DUNN

CERTIFICATION REPORT
GENERAL ELECTRIC COMPANY
CAPACITOR AND POWER PROTECTION OPERATION

Prepared for:

General Electric Company
Fort Edward, New York

March 3, 1992

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Prepared By:

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Date:

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The descriptions and documentation presented herein provide a summary of the construction and installation of a groundwater recovery and treatment system at the General Electric Company Capacitor and Power Protection Operations facility located in Fort Edward, New York. The groundwater recovery and treatment system described herein was installed in accordance with the Order on Consent executed on April, 1985 and the NYSDEC approved On-Site Remedial Plan.

DUNN GEOSCIENCE ENGINEERING CO., P.C.

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1.0 INTRODUCTION

1.1 General

In April 1985, General Electric Company (GE) and the State of New York entered into an Order on Consent (CO) which stipulated that GE would perform a remedial investigation and feasibility study (RI/FS) at its Capacitor and Power Protection Operations facility located in Fort Edward, New York. The purpose of the RI/FS was to determine the nature and extent of contamination to on-site areas and to evaluate and select a remedial alternative appropriate for the site.

The remedial investigation was prepared in 1985 and subsequently accepted by the New York Sate Department of Environmental Conservation (NYSDEC). The feasibility study was originally prepared in October, 1988 and later revised in May, 1989.

The remedial actions selected for the site and approved by the NYSDEC were comprised of the following four components:

1. Excavation and disposal of PCB contaminated soils with concentrations greater than 25 parts per million;

2. Installation of groundwater recovery wells in the shallow, unconfined aquifer;

3. Upgrading of groundwater recovery wells in the shallow, bedrock aquifer; and

4. Upgrading of the on-site groundwater treatment system.

1.2 Site Description

The Fort Edward plant is located on 32 acres approximately 800 feet west of the Hudson River and 1,500 feet south of the Village of Hudson Falls. It has been in continuous operation since 1942 in the manufacture of motors, generators and capacitors. Various liquid products have been used in the manufacturing processes and include: polychlorinated biphenyls, organic solvents, and kerosene. PCB's were last used in 1977.

Present facilities consist of two large manufacturing buildings, several smaller buildings, an impoundment basin on the southwest corner of the property and parking areas. Smaller structures include a pump house, a maintenance building, and the wastewater treatment facility.

An air stripper was installed in 1984 to remove volatile organic compounds from groundwater pumped from recovery well, RW-1. Flow from RW-1 is conveyed to the air stripper through a buried 3-inch diameter polyethylene pipe. Effluent from the air stripper is discharged to the impoundment basin where it is then filtered and further treated through activated carbon.

1.3 Project Objectives

In August, 1990, PCB contaminated soil in excess of 25 ppm was excavated and removed from the unloading area adjacent to Building 25 and the leach field south of Building 40. This work was performed by Jet-Line Services, Inc. under the oversight of personnel from Dunn Geoscience Engineering Co., P.C. (DUNN). This work was performed under Contract No. 1 of GE's On-Site Remedial Plan.

The objective of this project was to complete the remaining three components of the NYSDEC approved remedial plan. These components were:

1. Installation of groundwater recovery wells in the shallow, unconfined aquifer;

2. Upgrading of groundwater recovery wells in the shallow, bedrock aquifer; and

3. Upgrading of the on-site groundwater treatment system.

Plans, specifications, and contract documents for the performance of this work were prepared by DUNN and made a part of Contract No. 2 to GE's On-Site Remedial Plan. Clean Harbors, Inc. was selected as the prime contractor and was given notice to proceed on April 15, 1991. A more detailed description of the scope of work is provided in Sections 2.0 and 3.0.

2.0 SCOPE OF WORK

2.1 Shallow Groundwater Recovery System

In order to increase the effectiveness and efficiency of the groundwater recovery system a multiple recovery well system was designed for the shallow, unconfined aquifer. The purpose of this system is to prevent off-site migration of groundwater containing low levels of volatile organic compounds (VOC's) and PCB's. A multiple well system was designed from an evaluation of on-site hydrologic conditions and the efficiency of existing recovery well RW-1A. The results of the study indicate that the limited aquifer thickness, limited drawdown, overpumpage and well construction materials have resulted in bio-fouling problems with RW-1A which have compromised the efficiency and effectiveness of the recovery system.

The upgraded recovery system consists of six recovery wells, including, existing well RW-1A and RW-2 plus four new wells designated RW-3, RW-4, RW-5, and RW-6. All wells discharge to an existing 3-inch diameter polyethylene pipe which conveys flow to the air stripper.

2.2 Shallow Bedrock Recovery System

Low levels of VOC's and PCB's have been detected in existing bedrock wells GM-11D and GM-8D (R). In order to upgrade this existing system, the following activities were undertaken:

- Permanent installation of a submersible pump and piping at GM-11D;
- Installation of a 4-inch diameter stainless steel screen with requisite backfill material (e.g., sandpack, bentonite seal, etc.) in GM-8D (R); and
- Permanent installation of a submersible pump and piping at GM-8D (R).

Flow from these wells is discharged to the impoundment basin.

2.3 Groundwater Treatment System

As previously mentioned, the existing air stripper was installed in 1984. The relatively high iron content of the groundwater has resulted in significant growth of bacteria and the build-up of iron deposits. This fouling has adversely affected the stripper's ability to efficiently and effectively remove VOC's.

To upgrade the overall groundwater treatment capabilities at the site, the existing air stripper was replaced. The new air stripper system was designed for more efficient operation and includes the necessary appurtenances to facilitate easier maintenance.

3.0 RECOVERY AND TREATMENT SYSTEM CONSTRUCTION

3.1 Shallow Groundwater Recovery System

3.1.1 Pilot Borings

Construction of the four new groundwater recovery wells was initiated through pilot borings at each at the locations shown on Drawing No. 1 of 5 (Appendix C). The pilot borings were advanced using 4 1/4 inch ID hollow stem augers. Soil samples were collected using two inch diameter split-spoon samplers. Samples were collected at five foot intervals and at formation changes, above the water table and at two foot intervals below the water table. Samples were classified and logged by a DUNN hydrogeologist. Logs of the completed borings are included in Appendix A.

