C.1674

manitoba hydro

Mailing Address • P.O. Box 815, Winnipeg, Manitoba Canada • R3C 2P4
Telephone: (204) 474-3934
Fax: (204) 474-4329
1100 Waverley Street

February 18, 1999

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Cranberry Portage
Decommissioned Diesel Generating Station
Manitoba Hydro File No. 70132

The former Cranberry Portage Diesel Generating Station and tank farm (originally operated by the Federal Government as part of the Distant Early Warning Radar System (DEW Line)) is one of the decommissioned sites suspected to be contaminated to some degree with materials now regulated by the Federal and Provincial Governments. In order to delineate the magnitude and extent of the contamination, the Civil Engineering Department of Engineering Services, Manitoba Hydro, has conducted an environmental site investigation.

For your review and comments, the attached report (Report No. ESD99-08) summarizes the results from this investigation. Based on the findings contained herein, a remediation action plan (RAP) will be developed and issued under separate cover at a later date.

Please forward any comments to the writer at the above address.

Yours truly,

Kevin Leung

K.C.Y. Leung, Project Engineer
Transmission Line & Civil Construction Department
Construction Division
Transmission & Distribution

KL/MEM0218A.LIST
Att.

Re : Cranberry Portage
Environmental Site Investigation Report
Manitoba Hydro File No. 70132

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CRANBERRY PORTAGE

DECOMMISSIONED DIESEL GENERATING STATION

GEOTECHNICAL INVESTIGATION OF

SUBSURFACE CONTAMINANTS

GEOTECHNICAL DESIGN SECTION
CIVIL ENGINEERING DEPARTMENT
ENGINEERING SERVICES DIVISION
POWER SUPPLY
FEBRUARY 1999

Manitoba Hydro
P.O. Box 815
Winnipeg, Manitoba
R3C 2P4

CIVIL ENGINEERING DEPARTMENT
ENGINEERING SERVICES
POWER SUPPLY

CRANBERRY PORTAGE DECOMMISSIONED DIESEL GENERATING STATION GEOTECHNICAL INVESTIGATION OF SUBSURFACE CONTAMINANTS

PREPARED BY	J H ELLIS
REVIEWED BY	P JANZEN
APPROVED BY	R J WITTEBOLLE
NOTED BY	R D RABAN
DATE	FEBRUARY 1999
REPORT NO	ESD99 08
FILE NO	62D1

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ACKNOWLEDGMENTS

The environmental investigation described in the following report was conducted at the request of the Manitoba Hydro Eastern Region Division in 1996

Drilling and sampling were performed by Paddock Drilling of Brandon, Manitoba and chemical laboratory testing by Enviro-Test of Edmonton Alberta Geotechnical laboratory testing was performed "in-house" by Geotechnical Laboratory staff All field activities and report preparation were conducted under the direction of Manitoba Hydro's Geotechnical Department

EXECUTIVE SUMMARY

This report records the fieldwork and results of environmental hydrocarbon investigations at Manitoba Hydro s former Diesel Generating Station at Cranberry Portage in the fall of 1996 Cranberry Portage is one of a number of diesel sites where the handling of diesel fuel during the period the generating facility was in operation has resulted in contamination of the soil Originally the Federal Government operated the generating facility as part of the Distant Early Warning Radar System (DEW Line) but later it was taken over by Manitoba Hydro The site was operational from November 1962 until October 1975 when the community was connected to the provincial power grid All activities were carried out in accordance with the Manitoba Environment criteria established in A Guideline for the Environmental Investigation and Remediation of Petroleum Storage sites in Manitoba July 1993

Areas of hydrocarbon contamination are identified which will enable the development of a remediation action plan

CRANBERRY PORTAGE
GEOTECHNICAL INVESTIGATION OF
SUBSURFACE CONTAMINANTS

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CRANBERRY PORTAGE
GEOTECHNICAL INVESTIGATION OF
SUBSURFACE CONTAMINANTS

1 0 INTRODUCTION

The primary goal of the geotechnical investigation was to delineate the magnitude and extent of contaminants at the Cranberry Portage Manitoba Hydro decommissioned diesel generating station The areas containing hydrocarbon contamination are identified and presented in this report A final remediation plan will be issued in a separate report

1 1 Location and Site History

The decommissioned diesel site is located in the community of Cranberry Portage approximately 90 kilometers north of The Pas Manitoba on Provincial Highway 10 Originally the Federal Government operated the generating facility as part of the Distant Early Warning Radar System (DEW Line) but later it was taken over by Manitoba Hydro A regional location and site plan is shown on Figure 1 An aerial photograph taken on September 1 1966 shows the site as it was before decommissioning (See Figure 2)

Diesel service was first provided in November of 1962 with a capacity of 1500 kW There were two 5000-gallon (22 730-liter) storage tanks located to the south of the building A smaller 500 gallon (2 273 liter) underground oil storage tank was also located on the south side immediately adjacent to the building and is still there

During a portion of the time that the diesel plant was in operation two mobile generators were positioned along the east side of the building A third mobile generator was located near the transformers to the northwest of the building The diesel plant was taken out of service in October 1975 when the community was connected to the provincial power grid

Fuel was delivered to the powerhouse on tanker trucks and transferred to the on site fuel storage tanks These transfer points have historically been a source of contamination and were investigated as part of this study However there were no recorded spills having occurred at the site

The Cranberry Portage Community is currently using the former diesel plant as a garage A small building was constructed on the concrete dyke that surrounded the most easterly 5000-gallon fuel storage tank and is being used for storage The large building to the southwest of the diesel plant was formerly a print shop but is now being used as a helicopter hanger

Figure 3 shows the location of the pertinent structures associated with the site as well as the location of underground utility and sewer lines The drawing also shows the location of photographs 1 through 4 which were taken in the fall of 1991

2 0 FIELD INVESTIGATION

The Cranberry Portage field investigation was carried out in September 1996 Twenty-five holes were drilled and sampled for hydrocarbon contamination The results of this study are presented in this report

2 1 Field Survey

In order to provide horizontal survey control a local grid was established using the southwest corner of the former diesel plant This was assigned co-ordinates 100 N and 100 E with the grid paralleling the walls of the building

A steel bolt in the concrete pier on the south side of the building nearest the south west corner was assigned elevation 100 00 This served as vertical control throughout the subsequent investigation

2 2 Field Sampling and Testing

2 2 1 Equipment

Test holes were drilled with a truck mounted Canterra drill Supplied by Paddock Drilling of Brandon This drill came equipped with CME hollow-stem augers and 7 6 cm OD split tubes for sampling Continuous sampling was achieved with a 0 6 meter split sample tube located within the lead auger Other drilling equipment included hammer plate split spoon, and cathead Photos 5 and 6 show the drill in operation on another project

2 2 2 Field Sampling and Testing

Continuous sampling with the CME auger system has the lowest risk of contaminating the sample because sampling is done ahead of the augers through a clean split tube Sample locations are identified on the overburden logs contained in Appendix A The split tubes were cleaned after each sample was taken using a high pressure washer Except for 4 drill holes in which standpipes were installed to monitor the ground water all were backfilled with surplus excavated material and/or granular bentonite Hole depths ranged from 3 80 to 12 19 meters

Recovered soil samples were put into polyethylene bags and checked for contamination using a photoionization detector (Microtip PID) and by smell A description of the PID is included in Appendix C The PID test results may be found on the drill logs in Appendix A

A modified general headspace technique was used in the field to test samples for hydrocarbon contamination The soils were broken up and agitated inside a clean polyethylene sample bag The air inside the bag was checked for volatile hydrocarbons using the Microtip PID which has an internal memory to record the readings

After testing for contamination a part of the selected sample was placed in a sterile glass jar The sample jar was sealed with aluminum foil capped and labeled These samples were then stored in a freezer Samples selected for testing were packed into small coolers with ice packs and transported to Enviro-Test Laboratories in Edmonton Alberta The samples sent to Enviro Test Labs were

analyzed for Total Extractables and/or Benzene, Toluene Ethylbenzene and Xylene (BTEX) Enviro-Test Laboratories test results may be found in Appendix B

3 0 SUMMARY OF RESULTS

The ground surface in the immediate area of the former Cranberry Portage diesel site is relatively flat even though the general relief in the area is low to moderate with numerous lakes and swamps The site is located near the southern boundary of the Flin Flon – Snow Lake greenstone belt an area of major importance to Manitoba as a source of mineral deposits The precambrian bedrock consists of mainly mafic to felsic volcanic rocks that have been intruded by igneous granitic plutons None of the drill holes during the hydrocarbon investigation program reached the underlying bedrock at the site

3 1 Overburden

Overburden in the area is of glacial origin The sequence of geological glacial events as described by Manitoba Energy and Mines Branch are as follows

a) Dominant ice flow to the south and southwest

b) Ice retreat followed by a westerly ice advance and

c) Expansion of Lake Agassiz into the area as the ice retreated northward and final withdrawal of Lake Agassiz

Glaciofluvial deposits at the site are outwash fans formed where meltwater streams flowed from the ice into Lake Agassiz The logs from the 25 holes that were drilled may be found in Appendix A They show the overburden to be primarily sand or silty sand

3 2 Ground Water

Four standpipe observation wells were installed during the investigation to facilitate monitoring of the groundwater table at the site and also to allow for sampling and testing Five centimeter diameter PVC plastic pipe with a 0 02 millimeter slotted well screen at the base were sealed and backfilled into drill holes CB-001 CB-008 CB-021 and CB 024 Protective steel pipe and caps were also added Observations taken on September 24 1996 one to four days after the wells were installed indicated

a water table at Elevation 88 5 meters Water level observations are shown on Figure 8 and sketches of the installations are included with the drill logs in Appendix A

Water samples were collected from these wells and forwarded to Enviro-Test for BTEX testing

4 0 EXTENT OF SOIL CONTAMINATION

The Manitoba Department of the Environment published a document entitled "Treatment and Disposal of Contaminated Soil June 1996 revised May 1998 This provincial guideline contains remediation criteria based on site sensitivity levels The remediation criteria for soil contaminants are shown in Table 1

Remediation Criteria for Soil

Parameter	Level 1 mg/kg or ppm	Level 2 mg/kg or ppm	Level 3 mg/kg or ppm
Benzene	0 05	0 5	5
Toluene	0 1	3	30
Ethylbenzene	0 1	5	50
Xylene	0 1	5	50
Total Semi-Volatile Hydrocarbons	500	2000	2000
Total Volatile Hydrocarbons	100	150	800
Mineral Oil and Grease	1000	5000	5000

Table 1 Manitoba Environment Remediation Criteria for Soil

The Canadian Council of Ministers of the Environment published guidelines in Report CCME EPC-CS34 entitled "Interim Canadian Environmental Quality Criteria for Contaminated Sites" dated September 1991 Remediation criterion are given for both soil and water In addition, the CCME published updated

guidelines in March 1997 titled Recommended Canadian Soil Quality Guidelines

Table 2 summarizes some of the pertanent criteria from both reports for soil

CCME Recommended Canadian Soil Quality Guidelines

Parameter	Land Use			
	Agricultural mg/kg or ppm	Residential mg/kg or ppm	Commercial mg/kg or ppm	Industrial mg/kg or ppm
Benzene	0 05	0 5	5	5
Toluene	0 1	0 8	0 8	0 8
Ethylbenzene	0 1	1 2	20	20
Xylene	0 1	1	17	20
Polycyclic Aromatic Hydrocarbons				
Benzo(a)pyrene	0 1	0 7	0 7	0 7
Napthelene	0 1	0 6	22	22
Pentachlorophenol	7 6	7 6	7 6	7 6
Arsenic	12	12	12	12
Cyanide	0 9	0 9	8	8
Lead	70	140	260	400

CCME Interim Canadian Environmental Quality Criteria for Contaminated Sites

Polycyclic Aromatic Hydrocarbons				
Benzo(a)anthracene	0 1	1	10	10
Benzo(a)flouranthene	0 1	1	10	10
Benzo(k)flouranthene	0 1	1	10	10
Dibenz(a h)anthracene	0 1	1	10	10
Indeno(1 2 3-c d)pyrene	0 1	1	10	10
Phenanthrene	0 1	5	50	50
Pyrene	0 1	10	100	100
Polychlorinated Biphenyls	0 5	5	50	50

Table 2 CCME Soil Quality Guidelines

A distinction is made depending on the proposed property usage Agricultural Residential or Parkland, or Commercial and Industrial

Table 3 presents remediation criteria for drinking water and the support of freshwater aquatic life for various parameters

CCME Canadian Water Quality Guidelines

Parameter	Freshwater Aquatic Life Maximum Concentration ppb	Drinking Water Maximum Concentration ppb	Drinking Water Aesthetic Objectives ppb
Benzene	300	5*	
Toluene	2		<24
Ethylbenzene	90		<2 4
Xylene			<300*
Polycyclic Aromatic Hydrocarbons			
Benzo(a)Anthracene			
Benzo(a)pyrene		0 01*	
Benzo(b)flouranthene			
Benzo(k)flouranthene			
Dibenz(a h)Anthracene			
Indeno(1 2 3-c d)pyrene			
Phenanthrene			
Pyrene			
Pentachlorophenol	0 5	60*	<30*
Polychlorinated Biphenyls	1ng/L		
Arsenic	50	25*	

*** CCME Interim Canadian Environmental Quality Criteria for Contaminated Sites (Water)**

Table 3 CCME Canadian Water Quality Guidelines

The CCME guidelines are based on the Canadian Water Quality Guidelines (CCREM 1987) and Guidelines for Canadian Drinking Water Quality (Health and Welfare Canada 1989)

4 1 Total Extractable Hydrocarbons in Soils

A total of thirty-eight soil samples were sent to Enviro-Test Laboratories in Edmonton for total extractable hydrocarbon analysis Samples selected for testing were chosen on the basis of location, photoionization detector (PID) results smell and depth Enviro-Test Laboratory results are included in Appendix B and are tabulated on Figure 4

Figure 4 also shows a contour plot of Enviro-Test Laboratories total extractable results based on the highest laboratory result from each hole tested Contaminated soil is defined as having a concentration greater than 500 ppm of Total Semi Volatile Hydrocarbons to satisfy the Level I remediation criteria or 2000 ppm if Level II or III remediation criteria applies

A contour map of the highest photoionization detector (PID) values recorded in each drill hole is presented in Figure 5 PID results are also plotted on the drill logs found in Appendix A The absence of any hydrocarbon odor together with low PID values was used to define the outer boundaries of the contaminated areas

Although there is no direct correlation between PID values and parts per million of total extractable hydrocarbons determined by chemical analysis the areas defined by the contours shown in Figure 4 and those of Figure 5 are very similar Both figures suggest a high level of contamination in the area of the fuel tanks and to the east of the former diesel generating station The contaminated zone is also expected to extend under the existing building

The location of cross sections A-A and B B are shown in Figures 6 Anticipated zones of contamination are highlighted on these sections based on laboratory results PID readings and smell Contaminated materials with a reported level of total extractable hydrocarbon above 2000 ppm are found at depths up to 8 meters The water table in the area at the time the samples were taken was approximately 9 5 meters deep

4 2 BTEX in Soils

Six soil samples were tested for Benzene Toluene Ethylbenzene and Xylene (BTEX) The site and the surrounding properties are classed an Industrial Area None of the samples exceeded the 1997 CCME Recommended Guidelines for Industrial use See Figure 7

4 3 BTEX in Water

On September 20 1996 during the course of drilling CB-001 a water sample was collected and sent to Enviro Test Laboratories for testing The sample indicated levels below the detection limit for Benzene Toluene Ethylbenzene and Xylene and volatile hydrocarbons

On September 24 1996 water samples were collected from the standpipe wells CB-001 CB-008 CB 021 and CB-024 In the case of CB-008 and CB 021 two samples were taken an initial sample and another after the well had been bailed for some time The objective was to insure a sample representative of the water in the surrounding overburden

All were tested for BTEX and found to be below the accepted freshwater criteria to support aquatic life The results of the BTEX water testing program are presented on Figure 8 and the Enviro Test Laboratory results are included in Appendix B

4 4 Polycyclic Aromatic Hydrocarbons (PAH)

Five soil samples (CB 001 CB-005 CB-006 CB-010 and CB 016) were tested for PAH and none of these exceeded the criteria for Industrial Land Use The results from this testing program are presented on Figure 9

4 5 Total Volatile Hydrocarbon Testing

Figure 10 presents the results from the 6 soil samples tested for Total Volatile Hydrocarbon None of the samples exceeded the established Level III criteria of 800 ppm

4 6 Oil and Grease (Hydrocarbons Recoverable) in Soils

A sample from CB-016 was tested for Oil and Grease and exceeded the Level I criteria of 1000ppm with a result of 2500ppm This was well under the level II and level III criteria of 5000ppm

5 0 SITE INFORMATION

The following information is presented to comply with Section 2 of the Manitoba Environment July 1993 Guidelines

Site Description The former diesel generating station is being used by the community of Cranberry Portage as a garage for equipment and vehicles A small building has been erected on the concrete barrier formerly surrounding one of the 5000gal fuel tanks

Surrounding Land Use Industrial

Groundwater Usage Groundwater was encountered but we understand there is no groundwater usage

Surface Water No surface water in the area

Underground Structures An underground 500 gallon fuel tank is still located onsite There are also underground sewers and buried MTS telephone cables There may be remnant ground rods and grounding grids within the site area

Surficial Geology Sand and silty sand overlying precambrian bedrock

Other Environmental Conditions None

Evidence of Surface Contaminants Some visible ground staining

Proposed land use Industrial

6 0 SITE SENSITIVITY CLASSIFICATION

The site has been assessed in conformance with Section 5 of the Manitoba Environment July 1993 Guidelines

6 1 Groundwater/Surface Water

Receptor sensitivity is considered low, as there is no usage of groundwater for domestic supply While contaminated groundwater and surface runoff could enter the sewer system it would have no direct pathway to potable water supplies As a result the likelihood of impact is also considered low

6 2 Inhalation Risk

Receptor sensitivity is low as the area is Industrial Likelihood of impact is also low as the area will continue to be used by the community as a garage

With respect to groundwater vapors receptor sensitivity would also be low hence a low site sensitivity ranking

6 3 Remediation Criteria

The above findings indicated soil remediation requirements would be to Level 3 criteria Remediation of groundwater is not required

GLOSSARY

Aquifer - Rocks or unconsolidated sediments that are capable of yielding a significant amount of water to a well or a spring

Backfill - Material used during drilling to replace the material being removed

Bedding Plane - A planar or nearly planar surface within a mass of stratified rock layers that visibly separates each layer

Bedrock - A general term referring to rock that underlies unconsolidated material

Bentonite - A hydrous aluminum silicate clay mineral which is used to provide a seal between well casing and the borehole

Bio-Degradation - Refers to the decay breakdown or destruction of organic materials (in this case petroleum hydrocarbons) by micro organisms usually bacteria or fungi In this treatment process enzymes produced by the micro-organisms break down or digest molecules of the contaminants This is similar to the normal decay or rotting of fallen trees by naturally occurring micro-organisms (bacteria and fungi)

Bio-Piles - A treatment process used to reduce the concentration of petroleum hydrocarbons in the soil by bio-degradation and volatilization It involves spreading the contaminated soil in windrows, adding water and nutrients (fertilizer) and mixing or tilling periodically This provides optimal growth conditions for growth of micro-organisms (bacteria and fungi) in the soil The micro-organisms degrade or breakdown the contaminants (bio-degradation) In some cases it is necessary to add a culture of bacterial or fungi that have been acclimatized to digest petroleum hydrocarbons By exposing fresh surfaces of the contaminated soil to the air the process also increases the rate of evaporation of volatile (purgeable) contaminants

Borehole - A hole drilled or bored into the earth

BTEX - Benzene Toluene Ethyl-benzene Xylene

CCME - Canadian Council of Ministers of the Environment

Capillary Fringe - The zone immediately above the water table in which the pores are filled with water under pressure less that atmospheric

Cathead - A revolving drum mounted on a drill rig for purposes of friction-lifting the "Hammer" by its rope in the "Standard Penetration Test"

Clay - Fine-grained soil or the fine grained portion of soil that can be made to exhibit plasticity (putty-like properties) within a range of water contents and which exhibits considerable strength when air-dry

Contaminant - Refers to any solid, liquid, gas waste radiation or any combination thereof that is foreign to or in excess of the natural constituents of the environment, and
a) that affects the natural physical chemical or biological quality of the environment, or
b) that is or is likely to be injurious or damaging to the health or safety of a person

Contamination - The introduction into soil, air or water of a chemical material that will adversely affect the medium's quality

Dispersion - Process of contaminant transport which occurs as a result of mechanical mixing and molecular diffusion, the extent to which a substance spreads as it moves through the system

Extractable Hydrocarbons (or total extractables) - The results of an analytical procedure that represents a summation of the concentrations of hydrocarbons from the C_7 to C_{30} carbon range (including toluene, ethyl-benzene xylene) and is calculated against a calibrated diesel or gasoline standard Most hydrocarbons in this range are of low volatility such as diesel fuel or fuel oil (ie they do not evaporate as quickly as the smaller hydrocarbon molecules such as those found in gasoline and more volatile hydrocarbon materials)

Fracture - A break in a rock formation as a result of structural stresses If they are open, fractures may provide pathways for fluid movement

Geomembrane - An impermeable synthetic membrane used with soil, rock or earth materials in geotechnical engineering structures as a barrier to seepage or leakage

Groundwater - Water under hydrostatic pressure in interconnected pores of the saturated zone

Hammer - A 63 6 kg (140 lb) donut shaped metal weight which is dropped from a height of 0 76m (30 inches) onto the "plate" to drive the "split spoon" in the "Standard Penetration Test"

Hazard - Something that can cause injury disease death, economic loss or environmental deterioration

Hollow Stem Augers - A soil auger which has a hollow centre in its shaft through which a "Split Sample Tube" or a "Split Spoon" can be used for retrieving soil samples as the auger string is advanced

Hydraulic Gradient - The ratio of the change in total head to distance in a given direction

Hydrocarbons - Chemical compounds made up of hydrogen and carbon, for example methane propane butane, benzene ethylbenzene toluene xylene octane etc Petroleum products such as diesel fuel fuel oil gasoline lubricating oils and solvents are complex mixtures of hydrocarbons

Infiltration - The flow of fluid downward from the land surface into and through soil and rock pores

Landfarm - A level area of ground with an impervious base and perimeter dyke (usually clay) for containment and treatment of contaminated soil

Landfarming - A treatment process to reduce the concentration of petroleum hydrocarbons in the soil by bio-degradation and volatilization It involves spreading the contaminated soil in a layer 0 2 to 0 3 meters (8 to 12 inches) thick at a landfarm, adding water and nutrients (fertilizer), and tilling periodically This provides optimal growth conditions for growth of micro-organisms (bacteria and fungi) in the soil The micro-organisms degrade or breakdown the contaminants (bio-degradation) In some cases it is necessary to add a culture of bacteria or fungi that have been acclimatized to digest petroleum hydrocarbons The tilling process also increases the rate of evaporation of volatile (purgeable) contaminants by exposing fresh surfaces of the contaminated soil to the air

Migration - The movement of chemicals in flowing water or vapour in the subsurface

Moisture Content - The ratio expressed as a percentage of the weight of water in a given soil mass to the weight of solid particles

PCB - Polychlorinated biphenyls used in transformer oil because of their cooling, insulating and non-flammable properties

PCP - Pentachlorophenol used as a wood preservative

Plate - An annular collar attached to the uppermost rod section which is struck by the "Hammer" in the "Standard Penetration Test"

Plume - A body of contamination originating from a specific source and influences by certain factors such as local groundwater flow patterns and soil characteristics

Porosity - The ratio of the volume of pore spaces in a rock or sediment to the total volume of the rock or sediment

Purgeable Hydrocarbons The results of this test procedure are considered to represent the more volatile hydrocarbons such as benzene and are calculated against a calibrated diesel or gasoline standard Most hydrocarbons in this range are relatively volatile (ie they evaporate quickly) Examples include the smaller hydrocarbon molecules such as those found in gasoline and volatile solvents

Remediation Criteria - Refers to the acceptable residual levels of contaminants in soil or water after remediation activities have been completed For example Table 1 of the draft Manitoba Guideline specifies a remediation criterion of 500 milligrams total extractable hydrocarbons per kilogram of soil for soils at high sensitivity sites such as residential areas that are contaminated with diesel fuel or fuel oil Higher residual concentration (remediation limits) are specified for less sensitive land uses For example Table 1 of the draft Guideline permits levels up to 2 000 mg/kg total extractable hydrocarbons at low sensitivity or low risk sites

Risk - Probability that something undesirable will happen from deliberate or accidental exposure to a hazard

Sand - Particles of rock that will pass the No 4 standard sieve and be retained on the No 200 sieve

Saturated Zone - The zone where voids in the soil or rock are filled with water

Silt - Material passing the No 200 standard sieve that is non-plastic or very slightly plastic and that exhibits little or no strength when air dried

Split Sample Tube - A steel tube split in half lengthwise which fits inside the "Hollow Stem Augers" and projects below its cutting teeth so that a good quality soil sample can be retrieved during each advance of the augers

Split Spoon - A driven sampler containing a smaller sized version of the "Split Sample Tube" having a cutting shoe at its lower end and a check valve and drill rod connector at its top end, which can fit through the "Hollow Stem Auger" in the "Standard Penetration Test"

Standard Penetration Test - A soil sampling procedure whereby a "Split Spoon Sampler" is driven by means of a "Hammer" and "Plate" 0 46m (18 inches) into the soil The number of blows required for the last 0 30m (12 inches) of penetration is called the penetration resistance and is used to characterize the soil consistency or density

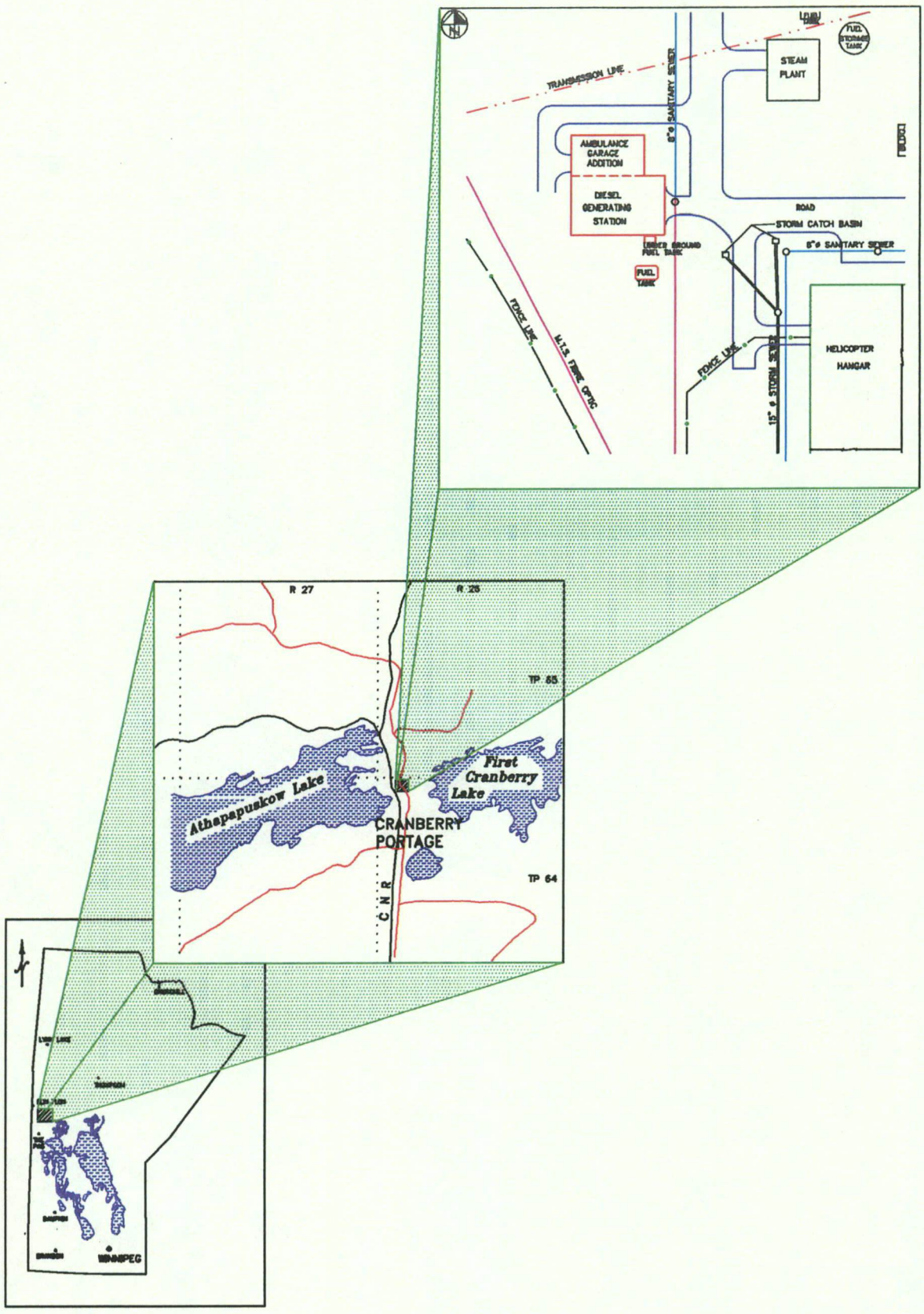
TEH - Total Extractable Hydrocarbon, the result is a summation of the hydrocarbon concentration from the C_7 to C_{30} carbon range (including toluene, ethyl-benzene xylene) and is calculated against a calibrated diesel standard

Till - Material deposited by glaciation, usually composed of a wide range of particle sizes, which has not been subjected to the sorting action of water

Volatilization - Refers to the evaporation of volatile compounds Since the concentrations of highly volatile compounds in soil contaminated with diesel fuel is relatively low this is generally a less significant factor than bio-degradation in the landfarming process

Water Table - The level at which the saturated zone is at atmospheric pressure It is measured by installing wells which extend a few feet into the saturated zone and then recording the water level in those wells

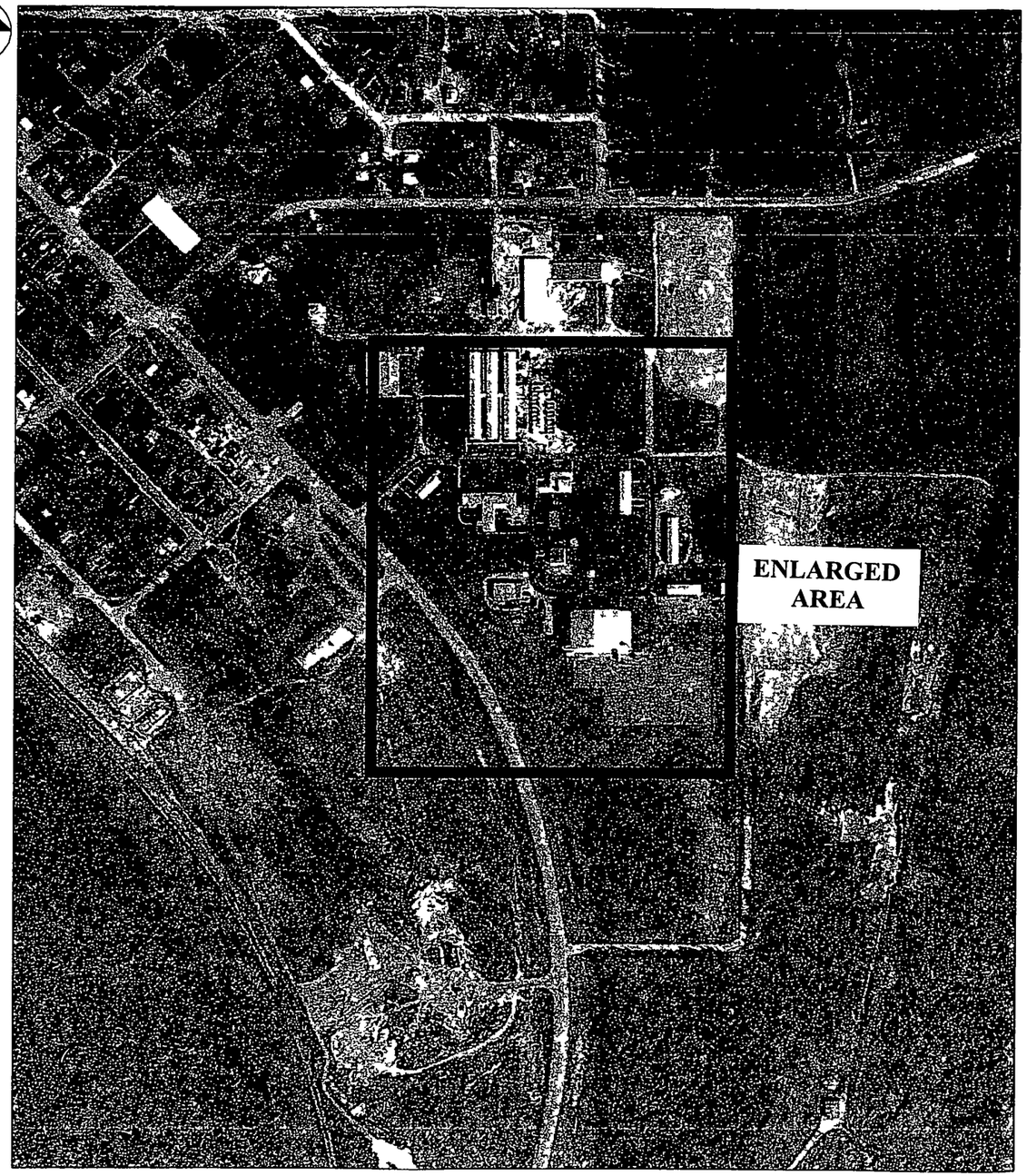
Figures

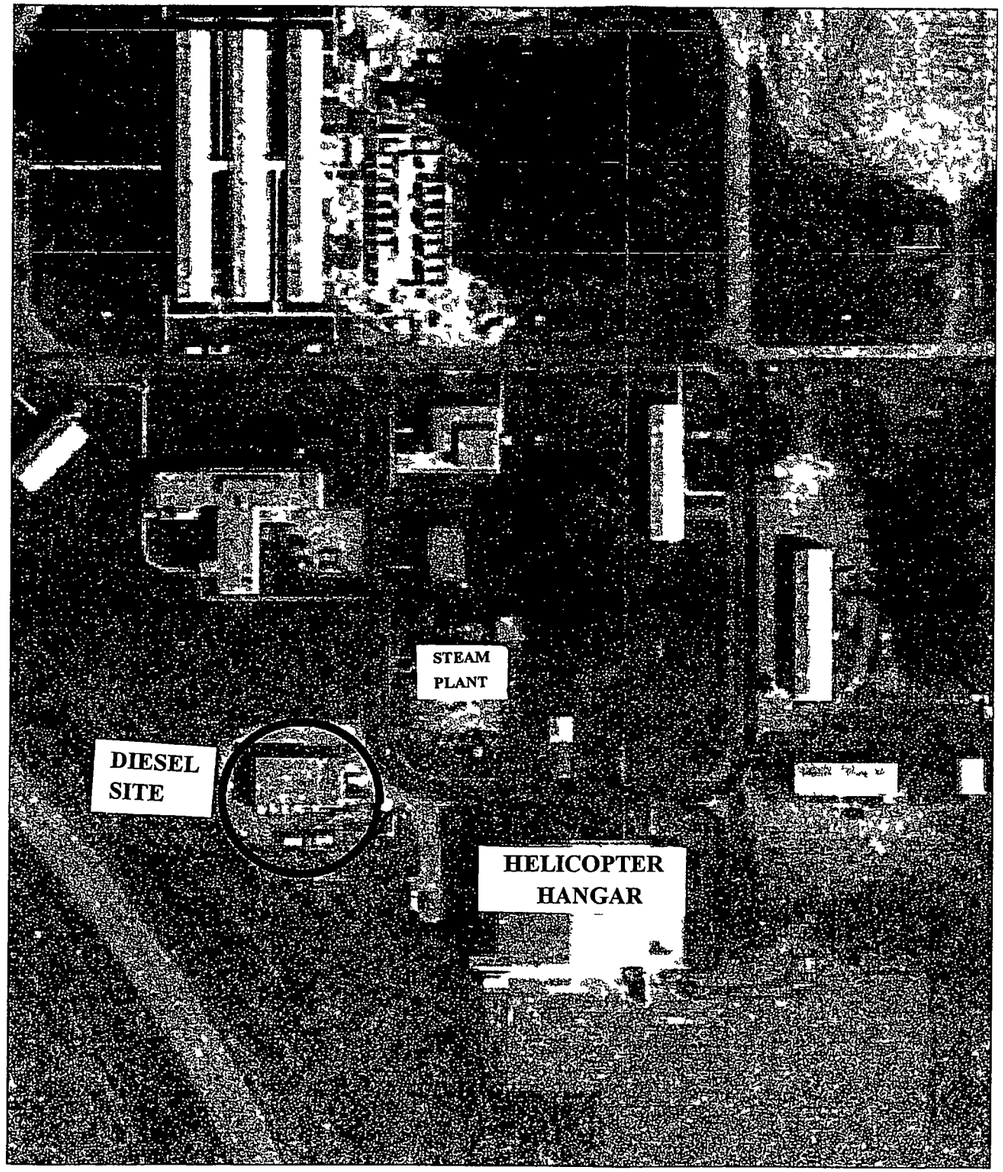


REGIONAL LOCATION
AND SITE PLAN

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL
GENERATING STATION

FIGURE 1





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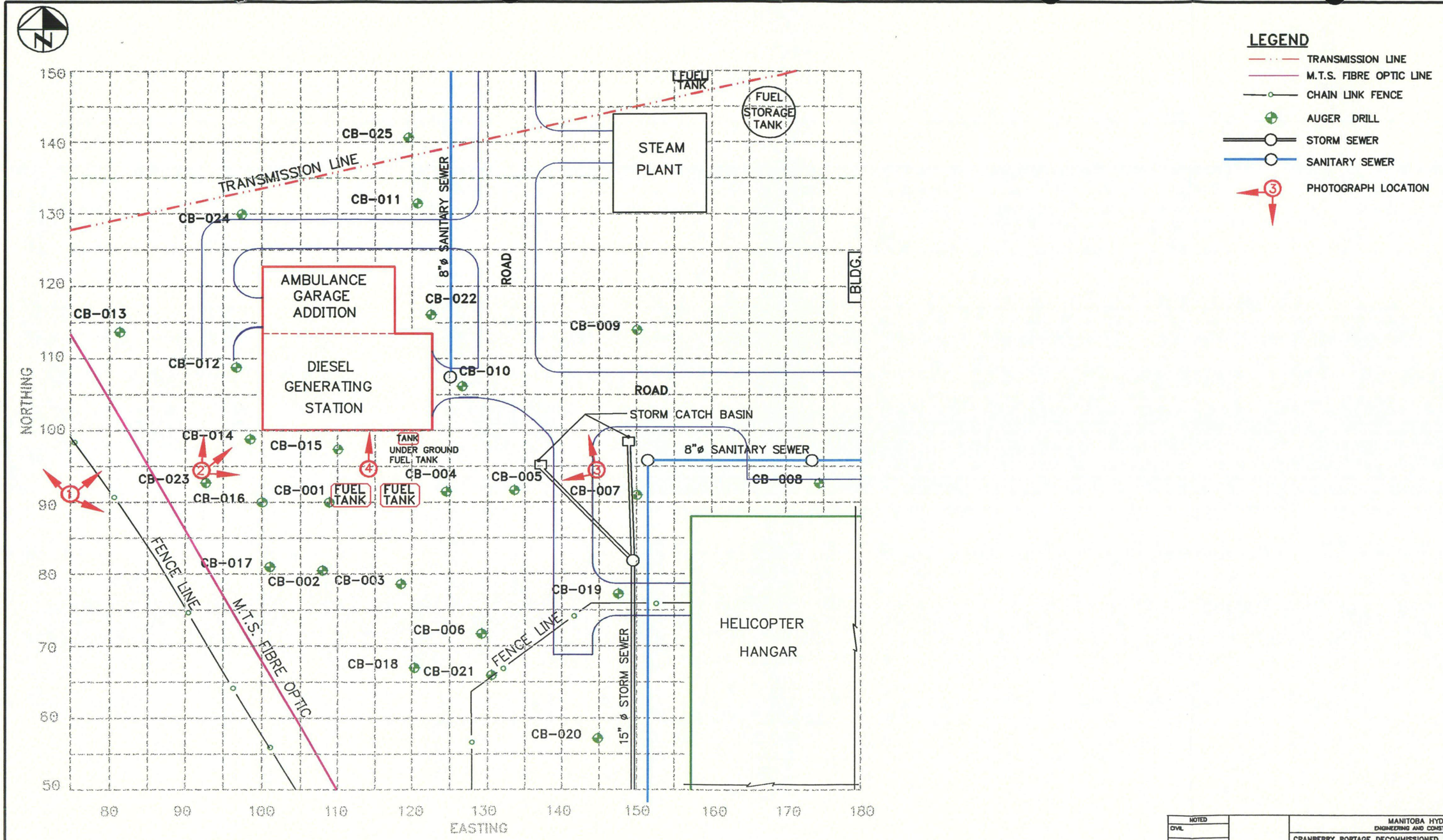


LEGEND

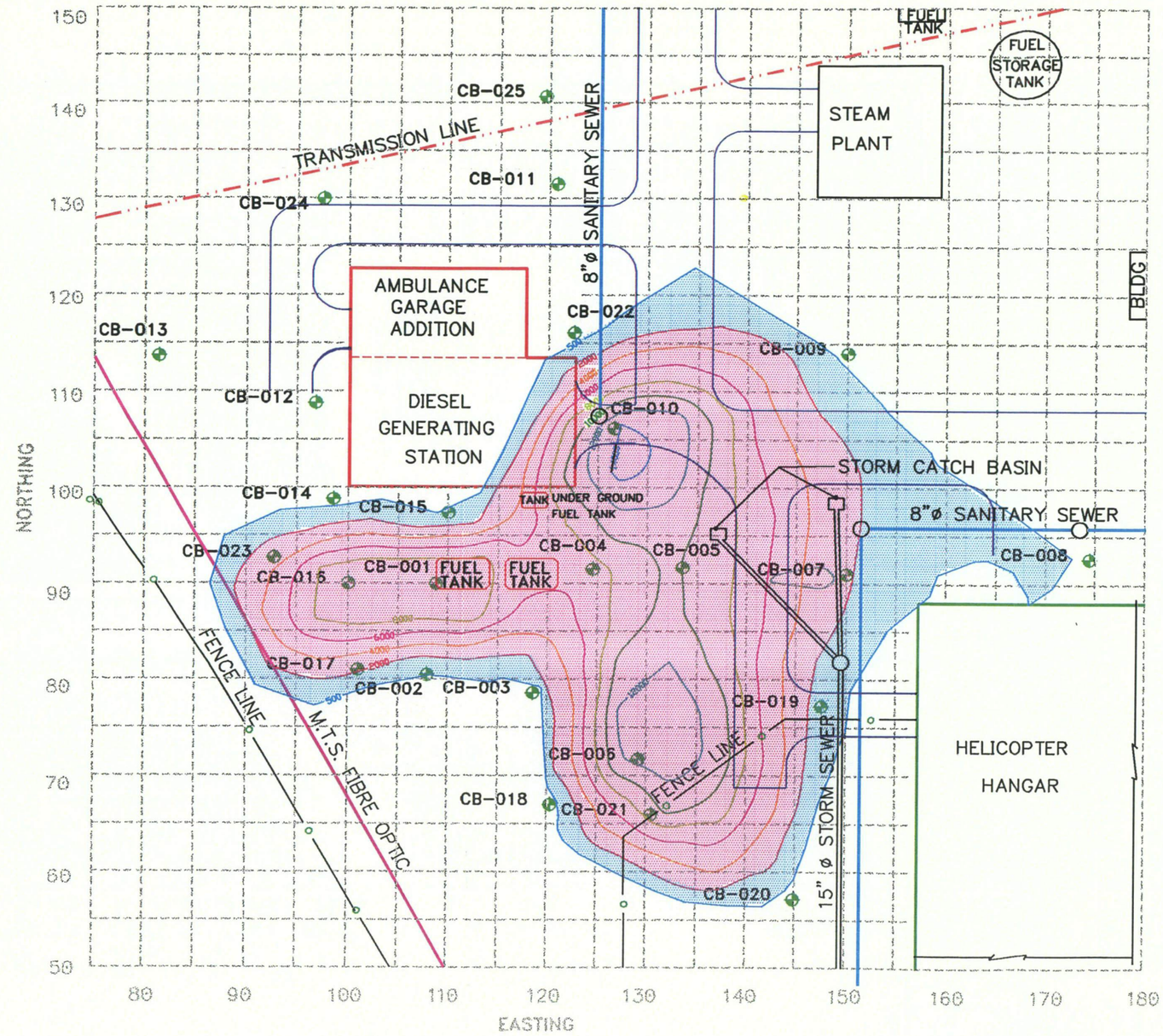
- TRANSMISSION LINE
- M.T.S. FIBRE OPTIC LINE
- CHAIN LINK FENCE
- AUGER DRILL
- STORM SEWER
- SANITARY SEWER
- PHOTOGRAPH LOCATION (3)

0 25m

SCALE 1:500

NOTED		MANITOBA HYDRO ENGINEERING AND CONSTRUCTION	
CIVIL		CRANBERRY PORTAGE DECOMMISSIONED DIESEL GENERATING STATION	
GEOTECHNICAL		CRANBERRY PORTAGE	
ELECTRICAL		LOCATION DRAWING AND SITE PHOTOGRAPHS	
F.P. ENGINEER			
MECHANICAL			
DISTRIBUTION	DRAWN		
PROJECT	CHECK		
CONSTRUCTION	SCALE 1:500	FIGURE 3	SHT. 001 REV. 00
MANAGER	DATE		

D:\1\DIESEL98\CRANBERY\NEW\FIGURE3.DWG



NOTE

1. FUEL TANKS AND POWERHOUSE WERE IN OPERATION FROM MAY 1965 TO NOVEMBER 1971.

LEGEND

- TRANSMISSION LINE
- M.T.S. FIBRE OPTIC LINE
- CHAIN LINK FENCE
- AUGER DRILL HOLE
- TOTAL EXTRACTABLE HYDROCARBONS 500-2000 ppm
- TOTAL EXTRACTABLE HYDROCARBONS > 2000

CRANBERRY PORTAGE
TOTAL EXTRACTABLE HYDROCARBON RESULTS

Hole Number	Depth (m)	Total Extractable Hydrocarbon (ppm)	Hole Number	Depth (m)	Total Extractable Hydrocarbon (ppm)
CB-001	4.7	11000	CB-008	10.28	4.1
CB-001	7.88	1.9	CB-009	2.62	5.9
CB-001	11.5	3.4	CB-010	4.55	3100
CB-002	1.5	7.3	CB-010	6.8	14000
CB-003	2.4	5.5	CB-010	7.15	ND
CB-004	2.28	67	CB-011	1.85	900
CB-004	3.8	7000	CB-014	2.62	1.6
CB-004	4.92	13	CB-015	2.25	1.4
CB-004	6.85	6000	CB-015	3.05	71
CB-005	3.05	10000	CB-016	1.87	10000
CB-005	6.85	7.5	CB-016	2.25	2500
CB-006	2.25	13000	CB-016	2.62	ND
CB-006	3.42	5100	CB-016	3.05	5.2
CB-006	3.8	190	CB-018	5.6	1.4
CB-007	2.62	1200	CB-019	8.35	1000
CB-007	5.3	2100	CB-019	10.35	ND
CB-007	8.95	1400	CB-020	3.42	11
CB-008	3.35	0.63	CB-022	3.42	11
CB-008	8.55	410	CB-024	3.4	13
Detection Limit		5 ppm			

Remediation criteria

Level 1	500 ppm
Level 2	2000 ppm
Level 3	2000 ppm

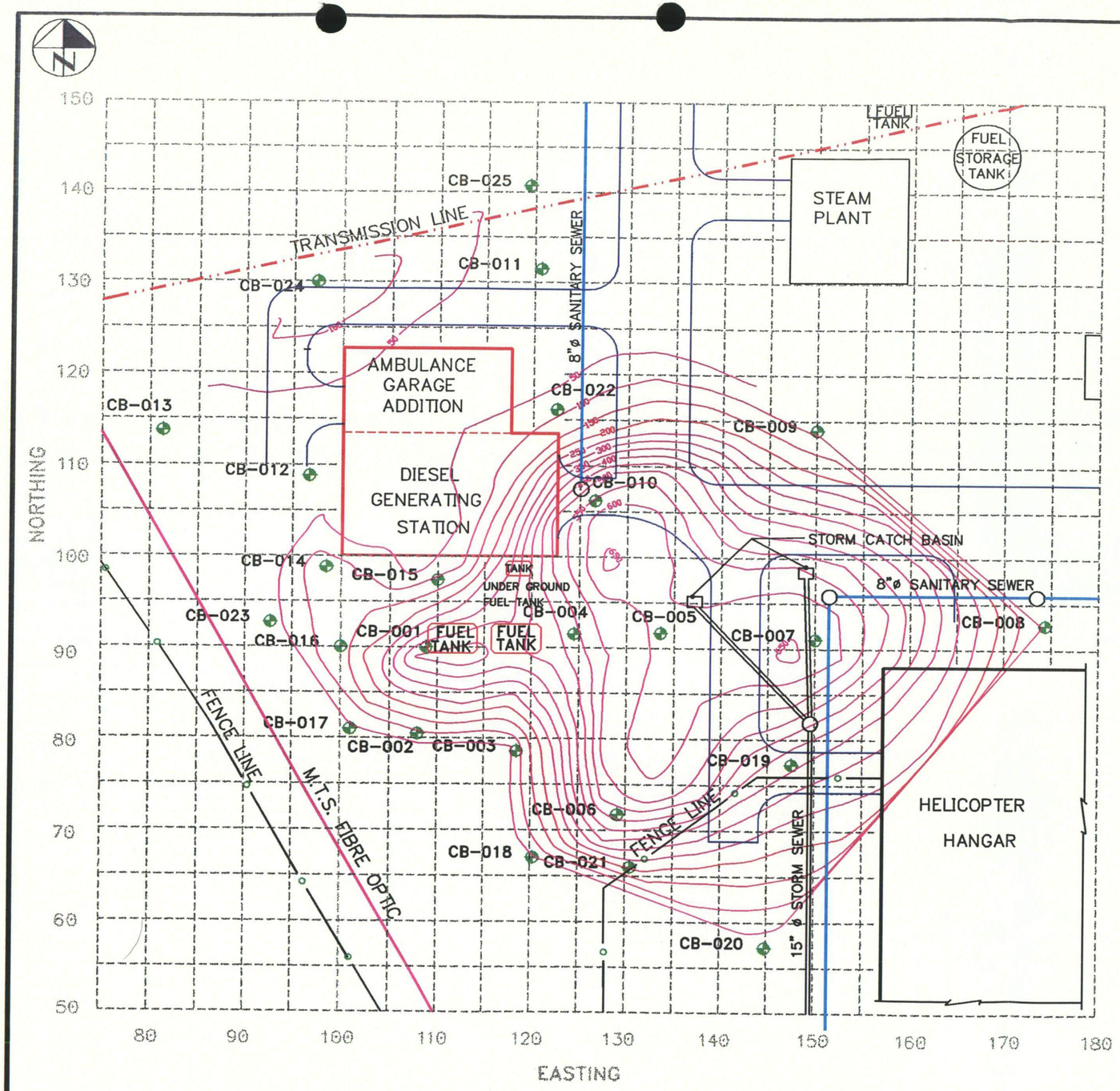
Note: Values exceeding the remediation criteria are highlighted in red.
ND= Not Detected

0 25m

SCALE 1:500

NOTED		MANITOBA HYDRO ENGINEERING AND CONSTRUCTION
CIVIL		CRANBERRY PORTAGE DECOMMISSIONED DIESEL GENERATING STATION
GEOTECHNICAL		CONTOUR PLAN OF MAXIMUM TOTAL EXTRACTABLE HYDRO – CARBONS CONCENTRATION
ELECTRICAL		
F.P. ENGINEER		
MECHANICAL		
DISTRIBUTION	DRAWN	
PROJECT	CHECK	
CONSTRUCTION	SCALE 1:500	FIGURE 4 SHT. 01 REV. 00
MANAGER	DATE	

D:\1\DIESEL98\CRANBERY\NEW\FIGURE4.DWG



LEGEND

- TRANSMISSION LINE
- M.T.S. FIBRE OPTIC LINE
- CHAIN LINK FENCE
- STORM SEWER
- SANITARY SEWER
- AUGER DRILL HOLE
- 100 — PHOTOIONIZATION DETECTOR CONTOUR

NOTE

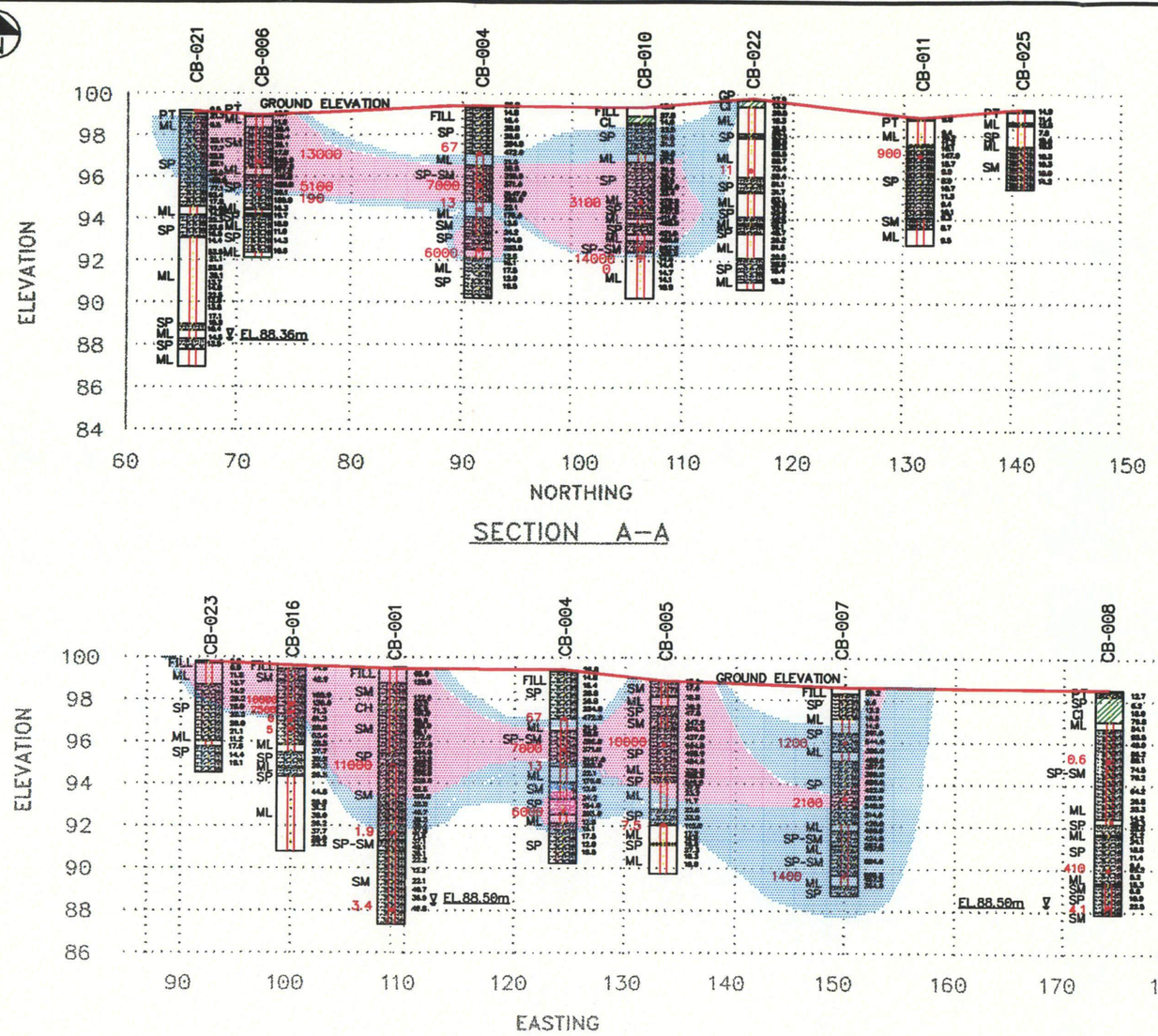
1. FUEL TANKS AND POWERHOUSE WERE IN OPERATION FROM MAY 1965 TO NOVEMBER 1971.
2. THE CONTOUR MAP PRESENTED ON THIS DRAWING IS BASED ON THE HIGHEST PHOTOIONIZATION DETECTOR (MICROTIP PID ANALYSIS FOR TOXIC GASES AND VAPOURS) VALUES RECORDED FROM SOIL SAMPLES IN EACH DRILL HOLE.

