	240	250	210	240	260,240	190	250	220	190-260	234.4	21.7
	В	13	20	27	14	28	29,32	5.1	28	22	5.1-32	20.8	8.1
X-7		35	38	42	46	48	45	68	56	73	35 - 73	50.1	12.3
A-7	A B	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA
	Б	ND	ND	ND	ND	ND	MD	ND	ND	ND	W.	1141	****
Pump House	С	54	50	27,26	2.9,4.5								
	D	4.3	2.5	3.1,2.9	ND, ND								
Clear Well	С					ND	<1	ND	ND	ND			

ND = None Detected

Code: A = Trichloroethylene

B = trans-1,2-dichloroethylene

C = Chloroform

D = Dichlorobromomethane

Note: Samples were also collected on 9/5, 9/19, and 10/4/84. Results are pending.

* Represents composite of all five samples.

. .

Table 9.2

	5/2	<u>5/16</u>	6/4	6/13	6/27	7/12	7/25	8/8	8/22	mean	S.D.
(X6+X7)÷X4	2.29	2.05	2.15	2.18	2.14	1.80	2.19	2.14	2.12	2.12	0.13
X4 ÷ X5	2.85	2.85	2.53	2.76	2.43	2.71	3.16	2.47	1.92	2.63	0.33
(X6+X7)÷X5	6.52	5.84	5.44	6.00	5.20	4.87	6.92	5.30	4.06	5.24	1.13

NOTE: The above figures represent the reduction in total organics (trichloroethylene plus trans-1,2-dichloroethylene) in going from one site to another, as indicated.

Taking the point source as the fork at sampling points X-6 and X-7, the reduction in concentration is about two fold by the time water reaches sampling point X-4; between X-4 and X-5 a concentration reduction of just over two and one-half times occurs. The overall reduction from the fork to X-5 is approximately five and one-quarter fold. The first stage (fork to X-4) is very constant as evidenced by the very low standard deviation. This factor increases and the precision of the concentration reduction decreases as water flows downstream, i.e. the standard deviation for the reductions of the two stages and the overall effect, are approximately 6, 12, and 21 percent, respectively.

As the stream ending at sampling point X-6 begins with a seep from the escarpment, it builds up momentum and volume as it moves downstream until finally it merges with the stream that ends at sampling point X-7. From the fork to X-4 the water is very shallow (3"-6") and slow moving; sometimes it is underground. This section is in heavily shaded forest. At X-4, the forest ends and an open marsh begins. The section of the marsh containing X-4 has heavy vegetation, mostly over six feet high. In the summer time this area was very hot, sunny and humid, causing an increase in stream temperature which would also increase volatility. X-5 is in a partially sunny, wooded area, unlike the other two sites.

In an attempt to close the data gap between the last well in the defined plume (DGC-3) and the earliest surface water site (X-6), a sample of water was collected from the toe of the escarpment where water emanating from the ground forms the stream that ends at X-6. This was collected on October 4; results are pending from the laboratory.

The consistency of the levels of surface water contamination may offer a mechanism of ground-water monitoring - levels in the surface water may act as indicators of levels in the ground water. If the relationship between ground-water contamination and surface water contamination can be linked by a constant parameter, then concentration information of one may be used to predict levels in the other, and vice-versa.

It is interesting to note that the stream containing site X-7 contributes only trichloroethylene and not trans-1,2-dichloroethylene. The stream at X-6 contains the highest concentration of both chemicals, the percent of trans-1,2-dichloroethylene relative to trichloroethylene being 8.87%. Although the stream containing X-7 has the same topography as the stream ending at X-6, it is interesting that we do not see at X-7 the 4-5 ppb trans-1,2-dichloroethylene expected from the 50 ppb (mean) of trichloroethylene.

10.0 SOILS - EXTENT OF CONTAMINATION

Due to time and access limitations of the soil sampling/analysis program, there is insufficient data to substantiate the reported widespread PCB contamination. Of the approximately 160 sites that have been analyzed by the field kit, only four have shown the possible presence of PCBs: The sites are identified on a map included in Appendix E.

<u>Site</u>	PCB as Aroclor 1242 (ppm)
A1b	36, 10
A1c	224, 180(216), 88
A2c	232, 162(180)
A4 c	106, 232(252)

Note: Replicate figures represent different extractions on different days. The number in parentheses is a repeat millivolt reading of the second solution after six hours.

The following samples have been sent to the ETC Laboratory for PCB confirmation by gas chromatography at a 1-2 ppm method detection limit; results are pending.

A1b	A3c	A19 c	м3
A1c	A4 c	С8	
A2b	A5 c	J9	
A2c	A14c	K2	

As soon as access to the site of proposed soil sample collection has been obtained and modifications to the sampling protocol are approved, site soil sampling will continue. Field kit and laboratory analyses will continue as samples become available. An addendum to this section of the report will be prepared and submitted following review and evaluation of the data.

11.0 AIR - EXTENT OF CONTAMINATION

The NYS Department of Environmental Conservation has established two air quality monitoring stations in the vicinity of the GE/Moreau Site. Their locations are shown on a map attached to the Work Plan located in Appendix A. The stations were activated in August, 1983 and maintained operation until mid November, 1983 approximately one month after remedial operations at the disposal site were interrupted. The stations were reactivated in mid June, 1984 prior to renewed remedial activities at the site. As of the preparation of this report, the stations were still operational with anticipated termination approximately mid November, 1984. Checking and sample/data collection from each station was done weekly by the on-scene coordinator from DEC with the exception of the initial 3-week period when operational checks were made every two or three days.

The stations monitor PCBs, trichloroethylene, benzene, methylene chloride, and total suspended particulate. In addition, the north station also monitors temperature, wind speed, and wind direction.

All of the results during the 1983 monitoring period were below detection limits with one exception. On November 2, 1983, the 24-hour average benzene concentration was found to be 18 ug/m^3 at the station near Terry Drive. The 1983 data report is located in Appendix K.

Communication with the Division of Air indicates that the evaluation and reporting of the 1984 data will not be available until the test results from the final samples are available and subsequent data evaluation, report preparation and review have been completed. The estimated availability of the report is early 1985.

References

- Freeze, R.A. and Cherry, J.A., 1979, Groundwater: Englewood, New Jersey, Prentice-Hall, Inc., 604 p.
- Hanson, W.R., 1961, Estimating potential evapotranspiration: Journal of the Hydraulics Division, Proceedings of the American Society of Civil Engineers, v. 87, no. HY3, Part 1, p. 107-120.
- Hardick Associates, 1978, PCB's removed from the Caputo site on December 18 & 20, 1978 Town of Moreau, Saratoga County, New York: So. Glens Falls, New York.
- Hardick Associates with C.A. Rich Consultants, 1983, Investigation of ground water contamination in the vicinity of the GE Moreau (Caputo) site: So. Glens Falls, New York.
- Heath, Mack and Tannenbaum, 1963; Groundwater studies in Saratoga County, New York, United States Geological Survey.
- Hvorslev, N.J., 1951, Time lag and soil permeability in groundwater observations: U.S. Army Crops Engrs. Waterways Exp. Sta. Bull, 36, Vicksburg, Miss.
- O'Brien & Gere Engineers, 1981, Caputo site engineering report: Syracuse, New York.
- O'Brien & Gere Engineers, 1982, Caputo site engineering report addendum: Syracuse, New York.
- O'Brien & Gere Engineers, 1982, Caputo site remedial program final plansubsurface investigation: Syracuse, New York.
- Trescott, P.G., Pinder, G.F. and Larson, S.P., 1976, Finite-difference model for aquifer simulation in two dimensions with results of numerical experiments: Washington, D.C., Techniques of Water-Resources Investigations of the USGS, Chapter Cl, Book 7 Automated Data Processing and Computations, 116 p.
- U.S. Environmental Protection Agency, 1983, Administrative order 11-CERCLA-302-1: New York, 12 p.
- U.S. Department of the Navy, 1982, Soil mechanics (Design manual 7.1): Washington, D.C., U.S. Gov. Printing Office, 348 p.
- Wehran Engineers, 1980, Conceptual engineering study of five disposal sites known to have received PCB wastes final report: Middletown, New York.

ONE RIVER ROAD
SCHENECTADY, N. Y. 12345

LEONARD K. DOVIAK
MANAGER-NEW YORK STATE
PUBLIC AFFAIRS/AREA COMMUNICATION

November 3, 1984

Dear Resident:

We have specifically requested that the enclosed status report on the Moreau Site be hand-delivered to your home. We believe you will want to review it because of concerns you may have about the site and how it might affect you.

This report is the result of extensive studies conducted for General Electric by several engineering consultants. Those studies have been submitted to the State and Federal governments for review.

The report, you will note, describes the nature of the problem at the Moreau Site, the steps that have been taken so far by GE to solve it and the next proposed steps.

Finally, we want to thank you for your patience in this matter. We did, however, want to be in a position to give you a meaningful report of the status of the Moreau Site.

As additional work on the Moreau Site is completed, General Electric plans to issue future reports to you.

Sincerely

Leonard K. Doviak

LKD/mv

Acknowledgments

This "Status Report To The Public" is the result of almost five years of study by experts engaged by the General Electric Company to determine the impact of the Moreau Site on the surrounding environment and the nearby drinking water supply.

The initial studies of the site were carried out by O'Brien & Gere Engineers, Inc., an engineering consulting firm headquartered in Syracuse, New York. This firm concentrated its efforts on the site itself and produced three documents (References 1, 2 and 3) detailing the results of those efforts. These and other related documents are referred to on the inside of the back cover of this report.

The work effort directed toward an understanding of the "off-site" impact of the Moreau Site was carried out by the Dunn Geoscience Corporation of Latham, New York.

The firm of Blasland & Bouck Engineers, P.C. of Syracuse, New York, provided technical assistance in the preparation of this Status Report. The key officers and professional staff of this firm were formerly associated with O'Brien & Gere Engineers, Inc.

For additional information on this report, please contact:

General Electric Company New York State Public Affairs 1 River Road Schenectady, New York 12345 Telephone: (518) 385-4999

TABLE OF CONTENTS

Section	Page
Introduction	5
Key Findings and Actions	6
The Moreau Site	7
What Are PCBs and TCE?	8
The Moreau Aquifer	8
Actions to Correct Waste Disposal Site Problems	9
Actions Taken by General Electric at the Moreau Site	10
Future Work Proposed by General Electric at the Moreau Site	15
Summary	17
Glossary of Technical Terms	18
References	

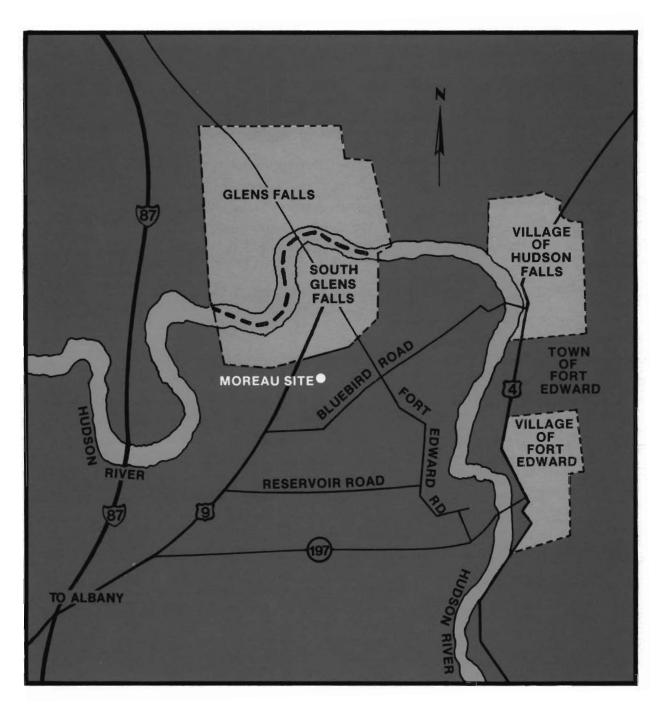


Figure 1: Map showing location of the Moreau Site in Saratoga County, New York.

Introduction

This report describes the past, present, and proposed future actions of the General Electric Company (GE) to investigate and provide remedies for chemical contamination at the Moreau Site (formerly known as the Caputo Site) in Saratoga County, New York (Figure 1).

From 1958 to 1969, that site was used for the disposal of industrial wastes. GE's actions have had three main purposes: 1) containing materials that remain on the site in the general area where they were originally deposited; 2) determining the precise location under the ground of contaminants that have left the site; and 3) using that knowledge, making sure that all users of the aquifer (an underground waterbearing zone that contains water) in the vicinity of the site are provided with potable water — that is, water suitable for drinking.

This report, prepared with the help of Blasland & Bouck Engineers, P.C., is based on studies conducted for GE by O'Brien & Gere Engineers, Inc. and the Dunn Geoscience Corporation. These studies describe findings made in engineering investigations that have been sponsored by the Company, and have been submitted to the New York State Department of Environmental Conservation (DEC) and the United States Environmental Protection Agency (EPA). The most recent report was submitted to the EPA on November 1, 1984.

The following pages list some of the major findings of the studies that GE has sponsored, and the actions GE has taken to fix the site. The remainder of the report describes in somewhat more detail the nature of the problem at the site, the steps taken so far to solve it, and the next steps proposed. A "Glossary of Technical Terms" used in this report is provided on page 18.

GE plans to issue future reports on the Moreau Site as additional study work is completed.

Key Findings and Actions

The key findings of the engineering and geophysical studies in the vicinity of the Moreau Site, and the key actions taken by GE can be divided into those concerned with the site itself (called "on-site") and those concerned with the immediate vicinity of the site (called "off-site").

On-site Findings and Actions

- With the approval of DEC, a system has been constructed to contain the contaminants remaining on-site. That system, which includes an underground wall extending 110 feet below the site, encloses the soil and that portion of the aquifer under the site. The wall is sealed to the natural clay barrier at the 110-foot depth; and a clay cap on top of the site will seal it from above. The wall was completed in September 1984, and the cap will be completed in the summer of 1985.
- The groundwater directly beneath the Moreau Site contains varying amounts of contaminants. Of primary concern are polychlorinated biphenyls (PCBs) and trichloroethylene (TCE).

Off-site Findings and Actions

- The flow of the groundwater away from the Moreau Site is towards the southsoutheast, at an average speed of twothirds of a foot per day. The direction of flow bends almost to the east as the water discharges from the ground.
- A portion of the TCE has migrated with the groundwater away from the site, creating a plume of water contamination.
- That TCE plume has contaminated four residential wells along Bluebird Road and one nonresidential well in a nearby gravel pit above levels designated by EPA. Water

- treatment systems have been installed on these five wells by GE.
- One residential well on Myron Road was found to contain tetrachloroethylene above levels designated by the EPA. A water treatment system has been installed on this well by GE.
- In continuing the current study, GE plans, through its consultants, to ensure that the water of all residents is suitable for drinking. This will be done by measuring the water quality in:
 - More than 150 existing residential wells in the area; and
 - Eight new test wells (called monitoring wells) to be installed by GE southwest of the site.
- The TCE plume has reached Reardon Brook, which had served as a source for the Village of Fort Edward's water supply. Reardon Brook has been diverted by the Village, and for the time being is not part of its water supply.
- The water in the four reservoirs that supply water to the Village of Fort Edward is not contaminated. Future monitoring will ensure that the water supply remains unaffected by the Moreau site.

Future Actions

- GE has proposed to install an airstripping treatment system for Reardon Brook to once more allow its use as a source of drinking water for the Village of Fort Edward.
- GE plans to issue future reports on the Moreau Site as additional study work is completed.

The Moreau Site

For over 30 years, GE has manufactured capacitors — devices that play important roles in the supply and use of electricity —at its plants in the Village of Hudson Falls and the Village of Fort Edward, New York. Until 1977, polychlorinated biphenyls (PCBs) were used by GE and other manufacturers as dielectrics (electrical insulating oils) in capacitors.

The Moreau Site was used from 1958 to 1969 by an independent private hauler with whom GE contracted to remove liquid wastes from its two plants. Those wastes contained PCBs, trichloroethylene (TCE) and other liquid solvents. The site was operated as an evaporative pit. That is, the wastes were deposited into a shallow open pit, which held them while they slowly evaporated into the air. Historically, this procedure was quite common throughout industry. At the Moreau Site, however, not all the liquid remained in the pit long enough to evaporate. An unknown quantity seeped into the underground water-bearing zone, or aquifer, beneath the site.

An aquifer (Figure 2) can be thought of as an underground sponge made of porous

soil and rock materials which contain water. An aquifer has a bottom of nonporous material such as clay or bedrock. Water falling as rain or held in ponds seeps into the aquifer, which absorbs it until the aquifer becomes saturated with water. The upper surface of the volume of underground water in the aquifer is known as the water table.

The underground water (called groundwater) in the aquifer flows downhill like a river, eventually emptying into a river, lake or ocean. Unlike a river, however, groundwater flows very slowly, usually traveling no more than one foot per day.

Because aquifers are slowly but continuously emptying their water and being refilled by rainwater, they have a natural flushing capability. This enables a groundwater system that has been contaminated to cleanse itself eventually, by the natural flow of fresh water through it. Cleansing, however, generally takes several years, and is effective only if the source of contamination is stopped.

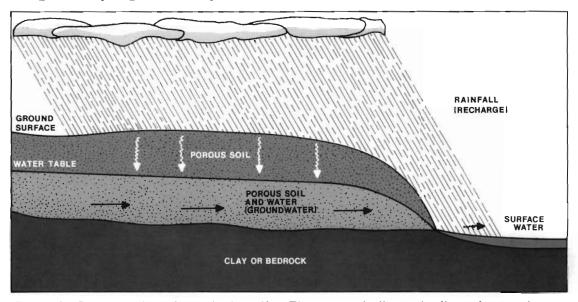


Figure 2: Cross section of a typical aquifer. The arrows indicate the flow of groundwater.

What Are PCBs and TCE?

Polychlorinated biphenyls, or PCBs, are chemicals once used in the manufacture of electrical equipment and in other commercial applications. When released into the environment, PCBs tend to adhere to solids, including soils, sediments, and rock. Because of this, if PCBs have penetrated below the surface of the ground, they will remain attached to the soil, and will migrate very slowly.

Trichloroethylene, or TCE, is a chemical which has been widely used as a degreasing agent in the cleaning of metal parts. TCE was also used as: a dry cleaning solvent; an extraction solvent for coffee, spices and other foods; a component of certain drugs; and a component of such consumer products as spot removers and cleaning fluids for rugs. It evaporates readily when it comes in contact with air.

The Moreau Aquifer

At the Moreau Site, the water table is about 30 feet below the surface of the ground, and the rate of groundwater flow is slow because the downhill slope of the clay beneath the aquifer is relatively flat.

Unlike the flow of a river, the flow of groundwater cannot be seen. To study the water in an aquifer, one must drill wells into it. These monitoring wells also serve for measuring the contamination in the water at each monitoring well location. By installing

monitoring wells, checking the level of water in each, and making careful chemical analyses, engineers and scientists can determine if contamination is present, where it is coming from, and where it is going. A total of 90 monitoring wells have been installed by GE and other parties near the Moreau Site, and about 170 groundwater samples have been obtained and analyzed so far.

Actions to Correct Waste Disposal Site Problems

In the 1970s, concerns began to emerge about past disposal practices of industries and municipalities, as society became more aware of the potential environmental and health hazards of industrial and household wastes.

Beginning in 1977, DEC commissioned two engineering assessments of PCB disposal sites in the Upper Hudson River Valley, including the Moreau Site. These assessments detected PCBs in the soil of the Moreau Site, the groundwater beneath it, and the air above it. As a result of this information, and the concern of its residents. the Town of Moreau began a program to clean up the site in December 1978. About 100 cubic yards of visibly stained soil were removed from the evaporative pit to a licensed landfill. In the spring of 1979, the Town and two state agencies covered and seeded the contaminated areas, minimizing the release of PCBs into the air above the site.

In September 1980, GE entered into an agreement with the State of New York to investigate environmental impacts and undertake remedial action at seven sites,

including the Moreau Site, and to bring to an end any significant current and future releases or migration of hazardous wastes from these sites.

GE has completed its primary obligations at six sites covered by the 1980 agreement. Those sites are the Kingsbury Landfill, the Fort Edward Landfill, the Old Fort Edward Site, and the Fort Miller Site, all located in Washington County; the Palmer (Stillwater) Site, located in Saratoga County; and the Loeffel Site, located in Rensselaer County. Work continues at the Moreau Site, located in Saratoga County.

The three sites where GE shared responsibility with other parties (Kingsbury, Fort Edward, and Loeffel) have been fully investigated and a design plan for securing these sites has been approved by DEC. GE has paid its share of the construction costs and the maintenance costs of these sites.

At the three sites where GE accepted full responsibility (Fort Miller, Old Fort Edward, and Palmer), construction has been completed. GE will maintain and monitor these sites for 30 years.

Actions Taken by General Electric at the Moreau Site

Immediately after signing the September 1980 agreement, GE constructed a security fence around the Moreau Site to restrict public access. GE also commissioned the engineering firm of O'Brien & Gere Engineers, Inc. to conduct a field investigation and to develop and evaluate alternative plans for dealing with contamination at the site. The work was completed and submitted to DEC for review and approval in December 1981.

Further studies were undertaken to identify the limits of contamination beyond the boundary of the evaporative pit, and were completed in April 1982. Those studies demonstrated that two distinct conditions existed at the site. One was already known: the presence of significant amounts of contamination (both PCBs and TCE) in the immediate vicinity of the original evaporative pit (that is, on-site). The other was the movement of TCE beyond the site (off-site). The second required further investigation. So the two were separated and addressed with two specific work programs.

The recommended solution for the onsite PCB and TCE condition in April 1982 was to construct a containment wall around the immediate area of the original evaporative pit, and to put a clay cap over an area somewhat larger than the original site, thereby sealing it from above. The wall was to be sealed into the natural clay layer, located 110 feet below the surface, that acts as the bottom of the containment.

To confirm that the wall would contain the PCBs, GE commissioned O'Brien & Gere Engineers, Inc. to perform additional sampling of soils outside the proposed limits of the containment wall. Those studies were performed during late 1982 and resulted in expanding the containment wall to its final designated location. Also in 1982, GE contracted with SCA Chemical Services, Inc., a licensed disposal firm, to remove drums located near the former evaporative pit, which had been covered by the Town of Moreau in 1979.

O'Brien & Gere Engineers, Inc. also conducted additional investigations during the summer of 1983 in an attempt to determine the outer limits of the region contaminated by TCE. Those investigations showed that some TCE had moved too far from the site for the containment system to be a practical solution. It was then decided that the two conditions would require different solutions: 1) to proceed with the installation of the containment system to contain essentially all of the PCBs and TCE on the site; and 2) to study further the TCE that had moved off the site.

Construction of the on-site containment system around the PCBs and TCE began in August 1983 and was successfully completed in September 1984. The wall was constructed to create a barrier to the flow of groundwater and to the further off-site movement of contaminants. It is over 2½ feet thick, and consists of a mixture of Bentonite (a water-resistant clay) and natural soils.

Work Done Under the 1983 EPA Administrative Order

EPA proposed putting the Moreau Site on its National Priorities List in December 1982. This led to the signing of an Administrative Order between GE and EPA on November 21, 1983. The Order required GE to conduct additional investigations to determine the extent of TCE contamination beyond the containment system. The Order also required GE to immediately provide a

supply of water suitable for drinking to those residents in the vicinity of the site whose water was contaminated above certain levels.

As a result of the Administrative Order, GE commissioned the Dunn Geoscience Corporation to conduct extensive testing of the drinking water in more than 150 private residences near the site. Five residential wells south of the site, and one nonresidential well in a nearby gravel pit, were found to have water that was not suitable for drinking by EPA assigned levels. These six water supplies were then equipped with water treatment systems by GE. Additional sampling of wells in the area under study is planned to reconfirm that the rest of the homes have water suitable for drinking.

The investigations required by the Administrative Order got underway in the summer of 1984 and are continuing today. The Dunn Geoscience Corporation has installed 60 monitoring wells penetrating to various depths of the aquifer in the directions the water flows from the site. Locations of these wells are shown in Figure 3. As a result, there is now a clearer picture of the structure of the aquifer, and the direction and speed of the groundwater flow through it.

The main direction of groundwater flow is initially south-southeast, bending to almost due east, as shown in Figure 4. The speed of flow varies as the aquifer becomes shallower. Between Bluebird Road and Reservoir Road, the speed averages two-thirds of a foot per day. The groundwater at each of the monitoring locations has been analyzed several times and will be measured again before the investigation is concluded. The zone of heaviest contamination is a plume, pointing in a south-southeasterly direction (Figure 5).

The investigation strongly suggests that the TCE that left the site during the 26 years since the original deposits were made in 1958 traveled within the plume and reached Reardon Brook, where water from the aquifer becomes surface water, only in recent years.

Village of Fort Edward Water System

In January 1984, Village officials reported the presence of TCE in the Village of Fort Edward drinking water system. This was confirmed by the New York State Department of Health. Since then, GE's investigation has indicated that contamination, while below levels assigned by EPA, is present and is probably linked to the Moreau Site. The problem, however, has shown up in only one stream, Reardon Brook, which fed New Reservoir, one of four reservoirs that provide water to the Village. Since Reardon Brook was diverted early in 1984 by Village officials, the Village water supply has been free of contamination.

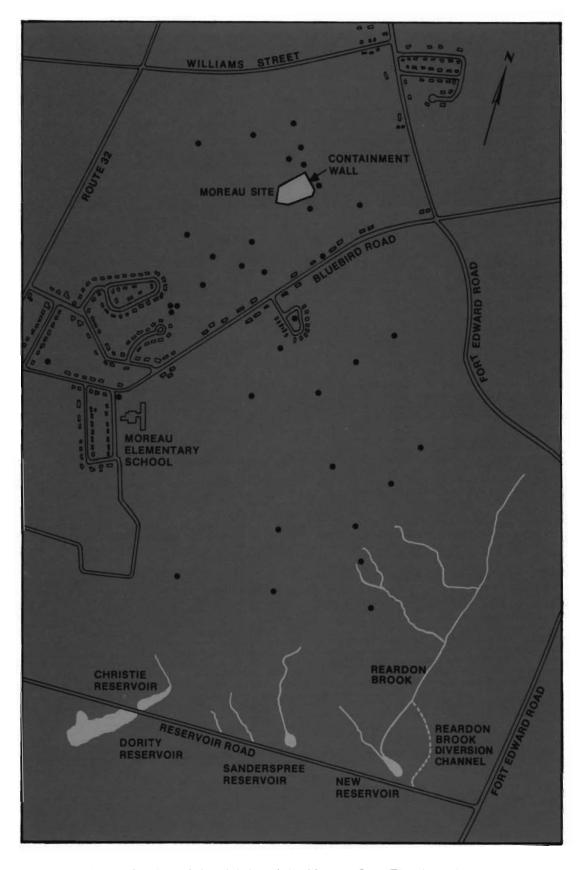


Figure 3: Map of the vicinity of the Moreau Site. The dots show the individual and clustered monitoring wells.

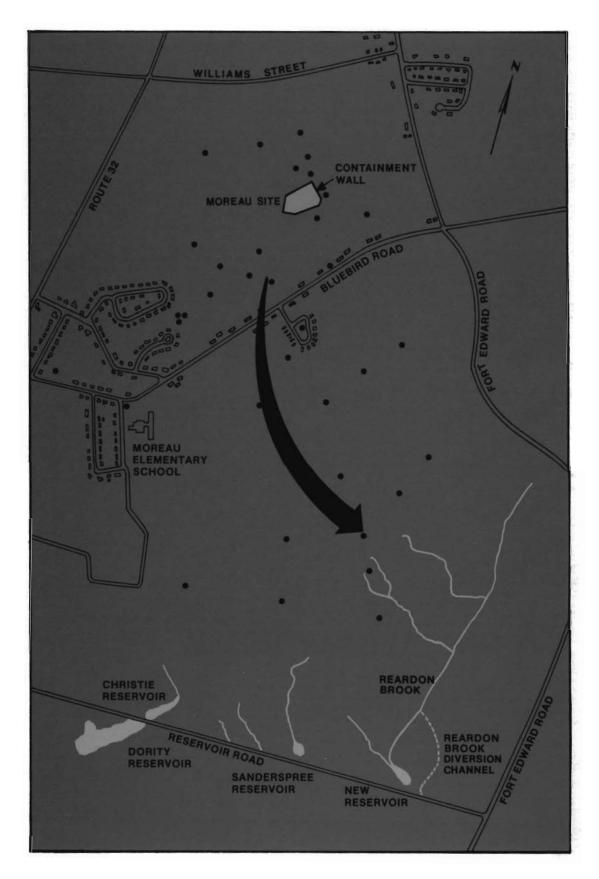


Figure 4: Map of the vicinity of the Moreau Site. The arrow indicates the general direction of groundwater flow and contaminant movement.

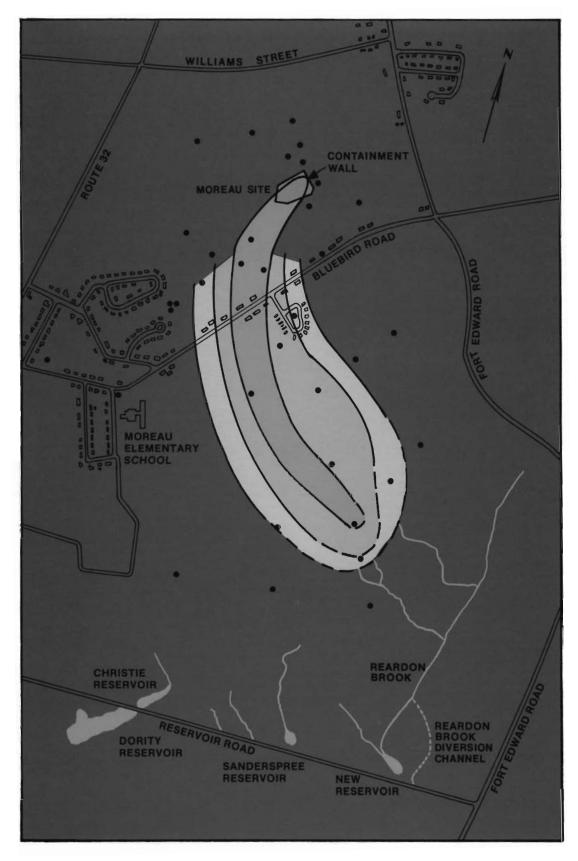


Figure 5: The dark to light color bands indicate decreasing concentrations of TCE in the plume, as of September 1984. The outermost edge of the plume, as depicted, represents a level of TCE at 100 parts per billion.

Future Work Proposed by General Electric at the Moreau Site

On-site Program

In September 1984, the containment wall sealed into the underlying natural clay barrier was completed. This should prevent any further releases of PCBs or TCE from the site. GE will finish capping of the site in the summer of 1985.

The Company is presently undertaking a soil sampling program to determine if there are remaining surface PCBs that were inadvertently moved from the original location of the pit to other parts of the site through construction, hauling, or other activities. Any such PCBs will be removed or isolated to prevent any further contamination.

Finally, GE will implement a 30-year monitoring and maintenance program at the site.

Off-site Program

During completion of work under the EPA Administrative Order, GE will continue to monitor residential wells in the area to make sure that their water remains suitable for drinking. In addition to the previous 60 monitoring wells, GE plans to install and sample additional wells to monitor the TCE plume and to provide added assurance to nearby residential well users that they will have water suitable for drinking. The eight new wells, shown in

Figure 6, will be strategically located between the limits of the plume and nearby residential wells.

Village of Fort Edward

With regard to the Village of Fort Edward water supply, GE has proposed to provide an air-stripping treatment system (a common technique employing a tower through which air and water move in opposite directions, enabling the air to "strip" readily evaporated chemicals from the water) for Reardon Brook. This will treat the TCE in the groundwater as it is released to the surface water, allowing use of the surface water as a source for the Village of Fort Edward water supply system. The impact of the exhaust of the treatment system on air quality will be nondetectable and will pose no health threat.

In addition, GE has offered to reimburse the Village for the expenses already incurred in bypassing Reardon Brook around New Reservoir. Preliminary meetings have been held between representatives of the Village and GE. It is GE's goal to have the treatment system in place by the summer of 1985, at which time Reardon Brook can be returned to the Village water supply. Future monitoring will ensure that the water supply remains unaffected by the Moreau Site.

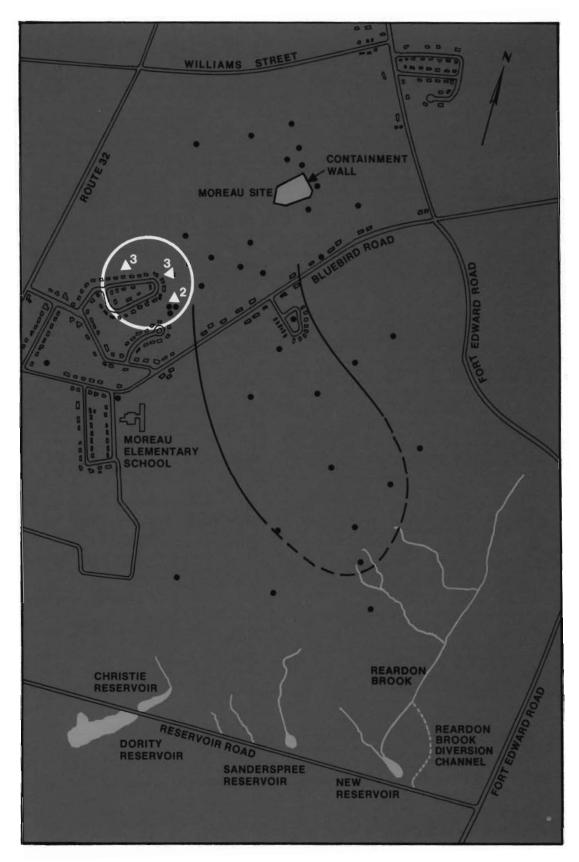


Figure 6: Location of three well clusters, constituting the eight new monitoring wells, is indicated by the white triangles in the circle at upper left. The numbers indicate the number of wells in each cluster.

Summary

Polychlorinated biphenyls (PCBs) and trichloroethylene (TCE) wastes were deposited in an evaporative pit at the Moreau Site during the period of 1958-1969, and seeped into the underlying soils and the groundwater below. Field investigations sponsored by the General Electric Company and conducted by O'Brien & Gere Engineers, Inc. and the Dunn Geoscience Corporation have now provided a clearer picture of the locations and movements of those materials. Just as important, they have shown which of the wells that make use of that groundwater are affected by those contaminants.

Those investigations have shown that essentially all the PCBs and a substantial portion of the TCE remain close to the original site. But some of the TCE has traveled away from the site in a south-southeast direction, in a plume stretching from the site toward Reardon Brook. The investigations strongly suggest that the TCE that left the site during the 26 years since the original deposits were made in 1958 reached Reardon Brook only in recent years. The water supply system used by the Village of Fort Edward was also affected, since Reardon Brook served as one source for that water supply.

Since essentially all the PCBs and much of the TCE remain at the site, they have been sealed in by constructing an underground clay containment wall around the site, and covering it with a clay cap. The wall was completed in September 1984, and the cap, now under construction, will be completed in the summer of 1985.

The plume, however, will continue to affect the water quality of certain wells that fall within its path. Studies of all wells in the vicinity of the site found six with water

not suitable for drinking. GE has installed water treatment systems on each of these six wells. Meanwhile, GE continues to evaluate other ways of assuring suitable drinking water to those whose wells are in the path of the plume.

As the underground water near the site continues to flow, it will gradually cleanse the contaminants out of the soil. Since the water flow is slow, this process may take many years. So the plume will continue to empty out of the ground near the headwaters of Reardon Brook for some time to come.

Early in 1984, it was reported that TCE was present in Reardon Brook, at that time a source of water for the Village of Fort Edward. Even though the amount of TCE in the Village's drinking water never exceeded levels designated by the EPA, the Village took the precautionary measure of isolating the brook from the rest of its water supply.

GE has offered to reimburse the Village for its past expense in isolating Reardon Brook, and to design and install a water treatment system to remove the TCE and exhaust it into the atmosphere. That would allow the Village to once again make use of Reardon Brook as part of its water supply. The impact of the exhaust on air quality will be nondetectable and will pose no health threat.

On the basis of the many rounds of testing of the residential wells and more than 60 monitoring wells, only six wells have been found to require water treatment systems. These have been installed by General Electric.

Currently, GE is installing eight additional sampling wells. The water in

these wells will be tested repeatedly so that residents in the area can be assured that their drinking water is suitable for drinking. GE plans to issue future reports on the Moreau Site as additional study work is completed.

Glossary of Technical Terms

Air Stripping Treatment System: a common technique employing a tower with an air blower at the bottom which forces air up and out of the top of the tower. Water enters the top of the tower and falls to the bottom. Volatile chemicals are "stripped" from the water by evaporation.

Aquifer: the complete system of groundwater and porous soil through which it flows.

Cap: a specifically designed and constructed barrier placed over waste material to prevent surface water from entering the wastes.

Capacitor: a device that stores energy in the form of an electric charge. It usually consists of conducting plates separated by thin layers of a dielectric.

Containment Wall (or Cutoff Wall): a specifically designed and constructed underground vertical barrier.

Dielectric: a material that does not conduct direct electric current, hence an insulator.

Groundwater: water below the surface of the earth that supplies wells, springs, rivers and lakes.

National Priorities List: a list published by the EPA that ranks waste disposal sites for remedial investigation and cleanup.

Plume: a distinctly shaped volume of groundwater in which a contaminant has been dispersed and has moved over time with the flow of the groundwater.

Polychlorinated Biphenyls (PCBs): chemical mixtures historically used as a dielectric material.

Solvent: a liquid capable of dissolving other substances.

Tetrachloroethylene: a solvent principally used as a dry cleaning agent, and for the cleaning of metal.

Trichloroethylene (TCE): a solvent principally used for the cleaning of metal parts, and formerly contained in certain consumer products.

References

- Caputo Site Engineering Report, prepared for the General Electric Company and the New York State Department of Environmental Conservation, December 1981, by O'Brien & Gere Engineers, Inc.
- 2. Caputo Site Engineering Report Addendum, prepared for the General Electric Company and the New York State Department of Environmental Conservation, April 1982, by O'Brien & Gere Engineers, Inc.
- 3. Caputo Site Remedial Program Final Plan, Contract No. 1, prepared for the General Electric Company by O'Brien & Gere Engineers, Inc., in 1982 and revised in 1983.
- Migration of PCBs from Landfills and Dredge Sites in the Hudson River Valley, New York — Final Report, prepared for the New York State Department of Environmental Conservation, November 1978, by Weston Environmental Consultants-Designers.
- 5. Conceptual Engineering Study of Five Disposal Sites Known to Have Received PCB Wastes, prepared for the New York State Department of Environmental Conservation, December 1980, by Wehran Engineering, P.C.
- 6. PCBs Removed from the Caputo Site on December 18 and 20, 1978, prepared for the Town of Moreau, New York, by the Town Engineer, Frank C. Hardick, P.E.
- Remedial Investigation GE/Moreau Site — prepared for the General Electric Company by Dunn Geoscience Corporation, November 1984.

GENERAL 👺 ELECTRIC



GENERAL ELECTRIC COMPANY
ONE RIVER ROAD
SCHENECTADY, N. Y. 12345

GEORGE B. COX
SENIOR VICE PRESIDENT AND GROUP EXECUTIVE
TURBINE BUSINESS GROUP

November 8, 1984

T. IANO TTO THE W Rosenchuck HOW SIG CC: Resenchesch March Monrol Bando Bando Bando (Ristor Day)

Commissioner Henry G. Williams Department of Environmental Conservation 50 Wolf Road Albany, New York 12233

Dear Commissioner Williams:

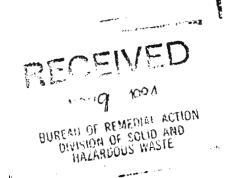
This morning we are hand-delivering to approximately 1300 house-holds in the Village of Fort Edward - Town of Moreau areas, a Status Report to the Public on the Moreau Site. I have asked that 50 copies of the report and the letter which accompanied its distribution be delivered to you for your use.

In the Status Report to the Public we have attempted to include the results of the extensive engineering studies which have been conducted on the site. The report, you will note, described the nature of the problem at the Moreau Site, the steps that have been taken so far by the Company to solve it and the next proposed steps.

Please let me know if you have any questions on the report's content.

Very truly yours,

George B. Cox





DIRECTOR'S DIFFICE INVISION OF SOLID AND HAZARDOUS WASTE



STATE OF NEW YORK DEPARTMENT OF

Environmental Conservation

ALBANY, NEW YORK 12233-0001

DEC 1 2 1984



Dear Mr. Cox:

We have reviewed your report entitled "Moreau Site Status Report to the Public" dated November 1984, which you delivered to approximately 1,300 households on November 8, 1984, and which we received from you on that date.

It is our opinion that the report can best be described as a vague and incomplete synopsis of the problems associated with the Moreau site. Although no statements in the report appear to be inaccurate, we firmly believe that the conclusions contained in the report regarding the groundwater plume's impact on certain Moreau private drinking wells west of the plume are premature and disagree that groundwater appears to be flowing away from all of the homes located to the west. We feel that only after several rounds of sampling and evaluation of data obtained from the eight new wells recently installed by General Electric, west of the plume near the Cheryl Drive, Terry Drive and Myron Road areas, can certain conclusions and inferences be drawn. Furthermore, while the report addresses in considerable detail, General Electric's plans for dealing with the Fort Edward water supply, little is said about the contaminated water supply of certain homes immediately adjacent to and west of the Moreau site.

We will be thoroughly evaluating the report prepared for General Electric by Dunn Geoscience, dated October 1984, for the Moreau site and will transmit our comments to the United States Environmental Protection Agency within the time period specified in the United States Environmental Protection Agency/General Electric Moreau CERCLA Order, Index Number 11-CERCLA-30201. We also will carefully evaluate the new data to be obtained from the eight wells recently installed to the west of the plume identified in your report.