Select split spoon samples were taken from each boring for sieve analysis. Information gained through the sieve analysis was used in determining screen slot sizes and the appropriate gravel pack material. The results of the sieve analysis are included in Appendix B.

3.1.2 Well Completion

Pilot boreholes were widened in preparation for the well installation by drilling using the cable-tool method with a twelve inch nominal diameter steel casing. This working casing was advanced to the required depth and the cuttings were removed by bailing to the level where the bottom of the gravel pack was to be placed.

An eight inch diameter well casing was installed within the working casing. The well screen was Type 304 stainless steel, wire wound, continuous slot screen with a welded stainless steel bottom plate. The riser consisted of Schedule 40, seamless carbon steel with welded joints.

Stainless steel centralizers were placed at the base of the screens and at a point ten feet above the base to ensure a concentric well construction.

The gravel pack was placed in the annular space between the working casing and the well casing in a suitable manner to avoid bridging and the creation of voids. Sufficient gravel pack material was used to extend a minimum of five feet above the top of the screen. Two feet of silica sand was placed on top of the gravel pack as an interface between the gravel pack and the cement grout seal which was added to fill the annular space to the ground surface. As the gravel pack and silica sand were added, the working casing was carefully removed to expose these materials to the formation. Appendix C contains well completion drawings which detail the final construction of wells RW-3, RW-4, RW-5, and RW-6.

Each well was developed using mechanical surging and pumping using a double surge block and a centrifugal pump. Each well was developed for a minimum of four hours or until the discharge was clear and sand-free.

Pitless adapters were installed in each well and connections were made to the existing 3-inch polyethylene pipe through new 3-inch diameter PVC pipe as shown on the record drawings in Appendix C.

3.2 Shallow Bedrock Recovery System

3.2.1 Well Completion

Bedrock well GM-8D (R) was converted from a 6-inch diameter unscreened borehole to a 4-inch diameter cased and screened well through the installation of a 4-inch diameter carbon steel riser with a 4-inch diameter wire wound, continuous slot, stainless steel screen. A gravel pack was installed in the annulus between the 6-inch diameter borehole and the 4-inch diameter casing.

3.3 Aquifer Pumping Tests - Shallow Recovery Wells

A series of pumping tests was completed on the on-site shallow groundwater recovery wells. The tests were conducted to determine the capability of the system to sustain long-term pumping during the operational phase of the shallow groundwater recovery system. The pumping system was calibrated to create a drawdown zone that will effectively capture the contaminant plume. The groundwater recovery system consists of two previously existing shallow groundwater recovery wells [one on-site (RW-1A) and one off-site (RW-2)] and the four new on-site shallow groundwater recovery wells (RW-3, 4, 5 and 6). The combined discharge of the six recovery wells during the operational phase of the recovery system is limited by the capacity of the groundwater treatment system, which is 120 gallons per minute (gpm). The process used to determine the long-term pumping rates is described in the following sections.

3.3.1 Aquifer Pumping Test Methodology

8-Hour Pumping Tests

An 8-hour constant rate pumping test was performed on each of the four new on-site shallow groundwater recovery wells. The tests began on July 17, 1991 and were completed on July 20, 1991. Water levels in each pumping well and nearby observation wells were monitored during each test. Water level measurements were taken before, during, and after each pumping test to measure static conditions, drawdown from pumping, and recovery after pumping ended, respectively. Clean Harbors personnel manually recorded all water level measurements to the closest 0.01-foot, using an electronic water level meter. Measurements were taken relative to a specific measuring point marked at the top of each recovery well casing. The depth to the top of the screen in each well was posted so that the pumping rate could be decreased in case the pumping level fell below the top of the screen. The drawdown and recovery water level measurements were taken at specific time intervals established prior to the start of the test to optimize analysis of the data. Drawdown water level measurements were taken for 8 hours and recovery measurements were recorded for one hour after pump shut down.

The constant pumping rate that was used for each test was calculated prior to the test from approximately half of the available drawdown multiplied by the specific capacity in each well. The available drawdown was the distance between the static water table and the top of the well screen or pump intake, whichever is higher. The specific capacity was estimated from drawdown and discharge data obtained during well development. This method was used to insure that the wells did not dewater during the test. the pumping rate in gallons per minute (gpm) for each test is shown in Table A.

Test pumps were installed in each of the four new recovery wells. Each test pump was calibrated to its respective pumping rate by turning the pump on and opening or closing the discharge valve until the desired rate was achieved, at which time the pump was turned off. The water level within the aquifer was given sufficient time to equilibriate after the calibration period prior to the start of the pumping test. Flow meters were used to monitor the pumping rate throughout each test. The pumping rate was also checked by measuring the flow into a 55-gallon drum over a specified time interval. An average pumping rate was calculated for each test by using the starting and ending values on the flow meter totalizer. Discharge effluent from each pumping well was directed into an on-site storm drain which emptied into the on-site groundwater treatment system.

72-Hour Pumping Test

A 72-hour constant rate pumping test involving the simultaneous pumping of all five on-site shallow groundwater recovery wells was begun on September 10, 1991. Water level measurements were taken in the five pumping wells and ten nearby observation wells before, during, and after the pumping test to measure static conditions, drawdown, and recovery, respectively. Pressure transducers that were installed below the pump intake in each recovery well were used to measure water levels. Clean Harbors personnel recorded water level measurements in feet of water above the transducer to the nearest 0.1-foot in the pumping wells using a digital readout of the pressure transducer readings. The transducer reading corresponding to the depth to the top of the screen in each recovery well was determined and posted so that pumping rates could be decreased in case the pumping level fell below the top of one of the screens. Clean Harbors personnel recorded water level measurements to the nearest 0.01-foot in the ten observation wells using an electronic water level meter relative to a specific measuring point at each well. Drawdown and recovery water level measurements were taken at previously specified time intervals for 72 hours. Recovery measurements were recorded at specified intervals for one hour after pump shutdown. Additional recovery readings were taken in the pumping and observation wells at 24-hour, 48-hour and 72-hour periods after the pumping test stopped.