0 25m

SCALE 1:500

NOTED		MANITOBA HYDRO ENGINEERING AND CONSTRUCTION
CIVIL		CRANBERRY PORTAGE DECOMMISSIONED DIESEL GENERATING STATION
GEOTECHNICAL		CRANBERRY PORTAGE
ELECTRICAL		CONTOUR PLOT OF PHOTO – IONIZATION DECTECTOR READINGS
F.P. ENGINEER		
MECHANICAL		
DISTRIBUTION	DRAWN	
PROJECT	CHECK	
CONSTRUCTION	SCALE 1:500	FIGURE 5 — SHT. 01 — REV. 00
MANAGER	DATE	

D:\1\DIESEL98\CRANBERY\NEW\FIGURE5.DWG



SECTION A–A

SECTION B–B

Hole Number	Northing	Easting	Elevation	Depth
CB-004	91.50	124.50	99.38	9.15
CB-006	71.70	129.10	98.96	6.85
CB-010	106.20	126.60	99.37	9.15
CB-011	131.50	120.70	98.90	6.10
CB-021	66.00	136.50	99.15	12.20
CB-022	116.10	122.50	99.80	9.15
CB-025	140.70	119.50	99.27	3.80

Hole Number	Northing	Easting	Elevation	Depth
CB-001	90.00	108.80	99.52	12.19
CB-004	91.50	124.50	99.38	9.15
CB-005	91.70	133.50	99.04	9.15
CB-007	91.00	150.00	98.63	9.90
CB-008	92.60	174.20	98.53	10.65
CB-016	90.00	100.00	99.63	8.85
CB-023	92.70	92.70	99.82	5.30

MANITOBA HYDRO ENGINEERING & CONSTRUCTION GEOTECHNICAL

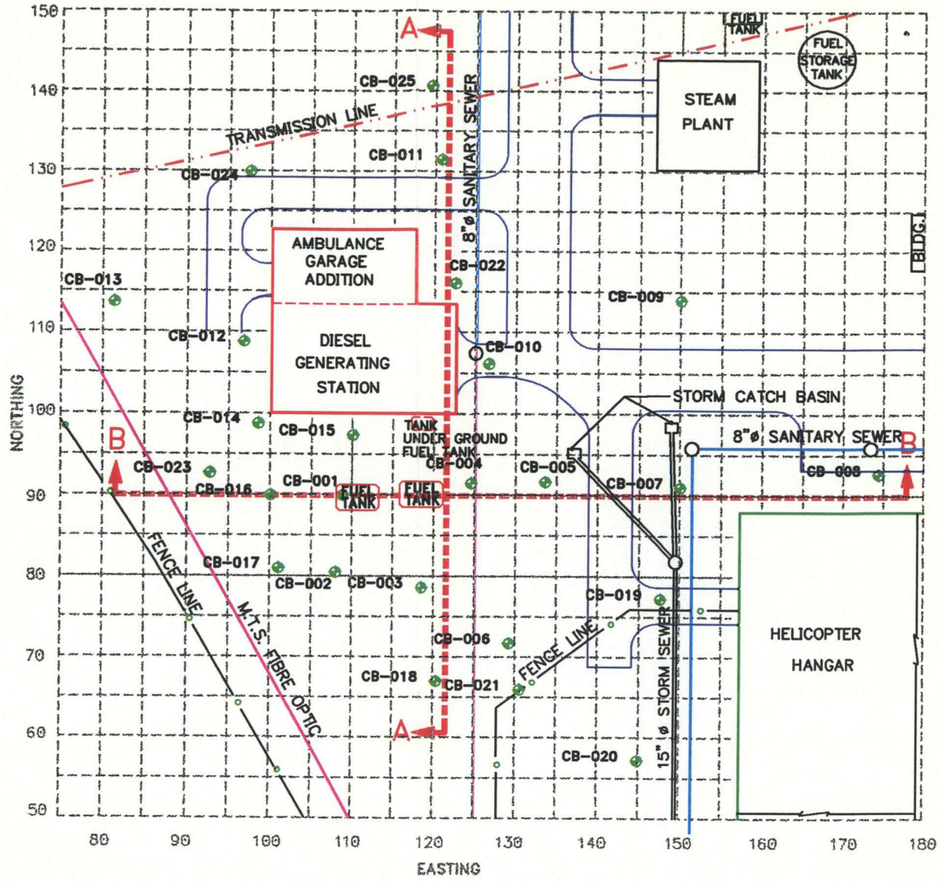
SYMBOLS LEGEND FOR OVERBURDEN MATERIALS

FINE GRAINED SOILS
- CH — High Plasticity Clay
- CI — Intermediate P. Clay
- CL — Low Plasticity Clay
- CL-ML — Borderline Class
- ML — Low/Non Plastic Silt
- MH — High Plasticity Silt

SAND SOILS
- SW — Well Graded Sand
- SW-SM — Borderline Class
- SP — Clean Sorted Sand
- SP-SM — Borderline Class
- SM — Silty Sand
- SC — Clayey Sand

GRAVEL SOILS
- GW — Well Graded Gravel
- GW-GM — Borderline Class
- GP — Clean Sorted Gravel
- GP-GM — Borderline Class
- GM — Silty Gravel
- GC — Clayey Gravel

OTHER BORDERLINE CLASSES
- SC-SM
- SP-SC
- SW-SC
- GC-GM
- GP-GC
- GW-GC



LEGEND
- TRANSMISSION LINE
- M.T.S. FIBRE OPTIC LINE
- CHAIN LINK FENCE
- AUGER DRILL HOLE
- TOTAL EXTRACTABLE HYDROCARBONS 500-2000 ppm
- TOTAL EXTRACTABLE HYDROCARBONS >2000 ppm

0 25m

SCALE 1:500

NOTED	
CIVIL	
GEOTECHNICAL	
ELECTRICAL	
F.P. ENGINEER	
MECHANICAL	
DISTRIBUTION	DRAWN
PROJECT	CHECK
CONSTRUCTION	SCALE 1:1
MANAGER	DATE

MANITOBA HYDRO
ENGINEERING AND CONSTRUCTION

CRANBERRY PORTAGE DECOMMISSIONED DIESEL GENERATING STATION

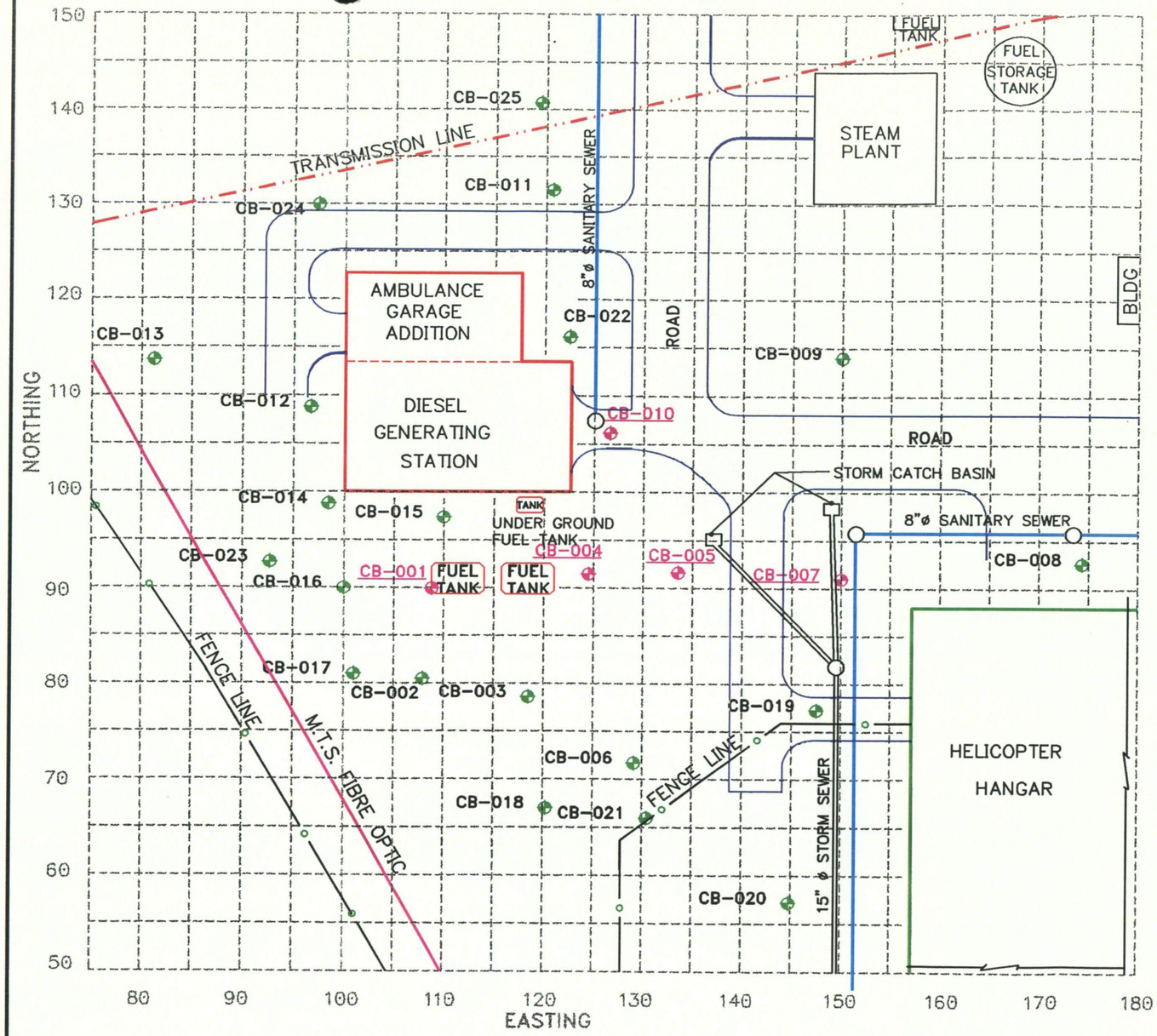
CRANBERRY PORTAGE

CROSS SECTION A– A &
CROSS SECTION B–B

FIGURE 6

SHT. 01 REV. 00

D:\1\DIESEL98\CRANBERY\NEW\FIGURE6.DWG



Benzene, Toluene, Ethylbenzene and Xylene In Soil

Auger Hole	Depth (m)	Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Xylene (ppm)
CB-001	4.70 - 5.10	ND	0.044	0.870	3.830
CB-004	2.28 - 2.85	ND	ND	ND	ND
CB-005	3.05 - 3.42	ND	0.160	0.350	9.000
CB-007	2.62 - 3.05	ND	ND	ND	0.268
CB-007	8.85 - 9.15	ND	ND	ND	0.420
CB-010	6.80 - 6.95	ND	0.042	0.074	5.500
Detection Limits		0.010	0.005	0.005	0.010
Industrial Land Use Criteria		**5**	**0.8**	**20**	**20**

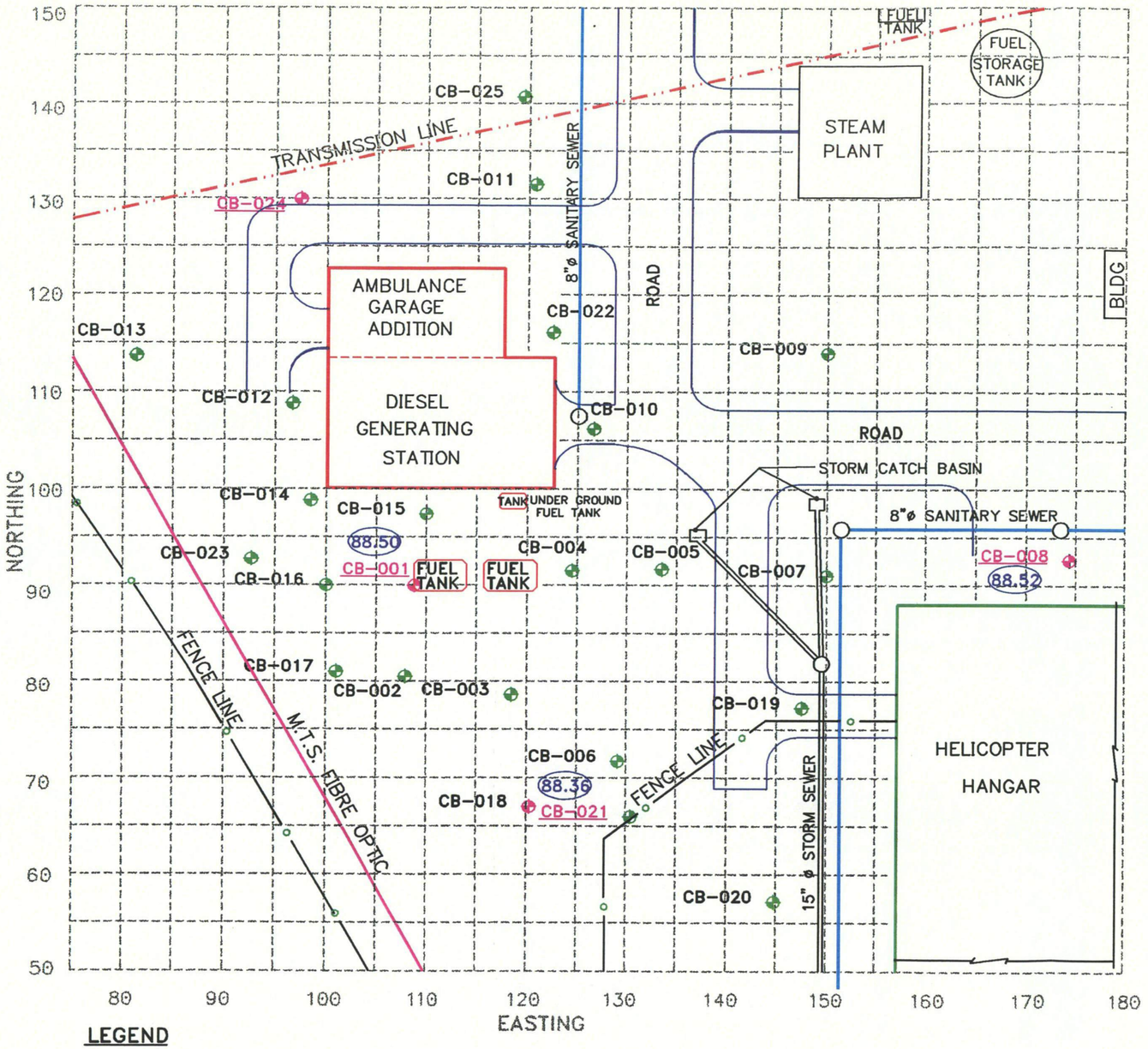
Note: ND - Not Detected

0 25m

SCALE 1:500

NOTED		MANITOBA HYDRO ENGINEERING AND CONSTRUCTION
CIVIL		CRANBERRY PORTAGE DECOMMISSIONED DIESEL GENERATING STATION
GEOTECHNICAL		CRANBERRY PORTAGE
ELECTRICAL		BENZENE, TOLUENE, ETHYLBENZENE & XYLENE IN SOIL
F.P. ENGINEER		
MECHANICAL		
DISTRIBUTION	DRAWN	
PROJECT	CHECK	
CONSTRUCTION	SCALE 1:500	FIGURE 7 — SHT. 01 REV. 00
MANAGER	DATE	

D:\1\DIESEL98\CRANBERY\NEW\FIGURE7.DWG



Benzene, Toluene, Ethylbenzene and Xylene In Water

September 24, 1996 Well Samples	Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Xylene (ppb)
CB-001	ND	0.7	ND	26.0
CB - 008	ND	2.2	5.2	29.0
* CB - 008	ND	1.9	4.6	27.0
CB - 021	ND	ND	ND	ND
* CB - 021	ND	0.5	ND	ND
CB - 024	ND	ND	ND	ND
Detection Limits	0.5 (ppb)	0.5 (ppb)	0.5 (ppb)	0.5 (ppb)
Freshwater Water Criteria Supporting Aquatic Life	**300 (ppb)**	**2 (ppb)**	**90 (ppb)**	**300 (ppb)**

Note: ND - Not Detected

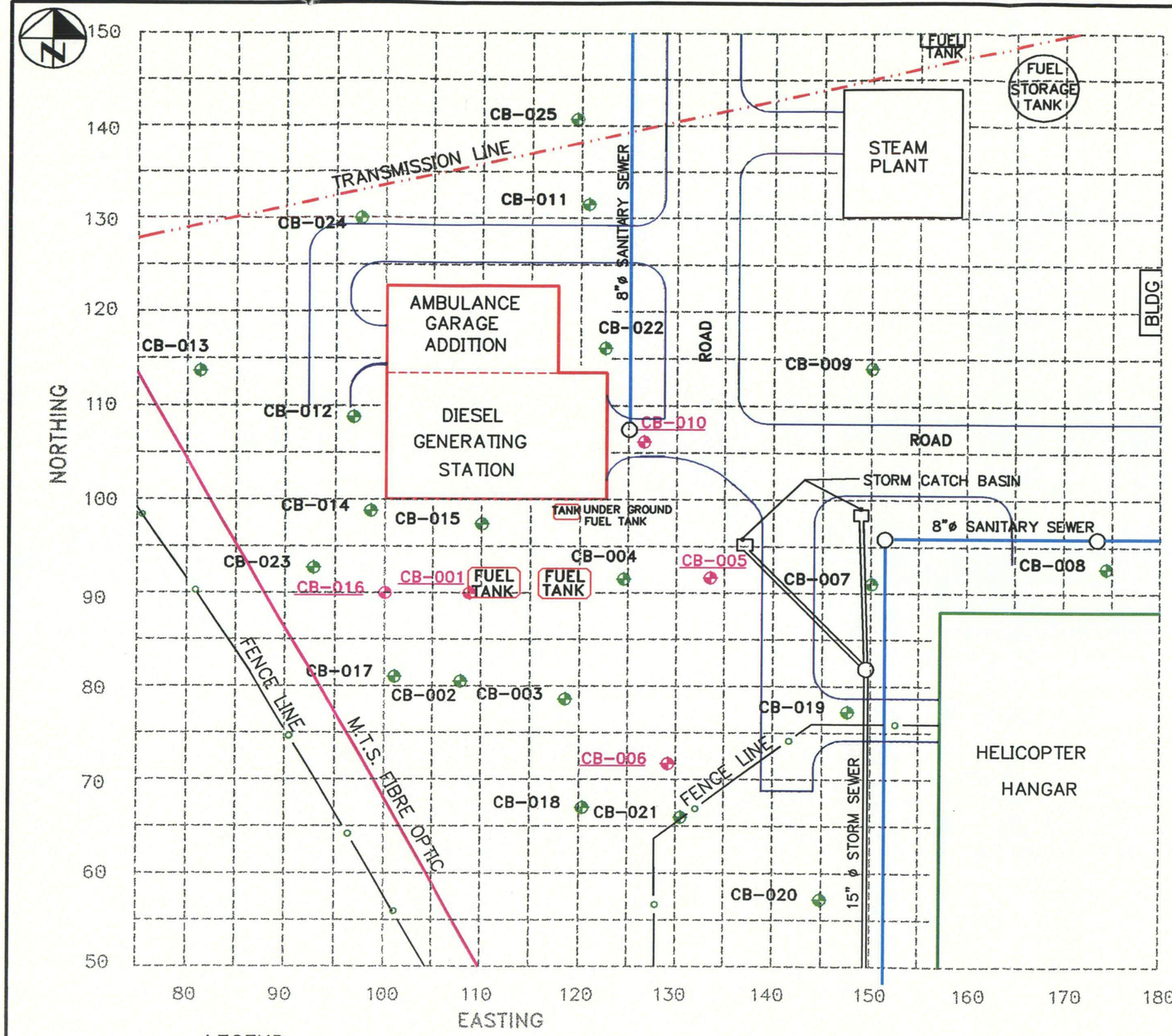
* Sample obtained after pumping for some time.

0 25m

SCALE 1:500

NOTED		MANITOBA HYDRO ENGINEERING AND CONSTRUCTION
CIVIL		CRANBERRY PORTAGE DECOMMISSIONED DIESEL GENERATING STATION
GEOTECHNICAL		CRANBERRY PORTAGE
ELECTRICAL		BENZENE, TOLUENE, ETHYLBENZENE & XYLENE IN WATER
F.P. ENGINEER		
MECHANICAL		
DISTRIBUTION	DRAWN	
PROJECT	CHECK	
CONSTRUCTION	SCALE 1:500	FIGURE 8 — SHT. 01 — REV. 00
MANAGER	DATE	

D:\1\DIESEL98\CRANBERY\NEW\FIGURE8.DWG



LEGEND

- TRANSMISSION LINE
- M.T.S. FIBRE OPTIC LINE
- CHAIN LINK FENCE
- AUGER DRILL HOLE
- CB-006 HOLES SAMPLED
- STORM SEWER
- SANITARY SEWER

0 25m

SCALE 1:500

CRANBERRY PORTAGE

Polycyclic Aromatic Hydrocarbons (PAH) in Soil

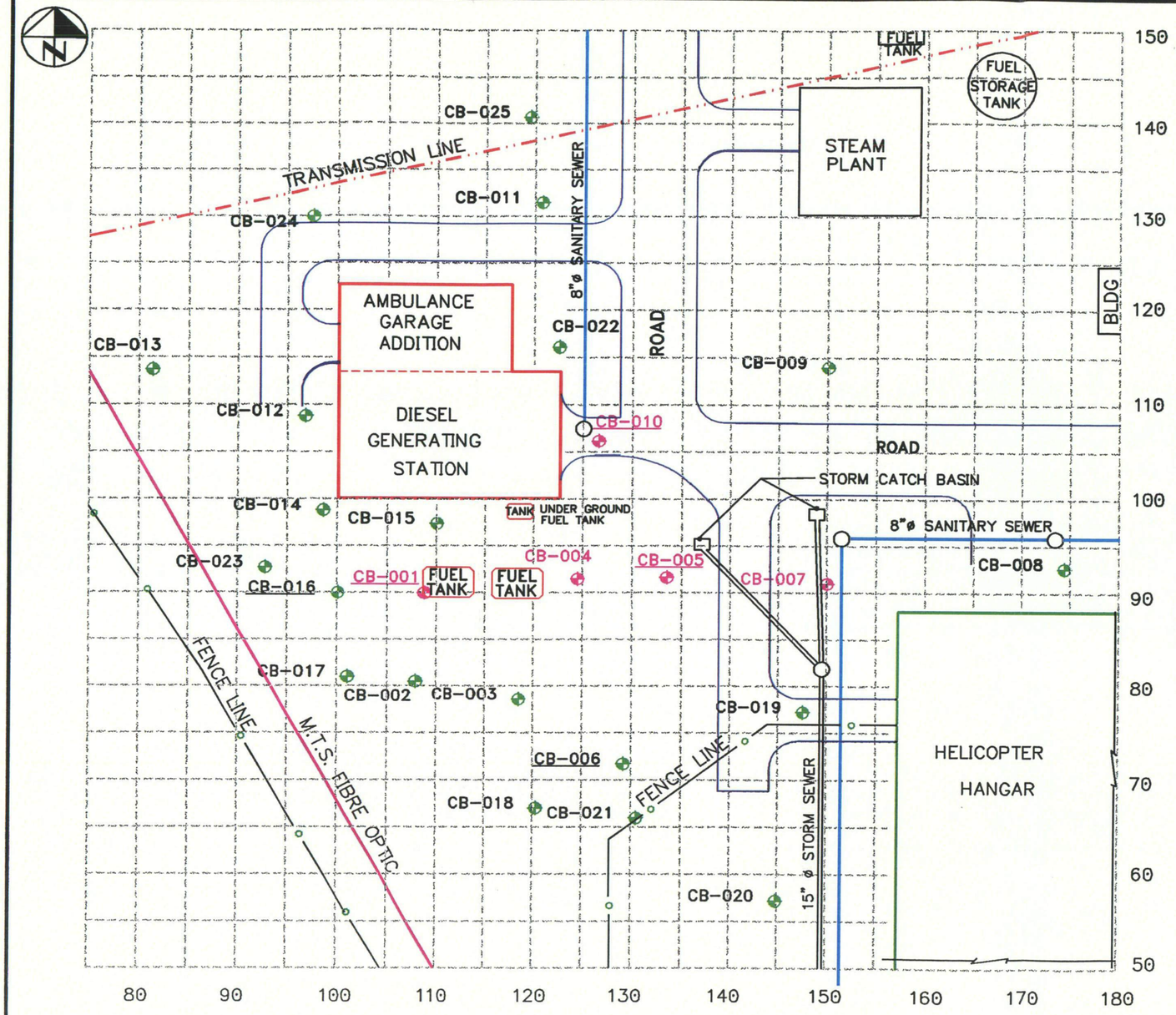
Auger Hole	DEPTH (m)	Benzo(a) Anthracene (ppm)	Benzo(a) Pyrene (ppm)	Benzo(b or k) Flouranthene (ppm)	Dibenzo(a,h) Anthracene (ppm)
CB - 001	4.70-5.10	0.05	ND	ND	ND
CB - 005	3.05-3.42	ND	ND	ND	ND
CB - 006	2.25-2.55	ND	ND	ND	ND
CB - 010	6.80-9.95	0.05	ND	ND	ND
CB - 016	1.87-2.25	ND	ND	ND	ND
Detection Limit		<0.10	<0.10	<0.10	<0.10
Industrial Land Use Criteria		**10 (ppm)**	**0.7 (ppm)**	**10 (ppm)**	**10 (ppm)**

Auger Hole	DEPTH (m)	Indeno (1,2,3-c,d)Pyrene (ppm)	Napthalene (ppm)	Phenanthrene (ppm)	Pyrene (ppm)
CB - 001	4.70-5.10	ND	0.43	1.00	ND
CB - 005	3.05-3.42	ND	0.30	0.80	ND
CB - 006	2.25-2.55	ND	0.08	ND	ND
CB - 010	6.80-9.95	ND	0.43	1.00	ND
CB - 016	1.87-2.25	ND	ND	ND	ND
Detection Limit		<0.10	<0.50	<0.10	<0.10
Industrial Land Use Criteria		**10 (ppm)**	**22 (ppm)**	**50 (ppm)**	**100 (ppm)**

Note: ND = Not Detected

NOTED		MANITOBA HYDRO ENGINEERING AND CONSTRUCTION
CIVIL		CRANBERRY DECOMMISSIONED DIESEL GENERATING STATION
GEOTECHNICAL		CRANBERRY
ELECTRICAL		POLYCYCLIC AROMATIC HYDROCARBON (PAH) TESTING
F.P. ENGINEER		
MECHANICAL		
DISTRIBUTION	DRAWN	
PROJECT	CHECK	
CONSTRUCTION	SCALE 1:500	FIGURE 9 — SHT. 01 — REV. 00
MANAGER	DATE	

D:\1\DIESEL98\CRANBERY\NEW\FIGURE9.DWG



CRANBERRY PORTAGE

TOTAL VOLATILE HYDROCARBON RESULTS

Hole Number	Depth (meters)	Total Volatile Hydrocarbon (ppm)	Hole Number	Depth (meters)	Total Volatile Hydrocarbon (ppm)
CB-001	4.7	5	CB-007	2.62	ND
CB-004	2.28	ND	CB-007	8.95	1
CB-005	3.05	22	CB-010	6.8	5

Detection Limit 1 ppm

Remediation criteria

Level 1	100 ppm
Level 2	150 ppm
Level 3	800 ppm

ND= Not Detected

LEGEND

- TRANSMISSION LINE
- M.T.S. FIBRE OPTIC LINE
- CHAIN LINK FENCE
- AUGER DRILL HOLE
- CB-006 HOLES SAMPLED
- STORM SEWER
- SANITARY SEWER

0 25m

SCALE 1:500

NOTED		MANITOBA HYDRO ENGINEERING AND CONSTRUCTION
CIVIL		CRANBERRY PORTAGE DECOMMISSIONED DIESEL GENERATING STATION
GEOTECHNICAL		CRANBERRY PORTAGE
ELECTRICAL		TOTAL VOLATILE HYDROCARBON RESULTS
F.P. ENGINEER		
MECHANICAL		
DISTRIBUTION	DRAWN	
PROJECT	CHECK	
CONSTRUCTION	SCALE 1:500	FIGURE 10 SHT. 01 REV. 00
MANAGER	DATE	

D:\1\DIESEL98\CRANBERY\NEW\FIGURE10.DWG

Photographs

Photo 1 Panoramic View of the Cranberry Portage Diesel Site looking North to East

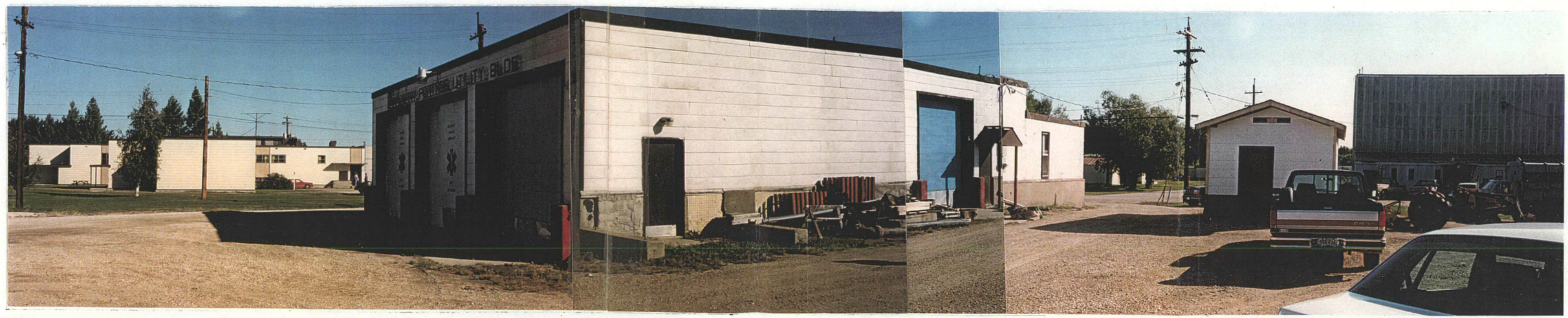


Photo 2 Former Cranberry Portage Diesel Generating Station

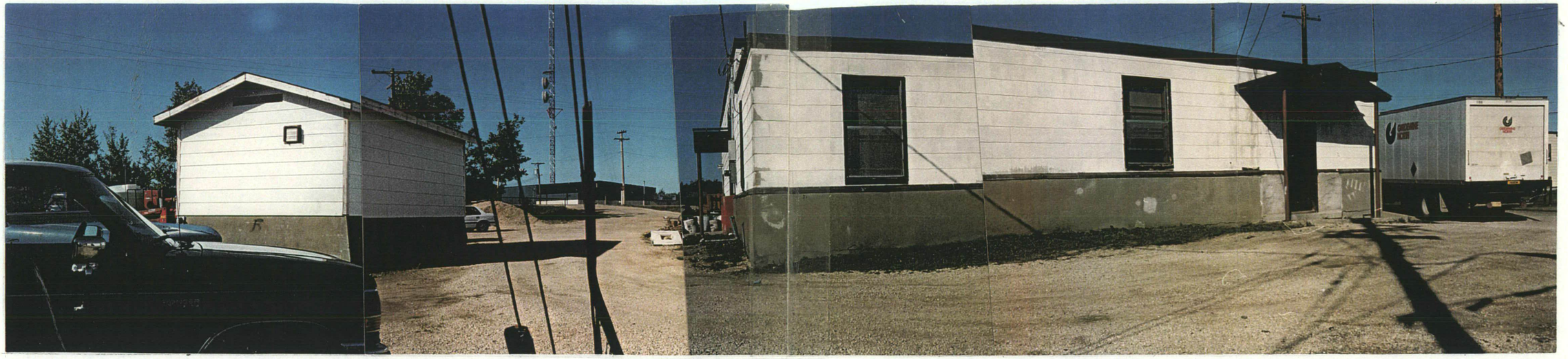


Photo 3 View of the Cranberry Portage Diesel Site looking West

Photo 4 Location of Underground Fuel Storage Tank on the South Side of the Former Diesel Generating Station

Photo 5 Paddock Drilling's Canterra Drill
(Photo from another Project)

Photo 6 Close-Up View of Paddock Drilling's Canterra Drill
(Photo from another Project)

Appendix A

MANITOBA HYDRO
ENGINEERING & CONSTRUCTION
GEOTECHNICAL

SYMBOLS LEGEND FOR OVERBURDEN MATERIALS

FINE GRAINED SOILS


CH
High Plasticity Clay


CI
Intermediate P Clay


CL
Low Plasticity Clay


CL ML
Borderline Class


ML
Low/Non Plastic Silt


MH
High Plasticity Silt

SAND SOILS


SW
Well Graded Sand


SW SM
Borderline Class


SP
Clean Sorted Sand


SP SM
Borderline Class


SM
Silty Sand


SC
Clayey Sand

GRAVEL SOILS


GW
Well Graded Gravel


GW GM
Borderline Class


GP
Clean Sorted Gravel


GP GM
Borderline Class


GM
Silty Gravel


GC
Clayey Gravel

OTHER BORDERLINE CLASSES


SC SM


SP SC


SW SC


GC GM

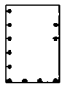

GP GC


GW GC

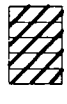
OTHER MATERIALS


B/R
Undifferentiated Bedrock


PT
Peat

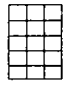

ICE
Ice/Ice + Soil


BLDR
Boulder


OH
High Plasticity Organic

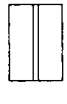

WATER
Free Water/River

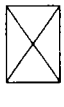

CBLS
Cobbles > 60%

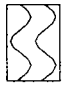

OL
Low Plasticity Organic

HOLE ADVANCEMENT


AUGER
Standard Augers

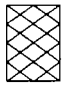

SPLIT
Split Tube Core Barrel


SPT
Split Spoon


SONIC
Sonic Drill


TESTPIT
Backhoe/Hand Dug


SHELBY
Shelby


CORE
Diamond Core Barrel


SPECIAL
Special Samplers

MANITOBA HYDRO

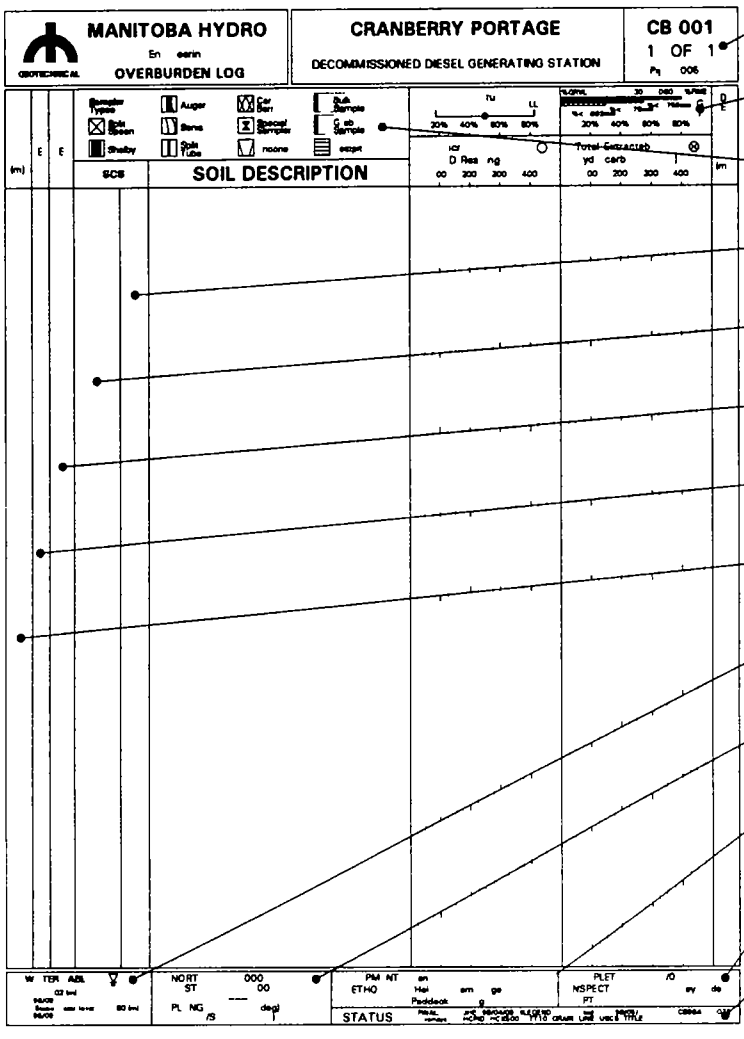
ENGINEERING & CONSTRUCTION

GEOTECHNICAL

OVERBURDEN LOG LEGEND

CRANBERRY PORTAGE

Sample Shown CB 001



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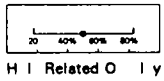
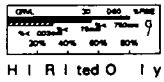


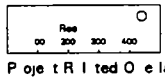
H l Related O l y 1

Att b g Limits nd Mo t C te t
D bes the Plast L m t L q d L m t nd mpl M t C t t p es d p t g The Plast L m t nd the L q d L m t p es t d by a h t t l b | symb l The M t C t t p t d by sol d c l ● ymb l These symb l | ned by a l ne wh h h w th g b tw lq d and plast l m t The scal on the t tle block s t 100 pe ce t Values cess of th s meas d t f das >>



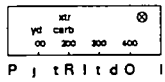
H l R l ted O l y 2

G al Size Analysis
Des bes the es lts obt ned f m S e e and Hyd m t G Sze A ly Test g Ab the b g ph me c p se t t f the pe t g e el the d m t t 10 30 nd 60 pe t p ss ng nd the pe t f nes The b g ph hows the pe t f ne th 4 75mm (nd nd f ne) the pe t f ne th 0 075mm nd the pe t f ne tha 0 002mm The d ffe e ce l ngths betwee these ba s a the p tage s nd s lt nd l y spe t ly



P oje t R l ted O e lay 1

Mi tip PID R edi gs
Ph t t D t t R ad ng p t d g t l assessm t f t gases nd p The M TIP m as es b ne t m t d t t bl by ph t t R ad ng p t d by pe l ○ ymb l



P j t R l t d O l y 2

Total Ext ctabl Hyd ocarb s
The s mmat o f Hyd oca bo c t t f m C11 t C30 ca b g (lud g t l ne thylb zene and xyl es) nd s c l l t d age nst lb t d d sel gas l ne t nda d R d g s p t d by a cl w th t l X ⊗ nd p essed part pe m ll f l nd p t pe b ll f w t

MANITOBA HYDRO
Engineering

GEOTECHNICAL

OVERBURDEN LOG

CRANBERRY PORTAGE

DECOMMISSIONED DIESEL GENERATING STATION

Prj # 200529

Sampler Types: Split Spoon; Shelby; Auger; Sonic; Auger Barrel; Core Barrel; Special Samplers; Tricone; Bulk Sample; Grab Sample; Air Hammer

Moisture: PL, M C, LL — 20% 40% 60% 80%

%GRVL D10 D30 D60 %FINE — % < 0 075mm, % 4 750mm — 20% 40% 60% 80% — G / A

Microtip PID Reading ○ — 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕ — 100 200 300 400

DEPTH (m)	SAMPLE #	USCS	SOIL DESCRIPTION
	1 CS/CG	FILL	(0 00 0 76) Sand and gravel backfill
1	2 CS/CG	SM	(0 76 1 77) Sand dark brown some gravel oxidized no odor backfill
	3 CS/CG		
2	4 CS/CG	CH	(1 77 2 02) Clay rootlets backfill
	5 CS/CG, 6 CS/CG, 7 CS/CG, 8 CS, 9 CS, 10 CS/CG	SM	(2 02 2 25) Sand backfill as above (2 25 2 60) Sand medium brown some silt dry slight odor (2 60 2 85) Sand as above dark brown weak odor (3 03) Auger refusal on rock Moved drill 1 0m East and redrill to 2 85m (2 85 4 10) Sand backfill dark brown coarse grained few clay lenses and wood pieces moderate odor
4	11 CS/CG, 12 CS/CG, 13 CS/CG	SP	(4 10 4 65) Sand light brown fine grained oxidized damp moderate odor
5	14 CS, 15 CS/CG, 16 CS/CG, 17 CS/CG, 18 CS/CG, 19 CS/CG, 20 CS/CG, 21 CS/CG, 23 CS/CG, 24 CS/CG, 25 CS/CG	SM	(4 65 4 70) Sand grey fine grained moderate odor (4 70 5 45) Sand as above light brown (5 45 7 88) Sand as above moderate odor few thin silt lenses/layers up to 1cm thick (7 88 8 21) Sand as above light brown coarse grained some silt moderate odor
	26 CS/CG	SP SM	(8 21 8 73) Sand light brown fine grained moderate odor
9	27 CS/CG, 28 CS/CG, 29 CS/CG, 30 CS/CG	SM	(8 73 8 90) Sand light brown coarse grained moderate odor damp (8 90 9 70) Sand light brown fine grained damp moderate odor (9 70 12 19) Sand as above very slight to no odor

PID readings (top to bottom): 65 0, 125 0, 122 0, 53 5, 46 9, 101 0, 90 0, 169 0, 50 1, 172 0, 227 0, 404 0, 423 0, 269 0, 422 0, 258 0, 320 0, 62 6, 198 0, 32 0, 49 7, 38 3, 30 4, 37 8, 71 6, 37 1, 42 1, 35 1, 22 2, 12 2, 22 1

Grain size at approx. 4.7 m: 0 10 46 4; Total Extractable Hydrocarbons 11000; ⊕ at approx. 8 m: 2

WATER TABLE ▽ 1) 11 02 (m) 96/09/24 2) Static water level 10 80 (m) 96/09/21	NORTH 90 000 EAST 108 800 TREND PLUNGE 90 0 (deg) ELEV G/S 99 52 (m)	EQUIPMENT Canterra METHOD Hollow Stem Auger DRILLER Paddock Drilling Ltd STATUS FINAL	COMPLETION 96/09/20 INSPECTOR W T Reynolds DEPTH 12 19 (m) Continued

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE

DECOMMISSIONED DIESEL GENERATING STATION

CB-001
2 OF 2
Prj # 200529

Sampler Types: Split Spoon; Shelby; Auger; Sonic; Auger Barrel; Core Barrel; Special Samplers; Tricone; Bulk Sample; Grab Sample; Air Hammer

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Moisture PL / M C / LL (20% 40% 60% 80%)	%GRVL D10 D30 D60 %FINE; % < 0 075mm; % 4 750mm; G / A (20% 40% 60% 80%)	DEPTH (m)
		31 CS/CG					
11		32 CS/CG		Static water level at 10 80m Wet sand obtaining water sample through augers	○40 7		11
		33 GG			○36 9		
		34 GG			○38 8	⊕	
12							12

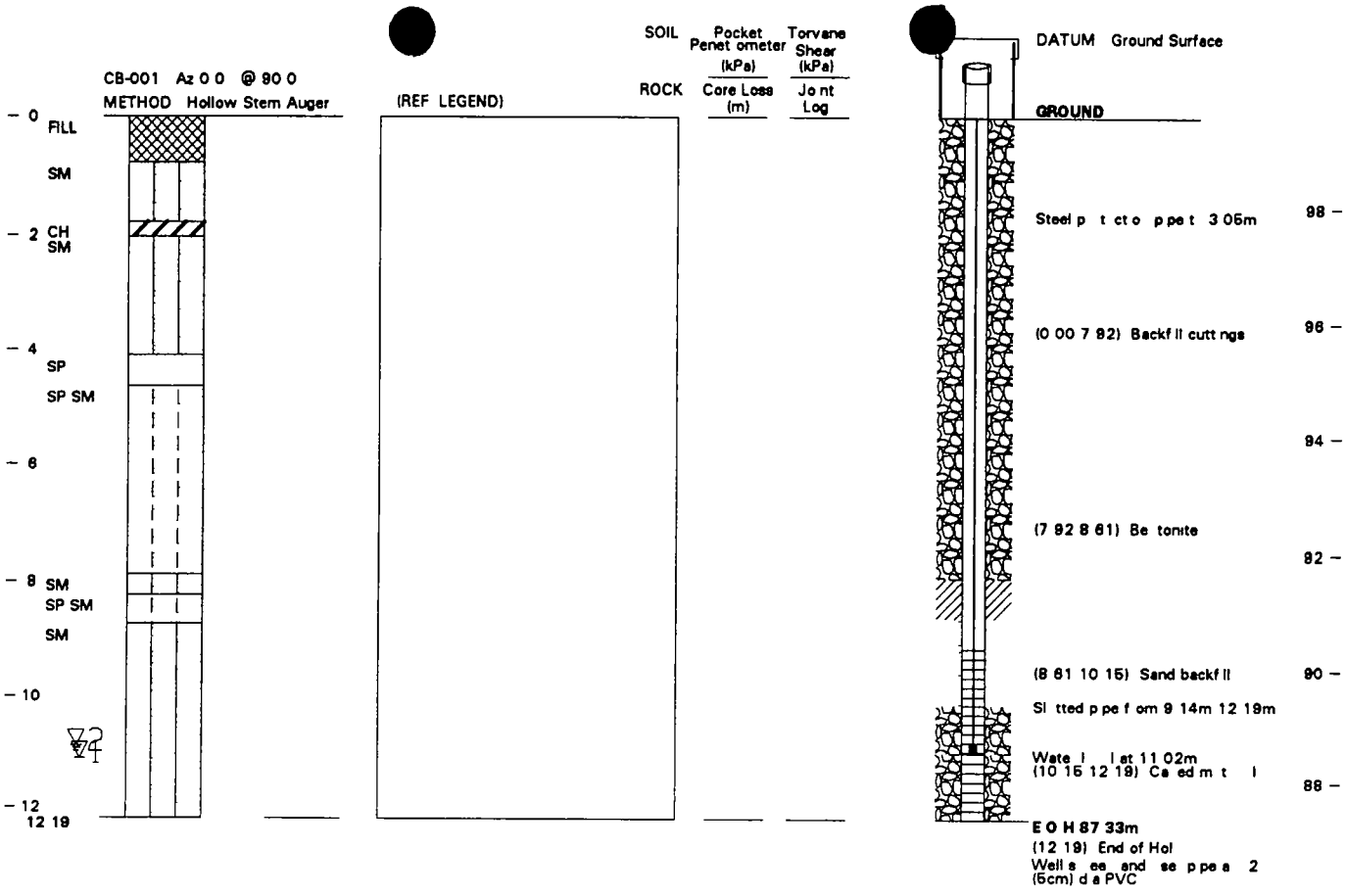
Microtip PID Reading ○ (100 200 300 400)

Total Extractable Hydrocarbons (ppm) ⊕ (100 200 300 400)

(12 19) End of Hole

Note Water level at 11 02m (Elev 88 50m) on 96 09 24
Well screen and riser pipe are 2 (5cm) diameter PVC

WATER TABLE ▽ 1) 11 02 (m) 96/09/24 2) Static water level 10 80 (m) 96/09/21	NORTH 90 000 EAST 108 800 TREND PLUNGE 90 0 (deg) ELEV G/S 99 52 (m)	EQUIPMENT Canterra METHOD Hollow Stem Auger DRILLER Paddock Drilling Ltd	COMPLETION 96/09/20 INSPECTOR W T Reynolds DEPTH 12 19 (m)
		STATUS FINAL Overlays JHE 98/04/08 O/B HCPID HCX500 ATT10 Plotted 98/04/08 09 29 CB96A GEOTECH GRAIN LINE USCS TITLE	



LEGEND

WATER TABLE ▽

1) 11 02 (m)
96/09/24
2) St t w t l l 10 80 (m)
96/09/21

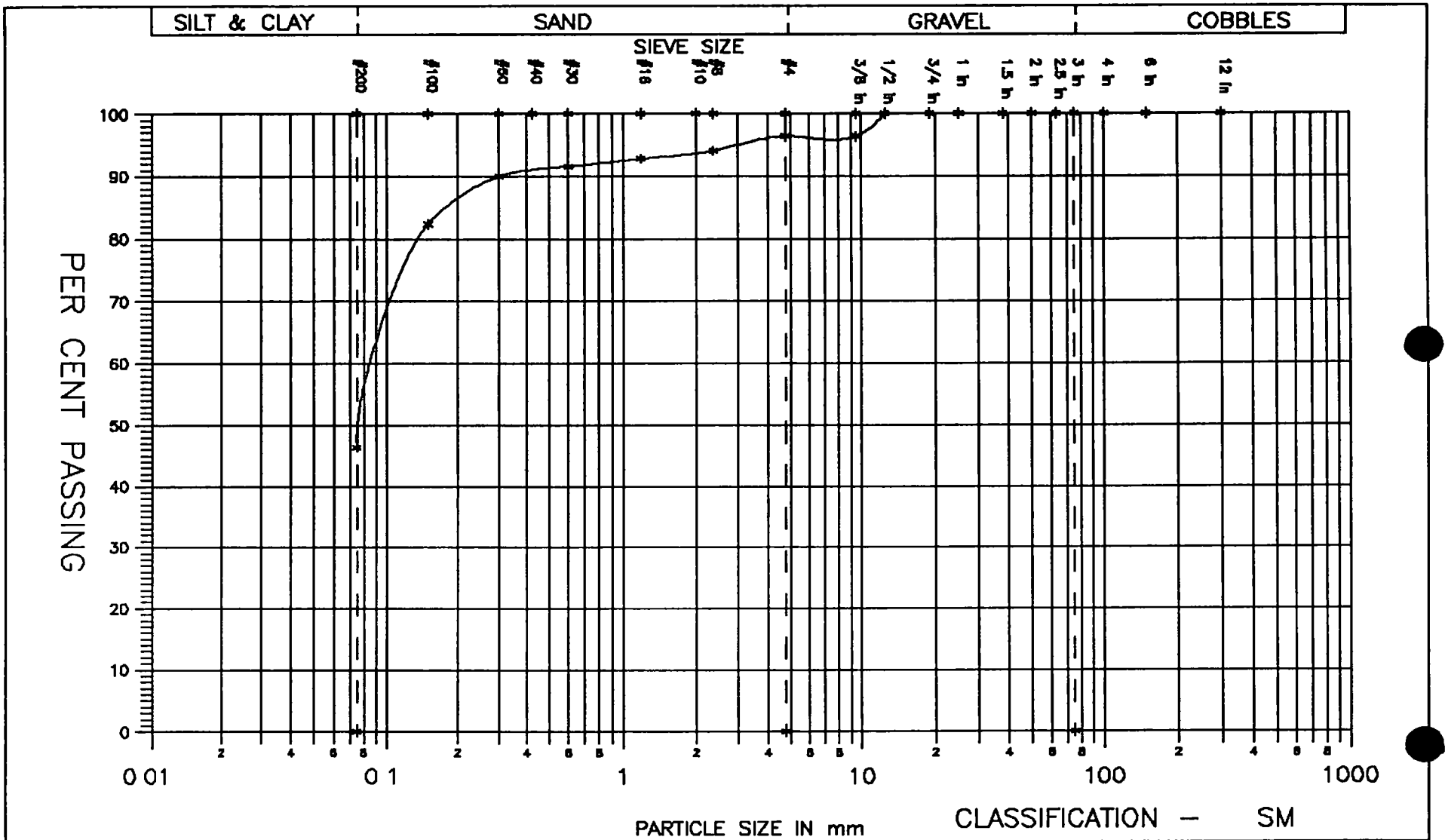
CRANBERRY PORTAGE

HOLE No CB-001

2 PVC Slotted Pipe

Installed 96/09/20
(m) 90 000 N 108 800 E
DECOMMISSIONED DIESEL
GENERATING STATION

Pr ed PM ampl NST
est BB



MANITOBA HYDRO Power Planning & Ops Geotechnical Engin Materials Testing Lab	GRAIN SIZE DISTRIBUTION GRAPH		REMARKS Cu = NA Cc = NA
	PROJECT CRANBERRY PORTAGE DECOM DIESEL GEN STN		COBBLES 0 % GRAVEL 4 % SAND 50 % SILT/CLAY 46 %
	SAMPLE NO / HOLE NO / DESCRIPTION/DEPTH		DATE 98 03 26 TESTED BY AK
	CS — 15 / CB — 001 / 4 70 — 5 10m		

DIRECTORY CB96A FILE 15CB001S

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-002
1 OF 2
Prj # 200529

Sampler Types: Split Spoon; Shelby; Auger; Sonic; Auger Barrel; Core Barrel; Special Samplers; Tricone; Bulk Sample; Grab Sample; Air Hammer