Sincerely,

15/

Henry G. Williams

Mr. George B. Cox
Senior Vice President and
Group Executive
General Electric Company
1 River Road

Schenectady, New York 12345

JEI:maj bcc: Commissioner Williams

- L. Marsh
- D. Banks
- C. Bassett
- N. H. Nosenchuck (2)
- M. O'Toole
- T. Monroe
 J. Greenthal
- D. King

- J. Iannotti
- W. Colden
- R. Cowen
- K. Morrison, NYSDOL
- R. Tramontano, NYSDOH
- B. Fear, NYSDOH
- W. Pierre, USEPA, Region II



New York State Department of Environmental Conservation

MEMORANDUM

TO: FROM:

John Iannotti, Eastern Remedial Section - Albany Ray E. Cowen, P.E., PCB Projects Engineer - Region 5

SUBJECT:

GE Moreau Off-Site - 11-Cercla-30201 - Remedial Investigation Report

DATE:

December 12, 1984

I have completed my review of the above noted report, and list the following comments:

I. GENERAL

The report and the field work associated with it is responsive to the intent of the order. The plume size, shape, concentration and direction of movement have essentially been defined. The exact western and northern boundaries of the plume remain undefined and the subject of further field investigation. Accordingly, this report should be considered preliminary in nature and not in full compliance with the terms of the order.

II. SPECIFIC

1. page 62 paragraph 4.1.1

According to my own observations and verified by the boring log in appendix B, the deep boring at location #9 was not "completed into the bedrock aquifer", but rather to the bedrock aquifer, and then it was only inferred since no bedrock sample was recovered.

2. page 64 paragraph 4.1.2 - 3rd paragraph on the page

One test boring was drilled into and through the logement till at location #9, see the boring log in Appendix B.

3. page 127, last paragraph

This statement concerning Cheryl and Terry Drives is premature at best and possibly inaccurate. Field work is underway at this time to better define this situation.

In summary, with the minor exceptions noted above, I can find nothing inaccurate in the report as it relates to what I observed in the field. However, the location of the western and northern boundaries of the plume will have a major effect on the remedial plan, so the important part of the report is yet to be generated.

On a related subject, the status report sent to the Moreau residents by GE in November is not inaccurate, but it is also not very specific. I don't think it warrants comment by the Department.

> Ray E. Cowen, III, P.E. PCB Projects Engineer

REC:isb

cc. D. A. Corliss

New York State Department of Environmental Conservation 50 Wolf Road, Albany, New York 12233-0001

Ray mer

Reserver.

Reviewer

bcc: N. Nosenchuck

M. O'Toole

T. Monroe

J. Greenthal

D. King

D. Corliss W. Colden

₩R. Cowen

J. Iannotti

B. Fear - DOH
R. Tramontano - DOH

K. Morrison - DOL

QUALITY

ENVIRONMENTAL OU/ WARRENSBURG

January 31, 1985

Mr. Mel Hauptman Hazardous Waste Site Branch U.S. Environmental Protection Agency Region II 26 Federal Plaza, Room 402 New York, New York 10278

Dear Mr. Hauptman:

Re: GE-Moreau Site Saratoga County 11-CERCLA-30201

The State of New York has reviewed the Remedial Investigation Report (Report) for the GE-Moreau Site dated October 1, 1984, prepared by Dunn GeoScience Corporation ("Dunn") for the General Electric Company ("G.E.") and which G.E. submitted to the USEPA pursuant to the requirements of the USEPA/GE Order ("Order") (11-CERCLA-30201). We offer the following comments and suggestions:

I. General:

The report and the field work associated with it is generally responsive to the intent of the Order and relates to what was observed in the field. We are in general agreement with the overall approach to the investigation as well as the assessment of the regional geologic and hydrologic setting. The plume size, shape, concentration and direction of movement have essentially been defined. Dunn has done an excellent job with the interpretation of data regarding geologic setting, stratigraphy, general hydrologic conditions and definition of the major containment plume, but these areas deal strictly with established facts. However, in these areas where data are inconclusive or additional information is needed, the report is clearly incomplete. The exact western and northern boundaries of the plume remain undefined and must be the subject of further field investigation since it will have a major effect on the remedial plan. The most notable example of this is the contamination in the area of Cheryl and Terry Drives. Accordingly, this report should be considered preliminary in nature and not in full compliance with the terms of the Order.

II. Specific:

The specific comments listed below follow the order of presentation in the report and page numbers are included for reference purposes.

A. Vertical Hydraulic Conductivity Tests

Page 17 of the report describes the methodology used to determine vertical hydraulic conductivity (K_V) in 29 wells. The method involved driving casing two feet into the zone of interest, clearing out the two foot plug to the bottom of the casing with a tri-cone bit, flushing the casing with water through a tremie pipe, and monitoring the water level drop in the casing over time. From this information, K_V was determined. The above procedure is essentially a percolation test and does not allow for the determination of vertical hydraulic conductivity for the following reasons:

- l. Material is cleaned out to the bottom of the casing. There is no restriction to horizontal flow immediately below the casing bottom. Because horizontal hydraulic conductivity (K_h) is always greater than K_v , the dominant influence on water level drop in the casing is horizontal flow immediately below the bottom of the casing. Thus, the test is not a measure of K_v .
- 2. There is no way of determining the condition of the test surface after drilling and washing, nor is it possible to estimate water loss through casing joints or skin effects caused by particle settlement since washing through a tremie cannot be completely effective.
- 3. There is no indication of how the $K_{\boldsymbol{v}}$ value was obtained from the raw data. Accuracy information or error bounds on the indicated values should be provided.
- 4. The resulting values for K_V ranged from 10^{-2} to 10^{-6} cm/sec for the glaciodeltaic sediments alone. This wide range is more likely due to the problems outlined above than from actual variations of K_V within the aquifer.

In summary, we do not consider the test method used reliable enough to provide meaningful estimates of vertical hydraulic conductivity.

B. Semi-Confined Bedrock Aquifer

1. Page 62 paragraph 4.1.1

According to DEC field observations and verified by the boring log in Appendix B, the deep boring at location #9 was not "completed into the bedrock aquifer", but rather to the bedrock aquifer, and then it was only inferred since no bedrock sample was recovered.

C. Confining Bed

1. Page 64 paragraph 4.1.2 - 3rd paragraph on the page

One test boring was drilled into and through the logement till at location #9. See the boring log in Appendix B.

D. Influence of Pumping Wells

The conclusion on page 79 that pumping influence by the trailer park well does not extend to well DGC-12 is unsupported by the data provided. This program was not well planned, data necessary for proper assessment were not used, and stratigraphic information for the area tested was not considered.

On page 75 the report states that water level information from well-DGC-12 indicates an anomalous ground water mound in that area. A possible explanation is given that a layer of less permeable material is present in the 30 to 40 foot range. The report also states that the trailer park well draws water from the intermediate and deep zones.

Based on this information, use of well DGC-12S is inappropriate for determining the pumping influence of the trailer park well. The lower permeability zone between DGC-12S and the trailer park well would preclude the effects of the pumping well from affecting water levels in DGC-12S.

The report also states that well DGC-12I was monitored for a period of one week. Again, no effects were noted other than "... anticipated seasonal water level decline". However, no information was included regarding precipitation before or during the test, the pumping rate of the trailer park well, or the percentage of time the pump was running.

The real problem is that if no change in the pumping schedule or rate was made prior to the monitoring of DGC-12I no effects would be apparent because water levels in the region would be in equilibrium with the pumping well. To get a true idea of the effects, the trailer park well would have to be shut down for a period of time to allow the aquifer to equilibrate to non-pumping conditions. DGC-12I would then have to be monitored for some time prior to, and after the resumption of pumping. Weather conditions (primarily precipitation and barometric pressure) would also need to be factored in before a determination could be made as to the influence of the trailer park well on local water levels.

E. Ground Water Modeling

Application of a ground water model, as stated on page 88, involves (1) system conceptualization, (2) history matching or model calibration, and (3) prediction. The main problem with this section of the report is that model calibration was not achieved to any reasonable degree and, therefore, any prediction or conclusion based on this model is inappropriate. Some specific points are enumerated below.

Plate 11 compares actual water level contours to those simulated by the model. The match is poor, especially in the area of Cheryl and Terry Drives where simulated water level contours are perpendicular to actual water level contours. In addition, many areas show a difference in water level elevation of as much as 10 feet between simulated and actual values. This indicates that calibration was unsuccessful.

One of the biggest problems with this modeling effort is the simulated ground water mound southwest of the site in the Myron Road area. A number

of conclusions are drawn based on this simulated mount including a statement that ground water flow to the southwest is inhibited by it. However, actual water level information shows that this mound does not exist.

On page 92 the following statements are made:

Thus, the model indicates water table highs inhibit ground water movement from the GE/Moreau site to the southwest, west, north and northeast. This conclusion is in accord with the observed movement of contaminants as can be seen by the shape and orientation of the plume shown on Plate 12.

These statements as written are true only within the conceptual framework of the ground water model. The model does indicate a mound to the southwest and this would be in accord with the movement of the main stream of contaminants as shown in Plate 12. However, in reality the mound to the southwest does not exist and while the main stream of contamination does indeed move as shown in Plate 12, low levels of contamination are also found in the areas northnorthwest of the site (DGC-21), west of the site (DGC-19), and southwest of the site (DGC-15, and in homes along Cheryl and Terry Drives). The model is thus shown to be, at best, oversimplistic.

Modeling aside, let's look at the facts.

FACT: Water level data indicate a relatively high hydraulic gradient from the site to the southeast.

FACT: A relatively lower hydraulic gradient exists to the west initially, and then curls southward. Refer to Plates 7 and 8. A flowline from the site beginning west would pass directly through the Cheryl and Terry Drive area.

Given these two facts, we would expect the majority of the contaminants to move in the direction of the maximum hydraulic gradient. We would also expect a portion of the contaminants to move west and south through Cheryl and Terry Drives. In addition, we would expect the concentration there to be lower due to dilution over the longer flowpath and greater travel time. These are exactly the conditions that we presently find at the Moreau site, and this refutes the conclusion (page 127, bottom) that the source of low level contamination in the Cheryl and Terry Drive area is unlikely to be from the GE/Moreau pit.

In summary, failure to achieve model calibration, which the report admits, precludes drawing conclusions regarding ground water flow and contaminant transport based on the model.

F. Ground Water - Extent of Contamination

The argument (page 127) that contaminant ratios indicate the Cheryl and Terry Drive contamination does not originate from the pit area is invalid. To begin with, there is absolutely no documentation to support the assertion that solvent ratios were consistent from load to load as they were dumped into the pit. In fact, materials of various compositions were deposited, and over a long period of time. Thus, there is no uniform composition to the wastes in the pit nor is uniformity expected. Secondly, there is the complicating factor

of product degradation in ground water, which is poorly understood. This alone would preclude use of contaminant ratios to indicate source areas. Significantly, the report authors themselves indicate the unreliability of using contaminant ratios when they note on page 134 that such ratios do not hold up in the surface water streams at X-6 and X-7, yet the springs feeding these two streams just above the sampling points are only 250 ft. apart.

The report conclusion regarding water contamination in the Cheryl and Terry Drives area (that the pit is not the source) is premature at best and field work is under way to better define this situation. This statement is based on a faulty theory of contaminant ratios, and a ground water mound (simulated by an uncalibrated model) in an area where no mound has been observed. There is a real inconsistency between this conclusion and other conclusions in the report that are founded in fact and are fully supported.

We are available to discuss this matter in more detail with USEPA, GE or its consultants. Please contact Mr. John E. Iannotti, P.E. of my staff at (518) 457-5637 if you have any questions.

Sincerely,

Norman H. Nosenchuck, P.E.

Director

Division of Solid & Hazardous Waste

cc: Robert Ogg - USEPA, Region II



C.O.M.A.C.

Citizens of Moreau Against Contamination

January, 1985

C.O.M.A.C. REPONSE TO THE GE MOREAU SITE STATUS REPORT

(CITIZENS OF MOREAU AGAINST CONTAMINATION)

P. O. Box 1038

South Glens Falls, N. Y. 12801

A Non-Profit Citizens Action Organization.

Committed to a better environment for the Town of Moreau.

"COMAC" (Citizens of Moreau Against Contamination), is a non-profit citizens action group formed over two years ago to address the Moreau Site Contamination. Membership is over 70 families living in the proximity of the site and using water via private wells from the Contaminated Moreau Acquifer. Our families are concerned of being affected now and in the future.

We are responding to the G.E. Status Report based on our knowledge of the problem as victims who must live daily with the problem. We feel the GE Report, although accurate in some areas, is incomplete and offers no real permanent solution to the water contamination problem.

(CITIZENS OF MOREAU AGAINST CONTAMINATION)

P. O. Box 1038

South Giens Falls, N. Y. 12801

A Non-Profit Citizens Action Organization.

Committed to a better environment for the Town of Moreau.

The GE report concludes that some 6 wells are contaminated above EPA levels.

The Comac group has a safe level of contamination, which is "ZERO" levels in our water source. According to a level of "ZERO" we calculate the number of violated wells, to the best of our resources, as follows:

Total number of violated wells 25

as related to Bluebird Road, Terry Drive, Cheryl Drive and Myron Road.

Please note: One violated well on the Bluebird Road area supplies some 22 families with water.

The total number of families using violated wells is 47, considering the above note about one well supplying 22 families.

Based on average census figures of persons per household, we calculate that 188 persons are using water daily from violated wells. Adding to these persons we consider next, the number of persons in neighboring households, that is to say families living adjacent to violated wells. This adds an additional 200 persons to the 188, giving a total of 388 persons either impacted or to be impacted due to the 2/3 of a foot per day of travel of the contaminates, as outlined in the GE Report.

The Comac inventory of impacted persons is fairly and realistrically equated and a far cry from the numbers acknowledged thus far. We feel the Public is entitled to know the vast expanse of the problem.

Regarding property values, it is obvious the quality of our property has been impacted by the Toxic Dumping. In 2 years we have seen virtually "ZERO" sales of realestate in the area.

(CITIZENS OF MOREAU AGAINST CONTAMINATION)

P. O. Box 1038

South Glens Falls, N. Y. 12801

A Non-Profit Citizens Action Organization.

Committed to a better environment for the Fown of Moreau.

As a result of the "SLURRY WALL" and the encapsulation, we are now required to live next to a "Toxic Time Bomb", which is very permanent and Multi-Lifetime in its existence, not merely a thirty year proposal. The slurry wall has created a permanent neighbor with the ability to devalue property to Unsaleable levels.

Comac has constantly questioned the number of chemicals being scanned (Tested) for, which can be nearly "THIRTY", nor merely the "THREE" as reported by the GE Report. PR material has let the public to feel only a few chemicals are in question. The Public is entitled to Know. Comac would like an analysis of filter media and further more wishes to know how the media is disposed of.

As we are told of the minimum Thirty (30) years of offsite monitoring, we see only the same 30 years of being forced to use a violated and contaminated water source. Every family in the area is justly due a clean - safe permanent water supply which will allow lives to go on in a normal fashion:

(CITIZENS OF MOREAU AGAINST CONTAMINATION)

P. O. Box 1038

South Glens Falls, N. Y. 12801

A Non-Profit Citizens Action Organization.

Committed to a better environment for the Gown of Moreau.

SUMMARY

Over the last two years, the Comac group has received a great deal of correspondence from involved agencies, as well as have attended many meetings which all have indicated very positive support towards a water supply system. Certain items of correspondense also indicate that "An Imminent and Significant health hazard does in fact exist to certain well water users."

The Comac group has also constantly asked about a health study to be started and conducted, to this request, we have obtained a "ZERO" level of attainment.

We are a group committed to a Safe environment in the Town of Moreau. We feel we have over the last two years been patient and have given every opportunity to becoming knowledgeable of the problem. Our memands are founded on solid, fair and moral reasons. It is our responsibility to reply to all published reports and to make our views known to all we can reach.

ONCE AGAIN, WE STAND FOR "ZERO LEVELS" OF CONTAINATION IN OUR WATER SOURCE.

WE MUST BE ALLOWED A COMPREHENSIVE WATER SYSTEM. NOW:

BRINGING GOOD LIFE BACK TO MOREAU IS COMAC'S MOST IMPOR-TANT PRODUCT.

C. O. M. A. C. Inc.

(CITIZENS OF MOREAU AGAINST CONTAMINATION)

P. O. Box 1038

South Glens Falls, N. Y. 12801

A Non-Profit Citizens Action Organization.

Committed to a better environment for the Jown of Moreau.

CC: to

Gov. Cuomo

Com. Henry Williams

Dr. Axelrod

Mr. Wiley Lavigne, PE Mr. James E. Connolly

James C. Woods, Region 11

Mr. Frank Hardick, Moreau Town Eng.

Moreau Town Board

Kathleen Morrison

James Sevensky

Gerald Solomon Robert D'Andrea

Joseph Bruno

Maurice Hinchey

C. O. M. A. C. Inc.

(CITIZENS OF MOREAU AGAINST CONTAMINATION)

P. O. Box 1038

South Glens Falls, N. Y. 12801

A Non-Profit Citizens Action Organization.

Committed to a better environment for the Town of Moreau.

REFERENCES

Town Map C-278-1

Sampling program water supply wells, cicinity of Caputo Site/Moreau (1), Saratoga County.

Center for Disease Control Memo dated 6/13/83.

Moreau Site Status report, November 1984.

ADDENDUM

REMEDIAL INVESTIGATION
GE / MOREAU SITE
II - CERCLA - 30201

prepared for:

GENERAL & ELECTRIC Schenectady, New York

prepared by:

Dunn Geoscience Corporation

ADDENDUM

REMEDIAL INVESTIGATION

GE/MOREAU SITE

II-CERCLA-30201

Prepared For:

GENERAL ELECTRIC
Schenectady, New York

Prepared By:

DUNN GEOSCIENCE CORPORATION

March, 1985

TABLE OF CONTENTS

	pa	ge
1.0	INTRODUCTION	1
	1.1 General	1
	1.2 Objectives of Additional Investigation	3
	1.3 Scope	3
2.0	METHODOLOGY	5
	2.1 General	5
	2.2 Field Investigation	5
	2.2.1 Drilling Program	5
	2.2.2 Soil Boring Sampling	6
	2.2.3 Well Installation	6
	2.2.4 Well Development	7
	2.2.5 Water Level Measurements	8
	2.2.6 Water Quality Sampling 1	0
	2.2.7 Surface Soil Sampling	6
	2.2.8 Soil Sampling Locations	9
	2.3 Laboratory Testing	3
	2.3.1 Chemical Analyses: Soils 2	3
	2.3.2 Chemical Analysis: Water	5
3.0	GEOHYDROLOGY	6
4.0	INFLUENCE OF PUMPING WELLS	8
5.0	GROUNDWATER MODELING	9
	5.1 Introduction	9
	5.2 System Conceptualization	0
	5.3 Model Update and Re-calibration	0
	5.4 Conclusions	0
6.0	GROUNDWATER - EXTENT OF CONTAMINATION	1
7.0	SURFACE WATER - EXTENT OF CONTAMINATION 6	0
8.0	SOILS - EXTENT OF CONTAMINATION	4

LIST OF FIGURES

		page
1.1	Study Area	2
2.1	New York State DOT Well Locations	9
2.2	Phase One Correlations	26
2.3	Phase Two Correlations	32
2.4	Excerpt from Orion Research Instruction Manual	33
3.1	Hydrographs of Selected Monitoring Wells	37
5.1	Conceptual Model of the Moreau Water Table Aquifer	41
5.2	Computer Model - Scenario 6	44
5.3	Regional Perspective of Simulated Groundwater Elevations for Scenario 6	45
5.4	Local Perspective of Simulated Groundwater Elevations for Scenario 6	46
5.5	Computer Model - Scenario 7	47
5.6	Regional Perspective of the Simulated Groundwater Elevations for Scenario 7	48
5.7	Local Perspective of the Simulated Groundwater Elevations for Scenario 7	49
7.1	Surface Water Quality	62
7.2	Approximate Surface Water Sampling Locations	63
8.1	Extent of Soil Contamination - Cross-Section Al-Al4	65

LIST OF TABLES

		page
2.1	Water Level Information	11
2.2	Phase One PCB Test Kit Results	24
2.3	Phase Two PCB Test Kit Results	28
5.1	Summary of Model Input Parameters (October, 1984)	43
6.1	Summary of Analytical Results - Groundwater Monitoring	52
7.1	Stream and Reservoir Analytical Results - Fort Edward, New York	61

LIST OF APPENDICES

Appendix A Soil Boring Logs
Monitoring Well Construction Details

Appendix B Grain-Size Distribution Analyses

Appendix C Initial PCB Field Kit Analytical Results;
Phase I and Phase II
Environmental Testing and Certification Technical Reports

Appendix D Surface Soil Sample Descriptions

Appendix E Groundwater Monitoring - Analytical Results

LIST OF PLATES

Plate 1	Study Area, Well Locations, and Location of Geologic Cross-Section
Plate 2	Geologic Section
Plate 3	Top of Clay Contour Map
Plate 4	Groundwater Table Contour Map - 10/26/84
Plate 5	Groundwater Table Contour Map - 11/28/84
Plate 6	Groundwater Table Contour Map - 12/28/84
Plate 7	Groundwater Table Contour Map - 1/29/85
Plate 8	Soil Sampling Sites
Plate 9	Simulated Versus Observed Water Level Contours - 1/29/85
Plate 10	Extent of Soil Contamination

1.0 INTRODUCTION

1.1 General

This Addendum to the October, 1984 Remedial Investigation report completes the remedial investigation conducted under II-CERCLA-30201.

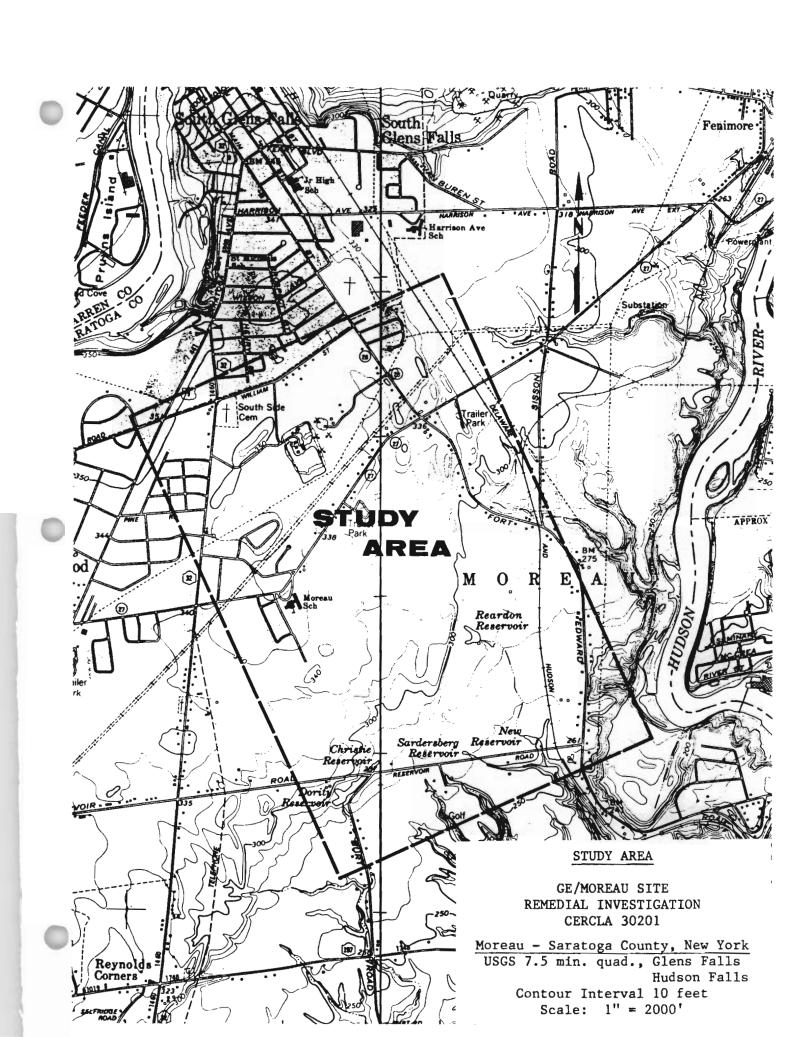
The October, 1984 report detailed an in-depth geohydrologic study of the area surrounding the GE/Moreau Site located in the Town of Moreau, just south of South Glens Falls, Saratoga County, New York. Figure 1.1 is a map of the site and surrounding area addressed in the October, 1984 report and this Addendum. The Addendum is the result of additional studies requested by the USEPA at a project summary meeting conducted in October, 1984.

The work was conducted by Dunn Geoscience Corporation under contract with General Electric. Subcontract drilling services were provided by Warren George, Inc., Jersey City, New Jersey. Water and soil analytical laboratory services were provided by ERCO/Energy Resources Company, Inc., Cambridge, Massachusetts, and Environmental Testing and Certification, Edison, New Jersey.

The Addendum includes the specific findings resulting from the additional investigations as well as any new data obtained since the preparation of the October, 1984 report. It references the earlier report for previously developed data, protocols, and background information.

The additional work reported in this Addendum is as follows:

- Installation of 13 additional monitoring wells;
- Horizontal hydraulic conductivity testing;
- Groundwater flow network;



- Groundwater flow rate;
- Refinement of the groundwater modeling;
- Groundwater extent of contamination:
- Surface water extent of contamination;
- Surface soil sample collection, analysis, and extent of contamination.

There are three parts to this Addendum: the text, 5 appendices, and a portfolio of plates.

1.2 Objectives of Additional Investigation

The additional investigations were conducted in two areas of the Moreau Site. The first area was in the vicinity of Terry Drive, Cheryl Drive, and Myron Road southwest of the former disposal site. Three additional monitoring well clusters were installed in this area. The second area was generally north of the former disposal area where additional shallow monitoring wells were installed to better define groundwater elevations and flow in the area north of the former disposal site.

Water quality and water level data from the newly-installed well clusters and water level data from the shallow monitoring wells were combined with data obtained from existing wells to further refine the extent of contamination and the direction of groundwater flow.

1.3 Scope

The scope of the additional investigation included the drilling of three additional monitoring well clusters consisting of a total of eight wells and five shallow water level monitoring wells. Two of the three monitoring well clusters consisted of shallow, intermediate, and deep wells.

_

The third cluster consisted of two "fill-in" intermediate wells resulting in a five-well cluster. The five shallow wells were for the sole purpose of obtaining water level measurements.

The soil sampling program was modified by EPA following the issuance of the October, 1984 report. The results of this program are included in this Addendum.

2.0 METHODOLOGY

2.1 General

All aspects of the remedial investigation were conducted using standard or accepted methods. Techniques and methods utilized during the field investigation and laboratory testing were described in the October, 1984 Remedial Investigation report. Modifications to previously described protocols used to perform the additional work are addressed within the respective sections of this addendum.

2.2 Field Investigation

2.2.1 Drilling Program

Thirteen additional monitoring wells were installed between October 30, 1984 and November 15, 1984 during a third phase of drilling and well construction. Five of the wells, DGC-26, 27, 28, 29, and 30, are shallow wells installed primarily to measure the water table in the area north and northeast of the former disposal site. The remaining eight wells constitute well clusters DGC-23, 24, and 25. The locations of the new Phase Three monitoring wells as well as the previously existing wells are shown on Plate 1.

As before, the drilling program utilized the mudrotary technique. A Mayhew 500 drilling rig,
employing a 4 3/4-inch tri-cone roller bit, and
bentonite based drilling fluid, was used in all
drilling. Water for drilling was obtained from a
municipal fire hydrant on William Street, Town of
Moreau.

2.2.2 Soil Boring Sampling

Split-spoon sampling was performed at standard intervals in borings DGC- 23D, 24D, and at the proposed screened intervals of borings 25Ia and 25Ib. Soil samples were also collected from a section of the anticipated screened interval in shallow wells DGC-26, 27, 28, 29, and 30. No sampling was performed on the intermediate and shallow borings at DGC 23 and 24. Soil boring logs describing subsurface materials encountered in the sampled test borings are included in Appendix A.

The sampling method is described in Section 2.2.2 of the October, 1984 Remedial Investigation Report. Fine gradation and hydrometer analyses were performed on eight of the samples by Dunn Geoscience Laboratory. Results of these analyses are included in Appendix B. Geologic information acquired from deep borings DGC-23D and 24D, was used to develop geologic cross-section F-F, shown in Plate 2 and to produce a revised top-of-clay contour map (Plate 3). The stratigraphy described in Section 3.2 of the October, 1984 report was confirmed in the new borings.

2.2.3 Well Installation

Installation of monitoring wells DGC-23D, 23I, 23S, 24D, 24I, 24S, 25Ia, and 25Ib followed the methods outlined in section 2.2.5 of the October 1984 report with the following exceptions:

- flush threaded #10-slot stainless steel screen and steel riser pipe were used rather than the PVC materials which were previously employed in earlier well construction.
- number 1/2 Morie sand was used in all filterpacks.
- wells DGC-25Ia and 25Ib, were installed such that their screened sections were positioned at the intervals not screened by existing wells TM-2, TM-5, and TM-C.

The five shallow wells (DGC-26 to DGC-30) were constructed with two-inch I.D. mechanical flush threaded, schedule 40, PVC riser and #10 slotted PVC pipe. Twenty feet of slotted pipe was used in each well, with the upper five feet extending above the water table, as estimated during drilling. Number 1/2 Morie sand was used as a filter pack. Above the filter pack, a two-foot bentonite seal was emplaced, and formational backfill was used to fill the remainder of the annulus. A lower bentonite seal was not used in these wells. As in all other wells, lockable, steel, protective casings were cemented over the PVC riser extending above the ground surface.

Construction details of all newly installed wells are shown in Appendix A and their locations are shown on Plate 1.

2.2.4 Well Development

All newly constructed wells (DGC-23 to DGC-30) were developed using the modified air-lift technique described in Section 2.2.6 of the October 1984 report.

2.2.5 Water Level Measurements

Water-level measurements, supplementing those in the October, 1984 Remedial Investigation report were obtained on four dates: October 26, November 28 and December 28, 1984, and January 29, 1985. Measurements were made on all Dunn Geoscience Corporation monitoring wells and GE/Moreau Site wells (O'Brien & Gere 1, 2, and 3; B-28; and Jebco wells). In addition, levels were obtained from Town of Moreau wells, an existing well on the former Lewis property (GE-1) and Department of Transportation monitoring wells (see Figure 2.1) when possible. Data was gathered as follows:

- October 26, 1984 measurements on DGC wells 1 to 22, and Town of Moreau and GE/Moreau Site wells;
- November 28, 1984 measurements on DGC wells 1 to 30, GE-1, Town of Moreau and GE/Moreau Site wells, and Department of Transportation wells 15 to 17 (formerly designated 1 to 3);
- December 28, 1984 measurements on DGC wells 1 to 30, the GE-1, the Town of Moreau and GE/Moreau Site wells;
- January 29, 1985 measurements on DGC wells 1 to 30, the GE-1, Town of Moreau and GE/Moreau Site wells, and Department of Transportation wells 1 to 17.

Measurements and data reduction were performed according to protocol established in the October, 1984 report. Due to possible frost-heave of the outer

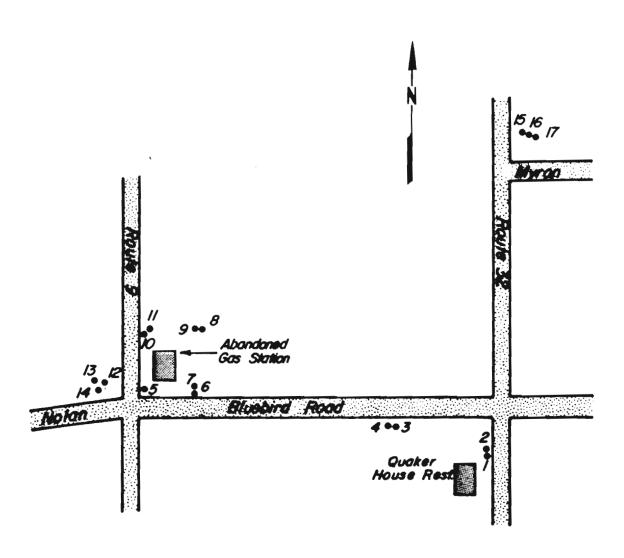


Figure 2.1

New York State Department of Transportation
Well Locations
and
DGC Numeric Annotations

protective casings, top of PVC was used as the standard measuring point. Water-level information with respect to mean sea level is presented in Table 2.1.

The information in Table 2.1 was used to construct water-table contour maps presented as Plates 4 to 7 and to calculate hydraulic gradients.

2.2.6 Water Quality Sampling

Since the Remedial Investigation report was submitted in October, 1984, additional groundwater sampling has been conducted.

The following monitoring wells were sampled between October 16 and 19, 1984:

DGC-6S, I	DGC-20S, I, D
DGC-10S, I, D	DGC-21S, I, D
DGC-11S, I, D	DGC-21S, I, D
DGC-15S, I, D	TM-A
DGC-19	TM-4

A second round of samples were collected from the following monitoring wells between December 5 and 21, 1984:

DGC-1S, I, D	DGC-16S, D	TM A,C,D,G
DGC-2S, I, D	DGC-18S, I, D	FE-1
DGC-3S, I, D	DGC-19	
DGC-4S, I, D	DGC-20S, I, D	
DGC-5S, I, D	DGC-21S, I, D	
DGC-6S, I, D	DGC-23S, I, D	
DGC-13	DGC-24S, I, D	
DGC-14S, I, D	DGC-251a,b	
DGC-15S, I, D	TM2,5	

Table 2.1 WATER LEVEL INFORMATION

Ounn Geoscience Wells	10/26/84	11/28/84	12/28/84	1/29/85
15	295.70	295.42	295.17	294.98
11	295.82	295.54	295.30	295.10
1D	296.38	296.14	295.93	295.74
2 S	296.54	296.27	296.10	296.32
21	294.45	294.21	294.03	293.82
2D	294.66	294.40	294.21	29 3.99
3S	294.56	294.29	294.06	293.85
31 3D	294.76 294.74	294.51 294.45	294.23	294.02 294.02
15	201.00	201 81	201 70	201 51
45	291.89	291.81	291.79	291.51
41	291.78	291.69	291.68	291.40
4 D	291.70	291.61	291.60	291.31
55	303.00	302.59	302.27	302.12
51	303.03	302.65	302.33	302.19
5D	304.70	304.41	304.15	304.05
6S	322.91	322.46	322.17	322.04
61	322.90	322.46	322.17	322.04
6 D	322.54	322.12	321.81	321.68
7 S	323.40	322.96	322.71	322.49
71	323.39	323.35	322.67	322.48
7 D	322.89	322.46	322. 17	322.02
88	323.41	322.95	322.66	322.50
81	323.40	322.96	322.66	322.47
8 D	322.92	322.49	322.20	322.04
9 S	dry	dry	dry	dry
91	298.96	298.51	298.17	297.86
9 D	298.87	298.44	298.07	297.79
105	316.87	316.49	316.22	316.07
101	316.94	316.55	316.27	316.11
10D	316.33	315.9 3	315.64	315.46
115	323.13	322.66	322.33	322.21
111	322.99	322.54	322.2 3	321.80
11D	322.37	321.93	321.64	321.51
125	325.50	325.00	324.60	
121	321.82	321.30	321.02	320.8 8
12D	321.89	321.41	321.08	320.98
13	281.42	282.21		281.98
145	320.19	319.76	319.46	319.50
141	320.29	319.86	319.57	319.61
14D	320.26	319.79	319.51	319.51
158	323.63	323.20	322.89	322.71
151	323.37	322.94	322.64	322.42
15D	323.12	322.71	322.42	322.24
165	317.78	317.55	317.48	317.19
16D	316.97	316.62	316.42	316.21
			211 11	21/ 22
17	314.74	314.49	314.44	314.22

Table 2.1 Water Level Information Page 2

Dura Considera				
Dunn Geoscience Wells	10/26/84	11/28/84	12/28/84	1/29/85
185	324.20	323.73	323.44	323.34
181	324.16	323.70	323.43	323.29
18D	322.92	322.51	322.22	322.12
19	323.92	323.50	323.20	322.85
2 0S	324.35	323.97	323.71	323.51
201	324.25	323.83	323.55	323.35
20 D	324.03	323.60	323.31	323.13
21S	324.46	324.01	323.76	323.67
211	324.46	324.01	323.76	323.65
21D	324.27	323.84	323. 56	323.44
22 S	318.34	317.93	317.63	317.52
221	318.64	318.28	318.05	317.99
22 D	318.81	318.42	318.12	318.01
2 3S		322.75	322.46	322.30
231		322.78	322.49	322.32
23D		322.78	322.56	322.29
2 4S		322.74	321.45**	322.31
241		322.74	322.45	322.30
24D		322.52	322.19	322.00
2 51a		322.32	322.01	321.91
25 1b		322.19	321.90	321.83
26		323.69	323.36	323.34
27		324.22	323.51	323.49
28		323.72	323.29	323.12
29		324.14	323.72	323.65
30		324.14	323.76	323.69
GE/Lewis			323.69	323.59
Sand Pit Stake	324.23	323.87		
Town of Moreau				
Wells				
A	324.47	324.04	323.77	323.73
В	323.70	323.29	322.70	322.71
c	322.44	322.01	321.74	321.82
D	321.64	321.21	320.92	320.99
E	322.60	322.11	321.78	321.68
F	321.01	320.54	320.22	320.07
G	298.96	298.54 321.69	298.22 321.36	297.99 321.27
2 3	322.12 322.71	322.27	321.96	321.83
4	322.57			
5	322.39	321.96	321.67	321.60
Caputo Site Wells				
OBG-1	324.41	324.03	323.78	323.59
OBG-2	324.42	324.02	323.77	323.60
OBG-3	324.36	323.97		323.69
B-28	324.41	324.02	323.76	323.58 323.80
Jebco 1.5 Jebco 2.0	324.55 323.38	324.03 322.98		323.80

Table 2.1
Water Level Information
Page 3

Department of Transportation				
Wells	10/26/84	11/28/84	12/28/84	1/29/85
1				321.54
2				321.54
3				322.15
4				322.16
5				,
6				322.16
7				322.14
8				322.16
9				322.16
10				
11				
12				321.66
13				321.67
14		~		321.76
15*		321.45		322.95
. 16*		321.55		322.33
17*		322.45		321.66

^{*}D.O.T. wells 15-17 correspond to D.O.T. wells 1-3 of the October 1984 R.I. report, respectively

^{**}Possible erroneous data point

A third round of samples were collected from the following monitoring wells between January 15 and 17, 1985:

DGC-23S, I, D TM2, 5
DGC-24S, I, D TM C
DGC-25Ia, b FE-1

On January 30 and 31, 1985, NUS Corporation, under contract to USEPA, collected samples from selected wells. Samples were split from the following wells:

DGC-15I DGC-21I DGC-24S, I, D

A fourth round of groundwater samples were collected from the following monitoring wells between February 15 and 18, 1985;

> DGC-23S, I, D TM-2 DGC-24S, I, D TM-5 DGC-25Ia, b TM-C

Two major rounds of residential well sampling were performed during November 12 to 16, 1984 and January 21 to 25, 1985. Monthly or bi- monthly sampling was also conducted at selected residences from September to December 1984.

Nine rounds of surface water collection were performed between October 19, 1984 and February 6, 1985. All water samples were identified by sample number, logged onto a chain-of-custody, chilled, and subsequently shipped to the laboratory.

Results of the sampling are discussed in later sections.

Several modifications to the groundwater sampling procedure were implemented during the December round of sampling. A list of modifications along with a justification for each is provided below:

- All washing of the pump was done in a sixteen-foot box truck stationed at the Town of Moreau Garage on William Street. Snow cover prevented transportation of the cleaning equipment to each well location. Instead, a four-wheel drive vehicle was used to shuttle the pump between the garage and the wells. The pump was transported on a clean sheet of plastic to prevent contamination during travel.
- A change in the pump cleaning procedure was enacted. The new method consisted of submerging the pump power cord and coil of teflon tubing into 40 gallon plastic containers, each dedicated, in order, to the following cleaning solutions: tap water and trisodium phosphate, tap water, and tap water. The pump was activated in each bath for three minutes, pumping at least three gallons of each bath water through the pump and tubing. A fourth station, constructed of a three-foot section of six-inch I.D. PVC sealed at one end, was filled with three gallons distilled water. The pump was placed in the

distilled water and pumping initiated until the water level was lowered to the pump intake level. The remaining water and an additional gallon of distilled water were then poured over the pump and first five feet of tubing. Finally, the pump was placed in a clean plastic sheath and the whole unit transferred to the clean plastic sheet in the four-wheel drive vehicle.

- An electric water-level indicator (Slope Indicator Co., Model #51453) replaced the steel tape method. Measurements were quicker, with no measurable loss of accuracy. The bottom four feet of electrical cord was rinsed with distilled water, then methanol, and finally distilled water before entry into each well to prevent cross-contamination.
- Each dedicated sampling bailer was thoroughly rinsed with a gallon of distilled water before use. This rinse was performed on each bailer, in addition to the cleaning protocol detailed in Appendix A of the October report before each sampling event.

2.2.7 Surface Soil Sampling

Section 2.2.11 of the October 1984 report discussed a soil sampling protocol approved by EPA to identify potential sites of PCB-contaminated soils. The study is classified as enumerative, or descriptive, in that action is directed to the number of soil sampling

sites from which the samples were taken; this is in contrast to an analytic study, the primary interest of which is the causal system or process which created the conditions observed in the study.

The main objectives of this study are two-fold: to determine the areal extent of PCB contamination and to assess the capabilities of a PCB Field Test Kit manufactured by McGraw-Edison (Franksville, Wisconsin). The latter objective will be discussed first since results from this study were used to determine the overall extent of soil contamination.

The soil sampling and field test kit protocol were divided into two phases. Phase I initial investigatory sampling consisted solely of collecting soil from depths between four and eight inches below ground surface as required by EPA. Phase I soil analysis consisted of dumping the collected soil sample into a large metal pan and taking small aliquots randomly until sufficient material was accumulated to follow the kit procedure. This was performed for samples. Field kit test results and other supporting data for all initial, first run, analyses are found in Appendix C. Laboratory analytical results for soil PCB content are also found in Appendix C. Those samples superscripted with an asterisk were part of the Phase One study; all other samples were part of Phase II. The entire project consists of 533 samples.

Following review of analytical data generated from samples collected by the New York State Department of Environmental Conservation in the area of interest, a change in sampling protocol was approved by the EPA. This change included additions and modifications to the original soil sampling plan approved by EPA on September 28, 1984.