TABLE A

Pumping Rates for the 8-Hour Pumping Tests

Recovery Well	Available Drawdown (ft)	Specific Capacity (gpm/ft)	Calibrated Pumping Rate (gpm)	Average Pumping Rate (gpm)
RW-3	2.8	7	10	9.86
RW-4	4.7	22.5	50	50.41
RW-5	3.9	8	20	20.18
RW-6	6.6	13.8	45	45.24

Note: Wells RW-3, -4, -5, and -6 pumped individually.

The pumping rate used for each recovery well for the 72-hour pumping test was determined from the analysis of the drawdown and recovery data obtained during the individual 8-hour pumping tests. The pump in each well was calibrated to its respective pumping rate by adjusting the discharge valve prior to the start of the pumping test. Flow meters were used to monitor pumping rates throughout the test. Average pumping rates were calculated from the starting and ending readings on the flow meter totalizers at each well. Discharge effluent from the pumping test was directed to the on-site groundwater treatment system.

3.3.2 Aquifer Pumping Test Analysis

8-Hour Pumping Tests

An analysis of the drawdown and recovery data from the four 8-hour pumping tests was conducted to establish pumping rates to be used during the 72-hour pumping test. Because the maximum capacity of the groundwater treatment system is 120 gpm, and considering that the system would receive 15 gpm from the off site recovery well (RW-2) during the operational phase, the total discharge of the five wells was limited to a rate of 105 gpm during the 72-hour pumping test.

The drawdown and recovery data for each pumping and observation well were plotted on time-drawdown graphs. Graphical analytical methods (Theis and Cooper-Jacob) were applied to the graphs to calculate the hydraulic properties (transmissivity and storativity) of the shallow unconsolidated aquifer. Once these properties were calculated, drawdown at each pumping and observation well for 72 hours of pumping was projected using the average 8-hour pumping rates established during each pumping test.

The summation of the projected 72-hour drawdown for each recovery well using the average 8-hour pumping rates represented the total drawdown in each recovery well if all wells were pumped simultaneously at the 8-hour test rates for 72 hours. The pumping drawdown for RW-1A (the previously existing on-site recovery well) and the drawdown in the other recovery wells caused by pumping RW-1A were calculated by graphical methods using the following data: prior stabilized operational pumping level (drawdown was calculated from an assumed static water level), pumping rate, and a one hour recovery test performed immediately after the pump was shut down for equilibration prior to the 8-hour pumping tests.

The cumulative drawdown calculations for all wells pumping simultaneously were repeated using a pumping rate combination and which was compatible with the hydraulic properties of the aquifer at each well. The cumulative drawdown for each pumping well was compared to its available drawdown. Iterations of the cumulative drawdown calculations were repeated for different pumping rate combinations to ensure that drawdown was evenly distributed throughout the well network and that the projected drawdown in each well did not exceed the available drawdown. The pumping rates chosen for the 72-hour pumping test are shown in Table B.

TABLE B

Pumping Rates for the 72-Hour Pumping Test

Recovery Well	Calibrated Pumping Rate (gpm)	Average Pumping Rate (gpm)
RW-1A	28	27.4
RW-3	5	4.13
RW-4	20	18.44
RW-5	20	19.65
RW-6	29	28.48
TOTAL	102	

Note: All wells pumped simultaneously.

72-Hour Pumping Test

The drawdown and recovery data from the 72-hour pumping test were analyzed to determine the final pumping rates to be used during the operational phase of the groundwater recovery system. The analysis involved comparing the maximum drawdown in each well after 72 hours of pumping with the values previously anticipated from the projected cumulative drawdown calculations and the total recovery of the wells 72 hours after pumping ceased. Full recovery should occur after pump shut down in the same length of time that the pumps were operating, unless more groundwater was removed from the system during the 72-hour test than the aquifer could supply on a long-term basis. The projected long-term pumping rates (Table C) were calculated by multiplying the average 72-hour pumping rates by the percent of recovery 72 hours after pump shut down. These pumping rates represent the optimum rates possible given the aquifer characteristics and recovery well configuration.

3.4 Groundwater Treatment System

3.4.1 Air Stripper Construction

The existing air stripper was removed and a new air stripper system was installed. The new stripper tower is constructed of fiberglass reinforced plastic (FRP) with a resin coating and is 32 feet tall and 4 feet in diameter. It is designed to be self supporting and to withstand design snow load and wind load of at least 35 mph. Drawings detailing the tower construction are included in Appendix C.

The tower contains a monofilament, polypropylene mist eliminator designed for removal of 99.9 percent of entrained water droplets. The tower is filled with polypropylene Jeager Tripac packing media supported on FRP grating.

The air stripper is equipped with a manually operated system for chemically cleaning the packing media. This system is operated by shutting off both influent and effluent flow to the stripping tower; then, an acid solution is pumped to the top of the tower to be collected in a tank at the base of the tower after it has passed through the media. The acid solution is circulated several times through the media until the media have been sufficiently cleaned.

The air stripper is provided with a single radial type air blower with outboard mounted bearings in which the impellers are keyed to a heavy-ground steel shaft and supported by anti-friction type bearings. The blower motor is a squired cage rotor type, two speed, 15 horsepower, 480 volt, 3 phase of cast iron and steel construction.

TABLE C

Projected Long Term Pumping Rates

Recovery Well	Average 72-Hour Pumping Rate (gpm)	% Recovery	Projected Long Term Pumping Rate (gpm)
RW-1A	27.40	87	24
RW-2	- - -	- - -	15
RW-3	4.13	69	3
RW-4	18.44	78	14
RW-5	19.65	82	16
RW-6	28.48	93	26
TOTAL			98

Note: Wells RW-3, -4, -5, and -6 pumped individually.

The blower is designed to operate under the following conditions:

Air Volume:	2000-3500 SCFM
Inlet Conditions:	-15 F to 100 F @ 14.7 psia
Discharge Pressure:	5 inches of water @ 3500 SCFM

All controls for the air stripping system are located within the Westvaco building. The control panel is equipped with: indicator lights to show the system status; a digital indicator to show water flow rates in gallons per minute; an annunciator to indicate malfunctions; and, visual and audible alarm indicators. The system is equipped with a high level switch which will shut off the blower and well pumps in the event of high water conditions in the stripping tower.