Moisture: PL — M C — LL (20% 40% 60% 80%)
Microtip PID Reading ○ (100 200 300 400)
%GRVL D10 D30 D60 %FINE G/A; % < 0 075mm; % < 4 760mm (20% 40% 60% 80%)
Total Extractable Hydrocarbons (ppm) ⊕ (100 200 300 400)

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading ○	Total Extractable Hydrocarbons (ppm) ⊕
0	CS/CG	1	FILL	(0 00 1 50) Sand light brown trace gravel damp fill	○16 1	
	CS/CG	2			○39 0	
	CS/CG	3			○61 2	
1	CS/CG	4			○35 3	
	CS/CG	5	SP	(1 50 1 90) Sand light brown medium grained damp	●58 3	⊕
	CS/CG	6		(1 90 3 00) Sand as above light tan brown	○30 0	
2	CS/CG	7			○29 5	
	CS/CG	8			○40 5	
	CS/CG	9		(3 00 3 75) Sand light brown medium to fine grained damp	○40 2	
3	CS/CG	10			○24 0	
	CS/CG	11		(3 75 4 00) Sand as above trace pebbles	○44 2	
	CS/CG	12	ML	(4 00 4 30) Silt medium brown with sand trace oxidation damp	○42 3	
4			SP	(4 30 4 75) Sand light brown medium to fine grained damp	○45 9	
	CS/CG	13			○17 1	
	CS/CG	14	ML	(4 75 4 87) Silt medium brown trace sand damp	○18 0	
	CS/CG	15	SP			
5	CS/CG	16	SM	(4 87 5 25) Sand light brown medium to fine grained damp	○14 8	
	CS/CG	17	SP	(5 25 5 62) Sand light brown with silt fine grained damp	○25 6	
	CS/CG	18	ML	(5 62 6 00) Sand light brown fine to medium grained trace silt damp	○24 0	
6	CS	19			○36 0	
	CS/CG	20	SP	(6 00 6 25) Silt light brown with sand damp	○39 3	
				(6 25 6 40) Silt medium brown damp		
	CS/CG	21	SM	(6 40 6 75) Sand light brown	○32 1	
7	CS/CG	22		(6 75 7 50) Sand light brown with silt fine grained damp	○35 3	
	CS	23	ML	(7 50 8 25) Silt light brown some sand damp	○36 0	
	CS/CG	24			○19 8	
8	CS/CG	25	SM	(8 25 8 50) Sand light brown some silt	○23 4	
	CS	26	ML	(8 50 9 15) Silt light brown trace sand damp	○39 7	
	CS/CG	27			○27 2	
	CS	28			○15 1	
9	CS/CG	29	SM	(9 15 9 90) Sand light brown fine grained with silt damp	○16 1	
	CS/CG	30			○12 1	
10	CS/CG	31	ML	(9 90 10 95) Silt medium brown some sand	○7 8	

WATER TABLE
No water level recorded

NORTH 80 500
EAST 107 900
TREND
PLUNGE 90 0 (deg)
ELEV G/S 99 42 (m)

EQUIPMENT Canterra
METHOD Hollow Stem Auger
DRILLER Paddock Drilling Ltd

COMPLETION 96/09/20
INSPECTOR F Demchenko
DEPTH 11 40 (m)

STATUS FINAL

Continued

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE

DECOMMISSIONED DIESEL GENERATING STATION

CB-002
2 OF 2
Prj # 200529

Sampler Types: Auger; Core Barrel; Bulk Sample; Split Spoon; Sonic; Special Samplers; Grab Sample; Shelby; Auger Barrel; Tricone; Air Hammer

Moisture: PL — M C — LL; 20% 40% 60% 80%

%GRVL D10 D30 D60 %FINE; % <0 075mm; % 4.750mm; G / A; 20% 40% 60% 80%

Microtip PID Reading ○; 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕; 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading ○	Total Extractable Hydrocarbons (ppm) ⊕	DEPTH (m)
		32 CS/CG		damp	○8 7		
		33 CS/CG			○6 8		
11		34 CS/CG	SP	(10 95 11 40) Sand light brown medium to fine grained damp	○11 8		11

(11 40) End of Hole

No bedrock encountered
No water level recorded

WATER TABLE No water level recorded	NORTH 80 500 EAST 107 900 TREND PLUNGE 90 0 (deg) ELEV G/S 99 42 (m)	EQUIPMENT Canterra METHOD Hollow Stem Auger DRILLER Paddock Drilling Ltd	COMPLETION 96/09/20 INSPECTOR F Demchenko DEPTH 11 40 (m)
		STATUS FINAL O I y JHE 98/04/09 O/B HCPID HCX600 ATT10	P ted 98/04/08 09 30 CB88A GEOTE GRAIN LINE USCS TITLE

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-003
1 OF 1
Prj # 200529

Sampler Types: Split Spoon; Shelby; Auger; Sonic; Auger Barrel; Core Barrel; Special Samplers; Tricone; Bulk Sample; Grab Sample; Air Hammer

Moisture: PL — M C — LL; 20% 40% 60% 80%

%GRVL D10 D30 D60 %FINE; % 0 075mm; % <4 750mm; G / A; 20% 40% 60% 80%

Microtip PID Reading ○; 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕; 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading	Total Extractable Hydrocarbons (ppm)	DEPTH (m)
	CS	1	FILL	(0 00 0 10) Sand fill	○15 8		
	CS/CG	2	SP	(0 10 0 75) Sand light tan brown coarse to fine grained trace gravel damp	○19 2		
	CS/CG	3			○15 3		
1	CS/CG	4		(0 75 1 50) Sand light brown coarse to medium grained damp	○29 0		1
	CS/CG	5			○35 2		
	CS/CG	6		(1 50 2 25) Sand light brown medium to fine grained damp			
2	CS/CG	7			○15 3		2
	CS/CG	8	ML	(2 25 2 40) Silt medium brown some sand damp	○39 0		
	CS/CG	9	SP		●○48 8		
3				(2 40 3 80) Sand light brown medium to fine grained damp			3
	CS/CG	10			○21 0		
	CS/CG	11					
	CS	12	ML	(3 80 4 05) Silt medium brown and sand damp	○19 0		
4	CS/CG	13			○16 8		4
	CS/CG	14	SP	(4 05 4 25) Silt medium brown trace sand damp	○25 0		
	CS/CG	16	ML	(4 25 4 55) Sand light tan brown fine to medium grained trace oxidation	○16 8		
5	CS/CG	18	SP		○23 4		5
				(4 55 4 80) Silt medium tan brown trace sand damp			
	CS/CG	17			○17 9		
	CS/CG	18		(4 80 6 10) Sand light brown fine to medium grained trace silt damp	○29 8		
6							6
	CS/CG	19	SM	(6 10 6 45) Silt medium brown with sand damp	○15 2		
	CS/CG	20		(6 45 6 85) Sand light brown some silt damp	○19 8		
				(6 85) End of Hole			

No bedrock encountered
No water level recorded

WATER TABLE
No water level recorded

NORTH 78 600
EAST 118 500
TREND
PLUNGE 90 0 (deg)
ELEV G/S 99 23 (m)

EQUIPMENT Canterra
METHOD Hollow Stem Auger
DRILLER Paddock Drilling Ltd

COMPLETION 96/09/20
INSPECTOR F Demchenko
DEPTH 6 85 (m)

STATUS FINAL JHE 98/04/09 O/B P ted 98/04/08 09 30 CB96A GEOTE
O lays HCPID HCX500 ATT10 GRAIN LINE USCS TITLE

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-004
1 OF 1
Prj # 200529

Sampler Types: Auger; Core Barrel; Bulk Sample; Split Spoon; Sonic; Special Samplers; Grab Sample; Shelby; Auger Barrel; Tricone; Air Hammer

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading (100 200 300 400)	Total Extractable Hydrocarbons (ppm) (100 200 300 400)
0		1 CS/CG	FILL	(0 00 0 05) Gravel fill	26 8	
		2 CS/CG	SP	(0 05 0 75) Sand dark brown with silt trace gravel damp	14 8	
1		3 CS/CG		(0 75 1 50) Sand medium tan brown trace silt damp	18 4	
		4 CS/CG			28 8	
		5 CS/CG		(1 50 2 28) Sand light brown medium to fine grained damp	26 8	
2		6 CS/CG			234 0	
		7 CS/CG	ML	(2 28 2 85) Silt medium brown grey with sand damp	472 0	⊕ 67
3		8 CS/CG	SP SM	(2 85 3 05) Sand light brown medium to fine grained damp	21 5	0 0 0 15 0 35 0 74 5 8
		9 CS/CG			58 8	
		10 CS/CG		(3 05 4 27) Sand light brown medium grain damp	306 0	
4		11 CS/CG			371 0	>> ⊕ 7000
		12 CS/CG		(4 27 4 55) Sand light brown fine to medium grained trace silt damp		>> 3147 0
		13 CS/CG	ML	(4 55 5 30) Silt light brown and sand damp	269 0	
5		14 CS/CG			2 1	⊕ 13
		15 CS/CG	SM	(5 30 6 10) Sand medium brown fine grained with silt damp	176 0	
		16 CS/CG			13 6	
6		17 CS/CG	SP	(6 10 7 10) Sand light brown trace silt medium to fine grained damp	24 2	
		18 CS/CG			104 0	
7		19 CS/CG	ML	(6 85 7 25) Silt light grey brown with sand	293 0	0 0 75 1 ⊕ 60007
		20 CS/CG	SP	(7 25 7 55) Sand light brown fine grained trace silt	12 6	
		21 CS/CG		(7 55 9 15) Sand as above with silt	16 1	
8		22 CS/CG			17 5	
		23 CS/CG			12 0	
		24 CS/CG			19 5	
9						

(9 15) End of Hole

No bedrock encountered
No water level recorded

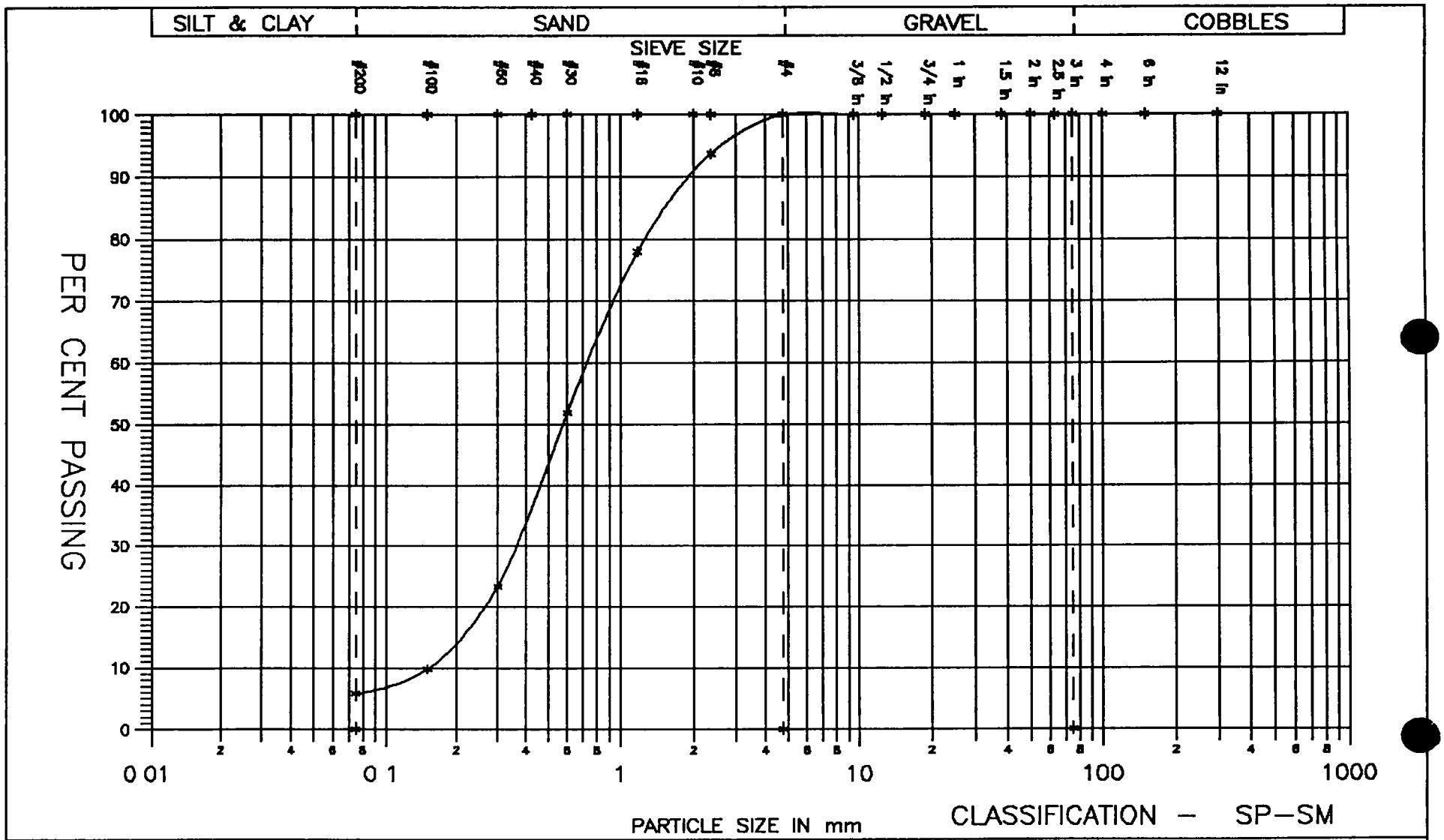
WATER TABLE
No water level recorded

NORTH 91 500
EAST 124 500
TREND
PLUNGE 90 0 (deg)
ELEV G/S 99 38 (m)

EQUIPMENT Canterra
METHOD Hollow Stem Auger
DRILLER Paddock Drilling Ltd

COMPLETION 96/09/20
INSPECTOR F Demchenko
DEPTH 9 15 (m)

STATUS FINAL O I ys JHE 98/04/09 O/B HCPID HCX600 ATT10 P ted 98/04/08 09 31 CB98A GEOTE GRAIN LINE USCS TITLE



CLASSIFICATION – SP–SM

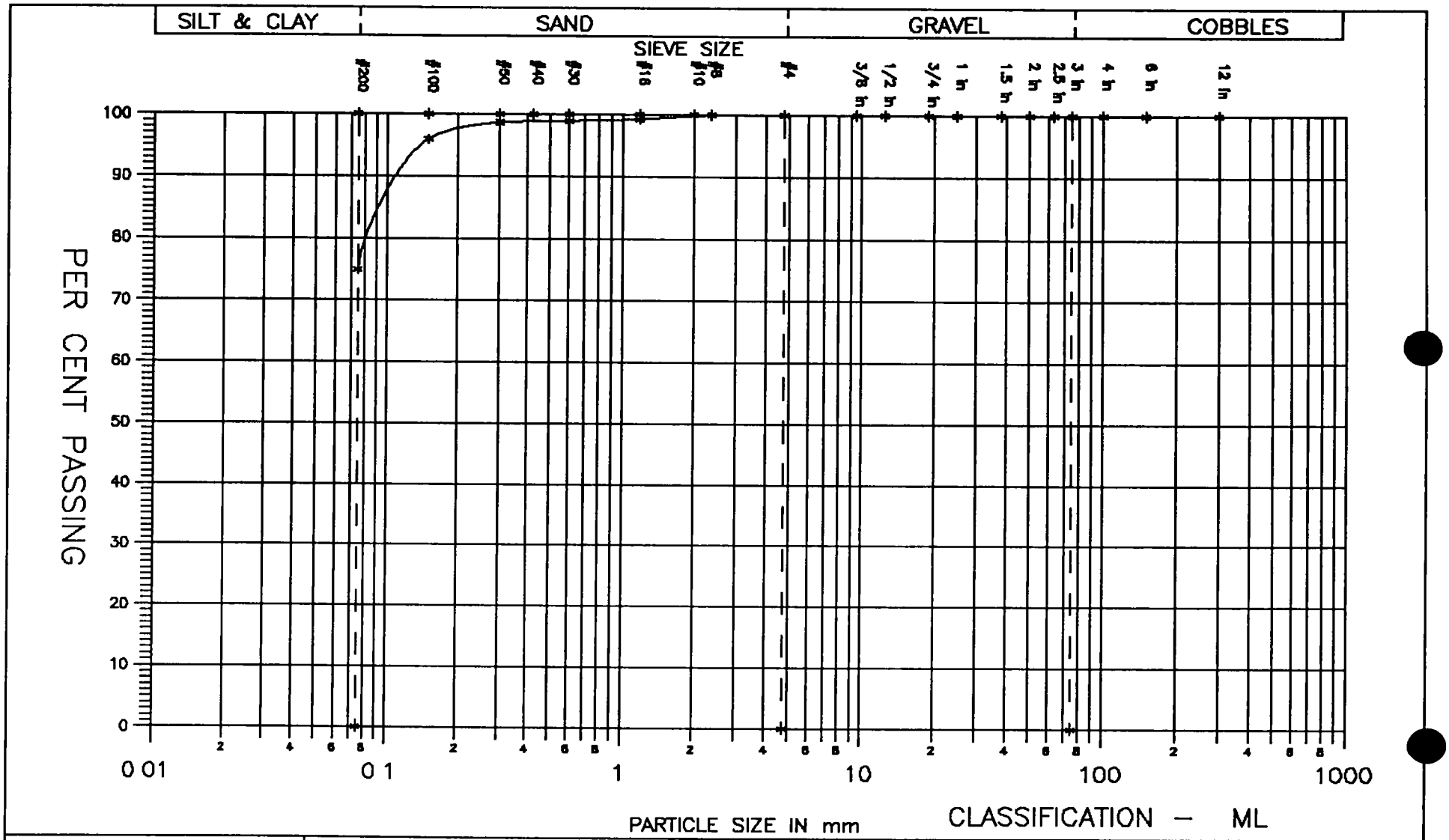
MANITOBA HYDRO	GRAIN SIZE DISTRIBUTION GRAPH		
Power Planning & Ops Geotechnical Engin Materials Testing Lab	PROJECT CRANBERRY PORTAGE DECOM DIESEL GEN STN		
	SAMPLE NO	HOLE NO	DESCRIPTION/DEPTH
	CS – 9	CB – 004	3.05 – 3.42m

REMARKS Cu = 4.80 Cc = 1.20

COBBLES	0 %
GRAVEL	0 %
SAND	94 %
SILT/CLAY	6 %

DATE 98 03 26 TESTED BY AK

DIRECTORY CB96A FILE 9CB004S



MANITOBA HYDRO Power Planning & Ops Geotechnical Engin Materials Testing Lab	GRAIN SIZE DISTRIBUTION GRAPH		REMARKS Cu = NA Cc = NA
	PROJECT CRANBERRY PORTAGE DECOM DIESEL GEN STN		COBBLES 0 % GRAVEL 0 % SAND 25 % SILT/CLAY 75 %
SAMPLE NO	HOLE NO	DESCRIPTION/DEPTH	DATE 98 03 26 TESTED BY AK
CS – 19	CB – 004	6 85 – 7 25m	

DIRECTORY CB96A FILE 19CB004S

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-005
1 OF 1
Prj # 200529

Sampler Types: Auger; Core Barrel; Bulk Sample; Split Spoon; Sonic; Special Samplers; Grab Sample; Shelby; Auger Barrel; Tricone; Air Hammer

Moisture: PL — M C — LL; 20% 40% 60% 80%

%GRVL D10 D30 D60 %FINE; %<0 075mm %<4 750mm G/A; 20% 40% 60% 80%

Microtip PID Reading ○; 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕; 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading	Total Extractable Hydrocarbons (ppm)
0		1 CS/CG	SM	(0 00 0 30) Sand medium brown with silt trace gravel damp	○13 6	
		2 CS/CG		(0 30 0 75) Sand medium brown some silt trace oxidation damp	○17 8	
1		3 CS/CG	ML	(0 75 1 20) Silt medium brown with fine grained sand damp	○19 8	
		4 CS/CG	SP	(1 20 1 65) Sand light brown medium grained damp	○30 2	
		5 CS/CG	SM	(1 65 2 25) Sand light brown fine grained and silt damp	○47 8	
2		6 CS/CG			○347 0	
		7 CS/CG	SP	(2 25 3 05) Sand medium brown medium grained damp		>>○574 0
		8 CS/CG			○427 0	
3		9 CS/CG		(3 05 4 40) Sand medium brown medium grained damp	●	>>○604 0 >>⊕ 10000
		10 CS/CG				○498 0
		11 CS/CG				○484 0
4		12 CS/CG	ML	(4 40 4 55) Silt light brown some sand damp	○334 0	○485 0
		13 CS/CG	SP			>>○510 0
5		14 CS	ML	(4 55 4 80) Sand light brown some silt damp	○7 6	0 0 0 09 53 1
		15 CS/CG				
		16 CS/CG		(4 80 5 00) Silt light brown some sand damp	○23 2	
		16 CS/CG		(5 00 6 10) Silt light brown and fine sand	○11 7	
6		17 CS/CG				
		18 CS/CG	SP	(6 10 6 85) Sand light brown fine grained damp	○22 6	
		19 CS/CG			○33 9	
7		20 CS/CG	ML	(6 85 7 22) Silt light brown trace sand damp	● ○118 0	⊕
		21 CS/CG		(7 22 7 70) Silt as above with sand	○17 2	
		22 CS/CG			○16 6	
		23 CS/CG	SP	(7 70 7 80) Sand seam medium brown medium grained damp	○19 5 ○27 3	
8		24 CS/CG	ML	(7 80 8 30) Silt light brown and fine grained sand damp	○18 3	
		25 CS/CG		(8 30 9 15) Silt as above some fine grained sand	○19 0	
		26 CS/CG				
9						

(9 15) End of Hole

No bedrock encountered
No water level recorded

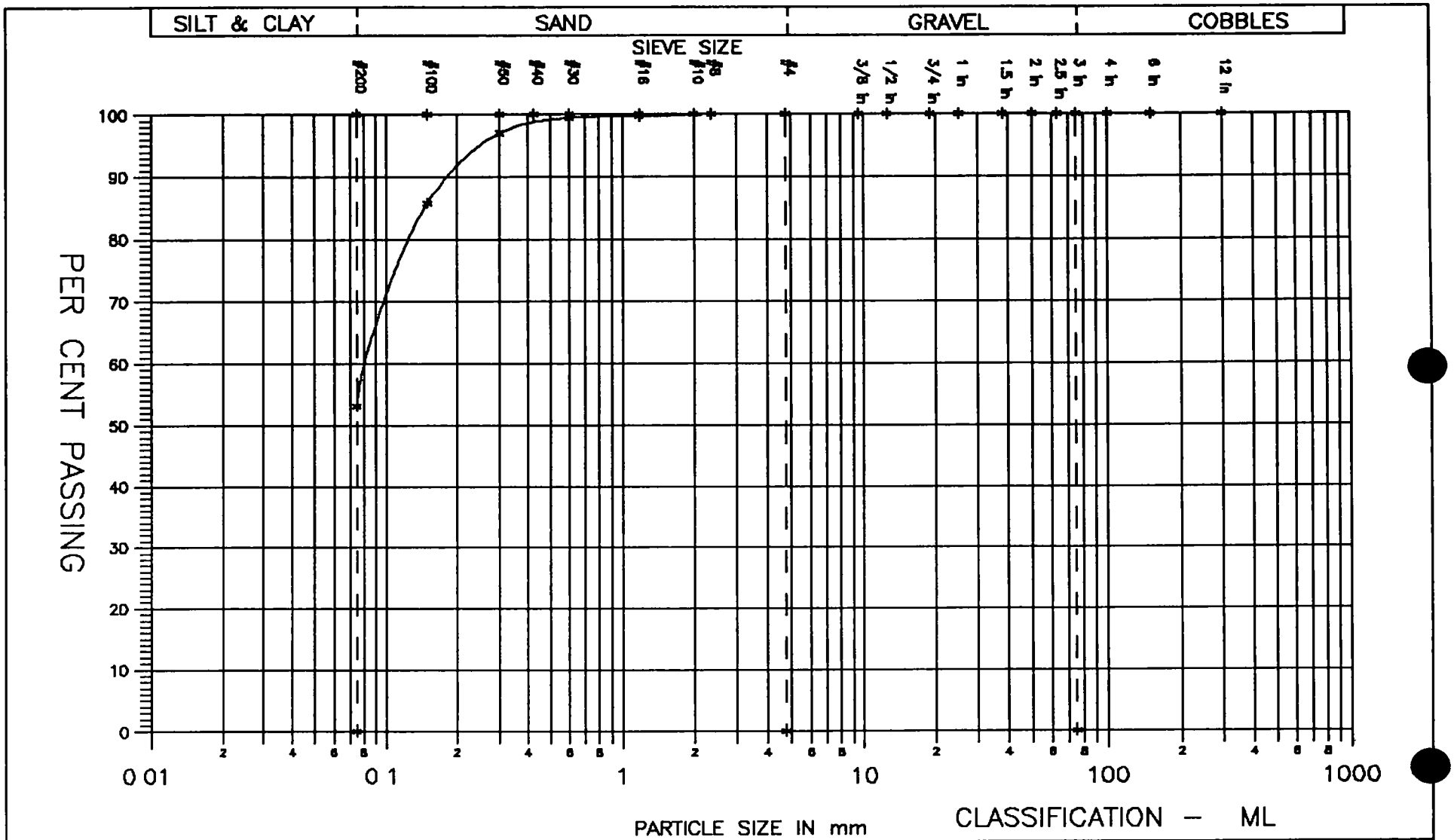
WATER TABLE
No water level recorded

NORTH 91 700
EAST 133 500
TREND
PLUNGE 90 0 (deg)
ELEV G/S 99 04 (m)

EQUIPMENT Canterra
METHOD Hollow Stem Auger
DRILLER Paddock Drilling Ltd

COMPLETION 96/09/20
INSPECTOR F Demchenko
DEPTH 9 15 (m)

STATUS FINAL O T y JHE 98/04/08 O/B P ted 98/04/08 09 31 CB98A GEOTE HCPID HCX600 ATT10 GRAIN LINE USCS TITLE



MANITOBA HYDRO Power Planning & Ops Geotechnical Engin Materials Testing Lab	GRAIN SIZE DISTRIBUTION GRAPH		REMARKS Cu = NA Cc = NA
	PROJECT CRANBERRY PORTAGE DECOM DIESEL GEN STN		COBBLES 0 % GRAVEL 0 % SAND 47 % SILT/CLAY 53 %
SAMPLE NO	HOLE NO	DESCRIPTION/DEPTH	DATE 98 03 26 TESTED BY AK
CS – 15	CB – 005	5 00 – 5 30m	

DIRECTORY CB96A FILE 15CB005S

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-006
1 OF 1
Prj # 200529

Sampler Types: Split Spoon; Shelby; Auger; Sonic; Auger Barrel; Core Barrel; Special Samplers; Tricone; Bulk Sample; Grab Sample; Air Hammer

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION
		1 CS/CG	PT	(0 00 0 10) Peat
		1 CS/CG	ML	(0 10 0 60) Silt light brown trace sand trace gravel damp
		2 CS/CG	SM	(0 60 2 55) Sand light brown with silt medium grained damp
1		3 CS/CG		
		4 CS/CG		
		5 CS/CG		
2		6 CS/CG		
		7 CS/CG		
		8 CS/CG	ML	(2 55 2 90) Silt medium brown trace sand damp
3		9 CS	SP	(2 90 4 55) Sand light brown medium grained damp
		10 CS/CG		
		11 CS/CG		
4		12 CS/CG		
		13 CS/CG		
		14 CS/CG	ML	(4 55 4 75) Silt medium brown trace sand damp
			SP	
5		15 CS/CG	ML	(4 75 4 82) Sand seam
			SP	(4 82 4 90) Silt medium brown trace sand damp
		16 CS/CG		
		17 CS/CG		(4 90 6 60) Sand light brown medium grained damp
6		18 CS/CG		
		19 CS/CG	ML	(6 60 6 85) Silt medium brown some fine sand damp

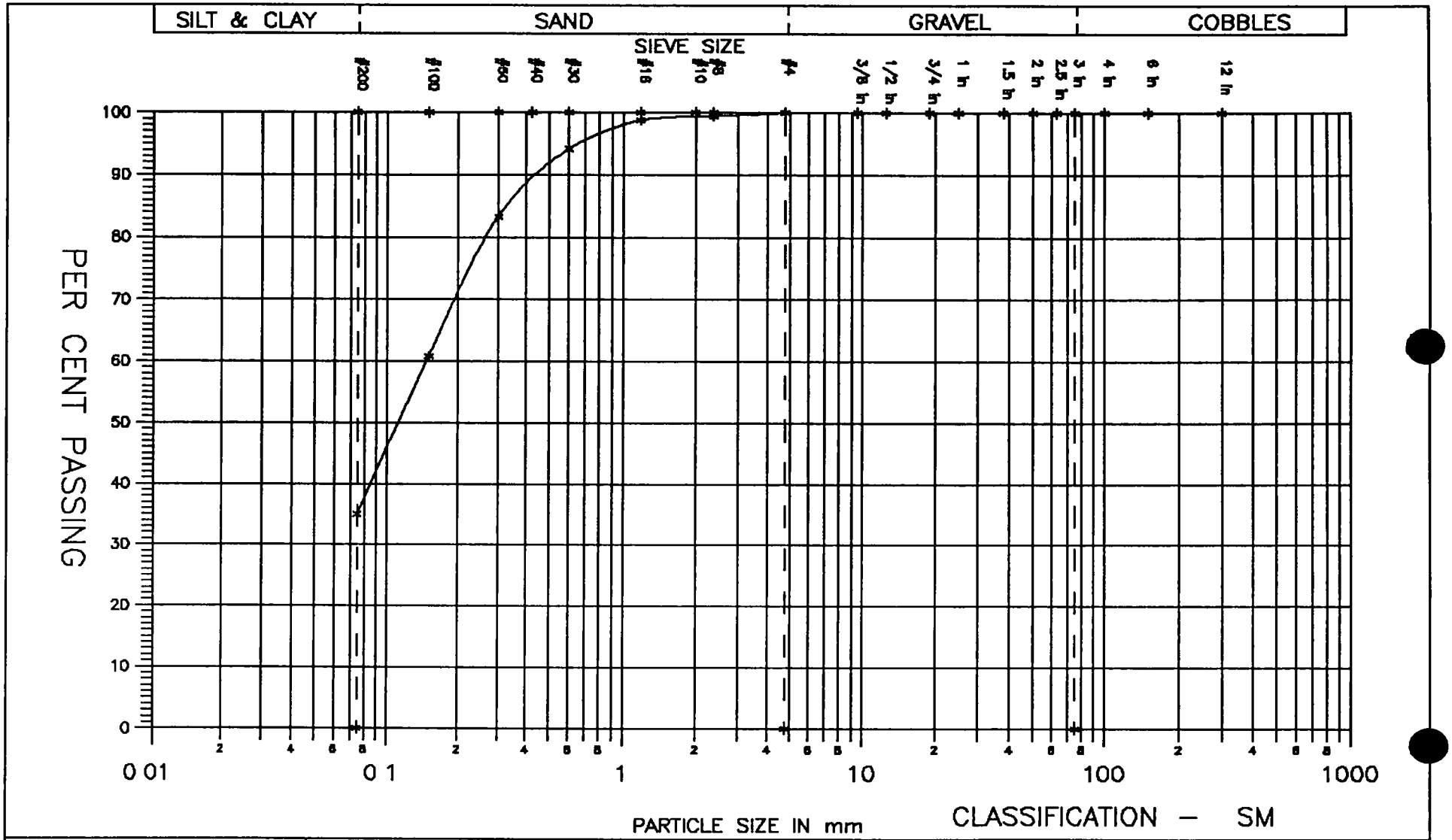
(6 85) End of Hole

No bedrock encountered
No water level recorded

Moisture: PL / M C / LL; 20% 40% 60% 80%
%GRVL D10 D30 D60 %FINE; %<0 075mm; %<4 750mm; G/A; 20% 40% 60% 80%
Microtip PID Reading: 100 200 300 400
Total Extractable Hydrocarbons (ppm): 100 200 300 400

Microtip PID Readings: 10 7; 11 8; 39 4; 33 4; 36 1; 17 0; 287 0; 417 0; 441 0; 428 0; 59 1; 180 0; 16 3; 19 7; 18 0; 11 0; 14 3; 10 6
Total Extractable Hydrocarbons (ppm): 0 0; 0 15; 35 0; 13000; 6100; 190

WATER TABLE No water level recorded	NORTH 71 700 EAST 129 100 TREND PLUNGE 90 0 (deg) ELEV G/S 98 96 (m)	EQUIPMENT Canterra METHOD Hollow Stem Auger DRILLER Paddock Drilling Ltd	COMPLETION 96/09/20 INSPECTOR F Demchenko DEPTH 6 85 (m)
		STATUS FINAL JHE 98/04/09 O/B P nted 98/04/08 08 32 CB96A GEOTE O I y HCPID HCX600 ATT10 GRAIN LINE USCS TITLE	



MANITOBA HYDRO Power Planning & Ops Geotechnical Engin Materials Testing Lab	GRAIN SIZE DISTRIBUTION GRAPH PROJECT CRANBERRY PORTAGE DECOM DIESEL GEN STN		REMARKS Cu = NA Cc = NA COBBLES 0 % GRAVEL 0 % SAND 65 % SILT/CLAY 35 % DATE 98 03 26 TESTED BY AK
	SAMPLE NO	HOLE NO	DESCRIPTION/DEPTH
	CS — 7	CB — 006	2 25 — 2 55m

DIRECTORY CB96A FILE 7CB006S

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE

DECOMMISSIONED DIESEL GENERATING STATION

CB-007
1 OF 1
Prj # 200529

Sampler Types: Auger; Core Barrel; Bulk Sample; Split Spoon; Sonic; Special Samplers; Grab Sample; Shelby; Auger Barrel; Tricone; Air Hammer

Moisture: PL 20% | M C 40% 60% | LL 80%

%GRVL D10 D30 D60 %FINE; % <0 075mm; % 4 750mm; G / A; 20% 40% 60% 80%

Microtip PID Reading ○ 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕ 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading	Total Extractable Hydrocarbons (ppm)
0			FILL	(0 00 0 30) Gravel fill		
		1 CS/CG	SP	(0 30 1 50) Sand medium brown fine grained with silt damp	○20 2	
		2 CS/CG			○8 6	
1		3 CS/CG			○13 2	
		4 CS/CG	ML	(1 50 2 20) Silt medium brown some sand damp	○18 5	
		5 CS/CG			○14	0 0 84 8
2		6 CS/CG	SP	(2 20 2 62) Sand light brown coarse to medium grained some gravel damp	○281 0	
		7 CS/CG		(2 62 3 05) Sand light brown medium grained some silt damp	>>○644 0	>>⊕ 1200
3		8 CS/CG	ML	(3 05 3 50) Silt medium brown with sand damp	○386 0	
		9 CS/CG	SP	(3 50 5 30) Sand brown coarse to medium grained some gravel damp	○460 0	
4		10 CS/CG			○327 0	
		11 CS/CG			○399 0	
		12 CS/CG			○488 0	
5		13 CS/CG			○422 0	
		14 CS/CG		(5 30 6 50) Sand light brown medium to fine grained damp	>>○612 0	>>⊕ 2100
		15 CS/CG			>>○549 0	
6		16 CS/CG			○314 0	
		17 CS/CG	ML	(6 50 6 85) Silt medium brown with sand damp	○429 0	
7		18 CS/CG	SP SM	(6 85 8 95) Sand light brown some silt medium to fine grained damp	○400 0	
		19 CS/CG			○424	0 0 0 15 0 23 10 6
		20 CS/CG	ML	(7 55 7 70) Silt seam medium brown damp	○287 0	
		21 CS/CG	SP SM		○437 0	
8		22 CS/CG			>>○524 0	
9		23 CS/CG	ML	(8 95 9 45) Silt medium brown with sand damp	>>○609 0	>>⊕ 1400
		24 CS/CG			○487 0	
		25 CS/CG	SP	(9 45 9 90) Sand light brown fine to medium grained some silt damp	○364 0	
				(9 90) End of Hole		

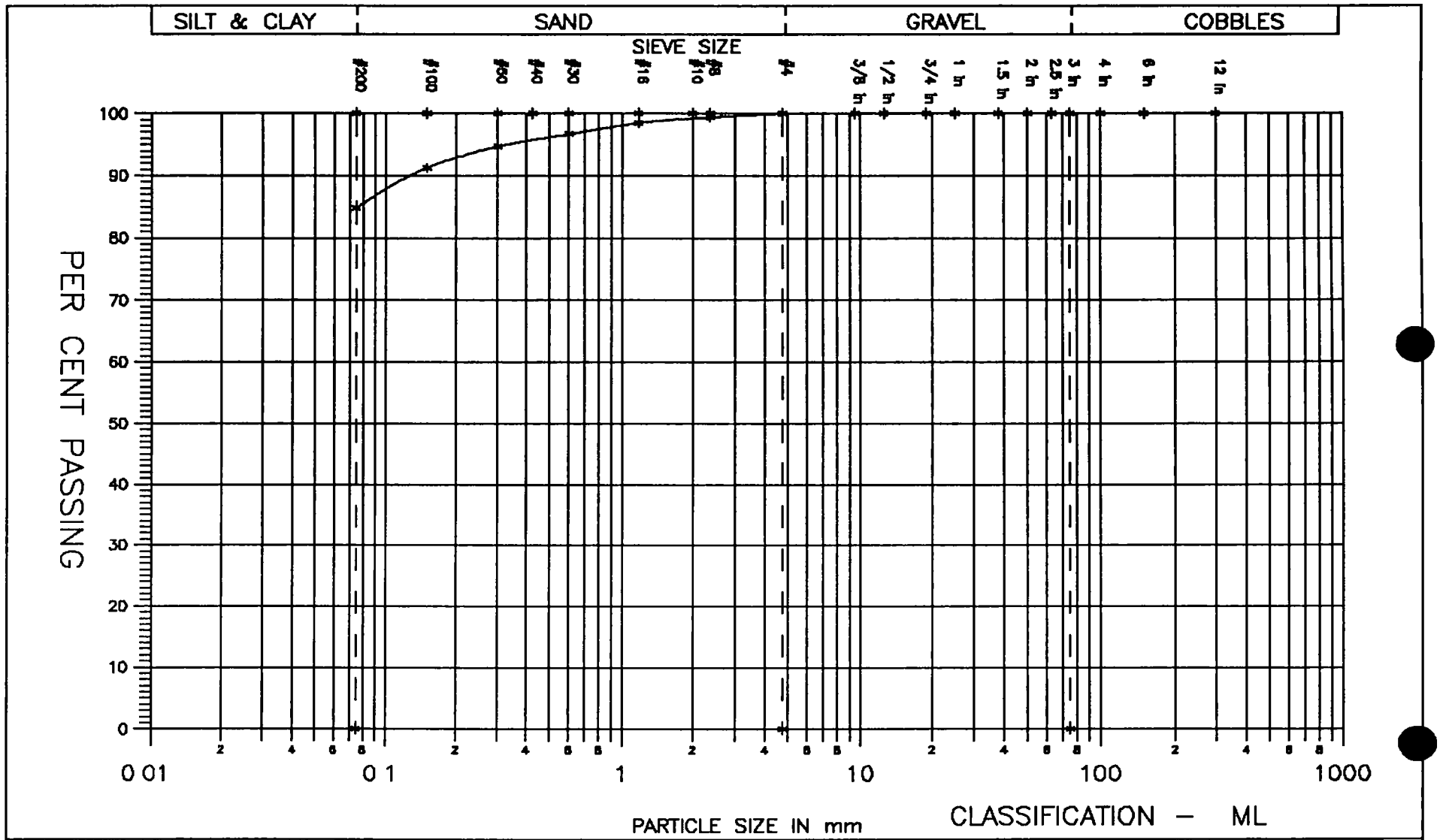
WATER TABLE
No water level recorded

NORTH 91 000
EAST 150 000
TREND N0E
PLUNGE 0 0 (deg)
ELEV G/S 98 63 (m)

EQUIPMENT Canterra
METHOD Hollow Stem Auger
DRILLER Paddock Drilling Ltd

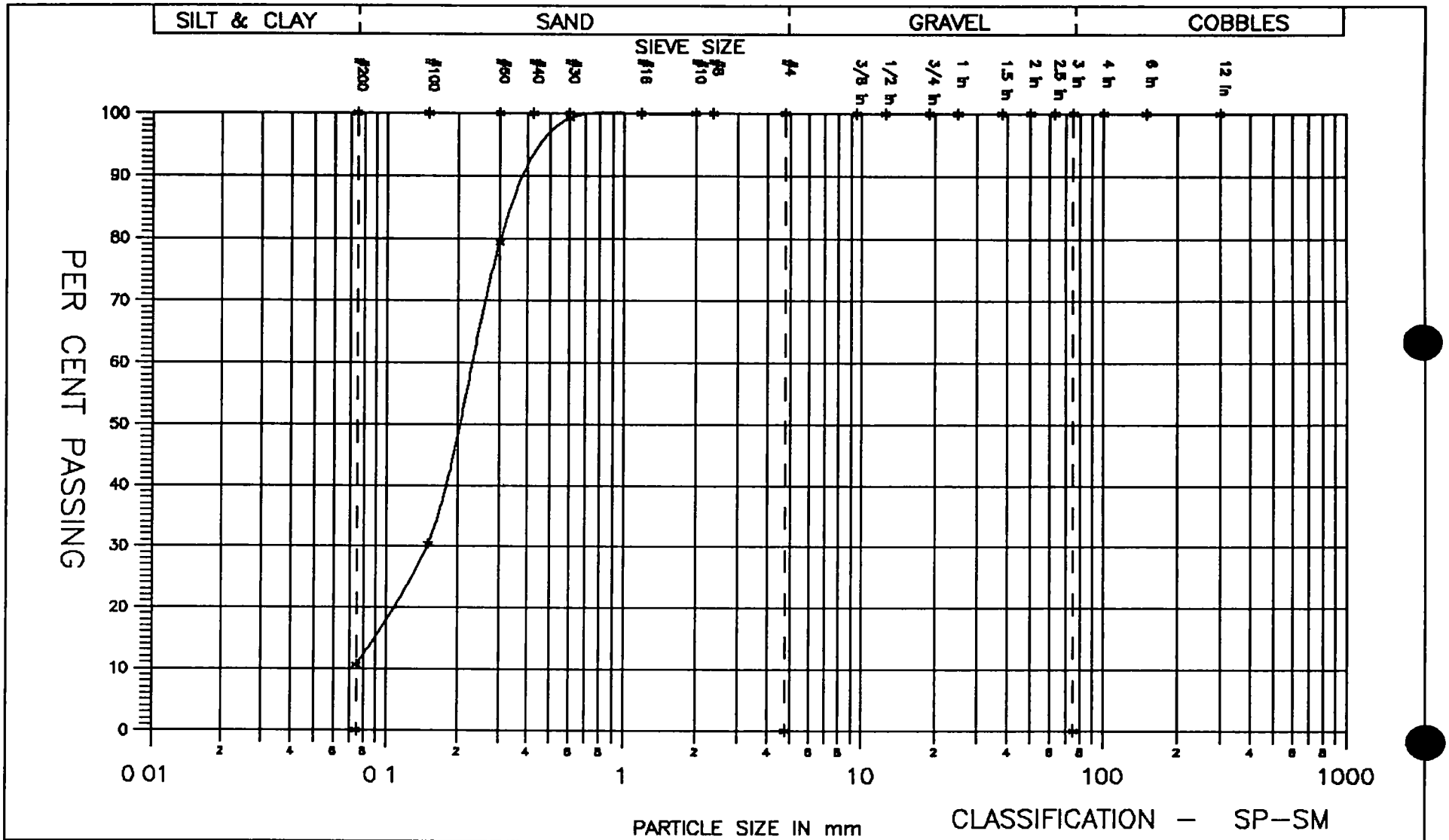
COMPLETION 96/09/21
INSPECTOR F Demchenko
DEPTH 9 90 (m)

STATUS FINAL O I ys JHE 98/04/08 O/B HCPID HCX500 ATT10 P ted 98/04/08 08 33 CB86A GEOTE GRAIN LINE USCS TITLE



MANITOBA HYDRO Power Planning & Ops Geotechnical Engin Materials Testing Lab	GRAIN SIZE DISTRIBUTION GRAPH		REMARKS Cu = NA Cc = NA
	PROJECT CRANBERRY PORTAGE DECOM DIESEL GEN STN		COBBLES 0 % GRAVEL 0 % SAND 15 % SILT/CLAY 85 %
SAMPLE NO	HOLE NO	DESCRIPTION/DEPTH	DATE 98 03 26 TESTED BY AK
CS – 5	CB – 007	1 87 – 2 20m	

DIRECTORY CB96A FILE 5CB007S



MANITOBA HYDRO Power Planning & Ops Geotechnical Engin Materials Testing Lab	GRAIN SIZE DISTRIBUTION GRAPH		
	PROJECT CRANBERRY PORTAGE DECOM DIESEL GEN STN		
	SAMPLE NO	HOLE NO	DESCRIPTION/DEPTH
	CS – 19	CB – 007	7 22 – 7 55m

REMARKS Cu = NA Cc = NA

COBBLES	0 %
GRAVEL	0 %
SAND	89 %
SILT/CLAY	11 %

DATE 98 03 26 TESTED BY AK

DIRECTORY CB96A FILE 19CB007S

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-008
1 OF 2
Prj # 200529

Sampler Types: Split Spoon; Shelby; Auger; Sonic; Auger Barrel; Core Barrel; Special Samplers; Tricone; Bulk Sample; Grab Sample; Air Hammer

Moisture: PL — M C — LL; 20% 40% 60% 80%

%GRVL D10 D30 D60 %FINE; %<0 075mm; %<4 750mm; G/A; 20% 40% 60% 80%

Microtip PID Reading ○; 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕; 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading	Total Extractable Hydrocarbons (ppm)	DEPTH (m)
			PT	(0 00 0 05) Peat with topsoil			
			SP	(0 05 0 30) Sand brown trace silt damp	○12 7		
		1 CS/CG	CI	(0 30 1 50) Clay brown trace silt trace sand blocky hard insitu above PL	○6 2		
1		2 CS/CG					1
		3 CS/CG			○18 0		
		4 CS/CG	ML	(1 50 1 85) Silt light brown some fine grained sand damp	○79 8		
2		5 CS/CG	SP SM	(1 85 3 05) Sand brown coarse to fine grained trace gravel damp	○54 1		2
		6 CS/CG			○83 5		
		7 CS/CG			○49 9		
3		8 CS/CG		(3 05 4 82) Sand brown medium grained damp	○56 2		3
		9 CS/CG			●○89 1	⊕<<	
		10 CS			○74 5		
4		11 CS			●○70 2	0 0 0 08 0 18 0 27 8 2	4
		12 CS/CG					
5		13 CS/CG		(4 82 5 30) Sand brown medium to fine grained trace silt damp	○64 2		5
		14 CS		(5 30 6 10) Sand brown fine grained with silt damp	○26 8		
		15 CS			○23 3		
6		16 CS	ML	(6 10 6 35) Silt medium brown trace sand damp	○14 2		6
		17 CS/CG	SP	(6 35 6 85) Sand light brown fine grained damp	○45 3		
7		18 CS	ML	(6 85 6 90) Silt seam light grey brown	○35 8 ○21 2		7
		19 CS	SP	(6 90 7 60) Sand light brown fine grained some silt damp	○24 1		
		20 CS/CG					
		21 CS		(7 60 8 55) Sand as above trace silt	○18 6		
8		22 CS/CG			○11 4		8
		23 CS			○9 4		
		24 CS/CG		(8 55 9 15) Sand as above no silt	●○65 2	⊕ 410	
9		25 CS	ML	(9 15 9 25) Silt light brown some sand trace gravel damp	○5 2 ○15 3		9
		26 CS	SM				
		27 CS		(9 25 10 65) Sand light brown fine gravel with silt damp	○6 8		
10		28 CS			○10 9		10

WATER TABLE ▽
1) 10 01 (m) 96/09/24
2) dry (m) 96/09/21

NORTH 92 600
EAST 174 200
TREND
PLUNGE 90 0 (deg)
ELEV G/S 98 53 (m)

EQUIPMENT Canterra
METHOD Hollow Stem Auger
DRILLER Paddock Drilling Ltd

STATUS FINAL

COMPLETION 96/09/21
INSPECTOR F Demchenko
DEPTH 10 65 (m)

Continued

MANITOBA HYDRO Engineering GEOTECHNICAL OVERBURDEN LOG	CRANBERRY PORTAGE DECOMMISSIONED DIESEL GENERATING STATION	CB-008 2 OF 2 Prj # 200529

Sampler Types: Auger; Core Barrel; Bulk Sample; Split Spoon; Sonic; Special Samplers; Grab Sample; Shelby; Auger Barrel; Tricone; Air Hammer

Moisture: PL — M C — LL; 20% 40% 60% 80%

%GRVL D10 D30 D60 %FINE; % 0 075mm; % 4 750mm; G / A; 20% 40% 60% 80%

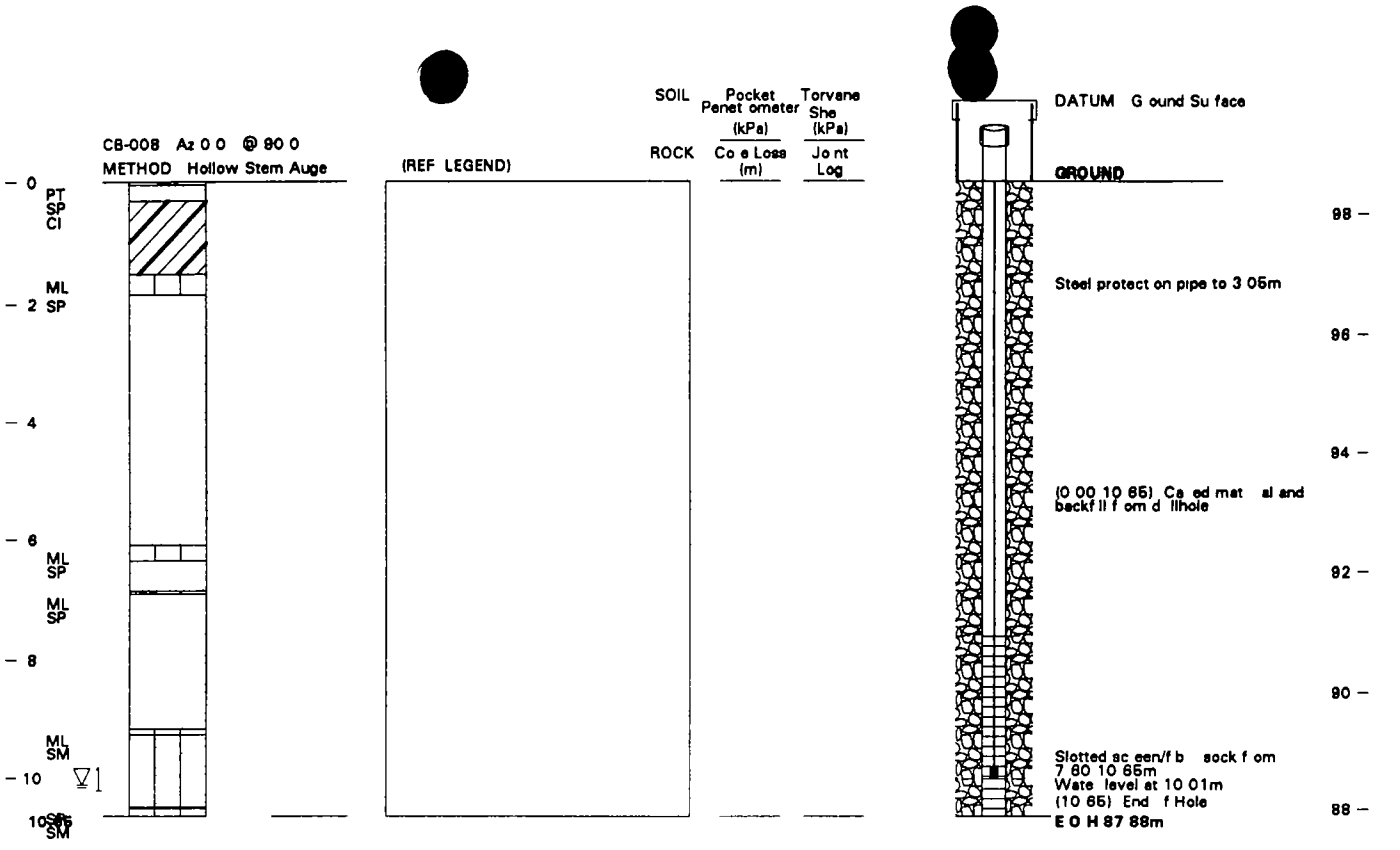
Microtip PID Reading ○; 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕; 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION
		28 CS/CG	SP	(10 50 10 52) SP sand seam more granular
			SM	**(10 65) End of Hole**

No bedrock encountered
Installed well Location 7 0m East of the east door from of the helicopter hangar 45° in a line through the storm sewer manhole cover
Well is screened to 7 60m with fiber sock
Caved and backfilled to ground surface
Assumptions 3 05m (10) of well screen installed Hole location made it necessary to be installed flush with ground surface 3 05m steel protection pipe installed

WATER TABLE ▽			
1) 10 01 (m) 96/09/24 2) dry (m) 96/09/21	NORTH 92 600 EAST 174 200 TREND PLUNGE 90 0 (deg) ELEV G/S 98 53 (m)	EQUIPMENT Canterra METHOD Hollow Stem Auger DRILLER Paddock Drilling Ltd	COMPLETION 96/09/21 INSPECTOR F Demchenko DEPTH 10 65 (m)
		STATUS FINAL O e lays JHE 98/04/08 O/B HCPID HCX600 ATT10 P ted 98/04/08 08 34 CB96A GEOTE GRAIN LINE USCS TITLE	