Phase II of the sampling protocol consisted of collecting samples at the ground surface and at several depths below the surface; in addition, all holes were dug deep enough to identify the natural horizons, regardless of the sample collection depth. These natural soil horizons were compared to a "clean" area adjacent to the site but far enough removed not to be involved in any of the problems associated with the transport of PCB-contaminated fill material. For testing soils, each field collected sample was homogenized by thorough mixing prior to removing aliquots for the kit method.

Quality assurance objectives were established by performing replicate field kit analyses and by calibration by an approved environmental laboratory employing gas chromatographic techniques (EPA Method 8.08, SW-846) with 10% of the samples collected. Two types of kit replicates were performed. Analytical replicates were performed by taking aliquots of liquid from the same soil extract and working them through the procedure concurrently. Sample replicates were carried out by extracting a fresh portion of the original sample.

Laboratory confirmation was performed by Environmental Testing and Certification (Edison, New Jersey). From approximately six ounces of soil per sample submitted to the laboratory, ten grams were arbitrarily removed, homogenized, and from this, two grams were taken for extraction and analysis. Again, Phase I consisted of sending non-homogenized/non-mixed samples to the laboratory; samples sent during Phase II were well mixed.

2.2.8 Sampling Locations

Plate 8 shows the soil sampling sites. Each soil sample collected is labeled by its section letter (capitalized) and a minimum designation of at least one number (e.g., Q6, L3, C4). Lateral sampling sites along a central sampling path are characterized by an additional letter (small case, e.g., A6b, D5b, G10d). Such lateral designations always use the "c" site as the centerline of the path; sites are labeled from approximate north to approximate south, perpendicular to the axis of the main path. These gridded sites are located 25 feet (b and d sites) and 50 feet (a and e sites) on either side of the centerline. Unless otherwise designated by a specific depth (inches below ground) or surface, S, samples are collected at a depth of six inches, plus or minus one to two inches (e.g., 4"-8", 5"-7", 4"-7"). Specific exceptions to these sample designations are listed in the individual section descriptions which follow. Centerline points are located every 50 feet along the main axis of a road or path.

Section

Description

Α

The (former) Lewis driveway originating from Fort Edward Road and extending to the (former) Lewis house. In addition to the 25 feet and 50 feet transects (a-e), sites Al through A4 contain transects at 75 feet and 100 feet (y,r, and z,t, respectively). Sites Al through A6 contain transects at 10 to 12 feet on either side of the centerline (c) labeled N and S and marked by the small case letter x. Sites Al-A6 are an exception/modification to the surface, S, designation. Sites labeled with a single S are sampled at the 6 inch depth (e.g., AlS, A4S); sites sampled surface (for Als-A6s designated with a double S (e.g., AlS-S, A4S-S). Al-A6 are the only sites where this will occur; all other S designations imply surface sampling (0"-1/2"). Sites A6c to A12c were sampled at depths down to just beyond four feet below the present grade using a block trench method. This area is composed largely of fill material. Geological soil classifications using the Burmister system are presented in Appendix D for these six sites as well as other selected sites.

B Around the (former) Lewis house and main paths leading away from the house as shown. Sites Bl-B6 were sampled at depths down to just over five feet depending on depth to the natural horizons. Logged soil classifications

are found in Appendix D.

С

D

Ε

F

A narrow, but worn, path extending north of the Niagara Mohawk Power Corporation (NMPC) right-of-way between the (former) Lewis driveway and the current GE/Moreau site access road (Section G).

Along the east fence of the GE/Moreau site; originating from the gate/parking area adjacent to the NYSDEC trailer and extending to the northeast corner of the fence. Samples were collected along or very near the fence at every 50 feet and laterally at 25 and 50 feet perpendicular to the fence in the eastward direction where appropriate.

An old access road connecting the (former) Lewis driveway and the GE/Moreau site near the middle of the east fence.

An area from the southwest corner of the old barrel storage area extending toward the northeast corner of the GE/Moreau site fence. Points are 25 feet on center except Fll which is directly in front of the gate of the old barrel storage area.

G The present paved access road from Fort Edward Road to the GE/Moreau site. Because of the asphalt pavement, no centerline (c) samples were collected.

Along centerline of NMPC right-of-way, southern leg, north of properties 36 and 39 on the Moreau tax map. Samples collected every 50 feet for 450 feet extending southwest from the northeast corner of property 36.

J

K A "triangle" defined by the following tax map locations: southwest corner of property 35; northeast corner of property 36; and a point at the general area of the southwest intersection of the two western legs of the NMPC right-of-way.

Rectangular grid extending northeast from the southeast corner of tax map property 35, along the NMPC right-of-way for 400 feet. Width is width of right-of-way.

M Rectangular grid extending southwest of Fort Edward Road on the NMPC right-of-way for 400 feet. Width is width of right-of-way.

Q

A path leading from the parking area adjacent to the NYSDEC trailer and extending 350 feet to a point adjacent to the major bend in the present GE/Moreau site access road (Section G).

2.3 Laboratory Testing

2.3.1 Chemical Analyses: Soils

Section 2.3.4 of the October, 1984 report outlined the field kit test methodology. All field kit testing since then has continued to follow these instructions. In addition to a calibration check every ten samples, the probe was rinsed in distilled water and the kit "Rinse" solution (in that order) after each sample probe measurement to insure that there was no chloride carry-over.

At the issuance of the October report, laboratory analysis was being performed on 13 soil samples. These 13 samples and 7 others were analyzed in duplicate by the field kit. The results of these measurements are presented in Table 2.2. Figure 2.2 is a graph of the probe response (in millivolts) versus the logarithm of the concentration of total PCBs determined by the laboratory. A plan to modify the protocol was developed. Prior to analysis by the kit, every sample was to be thoroughly homogenized by hand mixing. All samples treated this way would be referred to as Phase II samples; all measurements made previously on non-mixed soils were Phase I samples. Phase I consisted of 200 samples. Phase II consisted of 333 samples.

Table 2.2 PHASE ONE* PCB TEST KIT REPLICATE RESULTS

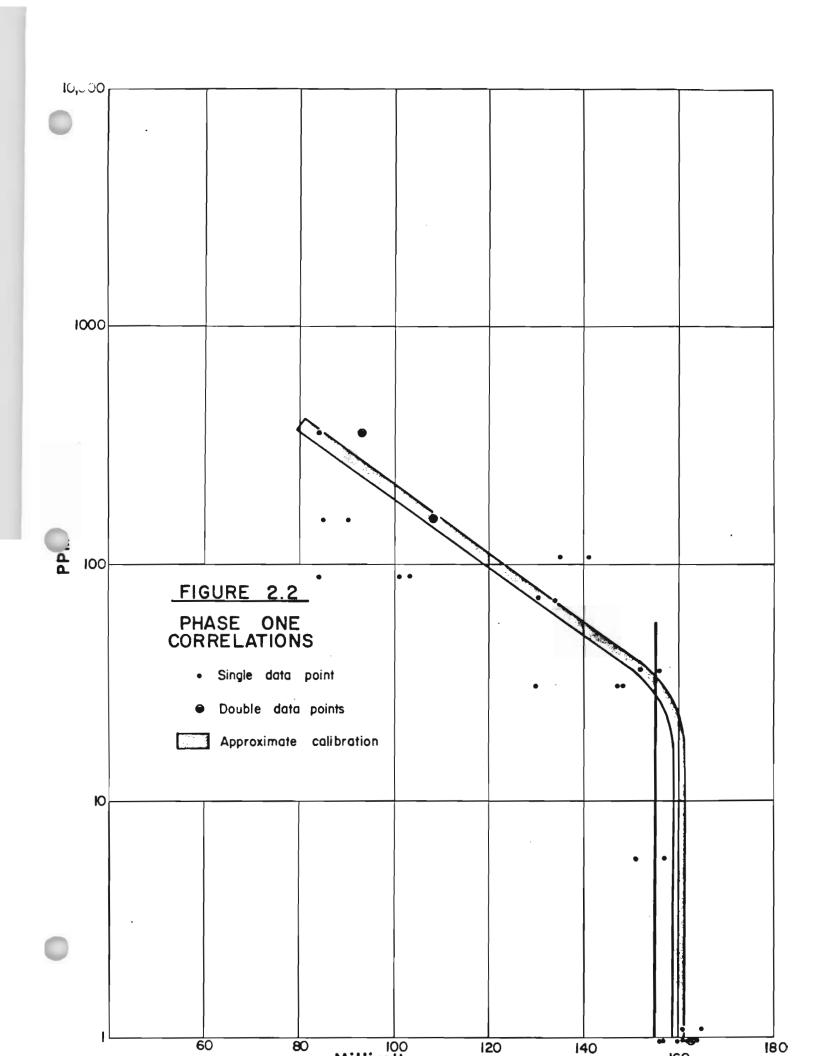
Sample	Date	Probe Response (mv)	Laboratory Result (ppm)**
Alb	9/24/84	130	31
	9/26/84	148	
	10/25/84	152,142(147)	
Alc	9/24/84	85	157
	9/26/84	90	
	10/1/84	108	
	10/25/84	108	
A2b	9/24/84	151	5.7
	10/25/84	157	
40 -	0/2//0/	0/	360
A2c	9/24/84	84	360
	9/26/84	93	
	10/25/84	93	
A3c	9/24/84	134	71
1.50	10/25/84	130	
A4c	9/24/84	103	90
A4C	9/24/84	84	70
		101	
	10/25/84	101	
A5c	9/25/84	141	109
	10/25/84	135	
Al4c	9/26/84	156	.36
11140	10/25/84	152	
Al9c	9/26/84	160	<1
	10/25/84	157	
C 8	9/27/84	161	<1
	10/25/84	156	
E3b	10/1/84	159	
	10/25/84	157	
E5d	10/1/84	162	
рсд	10/1/84	165	
)	10/23/64	103	
E7a	10/1/84	162	
	10/25/84	163	
El0a	10/15/84	158	
2,204	10/25/84	164	
	10/25/04	*V7	

PHASE ONE*
PCB TEST KIT REPLICATE RESULTS
Table 2.2
page 2

Sample	Date	Probe Response (mv)	Laboratory Result (ppm)**
G 8a	10/24/84	161	
	10/25/84	163	
G10a	10/24/84	158	
	10/25/84	162	
G13b	10/24/84	160	
	10/25/84	163	
J 9	9/27/84	161	1.1
	10/25/84	165	
K2	9/27/84	163	<1
	10/25/84	164	•
M 3	9/27/84	163	<1
•	10/25/84	162	

^{*} Aliquots of soil for kit analysis were picked from non-homogenized (field collected) samples.

^{**} Results are PCB as Aroclor 1248; all other Aroclors were at the not detected level or below the 1 ppm method detection limit.



During Phase II kit analysis, 44 soil samples were sent to the laboratory for confirmation. Six of these (A3c, A5c, A14c, A17c, E1c, G6d) were former Phase I samples which were thoroughly homogenized to become Phase II samples. Table 2.3 lists the results for Phase II kit and laboratory analyses. All 44 soil samples were run in kit sample replicate analyses, with some samples re-analyzed three or four times. Figure 2.3 represents a graph of Phase II sample probe responses versus laboratory quantitation analysis.

It is evident that the points show a great deal of scatter in the two figures. However, for purposes of a go/no go (i.e., contaminated/not contaminated) response, the scatter is acceptable.

Figures 2.2 and 2.3 show approximate curves fitted to Phase I and Phase II data. These curves show the expected relationship between electrode potential and concentration found with ion-selective electrodes. Figure 2.4 taken from an Orion (see Research instruction manual for chloride electrodes). Both curves show segments having a linear relationship between probe voltage and the logarithm concentration. Both also deviate curves asymptotically at higher voltage, becoming probe essentially vertical at 160 mv.

In both figures most of the points scattered about the vertical parts of the curve at 160 mv fall above 155 mv. In general, these points represent samples in which the PCB concentration is quite small or below the limit of analytical detection. A vertical line is drawn at 155 mv in both figures. This line crosses the curve at a concentration of approximately 32 ppm

DUACE TUO

PHASE TWO PCB TEST KIT REPLICATE RESULTS

Table 2.3

Sample	Date	Probe Response (mv)*	Laboratory Result (ppm)*
Aln	12/28/84 12/19/84 1/8/85	92 94 110,91,89(97)	420
Als	12/18/84 12/19/84 1/8/85 2/1/85 2/1/85 2/1/85	45 46 59,57,54(57) 61,66,63] 66,64,63] (65) 67,67,67]	3000
A3c	1/10/85 1/11/85	110,109,107(109) 108,105,107(107)	78
A3N-S	12/18/84 1/10/84 2/4/85	132 133,133,133(133) 131,133,138(134)	240
A3r-S	1/8/85 1/10/85	157 157,157,156(157)	5.2
A3y-S	1/8/85 1/10/85	158 155,159,159(158)	6
A5c	1/10/85 2/4/85	124,123,122(123) 135,150,151(145)	180
A5N	12/18/84 12/19/84 1/8/85 2/1/85 2/4/85	112 116 115,113,111(113) 138,138,136(137) 130,132,132(131)	450
A6c, 10"-12"	12/19/84 1/8/85 2/1/85	115 114,110,110(111) 126,125,126(126)	290
A6N	12/18/84 1/10/85	138 141,138,138(139)	177
A7c, 15"-19"	12/19/84 1/8/85	73 60,57,57(58)	890

PHASE TWO
PCB TEST KIT REPLICATE RESULTS
Table 2.3
page 2

A8c, 11"-13"	Sample	Date	Probe Response (mv)*	Laboratory Result (ppm) **
1/8/85 131,135,122(129) A9c, 11"-13" 12/19/84 136 230 A10b 1/10/85 124,122,118(121) 330 A10c, 21"-23" 12/19/84 130 260 A10c, 23"-25" 12/20/84 72 2,400 A11c, 23"-25" 12/20/84 85,85,84(85) 1/8/85 69,76,66(70) 2/1/85 66,65,64 1 64) 2/1/85 66,65,64 1 664) A14c 1/10/85 143,141,141(142) 70 A17c 1/10/85 155,158,156(156) 3.4 A20c-S 12/20/84 162 6 A20c-S 12/20/84 157,157,155(156) B1, 1"-4" 12/21/84 119,112,114(115) 2,000 B2, 1"-4" 12/21/84 151 200 B3, 1"-4" 12/21/84 151 200 B3, 1"-4" 12/27/84 98,98(98) 2,000	A8c, 11"-13"	1/8/85 2/1/85 2/1/85	116,114,112(114) 129,127,127] 122,120,120] (125)	270
1/10/85	A8c, 21"-24"			127
2/1/85 146,149,150(148) Al0c, 21"-23" 12/19/84 130 260 Al1c, 23"-25" 12/20/84 72 2,400 Al1c, 23"-25" 12/21/84 85,85,84(85)	A9c, 11"-13"			2 30
12/20/84 12/20/84 12/20/84 72 2,400 12/21/84 85,85,84(85) 1/8/85 69,76,66(70) 2/1/85 66,64,64] 2/1/85 66,65,64] 64,64,62] A14c 1/10/85 1/11/85 1/10/85 1/11/85 1/	A10b			330
12/21/84	Aloc, 21"-23"			2 60
1/11/85 140,140,139(140) A17c 1/10/85 155,158,156(156) 3.4 A20c-S 12/20/84 162 6 1/10/85 157,158,157(157) B1, 1"-4" 12/21/84 114 2,000 12/26/84 119,112,114(115) 2/4/85 138,136,136(137) B2, 1"-4" 12/21/84 151 200 1/10/85 150,143,146(146) B3, 1"-4" 12/26/84 113 2,000 1/27/84 98,98,98(98) 12/27/84 98,98,98(98) 2/4/85 126,126,126] (128)	Allc, 23"-25"	12/21/84 1/8/85 2/1/85 2/1/85	85,85,84(85) 69,76,66(70) 66,64,64] 66,65,64] (64)	2,400
1/11/85 157,157,155(156) A20c-S 12/20/84 162 6 1/10/85 157,158,157(157) B1, 1"-4" 12/21/84 114 2,000 12/26/84 119,112,114(115) 2/4/85 138,136,136(137) B2, 1"-4" 12/21/84 151 200 1/10/85 150,143,146(146) B3, 1"-4" 12/26/84 113 2,000 12/27/84 98,98,98(98) 2/4/85 126,126,126] (128)	A14c			70
1/10/85 157,158,157(157) B1, 1"-4" 12/21/84 114 2,000 12/26/84 119,112,114(115) 2/4/85 138,136,136(137) B2, 1"-4" 12/21/84 151 200 1/10/85 150,143,146(146) B3, 1"-4" 12/26/84 113 2,000 12/27/84 98,98,98(98) 2/4/85 126,126,126] (128)	A17c			3.4
12/26/84 119,112,114(115) 2/4/85 138,136,136(137) B2, 1"-4" 12/21/84 151 200 1/10/85 150,143,146(146) B3, 1"-4" 12/26/84 113 2,000 12/27/84 98,98,98(98) 2/4/85 126,126,126] (128)	A20c-S			6
1/10/85 150,143,146(146) B3, 1"-4" 12/26/84 113 2,000 12/27/84 98,98,98(98) 2/4/85 126,126,126] (128)	B1, 1"-4"	12/26/84	119,112,114(115)	2,000
12/27/84 98,98,98(98) 2/4/85 126,126,126] (128)	B2, 1"-4"			200
	ВЗ, 1"-4"	12/27/84	98,98,98(98) 126,126,126] (128)	2,000

PHASE TWO
PCB TEST KIT REPLICATE RESULTS
Table 2.3
page 3

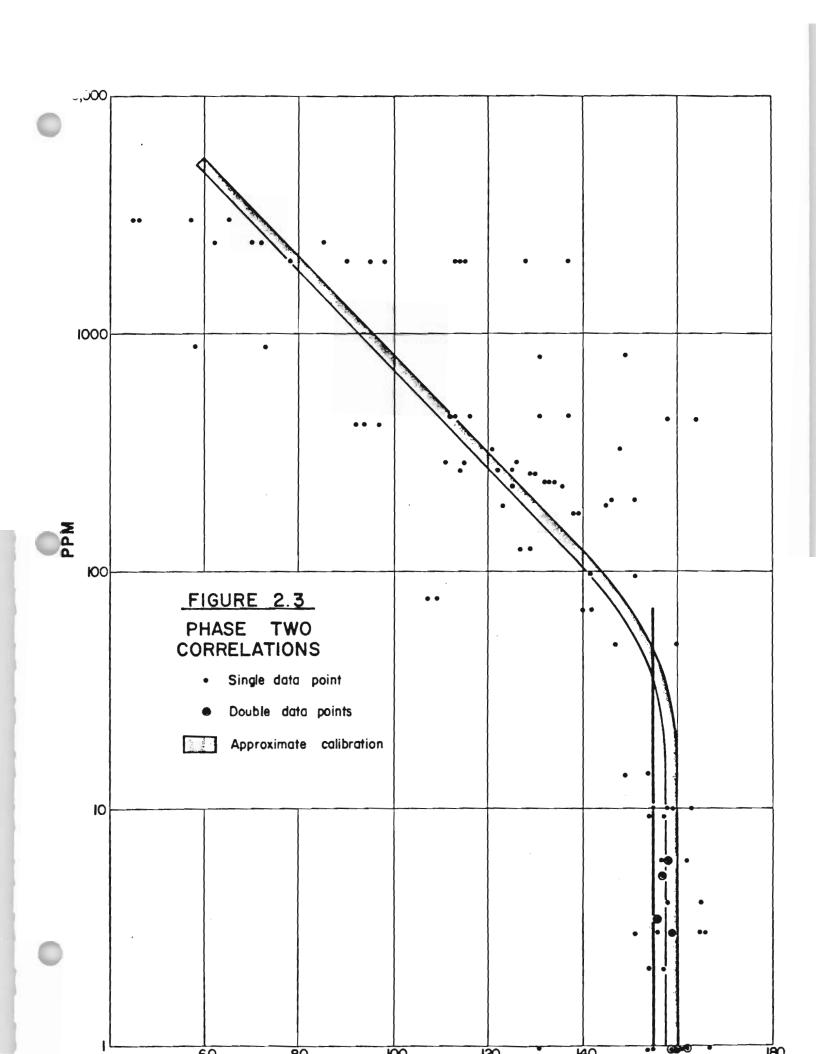
	•	•	
Sample	Date	<pre>Probe Response (mv)*</pre>	Laboratory Result (ppm)**
B4, 2"-6"	12/26/84 1/10/85	149 138,128,127(131)	800
B7, 3"-5"	12/26/84 1/10/85	160 151,144,145(147)	50
B8, 2"-4"	12/26/84 12/27/84 2/4/85	90 80,79,76(78) 96,93,95(95)	2,000
B13	12/27/84 1/10/85	164 158,160,157(158)	440
B16	12/27/84 1/10/85	163 157,153,154(155)	10
B18	12/27/84 1/10/85	164 159,158,158(158)	Interference
B19	12/27/84 1/10/85	165 159,151,159(156)	3
В31	12/27/84 1/11/85	166 158,159,159(159)	3
B39	12/27/84 1/11/85	165 158,156,159(158)	4
D3	12/28/84 1/11/85	155 161,160,160(160)	ND(<1)
D5.	12/28/84 1/11/85	154 161,160,158(160)	ND (<1)
D13, 2"-4"	12/28/84 1/11/85	151 160,160,158(159)	1.6(1.4)=3.0
Elc	12/28/84 1/11/85	149 - 155,154,152(154)	14
E2c	12/28/84 1/11/85	142 152,150,149(151)	9 8
E3d	1/2/85 1/11/85	131 (161,158,157)(159)	ND

PHASE TWO
PCB TEST KIT REPLICATE RESULTS
Table 2.3
page 4

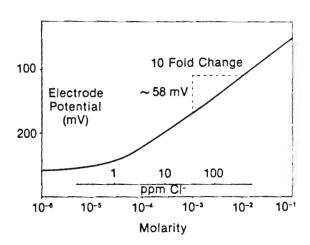
Sample	Date	Probe Response (mv)*	Laboratory Result (ppm)**
E4c	1/2/85 1/11/85	154 159,156,155(157)	7(26)=9.26
E4c-S	1/2/85 1/11/85	154 159,156,155(157)	2.2(<1)=2.2
E9	1/2/85 1/11/85	159 160,157,158(158)	10
F11	1/3/85 1/11/85	167 162,164,161	<1(<1)
G3d-S	1/4/85 1/11/85	159 161,162,162(162)	<1(<1)
G6d	1/11/85	161,162,162(162)	<1(<1)

^{*} Triple readings indicate analytical triplicate of the sample duplicate, i.e., three aliquots from the same initial soil extract worked through the kit process simultaneously. The average of these three points is found in the parentheses and it is this average that is used in the plot of log ppm vs mV.

^{**} Results as Aroclor 1248; number in parenthesis indicates level of PCB 1254 In cases where PCB 1254 occurred, the sum of PCBs 1248 and 1254 was used to plot log ppm vs mV.



typical chloride electrode calibration curve



In the direct measurement procedure, a calibration curve is constructed on semilogarithmic paper. Electrode potentials of standard solutions are measured and plotted on the linear axis against their concentrations on the log axis. In the linear regions of the curves, only three standards are needed to determine a calibration curve. In nonlinear regions, more points must be taken. The direct measurement procedures in the manual are given for concentrations in the region of linear electrode response. Low level measurement procedures are given for measurements in the nonlinear region.

direct measurement using 701A digital pH/mV meter

- Prepare 10⁻², 10⁻³, and 10⁻⁴ M or 100 and 10 ppm standards by serial dilution of the 0.1 M or 1000 ppm standard. Add 2 ml ISA per 100 ml standard. If samples have an ionic strength above 0.1 M, prepare standards with a composition similar to samples.
- Place the electrodes in the 10⁻⁴ M or 10 ppm standard. Set the function switch to MV. Stir thoroughly, wait for a stable potential reading, and record.
- Rinse the electrodes, biot dry, and place them in the 10-3 M or 100 ppm standard. Stir thoroughly, wait for a stable reading, and record.
- Rinse the electrodes, blot dry, and place them in the 10⁻² M or 1000 ppm standard. Stir thoroughly, wait for a stable reading, and record.
- Plot the millivolt readings (linear axis) against concentration (log axis) on standard semilogarithmic paper. See the typical calibration curve in figure 1. The linear calibration curve may be extrapolated down to about 2 x 10⁻⁴ M or 7 ppm.
- Transfer 50 to 100 ml of sample to a 150 ml beaker. Add 2 ml ISA to each 100 ml sample.
- Rinse the electrodes, blot dry, and place them in the sample. Stir thoroughly. Record the millivolt reading when stable. Determine the unknown concentration from the calibration curve.
- 8. Check calibration every 2 hours. If the ambient temperature has not changed, simply place the electrodes in the midrange standard. When the reading is stable, compare to the original reading recorded in step 3 above. If the readings differ by more than 0.5 mV or if the ambient temperature has changed, repeat steps 2-5 above. Prepare a new calibration curve daily.

Figure 2.4

Excerpt from Orion Research instruction manual for chloride electrodes: Form 94-17B1M/2811, 6 1982.

in Figure 2.2 and 42 ppm in Figure 2.3. Thus, for practical purposes the detection limit for the kit analysis procedure is 42 ppm. Any soil sample which yields a probe response of 155 mv or greater is considered below the detection limit for PCBs by the kit analytical procedure. Conversely, any sample yielding a probe response of less than 155 mv is considered PCB-contaminated.

Considering the Phase I data of Table 2.2, the probe gave a response of 155 mv or greater in 12 different kit analyses. Laboratory analysis showed that the kit correctly indicated the soil concentration to be less than 42 ppm 11 of the 12 times.

An analysis of the Phase II data in Table 2.3 shows that 33 different kit analyses gave a probe response of 155 mv or greater, indicating concentrations in soil samples of less than 42 ppm. Laboratory analytical results showed that this was a correct response 30 out of 33 times.

Combining Phase I and Phase II results, the kit correctly measured the soil concentration as less than 42 ppm 41 of 45 times, for a success rate of 91%.

In summary, the McGraw-Edison PCB field test kit was calibrated with laboratory analyses of the same soils tested in the field. The kit probe response over much of its range was shown to bear a linear relationship to the logarithm of PCB concentration. At low PCB concentrations the probe response becomes essentially constant and independent of PCB concentration. The concentration at which this occurs is taken as the kit's detection limit. This relationship between probe response and concentration is typical of

ion-selective electrodes.

Operating the kit as a go/no go instrument, it is possible to distinquish between soils contaminated with PCBs at concentrations greater than and less than approximately 42 ppm.

2.3.2 Chemical Analysis: Water

Chemical analysis of water samples was performed as described in the Remedial Investigation report. Results are presented in Appendix E.

3.0 GEOHYDROLOGY

Water levels in all wells except DGC-13 have shown a steady decline during the period of observation beginning July 11, 1984 as selected hydrographs of monitoring wells DGC-20S, DGC-6S and TM-F illustrate (see Figure 3.1). Levels in well DGC-13 located below the topographic scarp marking the aquifer boundary have fluctuated sporadically between 281 and 283 feet.

Water levels measured on October 26, November, 28, and December 28, 1984 and January 29, 1985 were used to construct water-table contour maps presented as Plates 4, 5, 6, and 7. As noted in the Remedial Investigation report, only wells screened at the water table can be considered representative of water table conditions. Therefore, only water-level elevations from shallow wells (new total of 48 wells) were used to prepare these plates. Water levels have dropped approximately two feet during the period of observation beginning July, 1984; while the general configuration of water-table contours has remained constant. The drop in levels, however, is reflected in a northward shifting of most contours through time.

The data from new wells (DGC 23-30, and Well GE-1 at the former Lewis residence) confirms the existence of a groundwater mound in proximity to the GE/Moreau Site. The mound is centered just north-east of the actual GE/Moreau Site; therefore, hydraulic gradients immediately near the site are towards the south, southeast, southwest, and west. However, the gradients to the west, and southwest are very low, generally less than 0.0015 ft./ft. Consequently, the ultimate movement of groundwater is toward the south and southeast where gradients increase toward the topographic scarp.

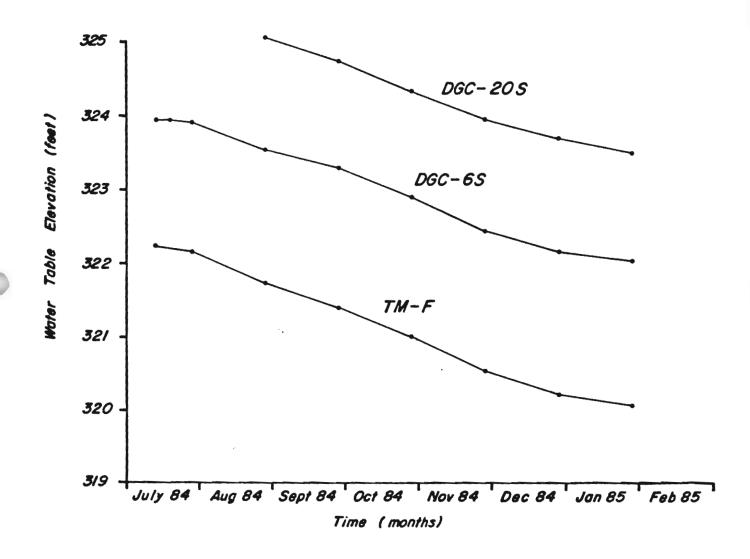


Figure 3.1
Hydrographs Of
Selected Monitoring Wells

4.0 INFLUENCE OF PUMPING WELLS

As indicated in Section 5.0 in the Remedial Investigation report, a well recorder was installed on DGC-12 to assess the impact of pumping at Bluebird Terrace trailer park on nearby water levels. The straight-line trends showing only seasonal water-level decline were attributed to high aquifer transmissivity precluding the development of a large pumping cone of depression (less than 100' radius).

To assess the possibility of a water-table depression due to pumping in the Terry and Cheryl Drive residential area, a well recorder was installed on DGC-25Ib, part of a cluster including DGC-25Ia, TM-C, TM5, and TM-2, for approximately two weeks in early January, 1985. The recorder, however, did not function for more than eight hours at any one time, perhaps due to the cold weather's effect on the spring-driven time clock. Additionally, minor vandalism included removal of the beaded float line from the guide pulleys precluded the collection of long-term, continuous data.

The short-term data was inconclusive. However, due to high aquifer transmissivity, the distributed nature of the Cheryl and Terry Drive pumping center, and the distance of DGC25 from the nearest pumping well (approximately 100'), no influence from pumping is expected.

5.0 GROUNDWATER MODELING

5.1 Introduction

A groundwater flow model was developed during the remedial investigation of the GE/Moreau site to aid the geohydrologic investigation of that region. A discussion of the preliminary results from that model is included in the October 1984 Remedial Investigation report. The conclusions from the initial modeling effort were:

- the task of modeling the groundwater flow in the vicinity of the GE/Moreau site was not completed.
- the simulated water levels indicated a groundwater divide exists northwest of the site.
- groundwater highs existed on the divide northeast and southwest of the site. Thus, the site was above a saddle-shaped portion of the water table surface.
- field data supporting model results concerning the groundwater divide and the saddle configuration were not available.
- the model would be updated when more stratigraphic and water level data were available.

The initial groundwater flow model has been updated. New field data were incorporated and aquifer recharge, evapotranspiration, and boundary conditions were adjusted. Conclusions from the updated model are similar to those of the initial modeling. A groundwater divide trending northeast-southwest persists immediately northwest of the site and a groundwater mound exists southwest of the site. The simulated hydraulic

aradiants in the immediate vicinity of the site are very low

The model utilized was the U.S. Geological Survey two-dimensional (2D) finite difference groundwater flow model. Details concerning the model and its underlying theory were discussed in the October 1984 Remedial Investigation Report.

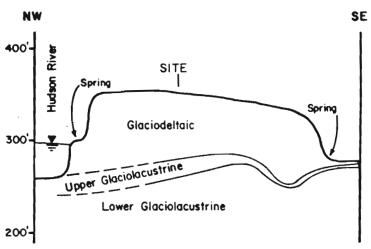
5.2 System Conceptualization

The conceptualization of the groundwater flow system and the underlying assumptions were established and discussed in Section 7.3 of the October, 1984 report. The conceptual model of the groundwater flow system in the vicinity of the GE/Moreau Site is illustrated in Figure 5.1. In general, the Moreau aquifer is recharged by precipitation; the water infiltrates to the water table and drains to discharge as springs at the base of sand cliffs or through well pumpage. The sand cliffs are located along the Hudson River to the west and north of the site and in the Fort Edward Forest southeast of the site.

5.3 Model Update and Re-calibration

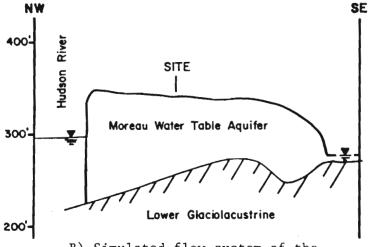
In an attempt to provide a simulated match to observed water level elevations, the initial modeling effort was re-evaluated and updated to conform with the recent field data. The initial model was updated by changing recharge, evapotranspiration, the aquifer base elevation, and the western boundary conditions. A good match was not achievable.

The aquifer recharge was decreased to 12.75 inches/year and evapotranspiration was increased to 22.4 inches/year, both in accord with the water budget calculations. The aquifer base elevation was adjusted slightly in the site area based on the



A) Natural flow system in the Moreau water table aquifer.

- Glaciodeltaic sediments; precipitation infiltrates vertically to recharge water table; ground-water discharges as springs eventually reaching the Hudson River and the Ft. Edward Reservoirs.
- Upper Glaciolacustrine sediments; groundwater flows to discharge as springs eventually reaching the Hudson River and the Ft. Edward Reservoirs. These sediments are 3 to 4 times less permeable than the glaciodeltaic sediments.
- Lower Glaciolacustrine sediments; semipermeable sediments probably exhibiting vertical leakage of groundwater.



B) Simulated flow system of the Moreau water table aquifer.

- Glaciodeltaic and Upper Glaciodeltaic sediments comprise water table aquifer with ground-water flowing horizontally and discharging as springs; the groundwater head in the vicinity of the springs is constant.
- Lower Glaciolacustrine sediments comprise the impermeable basal boundary of the aquifer.

Figure 5.1 - Conceptual Model of the Moreau water table aquifer.

new top of clay map and it was increased in South Glens Falls where bedrock outcrops along the Hudson River. The western constant head boundaries were increased by 5 to 10 feet. A summary of the calibration scenarios addressed in the previous report is shown in Table 5.1. Only a few scenarios were made with the updated model since the same trends were persisting.

The persisting trends are the groundwater divide northwest but in close proximity to the site and the existence of a groundwater mound southwest of the site.

Scenario 6 from the previous report is shown in Figures 5.2 to 5.4. The updated "best match" scenario (No. 7) is shown in Figures 5.5 to 5.7. The comparison of the observed versus the new simulated water level elevations is shown in Plate 9.

In the updated simulations, the hydraulic conductivity (K) was uniform across the modeled area. The reduction of K along the scarp was not considered appropriate in lieu of field measured K values. The averaged hydraulic conductivity used in Scenario 7 was 13.3 feet/day. Increasing the K has the effect of lowering the water level elevations. It does not affect the groundwater divide or the mounding.

The boundary conditions were manipulated to try to eliminate the mound to the southwest of the site. The constant head boundaries were lowered and increased, but the mounding persisted.

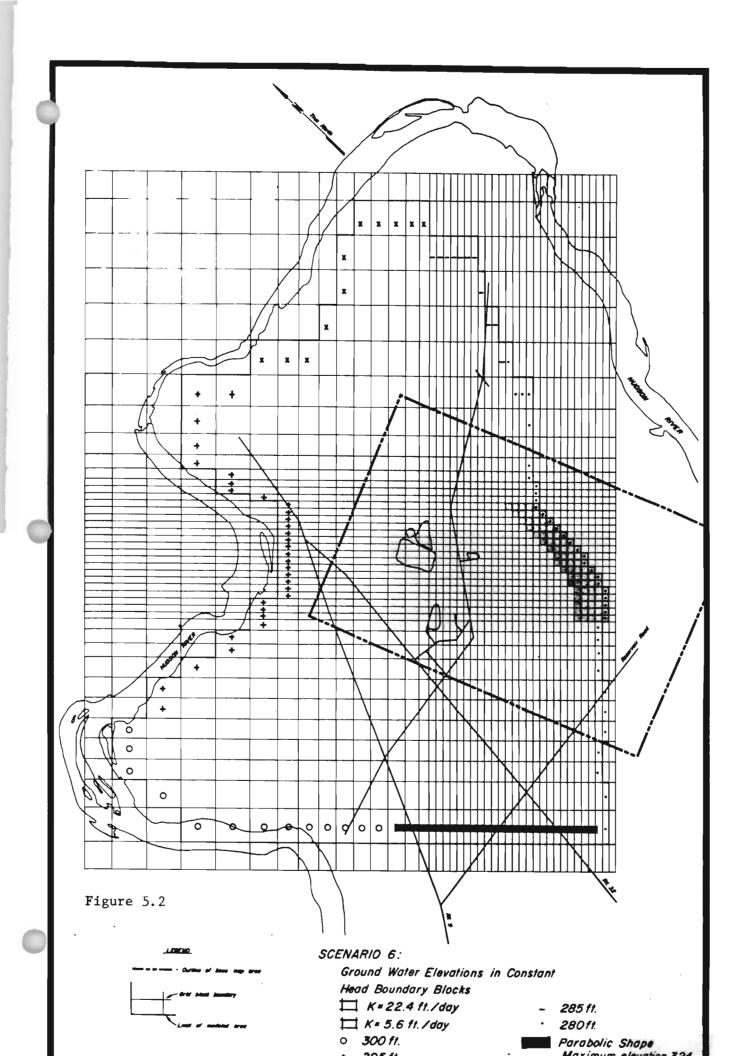
The major difference between the initial model and the updated model is the absence of the saddle shape in the water table configuration. This change is due to the change in the aquifer base elevations.

TABLE 5.1

SUMMARY OF MODEL INPUT PARAMETERS

FOR INITIAL MODEL (OCTOBER 1984)

Sc	enario	K (ft/day)	R (in/yr)	ET (in/yr)	Boundary Conditions:
	1	13	20	9.8	South-southwest boundary no flow, all other boundary blocks are constant head (300-285)
	2	13	20	9.8	same as 1 except 40 grid blocks added to northeast portion of grid
	3	22.4	30	9.8	same as scenario l except constant heads vary from 300 to 280.
	4	22.4	35	9.8	same as scenario 3
	5	22.4 and 5.6	35	9.8	same as scenario 3
	6	22.4 and 5.6	35	9.8	same as scenario 3 except south-southwestern boundary changed to constant head (a parabolic configuration, hmax+324)



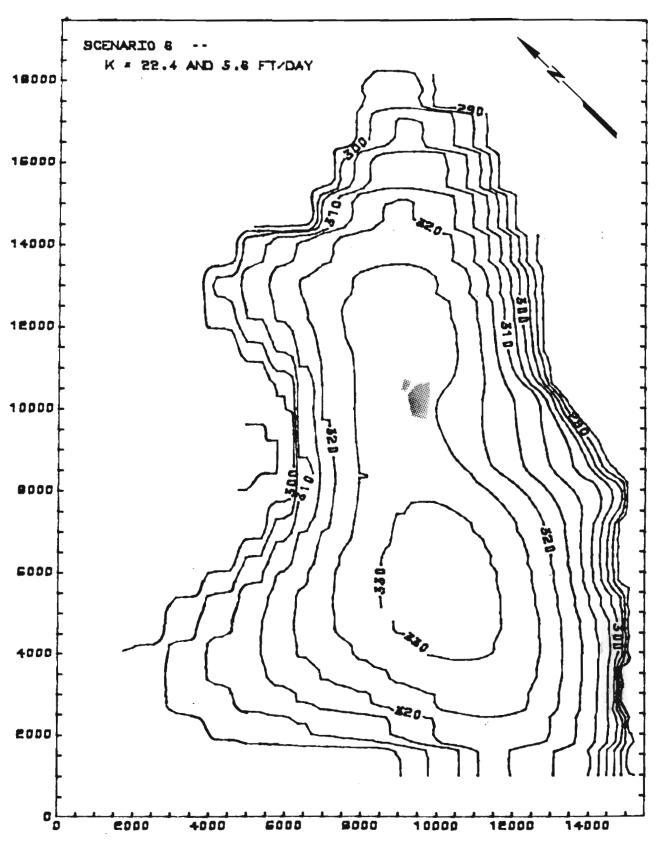


Figure 5.3 - Regional perspective of the simulated ground water elevations for scenario 6. R=35 inches/year, ET=9.8 inches/year, K=22.4 and 5.6 ft/day. Note change in the southwestern mound when compared to figure 7.16.