The air stripper was connected to the existing 3-inch diameter polyethylene (PE) subsurface influent pipe. The existing influent pipe has connected to a new 3-inch diameter, schedule 40 steel pipe at the point where the PE pipe surfaced. The above ground steel pipe was heat traced and insulated. Effluent from the stripper is conveyed to an existing manhole through a new 6 inch diameter, Schedule 80 polyvinyl chloride (PVC) pipe. Flow from the manhole is piped directly to the impoundment basin.

4.0 RECOVERY AND TREATMENT SYSTEM PERFORMANCE

4.1 Performance of the Groundwater Recovery System

4.1.1 Results of the Aquifer Pumping Tests

Long-term projections of discharge and drawdown conditions can be made from pumping tests, such as the 8-hour pumping tests described in Section 3.3. Accurate projections of discharge and drawdown can be made if the length of the test and the pumping rate are sufficient to allow observation of existing boundary conditions that may cause the availability of groundwater to change. Data gathered during the 8-hour tests were used to project drawdown conditions at the end of a hypothetical combined 72-hour test using various pumping rate combinations. The 72-hour test was conducted as a trial run to monitor the combined pumping of the five on-site shallow recovery wells on a short-term basis.

Drawdown measurements in the pumping wells indicated that the pumping level was approaching stabilization but still dropping at the end of the 72-hour test (between 0.1 and 0.3 foot drop in all pumping wells during the last 24 hours of the test). Ten observation wells were also monitored during the 72-hour test to observe drawdown at various distances and directions from the pumping wells. Drawdown measurements in the observations wells showed that the cone of depression induced by the pumping wells continued to spread laterally during the test.

The aquifer did not fully recovery within 72-hours at the end of the test. Recovery after 72 hours (Table C) was between 69 (RW-3) and 93 (RW-6) percent of the maximum drawdown in each of the five recovery wells. The percent recovery was greatest in RW-6 where the aquifer is thicker, and least in RW-3, which is located near an area where the aquifer pinches out.

4.1.2 Results of the Initial Phase of Long-Term Recovery Well Pumping

The initial phase of the long-term recovery well pumping began early October 1991. Water level measurements were recorded daily in the on-site groundwater recovery wells to continue monitoring the pumping level. Pumping rates were adjusted to the projected long-term rates shown on Table C. The pumping level continued to drop slowly and approached the top of the well screen or pump intake in two of the wells (RW-1A and RW-3). Further downward adjustments of the pumping rates, including turning off the pump in RW-1A, were made until the pumping level stabilized above the top of the well screens or pump intakes. The last adjustment to the pumping rates was performed on RW-3 on October 30, 1991. The current pumping rates and drawdown measurements made after the last adjustment are shown on Table D. Pumping rates for the individual wells within the system as well as the combined total for all the wells will fluctuate with seasonal variations in the groundwater table. Pumping rates may approach, but are not expected to achieve the projected rates given in Table C.

The pumping rate in the off-site shallow groundwater recovery well (RW-2) was reduced to 10 gpm because the pump was not able to maintain the expected pumping rate of 15 gpm against the line pressure created in the groundwater recovery system by the four new on-site recovery wells.

Water levels measured in the observation wells on October 7, 1991 indicate that the cone of depression was continuing to spread laterally below the parking lot. The cone of depression is expected to continue to increase until recharge within the area of the cone equals the discharge of the groundwater recovery system and equilibrium is achieved.

4.2 Performance of the Groundwater Treatment System

Following the completion of the installation and initial shakedown of the groundwater treatment system, the system was placed into full operation receiving groundwater flow from recovery wells RW-1A, RW-2, RW-3, RW-4, RW-5 and RW-6. Currently, RW-1A and RW-3 are inoperative due to the effect of the drawdown from RW-4, RW-5 and RW-6.

4.2.1 Specified Performance

Performance requirements for the groundwater treatment system were specified in the contract specifications of Contract No. 2. The performance requirements were as follows:

Organic Compound	Project Influent Quality (ppb)	Required Effluent Quality (ppb)	% Removal Required
Trans 1,2-dichloroethylene	350	ND	100
Trichloroethylene	2,700	100	97
1,1-Dichloroethylene	90	ND	100
1,1,1-Trichloroethene	25	ND	100
Vinyl Chloride	50	ND	100

4.2.2 Recorded Performance

To monitor the performance of the groundwater treatment system, influent and effluent samples are collected and analyzed monthly for the full suite of volatile organic compounds by EPA Method 624. Table E is a tabulation of the analysis of samples for a four month period (September, October, November and December 1991).

TABLE D

Current Pumping Rates

Recovery Well	Current Pumping Rate (gpm)	Available Drawdown (ft)	Drawdown (ft) 10/30/91
RW-1A	0	2.1	2.0
RW-2	10	- - -	- - -
RW-3	2	2.8	2.5
RW-4	15.5	4.7	2.6
RW-5	19	3.9	2.6
RW-6	28	6.6	3.6
TOTAL	75		

Note: Wells RW-3, -4, -5, and -6 pumped individually.

With the exception of the November 27, 1991 sampling, all volatile organic compounds detected in the influent were removed to an efficiency of 100 percent. Trichloroethylene was detected in the effluent sample on November 27, 1991 at a level of 4 ppb, giving a removal efficiency of 99.3%. This four month monitoring period shows the ability of the groundwater treatment system to achieve the specified performance.