LEGEND

WATER TABLE ▽

1) 10 01 (m) 96/09/24
2) d y (m) 96/09/21

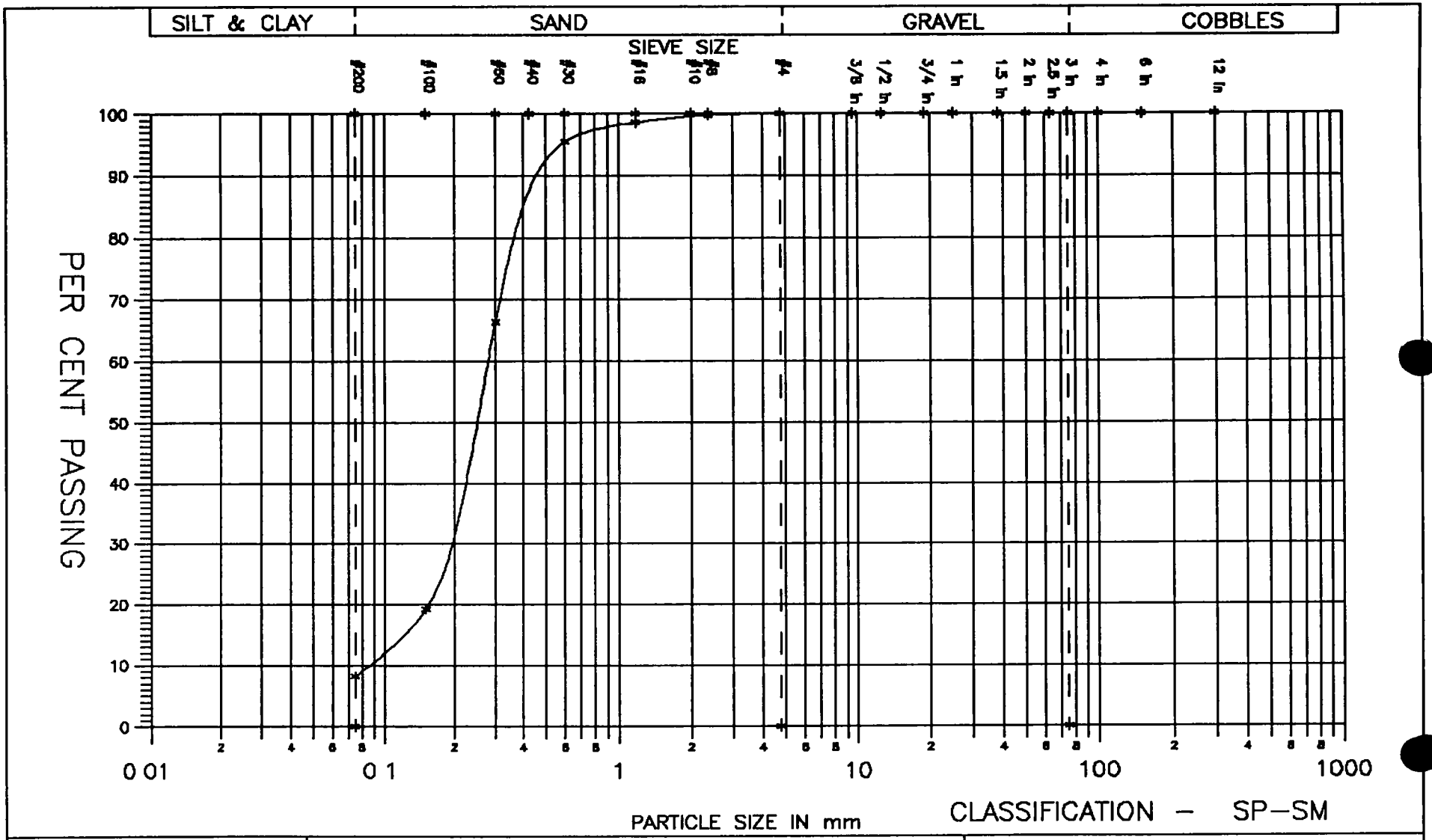
CRANBERRY PORTAGE

HOLE No CB-008

2" PVC Slotted Pipe

Installed 96/09/21
(m) 92 600 N 174 200 E
DECOMMISSIONED DIESEL GENERATING STATION

ed PM sm NST
as 89



MANITOBA HYDRO Power Planning & Ops Geotechnical Engin Materials Testing Lab	GRAIN SIZE DISTRIBUTION GRAPH PROJECT CRANBERRY PORTAGE DECOM DIESEL GEN STN		
	SAMPLE NO	HOLE NO	DESCRIPTION/DEPTH
	CS – 11	CB – 008	4 17 – 4 55m

REMARKS Cu = 3 10 Cc = 1 54

COBBLES	0 %
GRAVEL	0 %
SAND	92 %
SILT/CLAY	8 %

DATE 98 03 26 TESTED BY AK

DIRECTORY CB96A FILE 11CB008S

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-009
1 OF 1
Prj # 200529

Sampler Types: Split Spoon; Shelby; Auger; Sonic; Auger Barrel; Core Barrel; Special Samplers; Tricone; Bulk Sample; Grab Sample; Air Hammer

Moisture: PL — M C — LL; 20% 40% 60% 80%

%GRVL D10 D30 D60 %FINE; % 0 075mm; %<4 750mm; G / A; 20% 40% 60% 80%

Microtip PID Reading ○; 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕; 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading ○	Total Extractable Hydrocarbons (ppm) ⊕	DEPTH (m)
	CS	1	PT	(0 00 0 10) Peat	○11 1		
	CS		ML	(0 10 0 75) Silt light brown some sand damp			
1	CS	2	SP	(0 75 4 55) Sand brown coarse to fine grained trace gravel	○17 0		1
	CS	3			○31 5		
2	CS	4			○42 9		2
	CS	5			○55 6		
	CS	6			● ○89 5	⊕ B	
3	CS	7			○39 4		3
	CS	8			○83 5		
4	CS	8			○43 2		4
	CS	10			○57 3		
	CS	11		(4 55 5 35) Sand light brown coarse to fine grained damp	○45 9		
5	CS	12			○51 1		5
	CS	13		(5 35 6 85) Sand light brown fine grained damp trace silt	○30 3		
	CS	14			○34 5		
6	CS	15			○48 6		6
	CS	16			○44 8		
7	CS/CG	17	ML	(6 85 7 15) Silt light brown with sand damp	○29 0		7
	CS/CG	18	SP	(7 15 7 35) Sand light brown fine grained damp	○28 5		
			ML		○44 2		
	CS	19		(7 35 7 70) Silt light brown with sand damp	○9 9		
	CS	20	SP	(7 70 8 30) Sand light brown fine grained			
8			ML		○3 2		8
	CS/CG	21	SP	Silt seam at 7 90 7 92m			
				(8 30) End of Hole			

WATER TABLE
No water level recorded

NORTH 114 000
EAST 150 000
TREND
PLUNGE 90 0 (deg)
ELEV G/S 98 58 (m)

EQUIPMENT Canterra
METHOD Hollow Stem Auger
DRILLER Paddock Drilling Ltd

COMPLETION 96/09/21
INSPECTOR F Demchenko
DEPTH 8 30 (m)

STATUS FINAL O I y JHE 98/04/09 O/B HCPID HCX600 ATT10 Printed 98/04/08 08 34 CB98A GEOTE GRAIN LINE USCS TITLE

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-010
1 OF 1
Prj # 200529

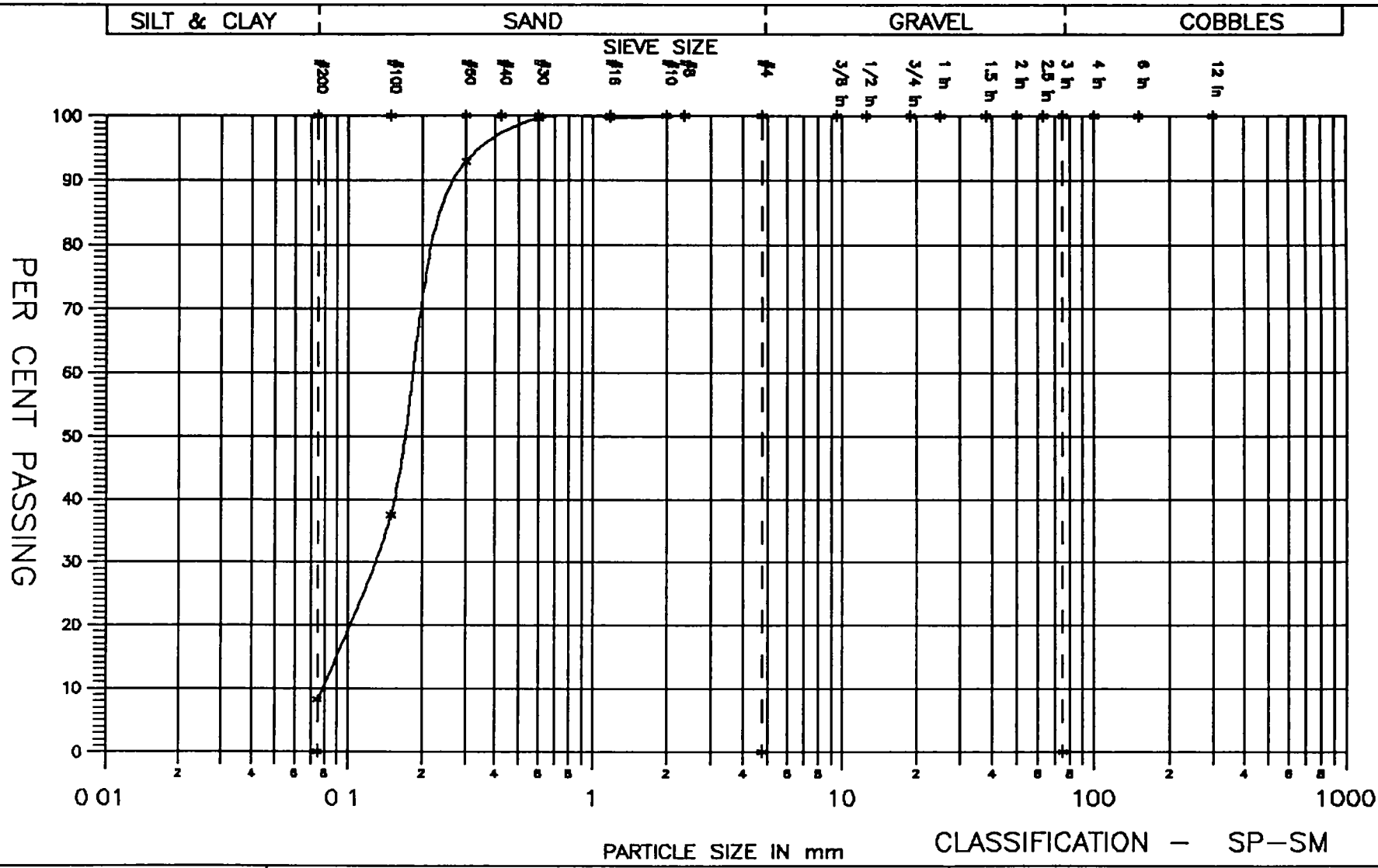
Sampler Types: Split Spoon; Shelby; Auger; Sonic; Auger Barrel; Core Barrel; Special Samplers; Tricone; Bulk Sample; Grab Sample; Air Hammer

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading (○)	Total Extractable Hydrocarbons (ppm) (⊕)	DEPTH (m)
		1 CS	FILL	(0 00 0 45) Sand fill	○13 6		
		2 CS	CL	(0 45 0 75) Clay medium grey brown some silt trace sand stiff insitu at PL	○27 8		
1		3 CS	SP	(0 75 1 80) Sand medium tan brown medium to fine grained trace gravel damp	○14 6		1
		4 CS			○22 5		
		5 CS			○19 8		
2		6 CS		(1 80 2 25) Sand light brown medium to fine grained trace silt	○31 3		2
		7 CS	ML	(2 25 2 45) Silt light brown some sand damp	○20 8		
		8 CS			○38 1		
		9 CS/CG	SP	(2 45 2 65) Silt as above and sand	○51 5		
3		10 CS		(2 65 3 70) Sand brown coarse grained trace gravel damp	○78 9		3
		11 CS			○38 7		
		12 CS		(3 70 3 80) Sand light brown fine grained trace silt damp	○30 9	○252 0	
4		13 CS/CG					4
		14 CS/CG		(3 80 4 92) Sand light brown fine grained damp	○33 4		
		15 CS/CG			●	○279 0	>>⊕ 3100
5		16 CS	ML	(4 92 5 05) Silt light grey brown damp		○304 0	5
		17 CS/CG	SP	(5 05 5 35) Sand light brown fine grained some silt damp		○447 0	
		18 CS	ML			○411 0	
		19 CS/CG	SP	(5 35 5 60) Silt light grey brown with sand damp		○403 0	
6		20 CS/CG	ML	(5 60 6 10) Sand light brown fine grained some silt damp		○421 0	6
		21 CS/CG	SP SM	(6 10 6 40) Silt light grey brown with sand damp	●	0 0 0 08 0 13 0 20 8 1	
		22 CS		(6 40 6 95) Sand light brown trace silt fine grained damp	●	>>○593 0	>>⊕ 14000
7		23 CS	ML			○382 0	7
		24 CS/CG		(6 95 7 15) Silt light grey brown damp	○ 4 6	⊕<< 0	
		25 CS		(7 15 7 60) Silt light tan brown with sand damp	○14 4		
8		26 CS/CG		(7 60 9 15) Silt light brown with fine grained sand damp	○14 7		8
		27 CS			○14 1		
		28 CS			○10 9		
9							9

(9 15) End of Hole

No bedrock encountered
No water level recorded
NOTE << INDICATES NOT DETECTED
Detection limit for total extractable hydrocarbons is 5 ppm

WATER TABLE No water level recorded	NORTH 106 200 EAST 126 600 TREND PLUNGE 90 0 (deg) ELEV G/S 99 37 (m)	EQUIPMENT Canterra METHOD Hollow Stem Auger DRILLER Paddock Drilling Ltd	COMPLETION 96/09/21 INSPECTOR F Demchenko DEPTH 9 15 (m)
		STATUS FINAL 0 I ys JHE 98/04/09 O/B HCPID HCX600 ATT10 P ted 98/04/08 10 01 CB98A GEOTE GRAIN LINE USCS TITLE	



MANITOBA HYDRO Power Planning & Ops Geotechnical Engin Materials Testing Lab	GRAIN SIZE DISTRIBUTION GRAPH		
	PROJECT CRANBERRY PORTAGE DECOM DIESEL GEN STN		
	SAMPLE NO	HOLE NO	DESCRIPTION/DEPTH
	CS – 21	CB – 010	6 40 – 6 80m

REMARKS Cu = 2 31 Cc = 1 20

COBBLES	0 %
GRAVEL	0 %
SAND	92 %
SILT/CLAY	8 %

DATE 98 03 26 TESTED BY AK

DIRECTORY CB96A FILE 21CB010S

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-011
1 OF 1
Prj # 200529

Sampler Types: Split Spoon, Shelby, Auger, Sonic, Auger Barrel, Core Barrel, Special Samplers, Tricone, Bulk Sample, Grab Sample, Air Hammer

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Moisture PL / M C / LL (20% 40% 60% 80%)	Microtip PID Reading ○ (100 200 300 400)	%GRVL D10 D30 D60 %FINE; % < 0.075mm; % < 4.750mm; G / A (20% 40% 60% 80%)	Total Extractable Hydrocarbons (ppm) ⊕ (100 200 300 400)	DEPTH (m)
		1 CS	PT	(0 00 0 10) Peat		9 0			
			ML	(0 10 0 75) Silt tan brown trace sand damp					
		2 CS		(0 75 1 00) Silt light tan brown with sand damp		9 4			
1		3 CS				10 2			1
		4 CS	SP	(1 00 1 25) Silt light grey brown trace fine sand damp		11 3			
		5 CS		(1 25 1 50) Sand light brown fine grained some silt damp		10 1			
2		6 CS		(1 50 1 85) Sand light brown fine grained damp		147 0		>> ⊕ 900	2
		7 CS		(1 85 2 25) Sand light grey brown some silt damp		15 7			
		8 CS		(2 25 4 17) Sand light brown fine grained damp		8 9			
3		9 CS				8 9		0 16 0 21 0 34 2 6	3
		10 CS				10 7			
		11 CS				11 3			
4		12 CS		(4 17 4 55) Sand light brown fine grained some silt damp		9 4			4
		13 CS		(4 55 4 82) Sand light brown fine grained damp		10 1			
5		14 CS	SM	(4 82 5 30) Sand light brown fine grained and silt damp		9 3			5
		15 CS	ML	(5 30 5 90) Silt light brown trace sand damp		8 7			
6		16 CS		(5 90 6 10) Silt medium brown some sand trace gravel moist		9 5			6
				(6 10) End of Hole					

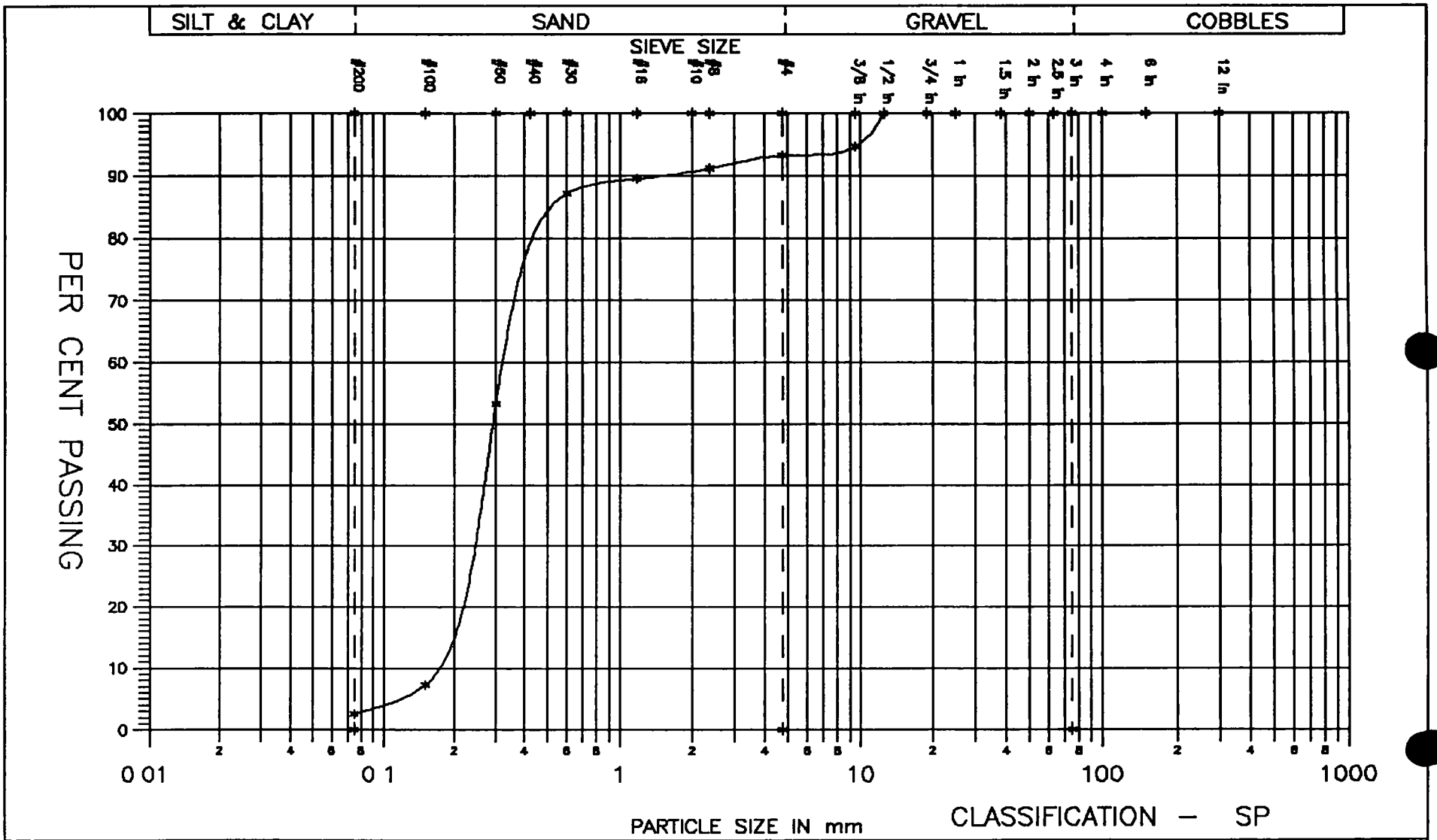
WATER TABLE
No water level recorded

NORTH 131 500
EAST 120 700
TREND
PLUNGE 90 0 (deg)
ELEV G/S 98 90 (m)

EQUIPMENT Canterra
METHOD Hollow Stem Auger
DRILLER Paddock Drilling Ltd

COMPLETION 96/09/21
INSPECTOR F Demchenko
DEPTH 6 10 (m)

STATUS FINAL Overlays JHE 98/04/09 O/B HCPID HCX500 ATT10 P tod 98/04/08 09 35 CB96A GEOTE GRAIN LINE USCS TITLE



MANITOBA HYDRO	GRAIN SIZE DISTRIBUTION GRAPH			REMARKS Cu = 1 88 Cc = 1 06
Power Planning & Ops Geotechnical Engin Materials Testing Lab	PROJECT CRANBERRY PORTAGE DECOM DIESEL GEN STN			COBBLES 0 % GRAVEL 7 % SAND 90 % SILT/CLAY 3 %
	SAMPLE NO	HOLE NO	DESCRIPTION/DEPTH	DATE 98 03 26 TESTED BY AK
	CS – 9	CB – 011	3 05 – 3 42m	

DIRECTORY CB96A FILE 9CB011S

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE

DECOMMISSIONED DIESEL GENERATING STATION

CB-012
1 OF 1
Prj # 200529

Sampler Types: Auger; Core Barrel; Bulk Sample; Split Spoon; Sonic; Special Samplers; Grab Sample; Shelby; Auger Barrel; Tricone; Air Hammer

Moisture: PL — M C — LL; 20% 40% 60% 80%

%GRVL D10 D30 D60 %FINE; % < 0.075mm; % < 4.750mm; G / A; 20% 40% 80% 80%

Microtip PID Reading ○; 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕; 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading ○	Total Extractable Hydrocarbons (ppm) ⊕	DEPTH (m)
		1 CS	FILL	(0 00 0 20) Fill	○11 7		
		1 CS	ML	(0 20 0 75) Silt medium brown trace sand trace gravel moist	○9 1		
		2 CS					
		3 CS		(0 75 1 50) Silt light tan brown with fine grained sand damp	○10 4		
1		4 CS			○8 8		1
		5 CS	SP	(1 50 3 05) Sand light brown coarse grained damp	○8 8		
		6 CS			○11 6		
2		7 CS			○11 6		2
		8 CS			○8 5		
		9 CS		(3 05 3 42) Sand light brown coarse grained some gravel damp	○10 7		
3		10 CS		(3 42 4 00) Sand light brown fine grained some silt damp	○11 2		3
		11 CS			○11 7		
		12 CS	ML	(4 00 4 20) Silt light brown and sand damp	○11 9		
		13 CS	SP	(4 20 5 30) Sand light brown fine grained damp	○13 5		
		14 CS			○9 7		
4		15 CS			○11 6		4
		16 CS	ML	(5 30 5 67) Silt as above	○11 8		
		17 CS		(5 67 6 10) Silt as above some sand	○13 5		
5							5
6							6

(6 10) End of Hole

WATER TABLE No water level recorded	NORTH 108 800 EAST 96 700 TREND PLUNGE 90 0 (deg) ELEV G/S 99 55 (m)	EQUIPMENT Canterra METHOD Hollow Stem Auger DRILLER Paddock Drilling Ltd	COMPLETION 96/09/21 INSPECTOR F Demchenko DEPTH 6 10 (m)
		STATUS FINAL O e l y JHE 98/04/09 O/B HCPID HCX600 ATT10 P ted 98/04/08 09 36 CB98A GEOTE GRAIN LINE USCS TITLE	

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-013
1 OF 1
Prj # 200529

Sampler Types: Split Spoon; Shelby; Auger; Sonic; Auger Barrel; Core Barrel; Special Samplers; Tricone; Bulk Sample; Grab Sample; Air Hammer

Moisture: PL — M C — LL; 20% 40% 60% 80%

%GRVL D10 D30 D60 %FINE G/A; % 0 075mm; % 4 750mm; 20% 40% 60% 80%

Microtip PID Reading ○; 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕; 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading ○	Total Extractable Hydrocarbons (ppm) ⊕
0			FILL	(0 00 0 20) Fill	○9 9	
		1 CS	SM	(0 20 0 50) Sand tan brown and silt	○8 4	
		2 CS	SP	(0 50 1 20) Sand tan brown coarse to fine grained damp	○8 6	
1		3 CS				
		4 CS	ML	(1 20 1 50) Silt light brown and sand damp	○12 9	
		5 CS		(1 50 1 70) Silt light grey brown some sand damp	○12 2	
		6 CS	SP		○12 0	
2		7 CS		(1 70 2 00) Sand light brown medium to fine grained damp	○13 3	
		8 CS		(2 00 3 80) Sand light brown coarse grained some gravel damp	○15 0	
		9 CS			○18 3	
3		10 CS/CG			○13 8	
		11 CS			○10 2	
		12 CS	ML	(3 80 4 17) Silt light grey brown trace sand damp	○14 0	
4		13 CS		(4 17 4 55) Silt light brown with fine sand damp	○11 4	
		14 CS	SP	(4 55 5 30) Sand light brown fine grained trace silt damp	○11 6	
5		15 CS			○12 2	
		16 CS	ML	(5 30 6 10) Silt light brown some fine grained sand damp	○11 0	
		17 CS/CG			○12 9	
6				(6 10) End of Hole		

No bedrock encountered
No water level recorded

WATER TABLE No water level recorded	NORTH 113 700 EAST 81 300 TREND PLUNGE 90 0 (deg) ELEV G/S 99 53 (m)	EQUIPMENT Canterra METHOD Hollow Stem Auger DRILLER Paddock Drilling Ltd	COMPLETION 96/09/21 INSPECTOR F Demchenko DEPTH 6 10 (m)
		STATUS FINAL JHE 98/04/09 O/B P ted 98/04/08 09 36 CB96A GEOTE O I y HCPID HCX600 ATT10 GRAIN LINE USCS TITLE	

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-014
1 OF 1
Prj # 200529

Sampler Types: Split Spoon; Shelby; Auger; Sonic; Auger Barrel; Core Barrel; Special Samplers; Tricone; Bulk Sample; Grab Sample; Air Hammer

Moisture: PL — M C — LL; 20% 40% 60% 80%

%GRVL D10 D30 D60 %FINE G/A; % < 0 075mm; % < 4.750mm; 20% 40% 60% 80%

Microtip PID Reading ○; 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕; 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading	Total Extractable Hydrocarbons (ppm)	DEPTH (m)
			FILL	(0 00 0 25) Fill			
		1 CS	SP	(0 25 0 60) Sand tan brown fine grained some silt damp	○24 6		
		2 CS		(0 60 1 05) Sand light brown fine grained damp/	○21 6		
1		3 CS	ML	(1 05 1 20) Silt light grey brown trace sand damp	○15 0		1
		4 CS	SP		○26 1		
		5 CS	ML	(1 20 1 50) Sand brown medium to fine grained trace oxidation damp	○18 6		
2		6 CS	SP	(1 50 1 87) Silt light brown grey with sand damp	○81 7		2
		7 CS		(1 87 2 25) Sand brown medium to fine grained damp	○78 6		
		8 CS		(2 25 3 42) Sand brown coarse to fine grained damp	●○134 0	⊕2	
3		9 CS			○82 7		3
		10 CS		(3 42 3 80) Sand brown medium to fine grained damp	○138 0		
4		11 CS		(3 80 4 17) Sand brown medium to fine grained trace silt trace gravel damp	○104 0		4
		12 CS		(4 17 5 10) Sand light brown fine grained trace silt damp	○57 2		
		13 CS			○32 7		
5		14 CS	ML	(5 10 5 30) Silt light grey brown with sand damp	○32 3		5
		15 CS			○11 0		
		16 CS		(5 30 5 85) Silt medium brown some sand trace gravel moist	○31 7		
6		17 CS		(5 85 6 10) Silt light brown some sand damp	○25 6		6
				(6 10) End of Hole			

No bedrock encountered
No water level recorded

WATER TABLE
No water level recorded

NORTH 98 800
EAST 98 500
TREND
PLUNGE 90 0 (deg)
ELEV G/S 99 53 (m)

EQUIPMENT Canterra
METHOD Hollow Stem Auger
DRILLER Paddock Drilling Ltd

COMPLETION 96/09/22
INSPECTOR F Demchenko
DEPTH 6 10 (m)

STATUS FINAL
O I y
JHE 98/04/09 O/B HCPID HCX500 ATT10
P ted 98/04/08 09 37 CB96A GEOTE GRAIN LINE USCS TITLE

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-015
1 OF 1
Prj # 200529

Sampler Types: Split Spoon; Shelby; Auger; Sonic; Auger Barrel; Core Barrel; Special Samplers; Tricone; Bulk Sample; Grab Sample; Air Hammer

Moisture: PL — M C — LL; 20% 40% 60% 80%

%GRVL D10 D30 D60 %FINE; % 0 075mm; % 4 750mm; G A; 20% 40% 60% 80%

Microtip PID Reading ○; 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕; 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading	Total Extractable Hydrocarbons (ppm)	DEPTH (m)
			FILL	(0 00 0 30) Fill			
		1 CS	SP	(0 30 1 20) Sand tan brown coarse to fine grained damp	○25 2		
		2 CS			○39 9		
1							1
		3 CS		(1 20 2 00) Sand brown medium to fine grained damp	○41 4		
		4 CS			○54 5		
2		5 CS		(2 00 3 55) Sand brown coarse to fine grained trace gravel damp	○66 1		2
		6 CS			● ○80 5	⊕	
		7 CS			○60 2		
3		8 CS			● ○70 3	⊕ 71	3
		9 CS		(3 55 4 00) Sand brown fine to medium grained damp	○62 7		
		10 CS			○41 9		
4		11 CS		(4 00 4 25) Sand brown medium grained damp	○42 4		4
		12 CS	ML	(4 25 4 80) Silt light grey brown some sand damp	○37 9		
		13 CS	SP		○21 5		
		14 CS	ML	(4 70 4 72) Sand seam	○42 9		
5			SP	(4 80 5 50) Sand brown medium to fine grained damp			5
		15 CS			○28 5		
		16 CS	ML	(5 50 5 70) Silt light grey brown trace sand damp	○19 1		
		17 CS			○21 7		
6				(5 70 6 50) Silt light brown with sand damp			6
		18 CS			○19 9		
		19 CS	SP	(6 50 6 65) Sand brown some gravel damp	○17 6		
		20 CS	ML	(6 65 7 10) Silt medium brown some sand damp	○17 3		
7		21 CS			○31 0		7
		22 CS		(7 10 7 92) Silt as above light brown	○26 6		
		23 CS			○20 9		
8		24 CS		(7 92 8 30) Silt as above trace gravel	○24 2		8
		25 CS		(8 30 8 75) Silt medium brown with sand damp	○31 6		
9		26 CS	SP	(8 75 9 15) Sand brown some silt some gravel damp	○25 3		9

(9 15) End of Hole

No bedrock encountered
No water level recorded

WATER TABLE No water level recorded	NORTH 97 400 EAST 110 000 TREND -- PLUNGE 90 0 (deg) ELEV G/S 99 62 (m)	EQUIPMENT Canterra METHOD Hollow Stem Auger DRILLER Paddock Drilling Ltd	COMPLETION 96/09/22 INSPECTOR F Demchenko DEPTH 9 15 (m)
		STATUS FINAL 0 1 ys JHE 98/04/09 O/B HCPID HCX600 ATT10 P ted 98/04/08 09 37 CB96A GEOTE GRAIN LINE USCS TITLE	

MANITOBA HYDRO
Engineering
GEOTECHNICAL **OVERBURDEN LOG**

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-016
1 OF 1
Prj # 200529

Sampler Types: Split Spoon; Shelby; Auger; Sonic; Auger Barrel; Core Barrel; Special Samplers; Tricone; Bulk Sample; Grab Sample; Air Hammer

Moisture: PL, M C, LL — 20% 40% 60% 80%

%GRVL D10 D30 D60 %FINE G/A — % < 0 075mm % 4 750mm — 20% 40% 60% 80%

Microtip PID Reading: 100 200 300 400

Total Extractable Hydrocarbons (ppm): 100 200 300 400

Sample #	USCS	SOIL DESCRIPTION	PID Reading
	FILL	(0 00-0 20) Gravel fill	14 5
1 CS/CG	SM	(0 20 0 75) Sand light brown fine grained with silt	42 9
2 CS/CG	SM	(0 75 2 62) Sand light brown fine grained with silt damp	
3 CS/CG			105 0
4 CS/CG			136 0
5 CS/CG			71 3
6 CS/CG		(2 62 3 80) Sand light brown with silt very fine grained damp	81 3
7 CS/CG			52 6
8 CS			53 4
9 CS	ML	(3 80 4 17) Silt light grey brown with sand damp	38 5
10 CS	SP	(4 17 4 85) Sand brown very fine grained trace silt damp	37 7
11 CS			32 9
12 CS	ML	(4 85 4 90) Silt light grey brown some sand damp	29 2
	SP	(4 90 5 30) Sand brown very fine grained trace silt damp	26 5
13 CS	ML	(5 30 6 10) Silt light grey brown some sand damp	
14 CS		(6 10 6 60) Silt light brown some sand dry	44 8
15 CS		(6 60 6 80) Silt light grey brown trace sand damp	25 9
16 CS		(6 80 7 97) Silt light brown trace sand damp	31 2
17 CS			38 0
18 CS			26 2
19 CS		(7 97 8 30) Silt light brown some fine grained sand dry	37 7
20 CS		(8 30 8 50) Silt as above damp	29 0
21 CS		(8 50 8 85) Silt as above trace gravel	23 2

Total Extractable Hydrocarbons: >> 10000 (approx. 2.0 m); 2600 (approx. 2.3 m); << (approx. 2.7 m); 5 (approx. 3.1 m)

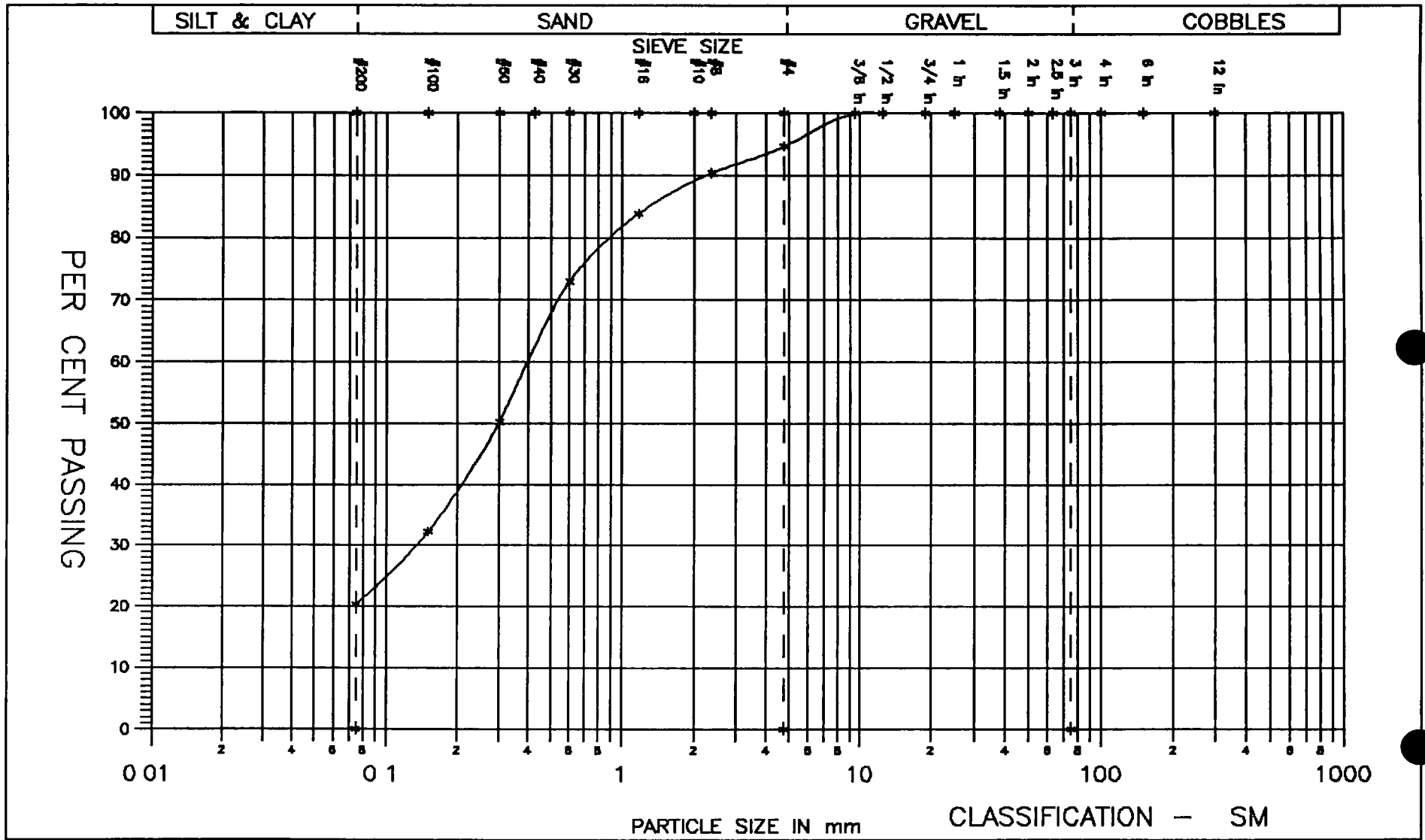
Grain size: 0 13 0 40 20 2 (approx. 2.3 m); 0 0 0 08 56 4 (approx. 7.2 m)

(8 85) End of Hole due to auger refusal on cobbles

NOTE << INDICATES NOT DETECTED
Detection limit for total extractable hydrocarbons is 5 ppm

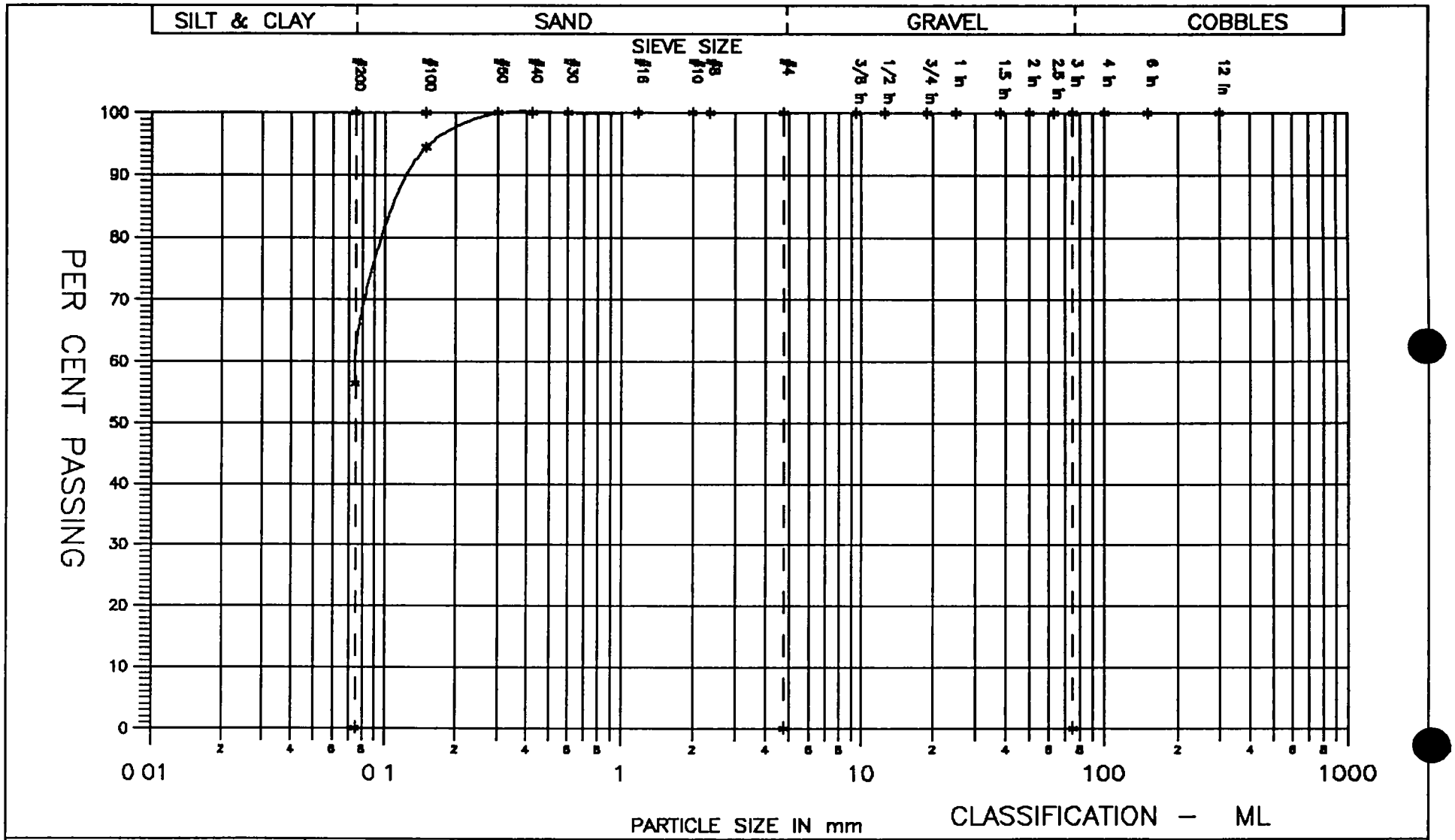
WATER TABLE No water level recorded	NORTH 90 000 EAST 100 000 TREND PLUNGE 90 0 (deg) ELEV G/S 99 63 (m)	EQUIPMENT Canterra METHOD Hollow Stem Auger DRILLER Paddock Drilling Ltd	COMPLETION 96/09/22 INSPECTOR F Demchenko DEPTH 8 85 (m)

STATUS FINAL O e l ys JHE 98/04/09 O/B HCPID HCX600 ATT10 P ted 98/04/08 10 14 CB96A GEOTE GRAIN LINE USCS TITLE



MANITOBA HYDRO Power Planning & Ops Geotechnical Engin Materials Testing Lab	GRAIN SIZE DISTRIBUTION GRAPH PROJECT CRANBERRY PORTAGE DECOM DIESEL GEN STN		REMARKS Cu = NA Cc = NA COBBLES 0 % GRAVEL 5 % SAND 75 % SILT/CLAY 20 % DATE 98 03 26 TESTED BY AK
	SAMPLE NO	HOLE NO	DESCRIPTION/DEPTH
	CS – 5	CB – 016	2 25 – 2 62m

DIRECTORY CB96A FILE 5CB016S



MANITOBA HYDRO Power Planning & Ops Geotechnical Engin Materials Testing Lab	GRAIN SIZE DISTRIBUTION GRAPH		REMARKS Cu = NA Cc = NA
	PROJECT CRANBERRY PORTAGE DECOM DIESEL GEN STN		COBBLES 0 % GRAVEL 0 % SAND 44 % SILT/CLAY 56 %
SAMPLE NO	HOLE NO	DESCRIPTION/DEPTH	DATE 98 03 26 TESTED BY AK
CS – 17	CB – 016	7 22 – 7 60m	

DIRECTORY CB96A FILE 17CB016S

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE

DECOMMISSIONED DIESEL GENERATING STATION

CB-017
1 OF 1
Prj # 200529

Sampler Types: Auger; Core Barrel; Bulk Sample; Split Spoon; Sonic; Special Samplers; Grab Sample; Shelby; Auger Barrel; Tricone; Air Hammer

Moisture: PL — M C — LL; 20% 40% 60% 80%

%GRVL D10 D30 D60 %FINE; %<0 075mm; %<4 750mm; G/A; 20% 40% 60% 80%

Microtip PID Reading ○; 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕; 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading ○	Total Extractable Hydrocarbons (ppm) ⊕	DEPTH (m)
			FILL	(0 00 0 30) Sand fill			
		1 CS	SP	(0 30 1 10) Sand tan brown fine grained damp	○18 8		
1		2 CS			○37 9		1
		3 CS	ML	(1 10 1 40) Silt light grey brown with sand damp	○42 7		
		4 CS	SP	(1 40 3 95) Sand light brown medium to fine grained damp	○43 7		
2		5 CS			○42 3		2
				No sample from 2 25 2 60m			
		6 CS			○36 7		
3				No sample from 3 05 3 70m			3
4		7 CS		(3 95 4 70) Sand light brown very fine grained trace silt dry	○35 0		4
		8 CS			○27 7		
		9 CS	ML	(4 70 4 80) Silt light grey brown	○18 0 ○21 7		
5		10 CS		(4 80 5 30) Silt light brown some sand damp			5
		11 CS	SM	(5 30 5 67) Sand light brown fine grained with silt damp	○16 2		
		12 CS	ML	(5 67 6 10) Silt light brown some fine grained sand dry	○20 8		
6				**(6 10) End of Hole**			6

No bedrock encountered
No water level recorded

WATER TABLE
No water level recorded

NORTH 81 000
EAST 101 000
TREND
PLUNGE 90 0 (deg)
ELEV G/S 99 66 (m)

EQUIPMENT Canterra
METHOD Hollow Stem Auger
DRILLER Paddock Drilling Ltd

COMPLETION 96/09/22
INSPECTOR F Demchenko
DEPTH 6 10 (m)

STATUS FINAL O I y JHE 98/04/09 O/B HCPID HCX500 ATT10 GRAIN LINE USCS TITLE P ted 98/04/08 09 39 CB98A GEOTE

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-018
1 OF 1
Prj # 200529

Sampler Types: Split Spoon, Shelby, Auger, Sonic, Auger Barrel, Core Barrel, Special Samplers, Tricone, Bulk Sample, Grab Sample, Air Hammer

Moisture: PL — M C — LL; 20% 40% 60% 80%

%GRVL D10 D30 D60 %FINE; % <0 075mm; % <4 750mm; G / A; 20% 40% 60% 80%

Microtip PID Reading ○; 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕; 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading	Total Extractable Hydrocarbons (ppm)	DEPTH (m)
		1 CS	PT	(0 00 0 10) Peat	○14 6		
			SP	(0 10 1 10) Sand tan brown medium to fine grained damp			
		2 CS			○17 0		
1							1
		3 CS		(1 10 1 50) Sand brown fine grained trace silt damp	○17 1		
		4 CS	SM	(1 50 2 25) Sand brown fine grained and silt damp	○25 3		
2							2
		5 CS			○17 7		
		6 CS	ML	(2 25 2 60) Silt light grey brown some sand trace cobbles damp	○20 6		
		7 CS	SP	(2 60 3 05) Sand brown fine grained trace silt damp	○32 3		
3							3
		8 CS		(3 05 3 35) Sand brown medium grained damp	○28 0		
		9 CS		(3 35 3 80) Sand as above fine grained	○27 8		
4		10 CS		(3 80 4 90) Sand as above medium to fine grained	○20 0		4
		11 CS			○34 8		
		12 CS			○26 0		
5		13 CS	ML	(4 90 5 20) Silt light grey brown some sand damp	○23 2		5
		14 CS	SP	(5 20 6 10) Sand brown fine grained damp	○30 3		
		16 CS			●41 8	⊕	
6							6
		16 CS	ML	(6 10 6 85) Silt light brown some fine grained sand damp	○27 0		
		17 CS		(6 60 6 70) Light grey brown silt seam	○20 6		

(6 85) End of Hole

No bedrock encountered
No water level recorded

WATER TABLE			
No water level recorded	NORTH 67 000 EAST 120 300 TREND PLUNGE 90 0 (deg) ELEV G/S 99 34 (m)	EQUIPMENT Canterra METHOD Hollow Stem Auger DRILLER Paddock Drilling Ltd STATUS FINAL JHE 98/04/09 O/B P nted 98/04/08 09 39 CB86A GEOTE O T y HCPID HCX600 ATT10 GRAIN LINE USCS TITLE	COMPLETION 96/09/22 INSPECTOR F Demchenko DEPTH 6 85 (m)

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-019
1 OF 2
Prj # 200529

Sampler Types: Split Spoon; Shelby; Auger; Sonic; Auger Barrel; Core Barrel; Special Samplers; Tricone; Bulk Sample; Grab Sample; Air Hammer

Moisture PL / M C / LL — 20% 40% 60% 80%

%GRVL D10 D30 D60 %FINE — % 0 075mm — % 4 750mm — G / A — 20% 40% 60% 80%

Microtip PID Reading ○ — 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕ — 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading ○	Total Extractable Hydrocarbons (ppm) ⊕
0			FILL	(0 00 0 25) Fill	5 7	
		1 CS	CI	(0 25 0 50) Clay medium grey brown trace silt trace sand trace gravel hard insitu above PL	6 7	
		2 CS	ML		11 9	
1		3 CS	SP	(0 50 0 75) Silt medium brown some sand damp	10 2	
		4 CS		(0 75 1 50) Sand tan brown fine grained trace silt damp	11 1	
		5 CS	ML	(1 50 1 85) Silt light brown and fine grained sand damp	11 1	
2		6 CS		(1 85 2 20) Silt light grey brown trace sand damp	12 4	
		7 CS	SP	(2 20 4 10) Sand brown coarse grained trace gravel damp	7 6	
		8 CS			15 6	
3		9 CS			15 9	
		10 CS			20 6	
		11 CS			37 7	
4		12 CS		(4 10 5 30) Sand brown medium to fine grained damp	15 0	
		13 CS			9 2	
		14 CS			10 2	
5		15 CS	ML	(5 30 5 60) Silt light grey brown trace sand damp	10 4	
		16 CS	SP	(5 60 6 10) Sand brown fine grained trace silt damp	20 4	
		17 CS		(6 10 7 12) Sand brown fine grained with silt damp	13 7	
6		18 CS			16 1	
		19 CS			11 9	
		20 CS	ML	(7 12 8 00) Silt brown with sand damp	9 2	
		21 CS			19 5	
7		22 CS		(8 00 9 50) Silt brown some sand damp	360 0	>> 1000
		23 CS/CC			193 0	
		24 CS/CC			178 0	
		25 CS			16 5	
8		28 CS		(9 50 9 90) Silt as above trace sand	17 0	
		27 CS		(9 90 10 05) Silt brown with sand	20 6	
9			SM		18 4	
10						

WATER TABLE
No water level recorded

NORTH 77 200
EAST 147 500
TREND --
PLUNGE 90 0 (deg)
ELEV G/S 98 88 (m)

EQUIPMENT Canterra
METHOD Hollow Stem Auger
DRILLER Paddock Drilling Ltd

COMPLETION 96/09/22
INSPECTOR F Demchenko
DEPTH 10 65 (m)

STATUS FINAL

Continued

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-019
2 OF 2
Prj # 200529

Sampler Types: Auger; Core Barrel; Bulk Sample; Split Spoon; Sonic; Special Samplers; Grab Sample; Shelby; Auger Barrel; Tricone; Air Hammer

Moisture: PL — M C — LL; 20% 40% 60% 80%

%GRVL D10 D30 D80 %FINE; % 0 075mm; % 4 750mm; G / A; 20% 40% 60% 80%

Microtip PID Reading ○; 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕; 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading ○	Total Extractable Hydrocarbons (ppm) ⊕	DEPTH (m)
		2S 2S 3S	ML	(10 05 10 20) Sand brown with silt (10 20 10 35) Silt brown trace sand (10 35 10 65) Silt brown and sand wet	○17	⊕ <<	

(10 65) End of Hole
No bedrock encountered

NOTE << INDICATES NOT DETECTED
Detection limit for total extractable hydrocarbons is 5 ppm

WATER TABLE No water level recorded	NORTH 77 200 EAST 147 500 TREND PLUNGE 90 0 (deg) ELEV G/S 98 88 (m)	EQUIPMENT Canterra METHOD Hollow Stem Auger DRILLER Paddock Drilling Ltd	COMPLETION 96/09/22 INSPECTOR F Demchenko DEPTH 10 65 (m)	
		STATUS FINAL O e lays JHE 98/04/09 O/B HCPID HCX500 ATT10	P ted 98/04/08 10 18 CB96A GEOTE GRAIN LINE USCS TITLE	

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-020
1 OF 1
Prj # 200529

Sampler Types: Split Spoon; Shelby; Auger; Sonic; Auger Barrel; Core Barrel; Special Samplers; Tricone; Bulk Sample; Grab Sample; Air Hammer

Moisture: PL — M C — LL; 20% 40% 60% 80%
Microtip PID Reading ○; 100 200 300 400
%GRVL D10 D30 D60 %FINE; % < 0 075mm; % < 4.750mm; G / A; 20% 40% 60% 80%
Total Extractable Hydrocarbons (ppm) ⊕; 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading ○	Total Extractable Hydrocarbons (ppm) ⊕
			FILL	(0 00 0 30) Fill		
		1 CS	ML	(0 30 0 60) Silt brown trace sand trace gravel damp	○4 5	
		2 CS	SP	(0 60 1 10) Sand brown fine grained some silt damp	○5 3	
1		3 CS	CI	(1 10 1 60) Clay medium brown trace silt trace gravel hard insitu above PL	○7 2	
		4 CS	ML	(1 60 1 80) Silt brown some sand damp	○5 6	
		5 CS	SP	(1 80 1 90) Sand brown some silt damp	○8 0	
2		6 CS	ML	(1 90 2 10) Silt brown fine grained damp	○12 1	
		7 CS	SP	(2 10 2 70) Sand brown fine grained damp	○8 2	
		8 CS			○15 7	
		9 CS		(2 70 4 20) Sand brown fine grained with silt damp	○10 6	
3		10 CS			○10 1	
		11 CS			●10 0	⊕ 11
4				No sample from 3 80 4 20m		
		12 CS		(4 20 4 55) Sand light brown fine grained some silt damp	○4 8	
		13 CS	ML	(4 55 5 30) Silt brown trace sand damp	○5 3	
5		14 CS			○4 8	
		15 CS	SP	Coarse sand seam from 5 15 5 19m	○11 4	
			ML	(5 30 5 80) Sand brown fine grained some silt damp		
			SP			
6		16 CS	ML	(5 80 5 95) Silt brown some fine sand damp	○11 7	
		17 CS		(5 95 6 85) Silt brown trace sand moist	○8 7	
		18 CS			○7 2	
7		19 CS		(6 85 8 60) Silt brown trace fine grained sand dry	○7 6	
		20 CS			○8 8	
		21 CS			○10 3	
8		22 CS			○12 0	
		23 CS			○6 0	
		24 CS		(8 60 9 00) Silt brown some sand damp	○12 2	
9		25 CS		(9 00 9 40) Silt light grey brown dry	○9 9	
		26 CS		(9 40 9 90) Silt brown some fine grained sand damp	○10 1	