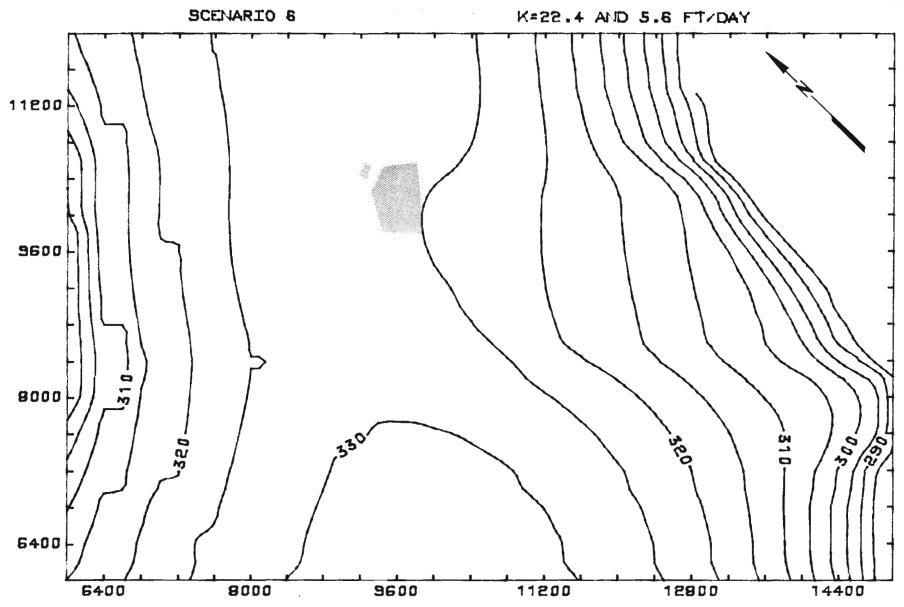
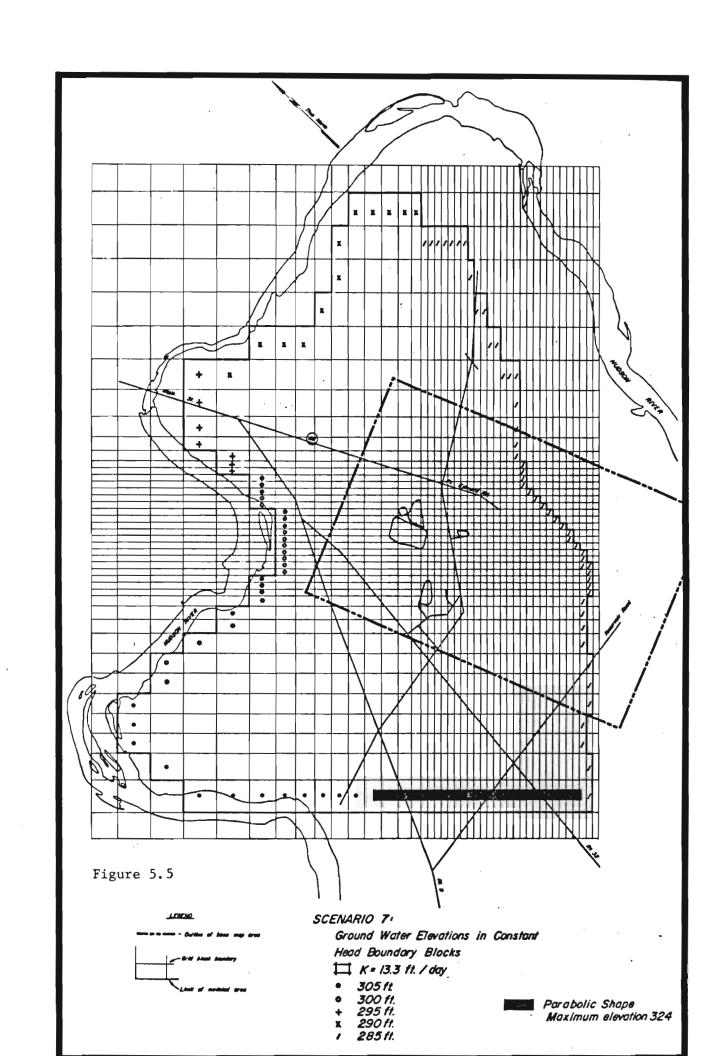


Figure 5.4 - Local perspective of simulated ground elevations for scenario 6.



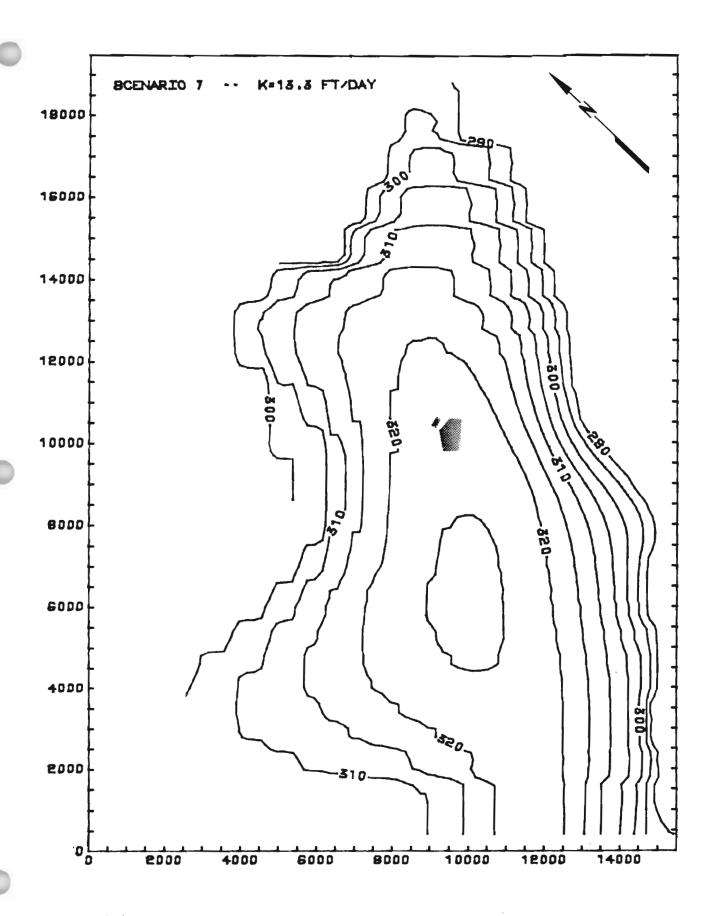


Figure 5.6 - Regional Perspective of the Simulated Groundwater Elevations for Scenario 7.

R = 12.75 inches/year
ET = 22.4 inches/year

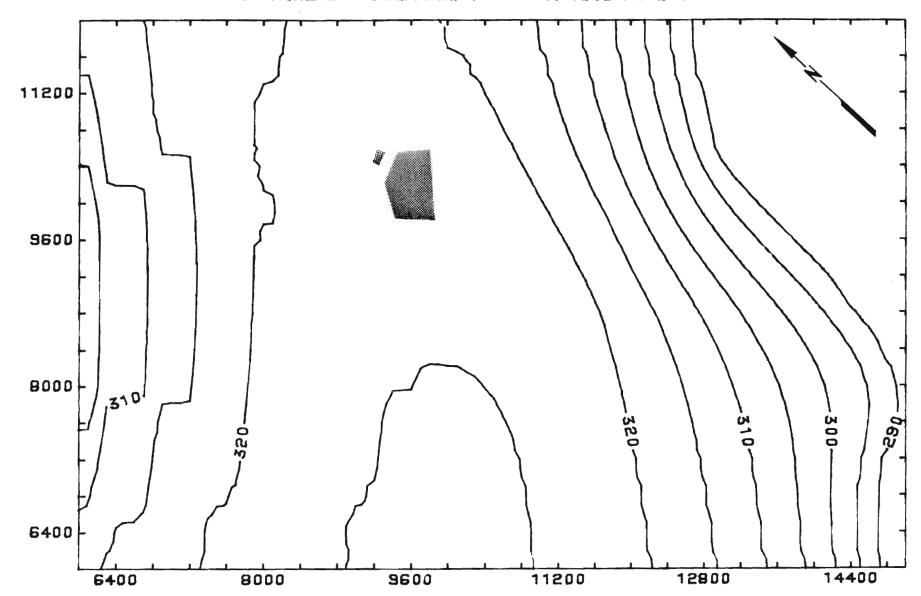


Figure 5.7 - Local Perspective of Simulated Groundwater Elevations for Scenario 7.

5.4 Conclusions

The groundwater modeling did not provide an exact match to the observed water table configuration. It does predict the existence of a groundwater divide northwest but in close proximity to the site and a groundwater mound southwest of the site. These simulated trends persisted despite the various combinations of aquifer parameters and boundary conditions. As stated previously, the modeling suggests groundwater originating from the GE/Moreau site would move only to the southeast.

6.0 GROUNDWATER - EXTENT OF CONTAMINATION

Experience gained by the hundreds of laboratory analyses required by this RIFS clearly demonstrates that, in spite of the most rigid quality assurance regime, no single analytical result should be relied on too heavily. Consistency - or a recognized pattern - is a test that all reliable data should be able to pass.

Accurate measurement of the concentration of organic chemicals at extremely low levels - in the parts per billion range - requires the utmost care throughout sample collection, preservation, transport, and laboratory analysis. Strict quality control and quality assurance procedures are designed to assure that such care is taken. Despite this, problems occasionally arise and a sample result may indicate contamination when, in fact, no contamination is present. At times the cause of the problem is obvious, but at other times it is not. The best test to determine whether or not contamination is really present in a given monitoring or residential well is through repeated sampling and analysis. If one sample shows contamination, but several subsequent samples do not, the probability is high that the indicated (reported) contamination was not present.

In the October report, the evidence presented was overwhelming that a groundwater sample that showed contamination within any portion of the plume would contain TCE as the dominant organic compound.

Thus, the contamination of any monitoring or residential well showing low concentrations of other organic compounds and the absence of TCE indicates that the source of contamination is not from the plume. This conclusion is further supported by the data presented below.

Table 6.1 includes the analytical results of samples collected from groundwater monitoring wells between June 25, 1984 and February 18, 1985. The laboratory analytical results for the period between October 16, 1984 and February 18, 1985 are included under separate cover as Appendix E.

Table 6.1 Summary of Analytical Results Groundwater Monitoring

			9								
			e G		A						
			Trans-1,2- dichloroethvlene				B				
		D	t h	H	o)			E			
			To		1,1,1-trichloroethane	1,1-dichloroethylene	a				Dichlorobromomethane
		Trichloroethvlene	h10		eth	17 16	Tetrachloroethvlene	Methylene Chloride	1		th
	pur	vle	110	Vinyl Chloride	oro	eth	h	0.1	-	ē	оше
	Rou	e th	1.	or	ch1	010	oet	Ch.		261	rom
	60	OLO	1,2	Ch1	T.	h.	lor	ē	E 0.	þen	cob
	Sampling Round	.h1c	187	y1	1-1	d Ic	ach	/le	Chloroform	Chlorobenzene	1101
U=11 N=	and a	1110	[ra]	/1n	-:	' ,	it r	r h	h10	,ji	1ch
Well No.	S	H	-	-	7	-	Te .	Ψe	Ü	0	۵
18	1										
	1 2 4										
	4										
11	1										
	2	4.3			<1						
	4										
1D	1 2										
	2 4	4.6			< 1 		3.3				
	7										
2S	1										
	2										
21	1								·		
	2										
2D	1 2										
	2										
38	1										
	2										
	4										
31	1	54			-						
	2	250	1.0	_				_	<1 1.3		
	4	93	< 1								
3 D	1	2700	11					39	6.1 1.9 3.8		
	2	16000 530	2.2						1.9 3.8		
	7	73 0	2.0								
45	1										
	2 4										
41	1 2	4.0 <1							1.0		
	4										
4D											
40	1 2								1, 1.4		
	4										
58	1										
	2 4										
	4										
51	1								4.2		
	2 4								4.2		
5D	1										
	2 4										
68	1 2	31 120	2.7						<1		
	2 3 **	42	2.1								
	4	31	2.2								
61	1	69									
	2	30	1.4						< 1		
	3 ** 4	42 69	2.1								
	4	03	~ A								

Table 6.1 Summary of Analytical Results Groundwater Monitoring page 2

141

2

			O Jene		A		B				
Well No.	Sampling Round	Trichloroethvlene	Trans-1,2- dichloroethvlene 🕥	Vinyl Chloride	1,1,1-trichloroethane	1,1-dichloroethylene	Tetrachloroethylene	Methylene Chloride	Chloroform	Chlorobenzene	Dichlorobromomethane
6 D	1 2 4	 		 							
7 S	1 2	800 1400	130 81	4.3			<1 		10		
71	1 * 2	5300 12000	3000 5000	31		6 13	5.5		77 2.6		
7D	1 2	3700 3200	480 550						<1		6.9
8S 8I	1 2 1	13 56 290	2.7							 	
8D	2	450									
9 s	2	3.8									
91	1 2	47 32	1.2								
9D	1 2	1300 1200	460 450								
105	1 2 3 **	110 1200 2300	8.9 870	 	 	 	 		1.7		
101	1 2 3 **	700 1300 2300	81 52 870	-	 	 	2.6		6.7		
10D	1 2 3 **	81 2300 2300	<1 56 870	 	9.3		47		12		
115	1 2 3 **†	3400 970 2400	70 11 880	5.8 60	3.8	-	<1 32 —	 12	2.1 5.6	<u></u>	
111	1 2 3 **†	4100 28000 2400	1300 1500 880	190 41 60	4.1	6.4	80	20 12	4.8 5.6	93	
110	1 2 3 **†	8300 22000 2400	160 730 880	 60	1.3	3.1	1.7 9.8	19 25 12	1.8 4.9 5.6	 	
125	1 2										
121	1 2								-		
12D	1 2	2.2 310									
13	1 2 4	<1		 			·			 	
145	2										

Table 6.1 Summary of Analytical Results Groundwater Monitoring page 3

		D	chvlene (A		B	E			
Well No.	Sampling Round	Trichloroethvlene	Trans-1,2- dichloroethvlene	Vinyl Chloride	1,1,1-trichloroethane	1,1-dichloroethylene	Tetrachloroethvlene	Methylene Chloride	Chloroform	Chlorobenzene	Dichlorobromomethane
158	2 3 4		 	 	 	==		 	 	 	
151	2 3 4 6	4.6 4.8 15	 <1 4.9			 		 	 <1 1	 	
15D	2 3 4	35 14 13	1.6	 				 	<1 <1		
165	2 4						=		<u></u>		==
16D	2 4										
17	2					-					
185	2 4										
181	2										
180	2 4										
19	2 3 4	2.4					1.2		<1 		
208	2 3 4					 					
201	2 3 4	 		 							. ==
20D	2 3 4			 	 	 	 			==	
215	2 3 4	120	<1 	<u></u>	1	 	12			 	
211	2 3 4 6	4.4 	 	 	 		 		 	 	
21D	2 3 4	9.3		 		 	 	 			
225	2.	22					_		<1		
221	2 3 1	7600 2000	180 260					93 91	<1 		
22D	2 g 3 n *	15000 2000	320 260					220 91	<1		

Table 6.1 Summary of Analytical Results Groundwater Monitoring page 4

			C lene		À						
		D	roeth	H		a L	6	E	0		a c
Well No.	Sampling Round	Trichloroethvlene	Trans-1,2- dichloroethvlene	Vinyl Chloride	1,1,1-trichloroethane	1,1-dichloroethylene	Tetrachloroethylene	Methylene Chloride	Chloroform	Chlorobenzene	Dichlorobromomethane
235	4 5 7	 				 	 	==	<1 		
231	4 5 7	<1 				 	<1 	 	<1 	 	
23D	4 5 7	<u>-1</u>		 		 	<u></u>	 			
24S	5 6 7	 		 		 			 		
241	4 5 6 7	 	 	 	 	 	 	 	 		
240	4 5 6 7				 	 	 		=======================================		
25Ia	4 5 7	 		 	 	 		 			
2 51b	4 5 7	 	 	 	 	 			3.7		
T:IA	3	5.8	*1 								
TMB TMC	2 2 4 5 7	8.5 	1.2	== == == ==	== == ==	 				 	
Th:D	2								2.3		
TME	2										
TMF	2	690	8.8								
TM2	2 2 4	120	5.4		 	 					
	5		<u>-</u>		==						_
TM3	2	52 81000	2.3 46000	510		140		200	 750	·	
****	3*	70000	52000	280		160			260		

Table 6.1 Summary of Analytical Results Groundwater Monitoring page 5

Well No.	Sampling Round	Trichloroethviene	Trans-1,2- dichloroethvlene	Vinyl Chloride	1,1,1-tr1chloroethane	I,1-dichloroethylene	Tetrachloroethvlene	Hethylene Chloride	Chloroform	Chlorobenzene	Dichlorobromomethane
FE1	2	6 DO	6.9					16	3.6		
	4	420	2.9						2.6		
	5	410	2.8						2.6		

Sampling Round Number	Dates
1	June 25 - July 9, 1984
2	September 5 - 17, 1984
3	October 16 - 19, 1984
4	December 5 - 21, 1984
5	January 15 - 17, 1985
6	January 30 - 31, 1985
7	February 15 - 18, 1985

- * EPA Method 624, GC/MS Analysis
- ** Composite of Cluster '
- *** Insufficient Water for Sampling
- -- Not Detected
- t Also detected were benzene (8.8ppb) and acetone (110ppb)
- Also detected was acetone (1200ppb)
- * Also detected were benzene (230ppb) ethyl benzene (62ppb), toluene (110 ppb) and acetone (3400 ppb)

Newly installed monitoring well clusters DGC-23, 24, and 25 were sampled in December, 1984, January and February, 1985. With the exception of an unconfirmed chloroform result of 3.7 ppb from the February sample of well DGC-25Ib, no purgeable organics were detected in well clusters DGC-24 and 25 for the three sampling events. In well cluster DGC-23, no purgeable organics above the reported method detection limit of 1 ppb were observed in the December sampling. These observations were confirmed during the January and February resampling of cluster DGC-23 when all parameters tested were reported to be not-detected.

Three monitoring wells DGC-19, DGC-21 and TM-A, which had earlier exhibited TCE concentrations between 2.4 and 120 ppb were resampled in December. Results were reported as not detected for TCE and other purgeable organics. In addition, well DGC-21 was resampled a second time (January 30) and results were again reported as not detected.

Monitoring well cluster DGC-15 was resampled twice (October 16 and December 13) and continued to show the presence of TCE primarily in the deep well. Well DGC-15I was resampled a third time on January 31 and resulted in a reported level of 15 ppb of TCE. This level is equivalent to the levels reported in the resampling of DGC-15D. These low, but consistently reported TCE values, indicate that well cluster DGC-15 is located at or near the western edge of the contaminant plume. Groundwater flowpaths interpreted from the water-level contour maps (Plates 4-7) indicate that groundwater flows past well cluster DGC-15 in a southerly direction through the area east of Cheryl and Terry Drives. These flowpaths also pass east of well cluster DGC-23. Since well clusters DGC-23 and DGC-25, and wells TM-2, TM-5 and TM-C all show no contamination it is concluded that the western limit of the plume is east of these locations.

Do Agree !

Selected wells located within the plume were resampled on various occasions and levels of purgeable organics were found to vary both above and below their observed levels in September, 1984. These data are compiled in Table 6.1.

Residential wells in the area southwest of the GE/Moreau site, encompassing Terry Drive, Cheryl Drive and Myron Road, continue to be monitored on a regular basis. Groundwater quality data from these sites agree with earlier observations reported in October, 1984, that organic compounds found in these residential well waters did not migrate from the former disposal area.

In the period from September 19, 1984 through January 9, 1985, only six of these residential wells had reported levels of chloroform and/or 1,1,1-trichloroethane and/or 1,1-dichloroethane above the method detection limit of 1 ppb. One other residential well in this area showed possible indications of tetrachloroethylene below the detection limit. Low level occurrence of these organics in a given well may be detected in one or two rounds of sampling but not in others. Moreover, it is not unusual to obtain results which show that at a given time the wells of adjacent homeowners have different low level compounds present or none at all.

Except for one round in the fall of 1984, TCE has not been detected in any of these residential wells since the issuance of the October 1984 report. In that fall round, the presence of TCE and other unlikely organic compounds in three samples strongly suggested laboratory analytical error, and resampling of the involved homes was undertaken. TCE and the other questionable compounds were not found in these repeat samples. This result and subsequent results on these wells confirmed the suspicion that the three earlier results were in error due to control problems in the laboratory.

No residential well southwest of the site has ever shown a consistent presence of TCE at any level. In fact, only one of these residential wells has ever shown the presence of TCE more than once since the monitoring program began in April 1984. This well showed trace levels of TCE on two successive occasions but TCE has not been found in four more recent sampling events.

A few test results where TCE was reported at low levels in the October report have since been attributed to a known type of problem in analysis by gas chromatography. This problem is "carry-over", whereby analyses of the samples incorrectly reported as containing trace levels of TCE were immediately preceded by analyses of samples containing exceptionally high concentrations of TCE, contributing to contamination of the analytical equipment.

The absence of confirmed TCE in these residential wells clearly indicates that the trace presence of organic compounds found in the Terry/Cheryl/Myron residential area do not originate from the former disposal site. Wells DGC-23, DGC-24, DGC-25Ia and 25Ib, TM-2, TM-5 and TM-C monitor the aquifer upgradient and to the east of this residential area and support this conclusion by the fact that they are consistently free of contamination.

The main organic constituent of the plume even at its farthest extremity in the Village of Fort Edward Watershed is TCE. Any minor contaminant in the plume finding its way into residential waters anywhere would be expected to be accompanied by a proportionately higher level of TCE, since no plume-associated groundwater or surface water contains any minor constituent without significantly higher levels of TCE. This fact leads to the conclusion that the presence of trace concentrations of organic compounds in well water in the aforementioned residential area, and the presence of these same compounds in plume-associated water at trace concentrations, is completely coincidental and not related to the plume.

7.0 SURFACE WATER - EXTENT OF CONTAMINATION

Since the issuance of the October 1984 report, periodic sampling and analysis have been performed on the stream and reservoir sites in the wooded area downgradient of the topographic escarpment. The results are listed in Table 7.1 and Figure 7.1. This table complements Table 9.1 of the October report.

In addition to the sites previously sampled, five new sites were added to the list: four feeder springs (FS-1 to FS-4) and a site at the toe of the escarpment. At the base of the escarpment, very shallow water (approximately 1/2 inch deep) flows from underground to form the origin of the stream containing sampling locations FS-1, FS-2 and X-6. To obtain samples at the "toe" site, a hole is dug 6 to 8 inches deep in the path of the flowing water, solids are allowed to settle, and aqueous samples are collected from the resulting "clear" water pool. Feeder springs FS-1 and FS-2 are contributing water sources located on the north bank of the stream. Feeder springs FS-3 and FS-4 are shallow flowing streams joining to form a common stream above X-7. These sites are shown in Figure 7.2.

Feeder springs 1 and 2 make obvious contributions to the surface water contamination problem. Feeder springs 3 and 4 and the escarpment toe site are, with a single exception, uncontaminated.

Except for an unconfirmed chloroform result of 2.1 ppb in a composite sample from three reservoirs (October 19), the reservoirs and collection boxes have remained uncontaminated.

Site X-7 continues to show the presence of only trichloroethylene, without the presence of trans-1,2-dichloroethylene.

Table 7.1 STREAM AND RESERVOIR ANALYTICAL RESULTS FORT EDWARD, NEW YORK

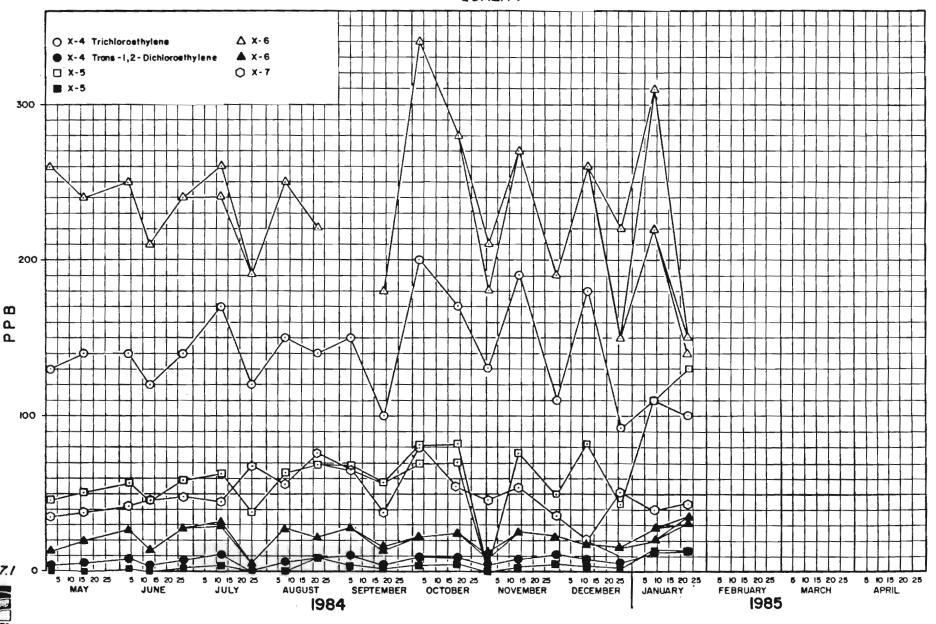
		September 5	September 19	October 3,4	October 19	November 1	November 14	November 29	December 12	December 26	January 9	January 23
New Reservoi	r	ND*	ND*	ND [†]	C=2.1*	ND	ND [†]	C<1	ND [†]	ND	ND	ND
Collection Bo	ox 1	ND *	ND*	ND	\mathtt{ND}^\dagger	ND	ND [†]	ND	ND [†]	ND	ND	ND
Collection Be	ox 2	ND*	ND [†]	ND*	ND [†]	ND	\mathtt{ND}^{\dagger}	ND	ND*	ND	ND	ND
Christie Res	ervoir	ND [†]	ND [†]	\mathtt{ND}^\dagger	C=2.1	ND	ND*	ND	ND*	ND	ND	ND
Sanderspree	Reservoir	ND [†]	ND*	ND*	иD ₊	ND	ND*	ND	ND [†]	ND	ND	ND
Dority Reserv		ND [†]	ND [†]	ND [†]	C≈2.1*	ND	ND*	ND(ND)	ND*			
Dottly Reserv	VOIL	ND	ND	ND	C=2.1	ND	NU	ND (ND)	ND	ND(ND)	ND	ND
	Code											
* /	A	150	100	200	170	130	190	110	180	92	110	100
X-4	В	10	3.9	9.3	9.3	3.8	8.5	11	7.9	5.5	11	13
X- 5	A	68(65)	57	69(81)	70(82)	ND	76	49	82	43	110	130
χ-3	В	4.4(3.7)	1.8	2.5(2.4)	2.9(2.3)	ND	3.0	4.6	3.5	2.5	12	14
X-6	A	85	180(180)	340	280	210(180)	270	190	260	150(220)	220(310)	150(140)
	В	28	16(14)	23	25	11(8.3)	26	23	18	11(16)	20(28)	35(32)
X-7	A B	63 ND	39 ND	80 ND	54 ND	48 ND	54 ND	38 <1	20	51	39	44
								_	ND	ND	ND	ND
FS-1	A R	-	-	-	140 68	47 30	-	-	140 42	49 27	7.0 3.0	75 59
	2		_		840				900			
FS-2	A B	-	-	-	180	-	_	-	160	430(490) 110(130)	590 (840) 170 (180)	440 (480) 220 (230)
	A	_	_	_	ND	ND		_	ND	ND	ND	ND
FS-3	В	-	-	-	ND	ND	-	_	ND	ND	ND	ND
	A	-	-	-	9.0	ND	-	-	ND(<1)	ND	ND	ND
FS-4	В	-	-	-	ND	ND	-	-	ND(ND)	ND	ND	ND
Toe of Escar	pment	-	-	ND	ND	ND	-	-	ND	ND	A,<1	ND
	A	ND	<1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Clear Well	B C	ND ND	ND < 1	ND 4.7	ND 4.5	ND 1.8	ND ND	ND 1.5	ND 4.2	ND 1.2	ND 1.8	ND < 1
	D	ND	<1	ND	מא	ND	ND	ND	ND	ND	ND	ND

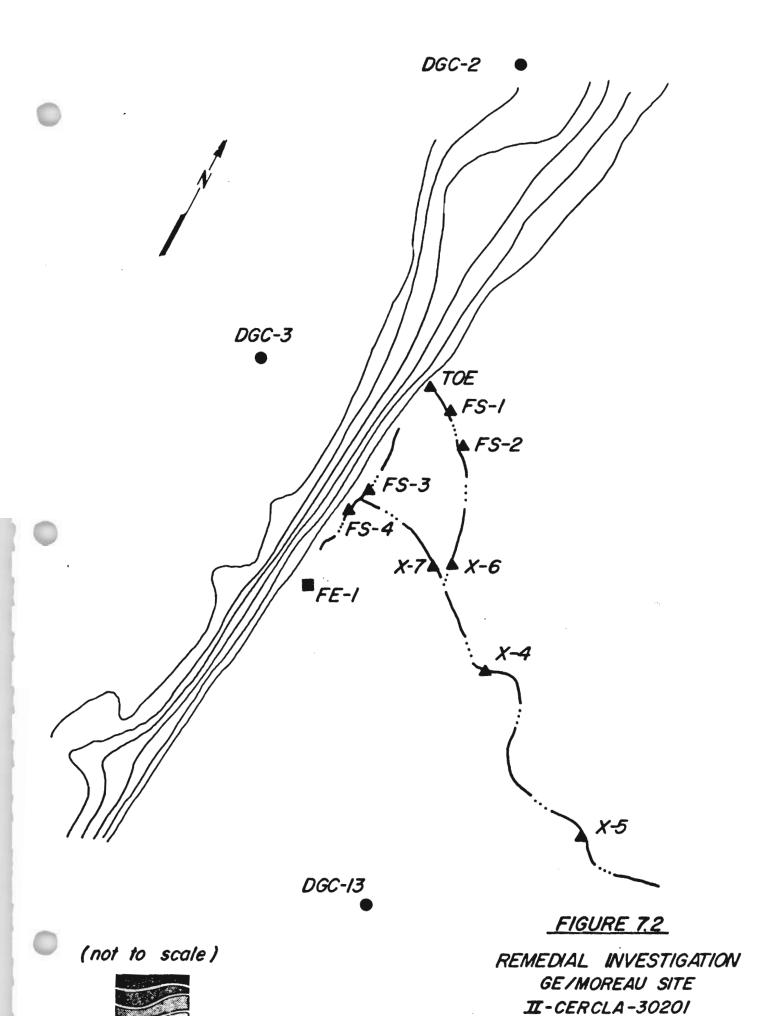
Code: A Trichloroethylene
B trans-1,2-dichloroethylene
C Chloroform

D Tetrachloroethylene

,† Components of composite or composite†.
ND Not Detected
NA Not Applicable
All values in ug/L(ppb)

REMEDIAL INVESTIGATION
GE/MOREAU SITE
II - CERCLA - 3020 I
SURFACE WATER
QUALITY





SURFACE WATER

8.0 Soils - Extent of Contamination

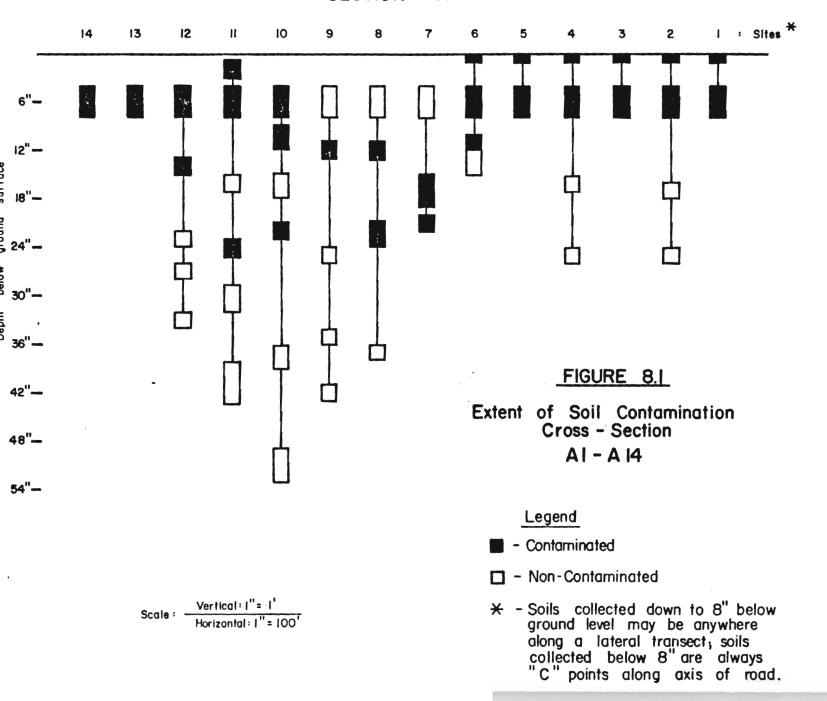
Five hundred thirty-three soil samples were analyzed with the McGraw-Edison Test Kit. The 533 samples were taken from 512 different locations, considering the various depths at which samples were collected as different locations. Each geographical sampling site illustrated on Plate 8 has, as a minimum, one sample collected from a depth at $6(\pm 2)$ inches. Many sites were sampled at different strata ranging from surface soil to over 4 feet below ground surface.

Of the 512 sample locations analyzed by the kit, only 99 of them (19.3%) showed kit probe responses less than 155 mV, indicating PCB contamination at the go/no go level described in Section 2.3.1. These 99 sample locations represent 76 different geographical sites as illustrated on Plate 10.

Of the 76 sites, 54 are directly on, or adjacent to, the former Lewis driveway and path E which leads to the former dumpsite. The majority of these 54 sites are concentrated along the first 650 feet of the former Lewis driveway. Contaminated areas were found at the ground surface and deeper, but none was found below 25 inches. Figure 8.1 represents a block diagram, cross-section of sampled areas along the first 650 feet of the driveway. Samples collected below 8 inches were all "C" sites along the axis of the driveway. Samples collected down to 8 inches may represent any location along the lateral transects.

Eight of the 76 contaminated sites are south and west of the former Lewis house. Six of these 8 sites (B1-B6) are in the backyard and were sampled to total depths ranging from 37 to 63 inches. In no case was contamination detected at depths greater than 6 inches below ground level in the back yard. Sample B8 showed contamination at 2-4 inches and 16-19 inches below ground level, but was clean at levels 8-11 inches and 24-27 inches.

SECTION A



Contamination detected by kit probe response showed 12 sites along the former dumpsite fence (D) to be affected. The two remaining sites are located along the presently used access road, G4a and G18b.

Using combined Phase I and Phase II data with a go/no go cut-off point at 155 mV as described in Section 2.3.1, the areal extent of contamination was determined to be that illustrated in Plate 10. This pattern is not unexpected given the history of the area. The main approach to the former evaporating pit and work area from Fort Edward Road extended two-thirds down the Lewis driveway and onto path/road E.

Figure 8.1 indicates that sites A1-A14 along the former Lewis driveway are almost uniformly contaminated at the 6 inch depth, and show scattered contamination between 12 and 24 inches in depth; however, no driveway contamination has been detected at depths greater than 25 inches below ground surface.

DU			ENCE CO			TEST	BORING	LOG	BORING NO). DGC-23S
PRO	JECT	GE Mo	oreau							
CLI	ENT	GE No	ott St.						SHEET I OF	
DRI	LLING	CONTRA	ACTOR	Warren	Georg	e			JOB NO. 3	383-5-2973
PUF	RPOSE	Mon	itoring V						ELEVATION	350.31
GRO	VUNDV	VATER				XXXXXXXX	SAMPLE	CORE	DATUM US	GS
DA	TE	TIME	DEPTH	CASING	TYPE	Mud Rot			DATE STARTED	11/13/84
					DIAMETE	R 5.75"			DATE FINISHED	11/13/84
					WEIGHT	г			DRILLER Vic	tor Aimar
					FALL				INSPECTOR R	odney Sutch
DEPTH FT.	CASING	SAMPLE	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC	10	ENTIF	ICATIO		REMARKS
10 -						Grout Bentonite Sand	0 - 12 - 17 - 19 -	12' 17' 51'(#½ 49'(10	steel pipe) sand) slot stainles	ss steel)

			ENCE CO			TEST	BORING	LOG	BORING NO). DGC-23I
PRO	JECT	GE Mot	reau							
CLIE	NT		tt St.						SHEET I OF	1
DRIL	LING	CONTRA	ACTOR	Warren	George				JOB NO. 383	3-5-2973
PUR	POSE	Monito	oring We	ll Insta	allation				ELEVATION 3	50.17
GRO	UNDV	VATER				\$4504£X	SAMPLE	CORE	DATUM USGS	
DAT	Ε	TIME	DEPTH	CASING	TYPE	Mud Rot			DATE STARTED	11/12/84
					DIAMETER	5 3/4"			DATE FINISHED	
					WEIGHT				DRILLER Vic	
					FALL				INSPECTOR RO	odney Sutch
DEPTH FT.	CASING	SAMPLE	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	II	DENTIF	ICATIO	N	REMARKS
				# 1						No split spoon sampling
		+]						
		1								
5]]		E.O.B. 8	2'			·
			<u> </u>	-						
ı		1		-						
}		┨		-						
]		4		7						
				<u> </u>		Stickup	31			
ĺ				7		Riser Pi	pe (+3)-	49' (2"	steel pipe)	
10		1		_		Bentonit	0 – te 42 –	471		
		-				Sandpack	47 -	81' (#	½ sand) 10 slot stai	loss stool)
						Screen Bentonit	49 – e 81 –	79 (# 82 '	to stot stal	miess steel)
				-	[1
		1								
1		\dashv		\dashv	1					
15 -				7						
				-						
		1								
		-		-	İ					
				 						
				-						
		1		_						

		GEOSCI				TEST	BORING	LOG	BORING NO). DGC-23D
P	ROJEC	GE M	oreau			,				
10	LIENT	GE N	ott St.						SHEET I OF	5
D	RILLIN	IG CONTR		Warren				_	JOB NO. 383	-5-2973
\vdash	URPOS		itoring \	Well Ins	stallati ————	on			ELEVATION 34	19.77
\vdash		OWATER				RAANO X	SAMPLE	CORE	DATUM US	SGS
	DATE	TIME	DEPTH	CASING	TYPE	Mud Rot.	S-S		DATE STARTED	11/1/84
L					DIAMETER	5.75"	2"0.D		DATE FINISHED	11/6/84
L					WEIGHT		140#		DRILLER Vic	
L		Ц		<u> </u>	FALL		30''		INSPECTOR Rod	ney Sutch
DEPTH	FT. CASING	BLOWS SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	Ш	DENTIF	ICATIO	N	REMARKS
		S-1	1 2 2 3	OL SP	В	k cmf o\$, rBr c ⁺ mfS nBr c ⁺ mfs	, t ⁻ \$	veg.	.5- 1.4-	Rec 1.8' Moist
5		S-2	3 4 6 6	SP	Т	nBr c+mfS	, t\$			Rec 1.0'
10	,	S-3	4 6 8 12	sw	T	nBr cmfS,	t\$, tfG			Rec .7'
15		S-4	7 12 15 20	SP	E	orTn c ⁺ mfS rown Tan race ⁻ Si	coarse +	to fin		Rec .8' Moist

PROJE	GE MC	oreau			_	SHEET 2 OF	5
CLIENT	GE No	ott St.				JOB NO. 383-	5-2973
PEPTH FT. CASING	BLOWS SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	N	REMARKS
	S-5	6 9 7 16	SW		Bk mfS, t ⁺ \$; Lt BrfS &\$ sea Br c ⁺ mfS, t ⁻ \$, tfG	m 20.3- 20.7-	Rec. = .7' WET
	S-6	12 22 20 37	SW		Br cmfS, t+\$; mfG seam (25.3-25.4), freq DkBr mfS Brown coarse to fine SAND, medium to fine Grayel seam frequent Dark Brown medium Sand seams	trace ⁺ Silt; (25.3–25.4),	Rec .9' WET
	S-7	9 15 15 20	SP		Br c ⁺ mfS, t\$, 1 mfG		Rec .7' WET
	S-8	14 22 22 22 24	SW		Br cmfS, t\$; mfG seam (35.2-35.3)		Rec .9'
	S-9	10 20 20 14	SW		Br cm ⁺ fS, 1 \$		Rec .7'

	IAM, NEW	YORK (518)	783-8		TEST BORING LOG		IO. DGC-23D	
ROJEC	GE Mo	oreau				SHEET 3 OF	5	
CLIENT	$\overline{}$	ott St.	 			JOB NO. 383	383-5-2973	
DEPTH FT. CASING BLOWS	SAMPLE	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	1	REMARKS	
	S-10	13 14 20 19	SW		Br cmfS, t\$		Rec .9' WET	
	S-11	8 12 11 10	SW		Br cmfS, t\$, tmfG		Rec .8'	
	S-12	15 21 27 31	SW		Br cmfS, t\$; freq dk S seams		Rec .8'	
	S-13	28 35 50 34	SW		Lt Br cmfS, t\$, tmfG; freq Dk S seam, seams of fractured partially oxidized bearing gravel(hematite or i		Rec .8 WET	
	S-14	18 37 33 39	SP		Br c ⁺ mfS, t\$, 1 mf ⁺ G 3r mf ⁺ S, s\$; TnBr \$&C seam	66.3-	Rec 1.1' WET (Partially washed)	

	וטפ			ENCE COI			TEST BORING LOG	BORING NO). DGC-23D
	70	JECT	GE Mor	•			<u> </u>	SHEET 4 OF	5
	CLIE		GE Not					JOB NO. 383-	5-2973
70	DEPTH FT.	CASING	SAMPLE	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	N	REMARKS
, 0			S-15	15 24 34 29	SW		Lt Br cmfS, t\$		Rec 1.3'
75			S-16	30 39 36 38	sw		Lt Br cm ⁺ fS, 1\$; freq Dk S seams		Rec 1.5' WET
80			S-17	18 26 37 46	SW		Br cmfS, t ⁺ \$; freq Dk S se Br mf ⁺ S, s ⁻ \$; occ GrBr \$ & C seams	ams 81.7-	Rec .9' WET
J5	-		S-18	25 35 50 72	sw		Br cmfS, t\$; occ TnBr \$yC Brown coarse to fine SAND, occassional Tan Brown Silt pockets	trace Silt;	Rec .8' WET
93	0		S-19	15 21 40 46	SM		(Glaciodeltaic)	ne)	Rec 1.0' WET

	LATHA	M, NEW	YORK (518)			TEST BORING LOG	BORING NO	
_	DJECT ENT	GE No	reau tt St.		· · ·		SHEET 5 OF	
DEPTH C	CASING	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATIO	.'	REMARKS
	J &	S-20	24 32 30 40	SM	59	GrBr cmfS, 1\$; freq Dk S seams, occ Gr C&\$ seams		Rec 1.3'
_		S-21	24 38 51 50	SM		GrBr cmfS, 1\$; freq Dk S seams		Rec 1.1' WET
 - 		S-22	24 45 65 56	SM		GrBr mfS, 1\$; freq Dk S seams		Rec .9' WET
0 _		S-23	7 11 13 21	CL		DkGr \$yC; freq fS, a \$ sear Dark Grey SILTY CLAY; freque Sand, and Silt seams, varve (Lower Glaciolacustrine)	n, vvd uent fine	Rec 2.0' WET
-						E.O.B. 112 Stickup 2.5' RiserPipe (+2.5)-79 (2" stogrout 72-0 Bentonite 77-72 Screen (10 slot stainless 109-79 Sand (#½ Morie) 110-77 Bentonite 110.5-110		•