TABLE E

Treatment System Performance

		Air Stripper Influent	Air Stripper Effluent	Percent Removal Efficiency	Air Stripper Influent	Air Stripper Effluent	Percent Removal Efficiency	Air Stripper Influent	Air Stripper Effluent	Percent Removal Efficiency	Air Stripper Influent	Air Stripper Effluent	Percent Removal Efficiency
Sample Date		9/11/91	9/11/91	9/11/91	10/29/91	10/29/91	10/29/91	11/27/91	11/27/91	11/27/91	12/18/91	12/18/91	12/18/91
Flow Rate (gpm)		97			74			75			75		
Volatile Organic Compounds													
Chloromethane	(2)	ND	ND		ND	ND		ND	ND		ND	ND	
Bromomethane	(2)	ND	ND		ND	ND		ND	ND		ND	ND	
Dichlorodifluoromethane	(2)	ND	ND		ND	ND		ND	ND		ND	ND	
Vinyl Chloride	(2)	23	ND	100	5	ND	100	4	ND	100	5	ND	100
Chloroethane	(2)	ND	ND		ND	ND		ND	ND		ND	ND	
Methylene Chloride	(1)	ND	ND		ND	ND		ND	ND		ND	ND	
Trichlorofluoromethane	(1)	ND	ND		ND	ND		ND	ND		ND	ND	
1,1-Dichloroethylene	(1)	1.1	ND		ND	ND		ND	ND		ND	ND	
1,1-Dichloroethane	(1)	3.0	ND	100	1.1	ND	100	1.3	ND	100	ND	ND	
Trans-1,2-Dichloroethylene	(1)	120	ND	100	42	ND	100	42	ND	100	35	ND	100
Chloroform	(1)	ND	ND		ND	ND		ND	ND		ND	ND	
1,2-Dichloroethane	(1)	ND	ND		ND	ND		ND	ND		ND	ND	
1,1,1-Trichloroethane	(3)	6	ND	100	ND	ND		ND	ND		ND	ND	
Carbon Tetrachloride	(1)	ND	ND		ND	ND		ND	ND		ND	ND	
Bromodichloromethane	(1)	ND	ND		ND	ND		ND	ND		ND	ND	
1,2-Dichloropropane	(1)	ND	ND		ND	ND		ND	ND		ND	ND	
Cis-1,3-Dichloropropylene	(1)	ND	ND		ND	ND		ND	ND		ND	ND	
Trichloroethylene	(3)	1100	ND	100	660	ND	100	530	4	99.3	570	ND	100
Benzene	(1)	ND	ND		ND	ND		ND	ND		ND	ND	
Trans-1,3-Dichloropropylene	(1)	ND	ND		ND	ND		ND	ND		ND	ND	
Dibromochloromethane	(1)	ND	ND		ND	ND		ND	ND		ND	ND	
1,1,2-Trichloroethane	(1)	ND	ND		ND	ND		ND	ND		ND	ND	
2-Chloroethyl vinyl ether	(1)	ND	ND		ND	ND		ND	ND		ND	ND	
Bromoform	(1)	ND	ND		ND	ND		ND	ND		ND	ND	
1,1,2,2-Tetrachloroethane	(1)	ND	ND		ND	ND		ND	ND		ND	ND	
Tetrachloroethylene	(1)	4.3	ND	100	1.3	ND	100	2.6	ND	100	1.9	ND	100
Toluene	(1)	ND	ND		ND	ND		ND	ND		ND	ND	
Chlorobenzene	(1)	4	ND	100	1	ND	100	1.4	ND	100	ND	ND	
Ethyl Benzene	(1)	ND	ND		ND	ND		ND	ND		ND	ND	
1,3-Dichlorobenzene	(1)	2	ND	100	ND	ND		ND	ND		ND	ND	
1,2-Dichlorobenzene	(1)	ND	ND		ND	ND		ND	ND		ND	ND	
1,4-Dichlorobenzene	(1)	3.4	ND	100	1.0	ND	100	ND	ND		ND	ND	

Concentration in PPB (ug/L)

ND = None detected above detection limit listed to the right of each compound.

All analyses performed by GE Environmental Control Laboratory unless otherwise indicated.

APPENDIX A

Pilot Borings

Dunn Corporation Albany, NY 12205 (518)458-1313	TEST BORING LOG			BORING No. RW-3	
PROJECT	Recovery Well Installation			SHEET 1 OF 2	
CLIENT	General Electric Company			JOB No.	00296-02090
DRILLING CONTRACTOR	A & W Environmental Drilling LTD			MEAS. PT. ELEV.	N.A.
PURPOSE	Pilot Boring			GROUND ELEV.	262.3'
DRILLING METHOD	Hollow Stem Auger	SAMPLE	CORE	CASING	DATUM	MSL
DRILL RIG TYPE Diedrich D-50	TYPE	SS		HSA	DATE STARTED 05/20/91
GROUNDWATER ELEV.	DIA.	2" OD		4 1/4" ID	DATE FINISHED 05/20/91
MEASURING POINT N.A.	WEIGHT	140 #			DRILLER John Richardson
DATE OF MEASUREMENT N.A.	FALL	30"			INSPECTOR Ralph Morse

DEPTH FT.	INTERVAL, RECOVERY, SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	ELEV. / DEPTH	REMARKS
							Samples retained by drillers for gradation analysis
2							
4							
		3			Lt br-tn cmf S, t$, t f G		Rec = 1.3 Damp
6	1	5	SW				
		6			Light brown-tan coarse to fine SAND, trace Silt, little fine Gravel.		
		8					
8							
10							

Dunn Corporation, Albany, NY 12205 (518)458-1313	TEST BORING LOG	BORING No. RW-3

PROJECT	Recovery Well Installation	SHEET 2 OF 2
CLIENT	General Electric Company	JOB No. 00296-02090

DEPTH FT.	INTERVAL, RECOVERY, SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI-FICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	ELEV. / DEPTH	REMARKS
	2	4, 6, 11, 10	SW		Lt br-tn cm(+)f S, t$, l mf(+) G		Rec = 1.2 Damp
12					Light brown-tan coarse medium (+) fine SAND, trace Silt, little medium fine (+) Gravel.		
14							
16	3	1, 3, 7, 11	SW		Same		Rec = 1.2 Wet
18	4	1, 1, 1	SP		Lt br mf S	243.9 / 18.4	Rec = 1.5 Wet
		2	CL		Lt br-tn $&C Lt brown-tan SILT & CLAY	243.3 / 19.0	
					Total Depth = 19.0' End of Boring		

Dunn Corporation
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No. RW-4

PROJECT	Recovery Well Installation			SHEET 1	OF 2
CLIENT	General Electric Company			JOB No.	00296-02090
DRILLING CONTRACTOR	A & W Environmental Drilling LTD			MEAS. PT. ELEV.	N.A.
PURPOSE	Pilot Boring			GROUND ELEV.	261.4'

			SAMPLE	CORE	CASING		
DRILLING METHOD	Hollow Stem Auger					DATUM	MSL
DRILL RIG TYPE	Diedrich D-50	TYPE	SS		HSA	DATE STARTED	05/20/91
GROUNDWATER ELEV.		DIA.	2" OD		4 1/4" ID	DATE FINISHED	05/20/91
MEASURING POINT	N.A.	WEIGHT	140 #			DRILLER	John Richardson
DATE OF MEASUREMENT	N.A.	FALL	30"			INSPECTOR	Ralph Morse