(9 90) End of Hole
No bedrock encountered
No water table recorded

WATER TABLE
No water level recorded

NORTH 57 200
EAST 144 800
TREND
PLUNGE 90 0 (deg)
ELEV G/S 98 98 (m)

EQUIPMENT Canterra
METHOD Hollow Stem Auger
DRILLER Paddock Drilling Ltd

COMPLETION 96/09/23
INSPECTOR F Demchenko
DEPTH 9 90 (m)

STATUS FINAL O T ye JHE 98/04/09 O/B P ted 98/04/08 10 19 CB98A GEOTE HCPID HCX600 ATT10 GRAIN LINE USCS TITLE

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-021
1 OF 2
Prj # 200529

Sampler Types: Split Spoon; Shelby; Auger; Sonic; Auger Barrel; Core Barrel; Special Samplers; Tricone; Bulk Sample; Grab Sample; Air Hammer

Moisture: PL — M C — LL; 20% 40% 60% 80%

%GRVL D10 D30 D80 %FINE; % < 0.075mm; % < 4.750mm; G / A; 20% 40% 60% 80%

Microtip PID Reading ○; 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕; 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading	Total Extractable Hydrocarbons (ppm)	DEPTH (m)
			PT	(0 00 0 15) Peat	○9 5		
		1 CS	ML	(0 15 0 30) Silt tan brown some fine grained	○21 2		
		2 CS	SP	sand dry			
				(0 30 1 50) Sand brown coarse to fine grained trace fine gravel dry	○6 5		
1		3 CS					1
		4 CS		(1 50 2 62) Sand light brown fine to medium grained dry	○23 1		
2		5 CS			○17 7		2
		6 CS			○33 8		
		7 CS		(2 62 3 05) Sand brown coarse to fine grained dry	○67 1		
3		8 CS		(3 05 4 60) Sand brown medium to fine grained dry	○23 9		3
		9 CS			●○188 0	0 0 0 16 0 31 0 44 3 0	
		10 CS			○77 1		
4		11 CS			○93 4		4
		12 CS	ML	(4 60 4 75) Silt brown trace sand damp	○17 9		
		13 CS		(4 75 5 00) Silt brown and sand damp	○34 0		
5		14 CS	SP	(5 00 5 30) Sand brown with silt damp	○14 6		5
		15 CS		(5 30 6 10) Sand brown fine grained trace silt	○22 3		
		16 CS			○23 8		
6		17 CS	ML	(6 10 6 30) Silt light brown some fine grained	○16 5		6
		18 CS		sand damp	○14 4		
				(6 30 6 85) Silt brown trace sand trace cobble (detected through drill action)			
				No sample from 6 46 6 85m	○53 5		
7		19 CS		(6 85 7 17) Silt light brown some fine grained sand	○21 1		7
		20 CS		(7 17 7 60) Silt light brown and sand			
		21 CS		(7 60 9 15) Silt light brown trace fine grained sand damp	○23 6		
8		22 CS			○38 1		8
		23 CS			●○8 7	0 0 0 09 51 6	
		24 CS			○14 0		
9		25 CS			○22 5		9
		26 CS		(9 15 9 90) Silt light brown with sand damp	○13 0		
		27 CS			○13 8		
10		28 CS		(9 90 10 20) Silt brown trace sand damp	○17 1		10
					○15 9		

WATER TABLE ▽
1) 10 78 (m) 96/09/24
2) dry (m) 96/09/23

NORTH 66 000
EAST 130 500
TREND --
PLUNGE 90 0 (deg)
ELEV G/S 99 15 (m)

EQUIPMENT Canterra
METHOD Hollow Stem Auger
DRILLER Paddock Drilling Ltd

COMPLETION 96/09/23
INSPECTOR F Demchenko
DEPTH 12 20 (m)

STATUS FINAL

Continued

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-021
2 OF 2
Prj # 200529

Sampler Types: Split Spoon; Shelby; Auger; Sonic; Auger Barrel; Core Barrel; Special Samplers; Tricone; Bulk Sample; Grab Sample; Air Hammer

Moisture: PL — M C — LL; 20% 40% 60% 80%
Microtip PID Reading ○; 100 200 300 400
%GRVL D10 D30 D60 %FINE; % 0 075mm % <4 750mm G / A; 20% 40% 60% 80%
Total Extractable Hydrocarbons (ppm) ⊕; 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading ○	Total Extractable Hydrocarbons (ppm) ⊕	DEPTH (m)
		29 CS	SP	(10 20 10 50) Sand brown fine grained some silt	○10 4		
▽ 11		30 CS	ML	(10 50 10 90) Silt brown some fine grained sand damp	○14 6		11
		31 CS	SP	(10 90 11 40) Sand brown fine grained some silt damp	○13 5		
		32 CS					
		33 CS	ML	(11 40 12 20) Silt medium brown with fine grained sand wet			
12							12

(12 20) End of Hole

No bedrock encountered

Assumptions 3 05m (10) steel protection pipe installed

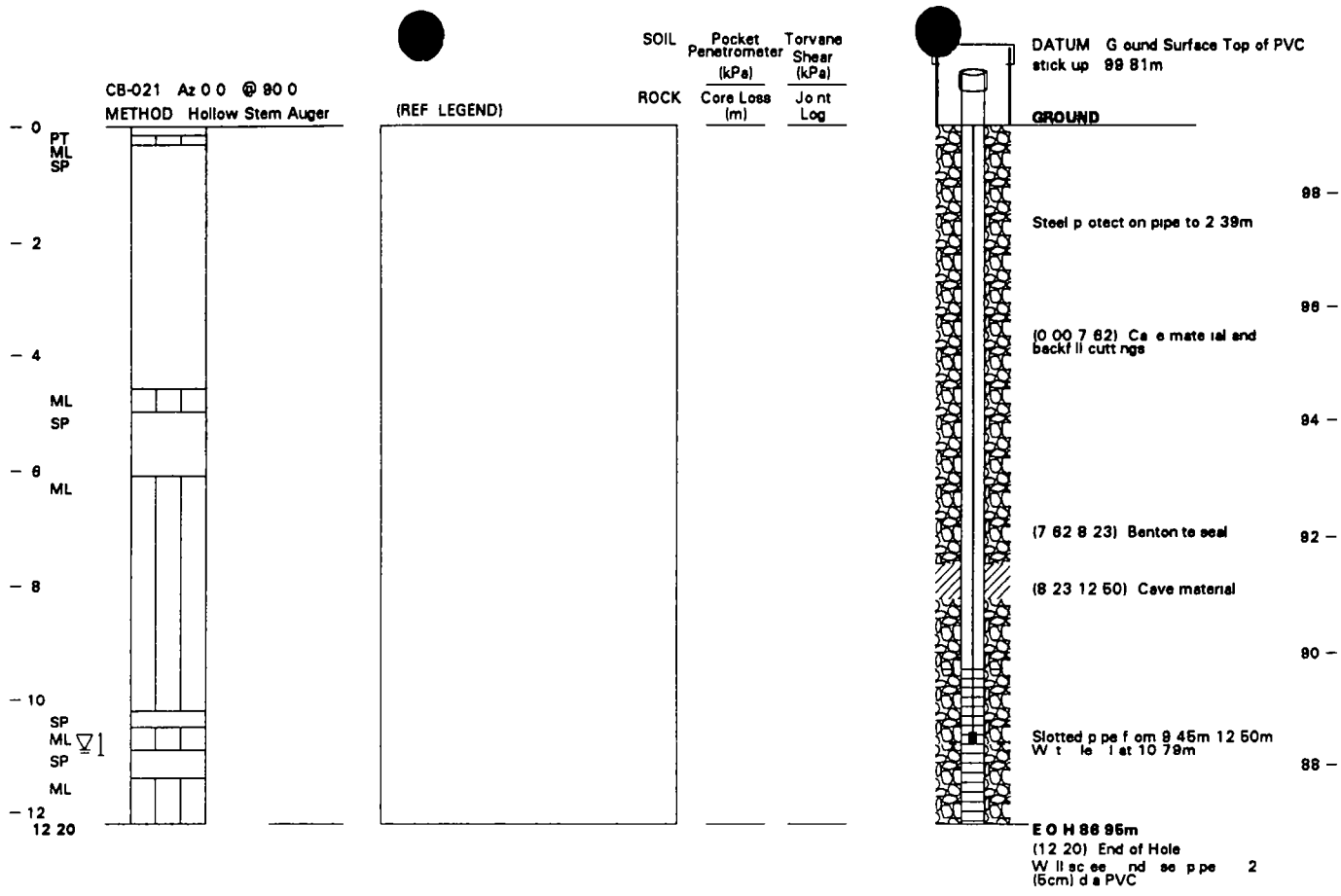
WATER TABLE ▽
1) 10 79 (m) 96/09/24
2) dry (m) 96/09/23

NORTH 66 000
EAST 130 500
TREND
PLUNGE 90 0 (deg)
ELEV G/S 99 15 (m)

EQUIPMENT Canterra
METHOD Hollow Stem Auger
DRILLER Paddock Drilling Ltd

COMPLETION 96/09/23
INSPECTOR F Demchenko
DEPTH 12 20 (m)

STATUS FINAL 0 days JHE 98/04/09 O/B HCPID HCX600 ATT10 P ted 98/04/08 09 42 CB98A GEOTE GRAIN LINE USCS TITLE



LEGEND

WATER TABLE ▽

1) 10 79 (m) 96/09/24
2) d y (m) 96/09/23

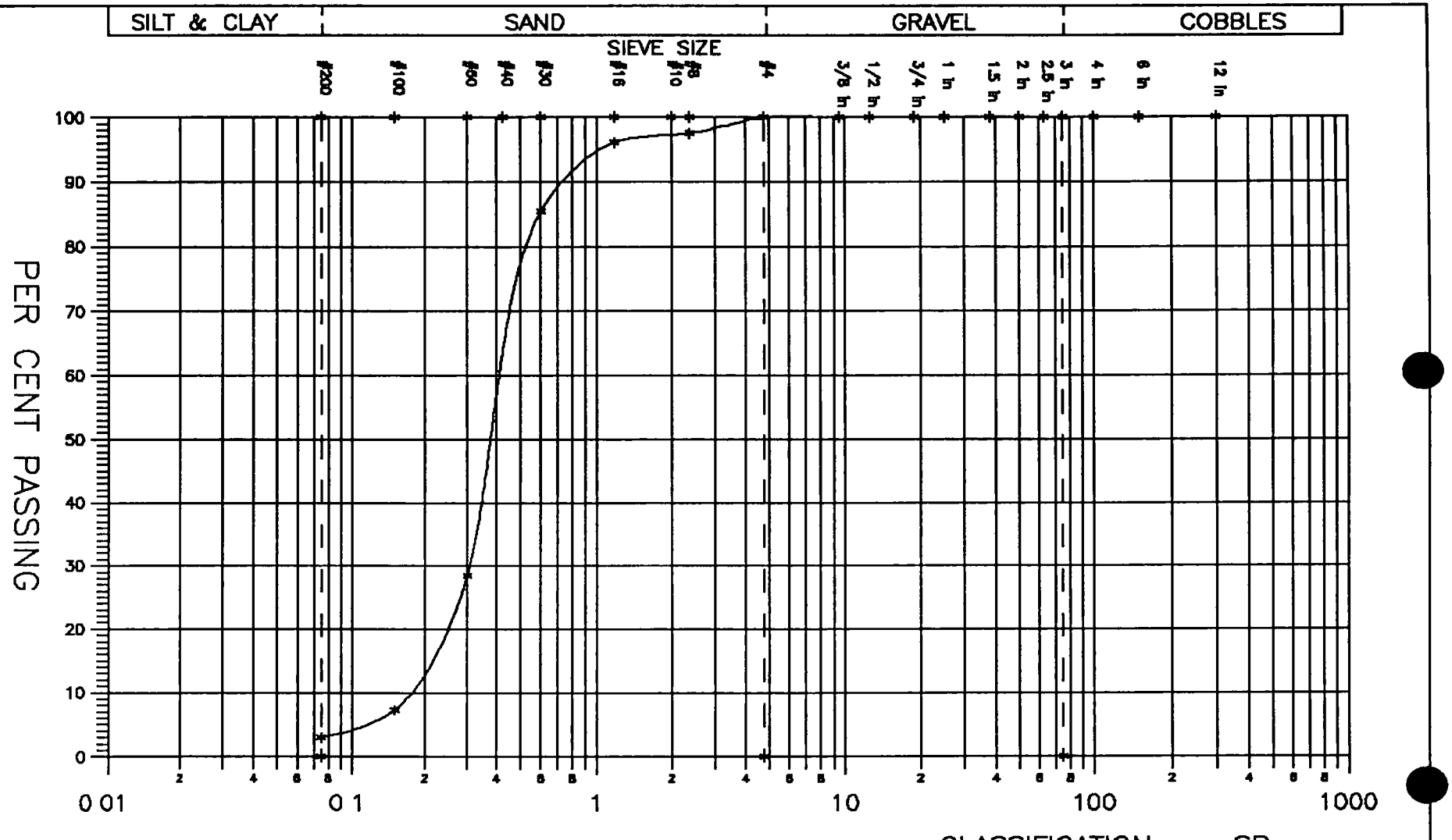
CRANBERRY PORTAGE

HOLE No CB-021

2 PVC Slotted Pipe

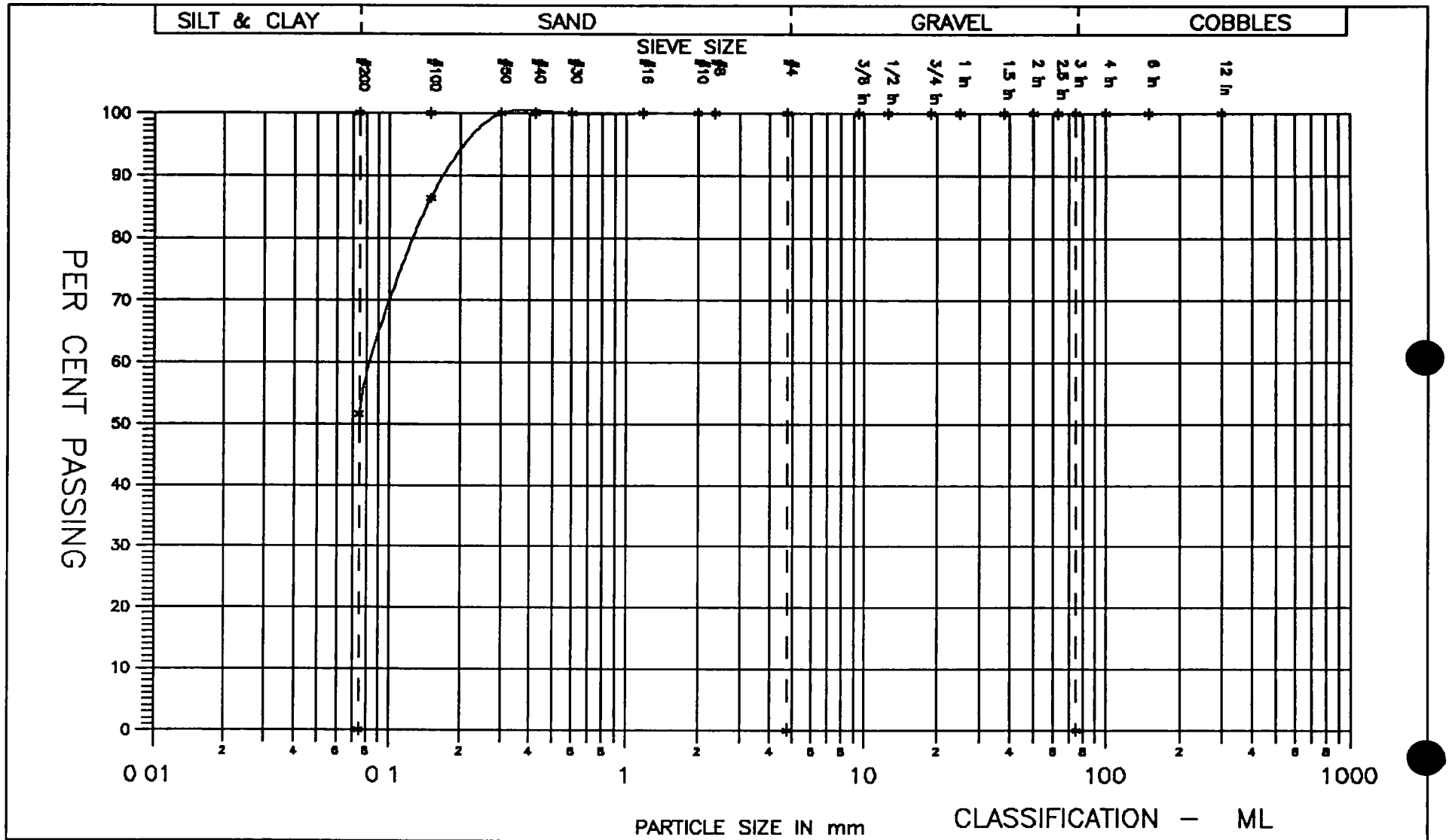
Installed 96/09/23
(m) 66 000 N 130 500 E
DECOMMISSIONED DIESEL GENERATING STATION

ed PM em NST
Projec 89



MANITOBA HYDRO Power Planning & Ops Geotechnical Engin Materials Testing Lab	GRAIN SIZE DISTRIBUTION GRAPH		REMARKS Cu = 2 34 Cc = 1 34
	PROJECT CRANBERRY PORTAGE DECOM DIESEL GEN STN		COBBLES 0 % GRAVEL 0 % SAND 97 % SILT/CLAY 3 %
	SAMPLE NO	HOLE NO	DESCRIPTION/DEPTH
	CS — 9	CB — 021	3 42 — 3 80m
			DATE 98 03 26 TESTED BY AK

DIRECTORY CB96A FILE 9CB021S



MANITOBA HYDRO Power Planning & Ops Geotechnical Engin Materials Testing Lab	GRAIN SIZE DISTRIBUTION GRAPH PROJECT CRANBERRY PORTAGE DECOM DIESEL GEN STN		
	SAMPLE NO	HOLE NO	DESCRIPTION/DEPTH
	CS – 23	CB – 021	8 30 – 8 55m

REMARKS Cu = NA Cc = NA

COBBLES	0 %
GRAVEL	0 %
SAND	48 %
SILT/CLAY	52 %

DATE 98 03 26 TESTED BY AK

DIRECTORY CB96A FILE 23CB021S

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-022
1 OF 1
Prj # 200529

Sampler Types: Split Spoon; Shelby; Auger; Sonic; Auger Barrel; Core Barrel; Special Samplers; Tricone; Bulk Sample; Grab Sample; Air Hammer

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Moisture PL / M C / LL (20% 40% 60% 80%)	Microtip PID Reading ○ (100 200 300 400)	Total Extractable Hydrocarbons (ppm) ⊕ (100 200 300 400)	%GRVL D10 D30 D60 %FINE; %<0.075mm; %<4.750mm; G/A (20% 40% 60% 80%)	DEPTH (m)
	CS	1	GP	(0 00-0 10) Crushed rock		○17 9			
	CS	1	CI	(0 10 0 40) Clay grey stiff insitu above PL		○13 2			
	CS	2	ML	(0 40 1 70) Silt brown some sand damp					
	CS	3				○20 6			
1	CS	4				○18 3			1
	CS	5				○15 8			
	CS	6	SP	(1 70 1 90) Sand brown medium to fine grained some silt damp		○55 1			
	CS	7	ML			○63 3			
2	CS	8		(1 90 2 45) Silt light brown some fine grained sand dry		○58 0			2
	CS	9		(2 45 2 60) Silt brown with sand		○52 5			
	CS	10		(2 60 3 05) Silt brown trace sand damp		○65 6			
	CS	11		(3 05 3 80) Silt light brown with fine sand dry		○69 7			
3	CS	12				● ○73 4	⊕ 11		3
	CS	13	SP	(3 80 4 55) Sand brown fine grained trace silt damp		○55 4			
	CS	14				○51 1			
4	CS	15	ML	(4 55 5 70) Silt brown some fine grained sand damp		○31 7			4
	CS	16				○83 1			
	CS	17				○30 8			
	CS	18				○34 5			
5	CS	19	SP	(5 70 6 00) Sand brown fine grained damp		○72 4			5
	CS	20	ML	(6 00 6 10) Silt brown some sand damp		○26 5 ○18 1			
	CS	21	SP	(6 10 6 50) Sand brown fine grained					
	CS	22	ML	(6 50 6 85) Silt brown with fine grained sand		○45 7			
6	CS	23		(6 85 7 00) Silt brown trace sand		○26 2			6
	CS	24		(7 00 7 65) Silt brown with fine grained sand		○51 6			
				No sample from 7 20 7 65m					
	CS	25	SP	(7 65 8 80) Sand brown very fine grained trace silt		○20 8			
7	CS	26				○28 8			7
	CS	27				○15 4			
	CS	28	ML	(8 80 9 15) Silt brown some sand damp		○15 3			
8									8
9									9

(9 15) End of Hole

No bedrock encountered
No water level recorded

WATER TABLE
No water level recorded

NORTH 116 100
EAST 122 500
TREND
PLUNGE 90 0 (deg)
ELEV G/S 99 80 (m)

EQUIPMENT Canterra
METHOD Hollow Stem Auger
DRILLER Paddock Drilling Ltd

COMPLETION 96/09/23
INSPECTOR F Demchenko
DEPTH 9 15 (m)

STATUS FINAL O I y JHE 98/04/09 O/B HCPID HCX600 ATT10 GRAIN LINE USCS TITLE P nted 98/04/08 09 42 CB98A GEOTE

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE

DECOMMISSIONED DIESEL GENERATING STATION

CB-023
1 OF 1
Prj # 200529

Sampler Types: Split Spoon; Shelby; Auger; Sonic; Auger Barrel; Core Barrel; Special Samplers; Tricone; Bulk Sample; Grab Sample; Air Hammer

Moisture: PL — M C — LL; 20% 40% 60% 80%

%GRVL D10 D30 D60 %FINE; %<0.075mm; %<4.750mm; G/A; 20% 40% 60% 80%

Microtip PID Reading ○; 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕; 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading	DEPTH (m)
		1 CS	FILL	(0 00 0 10) Fill	9 2	
		2 CS	ML	(0 10 0 40) Silt tan brown some fine grained sand trace gravel damp	8 0	
		3 CS		(0 40 1 12) Silt tan brown with fine grained sand damp	11 8	
1						1
		4 CS	SP	(1 12 2 25) Sand brown fine grained some silt damp	13 7	
		5 CS			14 2	
		6 CS			29 2	
2						2
		7 CS		(2 25 3 80) Sand brown medium to fine grained trace silt damp	19 8	
		8 CS			22 2	
3						3
		9 CS			20 0	
		10 CS			21 1	
		11 CS	ML	(3 80 4 05) Silt brown and fine grained sand damp	11 2	
4						4
		12 CS	SP	(4 05 5 30) Sand brown fine grained trace silt damp	17 6	
		13 CS			14 4	
		14 CS			19 1	
5						5

(5 30) End of Hole

No bedrock encountered
No water table recorded

WATER TABLE
No water level recorded

NORTH 92 700
EAST 92 700
TREND
PLUNGE 90 0 (deg)
ELEV G/S 99 82 (m)

EQUIPMENT Canterra
METHOD Hollow Stem Auger
DRILLER Paddock Drilling Ltd

COMPLETION 96/09/23
INSPECTOR F Demchenko
DEPTH 5 30 (m)

STATUS FINAL Oely JHE 98/04/09 O/B HCPID HCX500 ATT10 Ptd 98/04/08 09 43 CB96A GEOTE GRAIN LINE USCS TITLE

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE
DECOMMISSIONED DIESEL GENERATING STATION

CB-024
1 OF 2
Prj # 200529

Sampler Types: Split Spoon, Shelby, Auger, Sonic, Auger Barrel, Core Barrel, Special Samplers, Tricone, Bulk Sample, Grab Sample, Air Hammer

Moisture: PL — M C — LL; 20% 40% 60% 80%

%GRVL D10 D30 D60 %FINE; % < 0 075mm; % < 4 750mm; G / A

Microtip PID Reading ○; 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕; 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading	Total Extractable Hydrocarbons (ppm)
		1 CS	PT	(0 00 0 05) Peat	○17 9	
			ML	(0 05 0 95) Silt brown some sand damp	○45 0	
		2 CS				
					○39 4	
		3 CS			○22 6	
1		4 CS		(0 95 1 20) Silt brown and fine grained sand		
		5 CS	SP	(1 20 1 90) Sand brown fine grained some silt damp	○21 0	
		6 CS			○78 6	
					○48 4	
2		7 CS		(1 90 3 40) Sand brown medium to fine grained trace silt damp		
		8 CS			○77 8	
					○114 0	
3		9 CS				
		10 CS		(3 40 3 75) Sand brown coarse to fine grained trace gravel damp	● ○128 0	⊕ 13
		11 CS		(3 75 4 00) Sand brown fine grained trace silt	○95 7	
4		12 CS	SM	(4 00 4 55) Sand brown fine grained and silt		>> ○554 0
		13 CS	ML	(4 55 5 70) Silt brown with fine grained sand damp	○48 2	
5		14 CS			○82 4	
		15 CS			○20 6	
		16 CS		(5 70 5 90) Silt brown trace sand	○21 8	
6		17 CS		(5 90 6 85) Silt brown some sand	○20 5	
		18 CS			○21 6	
		19 CS			○28 0	
		20 CS		(6 85 7 60) Silt brown with fine sand damp	○71 3	
7		21 CS		Cobbles detected by drilling action	○39 2	
		22 CS		(7 60 8 60) Silt brown some fine sand	○21 3	
8		23 CS			○18 5	
		24 CS			○19 3	
		25 CS		(8 60 9 15) Silt brown and fine sand	○26 8	
9		26 CS		(9 15 9 90) Silt brown some sand damp	○17 7	
		27 CS			○13 2 ○23 8	
10		28 CS	SM	(9 90 10 65) Sand brown fine grained and	○13 4	

WATER TABLE
No water level recorded

NORTH 130 000
EAST 97 400
TREND
PLUNGE 90 0 (deg)
ELEV G/S 99 15 (m)

EQUIPMENT Canterra
METHOD Hollow Stem Auger
DRILLER Paddock Drilling Ltd

COMPLETION 96/09/24
INSPECTOR F Demchenko
DEPTH 12 20 (m)

STATUS FINAL

Continued

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE

DECOMMISSIONED DIESEL GENERATING STATION

CB-024
2 OF 2
Prj # 200529

Sampler Types: Auger; Core Barrel; Bulk Sample; Split Spoon; Sonic; Special Samplers; Grab Sample; Shelby; Auger Barrel; Tricone; Air Hammer

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Moisture PL / M C / LL (20% 40% 60% 80%)	%GRVL D10 D30 D60 %FINE; % < 0 075mm; % 4 750mm; G / A (20% 40% 60% 80%)	DEPTH (m)
		29 CS		silt damp	○13 4		
		30 CS	ML	(10 65 11 40) Silt brown with fine sand wet	○28 2		
11							11
		31 CS	SP	(11 40 12 20) Sand brown with silt saturated	○15 1		
					○15 2		
12		32 CS					12

Microtip PID Reading ○ (100 200 300 400)

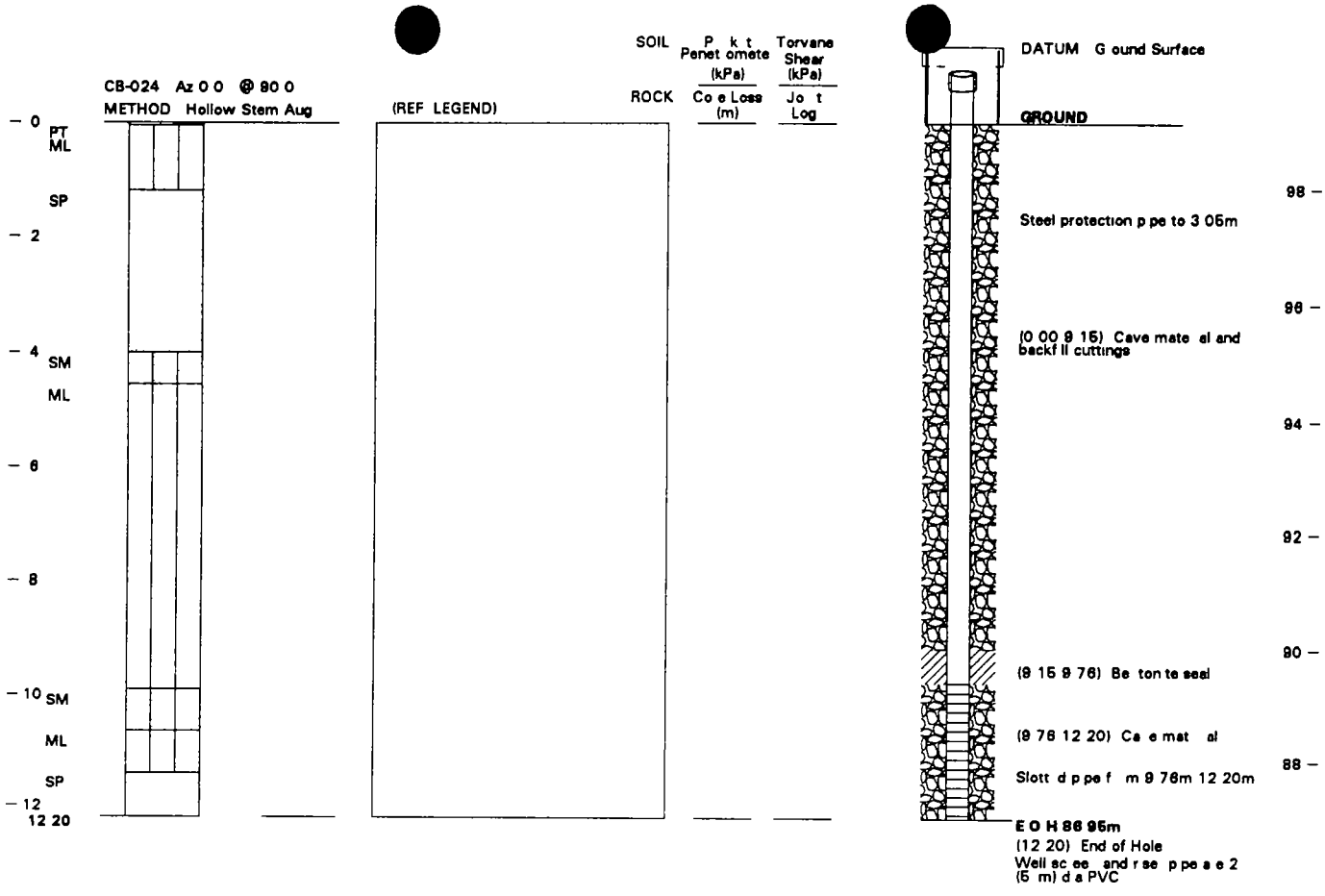
Total Extractable Hydrocarbons (ppm) ⊕ (100 200 300 400)

(12 20) End of Hole

No bedrock encountered

Note No weater level taken
Assumptions Field note states 2 44m (8) slotted pipe installed

WATER TABLE No water level recorded	NORTH 130 000 EAST 97 400 TREND PLUNGE 90 0 (deg) ELEV G/S 99 15 (m)	EQUIPMENT Canterra METHOD Hollow Stem Auger DRILLER Paddock Drilling Ltd	COMPLETION 96/09/24 INSPECTOR F Demchenko DEPTH 12 20 (m)
		STATUS FINAL JHE 98/04/09 O/B P ted 98/04/08 09 44 CB98A GEOTE O I y HCPID HCX600 ATT10 GRAIN LINE USCS TITLE	



LEGEND

WATER TABLE ▽
No water level recorded

CRANBERRY PORTAGE

HOLE No CB-024

2" PVC Slotted Pipe

Installed 96/09/24
(m) 130 000 N 97 400 E
DECOMMISSIONED DIESEL GENERATING STATION

MANITOBA HYDRO
Engineering
GEOTECHNICAL
OVERBURDEN LOG

CRANBERRY PORTAGE

DECOMMISSIONED DIESEL GENERATING STATION

CB-025
1 OF 1
Prj # 200529

Sampler Types: Auger; Core Barrel; Bulk Sample; Split Spoon; Sonic; Special Samplers; Grab Sample; Shelby; Auger Barrel; Tricone; Air Hammer

Moisture: PL — M C — LL; 20% 40% 60% 80%

%GRVL D10 D30 D80 %FINE; % 0 075mm; %<4 750mm; G/A; 20% 40% 60% 80%

Microtip PID Reading ○; 100 200 300 400

Total Extractable Hydrocarbons (ppm) ⊕; 100 200 300 400

DEPTH (m)	SAMPLER	SAMPLE #	USCS	SOIL DESCRIPTION	Microtip PID Reading ○	Total Extractable Hydrocarbons (ppm) ⊕	DEPTH (m)
		1 CS	PT	(0 00 0 10) Peat	○14 9		
			ML	(0 10 0 60) Silt brown some sand			
		2 CS	SP	(0 60 0 75) Sand tan brown some silt	○11 4		
		3 CS	ML	(0 75 1 75) Silt light brown some fine grained sand	○12 8		
1		4 CS			○7 8		1
		5 CS			○15 8		
		6 CS	SM	(1 75 2 25) Sand brown fine grained some silt	○●0 5	0 0 0 11 0 20 15 2	
2		7 CS		(2 25 3 05) Sand brown coarse to fine grained	○10 3		2
		8 CS			○19 3		
3		9 CS		(3 05 3 80) Sand as above fine grained	○19 0		3
		10 CS			○14 2		

(3 80) End of Hole

No bedrock encountered
No water level recorded

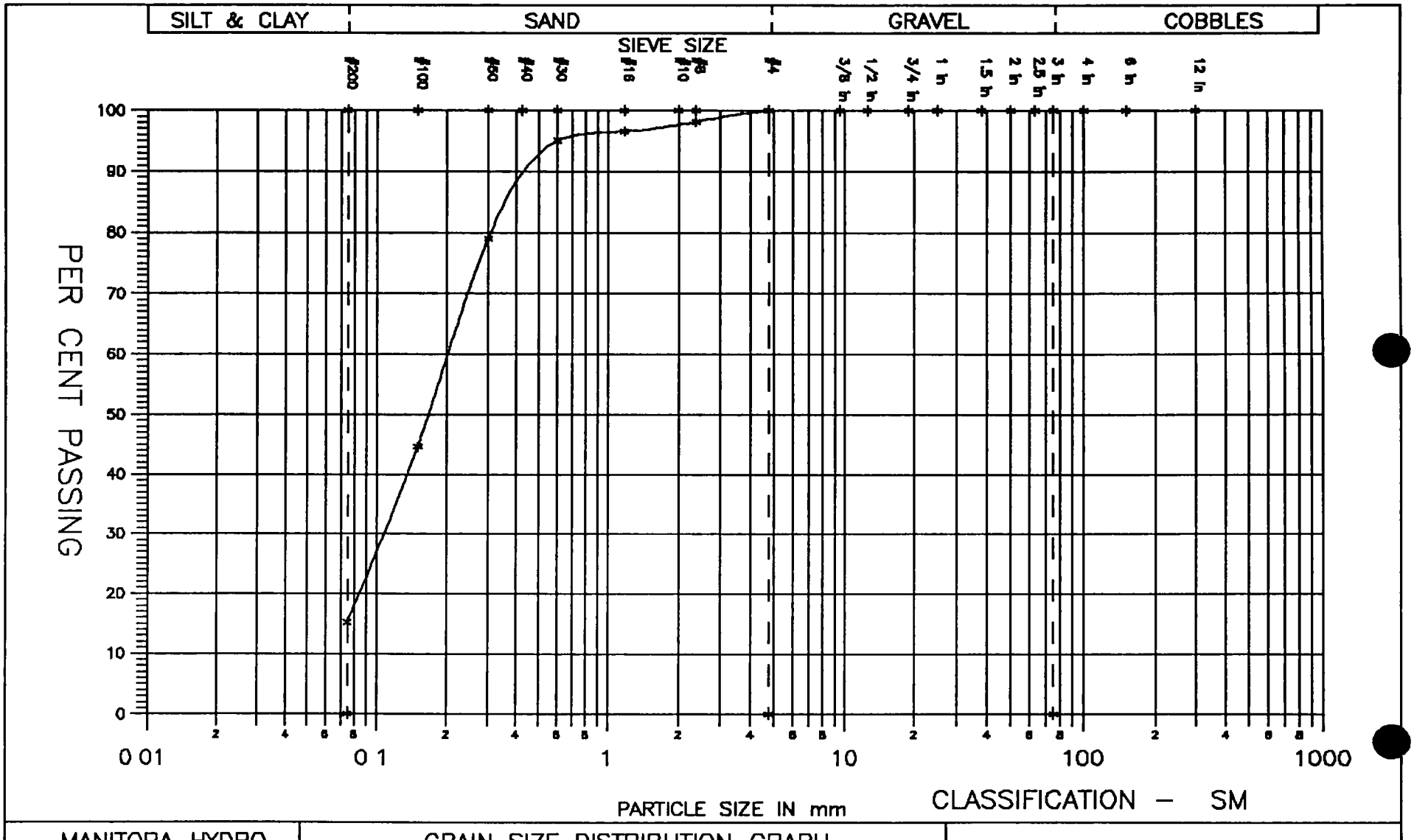
WATER TABLE
No water level recorded

NORTH 140 700
EAST 119 500
TREND
PLUNGE 90 0 (deg)
ELEV G/S 99 27 (m)

EQUIPMENT Canterra
METHOD Hollow Stem Auger
DRILLER Paddock Drilling Ltd

COMPLETION 96/09/24
INSPECTOR F Demchenko
DEPTH 3 80 (m)

STATUS FINAL O T y JHE 98/04/09 O/B HCPID HCX600 ATT10 P ted 98/04/08 09 44 CB96A GEOTE GRAIN LINE USCS TITLE



MANITOBA HYDRO Power Planning & Ops Geotechnical Engin Materials Testing Lab	GRAIN SIZE DISTRIBUTION GRAPH PROJECT CRANBERRY PORTAGE DECOM DIESEL GEN STN		REMARKS Cu = NA Cc = NA COBBLES 0 % GRAVEL 0 % SAND 85 % SILT/CLAY 15 % DATE 98 03 26 TESTED BY AK
	SAMPLE NO	HOLE NO	DESCRIPTION/DEPTH
	CS – 6	CB – 025	1 75 – 2 25m

DIRECTORY CB96A FILE 6CB025S

Appendix B

ETL EnviroTest MTC

LABORATORIES

Manitoba Technology Centre Ltd

Fax & Mail

CHEMICAL ANALYSIS REPORT

Manitoba Hydro Geotechnical Dept
1100 Waverly St
Winnipeg MB R3T 3X9

DATE October 2 1996

ATTN REYNOLDS B

Lab Work Order #	W960905766	Sampled By	Reynolds W
Project Reference	S 451 9501		
Project P O #	S-451-9501	Date Received	96/ 9/25

Comments

APPROVED BY Paul Nicolas

Paul Nicolas
Project Manager

ACCREDITATIONS STANDARDS COUNCIL OF CANADA (SCC) IN COOPERATION WITH THE CANADIAN ASSOCIATION FOR ENVIRONMENTAL ANALYTICAL LABORATORIES (CAEAL) FOR SPECIFIC TESTS AS REGISTERED BY THE COUNCIL (EDMONTON CALGARY WINNIPEG)
AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA) FOR INDUSTRIAL HYGIENE ANALYSIS (EDMONTON WINNIPEG)
AGRICULTURE CANADA UNDER THE CANADIAN FERTILIZER QUALITY ASSURANCE PROGRAM (SASKATOON)

ENVIRO - TEST CHEMICAL ANALYSIS REPORT

LAB ID SAMPLE ID TEST DESCRIPTION	RESULT	D L	UNITS	EXTRACTED	ANALYZED	BY
96 A54875 CB 001 A Man Hydro Sample Type Water Collected 96/ 9/19						
Chromatography						
Hydrocarbons Volatile T	< 100	< 100	ug/L		96/ 9/27	TJJ
Xylene meta and para	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
Xylene O	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
Toluene	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
Ethyl Benzene	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
Benzene	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
SAMPLE COMMENT (ORGANIC)						
BTEX and total purgeable hydrocarbon analysis b	purge & trap	C/P ID/FI				
96 A54876 CB 007 Man Hydro Sample Type Water Collected 96/ 9/20						
Chromatography						
Hydrocarbons Volatile T	Comment	< 100			96/10/ 1	TJJ
Xylene meta and para	Comment	< 0 5			96/10/ 1	TJJ
Xylene O	Comment	< 0 5			96/10/ 1	TJJ
Toluene	Comment	< 0 5			96/10/ 1	TJJ
Ethyl Benzene	Comment	< 0 5			96/10/ 1	TJJ
Benzene	Comment	< 0 5			96/10/ 1	TJJ
SAMPLE COMMENT (ORGANIC)						
BTEX and total purgeable hydrocarbon analysis b	purge & trap	C/P ID/FI				
LAB COMMENT The upper layer 5 3% by volume was analyzed for total extractable hydrocarbons and total volatile hydrocarbons The resulting (attached) chromatograms indicated the presence of diesel						
96 A54877 CB 001 4 70 5 10 Man Hydro Sample Type Soil Collected 96/ 9/19						

ENVIRO - TEST CHEMICAL ANALYSIS REPORT

LAB ID SAMPLE ID TEST DESCRIPTION	RESULT	D L	UNITS	EXTRACTED	ANALYZED	BY
Chromatography						
Moisture Content	8 80	< 0 01	%		96/ 9/25	RMS
Volatile Hydrocarbons Tot	5	< 1	mg/kg DWt*		96/ 9/24	TJJ
Benzene	< 0 01	< 0 01	mg/kg DWt*		96/ 9/24	TJJ
Toluene	0 044	< 0 005	mg/kg DWt*		96/ 9/24	TJJ
Ethyl Benzene	0 87	< 0 005	mg/kg DWt*		96/ 9/24	TJJ
Xylene meta and para	2 9	< 0 010	mg/kg DWt*		96/ 9/24	TJJ
Xylene ortho	0 93	< 0 005	mg/kg DWt*		96/ 9/24	TJJ
Hydrocarbons Total Ext	11000	< 0 50	mg/Kg DWt*		96/ 9/25	RMS
SAMPLE COMMENT (ORGANIC)						
BTEX and Total Volatile Hydrocarbon analysis by	Headspace GC/P	D/FID				
* DWt = Dry Weight						
96 A54878						
CB 001 7 88 8 21						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/19						
Chromatography						
Moisture Content	7 27	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	1 9	< 0 50	mg/Kg DWt*		96/ 9/25	RMS
96 A54879						
CB 001 11 50 12 19						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/19						
Chromatography						
Moisture Content	14 86	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	3 4	< 0 50	mg/Kg DWt*		96/ 9/25	RMS
96 A54880						
CB 002 1 50 1 90						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/20						
Chromatography						
Moisture Content	12 57	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	7 3	< 0 50	mg/Kg DWt*		96/ 9/25	RMS

ENVIRO - TEST CHEMICAL ANALYSIS REPORT

LAB ID SAMPLE ID TEST DESCRIPTION	RESULT	D L	UNITS	EXTRACTED	ANALYZED	BY
96 A54881						
CB 003 2 40 3 05						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/20						
Chromatography						
Moisture Content	4 25	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	5 5	< 0 50	mg/Kg DWt*		96/ 9/25	RMS
96 A54882						
CB 004 2 28 2 85						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/20						
Chromatography						
Moisture Content	3 98	< 0 01	%		96/ 9/25	RMS
Volatile Hydrocarbons Tot	< 1	< 1	mg/kg DWt*		96/ 9/24	TJJ
Benzene	< 0 01	< 0 01	mg/kg DWt*		96/ 9/24	TJJ
Toluene	< 0 005	< 0 005	mg/kg DWt*		96/ 9/24	TJJ
Ethyl Benzene	< 0 005	< 0 005	mg/kg DWt*		96/ 9/24	TJJ
Xylene meta and para	< 0 010	< 0 010	mg/kg DWt*		96/ 9/24	TJJ
Xylene ortho	< 0 005	< 0 005	mg/kg DWt*		96/ 9/24	TJJ
Hydrocarbons Total Ext	67	< 0 50	mg/Kg DWt*		96/ 9/25	RMS
SAMPLE COMMENT (ORGANIC)						
BTEX and Total Volatile Hydrocarbon analysis by	Headspace GC/P	D/FID				
* DWt - Dry Weight						
96 A54883						
CB 004 3 80 4 27						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/20						
Chromatography						
Moisture Content	4 35	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	7000	< 0 50	mg/Kg DWt*		96/ 9/25	RMS

ENVIRO - TEST CHEMICAL ANALYSIS REPORT

LAB ID SAMPLE ID TEST DESCRIPTION	RESULT	D L	UNITS	EXTRACTED	ANALYZED	BY
96 A54884						
CB 004 4 92 5 30						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/20						
Chromatography						
Moisture Content	9 04	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	13	< 0 50	mg/Kg DWt*		96/ 9/25	RMS
96 A54885						
CB 004 6 85 7 25						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/20						
Chromatography						
Moisture Content	7 86	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	6000	< 0 50	mg/Kg DWt*		96/ 9/25	RMS
96 A54886						
CB 005 3 05 3 42						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/20						
Chromatography						
Moisture Content	5 00	< 0 01	%		96/ 9/25	RMS
Volatile Hydrocarbons Tot	22	< 1	mg/kg DWt*		96/ 9/24	TJJ
Benzene	< 0 01	< 0 01	mg/kg DWt*		96/ 9/24	TJJ
Toluene	0 16	< 0 005	mg/kg DWt*		96/ 9/24	TJJ
Ethyl Benzene	0 35	< 0 005	mg/kg DWt*		96/ 9/24	TJJ
Xylene meta and para	7 2	< 0 010	mg/kg DWt*		96/ 9/24	TJJ
Xylene ortho	1 8	< 0 005	mg/kg DWt*		96/ 9/24	TJJ
Hydrocarbons Total Ext	10000	< 0 50	mg/Kg DWt*		96/ 9/25	RMS
SAMPLE COMMENT (ORGANIC)						
BTEX and Total Volatile Hydrocarbon analysis by	Headspace GC/P	D/FID				
* DWt = Dry Weight						

ENVIRO - TEST CHEMICAL ANALYSIS REPORT

LAB ID SAMPLE ID TEST DESCRIPTION	RESULT	D L	UNITS	EXTRACTED	ANALYZED	BY
96 A54887 CB 005 6 85 7 22 Man Hydro Sample Type Soil Collected 96/ 9/20						
Chromatography						
Moisture Content	8 50	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	7 5	< 0 50	mg/Kg DWt*		96/ 9/25	RMS
96 A54888 CB 006 2 25 2 55 Man Hydro Sample Type Soil Collected 96/ 9/20						
Chromatography						
Moisture Content	7 88	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	13000	< 0 50	mg/Kg DWt*		96/ 9/25	RMS
96 A54889 CB 006 3 42 3 80 Man Hydro Sample Type Soil Collected 96/ 9/20						
Chromatography						
Moisture Content	5 93	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	5100	< 0 50	mg/Kg DWt*		96/ 9/25	RMS
96 A54890 CB 006 3 80 4 17 Man Hydro Sample Type Soil Collected 96/ 9/20						
Chromatography						
Moisture Content	4 36	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	190	< 0 50	mg/Kg DWt*		96/ 9/25	RMS

ENVIRO - TEST CHEMICAL ANALYSIS REPORT

LAB ID SAMPLE ID TEST DESCRIPTION	RESULT	D L	UNITS	EXTRACTED	ANALYZED	BY
96 A54891						
CB 007 2 62 3 05						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/20						
Chromatography						
Moisture Content	13 88	< 0 01	%		96/ 9/25	RMS
Volatile Hydrocarbons Tot	< 1	< 1	mg/kg DWt*		96/ 9/24	TJJ
Benzene	< 0 01	< 0 01	mg/kg DWt*		96/ 9/24	TJJ
Toluene	< 0 005	< 0 005	mg/kg DWt*		96/ 9/24	TJJ
Ethyl Benzene	< 0 005	< 0 005	mg/kg DWt*		96/ 9/24	TJJ
Xylene meta and para	0 21	< 0 010	mg/kg DWt*		96/ 9/24	TJJ
Xylene ortho	0 058	< 0 005	mg/kg DWt*		96/ 9/24	TJJ
Hydrocarbons Total Ext	1200	< 0 50	mg/Kg DWt*		96/ 9/25	RMS
SAMPLE COMMENT (ORGANIC)						
The sample contained hydrocarbons in the boiling range of diesel fuel						
BTEX and Total Volatile Hydrocarbon analysis by Headspace GC/PID/FID						
* DWt = Dry Weight						
96 A54892						
CB 007 5 30 5 67						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/20						
Chromatography						
Moisture Content	7 34	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	2100	< 0 50	mg/Kg DWt*		96/ 9/25	RMS
96 A54893						
CB 007 8 95 9 15						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/20						
Chromatography						
Moisture Content	14 83	< 0 01	%		96/ 9/25	RMS
Volatile Hydrocarbons Tot	1	< 1	mg/kg DWt*		96/ 9/24	TJJ
Benzene	< 0 01	< 0 01	mg/kg DWt*		96/ 9/24	TJJ
Toluene	< 0 005	< 0 005	mg/kg DWt*		96/ 9/24	TJJ
Ethyl Benzene	< 0 005	< 0 005	mg/kg DWt*		96/ 9/24	TJJ
Xylene meta and para	0 29	< 0 010	mg/kg DWt*		96/ 9/24	TJJ
Xylene ortho	0 13	< 0 005	mg/kg DWt*		96/ 9/24	TJJ

ENVIRO - TEST CHEMICAL ANALYSIS REPORT

LAB ID SAMPLE ID TEST DESCRIPTION	RESULT	D L	UNITS	EXTRACTED	ANALYZED	BY
Hydrocarbons Total Ext	1400	< 0 50	mg/Kg DWt*		96/ 9/25	RMS
SAMPLE COMMENT (ORGANIC)						
The sample contained hydrocarbons in the boiling range of diesel fuel						
BTEX and Total Volatile Hydrocarbon analysis by Headspace GC/PID/FID						
* DWt = Dry Weight						
96 A54894						
CB 008 3 35 3 80						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/21						
Chromatography						
Moisture Content	4 37	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	0 63	< 0 50	mg/Kg DWt*		96/ 9/25	RMS
96 A54895						
CB 008 8 55 9 15						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/21						
Chromatography						
Moisture Content	10 42	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	410	< 0 50	mg/Kg DWt*		96/ 9/25	RMS
96 A54896						
CB 008 10 28 10 65						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/21						
Chromatography						
Moisture Content	11 59	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	4 1	< 0 50	mg/Kg DWt*		96/ 9/25	RMS
96 A54897						
CB 009 2 62 3 05						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/21						
Chromatography						

ENVIRO - TEST CHEMICAL ANALYSIS REPORT

LAB ID SAMPLE ID TEST DESCRIPTION	RESULT	D L	UNITS	EXTRACTED	ANALYZED	BY
Moisture Content	3 42	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	5 9	< 0 50	mg/Kg DWt*		96/ 9/26	RMS
96 A54898						
CB 010 4 55 4 92						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/21						
Chromatography						
Moisture Content	5 74	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	3100	< 0 50	mg/Kg DWt*		96/ 9/26	RMS
96 A54899						
CB 010 6 80 6 95						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/21						
Chromatography						
Moisture Content	4 90	< 0 01	%		96/ 9/25	RMS
Volatile Hydrocarbons Tot	5	< 1	mg/kg DWt*		96/ 9/24	TJJ
Benzene	< 0 01	< 0 01	mg/kg DWt*		96/ 9/24	TJJ
Toluene	0 042	< 0 005	mg/kg DWt*		96/ 9/24	TJJ
Ethyl Benzene	0 074	< 0 005	mg/kg DWt*		96/ 9/24	TJJ
Xylene meta and para	2 6	< 0 010	mg/kg DWt*		96/ 9/24	TJJ
Xylene ortho	2 9	< 0 005	mg/kg DWt*		96/ 9/24	TJJ
Hydrocarbons Total Ext	14000	< 0 50	mg/Kg DWt*		96/ 9/26	RMS
SAMPLE COMMENT (ORGANIC)						
BTEX and Total Volatile Hydrocarbon analysis by	Headspace GC/P	D/FID				
* DWt = Dry Weight						
96 A54900						
CB 010 7 15 7 60						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/21						
Chromatography						
Moisture Content	8 10	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	< 0 50	< 0 50	mg/Kg DWt*		96/ 9/26	RMS

ENVIRO - TEST CHEMICAL ANALYSIS REPORT

LAB ID SAMPLE ID TEST DESCRIPTION	RESULT	D L	UNITS	EXTRACTED	ANALYZED	BY
96 A54901 CB 011 1 85 2 25 Man Hydro Sample Type Soil Collected 96/ 9/21						
Chromatography						
Moisture Content	10 67	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	900	< 0 50	mg/Kg DWt*		96/ 9/26	RMS
96 A54902 CB 014 2 62 3 05 Man Hydro Sample Type Soil Collected 96/ 9/21						
Chromatography						
Moisture Content	1 98	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	1 6	< 0 50	mg/Kg DWt*		96/ 9/26	RMS
96 A54903 CB 015 2 25 2 62 Man Hydro Sample Type Soil Collected 96/ 9/21						
Chromatography						
Moisture Content	5 20	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	1 4	< 0 50	mg/Kg DWt*		96/ 9/26	RMS
96 A54904 CB 015 3 05 3 55 Man Hydro Sample Type Soil Collected 96/ 9/21						
Chromatography						
Moisture Content	5 65	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	71	< 0 50	mg/Kg DWt*		96/ 9/26	RMS

ENVIRO - TEST CHEMICAL ANALYSIS REPORT

LAB ID SAMPLE ID TEST DESCRIPTION	RESULT	D L	UNITS	EXTRACTED	ANALYZED	BY
96 A54905 CB 016 1 87 2 25 Man Hydro Sample Type Soil Collected 96/ 9/21						
Chromatography						
Moisture Content	10 69	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	10000	< 0 50	mg/Kg DWt*		96/ 9/26	RMS
96 A54906 CB 016 2 25 2 62 Man Hydro Sample Type Soil Collected 96/ 9/21						
Chromatography						
Moisture Content	5 68	< 0 01	%		96/ 9/25	GEV
Oil & Grease Total Rec	2500	< 50	mg/Kg DWt*		96/ 9/24	GEV
96 A54907 CB 016 2 62 3 05 Man Hydro Sample Type Soil Collected 96/ 9/21						
Chromatography						
Moisture Content	4 60	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	< 0 50	< 0 50	mg/Kg DWt*		96/ 9/26	RMS
96 A54908 CB 016 3 05 3 42 Man Hydro Sample Type Soil Collected 96/ 9/21						
Chromatography						
Moisture Content	11 63	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	5 2	< 0 50	mg/Kg DWt*		96/ 9/26	RMS