		M, NEW	YORK (518			1631	BORING		BORING NO	J. 200-240		
_	ENT		Moreau						SHEET I OF	1		
		CONTRA	Nott St.		0055	-				83-5-2973		
	POSE			larren G		ion			EL EVATION	EL EVATION		
	UNDW		nitoring	well In	stallat	EXENG	CALADY 5	CORF	3	37.74		
DA.		TIME	DEPTH	CASING	TYPE	Mud Rot.	SAMPLE	CORE	DATUM USG			
UA	<u>'</u> -	HMC	DEPIR	UASING						77/7/2		
					DIAMETER	7./7			DATE FINISHED	ctor Aimar		
					WEIGHT				INSPECTOR RO	ı		
					FALL				INSPECTOR			
DEPTH FT.	CASING	SAMPLE	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	11	DENTIF	ICATIO	N	REMARKS		
5 -					S 1	Grout Bentonite Band	2.5' e (+2.5)- 0 - 8 - 13 - 15 -	8' 13' 42' (#½ 40' (#10	steel pipe) sand) Sand)	Less steel)		
5 -												

DUI			ENCE CO			TEST	BORING	LOG	BORING NO	DGC-241
PRO	JECT		GE More	au						
CLIE	NT		GE Nott	St.					SHEET I OF	1
DRIL	LING	CONTR	<u> </u>	Warren				•		3-5-2973
PUR	POSE	<u> </u>	Monitor	ing Well ————	Inst	allation			ELEVATION 33	37.98
GRO	UNDV	VATER				EXEMG	SAMPLE	CORE	DATUM USGS	3
DAT	E	TIME	DEPTH	CASING	TYP	E Mud Rot	•		DATE STARTED	11/8/84
	_				DIAME	3175			DATE FINISHED	
					WEIGH	ग				ictor Aimar
				<u> </u>	FALI				INSPECTOR Ro	odney Sutch
DEPTH FT.	CASING	SAMPLE	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	11	DENTIF	ICATIO	N	REMARKS
5 -		}				E.O.B. 69' Stickup 2.	0'			
]		50_0.0.p				
						Riser Pipe Grout Bentonite	0 -	33	steel pipe)	
10 -						Sandpack	38 - 40 -	67 (#½ 65 (#1	sand) O slot stain]	less steel)
		1								
]						
15				7						
]						
20		_		┤						

		M, NEW	YORK (518				TEST	BORING	LOG	BORING NO). DGC-24D
CLIE			oreau ott St.							SHEET I OF	5
		CONTR		Varren (Penroe					JOB NO. 383	
	POSE		toring We							ELEVATION 3	
GRO	UNDW		<u></u>				EXEING	SAMPLE	CORE	DATUM USGS	
DA	TE	TIME	DEPTH	CASING	TY	PE	Mud Rot	. S-S		DATE STARTED	
					DIAME	TER	5.75"	2" O.D.		DATE FINISHED	11/7/84
					WEIG	HT		140#		DRILLER Vi	ctor Aimar
	\neg				FAL	L		30''		INSPECTOR R	odney Sutch
DEPTH FT.	CASING	SAMPLE	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG		11	DENTIF	ICATIO	N	REMARKS
			2	SW		Dk	Br cmfS,	s\$; rts	, dec ve	eg7-	Rec 1.7'
		S-1	3	-		Tn	Or, cmfS	, t\$			Moist
			4	SM							
				_							
]							
				<u> </u>							
5 -			3	-			_	_			_
		S-2	7	SP		Lt	Br c mfS	, t \$ n coarse	+ +0 fir	A SAND	Rec .9' Moist
-			7	or			ace Sil			ie Drivi)	MOTOC
				7							
				<u> </u>							
]							
10 -			8	_		ъ-	+	<u>+</u> -c			Rec .9'
		S-3	12 15	SP		Br	own_coar	t ⁻ \$ se to f	ine <u>S</u> ANI),	Moist
			25	_		tr	ace Sil	t			
				-							
				⊐							
				-							
15											
		S-4	7	-							
			19	SP		Br	cmfS, t	-\$			Rec .8'
			22	-							WET
		1		7		1					

	וטפ			ENCE CO			TEST BORING LOG	BORING N	O. DGC-24D
	, h	JECT		Moreau				SHEET 2 OF	
	CLIE	ENT		Nott St.	11			JOB NO. 38	3-5-2973
0	DEPTH FT.	CASING BLOWS	SAMPLE	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	N	REMARKS
			S-5	5 11 15 18	sw		LtBr cmfS, t\$ Light Brown coarse to fine trace Silt	SAND,	Rec .8' WET
.5	_		S-6	10 6 6 6	sw		Br cmfS, t\$, tmfG; dropston	ne	Rec 1.6' WET
	_		S-7	4 9 14 18	sw		LtBr cm ⁺ fS, t\$; occ Br fS,	a\$ seams	Rec 1.0'
35	_		S-8	13 14 15 17	sw		Br cmfS, t\$, tmf ⁺ G		Rec .9' WET
40	-		S-9	10 13 15 15	sw		Br cmfS, t\$, t ⁺ mfG; mf G s	eam	Rec .9' WET
45									

PRO	JECT	GE	Moreau				SHEET 3 OF	5
CLI			Nott St.	, - ,			JOB NO. 38	33-5-2973
DEPTH FT.	CASING	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	1	REMARK
		S-10	10 11 13 13	sw		Br cmfS, t\$, tmfG		Rec .8' WET
_		S-11	9 15 12 13	SW		Br cmfS, t ⁺ \$; .8"Gr \$yC layer		Rec 1.4' Wet
-		S-12	12 15 21 20	SW		Br cmfS, 1\$; freq BrfS seams, freq Dk S seams		Rec 1.4' WET
_		S-13	20 33 40 51	SW		Br cmfS, t\$; freq Dk S seam Brown coarse to fine SAND, Silt; frequent Dark Sand se	trace	Rec .8'
_		S-14	16 40 41 45	SP CL SM		Br c mfS, t\$, tfG (ilmenite pkt Tn C&\$ Br mf S, s \$	e); 65.6-	Rec .8' WET clayey laye felt in drilling as

DEPTH D FT. FT. G CASING Z BLOWS	S-15 2	t St.	W CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION		3-5-2973 REMARKS
	S-15 2	15 24 28		GRAPHIC LOG	IDENTIFICATION	u	REMARKS
	S-15 2	24 28	SM			}	
					Br mf ⁺ S, a\$; freq Gr \$yC se	ams	Rec 1.3'
	S-16	17 32 35 42	SW		LtBr cmfS, t ⁺ \$, t ⁻ fG, occ p Gr \$yC Br mf ⁺ S, a\$	ort 65.7-	Rec .9' WET
	S-17	18 31 36 37	SW CL		LtBr cmfS, 1\$; pkt Gr C&\$		Rec .8' WET
	S-18	14 34 39 31	SW		Br cmfS, 1\$; pkt Gr \$yC		Rec .9' WET
	S-19	18 41 47 55	SW		Br cmfS, t ⁺ \$; occ Gr \$yC pk	.t	Rec .9' WET
					(Glacio-de	1	

L/	HAM, NEW	YORK (518)	783-8	02	TEST BORING LOG	_	DGC-24D
ROJE	GE GE	Moreau				SHEET 5 OF	5
CLIEN	GE	Nott St.	· · · ·			JOB NO. 383	-5-2973
DEPTH FT.	BLOWS SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATIO	N	REMARKS
	S-20 S-21	10 15 15 14 10 15 15 14 10 15 15 14 10 15 15 14 10 15 15 14 10 15 15 16 17 17 18 18 18 18 18 18 18 18 18 18 18 18 18	CL	19	Gr fS, a C&\$; alt lyr (not as distinctly varved vious borings) Gr \$yC; freq fS, a\$ seams; E.O.B. 99' Stickup 3' Riser Pipe (+3)-65' (2" st Grout 0-58' Bentonite 58-63' Sandpack 63-96' (#½ sa Screen 65-95' (#10 s Bentonite 96-97')	vvd eel pipe)	Rec 1.8' WET Rec 1.9' WET

	LATHA	M, NEW	YORK (518				TEST	BORING	LOG	BORING NO). DGC-25Ia
-	JECT		Moreau								
	ENT		Nott St.	T.7	0					SHEET I OF	
		CONTRA		Warren			n				3-5-2973
┝	RPOSE		itoring V	vell in	Stalla	1110			 -	ELEVATION 33	37.11
<u> </u>	WONUC		γ				KARINGX	SAMPLE	CORE	DATUM USGS	
DA	TE	TIME	DEPTH	CASING	TY		Mud. Ro			DATE STARTED	
_					DIAME		5.75"	2" 0.D.		DATE FINISHED	
					WEIG	HT		140#		DRILLER Vic	ctor Aimar
					FAL	L	<u> </u>	30''		INSPECTOR Ro	dney Sutch
DEPTH FT.	CASING	SAMPLE	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG		11	DENTIF	ICATIO	N	REMARKS
											samples taken only in the screened interv
_		S-1	6 8 11 11								No Recovery change to plastic trap in the spoon
_		S-2	18 31 41 41	sw			cmfS, 1 Ilmenit mfS, 1\$	-\$, s mf e fgmts	G;	56.3-	Rec .9' WET
-		S-3	18 19 22 22	sw			c cm ⁺ fS,	t [†] \$, t ⁻ m e fgmts	fG;		Rec 1.1' WET

20	JECT	GE M	loreau				SHEET 2 OF	2
CLIE	ENT		ott St.				JOB NO. 383-	-5-2973
DEPTH FT.	CASING BLOWS	SAMPLE	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATIO	N	REMARKS
		S-4	14 19 27 30	SW	000	65.8 Br mfG s,c mfS, t \$ 66.05 Gr \$&C Seam 66.1 cmf +S, 1\$		Rec 1.2' WET
		S-5	7 18 18 25	SW		BrGr cmfS, t\$, t fG Brown Grey coarse to fine Strace Silt, trace fine Gra (Glaciodeltaic)	SAND, avel	Rec .9' WET
0-		S-6	14 22 27 32	SM		(Upper Glaciolacustrine) (transition zone) BrGr cmf ⁺ S, 1 ⁺ \$; freq Gr \$		Rec. 1.0' WET
_		S-7	18 26 38 43	SM		BrGr mf ⁺ S, 1\$; freq Gr \$&C	seams	Rec 1.0' WET
						E.O.B. 85' Stickup 3' Riser Pipe (+3)-52'(2" ste Grout 0-45' Bentonite 45-50' Screen 52-82'(2" sta Sandpack 50-84'(#½ san Bentonite 84-85'	inless steel	#10 slot)

				ENCE CO				TEST	BORING	LOG	BORING N	O. DGC-251b
	PRO	JECT	GE Mo	oreau							7	
0	CLIE	NT	GE No	ott St.							SHEET I OF	2
İ	DRIL	LING	CONTRA	ACTOR Wa	rren G	eorge					JOB NO. 38	3-5-2973
	PUR	POSE	Moni	toring We	ell Ins	tallat	ion				ELEVATION	336.61
ı	GRO	JNDW	ATER		· · · · · · · · · · · · · · · · · · ·			CASING	SAMPLE	CORE	DATUM US	SGS
ı	DAT	Έ	TIME	DEPTH	CASING	TYP	Ε	Mud Rot.	S-S		DATE STARTE	10/31/84
1						DIAME	TER	5.75	2" O.D.		DATE FINISHED	11/01/84
Ì						WEIG	нт		140#		DRILLER V	ictor Aimar
İ						FAL	L		30"		INSPECTOR F	Rodney Sutch
	DEPTH FT.	CASING	SAMPLE	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG		ı	DENTIF	CATIO	N	REMARKS
												samples taken only in the screened interv
)	-		S-1	7 11 21 20	SP		Br	c [†] mfS, own_coar ace Sil	se to f	ine <u>SANI</u>	⊋,	Rec 1.0'
			S-2	12 17 14 13	SW		Br	cmfS, t	:\$, t ⁻ fG			Rec .8'
			S-3	6 7 9	SM		Br	mfS, 1	[†] \$; occ G	r Cy\$ s	eams	Rec 1.0' WET
5												

80		M, NEW	YORK (518)			TEST BORING LOG BORING NO	O. DGC-251b
F	ENT	GE Mo					83-5-2973
DEPTH C	CASING	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATION	REMARKS
		S-4	13 19 20 24	SP		Br c [†] mfS, t ⁻ \$, tmfG	Rec .9'
_		S-5	4 9 13 14	SW		Br mfS, t\$, tfG Brown medium to fine SAND, trace Silt, trace fine Gravel	Rec .8' WET
- -		S-6	10 18 25 27	SW		Br cmfS, t\$, tmfG; occ Bk S seams	Rec .8'
-		S-7	6 13 19 21	sw		Br cmfS, t\$	Rec .9'
						E.O.B. 52' Stickup 3' Riser Pipe (+3)-23'(2" steel pipe) Grout 0-16' Bentonite 16-21' Screen 23-48'(10 slot stainless) Sandpack 21-50'(½ sand) Bentonite 50-52'	

855			YORK (518	783-810	2			BORING		BORING NO	-• DGC-20
PRO I CLIE	JECT	GE	Moreau							SHEET I OF	1
		CONTRA	Nott St.								3-5-2973
			ow Well 1	Varren G						ELEVATION	343.37
-		ATER		LIISLAIIA	LLOII		CASING	SAMPLE	CORE	DATUM USG	.=
DAT		TIME	DEPTH	CASING	TYP	· E	<u> </u>		CORE	DATE STARTED	
-				0.1101.710	DIAME	M	lud Rot.	S-S		DATE FINISHED	
-					WEIGI	-	5.75"	2" O.D.		DRILLER Vic	
		- · · · ·			FAL	\longrightarrow		140# 30''			Rodney Sutch
DEPTH FT.	CASING	SAMPLE	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG		I 1	DENTIF	ICATIO		REMARKS
		S-1	6 8 12 16	sw	-	Bro tra	ice Si	se to fin	ne SAND,		Rec .8' Moist Rec 1.2' WET
						Ris Cem For Ber	serpipe ment mationa ntonite	(+2.5)-1 2.5 - 1 Backfi 16 -1 37.5-1	0' 11 14- 2 4''	slot PVC)	

DUI	NN (SEOSCII	ENCE CO	RPOR 4	TION		TEST		1.00	BODING N	DGC-27
		AM, NEW	YORK (518				LST	BORING	LOG	BORING N	U. 560-27
-		<u> </u>	oreau							SHEET I OF	- 1
CLIE	_		ott St.								_
_		CONTRA		Warren							33-5-2973
<u> </u>	POSE		Low Well	Instal.	Lation	n T				ELEVATION	346.86
_		ATER		24 2712	1		KASHNGX	SAMPLE	CORE	DATUM USG	
DAT	E	TIME	DEPTH	CASING	TYF	-	Mud Rot			DATE STARTE	11/1/07
<u> </u>	\rightarrow				DIAME	-	5.75"	2" 0.D.		DATE FINISHE	
<u> </u>					WEIG			140# 30"			ictor Aimar
\vdash					FAL	<u> </u>		30		INSPECTOR F	Rodney Sutch
DEPTH FT.	CASING	SAMPLE	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG		11	DENTIF	ICATIO	N	REMARKS
											Sampling initia at 20'
		S-1	7 12 15 23			Lis	Br cm ⁺ fS ght Brow ND, trac	n_coarse	medium d	f <u>in</u> e	Rec .7' DRY
		S-2	8 22 26 24			1		, t\$, t ⁻ \$, t 0.B. 39'		25.5	- Rec 1.0' WET
	,					PV Cer For Ber	ment rmationa ntonite ndpack	(+2)-18' 0 - 3 1 Backfi 14 -17' 17 -39' 18 -38'	11 3-14	nd)	

	JECT		YORK (518) Moreau							
CLIE			Nott St.						SHEET I	OF 2
		CONTR	ACTOR	Warren	Georg	e			JOB NO.	383-5-2973
PUR	POSE	Shall	low Well I	nstalla	ation				ELEVATION	345.98
GRO	UNDW	ATER				*CALBING	SAMPLE	CORE	DATUM U	SGS
DAT	E	TIME	DEPTH	CASING	TYP	E Mud Rot	. s-s		DATE START	
					DIAME	TER 5 3/4"	2" 0.D.		DATE FINISH	ED 11/9/84
					WEIG	нт	140#		DRILLER	Victor Aimar
					FAL	L	30"		INSPECTOR	Rodney Sutch
DEPTH FT.	CASING	SAMPLE	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	11	DENTIF	ICATIO	N	REMARKS
										Sampling ini at 20'
			9			_ +	. -	+ ₀ -		Dec. 1.01
		S-1	17 15 15			Br c [†] mfS,	t \$, lmf	G; fG s	eam	Rec 1.0' Moist
			9							
		S-2	11 13 19			Br cmfS, t Brown coar silt, trac fine Grave	se to fi e medium	ne SAND,	_trace	Rec 1.0' Moist
)										
ıl		l		⊣	- 1					ì

DJECT	GE Mor	eau				SHEET 2	OF 2
LIENT	GE Not	t St.				JOB NO.	383-5-2973
CASING BLOWS	SAMPLE	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG	IDENTIFICATIO	N	REMARKS
	S-3 2	8 4 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6			E.O.B. 46' Stickup 2.5' PVC Riser (+2.5)-25'(2" PVC Cement Seal 0 - 3' onal Backfill 3 -20' Bentonite 20 -23' Screen 25 -45'(10 slower Seand)		Rec 1.4' WET

	_ATHA	M, NEW	ENCE CO YORK (518				TEST	BORING	LOG	BORING NO). DGC-29
CLIE			ott St.							SHEET ! OF	1
		CONTRA	ACTOR V	Warren (George	2	<u> </u>			JOB NO. 35	33-5-2973
PURP	POSE	Shallo	ow Well In	nstalla	tion					ELEVATION	347.96
GROU	INDW	ATER					SASING	SAMPLE	CORE	DATUM USO	
DATE	Ε	TIME	DEPTH	CASING	TY	PE	Mud. Rot	. S-S		DATE STARTED	11/14/84
					DIAME	TER	5.75"	2" O.D.		DATE FINISHED	
					WEIG	НТ		140#		DRILLER V:	ictor Aimar
	\neg				FAL	L		30"		INSPECTOR RO	odney Sutch
DEPTH FT.	CASING	SAMPLE	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG		11	DENTIF	CATIO	N	REMARKS
		S-1	12 17 22 21 7 17 19 22			British E. St. St. St. St. St. St. St. St. St. St	cace medio fine Gr	se to fix um to fix avel Sear (+2) - 1 0 - 1 Backfi 14 - 1 18 - 3	me SAND me Grav 11 3' 11 3-14 7' 8' (20	, trace silt el; medium am, fG seam PVC blank) slot PVC)	Rec .8' WET Rec .9' WET

PRO	JECT	GE Mo:	reau							1			
CLIE	NT	GE No	tt St.							SHEET I OF	1		
				Varren	•	2	-			JOB NO. 383	3-5-2973		
PUR	POSE	Shallov	w Well In	nstalla	tion					ELEVATION	344.03		
GRO	UNDW	ATER					rarne	SAMPLE	CORE	DATUM USG	sgs		
DAT	E	TIME	DEPTH	CASING	TY	PE	Mud.Rot	S-S		DATE STARTED	11/15/84		
					DIAME	TER	5 3/4"	2" 0.D.		DATE FINISHED	11/15/84		
					WEIG	тн		140#		DRILLER V	ictor Aimar		
					FAL	L		30"		INSPECTOR RO	odney Sutch		
DEPTH FT.	CASING	SAMPLE	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI- FICATION	GRAPHIC LOG		10	DENTIF	CATIO	N	REMARKS		
		S-1	8 15 15 20	SW		Bro Si	own coar	e medium	<u>lne SAND</u>	m , trace Gravel;	Rec .9' WET		
		S-2	11 28 22 17	SW	Form	E.C St: PV Cer ation	0.B. 38. ickup 2. C riser ment nal Back	5' (+2.5) - 0.0 - fill 3 -	17.5 '(2 3.0' 14.0' 16.0'	PVC blank			



52 ft

82 ft

112 ft

Date Drilled 11/1/84 - 11/13/84 Total Depths: Victor Aimar Driller __ Shallow Well_ DGC Geologist Rodney Sutch Intermediate Well. Deep Well___ DGC 23 Site Number_ DGC-23D DGC - 23I DGC - 23-S PVC 352.52 GR 350.31 PVC 352.08 PVC 352.95 GR 349.77' GR 350.17' 0 20 40-FEET 60 Z DEPTH 80 100 **LEGEND** Grout Sand Pack sampled to 112' 120 **Bentonite PVC Riser** PVC Screen

PVC

GR

El. top of PVC
Ground Elevation



44 ft

PVC Screen

PVC

El. top of PVC

Date Drilled 11/6/84 - 11/14/84 Total Depths: Driller Victor Aimar Shallow Well ___ DGC Geologist Rodney Sutch Intermediate Well 69 ft Deep Well 99 ft Site Number DGC 24 DGC-24 D DGC-24I DGC-245 PVC 340.68 PVC 339.93' PVC 340.091 337. 62 GR 337.74' GR GR 337.98 0. 20-40-FEET 60. Z DEPTH 80-100sampled to 99" LEGEND Grout Sand Pack 120 Bentonite PVC Riser



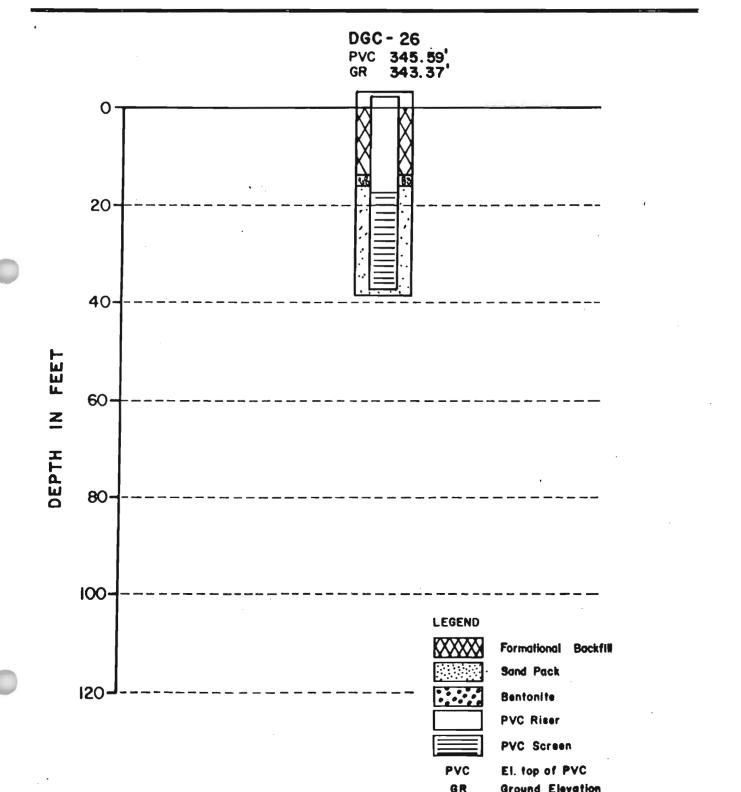
Driller _ DGC Ge	Victor Aimar ologist Rodney Sutch umber DGC 25	Total Depths: Shallow Wellf Intermediate Well 52,85 f Deep Wellf
DEPTH IN FEET	DGC - 25 I A PVC 339.96' GR 337.11' 0 20 80 80	DGC - 25 I B PVC 339.75' GR 336.61'
1	20	Sand Pack Bentonite PVC Riser

PVC Screen
El. top of PVC

PVC

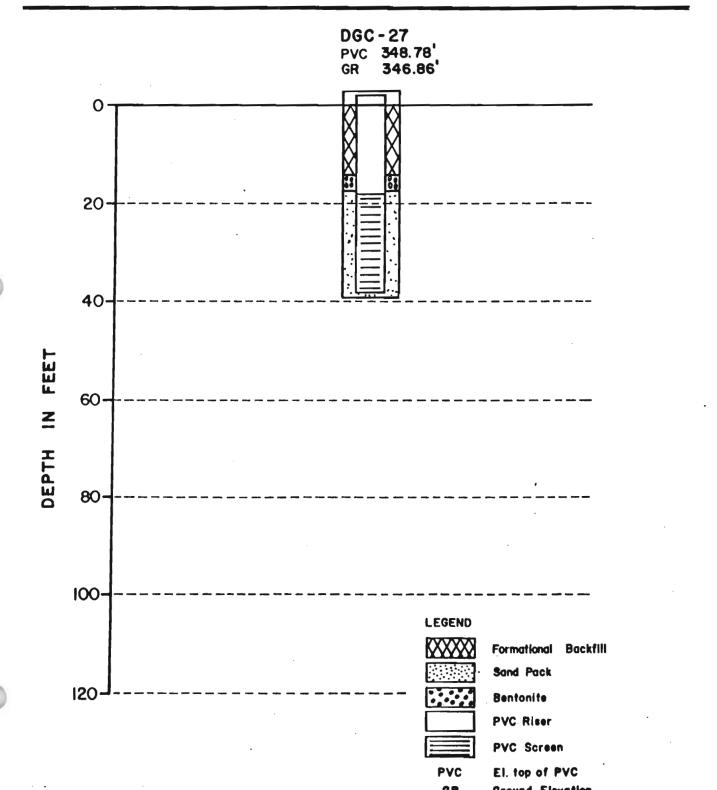


Date Drilled 11/8/84	Total Depths:
DrillerVictor Aimar	Shallow Well 38.5 f
DGC Geologist Rodney Sutch	Intermediate Well f
Site Number DGC 26.	Deep Wellf



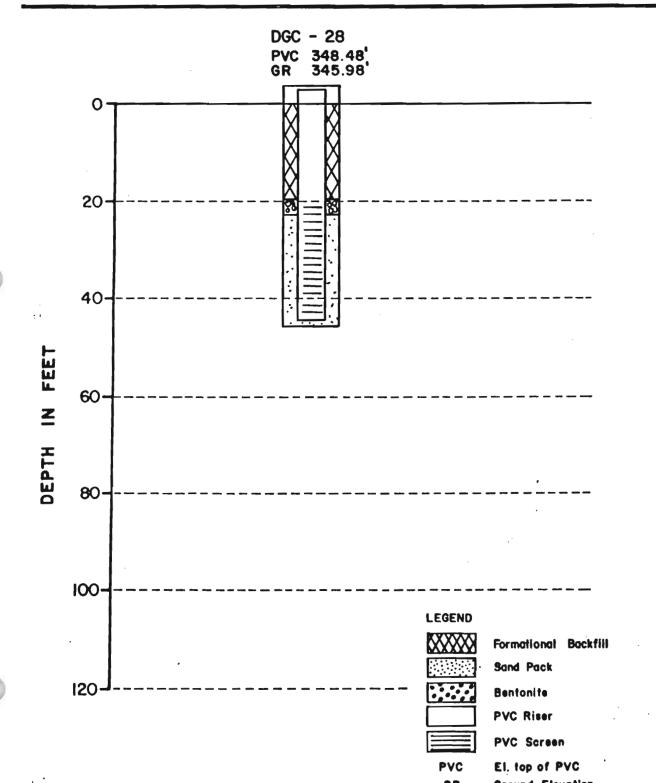


Date Drilled 11/14/84	Total Depths:	
Driller Victor Aimar	Shallow Well 39	ft
DGC Geologist Rodney Sutch	Intermediate Well	
Site Number 27	Deep Weil	ft



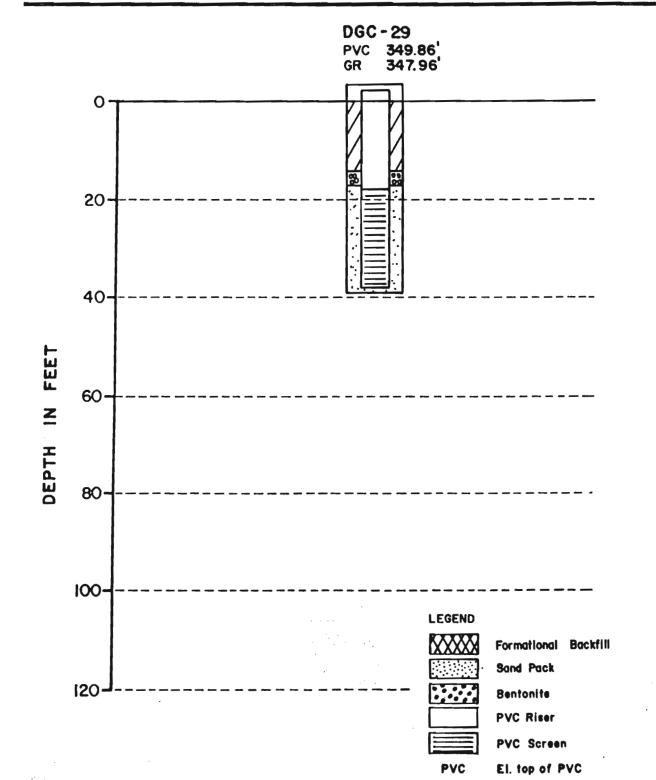


Date Drilled 11/9/84	Total Depths:
Driller Victor Aimar	Shallow Well 46 ft
DGC Geologist Rodney Sutch	Intermediate Wellf
Site Number DGC 28	Deep Wellf



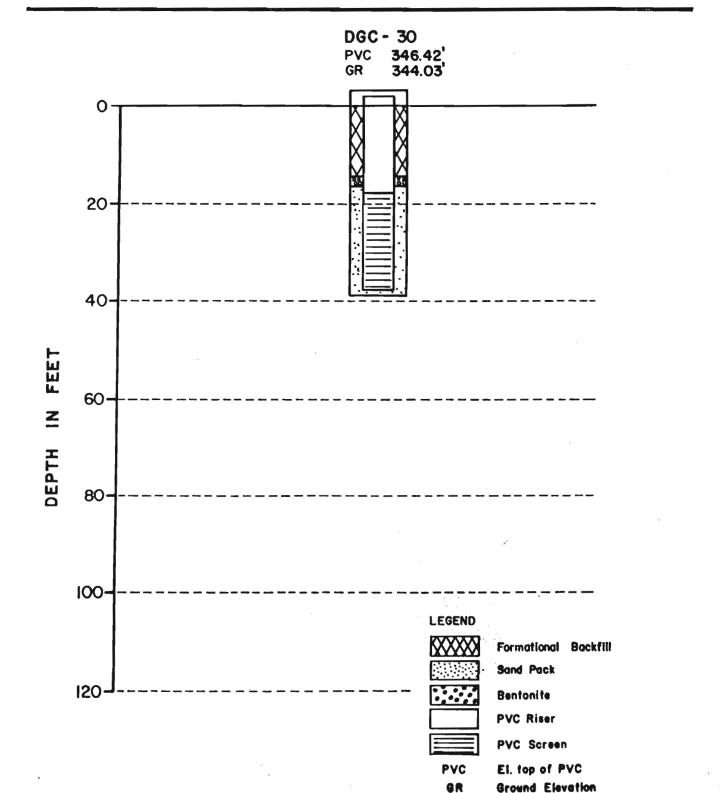


Date Drilled 11/14/84	Total Depths:	
Driller Victor Aimar	Shallow Well	39 ft
DGC Geologist Rodney Sutch	Intermediate Well	
Site Number DGC 29	Deep Well	ft





Date Drilled 11/15/84	Total Depths:
DrillerVictor Aimar	Shallow Well 38.5 ft.
DGC Geologist Rodney Sutch	Intermediate Well <u>ft</u>
Site Number DGC 30	Deep Wellft



Dunn Geoscience Laboratory

5 Northway Lane North, Latham, NY 12110 (518) 783-8102

CLIENT:

GENERAL ELECTRIC COMPANY NOTT

LAB NUMBER:

84-11-53/383-5-2973 DATE RECEIVED: 11/29/84

TEST BY:

JWH DATE TESTED:

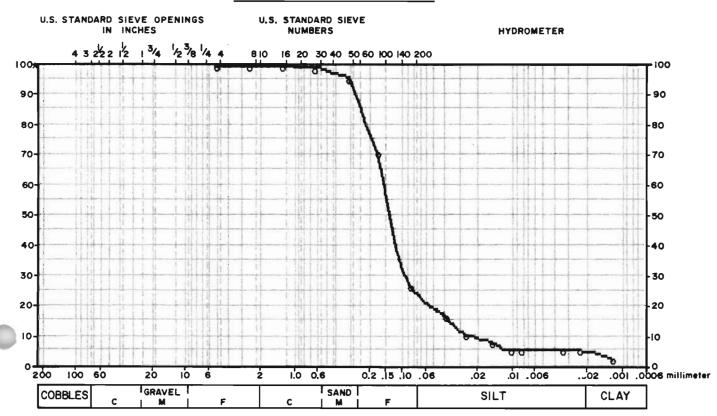
DATE REPORTED: 12/27/84

12/12/84

REVIEWED BY: SAMPLE DESCR:

DEC 251A, S-5 70'- 72'

GRAIN SIZE DISTRIBUTION



COARSE					FINE			HYDROMETER		
SIZE (inches)	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.	SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.	PARTICLE DIAMETE (mm)		SPECS.
_	0.00	0.00	_	4	0.00	100.00	_	. 036	17.22	E hydro
_	0.00	0.00	_	8	. 1 2	99.88	-	. 0 2 3	11.48	Eom
-	0.00	0.00	-	16	. 1 2	99.75	_	. 013	8.61	Eom
-	0.00	0.00	-	3 0	. 19	99.57	_	. 009	5.74	Eom
-	0.00	0.00	_	50	3.78	95.79	_	. 007	5.74	Eom
_	0.00	0.00	_	100	24.71	71.08	_	. 0 0 3	5.74	Eom
_	0.00	0.00	_	200	43.90	27.18	-	. 002	5.74	Eom
-	0.00	0.00	-	_	0.00		-	. 001	2.87	Eom
				PAN	l = 27.2	%				

WASH LOSS WAS NOT TESTED.

SPECIFICATION: ASTM C 136 ASTM D 422

TEST STANDARD: NONE NOTES: NONE

Test samples are retained for 30 days after submission then discarded, unless other arrangements are made.

5 Northway Lane North, Latham, NY 12110 (518) 783-8102

CLIENT:

GENERAL ELECTRIC COMPANY NOTT STREET

LAB NUMBER:

84-11-52/383-5-2973 DATE RECEIVED: 11/29/84

TEST BY:

DATE TESTED:

DATE REPORTED: 12/26/84

REVIEWED BY: SAMPLE DESCR: JWH

DG 251B, S-4, 34"- 37'

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE OPENINGS U.S. STANDARD SIEVE HYDROMETER IN INCHES NUMBERS 1/2 3/8 1/4 4 4 3 22 2 12 13/4 810 16 20 30 40 50 60 100 140 200 100 100 90 90 80 80-70 -70 60 60 50 -50 40 40 - 30 30 20 20 -10 10. .001 .0006 millimeter 100 60 20 1.0 0.6 0.2 .15 .10 .06 ٥٥٥. ان .502 200 óı 6 .02 GRAVEL SAND COBBLES SILT CLAY

	COARSE				FINE			Н	HYDROMETER		
SIZE (inches)	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.	SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.	PARTICLE DIAMETER (mm)	PERCENT PASSING	SPECS.	
1	0.00	100.00	_	4	4.05	89.21	_	. 036	3.53	E hydro	
3/4	6.74	93.26	-	8	3.83	85.38	-	. 0 2 3	2.65	Eom	
1 / Z	0.00	93.26	_	16	8.32	77.05	_	.013	1.76	Εom	
3/8	0.00	93.26	_	3 0	18.40	58.65	_	. 009	1.76	Eom	
_	0.00	0.00	_	50	34.94	23.71	_	.007	1.76	Eom	
_	0.00	0.00	-	001	14.18	9.53	-	.003	. 88	Eom	
_	0.00	0.00	_	200	5.70	3.83	_	. 002	. 88	Eom	
_	0.00	0.00	_	_	0.00	0.00	_	.001	. 88	Eom	
				DAR	1 _ 3 6	2 04.					

WASH LOSS WAS NOT TESTED.

SPECIFICATION:

ASTM C 136

ASTM D 422

TEST STANDARD:

NONE

NOTES:

NONE

Test samples are retained for 30 days after submission and then discarded, unless other arrangements are made.

5 Northway Lane North, Latham, NY 12110 (518) 783-8102

CLIENT:

GENERAL ELECTRIC COMPANY NOTT STREET

LAB NUMBER:

84-11-51/383-5-2973 DATE RECEIVED: 11/29/84

TEST BY:

DATE TESTED: 12/4/84

REVIEWED BY:

JWH NG3

DATE REPORTED: 12/26/84

SAMPLE DESCR:

DOE 24D, S-19, 90'-92'

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE OPENINGS U.S. STANDARD SIEVE IN INCHES NUMBERS HYDROMETER 1/2 3/8 1/4 4 4 3 22 2 12 1 34 810 16 20 30 40 50 60 100 140 200 100 100 90 90 80-80 70 -70 60 -60 50 -50 40 -40 30 - 30 20 -20 10--10 200 100 60 2 20 Ġ 1.0 0.6 0.2 .15 .10 .06 .oo .oo 6 10 .Ò2 ...02 .001 .0006 millimeter GRAVEL SAND COBBLES SILT CLAY

	CO	ARSE			FINE			HYDROMETER		
SIZE (inches)	PERCENT RETAINED	PERCENT PASSING	SPECS.	SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.	PARTICLE DIAMETER (mm)	PERCENT PASSING	SPECS.
1/2	0.00	100.00	_	4	0.00	97.22	_	. 036	9 25	E hydro
3/8	2.78		-	8	0.00		_	. 0 2 3	6.94	,
-	0.00	0.00	-	16	. 39	96.84	_	. 0 1 3	6.94	Eom
-	0.00	0.00	-	30	1.00	95.84	_	. 009	4.62	Еопа
-	0.00	0.00	-	50	14.26	81.57	-	.007	4.62	Eom
-	0.00	0.00	-	100	36.24	45.34	_	.003	4.62	Eom
-	0.00	0.00	_	200	26.29	19.04	-	.002	4.62	Eom
-	0.00	0.00	-	_	0.00	0.00	-	.001	4.62	Eom

PAN = 19.0%

С

I M

WASH LOSS WAS NOT TESTED.

SPECIFICATION: **ASTM C 136** ASTM D 422

TEST STANDARD: NONE NOTES: NONE

Test samples are retained for 30 days after submission and then discarded, unless other arrangements are made.

5 Northway Lane North, Latham, NY 12110 (518) 783-8102

CLIENT:

GENERAL ELECTRIC COMPANY NOTT STREET

LAB NUMBER:

84-11-50/383-5-2973 DATE RECEIVED: 11/29/84

TEST BY:

DATE TESTED:

12/4/84

REVIEWED BY:

JWH

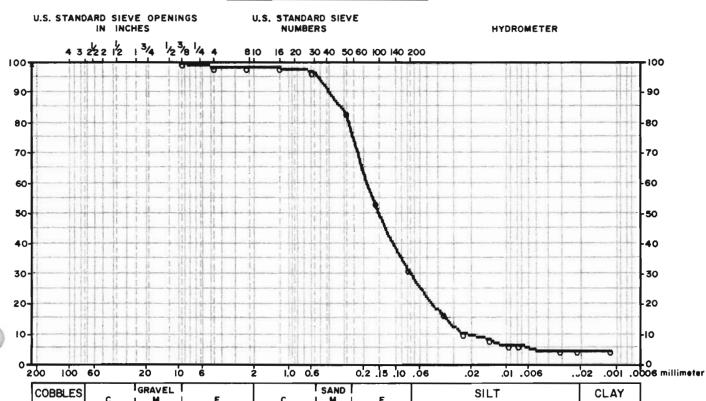
DATE REPORTED: 12/26/84

SAMPLE DESCR:

DGC 24D, S-16,

75'-77'

GRAIN SIZE DISTRIBUTION



	COARSE				FINE				HYDROMETER		
SIZE (inches)	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.	SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.	PARTICLI DIAMETE (mm)		SPECS.	
_	0.00	0.00	_	3/8	0.00	100.00	_	. 036	17.37	E hydro	
_	0.00	0.00	_	4	1.03	98.97	_	. 023	10.86	Eom	
_	0.00	0.00	-	8	. Z 1	98.77	-	. 013	8.68	Eom	
_	0.00	0.00	~	16	. 34	98.43	_	. 0 0 9	6.51	Eom	
_	0.00	0.00	_	30	. 89	97.54	_	. 007	6.51	Eom	
_	0.00	0.00	_	50	13.76	83.78	-	. 0 0 3	4.34	Eom	
_	0.00	0.00	_	100	29.98	53.80	-	. 002	4.34	Eom	
-	0.00	0.00	-	200 Pan	21.83 = 32.0		-	. 001	4.34	Eom	

WASH LOSS WAS NOT TESTED.

SPECIFICATION: **ASTM C 136** ASTM D 422

TEST STANDARD: NONE NOTES: NONE

Test samples are retained for 30 days after submission nd then discarded, unless other arrangements are made.