DEPTH FT.	INTERVAL, RECOVERY, SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI-FICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	ELEV. / DEPTH	REMARKS
2							
4							
		4			Tn mf S		Rec = 1.2 Damp
6	1	6	SP		Tan medium fine SAND.		
		8					
		9					
8							

Dunn Corporation Albany, NY 12205 (518)458-1313	TEST BORING LOG	BORING No. RW-4
PROJECT: Recovery Well Installation		SHEET 2 OF 2
CLIENT: General Electric Company		JOB No. 00296-02090

DEPTH FT.	INTERVAL, RECOVERY, SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	ELEV. / DEPTH	REMARKS
	2	8 6 8 9	SP		Lt br mf S, t f G		Rec = 1.3 Moist
12							
14							
16	3	3 5 8 10	SW		Lt br c(+)mf S, t f G Light brown coarse (+) to fine SAND, trace fine Gravel.		Rec = 1.2 Wet
18	4	3 5 8 6	SW		Lt br c(+) mf S, t $, tf G		Rec = 1.5 Wet
20	5	2 5 7 5	SW CL		Same @20.5' Tn $&C seam	240.5 20.9	Rec = 1.3 Wet
					Tn $&C		
					Total Depth = 21.0' End of Boring	240.4 21.0	

Dunn Corporation
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No. RW-5

PROJECT	Recovery Well Installation					SHEET 1	OF 2
CLIENT	General Electric Company					JOB No.	00296-02090
DRILLING CONTRACTOR	A & W Environmental Drilling LTD					MEAS. PT. ELEV.	N.A.
PURPOSE	Pilot Boring					GROUND ELEV.	260.5'
DRILLING METHOD	Hollow Stem Auger		SAMPLE	CORE	CASING	DATUM	MSL
DRILL RIG TYPE	Diedrich D-50	TYPE	SS		HSA	DATE STARTED	05/21/91
GROUNDWATER ELEV.		DIA.	2" OD		4 1/4" ID	DATE FINISHED	05/21/91
MEASURING POINT	N.A.	WEIGHT	140 #			DRILLER	John Richardson
DATE OF MEASUREMENT	N.A.	FALL	30"			INSPECTOR	Ralph Morse

DEPTH FT.	INTERVAL, RECOVERY, SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	ELEV. / DEPTH	REMARKS
2							
4							
5–7	1	4, 5, 5, 5	SP		Lt br mf S <u>Light brown medium fine SAND.</u>		Rec = 1.4 Damp
8							

Dunn Corporation Albany, NY 12205 (518)458-1313	TEST BORING LOG	BORING No. RW-5
PROJECT Recovery Well Installation		SHEET 2 OF 2
CLIENT General Electric Company		JOB No. 00296-02090

DEPTH FT.	INTERVAL, RECOVERY, SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI-FICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	ELEV. / DEPTH	REMARKS
	2	3 7 6 6	SP		Lt br mf S		Rec = 1.4 Moist W.T. ~ 11'
12	3	3 4 5 5	SW		Lt br cmf S, t $, tf G; freq m G <u>Light brown coarse to fine SAND, trace Silt, trace fine Gravel; frequent medium Gravel.</u>		Rec = 1.3 Wet
14	4	10 11 10 11	SW		Same		Rec = 0.8 Wet
16	5	5 7 11 15	SW		Same; occ c G		Rec = 1.4 Wet
18	6	7 7 5	SW		Same	240.8	Rec = 1.1 Wet
		5	CL/SW		Lt br-tn $&C seams Alt w cmf S Rd br $&C Alt w lt br-tn $	19.7	
20	7	2 2				239.2	Rec = 1.4 Wet
		9 10	CL		Lt br-gr $&C; vvd <u>Light brown-gray SILT & CLAY; varved.</u>	21.3 238.5	
22					Total Depth = 22.0 End of Boring	22.0	

Dunn Corporation
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No. RW-6

PROJECT	Recovery Well Installation					SHEET	1 OF 3
CLIENT	General Electric Company					JOB No.	00296-02090
DRILLING CONTRACTOR	A & W Environmental Drilling LTD					MEAS. PT. ELEV.	N.A.
PURPOSE	Pilot Boring					GROUND ELEV.	260.6'
DRILLING METHOD	Hollow Stem Auger		SAMPLE	CORE	CASING	DATUM	MSL
DRILL RIG TYPE	Diedrich D-50	TYPE	SS		HSA	DATE STARTED	05/21/91
GROUNDWATER ELEV.		DIA.	2" OD		4 1/4" ID	DATE FINISHED	05/21/91
MEASURING POINT	N.A.	WEIGHT	140 #			DRILLER	John Richardson
DATE OF MEASUREMENT	N.A.	FALL	30"			INSPECTOR	Ralph Morse

DEPTH FT.	INTERVAL, RECOVERY, SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI-FICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	ELEV. / DEPTH	REMARKS
2							
4							
		4			Lt br-or mf S		Rec = 1.5 Damp
6	1	4 6 7	SP		Light brown-orange medium fine SAND.		
8							

Dunn Corporation Albany, NY 12205 (518)458-1313	TEST BORING LOG	BORING No. RW-6
PROJECT Recovery Well Installation		SHEET 2 OF 3
CLIENT General Electric Company		JOB No. 00296-02090

DEPTH FT.	INTERVAL, RECOVERY, SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI-FICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	ELEV. / DEPTH	REMARKS
		6			Lt br cmf S, t $; occ mf G		Rec = 1.2 Wet
	2	13				249.8 / 10.8	
		15			Lt br mf S		
		15					
12		4			Same		Rec 1.6 Wet
	3	4					
		7					
		8				246.9 / 13.7	
14		3			Lt br-or cmf S Lt br cmf S; freq mf G		Rec = 1.3 Wet
	4	5					
		12					
		12					
16		3			Lt br cm(+)f S, t f G		Rec = 1.7 Wet
	5	6					
		8			Light brown coarse medium (+) fine SAND, trace fine Gravel.		
		10					
18		7			Same		Rec = 0.8 Wet
	6	9					
		16					
		18					
20		2			Lt br cm (+) f S		Rec = 2.0 Wet
	7	6					
		24					
		91					
22		6					