ENVIRO - TEST CHEMICAL ANALYSIS REPORT

LAB ID SAMPLE ID TEST DESCRIPTION	RESULT	D L	UNITS	EXTRACTED	ANALYZED	BY
96 A54959						
CB 018 5 60 6 10						
Man Hydro						
Sample Type Soil						
Collected 96/ 9/21						
Chromatography						
Moisture Content	5 61	< 0 01	%		96/ 9/25	RMS
Hydrocarbons Total Ext	1 4	< 0 50	mg/Kg DWt*		96/ 9/26	RMS

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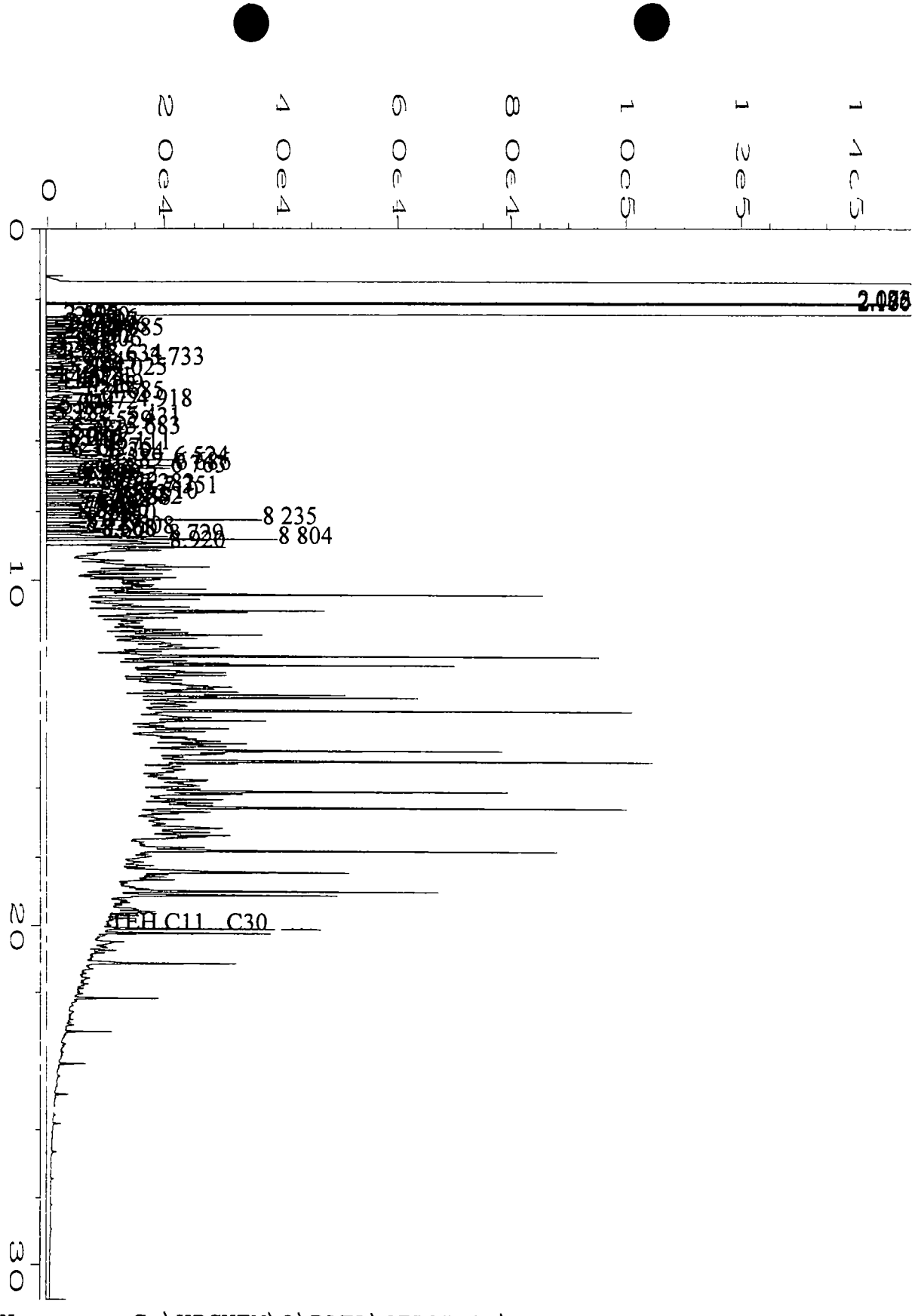

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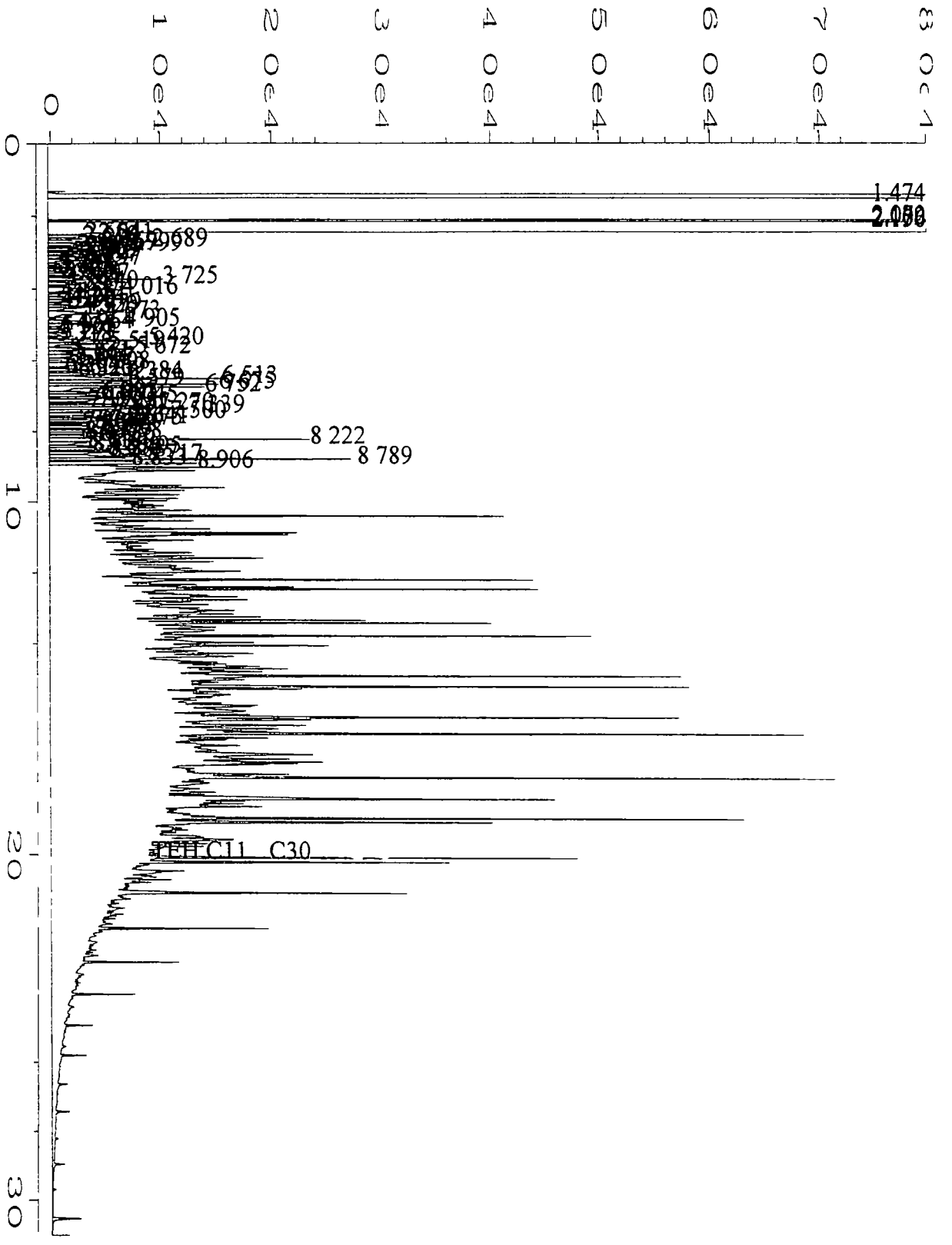
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	63
Sample Name	96-54876	Injection Number	1
Sample Time Bar Code		Sequence Line	11
Acquired on	26 Sep 96 06 47 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	27 Sep 96 10 51 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 07 15 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



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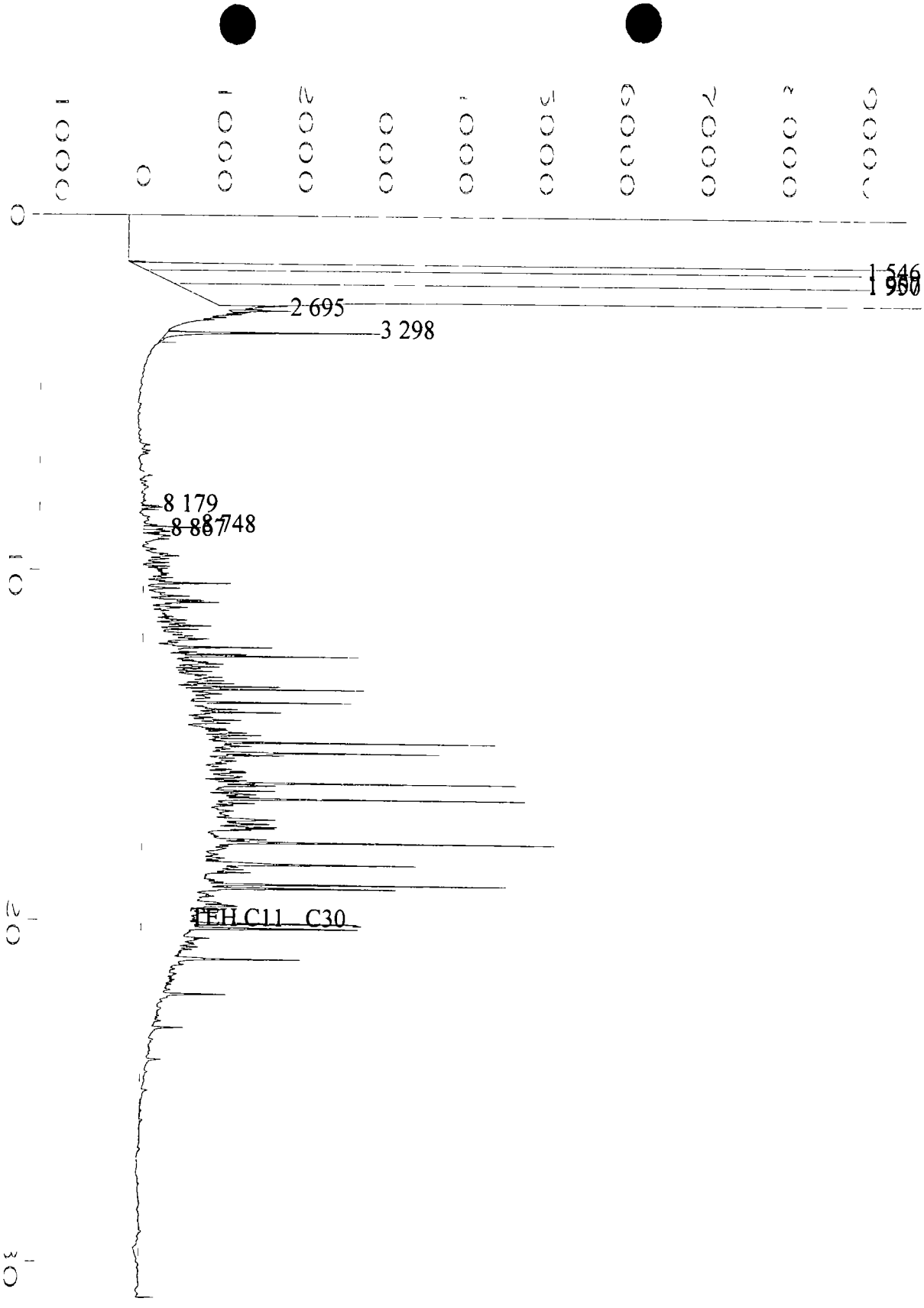
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	53
Sample Name	96-54877	Injection Number	1
Run Time Bar Code		Sequence Line	9
Acquired on	25 Sep 96 01 17 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	26 Sep 96 09 51 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 07 15 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



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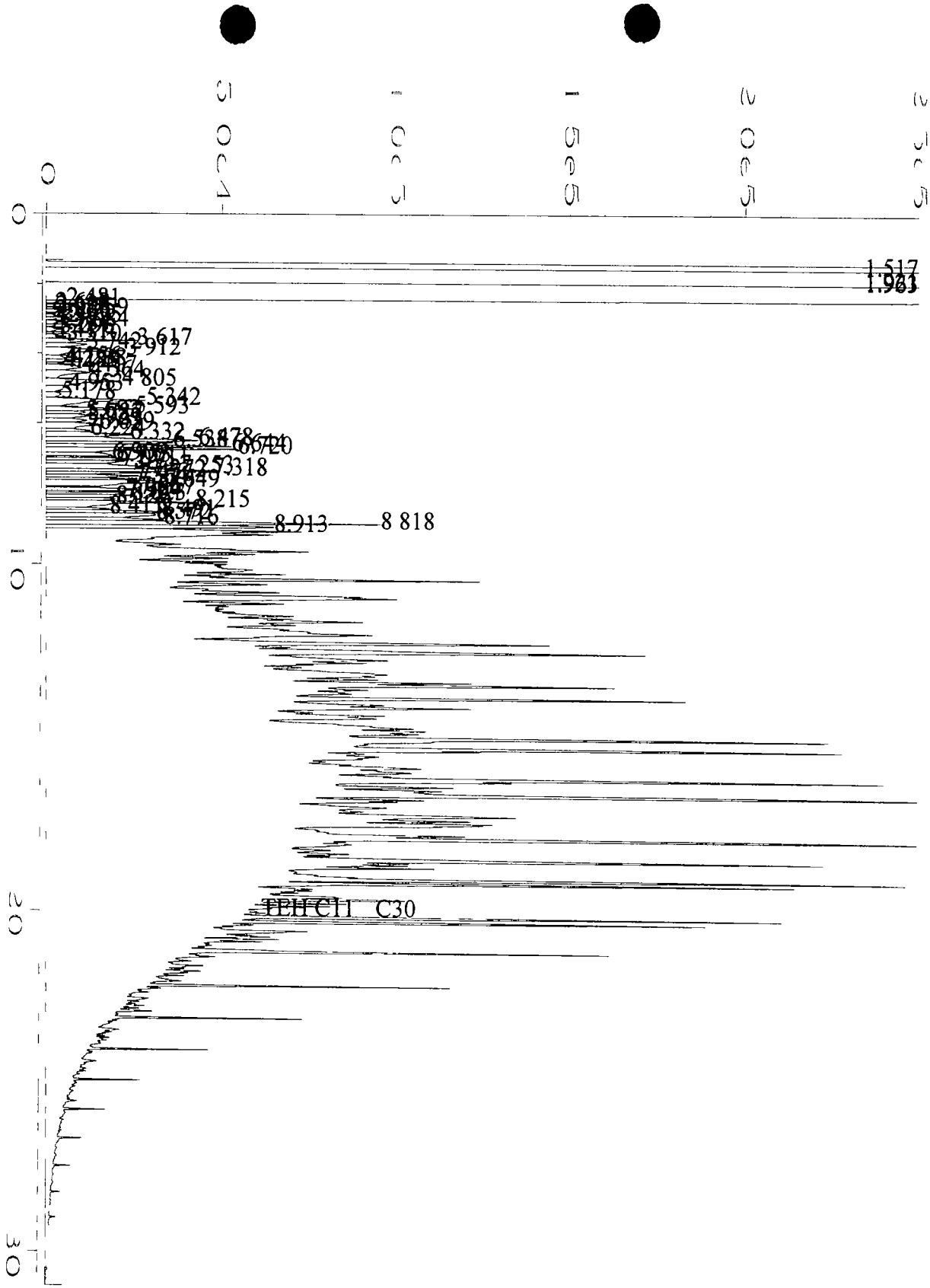
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	14
Sample Name	96-54882	Injection Number	1
Run Time Bar Code		Sequence Line	13
quired on	24 Sep 96 03 32 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	25 Sep 96 07 05 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 06 53 AM	Sample Amount	2448 94
Multiplier	10	ISTD Amount	
Sample Info	MB Hydro - CB-004-2 28-2 85		



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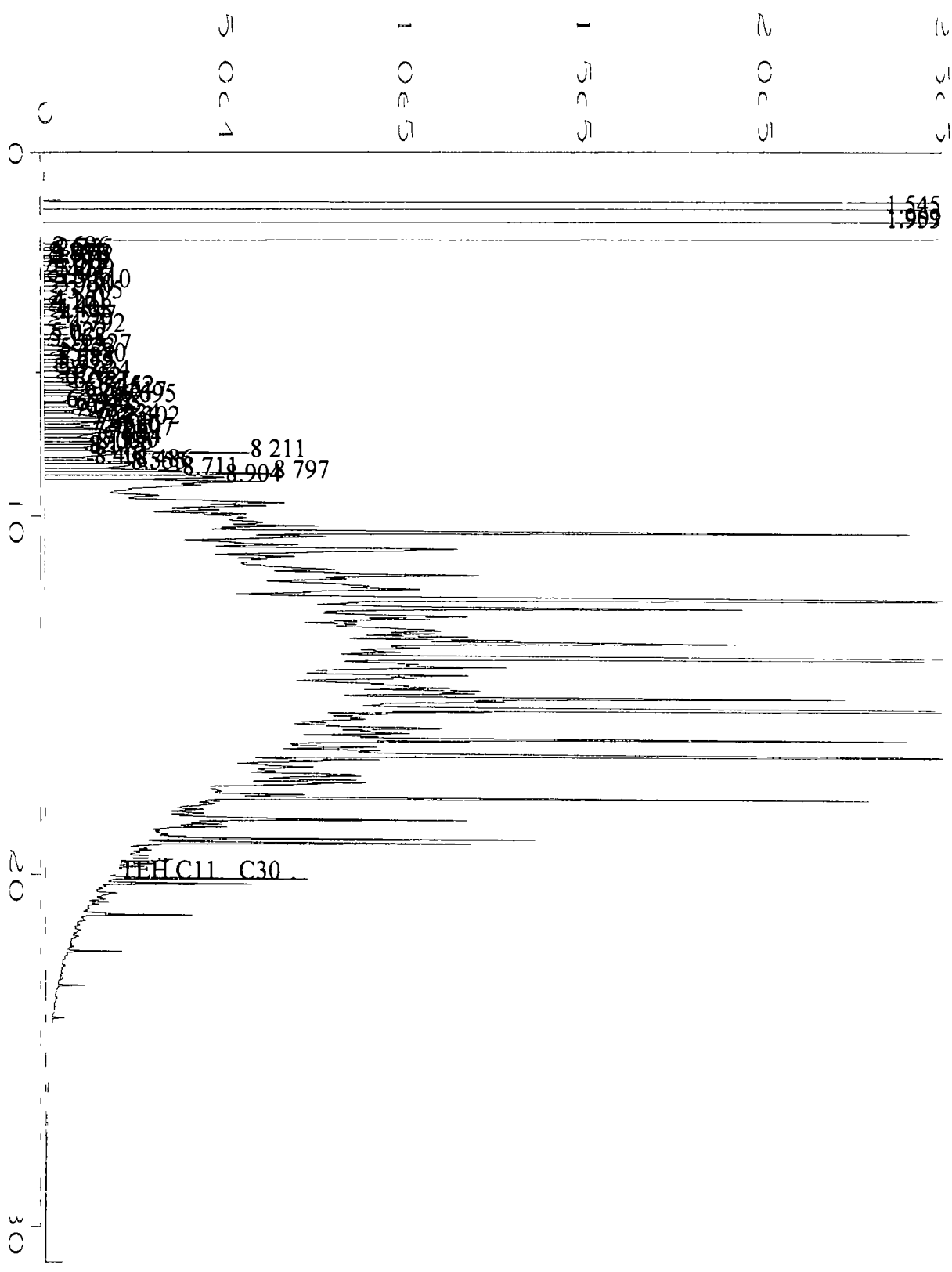
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	15
Sample Name	96-54883	Injection Number	1
Run Time Bar Code		Sequence Line	13
Acquired on	24 Sep 96 04 12 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	25 Sep 96 11 13 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 06 53 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



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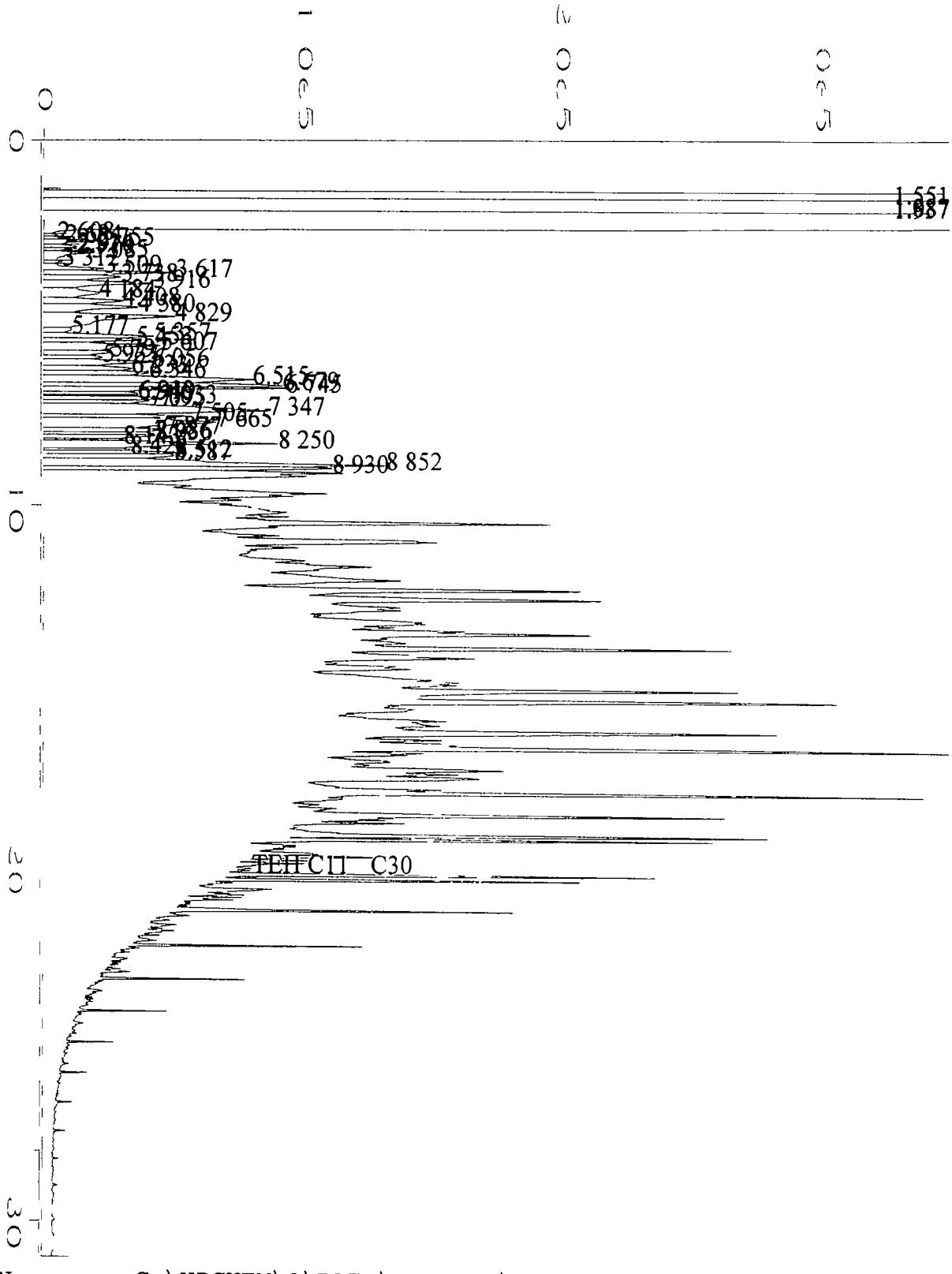
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	17
Sample Name	96-54885	Injection Number	1
Run Time Bar Code		Sequence Line	13
Acquired on	24 Sep 96 05 31 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	25 Sep 96 11 15 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 06 53 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



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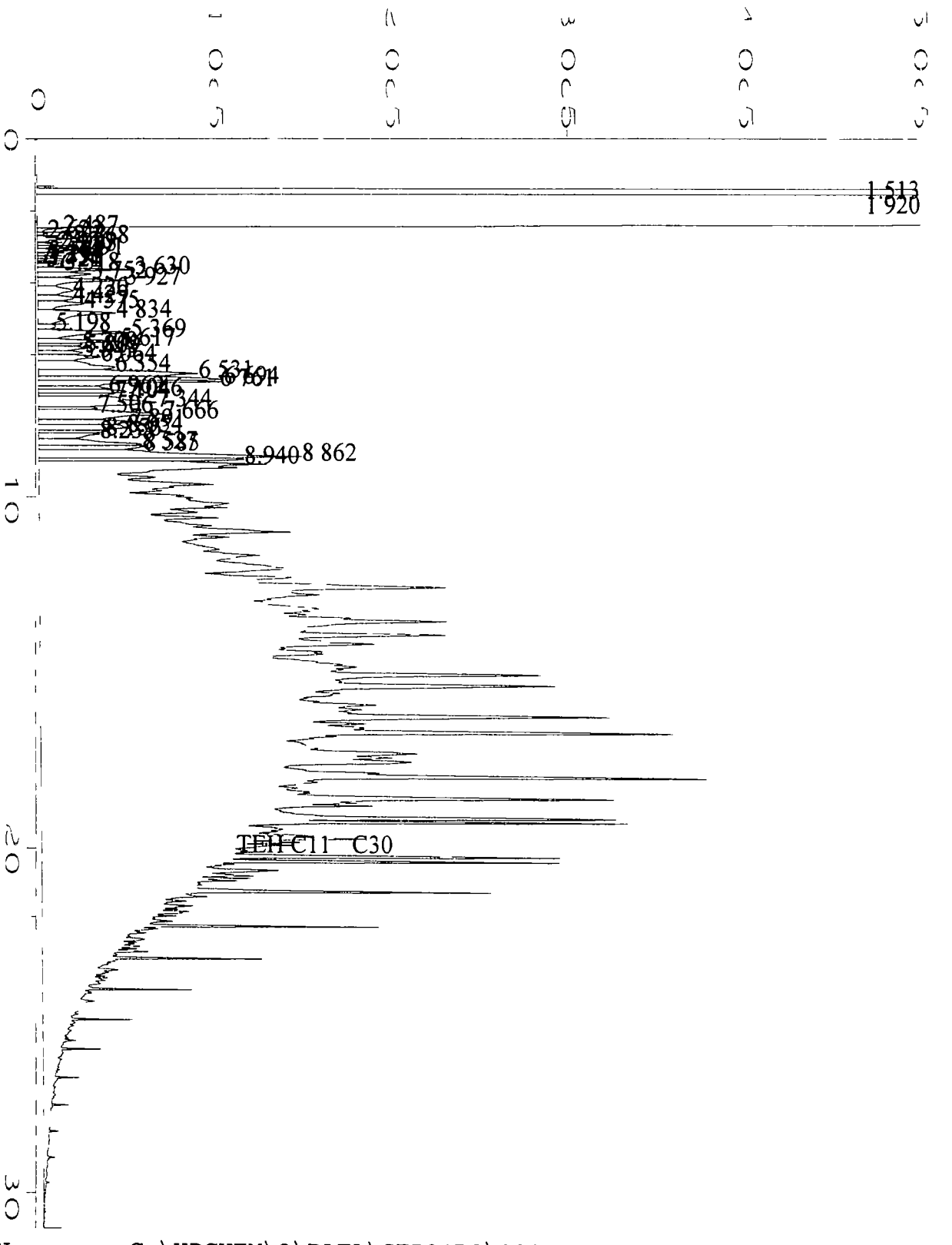
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	18
Sample Name	96-54886	Injection Number	1
Run Time Bar Code		Sequence Line	13
Acquired on	24 Sep 96 06 11 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	25 Sep 96 07 36 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 06 53 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



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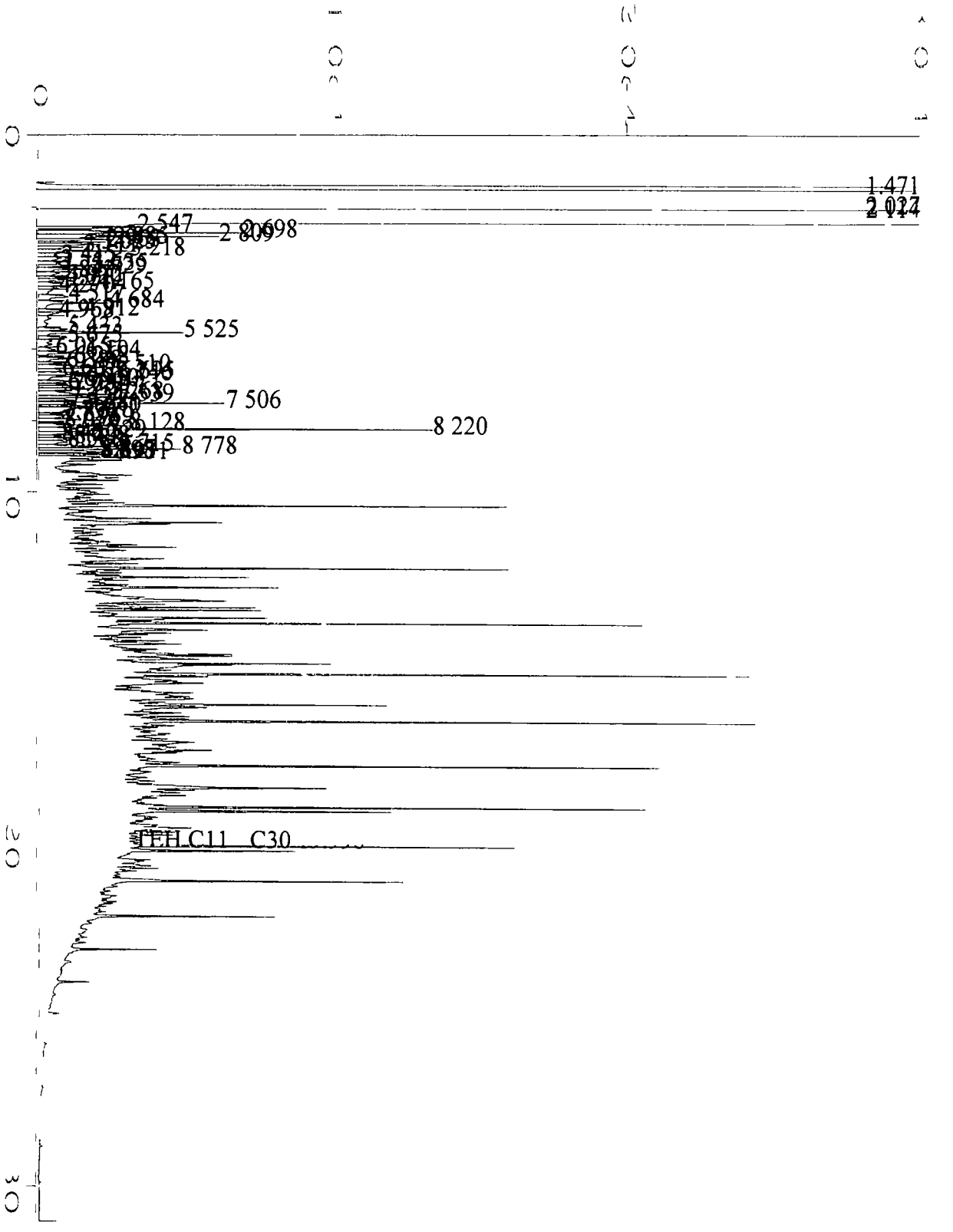
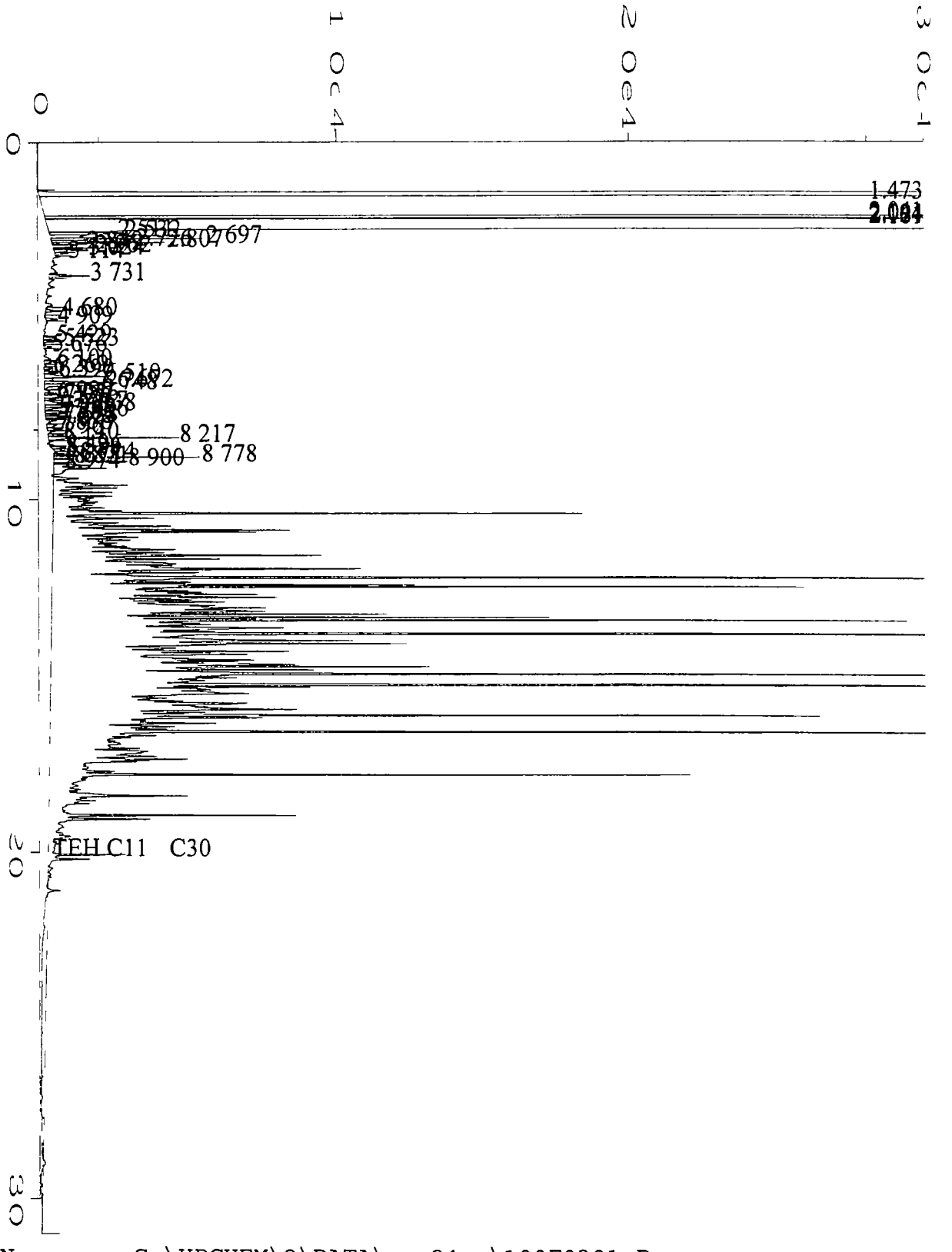
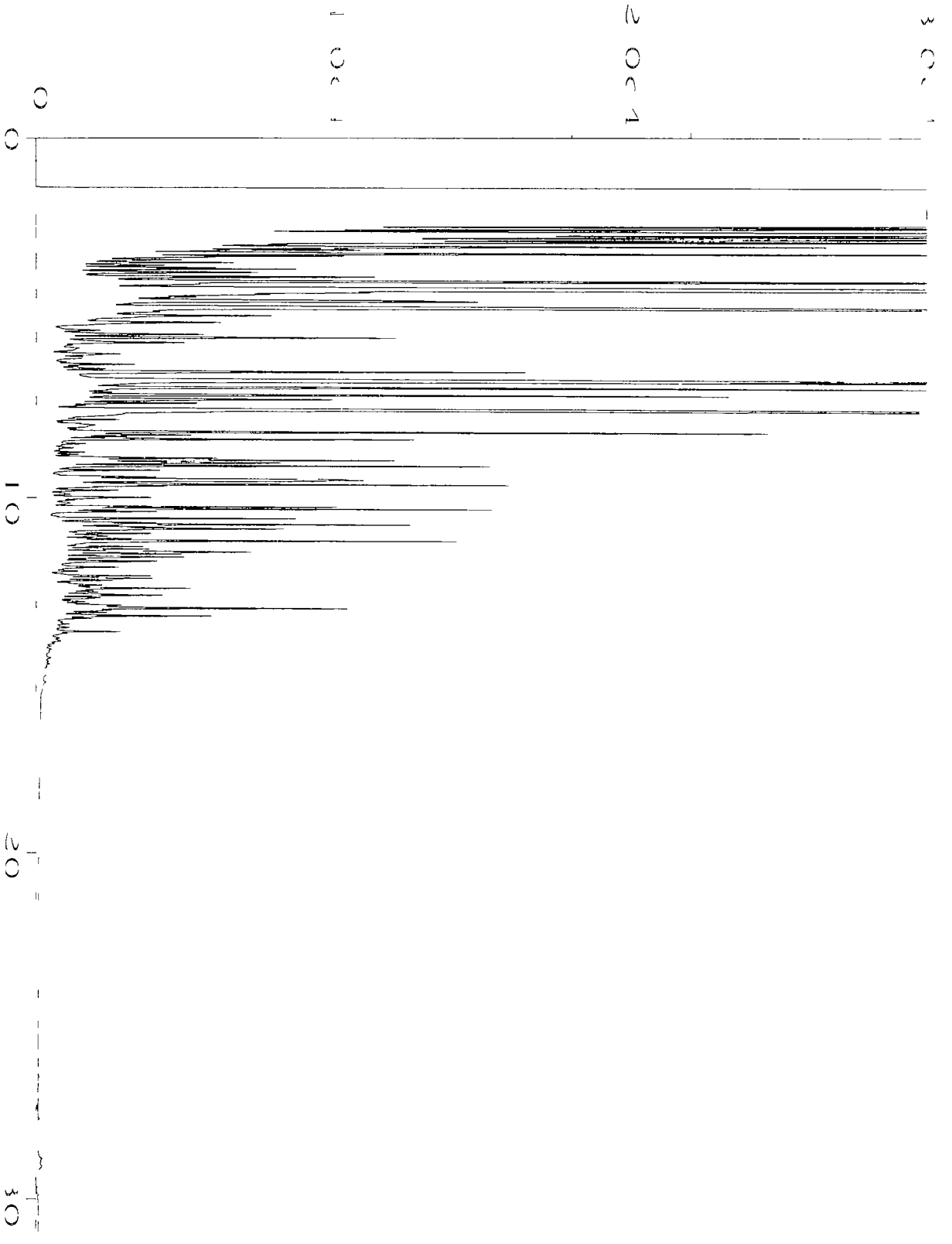
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	20
Sample Name	96-54888	Injection Number	1
Run Time Bar Code		Sequence Line	13
Acquired on	25 Sep 96 07 31 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	25 Sep 96 11 18 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 06 53 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



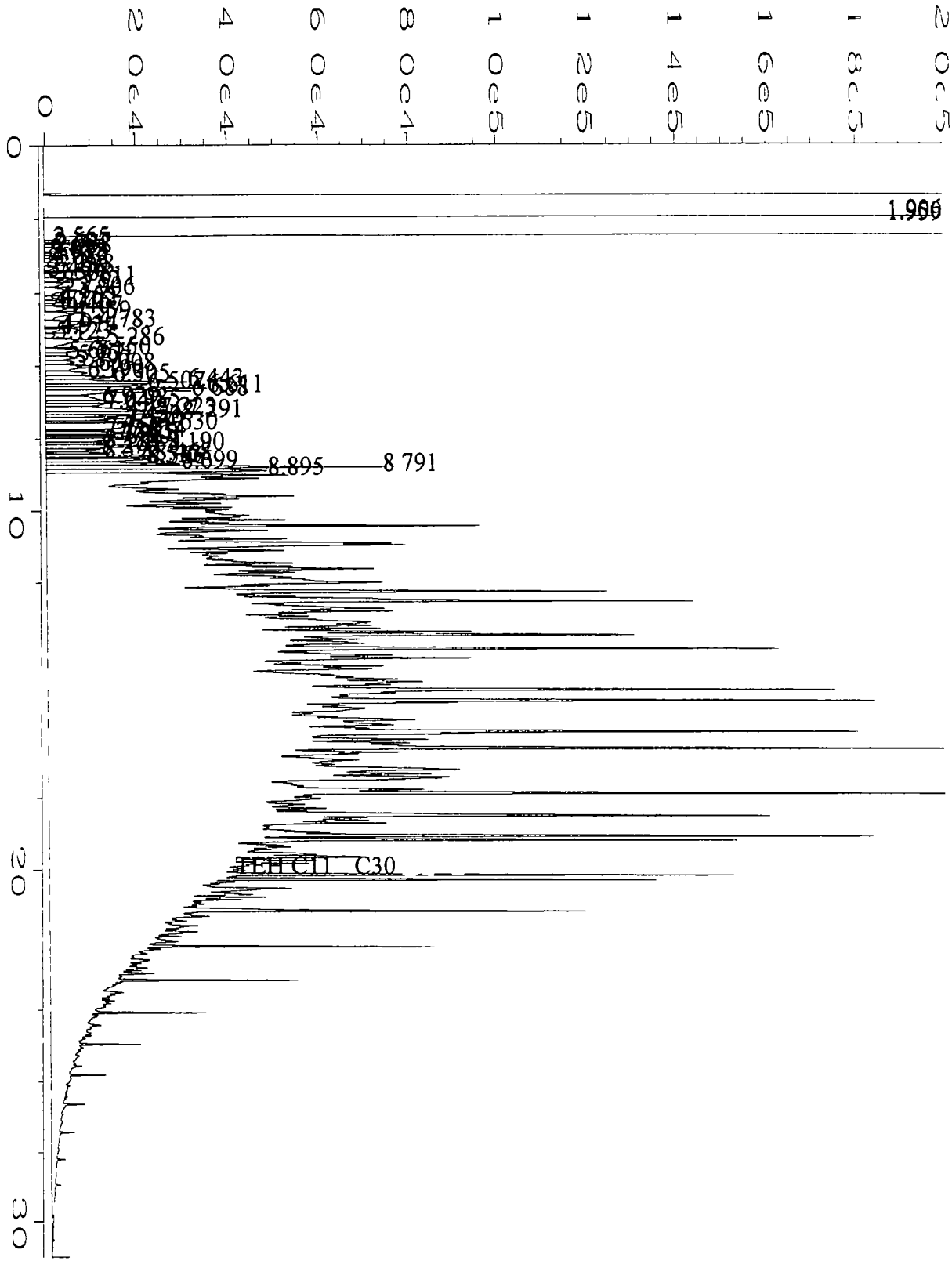
Data File Name	C \HPCHEM\2\DATA\SEP24RS\002F0202 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	2
Sample Name	diesel std	Injection Number	2
Pin Time Bar Code		Sequence Line	2
quired on	24 Sep 96 10 39 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	25 Sep 96 09 15 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 06 53 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



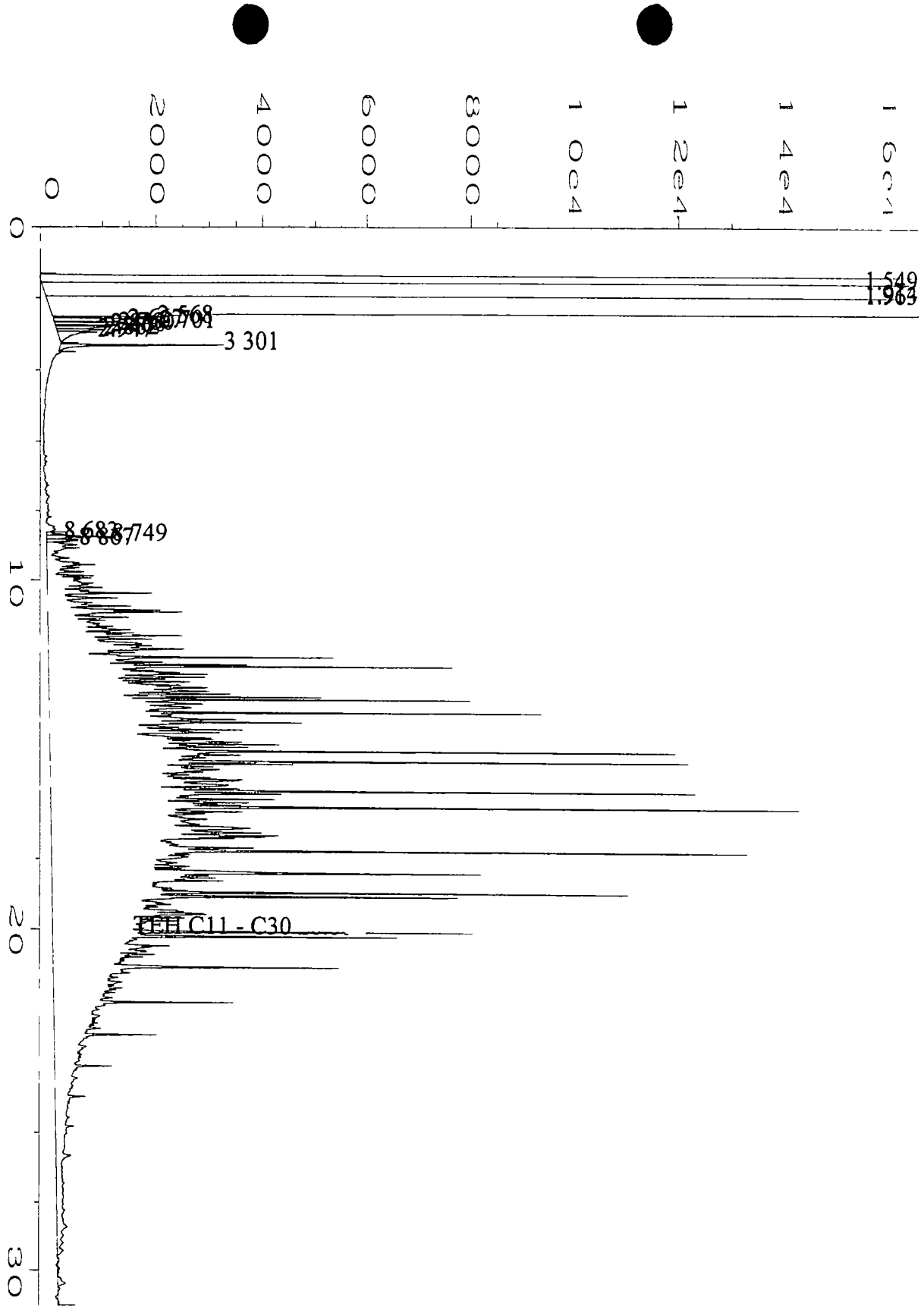
Data File Name	C \HPCHEM\2\DATA\sep24rs\100F0301 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	100
Sample Name	kerosene std	Injection Number	1
P n Time Bar Code		Sequence Line	3
Acquired on	24 Sep 96 11 19 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	25 Sep 96 09 14 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 06 53 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



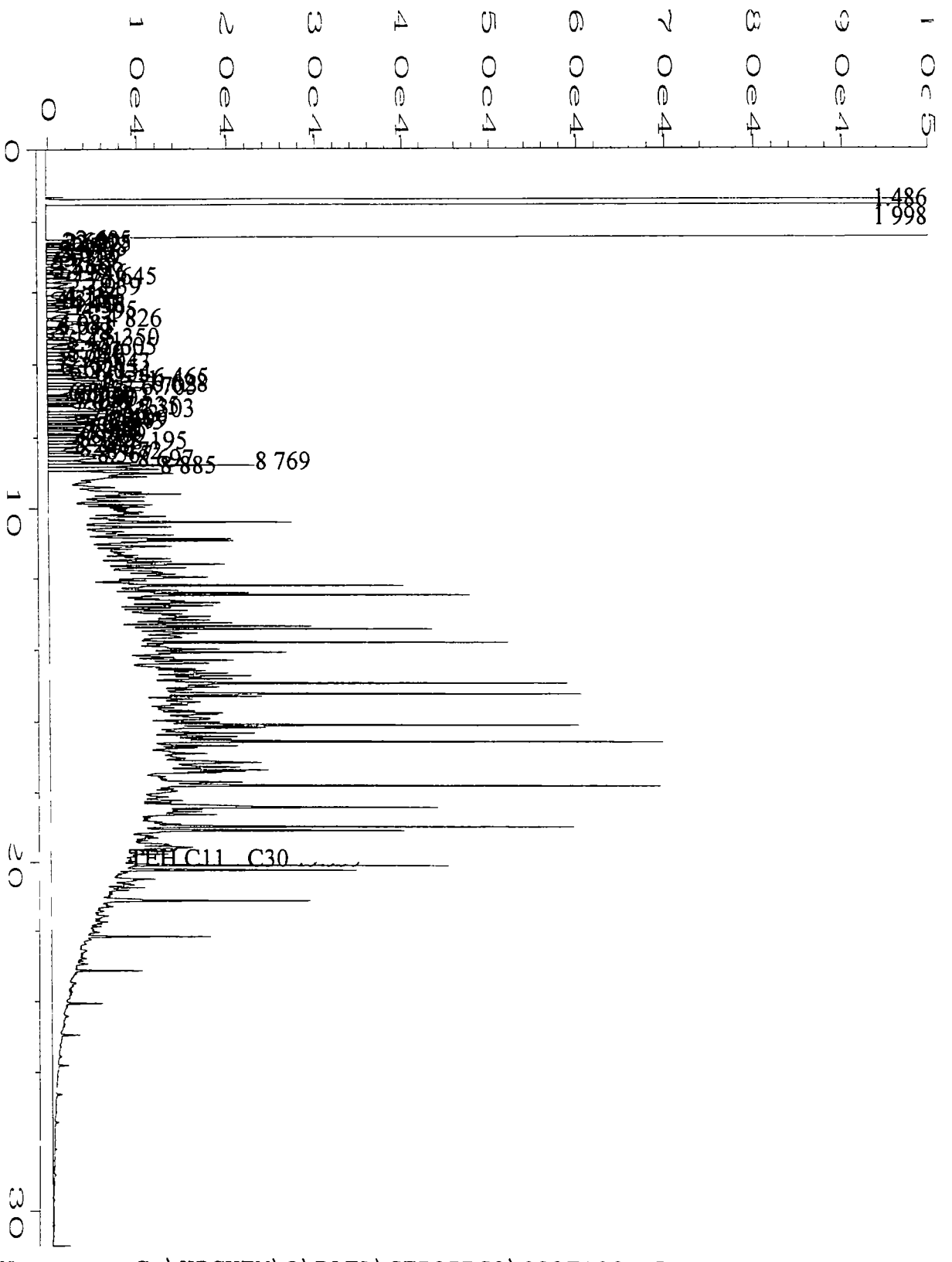
Data File Name	C \HPCHEM\2\DATA\SEP24RS\003F0501 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	3
Sample Name	Gas Qual Std	Injection Number	1
Run Time Bar Code		Sequence Line	5
Acquired on	24 Sep 96 12 39 PM	Instrument Method	TEHSOIL2 MTH
Report Created on	25 Sep 96 09 16 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 06 53 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



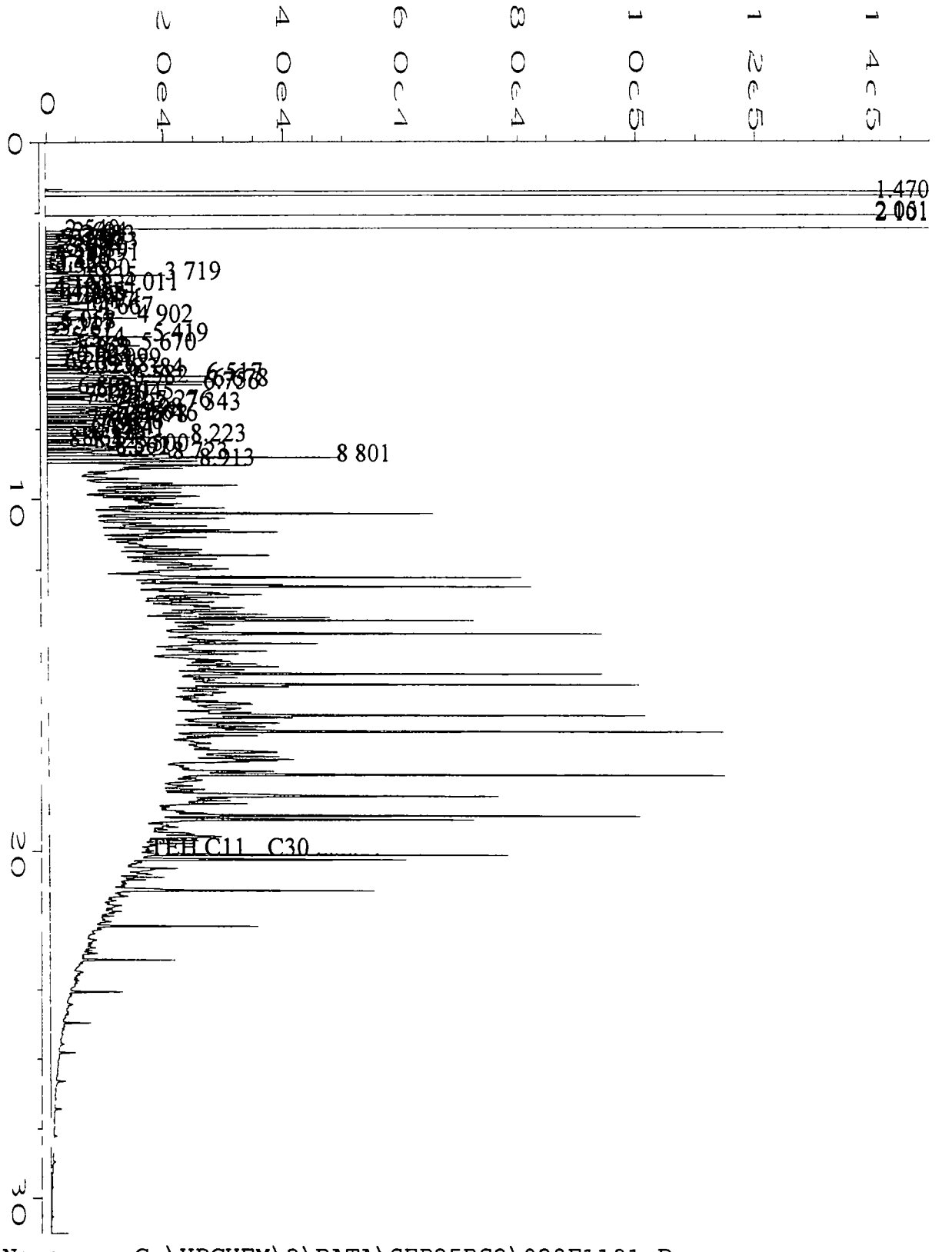
Data File Name	C \HPCHEM\2\DATA\SEP25RS2\021F1001 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	21
Sample Name	96-54889	Injection Number	1
Run Time Bar Code		Sequence Line	10
Acquired on	25 Sep 96 01 58 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	26 Sep 96 09 54 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 07 15 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