5 Northway Lane North, Latham, NY 12110 (518) 783-8102

CLIENT:

GENERAL ELECTRIC COMPANY NOTT STREET

LAB NUMBER:

84-11-48/383-5-2973 DATE RECEIVED: 11/29/84

TEST BY:

DATE TESTED:

12/4/84

REVIEWED BY:

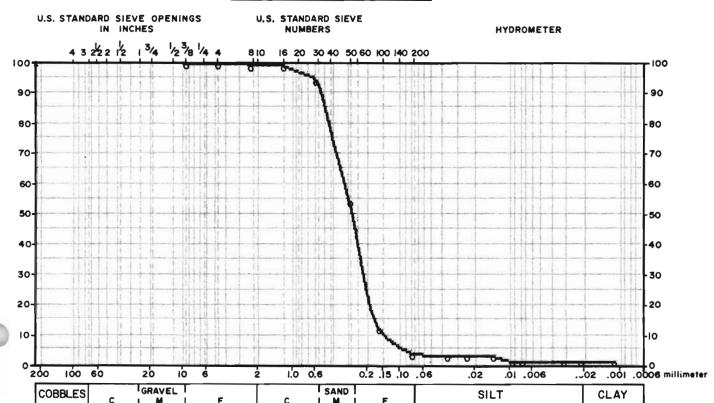
MA DA

DATE REPORTED: 12/26/84

SAMPLE DESCR:

DGC 23D, S-11, 50' - 52'

GRAIN SIZE DISTRIBUTION



	COARSE				FINE				HYDROMETER		
SIZE (inches)	PERCENT RETAINED	PERCENT PASSING	SPECS.	SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.	PARTICLE DIAMETER (mm)		SPECS.	
_	0.00	0.00	_	3/8	0.00	100.00	_	. 036	3.23	E hydro	
-	0.00	0.00	-	4	0.00	100.00	-	. 0 2 3	3.23	Еоп	
-	0.00	0.00	-	8	. 36	99.64	_	. 013	3.23	Eom	
-	0.00	0.00	-	16	. 43	99.21	_	. 009	1.61	Eom	
_	0.00	0.00	_	30	4.23	94.99	_	. 007	1.61	Eom	
-	0.00	0.00	_	50	40.04	54.94	-	. 003	1.61	Eom	
_	0.00	0.00	_	100	42.05	12.89	_	. 002	1.61	Eom	
-	0.00	0.00	-	200 Pan	8.81	4.08 %	-	. 001	1.61	Eom	

WASH LOSS WAS NOT TESTED.

SPECIFICATION: ASTM C 136 AS

ASTM D 422

TEST STANDARD: NONE NOTES: NONE

Test samples are retained for 30 days after submission of then discarded, unless other arrangements are made.

5 Northway Lane North, Latham, NY 12110 (518) 783-8102

CLIENT:

GENERAL ELECTRIC COMPANY

LAB NUMBER:

84-11-49/383-5-2973 DATE RECEIVED: 11/29/84

TEST BY:

JWH DATE TESTED: 11/4/84

NOTT STREET

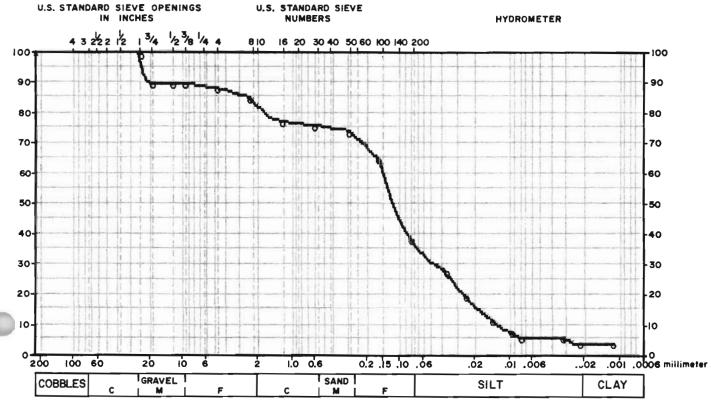
REVIEWED BY:

DATE REPORTED: 12/26/84

SAMPLE DESCR:

DAT BGZ 23D, S-14, 65'- 67'

GRAIN SIZE DISTRIBUTION



	ETAINED	CUMULATIVE				FINE		HYDROMETER		
		PERCENT PASSING	SPECS.	SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.	PARTICLE DIAMETER (mm)	PERCENT PASSING	SPECS.
1	0.00	100.00	_	4	1.71	88.58	_	. 036	28.04	E hydr
3/4	9.72	90.28	_	8	3.56	85.01	_	023	20.03	Eom
1/2	0.00	90.28	_	16	7.57	77.45	-	013	12.02	E on
3/8	0.00	90.28		30	1.48	75 96	_	. 0 0 9	8.01	Eom
-	0.00	0.00	-	50	2.00	73.96	_	.007	6.01	Eom
-	0.00	0.00	-	100	8.31	65.65	-	.003	6.01	Eom
-	0.00	0.00	-	200	27.08	38.58	-	002	4.00	Eom
-	0.00	0.00	-	_	0.00	0.00	_	.001	4.00	Eom

PAN = 38.6%

WASH LOSS WAS NOT TESTED.

SPECIFICATION:

ASTM C 136

ASTM D 422

TEST STANDARD:

NONE

NOTES:

NONE

Test samples are retained for 30 days after submission f then discarded, unless other arrangements are made.

5 Northway Lane North, Latham, NY 12110 (518) 783-8102

CLIENT:

GENERAL ELECTRIC COMPANY NOTT STREET

LAB NUMBER:

84-11-54/383-5-2973 DATE RECEIVED: 11/29/84

TEST BY:

JWH

DATE TESTED:

12/12/84

REVIEWED BY:

2023 P

DATE REPORTED: 12/27/84

SAMPLE DESCR:

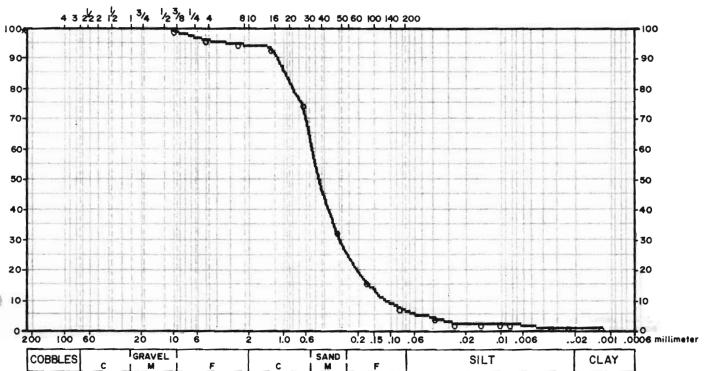
S - 2 35'- 37'

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE OPENINGS IN INCHES

U.S. STANDARD SIEVE NUMBERS

HYDROMETER



	COARSE				FINE			ł	HYDROMETER		
SIZE (inches)	PERCENT RETAINED	PERCENT PASSING	SPECS.	SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.	PARTICLE DIAMETER (mm)	PERCENT PASSING	SPECS.	
_	0.00	0.00	_	3 / 8	0.00	100.00	_	. 036	4.47	E hydro	
-	0.00	0.00	-	4	3.27	96.73	-	. 023	2.98	Eom	
-	0.00	0.00	-	8	1.55	95.18	_	. 013	2.98	Eom	
_	0.00	0.00	-	6 1	1.02	94.16	_	. 009	2.98	Eom	
_	0.00	0.00	_	30	19.02	75.13	-	. 007	2.98	Eom	
_	0.00	0.00	-	50	42.07	33.07	-	.003	1.49	Еот	
-	0.00	0.00		100	16.18	16.88	_	. 002	1.49	Eom	
-	0.00	0.00	-	200	9.06	7.82	-	. 001	1.49	Eom	
				PAN	- 7 B	D/a					

PAN =7.8%

WASH LOSS WAS NOT TESTED.

SPECIFICATION:

ASTM C 136

ASTM D 422

TEST STANDARD:

NONE

NOTES:

NONE

Test samples are retained for 30 days after submission 1 then discarded, unless other arrangements are made.

APPENDIX C

Initial PCB Field Kit Analytical Results Phase I and Phase II

Legend

The following tables list the appropriate technical information gathered from results of first time analyses only of Phase I and Phase II soil samples. Duplication analyses are not presented in these tables. Samples are listed in alphabetical and numberical order.

- * Phase I samples; remaining samples are Phase II.
- ** Results are reported as ppm, Aroclor 1248, with a method detection limit of 1 ppm.
- † Phase I soils which were homogenized and became a part of Phase II soils. Parentheses indicate Phase II results.
- I Interference, no reported quantitative result.
- # The first number denotes Aroclor 1248; the second number denotes Aroclor 1254.

Initial PCB Field Kit Analytical Results Phase I and Phase II

Sample	Date Sampled	Date Analyzed	Probe Response, mv	PCB as** 1248, PPM
Ala*	9/7/84	9/24/84	143	
Alb*	same	same	130	31
Alc*	same	same	85	157
Ald*	same	same	151	
Ale*	same	same	149	
Al-N	11/26/84	12/18/84	92	420
A1-NS	same	same	135	
Al-S	same	same	45	3000
Al-SS	same	same	151	
A2a*	9/7/84	9/24/84	153	
A2b*	same	same	151	5.7
A2c*	same	same	84	360
A2c, 16"-18"	11/26/84	12/18/84	151	
A2c, 24"-26"	same	12/19/84	160	
A2d*	9/7/84	9/24/84	154	
A2e*		same	154	
A2-N	same 11/26/84	12/18/84	156	
			145	
A2-NS	same	same	158	
A2-S A2-SS	same	same	149	
	same	same 9/24/84	156	
A3a*	9/7/84		157	
A3b*	same	same same (1/10/85)	134(109)	71 (78)
A3c* †	same		154(109)	71 (70)
A3d*	same	same	157	
A3e*	same	same	158	
A3-N	11/26/84	12/18/84	132	240
A3-NS	same	same	152	240
A3-S	same	same	136	
A3-SS	same	same	159	
A4a*	9/7/84	9/24/84	158	
A4b* A4c*	same	same	103	90
A4c, 15"-17"	same	same 12/19/84	162	
A4c, 24"-26"	11/26/84		163	
A4d*	same 9/7/84	same 9/24/84	157	
A4e*	same	same	156	
A4-N	11/26/84	12/18/84	150	
A4-N A4-NS	same	same	140	
A4-N3 A4-S	same	same	146	
A4-SS	same	same	147	
A5a*	9/7/84	9/25/84	158	
A5b*		same	149	
A5c*	same	same	141	109
A5d*	same	same	158	
A5e*	same		159	
AJE"	same	same	* 37	

Initial PCB Field Kit Analytical Results Phase I and Phase II

Sample	Date Sampled	Date Analyzed	Probe Response, mv	PCB as** 1248, PPM
A5-N	11/26/84	12/18/84	112	450
A5-NS	same	same	144	
A5-S	same	same	150	
A5-SS	same	same	148	
A6a*	9/7/84	9/25/84	158	
A6b*	same	same	155	
A6c*	same	same	153	
A6c, 10"-12"	11/26/84	12/19/84	115	290
A6c, 12"-15"	same	same	158	
A6d*	9/7/84	9/25/84	157	
A6e*	same	same	155	
A6-N	11/26/84	12/18/84	138	177
A6-NS	same	same	148	
A6-S	same	same	151	
A6-SS	same	same	151	
A7a*	9/7/84	9/25/84	160	
A7b*	same	same	161	
A7c* A7c, 15"-19"	same 11/26/84	same	158	
A7c, 20"-22"		12/19/84	73 150	890
A7d*	same 9/7/84	same 9/25/84	158	
A7e*	same	same	160	
A8a*	9/10/84	same	157	
A8b*	same	same	157	
A8c*	same	same	158	
A8c, 11"-13"	11/26/84	12/19/84	122	270
A8c, 21"-24"	same	same	127	127
A8c, 36"-38"	same	same	155	
A8d*	9/10/84	9/25/84	155	
A8e*	same	same	156	
A9a*	same	same	157	
A9b*	same	same	155	
A9c*	same	same	157	
A9c, 11"-13"	11/26/84	12/19/84	136	230
A9c, 24"-26"	same	same	162	
A9c, 34"-36"	same	same	166	
A9c, 41"-43"	same	same	164	
A9d*	9/10/84	9/25/84	153	
A9e*	same	same	156	
A10a*	same	same	156	(330)
A10b*†	same	same (1/10/85)	136 (121)	(330)
A10c*	same	same	155	
A10c, 9"-12"	11/26/84	12/19/84	153 159	
A10c,15"-18" A10c,21"-23"	same	same	130	260
A10c,36"-39"	same	same	163	200
A10c,49"-53"	same	same same	162	
A10C,47 -JJ	same	Jame	102	

Initial PCB Field Kit Analytical Results Phase I and Phase II

			Probe	PCB as**
Sample	Date Sampled	Date Analyzed	Response, mv	1248, PPM
A10d*	9/10/84	9/25/84	154	
Al0e*	same	same	155	
Alla*	same	same	156	
Allb*	same	same	155	
Allc*	same	same	152	
Allc, 1"- 3"	11/26/84	12/19/84	144	
Allc,15"-17"	same	12/20/84	161	
Allc,23"-25"	same	same	72	2400
Allc,29"-33"	same	same	162	2400
Allc,38"-43"	same	same	163	
Alld*	9/10/84	9/25/84	155	
Alle*	same	same	156	
Al2a*	same	same	157	
A12b*	same	same	154	
A12c*	same	same	149	
A12c,13"-15"	11/26/84	12/20/84	150	
A12c,22"-24"	same	same	161	
A12c,26"-28"	same	same	162	
A12c,32"-34"	same	same	162	
A12d*	9/10/84	9/25/84	156	
A12e*	same	same	155	
Al3a*	same	9/26/84	159	
Al3b*	same	same	158	
Al3c*	same	same	151	
Al3d*	same	same	159	
Al3e*	same	same	160	
Al4a*	same	same	159	
Al4b*	same	same	159	
A14c*+	same	same (1/10/85)	156 (142)	36(70)
A14d*	same	same	150 (142)	30(70)
Al4e*	same	same	161	
Al 5a*	same	same	158	
A15b*	same	same	160	
A15c*	same	same	155	
A15d*	same	same	161	
A15e*	same	same	157	
Al6a*	same	same	159	
A16b*	same	same	160	
A16c*	same	same	157	
A16d*	same	same	160	
Al6e*	same	same	161	
A17a*	same	same	159	
A17b*	same	same	160	
A17c*†	same	same (1/10/85)	160 (156)	(3.4)
A17d*	same	same	159	
Al7e*	same	same	159	
A18a*	same	same	160	
A18b*	same	same	159	
A18c*	same	same	160	
			_ _	

Initial PCB Field Kit Analytical Results Phase I and Phase II

Sample	Date Sampled	Date Analyzed	Probe Response, mv	PCB as ** 124 8, PPM
		<u> </u>		
A18d*	9/10/84	9/26/84	162	
Al8e*	same	same	150	
Al9a*	same	same	160	
A19b*	same	same	160	
A19c*	same	same	160	BMDL
A19d*	same	same	160	
A19e*	same	same	158	
A20a	11/30/84	12/20/84	162	
А20Ъ	same	same	162	
A20c-S	11/29/84	same	162	6
A20c,10"-12"	same	same	162	
A20c, 23"-25"	same	same	163	
A20c, 26"-28"	same	same	164	
A20d	11/30/84	same	163	
A20e	same	same	162	
A21a	same	same	162	
A21b	same	same	162	
A21c-S	11/29/84	same	162	
A21c, 5"- 7"	same	same	164	
A21c,23"-25"	same	same	164	
A21c,28"-30"	same	same	164	
A21d	11/30/84	12/20/84	162	
A21e	same	same	161	
Aly	1/7/85	1/8/85	148	
Aly-S	same	same	151	
Alz	same	same	155	
Alz-S	same	same	154	
A2y	same	same	159	
A2y-S	same	same	157	
A3y	same	same	159	
A3y-S	same	same	158	6
A4y	same	same	158	
A4y-S	same	same	154	
A4z	same	same	155	
A4z-S	same	same	156	
Alr	same	same	152	
Alt	same	same	147	
A2r	same	same	157	
A2r-S	same	same	157	
A2t	same	same	157	
A3r	same	same	157	
A3r-S	same	same	157	5.2
A3t	same	same	155	
A3t-S	same	same	158	
A4t	same	same	157	
A4r	same	same	156	

Initial PCB Field Kit Analytical Results Phase I and Phase II page 5

Sample	Date Sampled	Date Analyzed	Probe Response, mv	PCB as** 1248, PPM
B1, 1"- 4"	11/27/84	12/21/84	114	2000
B1,12"-14"	same	same	165	
B1,24"-26"	same	same	162	
B1,36"-38"	same	same	164	
B1,45"-50"	same	same	162	
B1,61"-63"	same	same	166	
B2, 1"- 4"	same	same	151	200
B2,12"-14"	same	same	165	
B2,24"-26"	same	same	165	
B2,36"-38"	same	same	160	
B2,48"-50"	same	12/26/84	155	
B2,56"-58"	same	same	155	
B3, 1"- 4"	same	same	113	2000
B3,12"-14"	same	same	165	
B3,24"-26"	same	same	165	
B3,36"-38"	same	same	165	
B3,46"-48"	same	same	158	
B3,50"-52"	same	same	157	
B4, 2"- 6"	same	same	149	800
B4,15"-18"	same	same	163	
B4,28"-30"	same	same	163	
B4,36"-38"	same	same	161	
B5, 2"- 4"	same	same	148	
B5,19"-21"	same	same	159	
B5,27"-29"	same	same	161	
B5,35"-37"	same	same	157	
B6, 2"- 6"	same	same	154	
B6,11"-13"	same	same	161	
B6,16"-19"	same	same	160	
B6,23"-26"	same	same	160	·
B6,36"-40"	same	same	168	
B7, 3"- 5"	same	same	160	50
B7, 8"-10"	same	same	161	
B7,14"-16"	same	same	161	
B7,25"-27"	same	same	160	
B8, 2"- 4"	same	same	90	2000
B8, 8"-11"	same	same	159	
B8,16"-19"	same	same	154	
B8,24"-27"	same	same	156	
В9	same	same	163	
B10	12/26/84	12/27/84	164	
B11	11/27/84	same	161	
B12, 5"- 7"	same	same	164	
B12,13"-15"	same	same	166	
B12,20"-22"	same	same	162	
B13	same	same	164	440
B14	same	same	164	
B15	same	same	166	
			_ • •	

Initial PCB Field Kit Analytical Results Phase I and Phase II $\,$

Sample	Date Sampled	Date Analyzed	Probe Response, mv	PCB as** 1248, PPM
В16	11/27/84	12/27/84	163	10
B17	same	same	162	
B18	same	same	164	I
B19	same	same	165	3
B20	same	same	163	
B21	same	same	164	
B22	same	same	162	
B23	same	same	164	
B24	same	same	164	
B25	same	same	163	
B26	same	same	164	
B27	same	same	164	
B28	same	same	165	
B29	same	same	166	3
B30	same	same	159	
B31	same	same	166	
B32	same	same	166	
B33	same	same	165 166	
B34	same	same	165	4
B35 B36	same	same	166	
B37	same	same	164	
B38	same	same same	163	
B39	same	same	165	
B40	same same	same	164	
B41	11/29/84	same	166	
B41-S	same	same	158	
B42	same	12/28/84	155	
B42-S	same	same	154	
B43	same	same	154	
B43-S	same	same	155	
B44	same	same	152	
B44-S	same	same	156	
B45	12/14/84	same	155	
B45-S	same	same	154	
C1*	9/20/84	9/27/84	161	
C2*	same	same	159	
C3*	same	same	159	
C4*	same	same	160	
C5*	same	same	160	
C6*	same	same	160	
C7*	same	same	162	DVDI
C8*	same	same	161	BMDL

Initial PCB Field Kit Analytical Results Phase I and Phase II

			Probe	PCB as**
Sample	Date Sampled	Date Analyzed	Response, mv	1248, PPM
D1	11/29/84	12/28/84	157	
D2	same	same	155	
D2-S	12/14/84	same	153	
D2b	11/29/84	same	155	
D3-S	12/14/84	same	153	
D3	11/29/84	same	155	ND
D3b	same	same	156	
D4-S	12/14/84	same	155	
D4	11/29/84	same	154	
D4b	same	same	154	
D4c	same	same	156	
D5	same	same	154	ND
D5b	same	same	159	
D6	same	same	156	
D6-S	12/14/84	same	154	
D7	11/29/84	same	156	
D7-S	same	same	157	
D8	same	same	156	
D8-S	same	same	155	
D9	same	same	156	
D9-S	same	same	148	
D9b	same	same	154	
D9b-S	same	same	154	
D10	same	same	158	
D10-S	same	same	156	
D11, 0"- 1"	same	same	156	
D11, 2"- 4"	same	same	158	
D11, 6"- 8"	same	same	156	
D11,12"-13"	same	same	158	
D12-S	same	same	156	
D12	same	same	158	
D13-S	same	same	153	
D13, 2"- 4"	same	same	151	1.6,1.4
D13, 6"- 7"	same	same	155	
D13,12"-14"	same	same	155	
D13,21"-23"	same	same	155	

Initial PCB Field Kit Analytical Results Phase I and Phase II

Sample	Date Sampled	Date Analyzed	Probe Response, mv	PCB as ** 1248, PPM
EOc, 0"-1"	11/30/84	12/28/84	154	
EOc, 8"-9"			152	
Elb*	same 9/10/84	same 9/27/84	162	
Elc*	9/10/84		161	
		same 12/28/84	149	17
Elc, † 4"-8"	11/30/84			14
Eld*	9/10/84	9/27/84	160	
E2a*	same	10/1/84	160	
E2b*	same	same	154	
E2c	11/30/84	12/28/84	142	98
E2d*	9/10/84	10/1/84	160	
E2e*	same	same	158	•
E3a*	same	10/1/84	160	
E3a	11/30/84	12/28/84	153	
E3b*	9/10/84	10/1/84	159	
E3b	11/30/84	1/2/85	161	
E3c, 4"-5"	same	same	159	
E3c, 7"-9"	same	same	150	
E3d*	9/10/84	10/1/84	163	
E3d	11/30/84	1/2/85	131	ND
E3e	same	same	161	
E3e*	9/10/84	10/1/84	162	
E4a	11/30/84	1/2/85	158	- -
E4a*	9/10/84	10/1/84	161	
E4b*	same	same	161	
E4b	11/30/84	1/2/85	160	
E4c-S	same	same	159	2.2,BMDL#
E4c	same	same	154	7,2.6 #
E4d	11/30/84	1/2/85	158	
E4d*	9/10/84	10/1/84	159	
E4e*	same	same	160	
E5a*	same	same	159	
E5b*	same	same	160	
E5b	11/30/84	1/2/85	155	
E5c, 5"-7"	same	same	160	
E5d	same	same	159	
E5d*	9/10/84	10/1/84	162	
E5e*	same	same	159	
E6a*	same	same	161	
E6b*	same	same	159	
E6c, 5"-7"	11/30/84	1/2/85	159	
E6d*	9/10/84	10/1/84	159	
E6e*	same	same	163	
E7a*			162	
	same	same		
E7b*	same	same	161	
E7c-S	11/30/84	1/2/85	159	
E7c, 5"-7"	same	same	161	

Initial PCB Field Kit Analytical Results Phase I and Phase II

Sample	Date Sampled	Date Analyzed	Probe Response, mv	PCB as ** 1248, PPM
E7d*	9/10/84	10/1/84	161	
E7e*	same	same	161	
E8a*	same	same	161	
E8b*	same	same	162	
E8c, 5"-7"	11/30/84	1/2/85	158	
E8d*	9/10/84	10/1/84	165	
E8e*	same	same	161	
E9a*	same	same	160	
E9b*	9/20/84	10/15/84	159	
E9 c	11/27/84	1/2/85	159	10
E9d *	9/20/84	10/15/84	158	
E9e*	same	same	155	
El0a	same	same	158	
ElOc, 5"-7"	same	1/2/85	160	
Ellc, 5"-7"	same	same	157	
El2c	1/7/85	1/8/85	157	
E12c-S	same	same	157	
E13	11/29/84	1/2/85	162	
E13-S	same	same	160	

Initial PCB Field Kit Analytical Results Phase I and Phase II

	•		Probe	PCB as **
Sample	Date Sampled	Date Analyzed	Response, mv	1248, PPM
F1	11/29/84	1/3/85	160	
F2	same	same	159	
F3	same	same	158	
F3-S	same	same	160	
F4	same	same	157	
F5	same	same	159	
F6, 10"-12"	same	same	158	
F6-S	same	same	159	
F7	same	same	158	
F7, 12"-14"	same	same	164	
F8	same	same	163	
F9, 12"-14"	same	same	166	
F9-S	same	same	167	
F10	same	same	166	
F11	same	same	167	BMDL
F11-S	same	same	166	

Initial PCB Field Kit Analytical Results Phase I and Phase II

Sample	Date Sampled	Date Analyzed	Probe Response, mv	PCB as ** 1248, PPM
Gla	11/30/84	1/3/85	163	
Gla-S	same	same	164	
Glb-S	same	same	162	
Gld	same	same	165	
Gld-S	same	same	162	
Gle	same	same	164	
Gle-S	same	same	164	
G2a	same	same	165	
G2b	same	same	165	
G2d	same	same	163	
G2d-S	same	same	160	
G2e	same	same	164	
G3a	9/20/84	10/15/84	156	
G3a	11/30/84	1/3/85	164	
G3b	9/20/84	10/15/84	158	
G3b	11/30/84	1/3/85	164	
G3d	9/20/84	10/15/84	158	
G3d	11/30/84	1/4/85	160	
G3d-S	same	same	159	BMDL
G3e	same	same	161	
G3e	9/20/84	10/15/84	158	
G4a*	same	same	154	
G4b*	same ,	same	163	
G4d*	same	same	164	
G4e*	same	same	165	
G5a *	same	same	165	
G5b*	same	same	164	
G5d*	same	same	163	
G5e*	same	same	165	
G6a*	9/20/84	10/15/84	165	
G6b*	same	same	165	
_ G6d*†		same (1/11/85)	162 (162)	BMDL
G6e*	same same	10/24/84	166	Dride.
G7a*	same	same	165	
G7b*	same	same	165	
G7d*	same	same	163	
G7e*	same	same	163	
G8a*	same	same	161	
G8b*	same	same	164	
G8d*	same	same	165	
G8e*	same	same	163	
G9a*	same	same	162	
G9b*	same	same	158	
G9d*	same	same	160	
G9e*	same	same	158	

Initial PCB Field Kit Analytical Results Phase I and Phase II

Sample	Date Sampled	Date Analyzed	Probe Response, mv	PCB as ** 1248, PPM
G10a*	9/20/84	10/24/84	158	
G10b*	same	same	159	
G10d*	same	same	161	
G10e*	same	same	160	
Glla*	same	same	159	
G11b*	same	same	159	
Glld*	same	same	158	
Glle*	same	same	158	
G12a*	same	same	160	
G12b*	same	same	157	
G12d*	same	same	160	
G12e*	same	same	158	
Gl3a*	same	10/24/84	159	
G13b*	same	same	160	
G13d*	same	same	160	
G13e*	same	same	159	
G14a	12/5/84	1/4/85	161	
G14b	same	same	160	
G14d	same	same	160	
G14d-S	same	same	161	
G14e	same	same	160	
G15a	same	same	160	
G15b	same	same	159	
G15b-S	same	same	161	
G15d	same	same	160	
G15d-S	same	same	160	
G16a	same	same	161	
G16b	same	same	160	
G16d	same	same	160	
G17a	same	same	160	
G17b	same	same	161	
G17d	same	same	160	
G18a	same	same	161	
G18b	same	same	(154)	
G18b-S	same	same	157	
G18d	same	same	157	
G18d-S	same	same	158	
G18e	same	same	156	
G19b	same	same	158	
G19d	same	same	157	
G19e	same	same	157	
G20d	12/5/84	1/4/85	157	
G20e	same	same	156	
G21b	same	same	158	

Initial PCB Field Kit Analytical Results Phase I and Phase II

Sample	Date Sampled	Date Analyzed	Probe Response, mv	PCB as ** 1248, PPM
G21d	12/5/84	1/4/85	159	
G21e	same	same	157	
G22d	same	same	157	
G22e	same	same	157	
G23b	12/14/84	same	159	
G23d	same	same	157	
G24b	same	same	159	
G25b	same	same	157	

Initial PCB Field Kit Analytical Results Phase I and Phase II page 14

			Probe	PCB as **
Sample	Date Sampled	Date Analyzed	Response, mv	1248, PPM
				
J1*	9/12/84	9/27/84	161	
J2*	same	same	162	
J3*	same	same	162	
J4*	same	same	162	
J5 *	same	same	160	
J5a*	same	same	160	
J6 *	same	same	161	
J7 *	same	same	160	- -
J8*	same	same	162	
J9(=K4)*	same	same	161	1.1
K1*	9/12/84	9/27/84	162	
K2*	same	same	163	BMDL
K3*	same	same	162	
K4(=J9)*	same	same	164	1.1
L1*	9/12/84	9/27/84	164	
L2*	same	same	164	
L3*	same	same	163	
L4*	same	same	163	
L5*	same	same	164	
Ml*	9/12/84	9/27/84	162	
M2*	same	same	162	
M3*	same	same	163	\mathtt{BMDL}
M4*	same	same	162	
M5*	same	same	163	
Q1	11/30/84	1/4/85	159	
Q2	same	same	158	
Q3	same	same	157	
Q3-S	same	same	156	
Q4	same	same	158	
Q5	same	same	157	
Q5-S	same	same	158	
Q6	same	same	159	
Q7	same	same	157	
Q7-S	same	same	156	
Q8	same	same	156	

Technical Report

for **DUNN GEOSCIENCE 5 NORTHWAY LANE** LATHAM, NY 12110

Chain of Custody Data Required for ETC Data Management Summary Reports

F7253 - F7265

DUNN GEOSCIENCE

GESURFPCB

ETC Sample No.

Company

Facility

Sample Point Date Time Hours

Denis C. K. Lin, Ph.D. Vice President

Research and Operations

Introduction

This report contains the analytical results on your soil samples. It is designed to include comprehensive data from the entire analytical process in order to satisfy the needs of various levels of review.

The results obtained from your samples are presented in tabular format immediately following this introduction. Quality assurance data is tabulated along with the appropriate sample results for verification. Depending on the analyses ordered, the quality assurance data may include results from blank, spiked blank, spiked sample (i.e. matrix spike) and replicate sample as well as results from surrogate compound analyses. Quality assurance data for verification of proper instrument performance is also included where appropriate. The report appendices include the chain of custody record for your samples and, where appropriate, the gas chromatograms and mass spectra.

The procedures used in the analysis of the samples are described in this report's methodology section. All analytical procedures within our laboratory are performed within a strictly enforced Quality Assurance Protocol. A description of this Protocol is included in the report.

Results

Sample results, and associated quality assurance data, are always tabulated in one or more of this report's Quantitative Results Tables. The format of each table varies with the class of analysis.

Aroclors (PCB's by GC/ECD)

Aroclor mixtures analyzed by gas chromatographic methods are reported with a blank, spiked blank, matrix spike and replicate. The method detection limit (MDL) is determined for each individual matrix. When a particular Aroclor mixture is determined to be present at concentrations less than the calculated MDL it is reported as BIMDL (Below Method Detection Limit).

Methodology for GC Analysis of Polychlorinated Biphenyls

The methods employed in the analysis of your soil sample for polychlorinated biphenyls are established EPA methods taken from the "Manual of Analytical Methods for the Analysis of Pesticide Residues in Human and Environmental Samples," June, 1980.

The soil method can be summarized as follows: A weighed amount of air dried sample, approximately 20 grams, is soxhlet extracted for 5 hours with 1:1 (v:v) acetone:hexane solution. The extract is dried and concentrated to approximately 3 ml. The concentrated extract is transferred to a silica gel column and eluted with hexane. The eluate is concentrated to a final volume of 1 ml and injected into a gas chromatograph equipped with an 50 Ni electron capture detector.

The GC operating parameters were as follows:

COLUMN

 $6^{\circ} \times 4$ mm glass 1.5% SP-2250 & 1.95% SP-2401 Supelcoport 100/120 mesh

CARRIER FLOW

60 ml/min. Argon/Methane

COLUMN OVEN

220° C

INJECTOR TEMPERATURE

225° C

DETECTOR TEMPERATURE

325° C

DETECTOR

Ni⁵³ Electron Capture Detector



Quality Assurance/Quality Control Procedures (QA/QC)

ETC bases its quality assurance protocols on the following government guidelines:

- . "Handbook for Analytical Quality Control in Water and Wastewater Laboratories", EPA-600/4-79-019, March 1979;
- National Enforcement Investigation Center Policies, and Procedures manual; EPA-330/9/79/00I-R, October 1979;
- . the recommended guidelines for EPA Methods 624 and 625. (Federal Register, December 3, 1979, pp. 69532-69559);
- . "Manual of Analytical Methods for the Analysis of Pesticides in Humans and Environmental Samples," EPA 600/8-80-038, June 1980; and
- . "Determination of 2,3,7,8-TCDD in Soil and Sediment" EPA, Region VII, Kansas City, September 1983.

However, we have modified our protocols to provide a higher level of QA/QC than the guidelines require. For example, we analyze a higher than required number of quality control samples and we pay especially careful attention to the certification of the "reference standard" compounds we use in analysis. Below are listed the key QA/QC elements for the methods we used.

Analysis of Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry

- Each batch of I3 samples consists of 9 customer samples (at a maximun), one blank sample, one spiked blank, one spiked sample and one replicate sample. This amounts to a 30% quality control factor.
- Three surrogate compounds are added to each sample in the batch of 13.
- A blind quality control sample is introduced to the laboratory for analysis on a weekly basis.
- Each GC/MS is checked and retuned, if necessary, at the beginning of each day to ensure that its performance on bromofluorobenzene (BFB) meets the EPA criteria.
- A calibration curve for quantitation is prepared using a mixture of Volatile Organic Priority Pollutant "standards" at a minimum of 3 different concentrations and using a mixture of 3 internal standards at a constant concentration.
- The calibration curve is verified with a mixture of priority pollutant standards every day. If the response factors factors vary greater than 10%, the instrument must be recalibrated.

Analysis of Organic Compounds Extracted in Acid or Base/Neutral Solutions by Gas Chromatography/Mass Spectrometry

- Each batch of 20 samples consists of 16 customer samples (at a maximum), one blank sample, one spiked blank (for water matrices), one sample spiked with the priority pollutant standard mixture and a duplicate customer sample. This amounts to a 20% quality control factor.
- Three surrogate compounds are added to each sample in the batch for Base/Neutral analysis.
- Two surrogate compounds are added to each sample in the batch for Acid analysis.
- A blind quality control sample is introduced to the laboratory for analysis on a weekly basis.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

- Each GC/MS is checked and retuned, if necessary, at the beginning of each day to
 ensure that its performance on decafluor otriphenylphosphine (DFTPP) meets the EPA
 criteria.
- A calibration curve for quantitation is prepared using __ nixture of standards composed
 of either the Organic Acid or Base/Neutral Extractable Compounds at a minimum of 3
 concentrations and using 2,2'-diffuorobiphenyl as an internal standard.

Analysis of Metals

All Samples

- New standards are prepared for each batch of samples.
- Normal calibration is performed using a blank sample and four standards that have been through the sample preparation procedure. A regression analysis is used to construct the calibration curve.
- All EP Toxicity samples and all samples determined by furnace atomic absorption are calculated by the "method of additions".
- For each sample analysis that requires the use of the "method of additions" technique, a three point calibration is performed using U.S. EPA "Methods for Chemical Analysis of Water and Wastes, 1979". Results are obtained using linear regression analysis. Any regression with a coefficient of correlation below 0.990 is considered suspect, necessitating review of calibration data or sample re-analysis.
- In constructing the normal calibration curves the lowest concentration levels we use are values greater than or equal to 5 times the Instrumental Detection Limit (IDL).
- All calibration standards are analyzed in duplicate, at a minimum.
- Independent reference standards are used to check the accuracy of calibration standards.
- A check standard is analyzed every ten samples to validate the normal calibration curve.
- One customer sample out of every ten is analyzed in triplicate.

Homogeneous Samples (except for Mercury analysis)

Samples are analyzed in batches of 30 or less. For batches in which the sample matrices are homogeneous, the QC program is a minimum of 25% and consists of analyzing:

- 3 sets of triplicate analyses;
- 2 Replicate spikes;
- 1 independent reference standard;
- 4 Calibration standards (processed using the sample preparation method);
- 4 Calibration standards (without sample preparation); and
- 1 Reagent Blank.

Heterogeneous Samples (except for Mercury analysis)

Samples are analyzed in batches of 30 or less. For batches in which the sample matrices are heterogeneous, the QC program is a minimum of 35% and consists of analyzing:

ETC ENVIRONMENTAL TESTING and CERTIFICATION

- 3 sets of triplicate analyses;
- 2 Replicate spikes;
- 1 Replicate independent reference standards;
- 4 Calibration standards (processed using the sample preparation method);
- 1 Procedural Blank;
- 4 Calibration standards (without sample preparation); and
- 1 Reagent Blank.

Analysis of Mercury

To analyze samples for mercury we group them by matrix in batches of 20 or less. Our QC program is a minimum of 30% and consists of analyzing:

- each of the 30 customer samples in duplicate;
- 3 sets of triplicate analyses;
- 2 Replicate spikes;
- 2 Replicate independent reference standards;
- 10 Calibration standards (processed using the sample preparation method); and
- 2 Procedural Blanks.

Analysis of Pesticides, Herbicides and PCB's by Gas Chromatography

Pesticide, herbicide and PCB samples are grouped in batches of 16 customer samples or less according to the type of analysis to be performed. The QC program for each of these three types of analyses is a minimum of 20% and consists of analyzing:

- 1 procedural blank sample(a reagent blank is analyzed in the case of non-water matrices);
- 1 spiked blank sample (the spiked blank is eliminated in the case of non-water matrices);
- 1 replicate sample;
- 1 replicate spiked sample; and
- 1 known reference QC sample for at least each 100 samples analyzed.

The instrument is calibrated each run with three standards, and checked every 10 samples.

Analysis of Cyanides, Phenols, Fluoride, Chloride, Nitrate and Nitrite

- All parameters are analyzed using a Technicon Autoanalyzer II GT.
- 3 calibration standards are analyzed at the beginning and end of each batch.
- Each batch (up to 80 samples) consists of analyzing one blank, one spiked blank, one duplicate and spiked sample every 20 samples, and an EPA known reference sample.

Analysis of Total Organic Carbon (TOC)

TOC samples are analyzed on a daily basis with the number of samples analyzed per day dependent on the request for duplicate or quadruplicate analyses. The quality control program is designed to maintain the appropriate amount of QC and consists of the following elements:

- Daily instrument calibration
- One blank
- Standard recalibration every 10 samples
- Spiked samples at a low and high level
- Every sample is run in duplicate at a minimum

Analysis of Total Organic Halide (TOX)

- Blank reagent water for absolute carbon backround must contain less than 5 ug/l of halide (as chloride).
- Using a trichlorophenol standard, the mean adsorption efficiency must be within +/-15% of the standard value.
- Calibration standards are run every 10 samples.
- Every sample is run in duplicate at a minimum.

Analysis of 2,3,7,8-TCDD (Dioxin) by GC/MS (SIM)

- Each sample is dosed with a known quantity of $^{13}C_{12}$ -2,3,7,8-TCDD as internal standard and $^{37}Cl_4$ -TCDD as surogate standard. The action limits for surrogate standard results is +/- 40% of the true value. Samples showing surrogate standard results outside of these limits are reextracted and reanalyzed.
- Two laboratory "method blanks" are run along with each set of 24 or fewer samples.
 The method blank is also dosed with the internal standard and surrrogate standard.
- At least one per set of 24 samples is run in duplicate to determine intralaboratory precision.
- Qualitative Requirements. The following are met in order to confirm the presence of native 2,3,7,8-TCDD:
 - a. Isomer specificity must be demonstrated initially and verified once per 8-hour work shift. The verification consists of injecting a mixture containing TCDD isomers which elute close to 2,3,7,8-TCDD. The 2,3,7,8-TCDD must be separated from interferring isomers, with no more than 25% valley relative to the 2,3,7,8-TCDD peak.
 - b. The 320/322 ratio is within the range of 0.67 to 0.87.
 - c. lons 320, 322, and 257 are all present and maximize together the signal to mean noise ratio must be 2.5 to 1 or better for all 3 ions.
 - d. The retention time is equal (within 3 seconds) the retention time for the isotopically labeled 2,3,7,8-TCDD.
 - e. At least one of the positives can be confirmed by obtaining partial scan spectra from mass 150 to mass 350. The partial scan guidelines are as follows:
 - . the 320/324 ratio should be $1.58 \pm 1/- 0.16$
 - . the 257/259 ratio should be 1.03 +/- 0.10

. the 194/196 ratio should be 1.54 +/- 0.15

- One sample is spiked with native 2,3,7,8-TCDD at a level of 1.0 PPB (for soil) for each set of 24 or fewer samples.
- In cases where no native 2,3,7,8-TCDD is detected, the actual detection limit is estimated and reported based on a signal to noise ratio of 2.5 to 1 at ions 320 and 322.
- For each sample, the internal standard is present with at least a 10 to 1 signal to noise ratio for both mass 332 and mass 334. Also, the internal standard 332/334 ratio must be within the range of 0.67 to 0.87.

Subcontractor QA/QC

Each subcontractoer is required to maintain an appropriate level of quality control. To insure this, each subcontractor is required to submit to ETC the quality control data for all analyses it performs. This data is kept on file at ETC. In general, the amount of quality control required is one duplicate sample with one spiked sample for every ten analyses.

Chain-of-Custody

The chain-of-custody procedure is part of our quality assurance protocol. We believe our chain-of-custody record fully complies with the legal requirements of federal, state and local government agencies and of the courts of law. The record covers:

- labeling of sample bottles, packing the Sample Shuttle and transferring the Shuttle under seal to the custody of a shipper;
- outgoing shipping manifests;
- the chain-of-custody form completed by the person(s) breaking the Shuttle seal, taking the sample, resealing the Shuttle and transferring custody to a shipper;
- incoming shipping manifests;
- breaking the Shuttle's reseal;
- storing each labeled sample bottle in a secured area;
- disposition of each sample to an analyst or technician; and
- the use of the sample in each bottle in a testing procedure appropriate to the intended purpose of the sample.

The record shows for each link in this process:

- the person with custody; and
- the time and date each person accepted or relinquished custody.