Dunn Corporation
Albany, NY 12205 (518)458-1313

TEST BORING LOG

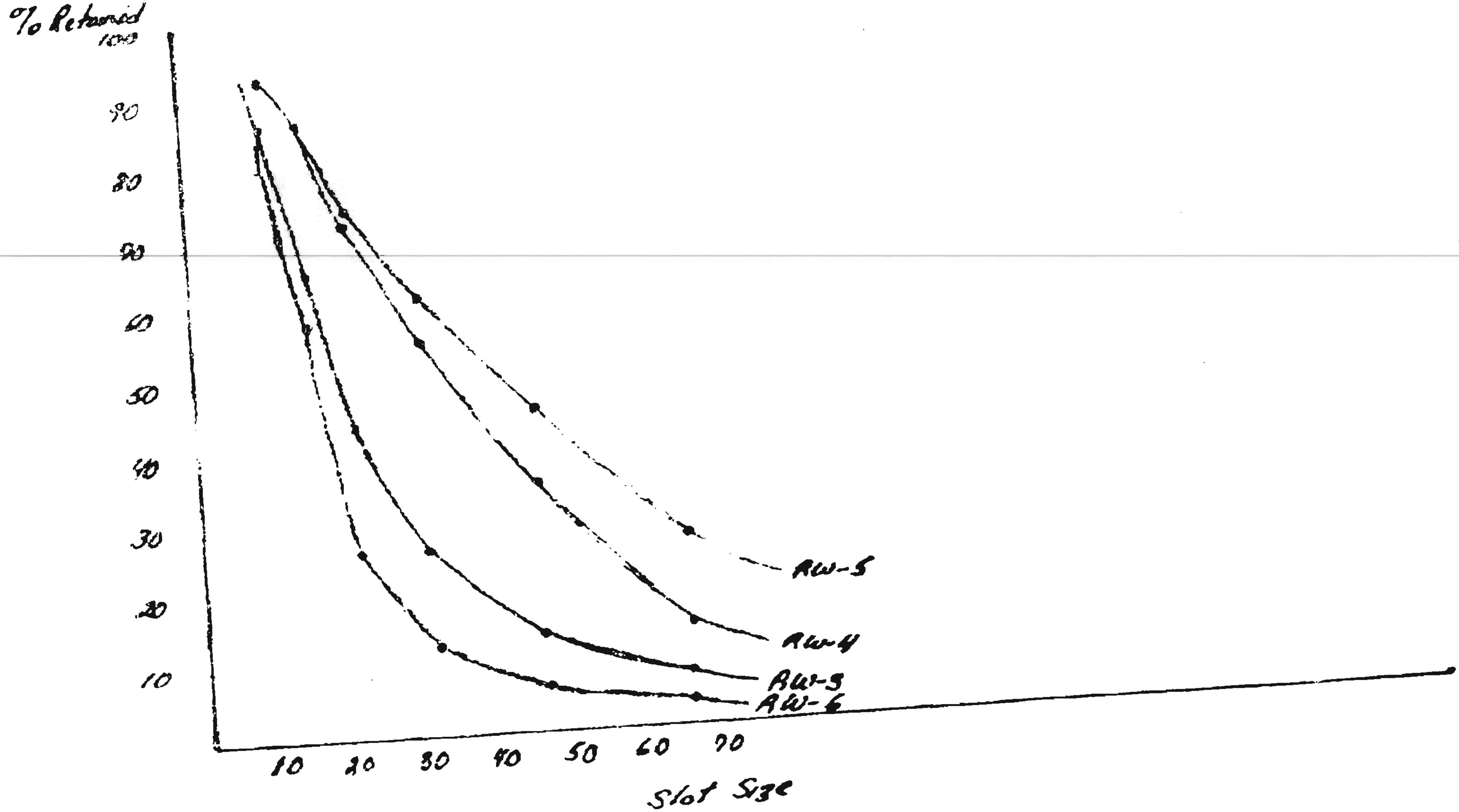
BORING No. RW-6

PROJECT	Recovery Well Installation	SHEET 3	OF 3
CLIENT	General Electric Company	JOB No.	00296-02090

DEPTH FT.	INTERVAL, RECOVERY, SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI-FICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	ELEV. / DEPTH	REMARKS
	8	16			Lt br mf S Light brown medium fine SAND.		Rec = 2.0 Wet Running Sands
		82					
		100/0.15					
24	9	4				236.4 / 24.2	Rec = 1.0 Wet Running Sands
		27			Alt seams of Tn $&C, cmf S, and $	235.6 / 25.0	Rods binding in augers, pen = 1.0
	10	5			Lt br $ Gr $		Rec = 1.0 Wet
26		6			GRAY SILT		
		20					
		62				233.6 / 27.0	
					Total Depth = 27.0' End of Boring		

APPENDIX B

Sieve Analysis



…reen Reccomendation
…3 & R6 30 Slot #2 Pac
R 4 & R5 50 Slot #3 Pac

Cumulative

JOB: General Electric Fort Edward

HOLE: RW-3, RW-4, RW-5

DEPTH: 10-18'6", 15'-21', 14'-20'

DATE: [illegible]/91

TOTAL WT.:

		RW-3 Wt.	RW-3 % Ret.	RW-4 Wt.	RW-4 % Ret.	RW-5 Wt.	RW-5 % Ret.
	.325						
	.263						
✓	.131						
✓	.093						
	[illegible]						
66	[illegible]	110	8.	231	14	404	[illegible]
	[illegible]						
	.046	192	14	576	35	[illegible]	4[illegible]
	.0328	356	26	915	55	918	[illegible]
	.0232	606	44	1203	72	1113	7[illegible]
	.0164	907	65	1429	86	[illegible]	[illegible]
	.0116	1199	86	1550	93	[illegible]	9[illegible]
	.0082	1302	94	1609	97	[illegible]	[illegible]
	[illegible]						
	00	1388	100	1664	100	[illegible]	10[illegible]