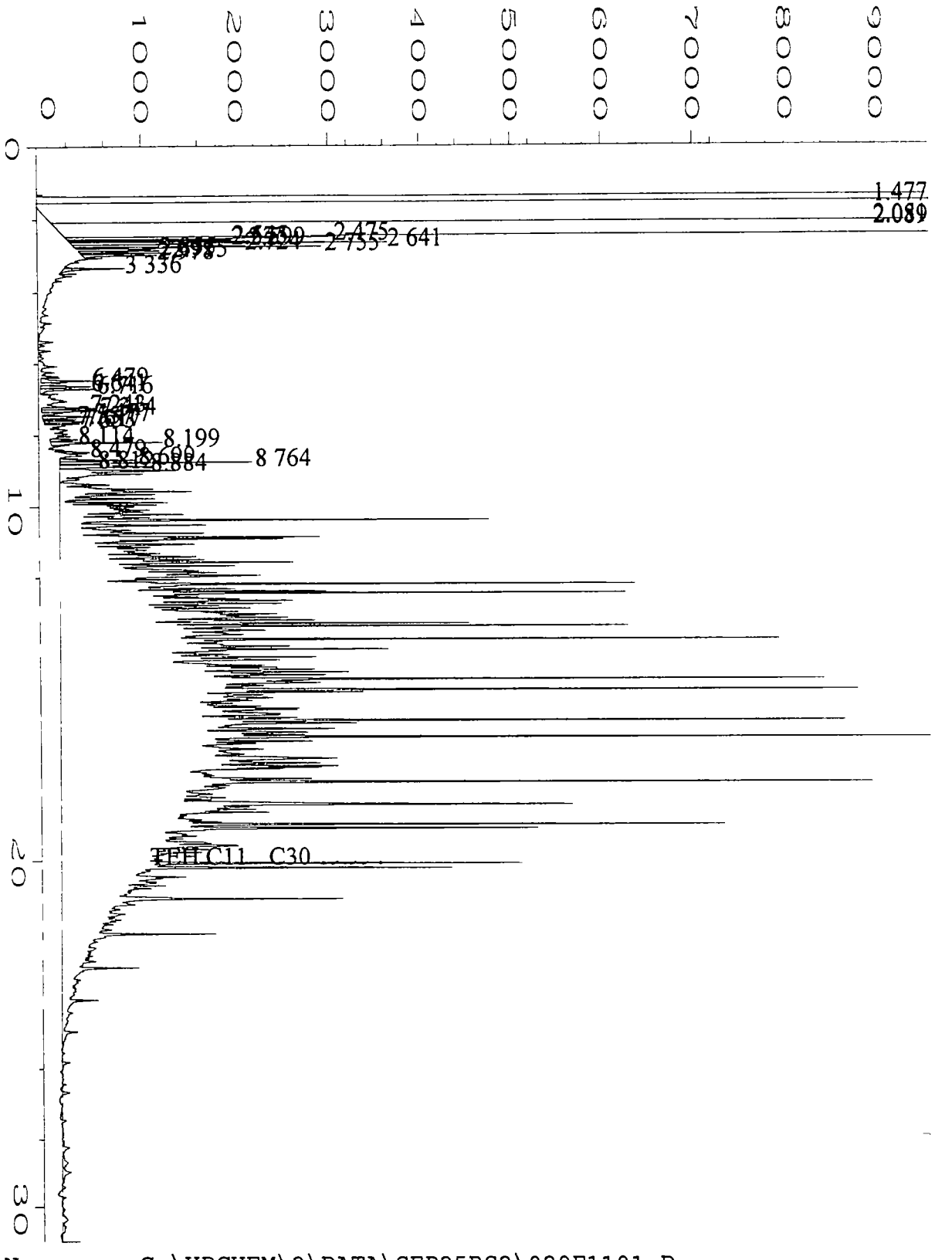
Data File Name	C \HPCHEM\2\DATA\SEP25RS2\022F1001 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	22
Sample Name	96-54890	Injection Number	1
Run Time Bar Code		Sequence Line	10
Acquired on	25 Sep 96 02 38 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	26 Sep 96 09 55 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 07 15 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



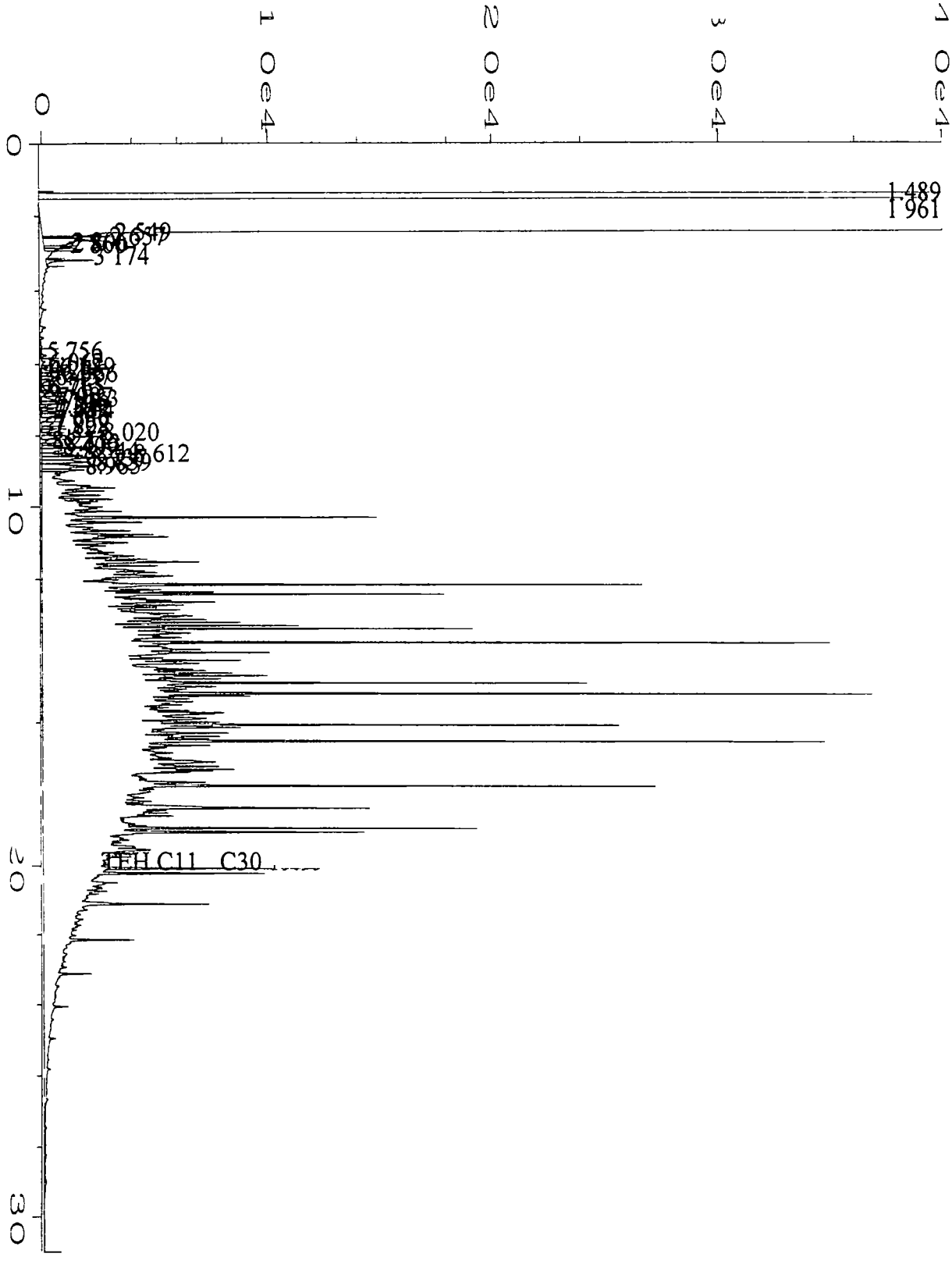
Data File Name	C \HPCHEM\2\DATA\SEP25RS2\023F1001 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	23
Sample Name	96-54891	Injection Number	1
Run Time Bar Code		Sequence Line	10
Acquired on	25 Sep 96 03 23 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	26 Sep 96 09 56 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 07 15 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



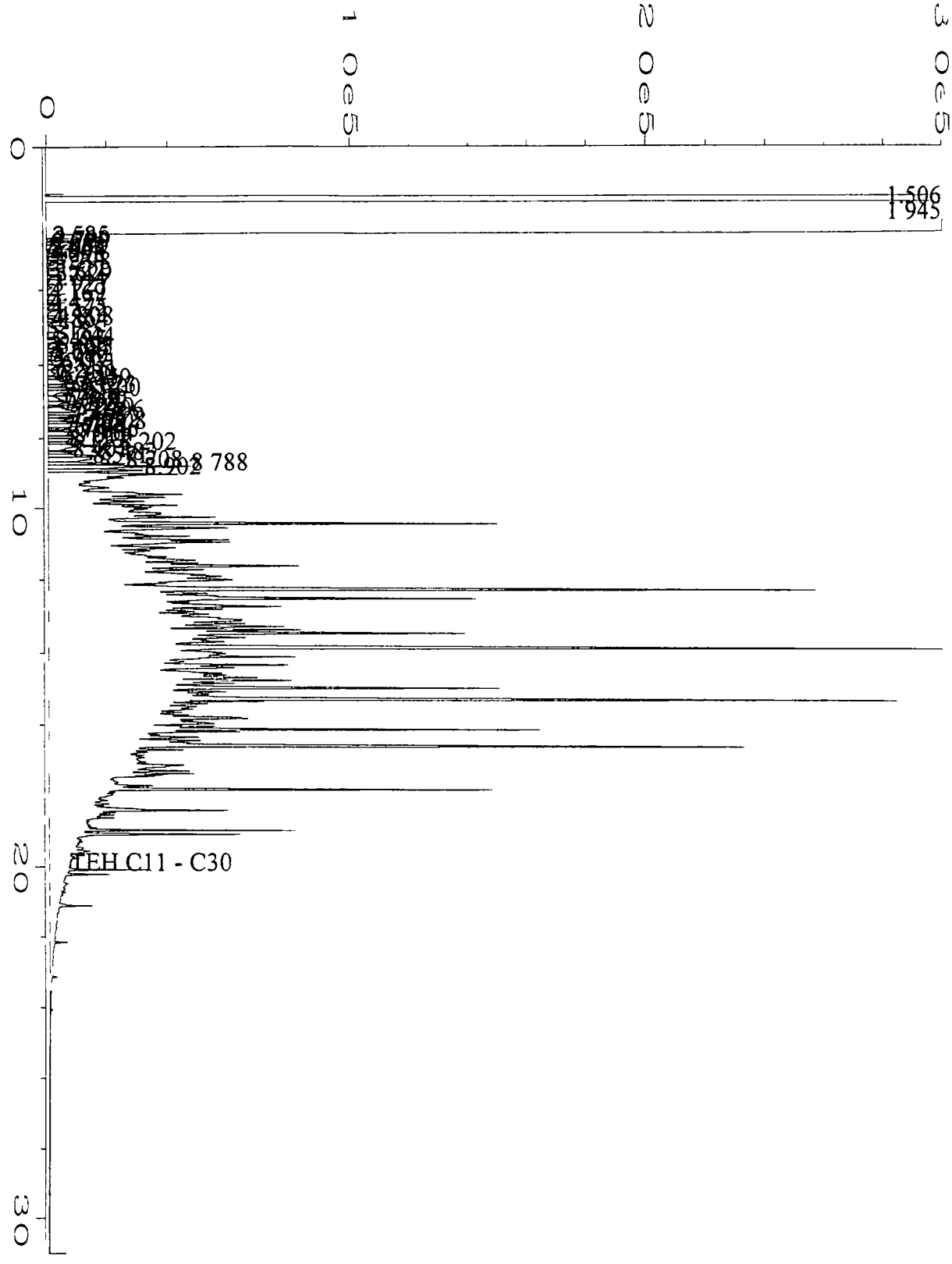
Data File Name	C \HPCHEM\2\DATA\SEP25RS2\028F1101 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	28
Sample Name	96-54892	Injection Number	1
Run Time Bar Code		Sequence Line	11
Acquired on	25 Sep 96 04 05 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	26 Sep 96 09 58 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 07 15 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



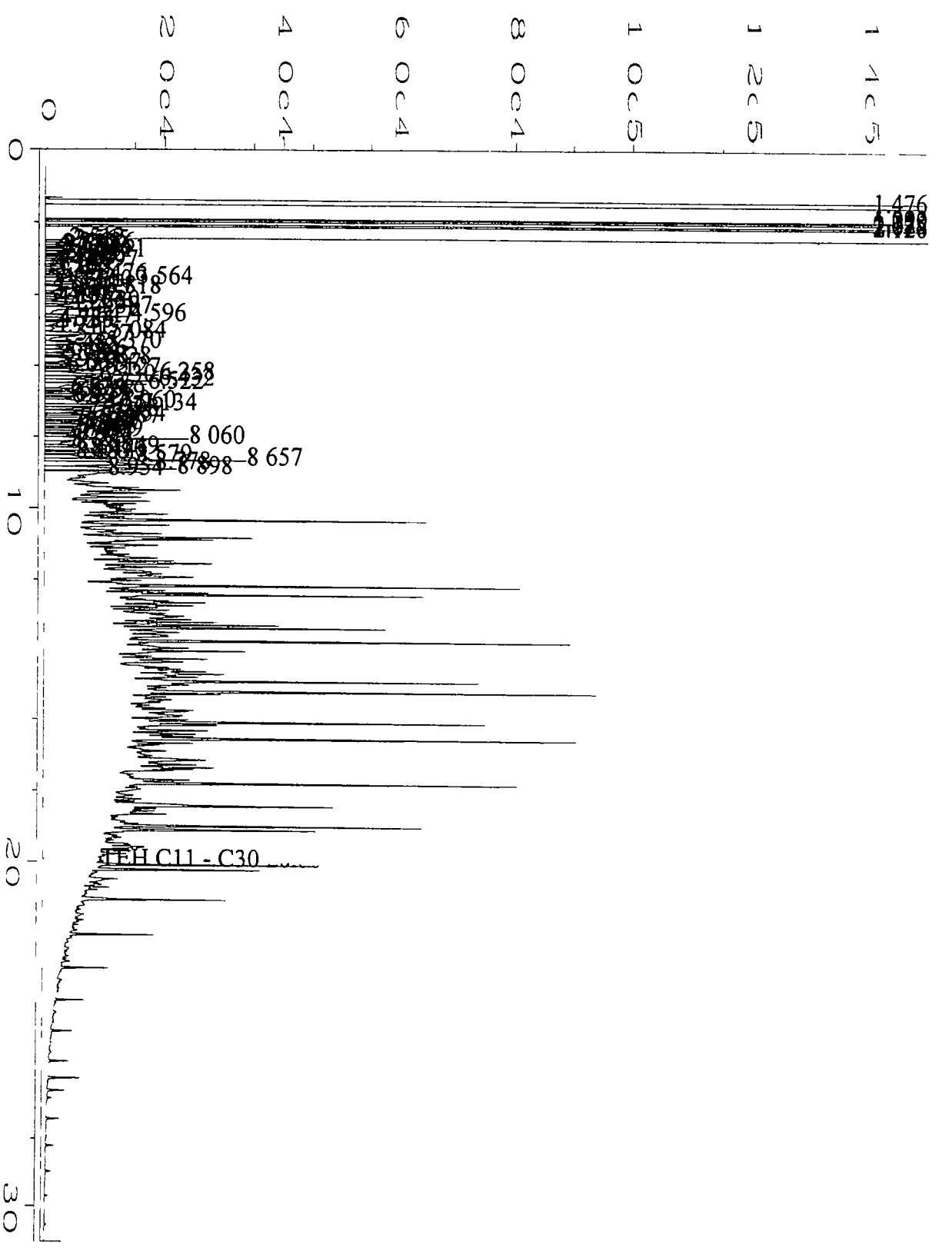
Data File Name	C \HPCHEM\2\DATA\SEP25RS2\029F1101 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	29
Sample Name	96-54893	Injection Number	1
Pl Time Bar Code		Sequence Line	11
Acquired on	25 Sep 96 04 46 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	26 Sep 96 10 04 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 07 15 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



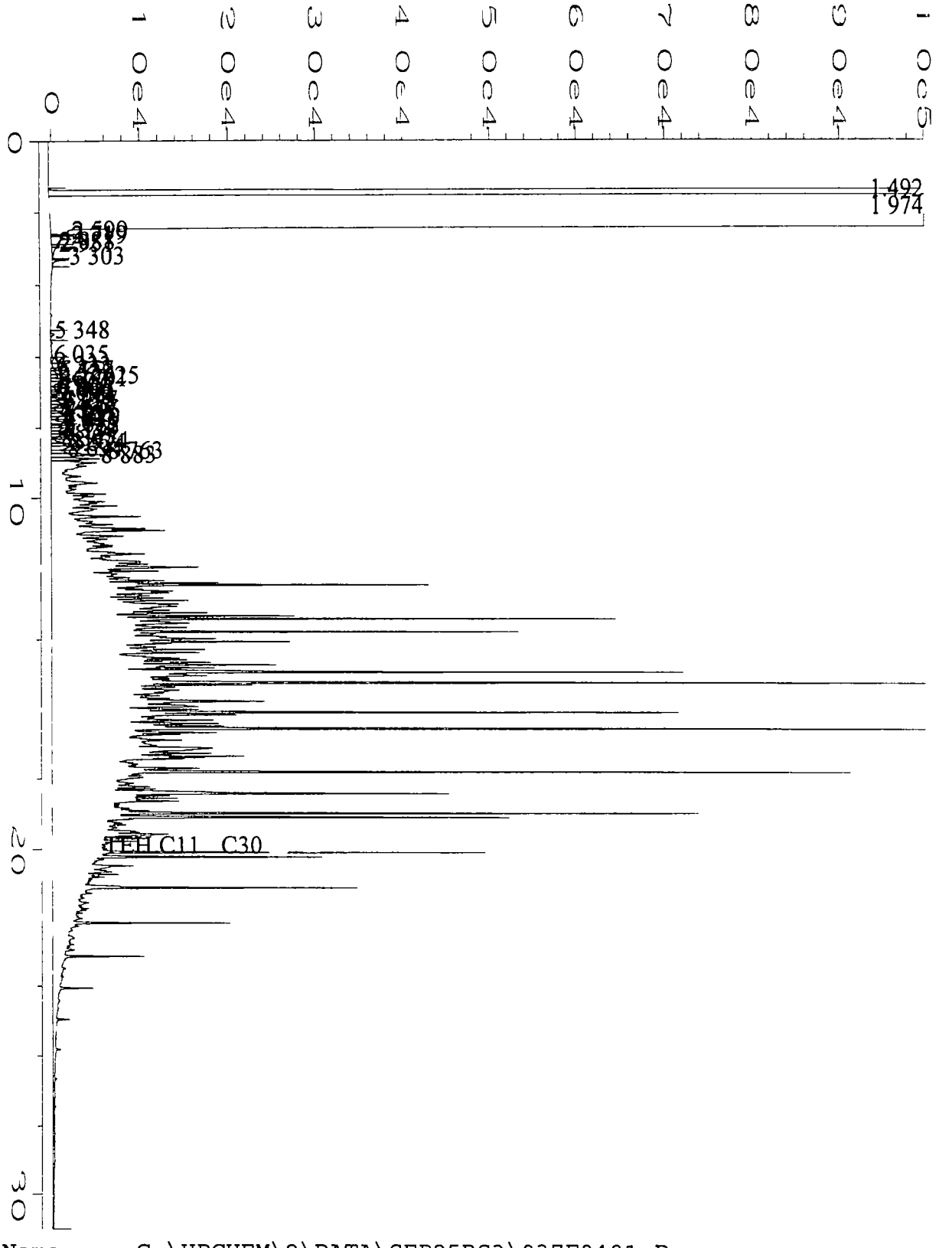
Data File Name	C \HPCHEM\2\DATA\SEP25RS2\031F1101 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	31
Sample Name	96-54895	Injection Number	1
Run Time Bar Code		Sequence Line	11
Acquired on	25 Sep 96 06 06 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	26 Sep 96 10 12 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 07 15 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



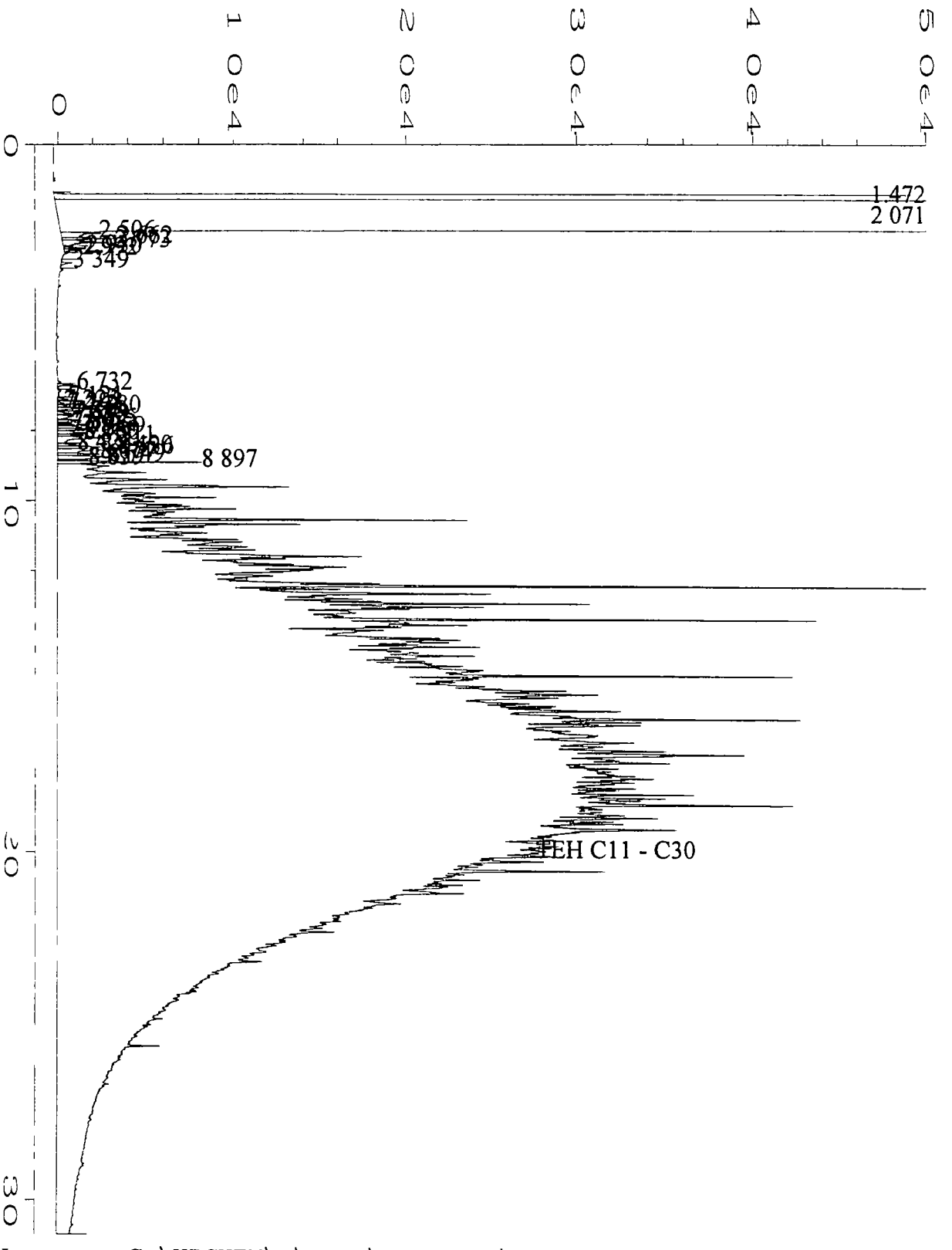
Data File Name	C \HPCHEM\2\DATA\SEP25RS3\034F0401 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	34
Sample Name	96-54898	Injection Number	1
Run Time Bar Code		Sequence Line	4
Acquired on	26 Sep 96 03 15 PM	Instrument Method	TEHSOIL2 MTH
Report Created on	27 Sep 96 08 59 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 07 15 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



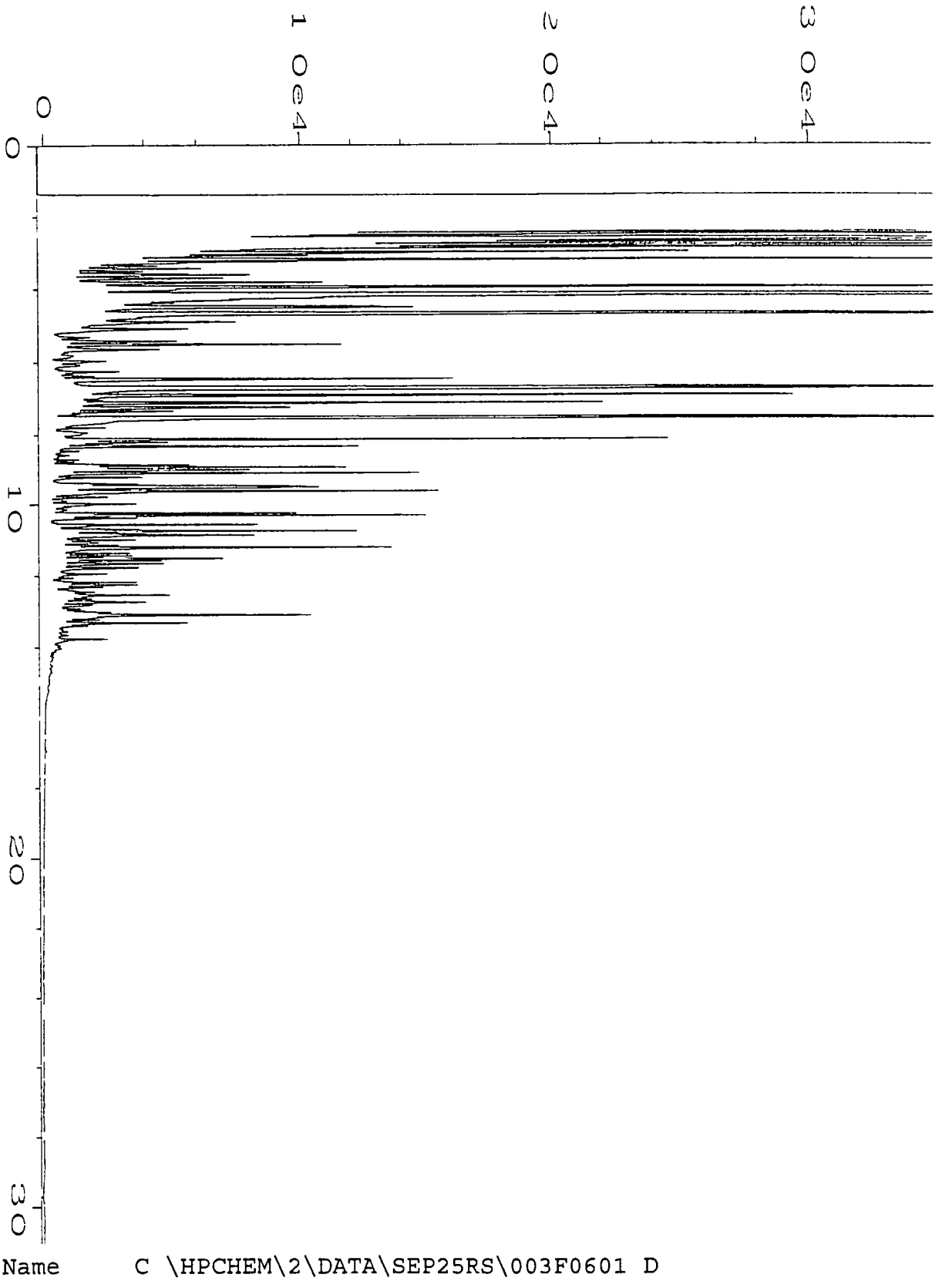
Data File Name	C \HPCHEM\2\DATA\SEP25RS3\035F0401 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	35
Sample Name	96-54899	Injection Number	1
P ⁻ Time Bar Code		Sequence Line	4
A quired on	26 Sep 96 03 55 PM	Instrument Method	TEHSOIL2 MTH
Report Created on	27 Sep 96 09 01 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 07 15 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



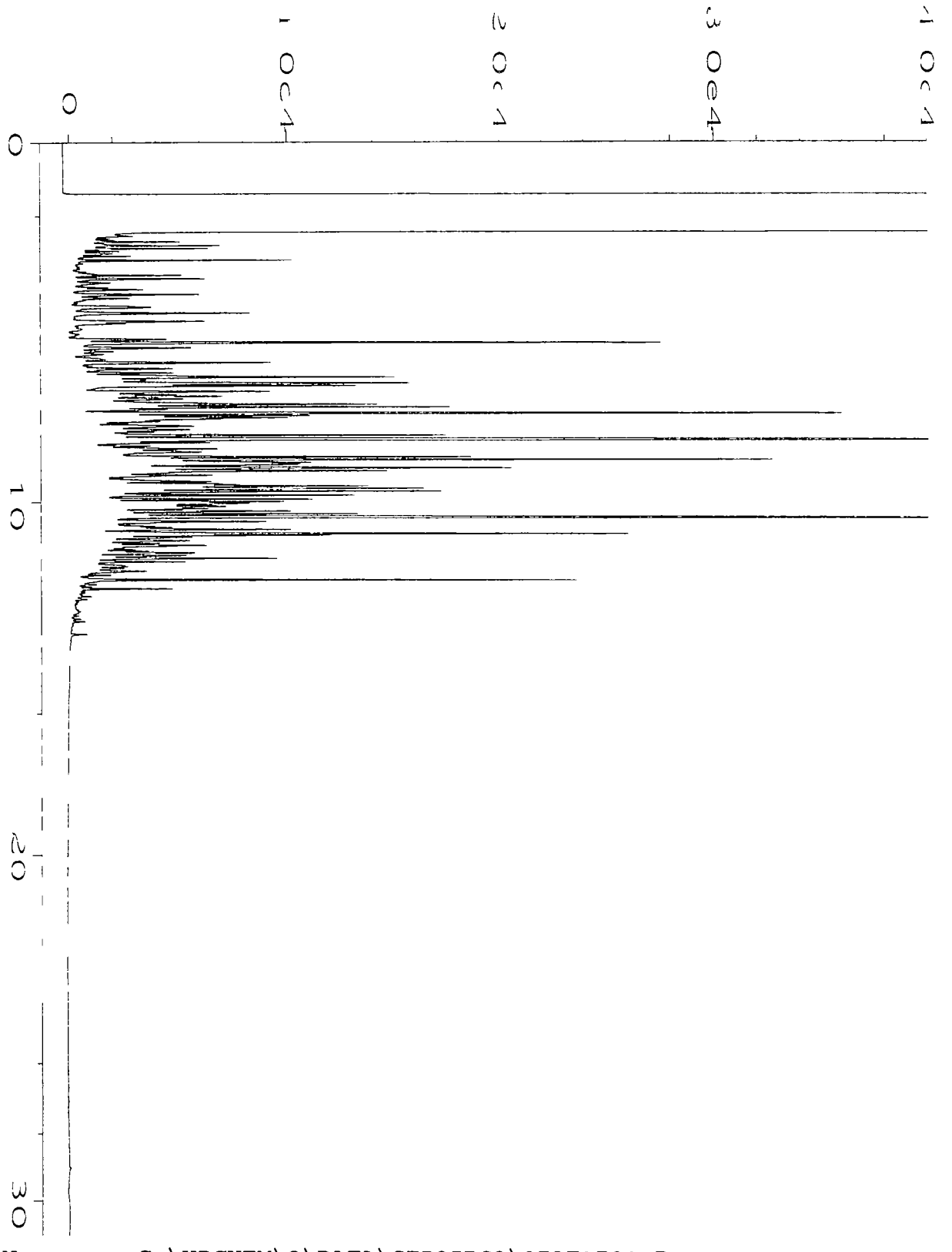
Data File Name	C \HPCHEM\2\DATA\SEP25RS3\037F0401 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	37
Sample Name	96-54901	Injection Number	1
P ⁻ Time Bar Code		Sequence Line	4
A quired on	26 Sep 96 05 16 PM	Instrument Method	TEHSOIL2 MTH
Report Created on	27 Sep 96 09 03 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 07 15 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



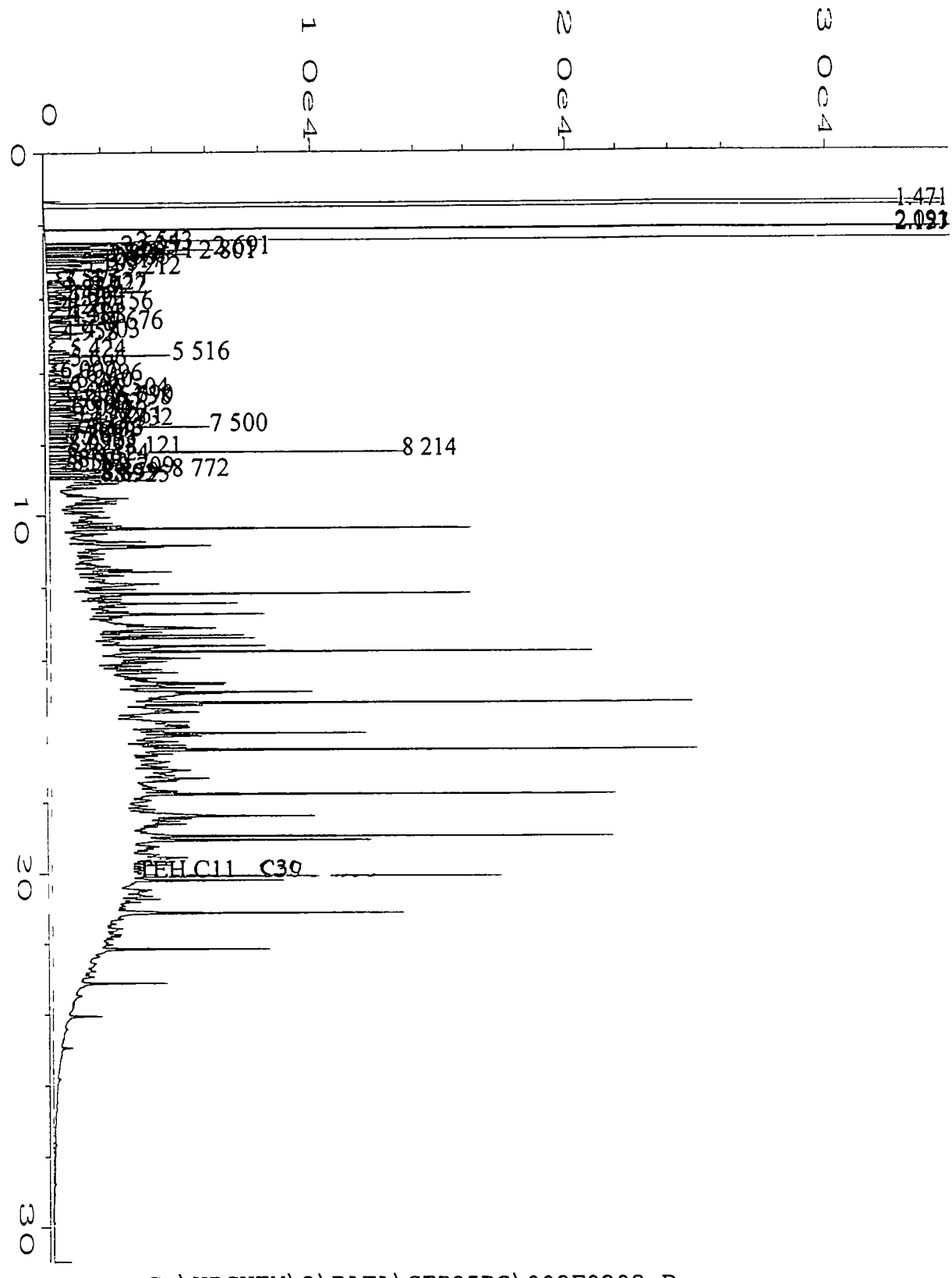
Data File Name	C \HPCHEM\2\DATA\SEP25RS3\052F1401 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	52
Sample Name	96-54905	Injection Number	1
F Time Bar Code		Sequence Line	14
Acquired on	27 Sep 96 09 29 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	27 Sep 96 10 37 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 07 15 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



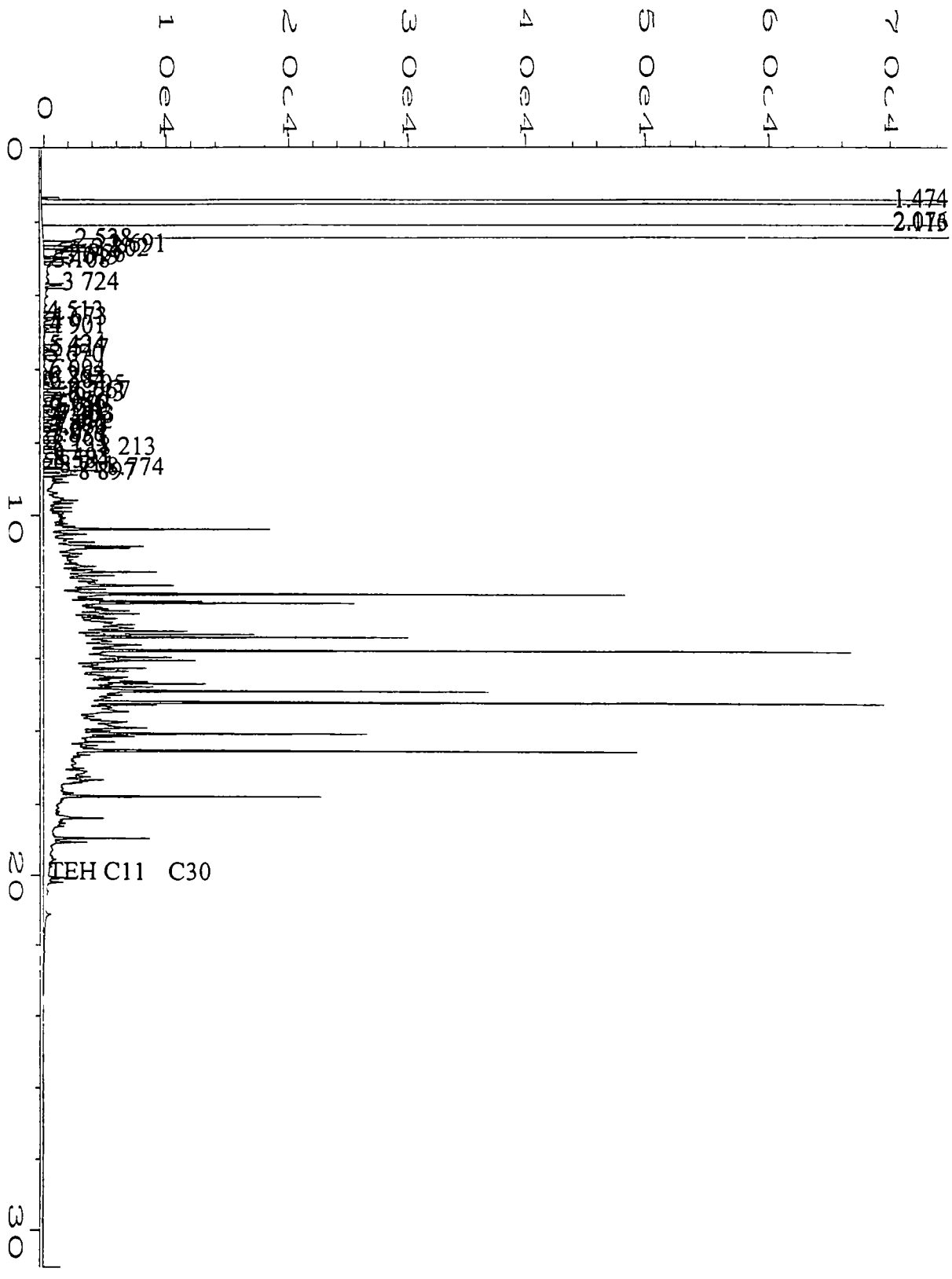
Data File Name	C \HPCHEM\2\DATA\SEP25RS\003F0601 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	3
Sample Name	Gas Qual Std	Injection Number	1
Ret Time Bar Code		Sequence Line	6
Acquired on	25 Sep 96 02 21 PM	Instrument Method	TEHSOIL2 MTH
Report Created on	26 Sep 96 07 24 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 07 15 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



Data File Name	C \HPCHEM\2\DATA\SEP25RS3\073F1701 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	73
Sample Name	Varsol qual std	Injection Number	1
Run Time Bar Code		Sequence Line	17
Acquired on	27 Sep 96 02 53 PM	Instrument Method	TEHSOIL2 MTH
Report Created on	27 Sep 96 03 41 PM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 07 15 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



Data File Name	C \HPCHEM\2\DATA\SEP25RS\002F0202 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	2
Sample Name	diesel std	Injection Number	2
R' Time Bar Code		Sequence Line	2
Acquired on	25 Sep 96 11 00 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	25 Sep 96 07 24 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 07 15 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



Data File Name	C \HPCHEM\2\DATA\SEP25RS\100F0401 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	100
Sample Name	kerosene std	Injection Number	1
Run Time Bar Code		Sequence Line	4
Acquired on	25 Sep 96 01 00 PM	Instrument Method	TEHSOIL2 MTH
Report Created on	26 Sep 96 07 26 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 07 15 AM	Sample Amount	0
Multiplier	1	ISTD Amount	

Method File : C:\STAR\MODU[illegible]\ABTX3[illegible].MTH
Sample ID : 40 ppb btex [illegible]

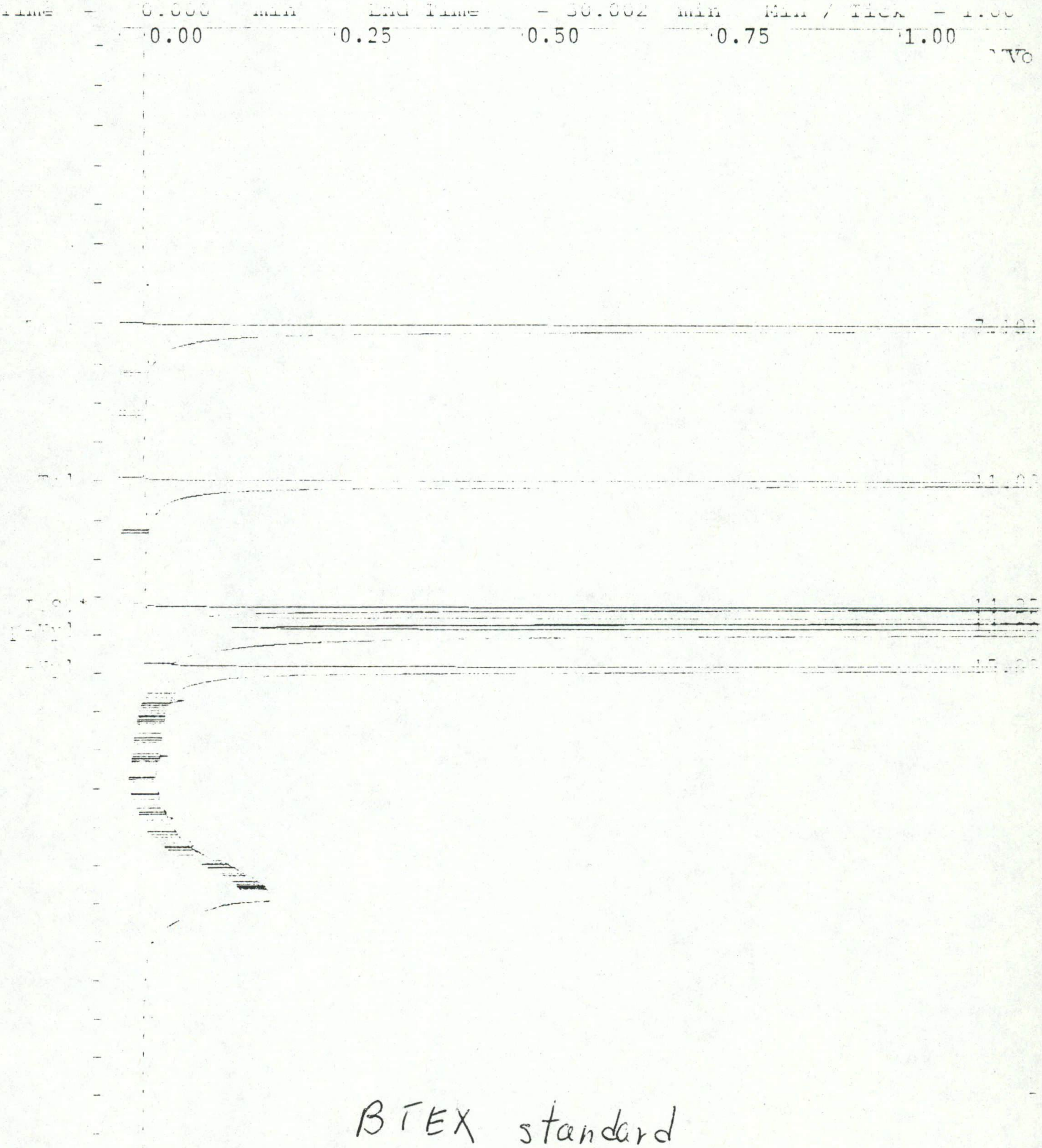
[illegible]

Operator : T. Jillette
Workstation: GCDATA
[illegible]
Channel : A - FID Range 10

Detector Type: ADCB (10 Volts)
Bus Address : 16
[illegible]
Run Time : 30.002 min

********** Star Chromatography Software ********** Version 4.01 *************

Chart Speed = 0.70 cm/min Attenuation = [illegible] Zero Offset = [illegible]
Start Time = 0.000 min End Time = 30.002 min Min / Tick = 1.00



BTEX standard

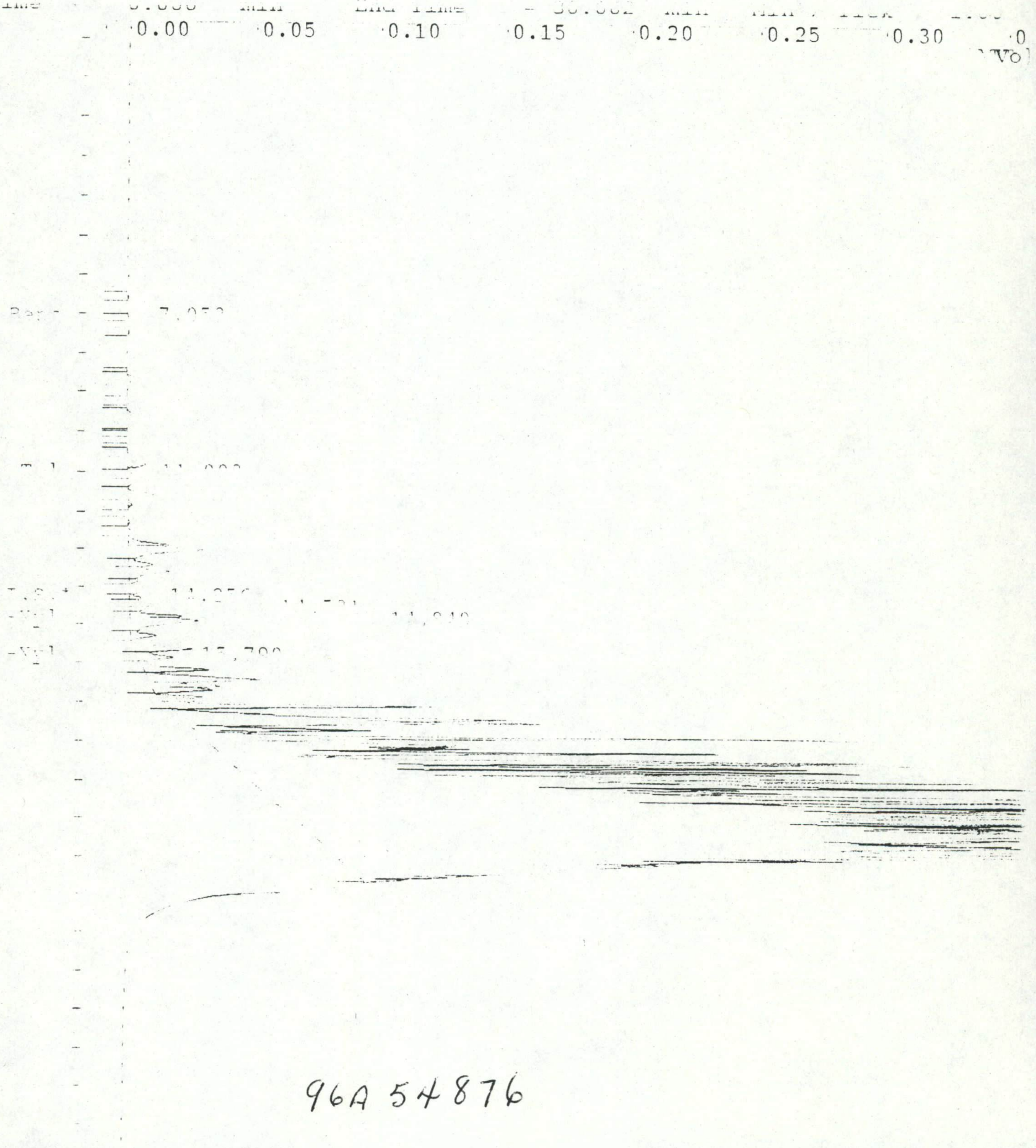
[illegible] : [illegible] TEK - [illegible] AND [illegible] GC/FID
Run File : C:\STAR\MODU[illegible]\[illegible].RUN
Method File : C:\STAR\MODULE16\ABTX3ETL.MTH
Sample ID : 96-A54876

Injection Date: 1-OCT-[illegible] 1:47 [illegible]   Calculation Date: [illegible]

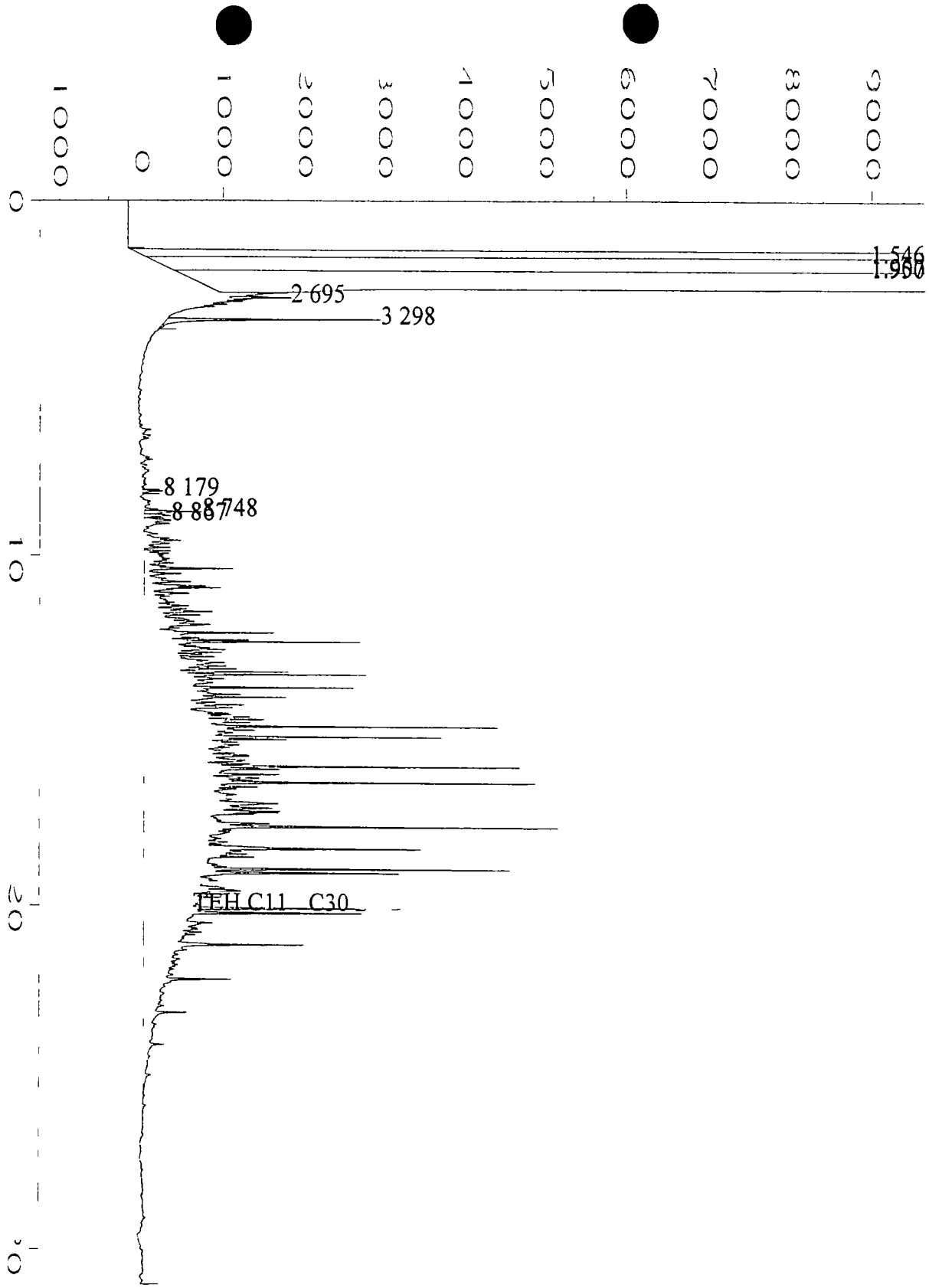
Operator : T. Jillette   Detector Type: ADCB (10 Volts)
Workstation: GCDATA   Bus Address : 16
[illegible] : [illegible] T[illegible]   Sample Rate : 10.[illegible]
Channel : A = FID Range 10   Run Time : 30.002 min