NOV 4, 1984

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports	
F7253 DUNN GEOSCIENCE GESURFPCB A18 84100	
I ETC Sample No. Company Facility Sample Point Date	
1 61C Sample No. Company Pacility Sample Point Date	
ETC Sample No. Company Facility Sample Point Date	Time Hours

	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
Compound	Sample Concen, mg/kg	MDL mg/kga	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	X Recov	Unspiked Sample mg/kg	Goncen Added mg/kg	Recov
Aroclor 1242 Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 A MOL calculated for each sample matrix. B Unable to calculate recovery due to interference from high level of	ND ND ND 31 ND ND ND		ND ND 31 ND ND ND	ND ND 24 ND ND ND	ND ND ND ND ND ND ND	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	-	ND ND ND 90 ND ND ND	1	

NOV 3, 1984

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

F7254 DUNN GEOSCIENCE GESURFPCB A1C 841004

ETC Sample No. Company Facility Sample Point Data Time Hours

	Rest	11ts 11.	QC Rep	licate	QC Blank	and Spiked	Blank	QC Ma	trix Spik	•
Compound	Sample Concen, mg/kg	MDL mg/kgx	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen : Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	X Recov
Aroclor 1242 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 A HDL calculated for each sample matrix. B Unable to calculate recovery due to interference from high level of	ND ND ND 157 ND ND ND		END END END END END END END END END END	ND ND ND ND ND ND ND	ND ND ND ND ND ND	0 0 0 0 0 0	-	ND ND ND 90 ND ND ND	0 0 0 0 0 0 0	
		•								



TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

F7255 DUNN GEOSCIENCE GESURFPCB A2B 841004

Elepsed ETC Sample No. Company. Facility. Sample Point Date Time Hours

	Res	ilts	QC Rep	licate	QC Blank and Spiked Blank			QC Matrix Spike		
Compaund	Sample Concen, mg/kg	MDL mg/kg,	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1242 Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1232 Aroclor 1221 Aroclor 1016 # MDL calculated for each sample matrix. # Unable to calculate recevery due to interference from high leve	ND ND BMDL 5.70 ND ND ND ND		ND ND ND BMDL ND ND	ND ND ND BMDL ND ND ND	ND ND ND ND ND ND ND	0 0 0 0 0 0	-	ND ND ND 90 ND ND ND	0 0 0 1 0 0	

NOV 3, 1984

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

F7256 DUNN GEOSCIENCE GESURFPCB A2C 841004

ETC Sample No. Company Facility Sample Point Date Time Hours

Compound Sample Concent MDL First Second Blank Concent Added Recovered Mg/kg M		Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
Aroclor 1248 Aroclor 1232 ND 1 ND ND ND 0 - 90 1 - 8 Aroclor 1221 Aroclor 1016 ND 1 ND ND ND ND ND 0 - ND 0	A CONTROL OF THE PROPERTY OF T	Concen.	MOL mg/kga	First mg/kg	Second mg/kg	Data	Added		Unspiked Sample mg/kg	Added	
	Aroclor 1242 Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016	ND ND ND 360 ND ND		ND ND ND BMDL ND ND	ND ND ND BMDL ND ND	ND ND ND ND ND ND	0 0 0 0 0	- - - -	ND ND ND 90 ND ND	0 0 0 1	

NOV 3, 1984

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

F7257 DUNN GEOSCIENCE GESURFPCB A3C 841004

ETC Sample No. Company Facility Sample Point Date Time Hours

	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
Compaund	Sample Concen. mg/kg	MDL mg/kg,	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen Added mg/kg	Recov
Aroclor 1242 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 A MDL calculated for each sample matrix. B Unable to calculate recovery due to interference from high level of	ND ND ND 71 ND ND ND		ND ND ND BMDL ND ND	ND ND ND BMDL ND ND	ND ND ND ND ND ND ND	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		ND ND 90 ND ND ND	0 0 0 1 0 0	

NOV 4, 1984

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

F7258 DUNN GEOSCIENCE GESURFPCB A4C 841004

Elepsed ETC Sample No. Company Facility Sample Point Data Time Hours

	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
Compound	Sample Concen, mg/kg	MDL mg/kga	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	X Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	X Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 B MDL calculated for each sample matrix. B Unable to calculate recovery due to interference from high level of	ND ND 90 ND ND ND		NO 20 20 20 20 20 20 20 20 20 20 20 20 20	ND ND 24 ND ND ND	ND ND ND ND ND	0 0 0 0 0 0		20 20 20 20 20 20 20 20 20 20 20 20 20 2		

NOV 3, 1984

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

F7259 DUNN GEOSCIENCE GESURFPCB A5C 841004

Elapsed
ETC Sample No. Company Facility Sample Point Date Time Hours

	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
Compound	Sample Concen. mg/kg	MDL mg/kgr	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	X Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016	ND ND 109 ND ND ND ND		ND ND BMDL ND ND	ND ND BMDL ND ND ND	ND ND ND ND ND	000000000000000000000000000000000000000		ND ND 90 ND ND ND	0 0 0 0 0 0 0	

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

F7260 DUNN GEOSCIENCE GESURFPCB C8 841004

ETC Sample No. Company Facility Sample Point Date Time Hours

Sample Concen. MDL First Second Data Added Mg/kg Mg/		Results		icate	Diam.	and Spiked	DIANK	W WC M	atrix Spik	е
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1232 Aroclor 1221 Aroclor 1221 Aroclor 1016 Aroclor 1016 Aroclor 1016 ND ND ND ND ND ND ND ND ND ND ND ND ND	Compound	Concen.	MDL First mg/kga mg/kg	Second mg/kg	Data	Added		Sample	Added	% Recov
	Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 8 MDL calculated for each semple matrix.	ND ND ND BMOL ND ND	1 ND 1 ND 1 ND 1 BMDL 1 ND 1 ND 1	ND ND ND BMDL ND ND	ND ND ND ND ND	0 0 0 0	-	ND ND ND 90 ND	0 0 0 1 0	

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

F7261 DUNN GEOSCIENCE GESURFPCB A14C 841004

ETC Sample No. Company Facility Sample Point Date Time Hours

Company	TO THE ROSE	11ts	QC Rep	licate	QC Blank	and Spiked	Blank	QC M	atrix Spik	(e
Compaund	Sample Concen mg/kg	MDL mg/kga	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 R MOL calculated for each sample matrix. B Unable to calculate recevery due to interference from high level of	ND ND ND 36 ND ND ND		ND ND ND ND ND ND ND ND ND ND ND ND ND N	ND ND ND BMDL ND ND ND	ND ND ND ND ND	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		ND ND ND 90 ND ND	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

F7262 DUNN GEOSCIENCE GESURFPCB K2 841004

ETC Sample No. Company Facility Sample Point Date Time Hours

	Resu	116 5 7 22 2	QC Rep	licate	QC Blank	and Spiked	Blank	QC M	strix Spik	
Compound	Sample Concen mg/kg	MDL mg/kga	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen Added mg/kg	% Recov
Aroclor 1242 Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 R MDL calculated for each simple matrix. B Unable to calculate recovery due to interference from high level of	ND ND ND BMDL ND ND ND		ND ND ND ND ND ND ND ND ND ND ND	Mg/kg	Mg/kg ND ND ND ND ND ND ND	mg/kg		mg/kg	mg/kg 0 0 0 0 0	
									San Control	

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Arociors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

F7263 DUNN GEOSCIENCE GESURFPCB M3 841004

ETC Sample No. Company Facility Sample Point Date Time Hours

Compound	Resu	1ts	QC Rep	licate	QC Blank	and Spiked	Blank	QC M	atrix Spike	6
Compound	Sample Concen mg/kg	MDL mg/kga	First .mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	X Recov	Unspiked Sample mg/kg	Concen Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 R MDL calculated for each sample matrix. 8 Unable to calculate recovery due to interference from high level	ND ND BMDL ND ND ND		ND ND ND ND ND ND ND ND	ND ND ND BMOL ND ND ND	ND ND ND ND ND ND	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		ND ND ND ND ND ND ND	000000	

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

F7264 DUNN GEOSCIENCE GESURFPCB J9 841004

ETC Sample No. Company Facility Sample Point Date Time Hours

	Results	115	QC Rep	licate	QC Blank	and Spiked	Blank	QC M	atrix Spik	e
Compound	Sample Concen, mg/kg	MDL mg/kga	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added Mg/kg	X Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1242 Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 # MDL calculated for each sample matrix. # Unable to calculate recovery due to interference from high level of	ND ND ND 1.10 ND ND ND		ND ND ND ND ND ND	ND ND ND BMDL ND ND ND	ND ND ND ND ND ND	0 0 0 0 0 0	-	20 20 20 20 20 20 20 20	0 0 0 0 0	

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

F7265 DUNN GEOSCIENCE GESURFPCB A19C 841004

ETC Sample No.

Company.

Facility

Dete Sample Point

Time

	Res	ilts	QC Rep	licate :	QC Blank	and Spiked	Blank	QC M	strix Spik	é
Compound	Sample Concen. mg/kg	MDL mg/kg:	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 # MDL calculated for each sample matrix. # Unable to calculate recovery due to interference from high level of	ND ND ND ND ND ND NO		ND ND ND ND ND ND ND	ND ND ND BMDL ND ND ND	ND ND ND ND ND ND	0 0 0 0 0 0 0		20 20 90 20 20 20 20 20 20 20 20 20 20 20 20 20	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	

Technical Report

for **DUNN GEOSCIENCE 5 NORTHWAY LANE** LATHAM, NY 12110

Chain of Custody Data Required for ETC Data Management Summary Reports

G6031-G6046

DUNN GEOSCIENCE

GESURFPCB

ETC Sample No.

Company

Facility Sample Point Date Time Hours

Denis C. K. Lin, Ph.D.

Xide President Research and Operations

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6031

DUNN GEOSCIENCE

GESURFPCB

13.6

AIN

850111

ETC Sample No.

Company

Facility

Sample Point - Date.

Elapsed me Hours

	Res	ultsije	QC Rep	licate	QC Blank	and Spiked	Blank	QC M	atrix Spik	e
Compound	Sample Concen. mg/kg	MDL mg/kg,	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 a Reogent Blank. Spiked Blank cannot be performed for this sample matrix.	ND ND ND 420 ND ND ND		ND ND ND 420 ND ND ND	ND ND ND 420 ND ND ND	ND ND ND ND ND ND ND ND ND ND ND ND ND N	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		ND ND ND ND ND ND ND	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	62

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6032 DUNN GEOSCIENCE

GESURFPCB AIS

850111

ETC Sample No.

Company

Facility

Sample Point Date Time

Elapsed ime Hours

Results QC Replicate QC Blank and Spiked Blank QC Matrix Spike Compound Sample Concen. Unspiked Blank. Concen. Concen. MDL First Second Data Added Recov Sample Added Recov mg/kga mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg Aroclor 1242 ND 10 ND ND ND 0 ND 0 Aroclor 1254 ND 10 ND ND ND 0 ND 0 ND ND 10 ND 0 ND ND 62 3000 10 420 420 ND 0 180 0 Aroclor ND 10 ND ND ND 0 ND 0 ND 10 ND Aroclor 1221 ND ND ND 0 Aroclor 1016 ND 10 ND ND ND ND A Repent Blank. Spiked Blank cannot be performed for this sample not an

FEB

1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

DUNN GEOSCIENCE G6033

GESURFPCB

A3C

850111

ETC Sample No.

Facility.

Sample Point

Date Time

Elapsed Hours

	Results		QC Rep	licate	QC Blank	and Spiked	Blank	QC M	atrix Spik	e
Compound	Sample Concen mg/kg	MDL mg/kg	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 # Respent Blonk. Spiked Blank cannot be performed for this sample note ### MPL calculated for each sample natrix.	ND ND ND 78 ND ND ND		ND ND 420 ND ND ND	ND ND ND 420 ND ND ND	ND ND ND ND ND ND	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		ND ND 180 ND ND ND	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	62

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6034 DUNN GEOSCIENCE GESURFPCB A3N-S 850111

ETC Sample No. Company Facility Sample Point Date Time Hours

	Res	ults	QC Rep	licate	QC Blank	and Spiked	Blank	QC Ma	atrix Spik	é
Compound	Sample Concen mg/kg	MDL mg/kg	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 a Respent Blank, Spiked Blank cannot be performed for this sample metrical mode, and the sample of the sa	ND ND 240 ND ND ND	ភភភភភភភ	ND ND 420 ND ND ND	ND ND 420 ND ND ND	ND ND ND ND ND ND	0 0 0 0 0 0 0		ND ND 180 ND ND ND	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	62
										1

EP 1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6035 DUNN GEOSCIENCE

GESURFPCB A3R-S

850111

ETC Sample No.

Company

Facility

Sample Point Date

Elapsed Hours

	Resu	ilts	QC Rep	licate	QC Blank	and Spiked	Blank	QC Ma	trix Spike	2
Compound	Sample Concen mg/kg	MDL mg/kg:	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1242 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 R Respent Blank. Spiked Blank cannot be performed for this sample nate B MDL calculated for each sample natrix.	ND ND ND 5.20 ND ND ND		ND ND ND 420 ND ND	ND ND ND 420 ND ND ND	M9/K9 ND ND ND ND ND ND	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		Mg/kg ND ND 180 ND ND ND ND	mg/kg 0 0 0 0 0 0 0	62

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6036 DUNN GEOSCIENCE GESURFPCB A3Y-S 850111

ETC Semple No. Company Facility Sample Point Date Time Hours

	Results				QC Rep	licate	QC Blank	and Spiked	Blank	QC M	strix Spik	e
Compound	Sample Concen. mg/kg	MDL mg/kg₀	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen Added mg/kg	% Recov		
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 A Respent Block, Spiked Block cannot be performed for this sample mates B MDL colculated for each sample matrix.	ND ND 6.00 ND ND ND		ND ND 420 ND ND	ND ND 420 ND ND	299999	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		20 20 20 20 20 20 20 20	0 0 0 0 0 0	62		

EB .

1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6037 DUNN GEOSCIENCE GESURFPCB A5C 850111

Elaosed

Sample No. Company

ty Sample P

Elapsed Hours

	Resi	ılts	QC Rep	licate	QC Blank	and Spiked	Blank	QC M	atrix Spik	e
Compound	Sample Concen. mg/kg	MDL mg/kg	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 R Respect Stank. Spiked Stank connot be performed for this sample not 8 MOL calculated for each sample natrix.	ND ND 180 ND ND ND	1	ND ND ND 420 ND ND ND	ND ND VD VD ND ND ND	ND ND ND ND ND	0 0 0 0 0 0 0	-	ND ND ND ND ND	0 1 0 0 0	62

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

DUNN GEOSCIENCE G6038

GESURFPCB A5N 850111

ETC Sample No.

Company

Facility

Sample Point Date

Elapsed

	Res	1116	QC Rep	licate	QC Blank	and Spiked	Blank	QC Ma	atrix Spik	e
Compound	Sample Concen, mg/kg	MDL mg/kg	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 A Respect Blank. Spited Blank cannot be performed for this sample metric B MOL colculated for each sample metrix.	ND ND ND 450 ND ND ND	10 10 10 10 10 10	ND ND 420 ND ND ND	ND ND 420 ND ND ND	ND ND ND ND ND ND	0 0 0 0 0 0		ND ND ND ND ND ND	0 0 0 0 0 0	62

1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6039 DUNN GEOSCIENCE

GESURFPCB A6C

850111

ETC Sample No.

Company

Facility

ple Point Date

Elapsed Hours

	Rest	lts	QC Rep	licate	QC Blank	and Spiked	Blank	QC M	atrix Spik	é
Compound	Sample Concen. mg/kg	MDL mg/kg,	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 R Respect Blank. Spiked Blank cannot be performed for this sample matter. B MDL calculated for each sample matter.	ND ND 290 ND ND ND	5555555	ND ND 420 ND ND ND	ND ND 420 ND ND ND	ND ND ND ND ND NO	0 0 0 0 0 0 0		ND ND ND ND ND ND ND	0 0 0 0 0 0	62

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6040 DUNN GEOSCIENCE GESURFPCB A6N 850111

ETC Sample No. Company Facility Sample Point Date Time Hours

	Rest	11ts	QC Rep	licate	QC Blank	and Spiked	Blank	QC Ma	atrix Spik	é
Compound	Sample Concen, mg/kg	MDL mg/kgc	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1242 Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016	ND ND IND 177 ND ND ND		ND ND ND 420 ND ND ND	ND ND ND 420 ND ND ND	20000000000000000000000000000000000000	00000	111111	ND ND ND 180 ND ND ND	0 0 1 0 0 0	62
A Respect Blank, Spiked Blank cannot be performed for this emple mate B Sample may contain Araclar 1280, however, quantitation met possible. C MDL calculated for each sample matrix.		Aroclor 1245.								

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

DUNN GEOSCIENCE G6041

GESURFPCB A7C

850111

ETC Sample No.

Company

Facility

Sample Point Date Elapsed

and the community of the complete of the compl

QC Replicate QC Blank and Spiked Blank QC Matrix Spike Results Compound Blank Concen. % Unspiked Сопсеп. % Sample Recov MDL First Second Data Added Recov Sample Added Concen. mg/kg mg/kg. mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg ND 10 ND ND ND 0 ND 0 Aroclor 1242 Aroclor 1254 ND 10 ND ND ND 0 ND 0 62 ND ND ND ND ND Aroclor 1260 10 890 10 420 180 0 Aroclor 1248 420 ND ND 10 ND ND ND ND Aroclor 1232 ND 10 ND ND ND ND Aroclor 1221 10 ND ND ND Aroclor 1016 Blank. Spiked Blank connet be performed for this sample matrix. 8 MDL calculated for each sample matrix.

TAIVIBANIAE AIT AI

FEB 2, 1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

. Chain of Custody Data Required for ETC Data Management Summary Reports

G6042 DUNN GEOSCIENCE

GESURFPCB A8C

850111

ETC Sample No.

Company

Facility.

Sample Point Date Time

Elapsed Hours

Results QC Replicate QC Blank and Spiked Blank QC Matrix Spike Compound **Blank** Concen. % Unspiked Concen. Sample. MOL First Added. Recov Added Recov Concen. Second Data Sample mg/kg mg/kgc mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg ND ND ND ND Aroclor 1242 Aroclor 1254 ND ND ND ND ND IND ND 62 ND ND ND 420 420 ND 180 Aroclor 1248 270 ND ND ND ND ND Aroclor 1232 ND ND ND ND ND Aroclor 1221 Aroclor 1016 ND contain Areclar 1280, however, quantitation not possible fue to high level of Areclar 1248.

TABLE 1: QUANTITATIVE RESULTS 1d QUALITY ASSURANCE DATA

Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6043 DUNN GEOSCIENCE

A8C

850111

ETC Sample No.

Company

GESURFPCB Facility

ple Point

Date ...

Hours

	Results		QC Rep	licate	QC Blank	and Spiked	Blank	QC M	atrix Spik	(e
Compound	Sample Concen, mg/kg	MDL mg/kg,	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 Resigns Blank, Spiked Blank cannot be performed for this sample matrix.	ND ND 127 ND ND ND		ND ND 420 ND ND ND	ND ND 420 ND ND ND	ND ND ND ND ND ND	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		ND ND 180 2D ND	0 0 0 0 0 0	62

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6044 DUNN GEOSCIENCE

GESURFPCB A9C

850111

ETC Sample No.

Company

Facility

Sample Point

Date Time

Elapsed Hours

47年10日 - 10日 國際基礎 行。	Res	ults	QC Rep	licate	QC Blank	and Spiked	Blank	QC Ma	atrix Spik	е
Compound	Sample Concen. mg/kg	MDL mg/kg,	First mg/kg	Second mg/kg	Blank Data mg/kg	Concent Added mg/kg	X Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 # Respect Blank, Spiked Blank connot be performed for this sample note in the performed for the sample note.	ND ND 230 ND ND ND		ND ND ND 420 ND ND ND	ND ND ND 420 ND ND ND	ND ND ND ND ND ND	0 0 0 0 0 0	-	2D 2D 2D 2D 2D 2D 2D	0 0 1 0 0 0	62

FEB



TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6045

ETC Sample No.

DUNN GEOSCIENCE

GESURFPCB

AloB

850111

Facility

Sample Point Date

Time Hours

the last	Rest	lts	QC Rep	licate	QC Blank	and Spiked	Blank	QC Ma	trix Spik	e
Compound	Sample Concen. mg/kg	MDL mg/kg₃	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 A Reagent Blank, Spiked Blank cannot be performed for this sample matrix.	ND ND 330 ND ND ND		ND ND ND 420 ND ND ND	ND ND ND 420 ND ND ND	ND	0 0 0 0 0 0		ND ND ND ND ND ND ND	0 0 0 0 0 0	62

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

DUNN GEOSCIENCE G6046

Company

ETC Sample No.

GESURFPCB

850111

Facility

Sample Point Date Time

Elapsed

		<u></u>								
	Res	ults	QC Rep	licate	QC Blank	and Spiked	Blank	QC Ma	trix Spik	e
Compound	Sample Concen, mg/kg	MDL mg/kg	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen Added mg/kg	% Recov
Aroclor 1242 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 A Respent Blank, Spited Blank cannot be performed for this sample not B MOL colculated for each sample notrix.	ND ND 260 ND ND ND		ND ND ND ND ND ND ND ND ND ND ND ND ND N	ND ND ND 420 ND ND ND	ND ND ND ND ND ND ND ND ND ND ND ND ND N	0 0 0 0 0 0 0 0		ND ND ND ND ND ND ND	0 0 1 0 0 0 0	62

Technical Report

for **DUNN GEOSCIENCE 5 NORTHWAY LANE** LATHAM, NY 12110

Chain of Custody Data Required for ETC Data Management Summary Reports

G6063-G6074

DUNN GEOSCIENCE

GESURFPCB

ETC Sample No.

Company

Facility

Sample Point Date Time Hours

vice President

Research and Operations

TABLE OF CONTENTS

Introduction

Table 1. Results and Quality Assurance Data

Methodology

QA Protocol

Report Appendices

Appendix A.1 - Gas Chromatographic Spectral Data for Quantitated Compounds

Appendix E - Chain of Custody Forms

FLD 3, 1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6063 DUNN GEOSCIENCE

GESURFPCB D3

850111

ETC Sample No.

Company

Facility

Sample Point Date

Elapsed Hours

	Res	ılts	QC Rep	licate	QC Blank	and Spiked	Blank	QC Ma	strix Spik	е
Compound	Sample Concen. mg/kg	MDL mg/kg,	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen Added mg/kg	Recov
Aroclor 1242 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 A Frequent Riank. Spited Blank cannot be performed for this sample national Riank calculated for each sample nations.	ND BMDL ND ND ND ND		202222	ND .035 ND ND ND ND	ND ND ND ND ND ND	0 0 0 0 0 0		ND ND 14 ND ND ND	0 0 0 0 0 0	122

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6064 DUNN GEOSCIENCE

Company

ETC Sample No.

GESURFPCB

850111

1 1

.

Facility

Sample Point Date

D5

Time Hours

Results QC Replicate QC Blank and Spiked Blank QC Matrix Spike Compound Sample Blank Concen. Unspiked Concen. Concen. MDL First Second Data Added Recov Sample Added Recov mg/kg mg/kg mg/kg. mg/kg mg/kg mg/kg mg/kg mg/kg Aroclor 1242 ND ND ND 0 ND ND Aroclor 1254 BMDL ND .035 ND 0 ND 0 122 Aroclor 1260 ND ND ND ND 0 ND Aroclor 1248 ND ND ND ND 0 14 0 0 Aroclor 1232 ND ND ND ND ND 0 ND ND ND 0 Aroclor 1221 ND ND Aroclor 1016 ND ND ND ND ND

FEL. 3, 1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6065

DUNN GEOSCIENCE

GESURFPCB

D13

850111

ETC Sample No.

Company

Facility

Sample Point Date

Elapsed Time Hours

	Resu	lts	QC Rep.	licate	QC Blank	and Spiked	Blank	QC M	atrix Spik	e
Compound	Sample Concen. mg/kg	MDL mg/kg₅	First mg/kg	Sécond mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 # Resent Blunk, Spiked Blank cannot be performed for this sample matrix. # MDL calculated for each sample natrix.	ND 1.40 ND 1.60 ND ND ND		ND ND ND ND ND ND	ND .035 ND ND ND ND	200020	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	-	ND ND 14 ND ND ND	0 0 0 0 0 0	122

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6066 DUNN GEOSCIENCE

GESURFPCB EIC

850111

ETC Sample No.

Company

Facility

Sample Point Date

e Tim

Elapséd Hours

	Resu	lts	QC Rep	licate	QC Blank	and Spiked	Blank	QC M	itrix Spik	е
Compound	Sample Concen. mg/kg	MDL mg/kg₀	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 R Reagent Blank, Spiled Blank cannot be performed for this sample main B MPL calculated for each sample mitrix.	ND ND ND 14 ND ND ND	2.50 2.50 2.50 2.50 2.50 2.50	29 29 29 29 29 29 29 29 29 29 29 29 29 2	ND .035 ND ND ND ND	ND ND ND ND ND	0 0 0 0 0 0 0		ND ND ND ND ND ND ND	0 0 1 0 0 0	122

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6067 DUNN GEOSCIENCE

E2C

850111

ETC Sample No.

Company

GESURFPCB Facility

Sample Point Date

Time Hours

	Resi	ilts	QC Rep	licate	QC Blank	and Spiked	Blank	QC Ma	trix Spik	e
Compound	Sample Concen. mg/kg	MDL mg/kg,	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 A Reagent Blank. Spiked Blank cannot be performed for this sample natrial MDL calculated for each sample matrix.	ND ND ND ND ND ND ND ND ND ND ND ND ND N	2.50 22.50 22.50 22.50 22.50	20000 2000 2000 2000 2000	ND .035 ND ND ND ND	999999	000000		ND ND ND ND ND ND ND ND	0 0 1 0 0 0	122

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6068 DUNN GEOSCIENCE

GESURFPCB E3D

850111

ETC Sample No.

Company

Facility

Sample Point

Date

Elapsed

	Res	ilts	QC Rep	licate	QC Blank	and Spiked	Blank	QC Ma	itrix Spik	e
Compound	Sample Concen mg/kg	MDL mg/kg,	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	X Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 A Respent Blank. Spiked Blank cannot be performed for this sample matrix. B NOL calculated for each sample matrix.	ND ND ND ND ND ND		2D 2D 2D 2D 2D 2D 2D	ND . 035 ND ND ND ND	20 20 20 20 20 20 20	0 0 0 0 0 0	-	ND ND ND ND ND ND ND ND	0 0 1 0 0 0	122

FEB

1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6069 DUNN GEOSCIENCE

E4C

850111

ETC Sample No.

Company

GESURFPCB Facility

mple Point C

1

Hours

	Res	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
Compound	Sample Concen. mg/kg	MDL mg/kg _s	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov	
Aroclor 1242 Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 a Respect Blank. Spiked Blank cannot be performed B MDL calculated for each sample matrix.	ND 2.60 ND 7.00 ND ND ND ND ND	2.50	ND ND ND ND ND ND ND ND ND ND ND ND ND N	ND 035 ND ND ND ND	29222 29222	0 0 0 0 0 0 0		ND ND 14 ND ND ND	0 0 0 0 0	122	

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

DUNN GEOSCIENCE G6070

GESURFPCB

E4C-S

850111

ETC Sample No.

Company

Facility

Sample Point Date Time Hours

1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
Compound	Sample Concen. mg/kg	MDL mg/kg:	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 a Respent Blumb. Spiked Blank connect be performed for this sample matrix. B MDL calculated for each sample matrix.	ND BMDL 2.20 ND ND ND		299999	ND . 035 ND ND ND ND	2000 2000 2000 2000 2000 2000 2000 200	0 0 0 0 0 0	-	ND ND 14 ND ND ND	0 0 1 0 0 0	122

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6071 DUNN GEOSCIENCE

GESURFPCB E9

850111

ETC Sample No.

Company

Facility

Sample Point Date

Time Hours

QC Replicate QC Blank and Spiked Blank QC Matrix Spike Results Compound Sample Blank Concen. % Unspiked Concen. % Added MDL First Second Data Recov Sample Added Recov Concen. mg/kg mg/kg mg/kg_b mg/kg mg/kg mg/kg mg/kg mg/kg 2.50 2.50 2.50 2.50 2.50 2.50 2.50 2.50 Aroclor 1242 ND ND ND ND ND 0 .035 ND 0 Aroclor 1254 ND ND ND 0 Aroclor 1260 ND ND ND ND Ó ND 122 0 Aroclor 1248 10 ND ND ND 14 0 ND ND ND 0 ND Arcelor 1232 ND ٠ 🖚 0 ND ND ND ND 0 ND 0 Aroclor 1221 ND ND ND ND Aroclor 1016 A Reagent Blank, Spiked Blank connot be performed for this sample matrix.

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6072 DUNN GEOSCIENCE

GESURFPCB F1

850111

ETC Sample No.

Company

Facility

Sample Point

Date

Elapsed Hours

		Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Compound	Sample Concen. mg/kg	MDL mg/kga	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1242 Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 # Research Blank, Spiked Bl	ank cannot be performed for this sample matr	ND BMDL ND ND ND		20 20 20 20 20 20 20 20 20 20 20 20 20 2	ND . 035 ND ND ND ND	20 20 20 20 20 20 20 20 20 20 20 20 20 2	0 0 0 0 0 0 0		ND ND ND ND ND ND ND ND ND ND ND ND ND N	0 0 1 0 0 0	122

1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6073

DUNN GEOSCIENCE

GESURFPCB

850111

ETC Sample No.

Company:

Facility

Sample Point Date Time Hours

and the second s	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
Сомроила	Sample Concen. mg/kg	MDL mg/kg,	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 B Respent Blank. Spited Blank cannot be performed for this sample not B NOL colculated for each sample matrin.	ND BMDL ND BMDL ND ND		22222 22222 22222 22222 22222 22222 2222	ND . 035 ND ND ND ND	ND ND ND ND ND ND	0 0 0 0 0		ND ND ND ND ND ND ND ND ND ND ND ND ND N	0 0 1 0 0 0	122

FEB 3, 1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

DUNN GEOSCIENCE G6074

GESURFPCB G6D

850111

ETC Sample No.

Company

Facility

Sample Point

Date

Elapsed Time Hours

. 12 A A A A A A A A A A A A A A A A A A	Results		QC Rep	licate	QC Blank	and Spiked	Blank	QC Ma	strix Spik	e
Compound	Sample Concen, mg/kg	MDL mg/kg ₀	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 A Respent Blook. Spiked Blook connect be performed for this sample matrix.	ND BMDL ND ND ND ND		222222	ND . 035 ND ND ND ND	ND ND ND ND ND	0 0 0 0 0 0		ND ND ND ND ND ND ND ND ND ND ND ND ND N	0 0 1 0 0 0	122

Technical Report

for **DUNN GEOSCIENCE 5 NORTHWAY LANE LATHAM, NY 12110**

Chain of Custody Data Required for ETC Data Management Summary Reports

G6047-G6062

DUNN GEOSCIENCE GESURFPCB

ETC Sample No.

Company

Facility

Sample Point Date Time Hours

Denis C. K. Lin, Ph.D. Vice President

Research and Operations

TABLE OF CONTENTS

Introduction

Table 1. Results and Quality Assurance Data

Methodology

QA Protocol

Report Appendices

Appendix A1 - Gas Chromatographic Spectral Data for Quantitated Compounds

Appendix E - Chain of Custody Forms

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6047 DUNN GEOSCIENCE

Company

ETC Sample No.

GESURFPCB AllC

850111

Facility

Sample Point Date

Time Hours

	Res	ults	QC Rep	licate	QC Blank	and Spiked	Blank	QC M	atrix Spik	e
Compound	Sample Concen. mg/kg	MDL mg/kga	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1242 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 # Mol calculated far each sample matrix. # Peogent Blonk. Spiked Blank cannot be performed for this sample matrix. C High recovery due to interference from Broclor 1248.	ND ND 2400 ND ND ND ND ND ND	25 25 25 25 25 25 25 25	ND ND ND 2400 ND ND NO	ND ND ND 4300 ND ND	ND ND ND ND ND ND	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		ND ND ND 70 ND ND ND	0 0 0 0 0	270

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6048 DUNN GEOSCIENCE

Company:

GESURFPCB A14C

850111

douge boiling account

ETC Sample No.

Facility

Sample Point Date

Time Hours

	Results Sample		QC Rep	licate	QC Blank	and Spiked	Blank	QC M	strix Spik	e
Compound	Sample Concen mg/kg	MDL mg/kg₄	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 R NOL celculated for each sample matrix. B Rengent Blank. Spiked Blank connot be performed for this sample motor. C High recovery due to interference from Braclor 1248.	ND ND 70 ND ND ND		ND ND ND 2400 ND ND ND	ND ND ND 4300 ND ND ND	ND ND ND ND ND ND	0 0 0 0 0 0 0		ND ND ND ND ND ND ND	0 0 0 0 0 0	2706

1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6049 **DUNN GEOSCIENCE** GESURFPCB A17C 850111

Elapsed

ETC Sample No.

Company

Facility

Sample Point Date Time Hours

Compound Sample									e
Compound Sample Concen mg/kg	MDL mg/kg₄	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen Added mg/kg	% Recov
Aroclor 1242 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 ### MPL calculated for each sumple matrix. ### Propent Block. Spiked Blank connot be performed for this sample matrix. C High recovery due to interference from Braclar 1248.		ND ND ND 2400 ND ND ND ND	ND ND ND 4300 ND ND ND	ND ND ND ND ND ND ND ND ND ND ND ND ND N	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		ND ND ND 70 ND ND ND	0 0 0 0 0 0 0	2706

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

DUNN GEOSCIENCE G6050

GESURFPCB A20C-S 850111

ETC Sample No.

Company Facility. Sample Point Date Time Hours

	Results		QC Rep	licate	QC Blank	and Spiked	Blank	QC Ma	atrix Spik	e .
Compound	Sample Concen mg/kg	MDL mg/kg₄	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 A MCL calculated for each sample matrix. B Prugent Blonk. Spiked Blank cannot be performed for this sample matrix. C High recovery due to interference from Bractor 1248.	ND ND 6.00 ND ND ND	1 1 1 1 1	ND ND ND 2400 ND ND ND	ND ND ND 4300 ND ND ND	ND ND ND ND ND ND	0 0 0 0 0 0 0		ND ND ND ND ND ND	0 1.0 0 0 0	2706

ETC

1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

DUNN GEOSCIENCE G6051

GESURFPCB BI 850111

ETC Sample No. Company

Facility

Sample Point Date

	Results		QC Rep	licate	QC Blank	and Spiked	Blank	QC M	atrix Spik	e
Compound	Sample Concen. mg/kg	MDL mg/kg₄	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 ### Mol. calculated for each sample matrix. ### Reogent Blank. Spiked Blank cannot be performed for this sample matrix. #### C High recovery due to interference from Proclor 1248.	ND ND 2000 ND ND ND	13 13 13 13 13 13	ND ND 2400 ND ND ND	ND ND A300 ND ND ND ND	ND ND ND ND ND ND	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		ND ND 70 ND ND ND	0 0 0 0 0 0 0 0	2700

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

DUNN GEOSCIENCE G6052

GESURFPCB **B**2 850111

ETC Sample No.

Facility

Sample Point Date

	Res	ults	QC Rep	licate	QC Blank	and Spiked	Blank	QC M	atrix Spik	e
Compound	Sample Concen, mg/kg	MDL mg/kga	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 A MOL calculated for each sample metrix. B Reagent Blank. Spiked Blank cannot be performed for this sample matching recovery due to interference from Braclor 1248.	ND ND 200 ND ND ND	5555555	ND ND ND 2400 ND ND ND	ND ND ND 4300 ND ND ND	20 20 20 20 20 20 20 20 20 20 20 20 20 2	0 0 0 0 0 0 0		ND ND ND ND ND ND ND ND	0 0 0 0 0 0	270

1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6053 DUNN GEOSCIENCE

GESURFPCB

850111

Eläpséd

ETC Sample No.

Facility

Sample Point Date

Time

Results QC Replicate QC Blank and Spiked Blank QC Matrix Spike Compound Blank Concen. % Unspiked Concen % Sample MDL First Second Sample Recov Concen. Data Added Recov Added mg/kg mg/kg∗ mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg Aroclor 1242 ND 13 ND ND ND ND 0 13 0 0 Aroclor 1254 ND ND ND ND ND 1.0 ND 0 ND 270c Aroclor 1260 ND ND ND 13 ND 70 Aroclor 1248 2000 2400 4300 13 ND ND ND ND Aroclor 1232 ND 13 ND Aroclor 1221 ND ND ND ND ND ND Aroclor 1016 B Reagent Blank. Spiked Blank cannot be performed for this sample mot x. E High recovery due to interference from Aroclar 1248.

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6054 DUNN GEOSCIENCE GESURFPCB B4 850111

ETC Sample No. Company Facility Sample Point Date Time Hours

Results QC Replicate QC Blank and Spiked Blank QC Matrix Spike

Compound Sample Blank Concen. % Unspiked Concen.

Compound Camen MOL mg/kg mg/	1777 T. T. T. T. T. T. T. T. T. T. T. T. T.										
Aroclor 1254	Compound	Concen.	MDL mg/kga	First mg/kg		. Data ↔	Added	Recov	Sample	Added	
	Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 # HOL calculated for each sample matrix. # Reopent Blank, Spiked Blank cannot be performed for this sample matrix.	ND ND 800 ND ND ND	13 13 13	ND ND 2400 ND ND	ND ND 4300 ND ND	ND ND ND ND	0 0 0 0	111111111111111111111111111111111111111	ND ND 70 ND ND	1.0 0 0 0	

FEB

1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6055 DUNN GEOSCIENCE

GESURFPCB

B7

850111

Flance

ETC Sample No.

Company

Facility

Sample Point

Date Time Hours

		·			licate	QC Blank	and Spiked	Blank	QC M	atrix Spik	e
	Compound	Sample Concen. mg/kg	MDL mg/kga	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen Added mg/kg	% Recov
Aroclor 1242 Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 # ROL calculated for ench samp # Peopent Blank. Spiked Blank of	connot be performed for this sample mate	ND ND S6 ND ND ND		ND ND ND 2400 ND ND ND	ND ND ND 4300 ND ND ND	ND ND ND ND ND	0 0 0 0 0 0 0 0		ND ND 70 ND ND ND	0 1 0 0 0 0	2700

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6056 DUNN GEOSCIENCE

GESURFPCB

RR

850111

Elapsed Time Hours

ETC Sample No.

Company

Facility

ty Sample Point Date

Results QC Replicate QC Blank and Spiked Blank QC Matrix Spike Compound Sample Blank Concen. Unspiked Concen. % MDL Concen. First Second Data Added Recov Sample Added Recov mg/kg mg/kga mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg Aroclor 1242 ND 13 ND ND ND ND 0 Aroclor 1254 13 ND ND ND ND 0 ND 0 Aroclor 1260 ND 13 Ó ND ND ND ND 1.0 270c Aroclor 1248 2000 13 **24**00 4300 ND 0 70 13 Ŏ ND ND ND ND Aroclor 1232 ND 0 13 ND ND ND ND Aroclor 1221 ND Aroclor 1016 13 ND ND ND ND ND Peagent Blank. Spiked Blank cannot be performed for this sample matrix. C High recovery due to interference from Aroclar 1248.

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6057 DUNN GEOSCIENCE

GESURFPCB B13

850111

ETC Sample No.

Company

Facility

Sample Point Date

Flapsed Time Hours

Compound Concen MDL mg/kg mg		Resi	ılts	QC Rep	licate	QC Blank	and Spiked	Blank	QC M	atrix Spik	е
Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1221 Aroclor 1016 B Fragent Blunk. Spiked Blank cannot be performed for this sample nature. ND Aroclor 1260 ND ARO AROCLOR 1248 ND ND ND ND ND ND ND ND ND ND ND ND ND		Concen.		First mg/kg	Second mg/kg	Data	Added	Recov	Sample	Added	% Recov
	Aroclor 1242 Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 R RDL calculated for each sample natrix. B Peagent Blunk. Spiked Blank cannot be performed for this sample nat	ND ND ND 440 ND ND ND		ND ND ND 2400 ND ND	ND ND ND 4300 ND ND	ND ND ND ND ND	0 0 0 0 0	- -, -	ND ND ND 70 ND ND	0 0 1.0 0 0	270.

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6058

DUNN GEOSCIENCE

GESURFPCB

B16

850111

ETC Sample No.

Facility

Sample Point ... Date ... Time Hours

	1.0	Resu	1116	QC Rep	licate	QC Blank	and Spiked	Blank	QC Ma	trix Spik	e
Compo	und .	Sample Concen. mg/kg	MDL mg/kg₄	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 8 MDL calculated for each sample matrix. B Reagent Blank. Spiked Blank connot be g C High recovery due to interference for f D identification difficult due to sample	Arocior 1248.	2000 2000 2000 2000 2000 2000 2000 200		ND ND ND 2400 ND ND ND	ND ND ND 4300 ND ND	25555	0 0 0 0 0		ND ND 70 ND ND	0 0 0 0 0 0	2700

1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6059

DUNN GEOSCIENCE

GESURFPCB

B18

850111

ETC Sample No. Company

Facility

Sample Point Date

Elapsed Hours Time

Results QC Replicate QC Blank and Spiked Blank QC Matrix Spike Compound Sample % Concen. **Blank** Concert. Unspiked Concen. MDL First Second Data Added Recov Sample Added Recov mg/kg mg/kga mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg Aroclor 1242 ND ND ND ND ND 0 Aroclor 1254 IND ND ND ND 0 ND 0 Aroclor 1260 ND ND ND ND 0 ND 1.0 270c Aroclor 1248 IND 2400 4300 ND 70 Aroclor 1232 ND ND ND ND ND 0 Aroclor 1221 ND ND ND ND ND 0 Aroclor 1016 ND ND ND ND ND nt Blank. Spiked Blank cannot be performed for this sample matrix. may contain a low level either 1254 or 1248 but excessive in preference makes identification impossible

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors – GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6060 DUNN GEOSCIENCE GESURFPCB B19 850111

Elapsed ETC Sample No. Company Facility Sample Point Date Time Hours

	Res	ults	QC Rep	licate	QC Blank	and Spiked	Blank	QC M	atrix Spik	е
Compound	Sample Concen. mg/kg	MDL mg/kga	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 R NDL colculated for each sample matrix. B Reagent Blank. Spiked Blank cannot be performed for this sample (High recovery due to interference from Araclor 1248. G fillculated as 1248, identification difficult Me to sample mat			ND ND ND 2400 ND ND ND	ND ND ND 4300 ND ND ND	ND ND ND ND ND ND	0 0 0 0 0 0 0		ND ND 70 ND ND ND	0 0 1.0 0 0 0	270

FEB

1985

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6061

ETC Sample No.