Approximate 40% Size

25 Slot

42 Slot

[illegible] Slot

Cumulative

JOB: General Electric For Edward

HOLE: BW-6

DEPTH: 18-24

DATE: 5/29/91

TOTAL WT.-

	Wt.	% Ret.	Wt.	% Ret.	Wt.	% Ret.
.525						
.263						
✓ .131						
✓ .093						
.[illegible]						
66 .[illegible]	53	4.				
[illegible]						
.046	83	7				
.0328	164	13				
.0232	318	26				
.0164	718	58				
.0116	1056	85				
.0082	1156	93				
[illegible]						
00	1247	100				

App

18
slot

JOB: General Electric Fort Edward

HOLE: [illegible] 3

DATE: [illegible]/28/81

DEPTH: 10-12 15-17 17-18'6"

TOTAL WT. -

	Wt.	% Ret.	Wt.	% Ret.	Wt.	% Ret.
.525						
.263						
✓ .131						
✓ .093						
.[illegible]						
66 .[illegible]	68	14.	42	8	0	—
[illegible]	[illegible]					
.046	10[illegible]	23	80	16	3	1
.0328	284	38	163	33	9	2
.0232	290	60	290	[illegible]	26	6
.0164	372	[illegible]	401	80	134	33
.0116	420	87	453	91	326	[illegible]
.0082	448	93	479	96	375	92
[illegible]						
00	480	100	500	100	406	100

JOB: GENERAL Electric Fort Edward

HOLE: RW-4

DATE: 5/29/91

DEPTH: 10'-12' | 15'-17' | 17'-19'

TOTAL WT. -

	10'-12' Wt.	10'-12' % Ret.	15'-17' Wt.	15'-17' % Ret.	17'-19' Wt.	17'-19' % Ret.
.525						
.263						
✓ .131						
✓ .093						
.[illegible]						
66 .[illegible]	54	11.	94	17	64	12
[illegible]						
.046	76	15	179	32	132	[illegible]
.0328	104	20	310	56	255	[illegible]
.0232	164	32	416	75	370	68
.0164	291	57	486	88	469	86
.0116	416	81	522	94	510	[illegible]
.0082	478	93	541	97	530	97
[illegible]						
00	512	100	555	100	546	100

JOB: ~~Ro~~ General Electric: Fort Edward

HOLE: RW4.

DATE: 5/29/91

DEPTH: 19'-21'

TOTAL WT.-

	Wt.	% Ret.	Wt.	% Ret.	Wt.	% Ret.
.525						
.263						
.131						
.093						
[illegible]						
[illegible]	73	13.				
[illegible]						
.046	265	47				
.0328	350	62				
.0232	417	74				
.0164	474	84				
.0116	518	92				
.0082	538	96				
[illegible]						
00	563	100				

JOB: General Electric Fort Edward

HOLE: RW 5.

DATE: 5/29/9[illegible]

DEPTH: 10-12 Cooked Stones | 12-14 | 14-16

TOTAL WT.-

	Wt.	% Ret.	Wt.	% Rec.	Wt.	% Rec.
.523						
.263						
✓ .131						
✓ .093						
.[illegible]						
66 .[illegible]	13	3.	~~100~~/130	18	92	[illegible]
[illegible]						
.046	26	5	157	29	180	38
.0328	72	15	228	42	266	56
.0232	164	33	324	59	342	72
.0164	328	66	430	78	404	85
.0116	427	86	485	89	435	[illegible]2
.0082	468	95	520	95	454	96
[illegible]						
00	495	100	548	100	473	100

JOB: General Electric Fort Edward

HOLE: RW 5

DATE: 5/25/91

DEPTH: 16-18 / 18-20 / 20-22

TOTAL WT. -

	16-18 Wt.	16-18 % Ret.	18-20 Wt.	18-20 % Ret.	20-22 Wt.	20-22 % Ret.
.525						
.263						
✓ .131						
✓ .093						
[illegible]						
66 [illegible]	150	29.	162	31		
[illegible]						
.046	246	47	251	48		
.0328	328	63	324	62		
.0232	391	75	380	73		
.0164	452	87	441	85		
.0116	478	92	476	92		
.0082	491	95	490	94		
~~.0041~~						
00	518	100	520	100		

05/29/91

JOB: General Electric - Fort Edward

HOLE: RW6

DATE: 5/29/91

DEPTH: 10-12 | 12-14 | 14-16

TOTAL WT.-

	Wt.	% Rec.	Wt.	% Rec.	Wt.	% Rec.
.525						
.263						
✓ .131						
✓ .093						
.[illegible]						
66 .[illegible]	27	6.	20	4	77	15
[illegible]						
.046	70	14	31	6	135	25
.0328	134	28	53	11	236	45
.0232	208	43	77	16	344	65
.0164	290	60	136	28	414	78
.0116	377	78	328	68	455	86
.0082	435	90	424	89	491	93
[illegible]						
00	485	100	479	100	530	100

JOB: General Electric Fort Edward

DATE: 5/29/91

HOLE: RW6.

DEPTH: 16-18 | 18-20 | 20-22

TOTAL WT.-

	16-18 Wt.	16-18 % Ret.	18-20 Wt.	18-20 % Ret.	20-22 Wt.	20-22 % Ret.
.525						
.263						
✓ .131						
✓ .093						
~~.[illegible]~~						
66 ~~.[illegible]~~	53	10.	28	9	18	4
~~[illegible]~~						
.046	80	16	41	13	30	7
.0328	131	26	72	22	60	[illegible]
.0232	234	46	115	36	109	[illegible]
.0164	381	75	192	60	250	[illegible]
.0116	451	89	275	85	373	[illegible]
.0082	479	95	298	93	398	[illegible]
~~[illegible]~~						
00	505	100	322	100	427	100

JOB: General Electric Fort Edward

HOLE: RW6

DEPTH: 22-24 24-25

DATE: 5/29/91

TOTAL WT. -

	Wt.	% Rec.	Wt.	% Rec.	Wt.	% Rec.
.525						
.263						
✓ .131						
✓ .093						
.[illegible]						
65 .[illegible]	7	1.	150	37		
[illegible]						
.046	12	2	184	46		
.0328	32	6	230	57		
.0232	94	19	272	68		
.0164	276	55	320	80		
.0116	408	82	352	88		
.0082	460	92	378	94		
~~.0041~~						
00	498	100	402	100		

APPENDIX C

Record Drawings