*********** Star Chromatography Software ********** Version 4.[illegible] **************

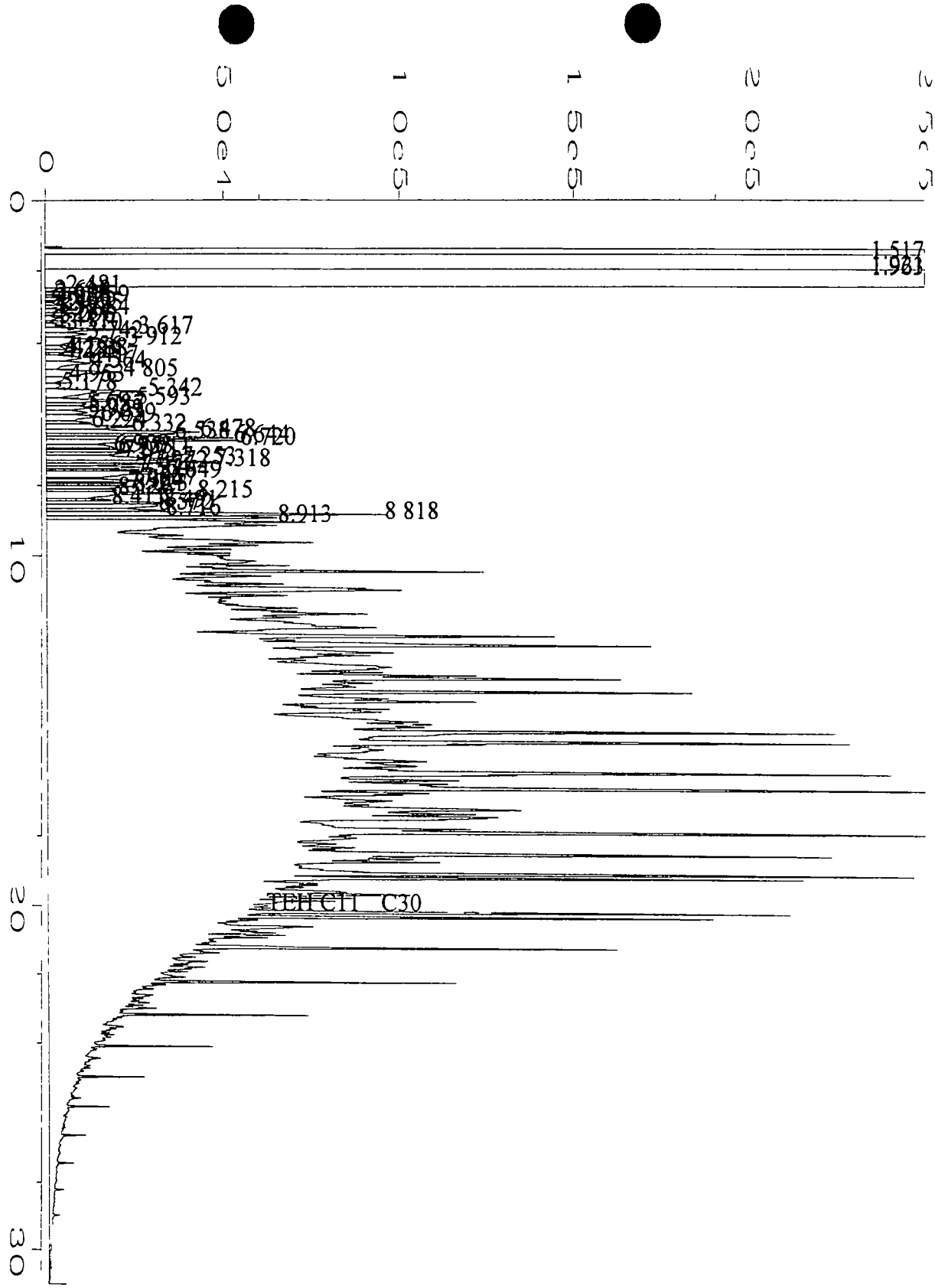
[illegible] Speed = [illegible].70 [illegible] Attenuation = [illegible]
Start Time = 0.000 min   End Time = 30.002 min   Min / Tick = [illegible]



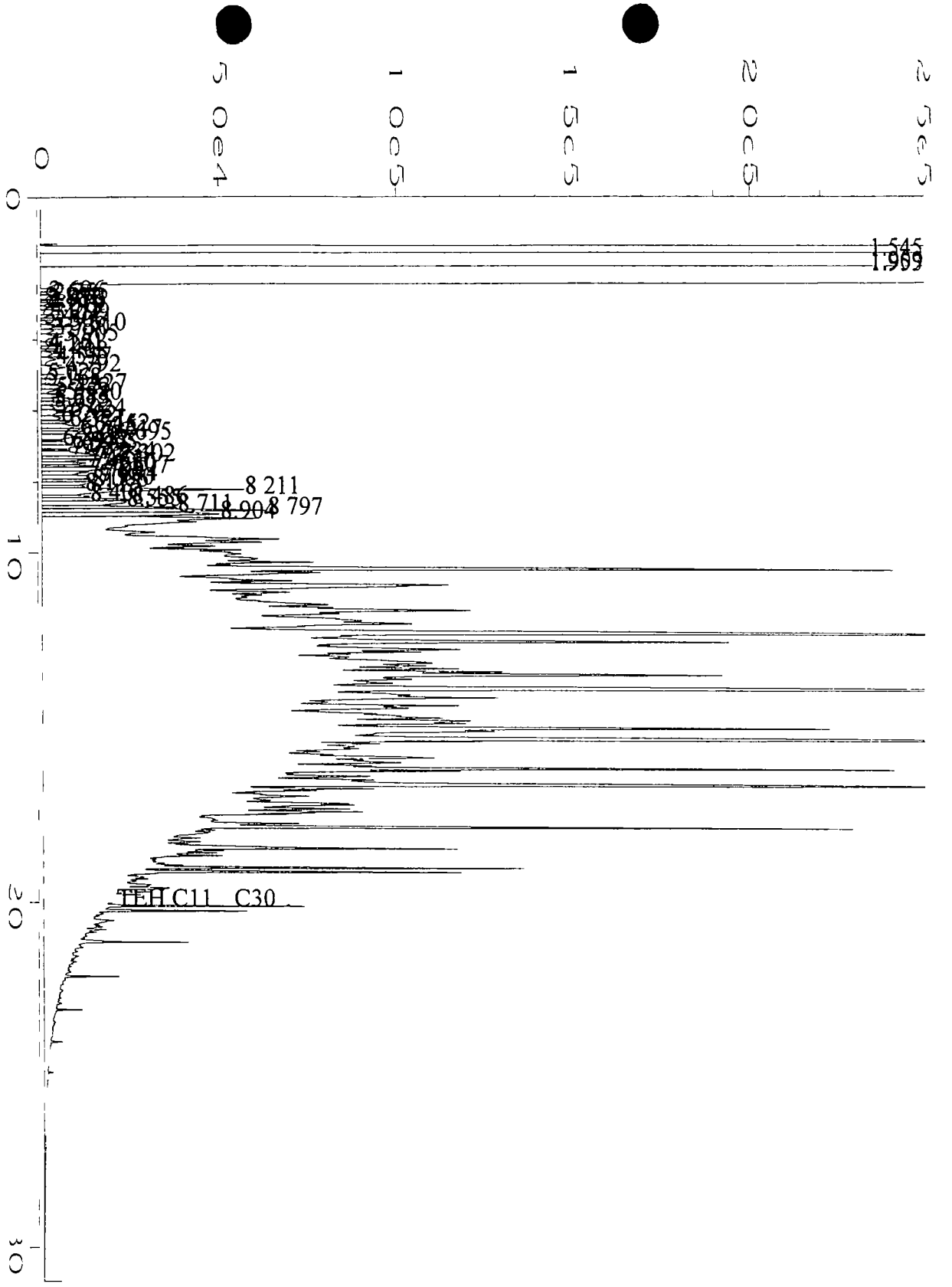
96A 54876



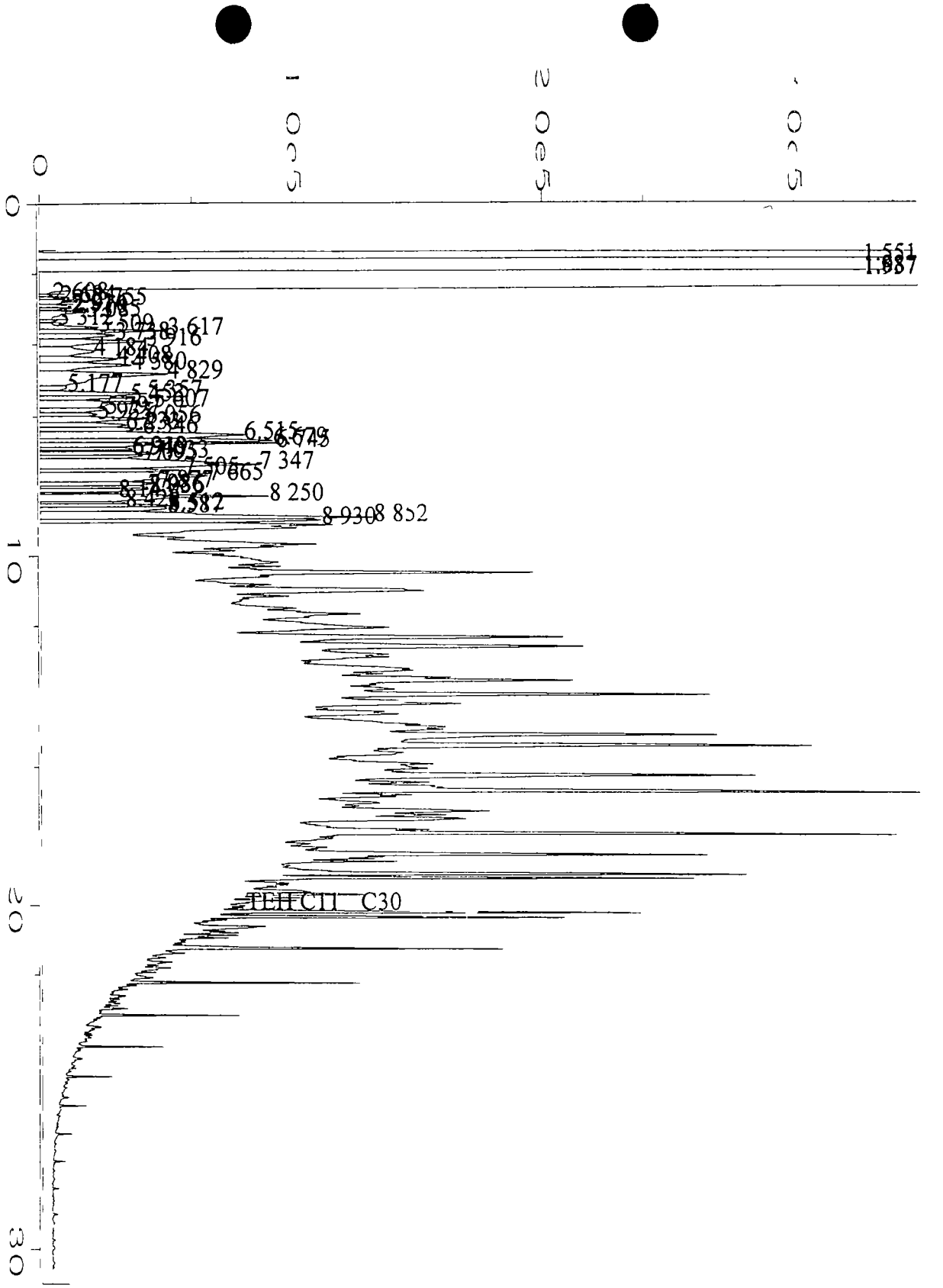
Data File Name	C \HPCHEM\2\DATA\sep24rs\014F1301 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	14
Sample Name	96-54882	Injection Number	1
Run Time Bar Code		Sequence Line	13
Acquired on	24 Sep 96 03 32 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	25 Sep 96 07 05 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 06 53 AM	Sample Amount	2448 94
Multiplier	10	ISTD Amount	
Sample Info	MB Hydro - CB-004-2 28-2 85		



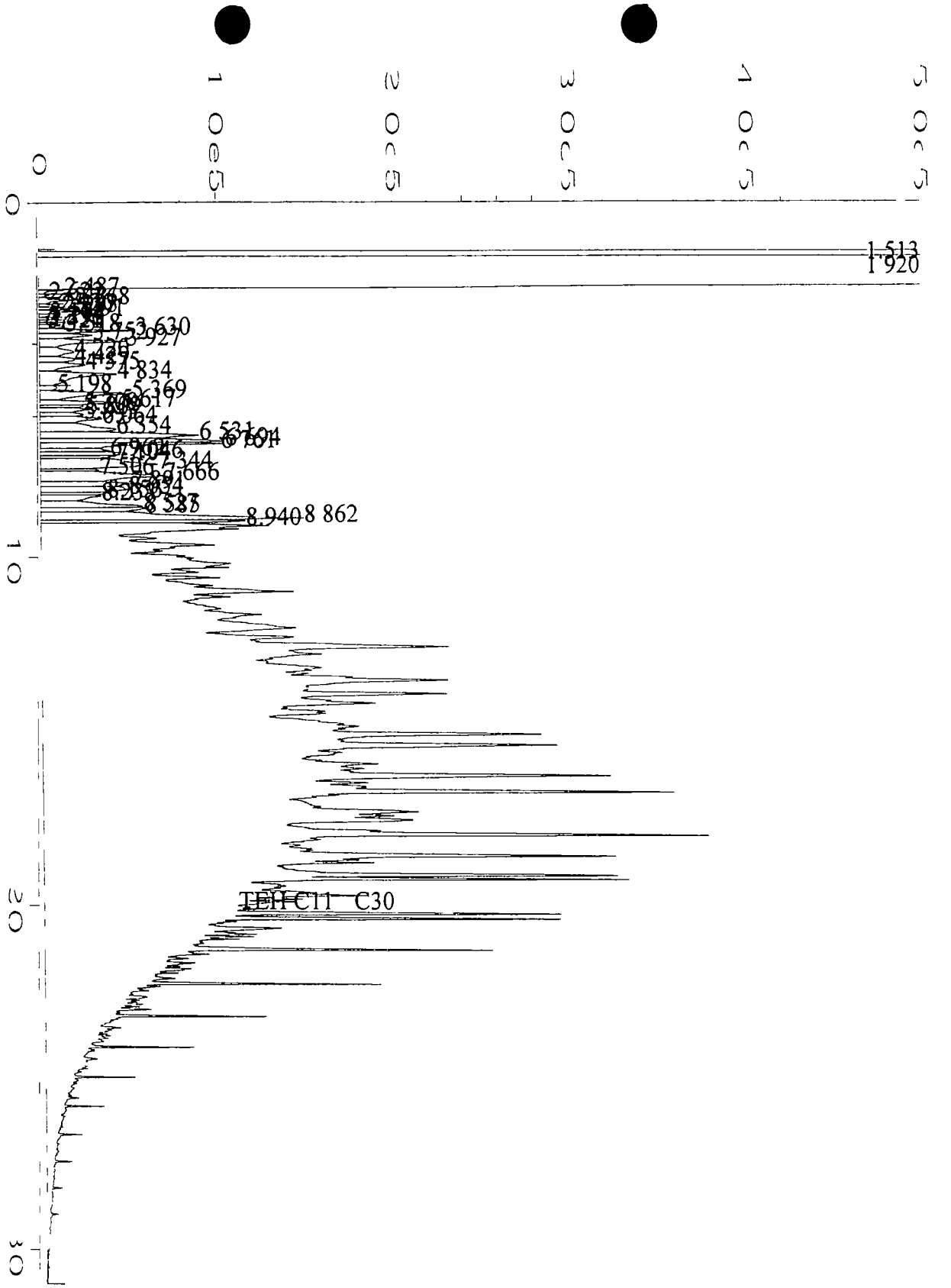
Data File Name	C \HPCHEM\2\DATA\SEP24RS\015F1301 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	15
Sample Name	96-54883	Injection Number	1
Run Time Bar Code		Sequence Line	13
Acquired on	24 Sep 96 04 12 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	25 Sep 96 11 13 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 06 53 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



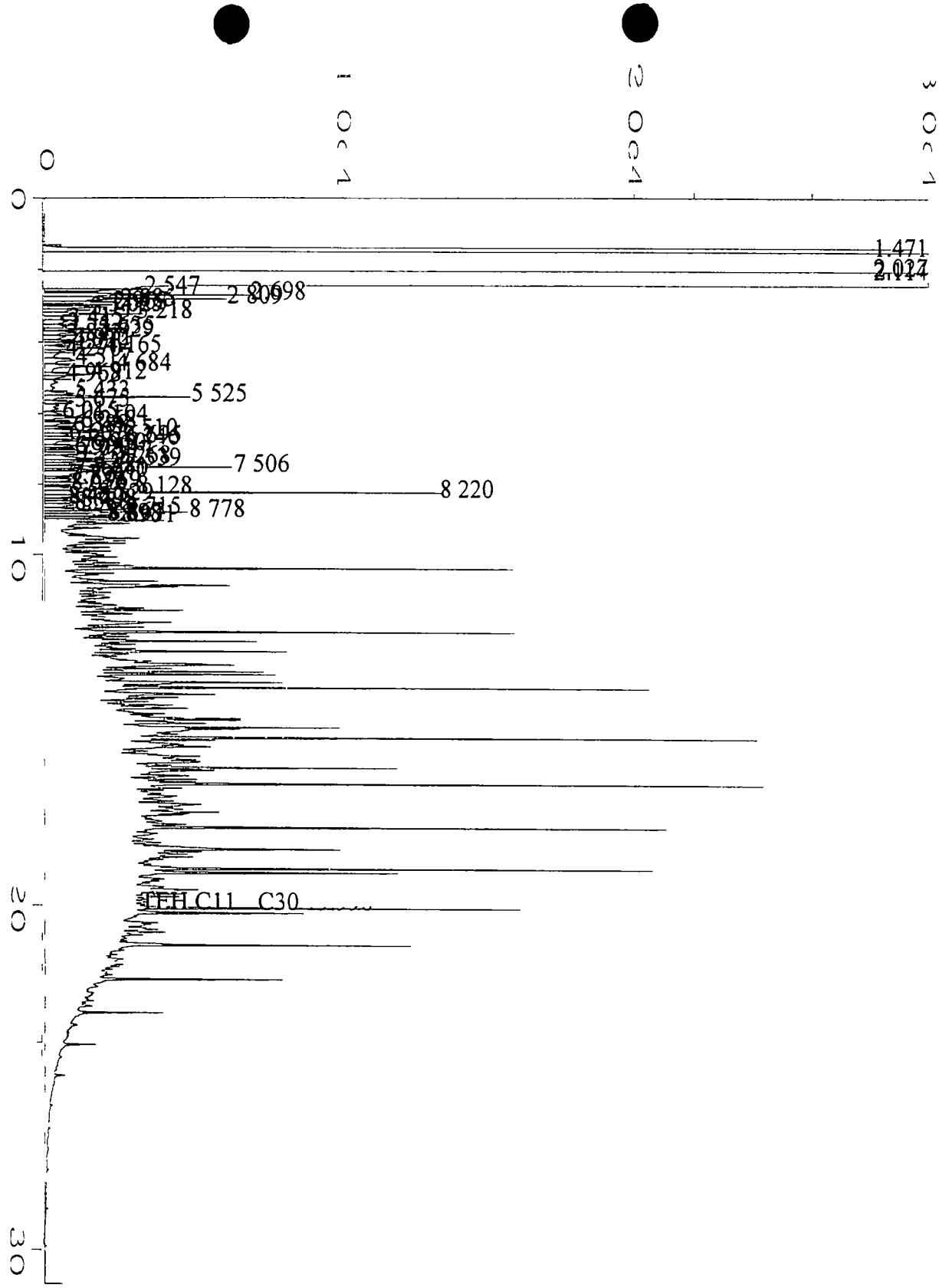
Data File Name	C \HPCHEM\2\DATA\SEP24RS\017F1301 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	17
Sample Name	96-54885	Injection Number	1
Run Time Bar Code		Sequence Line	13
Acquired on	24 Sep 96 05 31 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	25 Sep 96 11 15 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 06 53 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



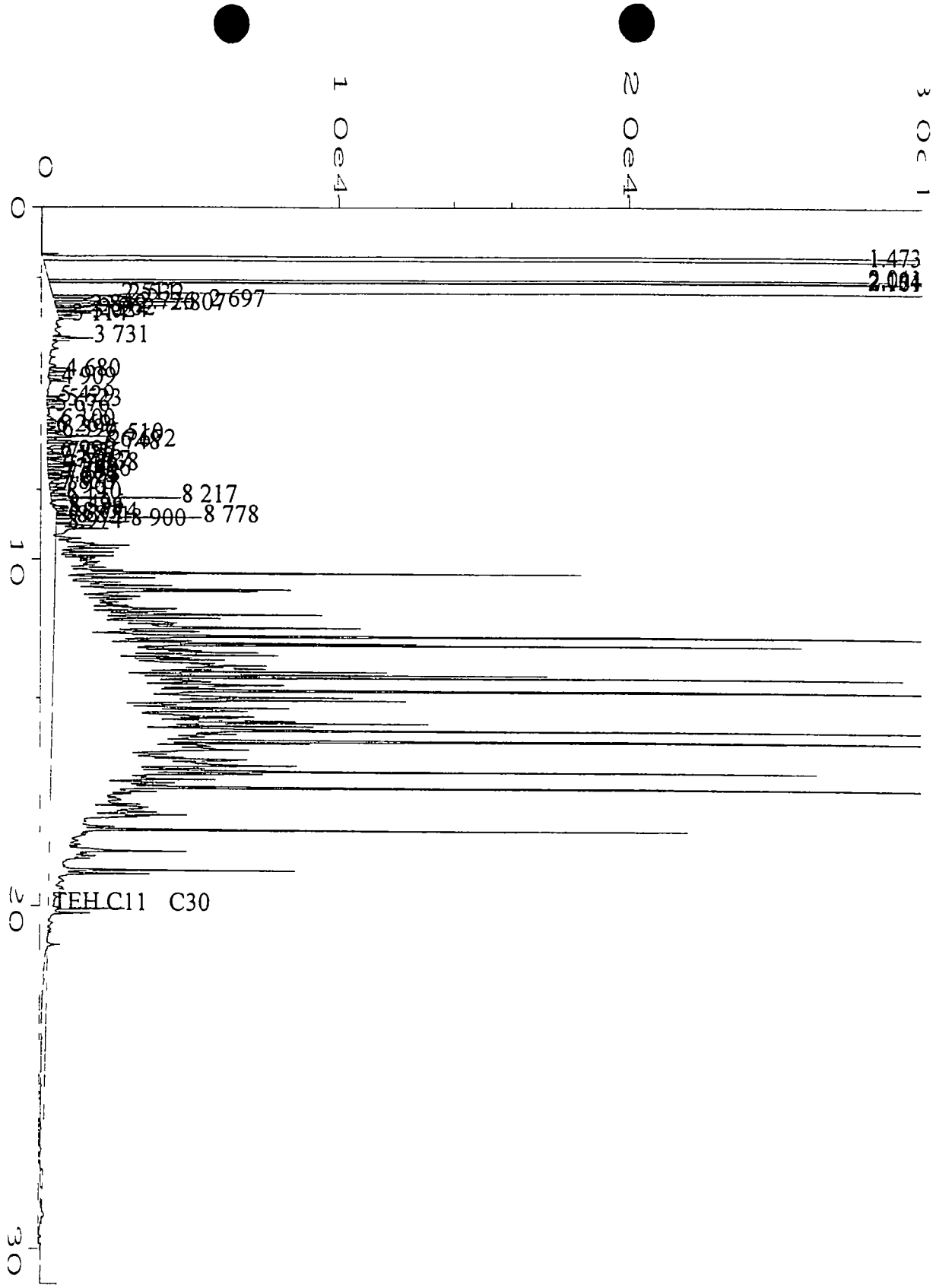
Data File Name	C \HPCHEM\2\DATA\sep24rs\018F1301 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	18
Sample Name	96-54886	Injection Number	1
Run Time Bar Code		Sequence Line	13
Acquired on	24 Sep 96 06 11 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	25 Sep 96 07 36 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 06 53 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



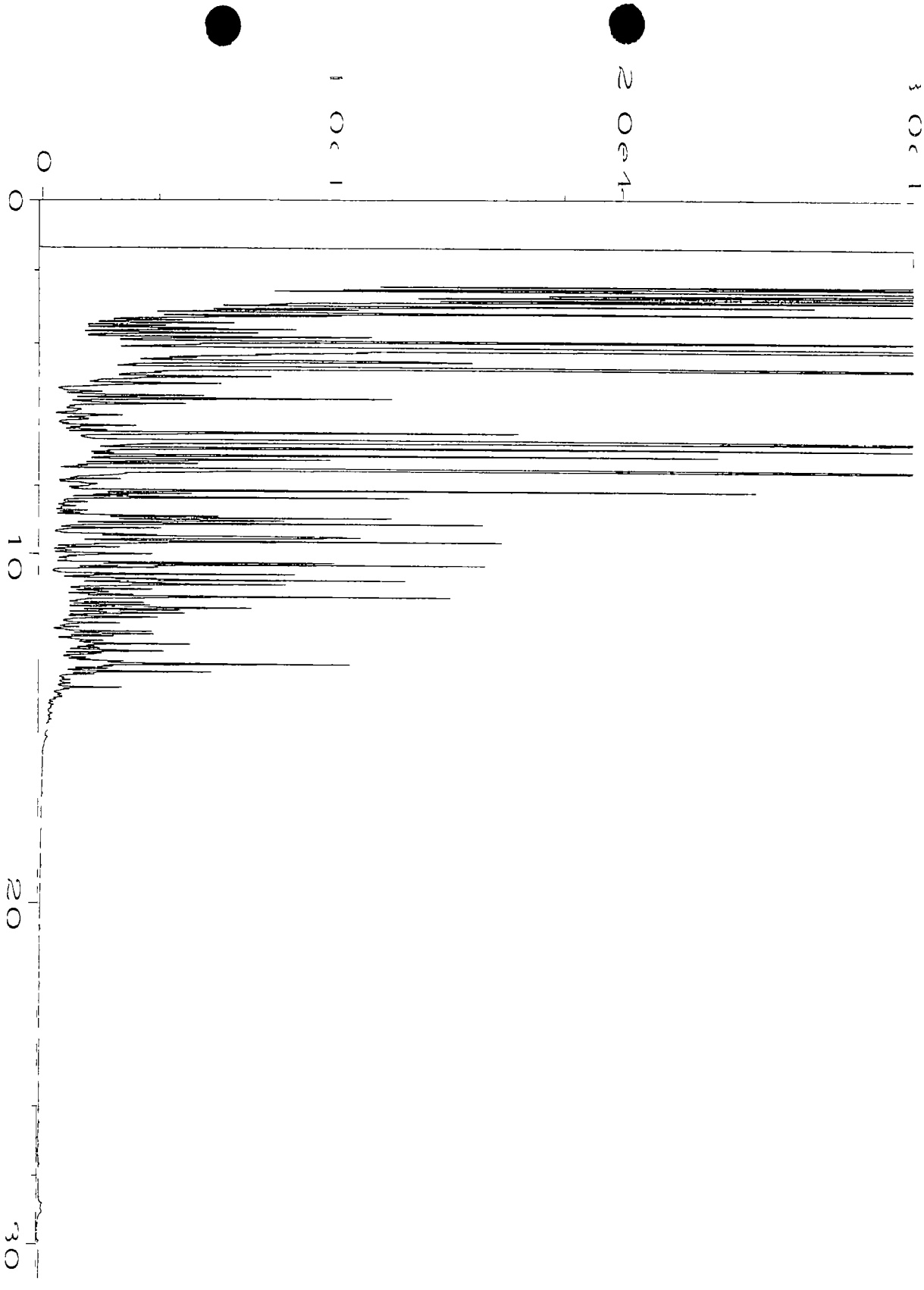
Data File Name	C \HPCHEM\2\DATA\SEP24RS\020F1301 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	20
Sample Name	96-54888	Injection Number	1
Run Time Bar Code		Sequence Line	13
Acquired on	25 Sep 96 07 31 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	25 Sep 96 11 18 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 06 53 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



Data File Name	C \HPCHEM\2\DATA\SEP24RS\002F0202 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	2
Sample Name	diesel std	Injection Number	2
Run Time Bar Code		Sequence Line	2
Acquired on	24 Sep 96 10 39 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	25 Sep 96 09 15 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 06 53 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



Data File Name	C \HPCHEM\2\DATA\sep24rs\100F0301 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	100
Sample Name	kerosene std	Injection Number	1
Run Time Bar Code		Sequence Line	3
quired on	24 Sep 96 11 19 AM	Instrument Method	TEHSOIL2 MTH
eport Created on	25 Sep 96 09 14 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 06 53 AM	Sample Amount	0
Multiplier	1	ISTD Amount	



Data File Name	C \HPCHEM\2\DATA\SEP24RS\003F0501 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	3
Sample Name	Gas Qual Std	Injection Number	1
Run Time Bar Code		Sequence Line	5
quired on	24 Sep 96 12 39 PM	Instrument Method	TEHSOIL2 MTH
eport Created on	25 Sep 96 09 16 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 06 53 AM	Sample Amount	0
Multiplier	1	ISTD Amount	

ETL **EnviroTest** MTC

LABORATORIES

Manitoba Technology Centre Ltd

Fax & Mail

CHEMICAL ANALYSIS REPORT

Manitoba Hydro Geotechnical Dept
1100 Waverly St
Winnipeg MB R3T 3X9

DATE October 1 1996

ATTN REYNOLDS W

Lab Work Order #	W960906056	Sampled By	Manitoba Hydro
Project Reference	Cranberry Portage		
Project P O #	S-451-9501	Date Received	96/ 9/25

Comments

APPROVED BY *Paul Nicolas*

Paul Nicolas
Project Manager

ACCREDITATIONS STANDARDS COUNCIL OF CANADA (SCC) IN COOPERATION WITH THE CANADIAN ASSOCIATION FOR ENVIRONMENTAL ANALYTICAL LABORATORIES (CAEAL) FOR SPECIFIC TESTS AS REGISTERED BY THE COUNCIL (EDMONTON CALGARY WINNIPEG)
AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA) FOR INDUSTRIAL HYGIENE ANALYSIS (EDMONTON WINNIPEG)
AGRICULTURE CANADA UNDER THE CANADIAN FERTILIZER QUALITY ASSURANCE PROGRAM (SASKATOON)

74- Logan A ... • Phone (204) 945 3705 • Fax 20... • Toll Free 1 800 6... 7555

ENVIRO - TEST CHEMICAL ANALYSIS REPORT

LAB ID SAMPLE ID TEST DESCRIPTION	RESULT	D L	UNITS	EXTRACTED	ANALYZED	BY
96 A55671 CB 018 5 60 6 10 Manitoba Hydro Geotechnical Dept Sample Type Soil Collected 96/ 9/22						
Other Analysis ALL ANALYTES WERE DELETED	Submitted o	960923				
96 A55672 CB 019 8 35 8 80 Manitoba Hydro Geotechnical Dept Sample Type Soil Collected 96/ 9/23						
Chromatography						
Moisture Content	4 09	< 0 01	%		96/ 9/27	RMS
Hydrocarbons Total Ext	1000	< 0 50	mg/Kg DWt*		96/ 9/27	RMS
96 A55673 CB 019 10 35 10 65 Manitoba Hydro Geotechnical Dept Sample Type Soil Collected 96/ 9/23						
Chromatography						
Moisture Content	14 87	< 0 01	%		96/ 9/27	RMS
Hydrocarbons Total Ext	< 0 50	< 0 50	mg/Kg DWt*		96/ 9/26	RMS
96 A55674 CB 020 3 42 3 80 Manitoba Hydro Geotechnical Dept Sample Type Soil Collected 96/ 9/23						
Chromatography						
Moisture Content	3 15	< 0 01	%		96/ 9/27	RMS
Hydrocarbons Total Ext	11	< 0 50	mg/Kg DWt*		96/ 9/26	RMS
96 A55675 CB 022 3 42 3 80 Manitoba Hydro Geotechnical Dept Sample Type Soil Collected 96/ 9/23						

ENVIRO - TEST CHEMICAL ANALYSIS REPORT

LAB ID SAMPLE ID TEST DESCRIPTION	RESULT	D L	UNITS	EXTRACTED	ANALYZED	BY
Chromatography						
Moisture Content	6 30	< 0 01	%		96/ 9/27	RMS
Hydrocarbons Total Ext	11	< 0 50	mg/Kg DWt*		96/ 9/26	RMS
96 A55676						
CB 024 3 40 3 75						
Manitoba Hydro Geotechnical Dept						
Sample Type Soil						
Collected 96/ 9/24						
Chromatography						
Moisture Content	5 06	< 0 01	%		96/ 9/27	RMS
Hydrocarbons Total Ext	13	< 0 50	mg/Kg DWt*		96/ 9/26	RMS

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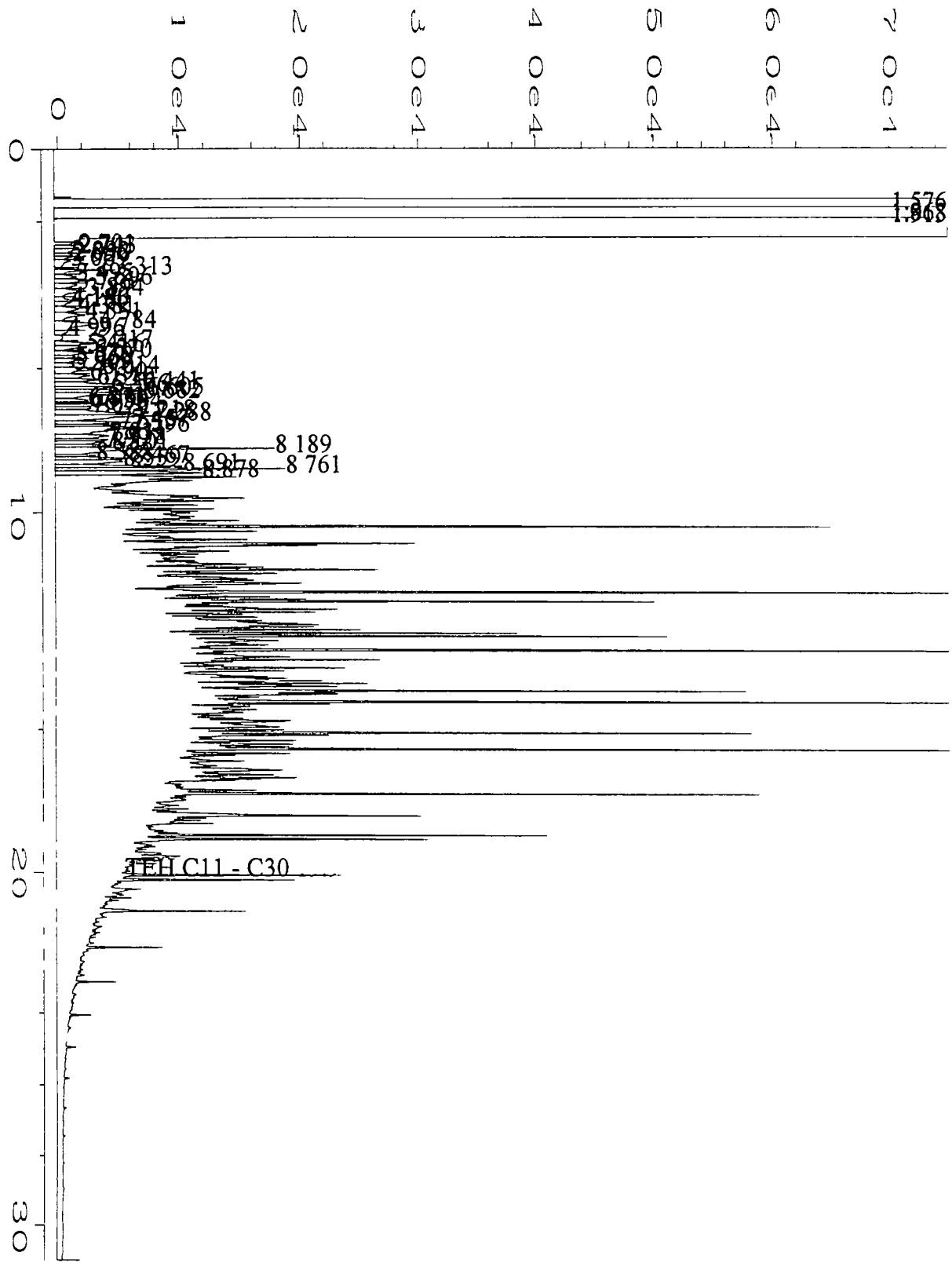

Data File Name	C \HPCHEM\2\DATA\SEP25RS3\064F1301 D		
Operator	RENA STIEBEN	Page Number	1
Instrument	INSTRUMEN	Vial Number	64
Sample Name	96-55672	Injection Number	1
P ¬ Time Bar Code		Sequence Line	13
Acquired on	27 Sep 96 08 08 AM	Instrument Method	TEHSOIL2 MTH
Report Created on	27 Sep 96 10 55 AM	Analysis Method	TEHSOIL2 MTH
Last Recalib on	25 SEP 96 07 15 AM	Sample Amount	0
Multiplier	1	ISTD Amount	

ETL Enviro-Test MTC
LABORATORIES
Manitoba Technology Centre Ltd

Fax & Mail

CHEMICAL ANALYSIS REPORT

Manitoba Hydro Geotechnical Dept
1100 Waverly St
Winnipeg MB R3T 3X9

DATE October 1 1996

ATTN REYNOLDS B

Lab Work Order # w960906056 Sampled By Manitoba Hydro

Project Reference Cranberry Portage

Project P O # S-451-9501 Date Received 96/ 9/25

Comments

APPROVED BY Paul Nicolas

Paul Nicolas
Project Manager

ACCREDITATIONS STANDARDS COUNCIL OF CANADA (SCC) IN COOPERATION WITH THE CANADIAN ASSOCIATION FOR ENVIRONMENTAL ANALYTICAL LABORATORIES (CAEAL) FOR SPECIFIC TESTS AS REGISTERED BY THE COUNCIL (EDMONTON CALGARY WINNIPEG)
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• Fax (204) 945 0763 • Toll Free 1 800 667 755

ENVIRO - TEST CHEMICAL ANALYSIS REPORT

LAB ID SAMPLE ID TEST DESCRIPTION	RESULT	D L	UNITS	EXTRACTED	ANALYZED	BY
96 A55677 CB 008U Manitoba Hydro Geotechnical Dept Sample Type Water Collected 96/ 9/24						
Chromatography						
Hydrocarbons Volatile T	160	< 100	ug/L		96/ 9/27	TJJ
Xylene meta and para	13	< 0 5	ug/L		96/ 9/27	TJJ
Xylene O	16	< 0 5	ug/L		96/ 9/27	TJJ
Toluene	2 2	< 0 5	ug/L		96/ 9/27	TJJ
Ethyl Benzene	5 2	< 0 5	ug/L		96/ 9/27	TJJ
Benzene	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
SAMPLE COMMENT (ORGANIC)						
BTEX and total purgeable hydrocarbon analysis b	purge & trap	C/P ID/FI				
96 A55678 CB 008P Manitoba Hydro Geotechnical Dept Sample Type Water Collected 96/ 9/24						
Chromatography						
Hydrocarbons Volatile T	140	< 100	ug/L		96/ 9/27	TJJ
Xylene meta and para	12	< 0 5	ug/L		96/ 9/27	TJJ
Xylene O	15	< 0 5	ug/L		96/ 9/27	TJJ
Toluene	1 9	< 0 5	ug/L		96/ 9/27	TJJ
Ethyl Benzene	4 6	< 0 5	ug/L		96/ 9/27	TJJ
Benzene	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
SAMPLE COMMENT (ORGANIC)						
BTEX and total purgeable hydrocarbon analysis b	purge & trap	C/P ID/FI				
96 A55679 CB 001 Manitoba Hydro Geotechnical Dept Sample Type Water Collected 96/ 9/24						
Chromatography						
Hydrocarbons Volatile T	180	< 100	ug/L		96/ 9/27	TJJ
Xylene meta and para	12	< 0 5	ug/L		96/ 9/27	TJJ
Xylene O	14	< 0 5	ug/L		96/ 9/27	TJJ
Toluene	0 7	< 0 5	ug/L		96/ 9/27	TJJ
Ethyl Benzene	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ

ENVIRO - TEST CHEMICAL ANALYSIS REPORT

LAB ID SAMPLE ID TEST DESCRIPTION	RESULT	D L	UNITS	EXTRACTED	ANALYZED	BY
Benzene	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
SAMPLE COMMENT (ORGANIC)						
BTEX and total purgeable hydrocarbon analysis b	purge & trap	C/P ID/FI				
96 A55680						
CB 024						
Manitoba Hydro Geotechnical Dept						
Sample Type Water						
Collected 96/ 9/24						
Chromatography						
Hydrocarbons Volatile T	< 100	< 100	ug/L		96/ 9/27	TJJ
Xylene meta and para	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
Xylene O	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
Toluene	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
Ethyl Benzene	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
Benzene	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
SAMPLE COMMENT (ORGANIC)						
BTEX and total purgeable hydrocarbon analysis b	purge & trap	C/P ID/FI				
96 A55681						
CB 021U						
Manitoba Hydro Geotechnical Dept						
Sample Type Water						
Collected 96/ 9/24						
Chromatography						
Hydrocarbons Volatile T	< 100	< 100	ug/L		96/ 9/27	TJJ
Xylene meta and para	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
Xylene O	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
Toluene	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
Ethyl Benzene	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
Benzene	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
SAMPLE COMMENT (ORGANIC)						
BTEX and total purgeable hydrocarbon analysis b	purge & trap	C/P ID/FI				
96 A55682						
CB 021P						
Manitoba Hydro Geotechnical Dept						
Sample Type Water						
Collected 96/ 9/24						

ENVIRO - TEST CHEMICAL ANALYSIS REPORT

LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D L	UNITS	EXTRACTED	ANALYZED	BY
		Chromatography						
		Hydrocarbons Volatile T	< 100	< 100	ug/L		96/ 9/27	TJJ
		Xylene meta and para	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
		Xylene O	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
		Toluene	0 5	< 0 5	ug/L		96/ 9/27	TJJ
		Ethyl Benzene	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
		Benzene	< 0 5	< 0 5	ug/L		96/ 9/27	TJJ
		SAMPLE COMMENT (ORGANIC)						
BTEX and total purgeable hydrocarbon analysis b			purge & trap	C/P ID/FI				

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ETL Enviro-Test MTC
LABORATORIES
Manitoba Technology Centre Ltd

Reynolds B
Manitoba Hydro-Geotechnical Dept
1100 Waverly St
Winnipeg MB R3T 3X9

Date Received 96/10/ 7
Date Reported 96/10/30
Work Order W961006838

Submitted By Reynolds B
COPIES TO Paul Nicolas

	Results	Units	Date Analysed
96-B57939			
Sample I D As attached Location Cranberry Portage Date Sampled 96/10/ 7 Time Sampled 15 04			
Miscellaneous Analysis	See Attached		96/10/30

LAB COMMENT

Manitoba Hydro Bill Reynolds Sublet sent to Edmonton
for PAH's in soil and water 96/10/07dmz

Approved By Paul Nicolas Date 96/10/30

ENVIRO-TEST CHEMICAL ANALYSIS REPORT ATTACHMENT

LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D L	UNITS	EXTRACTED	ANALYZED	BY
96 8 5793	CB-001							
Sample Type WATER								
Collected 09/24/96 10 00								
								EDM
		PAH In Water						EDM
		Naphthalene	10	0 1	ug/L (ppb)	10/17/96	10/20/96	EDM
		Methyl naphthalenes	26	0 1	ug/L (ppb)	10/17/96	10/20/96	EDM
		Acenaphthylene	N D	0 1	ug/L (ppb)	10/17/96	10/20/96	EDM
		Acenaphthene	N D	0 1	ug/L (ppb)	10/17/96	10/20/96	EDM
		Fluorene	3 9	0 1	ug/L (ppb)	10/17/96	10/20/96	EDM
		Phenanthrene/Anthracene	3 1	0 1	ug/L (ppb)	10/17/96	10/20/96	EDM
		Fluoranthene	N D	0 1	ug/L (ppb)	10/17/96	10/20/96	EDM
		Pyrene	0 2	0 1	ug/L (ppb)	10/17/96	10/20/96	EDM
		Benzo(a)anthracene/Chrysene	N D	0 1	ug/L (ppb)	10/17/96	10/20/96	EDM
		Benzo(b or k)fluoranthene	N D	0 1	ug/L (ppb)	10/17/96	10/20/96	EDM
		Benzo(a)pyrene	N D	0 1	ug/L (ppb)	10/17/96	10/20/96	EDM
		Indeno(1 2 3 cd)pyrene	N D	0 1	ug/L (ppb)	10/17/96	10/20/96	EDM
		Dibenzo(a h)anthracene	N D	0 1	ug/L (ppb)	10/17/96	10/20/96	EDM
		Benzo(g h i)perylene	N D	0 1	ug/L (ppb)	10/17/96	10/20/96	EDM
96 54876	CB-007							
Sample Type WATER								
Collected 09/21/96								
								EDM
		PAH in Water						EDM
		Naphthalene	23000	100	ug/L (ppb)	10/17/96	10/24/96	EDM
		Methyl naphthalenes	140000	100	ug/L (ppb)	10/17/96	10/24/96	EDM
		Acenaphthylene	2000	100	ug/L (ppb)	10/17/96	10/24/96	EDM
		Acenaphthene	5200	100	ug/L (ppb)	10/17/96	10/24/96	EDM
		Fluorene	14000	100	ug/L (ppb)	10/17/96	10/24/96	EDM
		Phenanthrene/Anthracene	8300	100	ug/L (ppb)	10/17/96	10/24/96	EDM
		Fluoranthene	210	100	ug/L (ppb)	10/17/96	10/24/96	EDM
		Pyrene	470	100	ug/L (ppb)	10/17/96	10/24/96	EDM
		Benzo(a)anthracene/Chrysene	330	100	ug/L (ppb)	10/17/96	10/24/96	EDM
		Benzo(b or k)fluoranthene	N D	100	ug/L (ppb)	10/17/96	10/24/96	EDM
		Benzo(a)pyrene	N D	100	ug/L (ppb)	10/17/96	10/24/96	EDM
		Indeno(1 2 3 cd)pyrene	N D	100	ug/L (ppb)	10/17/96	10/24/96	EDM
		Dibenzo(a h)anthracene	N D	100	ug/L (ppb)	10/17/96	10/24/96	EDM
		Benzo(g h i)perylene	N D	100	ug/L (ppb)	10/17/96	10/24/96	EDM
96 54877	CB 001 4 70 5 10							
Sample Type SOIL								
Collected 09/19/96								
								EDM
		PAH in Solid Samples						EDM
		Naphthalene	1 2	0 5	ug/g (ppm)	10/21/96	10/23/96	EDM
		Methyl naphthalenes	8 5	0 5	ug/g (ppm)	10/21/96	10/23/96	EDM
		Acenaphthylene	N D	0 5	ug/g (ppm)	10/21/96	10/23/96	EDM
		Acenaphthene	1 1	0 5	ug/g (ppm)	10/21/96	10/23/96	EDM
		Fluorene	3 2	0 5	ug/g (ppm)	10/21/96	10/23/96	EDM
		Phenanthrene/Anthracene	3 3	0 5	ug/g (ppm)	10/21/96	10/23/96	EDM
		Fluoranthene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Pyrene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Benzo(a)anthracene/Chrysene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Benzo(b or k)fluoranthene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Benzo(a)pyrene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Indeno(1 2 3 cd)pyrene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Dibenzo(a h)anthracene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Benzo(g h i)perylene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
96-54886	CB-005-3 05 3 42							
Sample Type SOIL								
Collected 09/20/96								
								EDM
		PAH in Solid Samples						EDM
		Naphthalene	0 3	0 1	ug/g (ppm)	10/21/96	10/23/96	EDM
		Methyl naphthalenes	5 2	0 1	ug/g (ppm)	10/21/96	10/23/96	EDM
		Acenaphthylene	N D	0 1	ug/g (ppm)	10/21/96	10/23/96	EDM
		Acenaphthene	N D	0 1	ug/g (ppm)	10/21/96	10/23/96	EDM
		Fluorene	0 7	0 1	ug/g (ppm)	10/21/96	10/23/96	EDM
		Phenanthrene/Anthracene	0 8	0 1	ug/g (ppm)	10/21/96	10/23/96	EDM
		Fluoranthene	N D	0 1	ug/g (ppm)	10/21/96	10/23/96	EDM
		Pyrene	N D	0 1	ug/g (ppm)	10/21/96	10/23/96	EDM
		Benzo(a)anthracene/Chrysene	N D	0 1	ug/g (ppm)	10/21/96	10/23/96	EDM
		Benzo(b or k)fluoranthene	N D	0 1	ug/g (ppm)	10/21/96	10/23/96	EDM
		Benzo(a)pyrene	N D	0 1	ug/g (ppm)	10/21/96	10/23/96	EDM
		Indeno(1 2 3 cd)pyrene	N D	0 1	ug/g (ppm)	10/21/96	10/23/96	EDM
		Dibenzo(a h)anthracene	N D	0 1	ug/g (ppm)	10/21/96	10/23/96	EDM

ENVIRO-TEST CHEMICAL ANALYSIS REPORT ATTACHMENT

LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D L	UNITS	EXTRACTED	ANALYZED	BY
96 54886	CB-005 3 05 3 42							
Sample Type:SOIL								
Collected 09/20/96								
		Benzo(g h i)perylene	N D	0 1	ug/g (ppm)	10/21/96	10/23/96	EDM
96 54888	CB 006 2 25 2 55							
Sample Type:SOIL								
Collected 09/20/96								
		PAH in Soil Samples						EDM
		Naphthalene	0 08	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Methyl naphthalenes	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Acenaphthylene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Acenaphthene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Fluorene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Phenanthrene/Anthracene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Fluoranthene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Pyrene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Benzo(a)anthracene/Chrysene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Benzo(b or k)fluoranthene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Benzo(a)pyrene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Indeno(1 2 3 cd)pyrene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Dibenzo(a h)anthracene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Benzo(g h i)perylene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
96 54899	CB-010 6 80-6 95							
Sample Type:SOIL								
Collected 09/20/96								
		PAH in Solid Samples						EDM
		Naphthalene	0 43	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Methyl naphthalenes	5 3	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Acenaphthylene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Acenaphthene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Fluorene	1 2	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Phenanthrene/Anthracene	1 0	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Fluoranthene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Pyrene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Benzo(a)anthracene/Chrysene	0 05	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Benzo(b or k)fluoranthene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Benzo(a)pyrene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Indeno(1 2 3 cd)pyrene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Dibenzo(a h)anthracene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
		Benzo(g h i)perylene	N D	0 05	ug/g (ppm)	10/21/96	10/23/96	EDM
96 54905	CB 016 1 87 2 25							
Sample Type:SOIL								
Collected 09/22/96								
		PAH in Solid Samples						EDM
		Naphthalene	N D	0 01	ug/g (ppm)	10/21/96	10/23/96	EDM
		Methyl naphthalenes	N D	0 01	ug/g (ppm)	10/21/96	10/23/96	EDM
		Acenaphthylene	N D	0 01	ug/g (ppm)	10/21/96	10/23/96	EDM
		Acenaphthene	N D	0 01	ug/g (ppm)	10/21/96	10/23/96	EDM
		Fluorene	N D	0 01	ug/g (ppm)	10/21/96	10/23/96	EDM
		Phenanthrene/Anthracene	N D	0 01	ug/g (ppm)	10/21/96	10/23/96	EDM
		Fluoranthene	N D	0 01	ug/g (ppm)	10/21/96	10/23/96	EDM
		Pyrene	N D	0 01	ug/g (ppm)	10/21/96	10/23/96	EDM
		Benzo(a)anthracene/Chrysene	N D	0 01	ug/g (ppm)	10/21/96	10/23/96	EDM
		Benzo(b or k)fluoranthene	N D	0 01	ug/g (ppm)	10/21/96	10/23/96	EDM
		Benzo(a)pyrene	N D	0 01	ug/g (ppm)	10/21/96	10/23/96	EDM
		Indeno(1 2 3 cd)pyrene	N D	0 01	ug/g (ppm)	10/21/96	10/23/96	EDM
		D benzo(a h)anthracene	N D	0 01	ug/g (ppm)	10/21/96	10/23/96	EDM
		Benzo(g h i)perylene	N D	0 01	ug/g (ppm)	10/21/96	10/23/96	EDM

N D NOT DETECTED LESS THAN THE DETECTION LIMIT
THIS PORTION OF REPORT ANALYZED AT THE EDMONTON FACILITY
THIS IS THE FINAL PAGE OF THE REPORT ATTACHMENT
NOT INCLUDING APPENDICES

EDMONTON TEST METHODOLOGIES

PAH in Solid Samples

Preparation Method	Soxhlet extraction with DCM or by accelerated solvent extraction with DCM/Acetone	
Instrument Method	GC/MSD analysis	
Method Reference	Extraction Method (modified)	EPA 3540 (modified) or EPA 3545
	Analytical Method	EPA 8270 (modified)

PAH in Water

Preparation Method	Liquid/liquid extraction with DCM	
Instrument Method	GC/MSD analysis	
Method Reference	Extraction Method	EPA 3510 or EPA 3520 (modified)
	Analytical Method	EPA 8270 (modified)

THIS IS THE LAST PAGE OF THE EDMONTON METHODOLOGIES

Appendix C