DUNN GEOSCIENCE

Company

GESURFPCB

B31

850111

Facility

Sample Point Date

Elapsed Hours

	Resu	ilts	QC Rep	licate	QC Blank	and Spiked	Blank	QC Ma	strix Spik	ė
Compound	Sample Concen. mg/kg	MDL mg/kga	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen. Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 # MOL calculated for each sample matrix. ## Reagent Blank. Spiked Blank cannot be performed for this sample matrix. ## C High recovery due to interference from firector 1248. ## D Calculated as 1248, quantitation difficult due to sample matrix into			ND ND ND 2400 ND ND ND	ND ND ND 4300 ND ND ND	ND ND ND ND ND	0 0 0 0 0 0 0		ND ND TO ND ND ND	0 0 1.0 0 0 0	2700

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA Aroclors - GC Analysis Data (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

G6062 DUNN GEOSCIENCE GESURFPCB B39 850111

ETC Sample No. Company Facility Sample Point Date Time Hours

	Resu	lts	QC Rep	licate	QC Blank	and Spiked	Blank	QC Ma	atrix Spik	e
Сотроила	Sample Concen. mg/kg	MDL mg/kg₄	First mg/kg	Second mg/kg	Blank Data mg/kg	Concen. Added mg/kg	% Recov	Unspiked Sample mg/kg	Concen Added mg/kg	% Recov
Aroclor 1254 Aroclor 1260 Aroclor 1248 Aroclor 1232 Aroclor 1221 Aroclor 1016 R Mil culculated for each sample matrix. R Fragent Blank. Spiked Blank cannot be performed for this sample matrix (High recovery due to interference from Broads 1748. Distributed as 1248, quantitation difficult due to sample matrix into			ND ND 2400 ND ND ND	ND ND 4300 ND ND ND	ND ND ND ND ND	0 0 0 0 0 0 0 0 0		ND ND 70 ND ND	0 0 0 0 0 0	270r

GE Moreau - 11/26/84

Depths

Inital	Final	Description		Hole #
0"	15"	DkBr mf(+)S, 1\$ (fill)		A-4
15"	17"	Br cm(+)fS, t\$	(B Horizon)	
17"	32"	LtBr mf(+)S, t\$		
0"	6''	Br mf(+)S, 1\$		A-2
6"	10"	DkBr mf(+)S, 1\$	(A Horizon)	
10"	17"	OrBr m(+)fS, t(-)\$	(B Horizon)	
17"	38"	LtBr $cm(+)fS$, $t(-)$ \$	(C Horizon)	

GE Moreau - 11/26/84 page 2

Den	+	h	c
Deb	L	п	s

Initial	Final	Description		Hole #
0"	11"	DkBr-TnOr cmfS, t\$ (fill)		A6
11"	18"	LtOrBr cmfS, t\$	(B Horizon)	
18"	23" (TD)	LtBr cmfS, t\$	(C Horizon)	
0"	14"	Br-TnOr cmfS, t\$ (fill)		A7
14"	16"	DkBr cmfS, t\$	(A Horizon)	
16"	25" (TD)	LtOrBr cmfS, t\$	(B Horizon)	
0"	9"	Br cmfS, t\$ (fill)		A8
9"	14"	DkBr cmfS, t\$ (fill)		110
14"	22"	LtBr cmfS, t\$ (fill)		
22''	30"	DkBr c(+)mfS, t(-)\$	(A Horizon)	
30"	42" (TD)	OrBr cmfS, t\$	(B Horizon)	
30	42 (12)	orbi cmro, cy	(B Hollzon)	
0"	13"	OrBr cmfS, pkt DkBr cmfS,	t\$ (fill)	A9
13"	22"	LtBr cmfS, t(-)\$ (fill)		
22"	27"	DkBr cmfS, t(-)\$		
27"	32"	Br c(+)mfS, t(-)\$		
32"	38"	DkBr mf(+)S, 1\$	(A Horizon)	
38"	44"	OrBr cmfS, t\$	(B Horizon)	
0''	20"	DkBr-Or-LtBr cmfS, t\$ (fi		A10
20"	22"	DkBr mf(+)S, 1\$, cmfG (si	lag)	
22"	33"	Br-LtBr cmfS, t\$ (fill)		
33"	43"	DkBr cmfS, 10\$	(A Horizon)	
43''	54" (TD)	OrBr cmfS, t(-)\$	(B Horizon)	

Deptils			
Initial	Final	Description	Hole #
0"	6"	DkBr cm(+)fS, So\$ (rts, ts fill)	B-1
6"	43"	Br-LtBr cmfS, t\$ (fill)	
43"	54"	DkBr cmfS, s\$ (rts) (A Horizon)	
54"	62" (TD)	OrBr cmfS, t\$ (B Horizon)	
0"	7"	DkBr cm(+)fS, so\$ (rts, ts fill)	B-2
7''	38"	Br-LtBr cmfS, t\$ (fill)	
38"	51"	DkBr cmfS, s\$ (rts, ts fill) (A Horizon)	
51"	67" (TD)	OrBr cmfS, t\$ (B Horizon)	
0"	8"	DkBr cmfS, so\$ (rts, ts)	B-3
8"	42"	Br-LtBr cmfS, t\$ (rts, fill)	
42"	47"	DkBr cmfS, s\$ (A Horizon)	
47"	55" (TD)	OrBr cmfS, t\$ (B Horizon)	
0"	7''	DkBr cmfS, so\$ (rts, ts fill)	B-4
7"	26"	LtBr-OrBr-DkBr cmfS, 1\$ (mtld, fill)	
26"	31"	DkBr cmfS, s\$ (A Horizon)	
31"	48" (TD)	OrBr cmfS, t\$ (B Horizon)	
0"	5"	DkBr cmfS, so\$ (rts, ts fill)	B-5
5''	24"	LtBr-OrBr-DKBr cmfS, 1\$ (mtld, fill)	
24"	31"	DkBr cmfS, s\$ (A Horizon)	
31"	37" (TD)	OrBr cmfS, t\$ (B Horizon)	
0"	8"	DkBr cmfS, so\$ (rts, ts fill)	В-6
8"	15"	LtBr cmfS, t\$ (fill)	
15"	21½"	DkBr cmfS, s\$ (rts) (A Horizon)	
_		OrBr cmfS, t\$ (B Horizon)	
32"	39" (TD)	LtBr cmfS, t(-)\$ (C Horizon)	

GE Moreau - 11/26/84 page 3

_				
De	D	t	h	S

Initial	<u>Final</u>	Description		Hole #
0"	20"	Br-LtBr cmfS, t\$ (fill)		A11
20'	24"	DkBr mf(+)S, 1\$, cmfG (h	ardpan slag)	
24"	28"	Br c(+)mfS, t(-)\$		
28"	32"	DkBr cmfS, Lo\$	(A Horizon)	
32"	43"	OrBr cmfS, t(-)\$	(B Horizon)	
43"	57" (TD)	LtBr, cmfS, t(-)\$	(C Horizon)	
0"	26"	Br-LtBr cmfS, t\$ (fill)		A12
26"	32"	DkBr cmfS, 1o\$	(A Horizon)	
32"	38"	OrBr c(+)mfS, t(-)\$	(B Horizon)	
38"	46" (TD)	LtBr, cmfS, t(-)\$	(c Horizon)	
0"	22"	LtBr c(-)m(+)fS, t\$ (fil	1)	A20c
22"	24"	DkBr m(+)fS, t\$	(A Horizon,	
			disturbed)	
26"	36"	OrBr m(+)fS, 1\$	(B Horizon)	
0"	22"	LtBr c(-)M(+)fS, t\$ (fil:	1)	A21c
22"	26"	DkBr m(+)fS, 1\$	(A Horizon)	
26"	32"	OrBr m(+), 1\$	(B Horizon)	b.
			, ,	

GE Moreau - 11/27/84 Page 5

D~~	- 1	L.	_
Der) T	n.	_

Initial	Final	Description	Hole
0"	12"	DkBr cmf(+)S, to\$ (rts, ts fill)	B-8
12"	22"	LtBr cm(+)fS, t\$ (fill)	
22"	26"	OrBr c(+)mfS, t\$ (A Horizon)	
26"	38" (TD)	LtBr c(+)mfS, t\$ (B Horizon)	
0"	3"	DkBr mf(+)S, lo\$ (rts, ts fill)	B-7
3"	412"	LtBr cm(+)fS, t\$ (fill)	
412"	12"	DkBr mf(+)S, lo\$ (A Horizon)	
12"	18"	OrBr c(+)mfS, t\$ (B Horizon)	
18"	35" (TD)	LtBr c(+)mfS, t\$ (C Horizon)	

GE Moreau

Page 6

De	n t	h	s
DE	עע	11	J

Initial	Final	Description		Hole
0"	1"	Br cmfS, t\$ (fill)		D-11
1"	5''	RdBr wd fgmts (partially	dec)	
5"	11"	DkBr m(+)fS, 1\$	(A Horizon)	
11"	TD	LtBr m(+)fS, 1\$	(B Horizon)	
0"	2"	Br c(+)mfS, t\$ (fill)		D-12
2"	4"	RdBr wd fgmts (partially	dec)	
4"	10"	DkBr m(+)fS, 1\$	(A Horizon)	
10"	TD	OrBr m(+)fS, t\$	(B Horizon)	
0"	5''	DkBr cm(+)fS, 1\$	(A Horizon & furnace slag)	D-13
5"	8"	Br cm (+)fS, 1\$	(A ₂ Horizon)	
8"	19"	OrBr cm(+)fS, t\$	(B Horizon)	
19"	27"	LtBr cm(+)f(-)S	(C Horizon)	

Deptr	ıs		
Initial	Final	Description	Hole #
0"	3''	DkBr m(+)fS, s\$ (fill)	E-0c
3"	7"	Bk wd fgmts (partially dec)	
7''	10"	GrBr cmfS, 1\$ (fill)	
10"	12"	OrBr c(-)mf(+)S, 1\$ (B Horizon)	
0"	6"	Br m(+)fS, s\$ (fill)	E-lv
6"	9"	LtBr $cm(+)fS$, t\$ (fill)	
9"	14"	GrBr cmfS, s\$. mG (fill)	
14"	19"	DkBr m(+)fS, s\$ (A Horizon)	
19"	21"	OrBr m(+)fS, 1\$ (B Horizon)	
0.11			~ 0
0"	4"	DkBr M(+)fS, s\$ (fill)	E-2c
4"	10"	LtBr cm(+)fS, 1\$ (fill)	
10"	15"	DkBr m(+)fS, s\$ (A Horizon)	
15"	18"	OrBr c(+)mfS, t\$ (B Horizon)	
0"	3½"	Br cm(+)fS, 1\$ (fill)	E-3c
3½"	5½"	LtBr-Bk cmfS, s\$ (fill) (wd fgmts in dk lyr, mtld.)	
5½"	11½"	DkBr $c(-)m(+)fS$, 1\$ (possible disturbed A Horizon or fill)	
11½"	15"	OrBr cm(+)fS, t\$ (B Horizon) (Iron staining at upper co	ontact)
0"	3"	Br cm(+)fS, 1\$ (fill)	E-4c
3"	3 9''		E-40
_	-	DkBr cm(+)fS, 1\$ (fill)	
9"	13"	LtBr cmf(-)S, L\$ (fill)	
13"	14"	DKBr mfS, 1\$ (A Horizon)	
14"	17"	OrBr mf(+)S, 1\$ (B Horizon)	
0"	3"	Br cm(+)fS, 1\$ (fill)	
3"	6"	LtBr cmf(-)S, 1\$ (fill)	E-5c
6"	9"	DkBr mfS, and o\$ (dec wd fgmts)	
	1011	7.5 (1)50 14 (5111)	

GE Moreau page 8

Dei	рt	hs

Initial	<u>Final</u>	Description	Hole #
0"	7''	LtBr cm(+)fS, t\$ (fill)	E-6c
7''	10"	DkBr-Bk wd fgmts (dec)	
10"	11"	GrBr cm(+)fS, 1\$ (fill)	
11"	19"	OrBr cmf(-)S, t\$ (B Horizon)	
19''	27"	LtBr cmf(-)S, t(-)\$ (C Horizon)	
0"	6"	LtBr cm(+)fS, 1\$ (fill)	E-7c
6"	13"	DkBr-Bk cmfS, so\$ (A Horizon ?)	
13"	22"	OrBr cmf(-)S, t(-)\$ (B Horizon)	
0"	8"	LtBr cmfS, t\$ (fill)	E-8c
8"	12"	DkBr cmfS, s\$ (fill) Bk dec wd lyr	
13"	18"	OrBr cmf(-)S, t(-)\$ (B Horizon)	
0"	4"	Br cmfS, 1\$ (fill)	E-10c
4"	7''	Bk dec wd chips	
7''	14"	GrBr cmfS, 1\$ (fill)	
14"	19"	OrBr cmf(-)S, t(-)\$ (B Horizon)	
0"	5''	Br mfS, a\$ (fill)	E-11c
5''	14"	DkBr-Bk dec wd frag	
14"	15"	GrBr cmfS, 1\$ (fill)	
15''	17"	OrBr cmf(-)S, t(-)\$ (B Horizon)	



GENERAL ELECTRIC COMPANY

ONE RIVER ROAD

SCHENECTADY, N. Y. 12345

LEONARD K. DOVIAK
MANAGER-NEW YORK STATE
PUBLIC AFFAIRS/AREA COMMUNICATION

April 4, 1985

Mr. Thomas Monroe DEC - Region 5 Hudson Street Extension Warrensburg, NY 12885

Dear Mr. Monroe:

This morning we delivered the enclosed letter to approximately 1300 households in the Village of Fort Edward-Town of Moreau areas.

In the letter to the residents of the Moreau-Fort Edward areas, we have updated and added to our "Status Report to the Public on the Moreau Site" which we distributed last November.

Please let me know if you have any questions on the enclosure.

Sincerely,

Leonard K Dowiek

LKD/ts Enclosure

0093Н



GENERAL ELECTRIC COMPANY
ONE RIVER ROAD
SCHENECTADY, N. Y. 12345

LEONARD K. DOVIAK
MANAGER-NEW YORK STATE
PUBLIC AFFAIRS/AREA COMMUNICATION

April 4, 1985

Dear Resident:

In early November of 1984 we distributed a report entitled "Moreau Site Status Report to the Public." In that report we described the findings of consulting firms retained by General Electric to study conditions at the Moreau Site resulting from the disposal of industrial wastes. This letter presents new information, which supports those findings.

The November 1984 report noted that General Electric, in consultation with both the New York State Department of Environmental Conservation and the United States Environmental Protection Agency (EPA), had undertaken certain work at and in the vicinity of the Moreau Site. This included:

- o The construction of a 110 feet deep containment wall around the site, with a clay cap on top, to seal the site.
- o The installation of treatment systems on the six residential drinking water wells which were found to contain concentrations of certain chemicals at or above levels designated by EPA.

The November 1984 report concluded by noting that GE would be installing additional groundwater monitoring wells and undertaking a soil sampling program. The report also noted that the company had proposed to provide an air-stripping system to the Village of Fort Edward for the treatment of Reardon Brook.

The additional monitoring wells, which are located west of the site, were installed during the early part of November, 1984. Samples of groundwater were drawn from the wells and sent to ERCO Laboratory in Cambridge, Massachusetts for analysis. These samples contained no measurable contaminants.

The analysis of the samples taken from the new monitoring wells also confirmed that the plume of contamination, as originally reported, is moving with the flow of groundwater toward the south-southeast--away from the residential wells in the Cheryl Drive-Terry Drive area.

As for the soil sampling, we have conducted an extensive sampling program in areas around and leading to the original disposal site. More than five hundred samples were taken from various locations and depths and surveyed for PCB. This information has been submitted to EPA; those areas identified as having a measurable amount of PCB in soil will be addressed in the upcoming Feasibility Study.

With respect to the Village of Fort Edward, the design of the air-stripping system for Reardon Brook is complete. We are working with state and local officials to have the system operating by this summer.

Through this Spring, General Electric will be conducting a Feasibility Study for EPA. That Study will analyze alternative measures which might be undertaken to remedy remaining problems associated with the Moreau Site. We plan to report to you again as that Study progresses.

Thank you for giving us the opportunity to share with you the status of the work taking place in the Moreau area.

Sincerely,

Leonard K. Doviak

GE claims chemicals

By Peter Tarr

Staff writer

MOREAU — General Electric Co. announced Thursday it had received new evidence that a "plume" of toxic chemicals eminating from a company dump in the town of Moreau, Saratoga County, was moving away from a cluster of private homes and drinkingwater wells.

But early indications were that the finding — which supports claims about the plume's drift made by GE last November — would do little to calm the fears of Moreau residents with homes near the spot where GE disposed of liquid wastes between 1958 and 1969.

Among those wastes, previous studies have shown, are concentrations of two suspected carcinogens, polychlorinated biphenlys (PCBs) and trichloroethylene (TCE), both used in industrial processes at GE's Fort Edward plant.

The findings have been forwarded to the federal Environmental Protection Agency (EPA) for its review in conjunction with other data relating to the dump site.

In a two-page letter hand-delivered to some, but not all of Moreau's homeowners, GE spokesman Leonard K. Doviak reported results of water samples taken from eight new wells drilled last November near homes believed to be endangered by the toxic plume.

The wells were drilled in three clusters, all west of the toxic plume's known boundaries.

"Samples of groundwater were drawn from the wells and sent to ERCO Laboratories in Cambridge, Mass. for analysis. These samples contained no measurable contaminants," the letter said.

Doviak also noted in the letter that the new tests "confirmed that the plume of contamination is moving with the flow of groundwater ... away from the residential wells in the Cheryl Drive-Terry Drive area."

GE has claimed only six drinking water wells in the vicinity of the dump site have been contaminated with TCE: four inside the plume on Bluebird Road, one on Myron Road (between Cheryl and Terry Drives), and one near a gravel pit adjacent to the dump site.

Residents of Terry and Cheryl Drives have been among those calling upon GE to finance the creation of a new Moreau water district that would tap sources a safe distance from the

GE claims tests show chemicals moving away

Continued from B-1

area impacted by the company's wastes.

Marilyn Brosius, treasurer of Citizens of Moreau Against Contamination, said Thursday that GE's latest claims could not erase a deep feeling of uncertainty about the possible effects of the dump site on her family's health.

Said Brosius, who lives on Cheryl Drive, a quarter mile from the dump site and several hundred yards from the westernmost edge of the toxic plume, "Over at GE headquarters, they turn on their faucets and get good water. I turn on my faucet, and who knows? I don't know what's going to happen years down the road, and believe me, neither do they."

Brosius said she had walked in the woods near the dumpsite while pregnant, long before residents knew what had been deposited there.

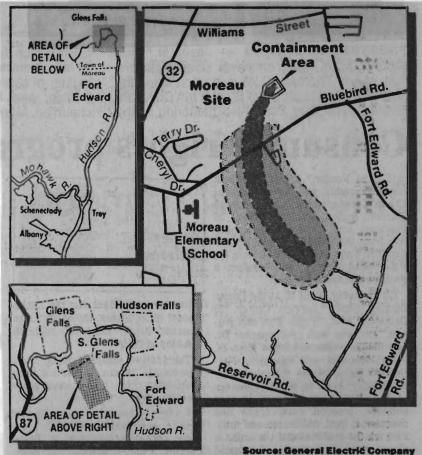
"What really scares me is that my two older boys played in that stuff. They used to bring things back — I guess they were batteries — and stuff was oozing out of them. The kids used to put each other in empty (chemical) barrels and roll one another down the hill. All summer long for three consecutive years my son had itchy rashes. I wish I knew then what I know now. Now, my son is married and has a baby son. What's going to happen to him?"

Spokesman Doviak has insisted since the release last November of GE's first official report on the Moreau site that creation of a new water district in Moreau would be "unwarranted" unless it were proven that a more extensive area was affected by the plume.

In a general statement of principle, Doviak said Thursday, "To the extent GE's activities cause problems (with the drinking water supply), GE would expect to pay the cost of fixing those problems."

GE has already vowed to finance a cleanup of Reardon Brook, a local stream situated south of the dump site, but directly in the path of the toxic plume of contaminated water flowing from the dump.

The final arbiter of GE's responsibilities, Doviak noted, would be EPA.



LOOKING AT TCE — In the plume, the darker stripes indicate the increasing concentrations of TCE.

Residents get GE letter

By LISA ANGERAME Staff Writer

The General Electric Co. early Friday hand-delivered a letter to some 1,300 residents in Moreau and Fort Edward.

The letter supported past findings relating to chemical contamination from GE wastes.

Recent analyses of eight monitoring wells around the GE/Moreau dumpsite conclude there are no measurable contaminants in those wells, according to the letter. "Measurable" refers to significant standards of contamination set by the federal Environmental Protection Agency.

GE also said additional testing of the wells around the Moreau dumpsite confirmed that "the plume of contamination, as originally reported, is moving with the flow of groundwater toward the south-southeast — away from the residential wells in the Cheryl Drive-Terry Drive area."

GE spokesman Leonard K. Doviak said testing on the perimeter of the plume — where there is the heaviest concentration of contamination — would continue.

Under a 1983 federal Environmental Protection Agency (EPA) order, GE was required to conduct an investigation to determine the extent of contamination in the area.

GE is also testing residents'

wells for contamination. To date, six wells — one which serves a trailer park of 22 families — have been found to contain trichloroethylene (TCE). Friday's letter did not address private well contamination.

Testing of private wells also will continue, according to EPA Engineer Mel Hauptman.

The letter, according to Doviak, was not delivered to residents involved in lawsuits against GE on the advice of GE attorneys. Doviak said the plantiffs' attorneys received copies of the letter.

The head of a local citizens group was not happy with the letter.

"As far as I'm concerned, this is a real cheap shot," said Robert Buttles, president of Citizens of Moreau Against Contamination (COMAC).

"If three of my neighbors get this letter that says things are fine, they're going to say, 'what's you're problem, Buttles,' like I have nothing to gripe about. It's a big PR document, to create an air of relaxation on the whole thing,' said Buttles.

GE also reported that extensive soil sampling for polychlorinted biphenyls (PCBs) was taken in areas where "vehicular or human traffic would be expected" around the dumpsite. According to the report, the soil sampling results have been submitted to the EPA.

Any areas identified as having a "measurable" amount of PCBs will be addressed in an upcoming feasibility study, also a provision of EPA's 1983 consent order, the report said. The feasibility study will analyze alternative measures to remedy contamination associated with the Moreau site.

Hauptman said that EPA, GE and state agencies will begin the feasibility study sometime next month.

The GE report also noted that an air-stripping system to address contamination in nearby Fort Edward's Reardon Brook is now complete. The system enables readily evaporated chemicals to be removed from water. Doviak said GE hopes to have the operation in place by summer, and that testing in Fort Edward would continue.

Some 452 tons of chemical waste from local General Electric plants was dumped at the now-called Moreau chemical dumpsite in the 1960s. The chemicals have migrated from the site and have been attributed to contamination of the surrounding aquifer.

Early last November, GE hand-delivered an extensive report to most of the same residents who received Friday's letter, describing the findings of consulting firms it hired to study conditions resulting from the contamination.

P. Star 4-5-85



New York State Department of Environmental Conservation

MEMORANDUM

TO:

Distribution Below

FROM: John E. Iannotti, Supervisor, Eastern Remedial Projects Section

SUBJECT: GE-Moreau II-CERCLA-30201

DATE:

May 30, 1985

Attached for your information is a copy of a letter dated May 15, 1985 from Robert Ogg of the United States Environmental Protection Agency to T. Leo Collins of GE transmitting the USEPA and State of New York's response to the Remedial Investigation Report and Addendum prepared by Dunn Geoscience Corp. for the General Electric Company as part of GE's obligations under the USEPA/GE CERCLA Order II-CERCLA-30201.

Attachment JEI:dm

Distribution:

- N. Nosenchuck
- M. O'Toole
- T. Monroe
- J. Greenthal
- D. King
- D. Corliss
- W. Colden attn: R. Cowen
 - R. Tramontano, NYSDOH
 - B. Fear, NYSDOH
 - M. Moore, NYSDOL



John E. James

FILE COPY

Copy MJSJ. DK,
John Jannett
MSJ20

1 5 MAY 1985

Mr. T. Leo Collins, Manager Environmental Quality & Resource Planning General Electric Company Turbine Business Group Bldg. 300-1 Nott Street Plant Schenectady, New York 12345

Dear Mr. Collins:

The Environmental Protection Agency (EPA) has completed the review of the GE/Moreau Remedial Investigation Report prepared by Dunn Geoscience Corporation (Dunn). General Electric (GE) has complied with Part II of the Administrative Order between EPA and GE, Index No. II-CERCLA-30201.

The extent of groundwater, surface water, soil, and air contamination related to the GE/Moreau Site (Site) has been adequately defined in the Report. EPA and the New York State Department of Environmental Conservation (NYSDEC) have met and agree upon the conclusions expressed below. EPA disagrees with the conclusion reached by Dunn relating to groundwater contamination in the Cherly Drive, Terry Drive, and Myron Road (C/T/M) area. We disagree with Dunn that this contamination could not have come from the Site. Both agencies also find the numerical groundwater model developed by Dunn to be inaccurate and inadequate. These conclusions are further described below.

Contamination in the C/T/M Area

The determinations reached by Dunn regarding the west side of the contaminant plume are not sufficiently conclusive. EPA and NYSDEC view the presence of trichloroethylene (TCE) in the intermediate and deep levels of monitoring wells DGC 15 as indicating the ability of TCE to migrate in the westerly direction from the Site. Flow directions from the area of this well continue southward into the C/T/M area. If groundwater of this quality is not now present in that area, it may be in time, and the area is at least threatened by TCE in the 10's of ug/l range.

Concentrations of VO's in residential wells are in the very low ug/l range and are highly variable in time and type of chemical species. The residential well testing results are inconclusive regarding contamination from the Site, there is we are not basing our determination on these analysis.

RECEIVED

MAY 2 0 1985

Monitoring wells, however, are not ambigious especially regarding the deeper groundwaters which could not have come from another source of surficial contamination in the C/T/M area.

Although some monitoring wells on the west side of the plume have not shown contaminants during the period sampled (DGC 23, 24, and 25, TMC, TM5, TM2), others have (DGC 6, 8, and 15).

The sporatic character of contamination in this area is expected as it is on the edge of so large a plume where concentrations change as a result of variations in groundwater flow direction and source irregularities. In addition, the gravel pit adjacent to the Site may play a roll in the vagarities of contaminant levels by virtue of high and low water levels affecting the groundwater flow westward from the Site. In view of the above analysis, we think the appropriate course of action for GE is to include the C/T/M area within the Site solutions to be evaluated in the upcoming Feasibility Study.

2. The Numerical Groundwater Model

Clearly, this model does not describe flow conditions in the area of the Site. Two ground water mounds or areas of water table highs are predicated by the model east and west of the Site. Neither of these features is suggested by the water level data from wells in the area of the Site. Field data show a water table high in the area of the Site and movement of groundwater away from this area in a radial pattern. As the Site is on the southwest side of this mound, most of the contaminants from the pit have moved south to southeast with groundwater flow paths to discharge along the escarpment where the Village of Fort Edwards water supply reservoirs are located. The model does not predict these features.

As the model does not describe contaminant flow in the area, rather than have Dunn "tinker" with the model we suggest discarding it as a tool for this study. The presence and movement of contaminants is better described by the field data. We don't see any advantage in trying to fix the model to agree with field data.

3. PCB-Contaminated Soils

Dunn has defined the PCB-contaminated areas adjacent to the Site to the satisfaction of EPA and NYSDEC. The use of the McGraw-Edison Field Test Kit with the addition of laboratory confirmation is acceptable for the purposes of this Remedial

Investigation as the technique establishes areas of PCB soil contamination as well as non-contamination.

If you wish to meet with our staff and representatives of NYSDEC to discuss our review of the Remedial Investigation, feel free to call Mr. Hauptman at (212) 264-7681 to arrange a meeting

Sincerely yours,

Robert N. Ogg, P.E., Chief Site Investigation & Compliance Branch

cc: Norman H. Nosenchuck

Robert Buttles
President, C.O.M.A.C.
8101 Myron Rd.
South Glens Falls, New York 12801

Pe: EPA Review of the General Electric's Remedial Investigation

Dear Bob:

Please let this letter invite you and your group to an informal meeting at the Moreau Town Hall at 11:00 a.m. on Friday June 21, 1985. Please find attached our comments on the Remedial Investigation which we addressed to General Electric by letter dated May 15, 1985. As you read the letter you will note that EPA disagrees with General Electric's conclusions in several significant areas. We will be prepared to discuss our conclusions, and interpetation of the data with your group on the 21st.

I must also admit to being remiss in not responding to your and Betty Winette's request for the analyses of the samples which were taken in January of 1985. The reason we have not as yet provided it is because our laboratory has not completed its Quality Assurance and Quality Control review. I understand the work will be completed this week, and the results will be available to you and your group on the 21st. I apologize for not calling to advise you this was the case.

I should also advise you that General Electric has requested permission to place PCB contaminated soil from the Lewis property beneath the cap at the Caputo Site. We have discussed this matter with the company, and have asked it to provide to EPA a technical justification based upon the regulations governing the disposal of PCBs under the Toxic Substances Control Act. The company last week submitted a document for our review. In the next two weeks we will be making a technical review of the submission. If your group would like to comment on the proposal, please advise me promptly, so we can arrange a deadline for comments, and a time for our response.



JUN 1 0 1985

BUREAU OF EASTERN REMEDIAL ACTION

If you have any questions, please feel free to call me. Sincerely,

James C. Woods
Assistant Regional Attorney
Waste & Toxic Substances Branch
Office of Regional Counsel

w/enclosure

cc: Cardner Congdon Town Supervisor Town of Moreau

Gerald Ratzmen
Patterson, Sampson, Ginsberg
& Criffin, P.C.

bcc: John Iannotti
 Division of Solid &
 Hazardous Waste
 New York State Department of
 Environmental Conservation

Mel Hauptman ERRD-SIC

Lillian Johnson OEP



New York State Department of Environmental Conservation

MEMORANDUM

TO:

Norman H. Nosenchuck, Director, Division of Solid and Hazardous Waste

FROM:

John E. Iannotti, Supervisor, Eastern Remedial Section

SUBJECT:

GE-Moreau II-CERCLA-30201 - Remedial Investigation Report and Addendum by Dunn John 6. Jamotti.

DATE:

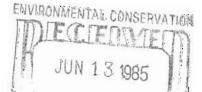
June 6, 1985

This memorandum will confirm a meeting which was held in my office on May 7, 1985 between representatives of the Department of Environmental Conservation, the Department of Law and the US Environmental Protection Agency regarding the Remedial Investigation Report and Addendum that was prepared by Dunn Geoscience Corporation for the General Electric Company as part of GE's obligations under the USEPA/GE CERCLA Order. The primary purpose of the meeting was to discuss certain conclusions and inferences contained within the report primarily regarding whether the plume of contamination is having or could have an effect on residences in the Cheryl, Terry and Myron Road areas near the site. Those in attendance included DEC - John E. Iannotti, Ray Cowen and Brian Davidson; Department of Law - Bill Neubeck; and USEPA - Mel Hauptman and Grant Kimmel.

Considerable discussion centered around five major areas with agreements being reached by the parties as described below:

1. Cheryl, Terry and Myron Road Contamination

It was agreed by all parties that determinations reached by Dunn regarding the west side of the contaminant plume are not sufficiently conclusive. GE has concluded that the contamination found in Well DGC-15 is attributable to site, but that the flow path from that well passes to the east of the residential area. However, the USEPA, DEC and the Department of Law all agreed that the presence of trichloroethylene (TCE) in the intermediate and deep levels of monitoring Well DGC-15 indicate the ability of TCE to migrate in the westerly direction from the site. Further, flow directions from the area of this well continue southward in th general area of Cheryl, Terry and Myron Road. Therefore, the potential clearly exists for contaminants from the site to reach the residential area. In addition, it was agreed that even though contamination does not presently exist in DGC-25 $1\,\mathrm{A}$ and DGC-25 $I\,\mathrm{B}$, the area is clearly threatened by TCE. Only three rounds of sampling have been taken to date, and that as additional rounds of sampling are taken over time, the possibility of finding contamination in the intermediate and deep wells is likely.



It was agreed by all parties present that the residential well testing results are inconclusive regarding contamination from the site and, therefore, the agreement reached by the parties at this meeting regarding the potential for the plume to extend into the Cheryl, Terry and Myron areas is not based on residential well sampling results. Furthermore, it was agreed that the sporatic levels of contamination in this general area is expected, since it is clearly on the fringes of the plume where concentrations have generally been low and can change as the result of variations in groundwater flow directions and source variables.

Therefore, after considerable discussion, the parties agreed that the appropriate course of action for General Electric would be to include the Cheryl, Terry and Myron areas for evaluation for final site solutions as part of the Feasibility Study. USEPA also agreed that if General Electric objected to the position, then EPA would require GE to continue the residential well sampling and the monitoring well sampling program including indefinitely the possible addition of several new monitoring wells to monitor and track the fringes of the plume to insure that the residents in the Cheryl, Terry and Myron Road areas will not be adversely impacted.

2. Groundwater Model

It was agreed by all parties that this model does not describe flow conditions in the area of the site and that as such, this model is inadequate, inaccurate and inappropriate. Therefore, it was agreed by all that no conclusions can or should be drawn based on data generated by the model and that the presence of movement contaminants is better described by the field data. It was agreed by all that there is no advantage in asking Dunn to adjust the model to agree with field data for the above reasons.

3. <u>Vertical Conductivity</u>

Previous conclusions drawn by Dunn in the remedial investigation report and further amplified in the addendum appear inaccurate. It was agreed by the parties that the conductivity data obtained is more likely a function of leakage of well casing joints and around the bottom of the casing than being a true measure of conductivity. Therefore, it was agreed that no conclusions can or should be made from this data.

4. Bluebird MHP Pump Test

It was agreed at the meeting that the pump test conducted at DGC-12 and the Bluebird MHP to ascertain the reason for the groundwater mound at that vicinity was not properly conducted as no baseline conditions were measured.

5. Soil Sampling

All parties at the meeting agreed that Dunn has defined the PCB contaminated areas adjacent to the site using the McGraw-Edison Field test kit with laboraty confirmation by

ERCO for the purposes of this remedial investigation. This area is essentially the former Lewis Property which GE purchased in the fall of 1984.

In conclusion, it was agreed that the field work performed by Dunn Geoscience Corporation for General Electric regarding well drilling installation, well development, water level measurements, water quality sampling and service soil sampling was accomplished within the guidelines of standard protocols, verified by on-site field inspections and within the purposes of the CERCLA Order.

I can discuss this with you in more detail if you desire.

JEI:ks

cc: M. Hauptman

- M. O'Toole
- J. Greenthal
- D. King
- D. Corliss
- R. Cowen
 - R. Tramontano, DOH
 - B. Fear, DOH
 - M. Moore, DOL

To decide beauty

United States Environmental Protection Agency Region 2 26 Federal Plaza New York, N.Y. 10278

to the rougheser

New Jersey New York Puerto Rico Virgin Islands

Official Business
Penalty for Private Use

Postage and Fees Paid Environmental Protection Agency EPA 335



SEPA

Environmental Facts

alle indeed y shiressing alle

June 1985

GE/MOREAU SITE, MOREAU, NY

ACTIONS TO DATE

The Environmental Protection Agency (EPA) has reviewed the GE/Moreau Remedial Investigation Report prepared by Dunn Geoscience Corporation dated March 1985. This work was conducted for the General Electric Company (GE) under a Superfund Administrative Order on Consent dated November 21, 1983.

The Remedial Investigation consisted of an in-depth hydrogeological study of the area surrounding the GE/Moreau site. It included the installation of monitoring wells; the measurement of water levels in wells; the collection and analysis of samples from wells; the collection and analysis of surface water samples from the Ft. Edward New Reservoir drainage area; and, the collection and analysis of water samples from private residential wells. It also included the collection and analysis of soil samples from the former Lewis property.

The Report has identified a plume of contaminated groundwater emanating from the site. The plume is contaminated with various volatile organic chemicals, primarily trichloroethylene. This plume has contaminated several residential wells along Cheryl and Terry Drives in addition to wells on Bluebird Road. Activated carbon filters have been installed on wells which have shown contaminant levels exceeding the guidelines established by the Order.

EPA and DEC conclusions with regard to the data differ from GE's in that the agencies view the presence of trichloroeth-ylene (TCE) in the intermediate and deep levels of monitoring well 15 as indicating the ability of TCE to migrate in a westerly direction from the site. Flow directions from the areas of this well continue southward into the Cheryl Drive, Terry Drive and Myron Road area. If groundwater of this quality is not now

present in this area, it may be in time, and the area is at least threatened with TCE contamination.

The plume has travelled to the southeast and entered Reardon Brook, the surface water stream that feeds New Reservoir. The Village of Ft. Edward had diverted Reardon Brook around New Reservoir. GE has proposed the installation of an aerator to remove the volatile organic contaminants and is about to begin the installation of the aerator shortly.

FUTURE ACTIONS

The completed Remedial Investigation Report will provide the basis for completion of the Feasibility Study which is now underway. The Feasibility Study will evaluate engineering alternatives for ultimately addressing site clean up. EPA expects a draft Feasibility Study Report from GE in late July.

BACKGROUND

The GE Moreau Site, also known as Caputo Landfill, is located in the Town of Moreau, northeastern Saratoga County, New York. The site includes a small evaporation lagoon and drum disposal area. In addition, waste materials are scattered over approximately 30 acres. The evaporation lagoon was previously an open sand pit used to dump liquid polychlorinated biphenyls. The drum disposal area consists of approximately 100 drums and associated contaminated soil. There are numerous private drinking water wells in the area, as well as the public supply wells for the Village of Fort Edward. A few private wells south of the site have been adversely impacted due to chemical contamination.

Q ash Washingtoners to and a town of

By JORN CLUGSTON Correspondent

MOREAU — Federal and state and pany's latent study, which has not been pany's latent study, which has not been with a new General Electric Co. Tope Print anying the company inaccurately described test results on the extent of water.

Myron Road areas could not take notice. pollution from GE's dumpaite in Mersau.

GE also has asked the U.S. Environ-mental Protection Agency for permission to place contaminated soil from the forto place contaminated soil from the forms the form the former Lewis property under a clay car at the response to GE the contamination, Robert Buttler, prusident of the Citizens of Moreau Against Contamination, said Tuesday. He said he learned about GE's request in a letter sent to him by the U.S. Environmental Protection Agency.

In a letter to GE; copies of which were classifications at last pich's team.

board meeting EPA and the state De-partment of Environmental Observation challenged conclusions made in the com-

from the Moreou alls, where the esem-pany dumped 452 tons of its second actusing wastes, according to the lecture 1909250AT

The federal EPA, however, equiends to

distributed by Buttles at last night's form of An and the Country of Solution to clean es contamination.

> Variations in the direction of groundwater flow and a gravel pit near the GE dump, the environmental protection agencies wrote, 'min play a role" in the varying levels of the chemical.

GE's description of the direction of groundwater flow is de-scribed in the agencies' letter as "inaccurate and inadequate,"

and, the letter concludes, "the model does not describe contaction nant flow in the area, and rather than have Dunn 'tinker' with the model we suggest discarding it as a tool for this study."

An air stripper system has been installed by GE to eliminate the TCE in water used by Fort Edward. The village gets its water from Reardon Brook, located southeast of the dump.

A meeting has been scheduled for 11 a.m. on June 21 at the Town Hall with EPA officials to discuss the study.

New York State Department of Environmental Conservation





Henry G. Williams Commissioner

JUL 03 1985

Mr. Leonard K. Doviak
Manager
NYS Public Affairs/Area Communication
General Electric Company
One River Road
Schenectady, New York 12345

Dear Mr. Doviak:

Re: GE-Moreau Site

This is in response to your letter dated April 4, 1985 to residents near the GE-Moreau site wherein you update your November 1984 Report entitled "Moreau Site Status Report to the Public" by presenting new information.

Your updated report focuses on a number of actions undertaken at and near the Moreau site by the General Electric Company pursuant to its orders on consent with the Department of Environmental Conservation and the USEPA, respectively. Most notable of your statements centers around potential contamination in the Cheryl Drive, Terry Drive, and Myron Road areas.

Your report states that samples taken from the new monitoring wells confirm that "the plume of contamination, as originally reported, is moving with the flow of groundwater towards the south-southeast--away from the residential wells in the Cheryl Drive, Terry Drive area."

We object to this position. The data contained in both the November 1984 remedial investigation report and the March 1985 addendum on the remedial investigation both prepared by Dunn Geoscience Corporation for General Electric, clearly do not bear this out. General Electric, in those reports, acknowledges that trichloroethylene contamination in Well DGC-15 could only have come from the Moreau site. Given the groundwater flow directions and the proximity of the homes on Cheryl Drive, Terry Drive and Myron Road to the site, it is very likely that these homes could be impacted by contaminants from the GE-Moreau site. The fact that water samples taken from the new wells showed virtually no contamination is not conclusive. Only three rounds of samples have been obtained and, given the flow directions from the site and other known wells of contamination identified in the Dunn Reports,

it is likely that continued monitoring of additional wells would show contamination. Therefore, at best, the residences on Cheryl Drive, Terry Drive and Myron Road areas are on the fringes of the groundwater contamination plume emanating from the site and, as such, should clearly be included as part of any long-term feasibility study that GE is to undertake pursuant to the USEPA/GE Order II-CERCLA-30201.

If you have any questions on this, please contact John E. Iannotti, P.E. of my staff, at 518-457-5637.

Sincerely,

Norman H. Nosenchuck, P.E.

Director

Division of Solid and Hazardous Waste

cc: R. Congdon, Supervisor, Town of Moreau

R. Buttles, C.O.M.A.C.

M. Hauptman, USEPA

R. Tramontano, DOH

B. Fear, DOH

M. Moore, DOL

L. Collins, G.E.

JEI:ks

make the Mariney read of the said

bcc: w/incoming - L. Marsh

w/incoming - D. Banks

w/incoming - N. Nosenchuck (2)

w/incoming - M. O'Toole

w/incoming - C. Bassett

w/incoming - J. Greenthal

w/incoming - D. King

w/incoming - D. Corliss, Region 5

W/incoming - R. Cowen, Region 5

w/incoming - T. Monroe, Region 5