

File c. 2018

August 2, 2002

File No. 02-570-01

Manitoba Conservation
Environmental Operations
Winnipeg Region
Dangerous Goods
123 Main Street, Suite 160
Winnipeg, Manitoba
R3C 1A5



ATTENTION: Mr. Randy Webber
Environment Officer

RE: Remedial Action Plan for 1600 Erin Street

Dear Mr. Webber:

On behalf of Maple Leaf Construction, KGS Group is submitting the attached Remedial Action Plan (RAP) for the property at 1600 Erin Street in Winnipeg, Manitoba. Appended to the RAP is the Phase II Environmental Site Assessment for the site prepared by KGS Group in January 2000. Upon approval, the remediation activities are expected to be initiated in the Fall of 2002.

If you have any questions, or wish to discuss the document, please do not hesitate to contact the undersigned.

Regards,

Kimber Osiowy, P.Eng.
Senior Environmental Engineer

cc: Barry Brown, Maple Leaf Construction

MAPLE LEAF CONSTRUCTION

File C. _____

REMEDIAL ACTION PLAN
1600 ERIN STREET
WINNIPEG, MANITOBA

AUGUST 2002

KGS
GROUP

KONTZAMANIS ▪ GRAUMANN ▪ SMITH ▪ MACMILLAN INC.
CONSULTING ENGINEERS & PROJECT MANAGERS

August 2, 2002

File No. 02-570-01

Manitoba Conservation
Environmental Operations
Winnipeg Region
Dangerous Goods
123 Main Street, Suite 160
Winnipeg, Manitoba
R3C 1A5

ATTENTION: Mr. Randy Webber
Environment Officer

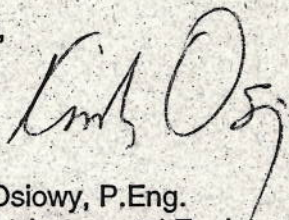
RE: Remedial Action Plan for 1600 Erin Street

Dear Mr. Webber:

On behalf of Maple Leaf Construction, KGS Group is submitting the attached Remedial Action Plan (RAP) for the property at 1600 Erin Street in Winnipeg, Manitoba. Appended to the RAP is the Phase II Environmental Site Assessment for the site prepared by KGS Group in January 2000. Upon approval, the remediation activities are expected to be initiated in the Fall of 2002.

If you have any questions, or wish to discuss the document, please do not hesitate to contact the undersigned.

Regards,



Kimber Osiowy, P.Eng.
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cc: Barry Brown, Maple Leaf Construction

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FIGURE

Figure 1 - Excavation Limits and Sequence

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Appendix A - Phase II Environmental Site Assessment

1.0 INTRODUCTION

The following Remedial Action Plan (RAP) has been prepared for the Maple Leaf Construction equipment storage site located at 1600 Erin Street in Winnipeg, Manitoba. The extent of the site impacts was described in the KGS Group Phase II Environmental Site Assessment (ESA), dated January 2000, which is appended to this document. This RAP outlines the proposed measures to remediate the site and is being submitted in conjunction with an application to operate a petroleum contaminated soil (PCS) treatment facility at 2245 Brookside Boulevard in Winnipeg, Manitoba.

2.0 SITE DESCRIPTION

The property limits of the 1600 Erin Street site are shown on Figure 1. The site is currently being used by Maple Leaf Construction (MLC) to store equipment including machinery, trailers and piping. It was previously used by Gulf Canada (now Petro Canada) as a bulk fueling facility from the early 1960's to the early 1980's. As documented in the Phase II ESA, the site was previously occupied by several buildings including a drum-filling warehouse in the center of the yard, a three-bay garage on the west-central boundary and a truck unloading facility. Several ASTs containing gasoline, fuel oil, naphthalene, solvent and aviation gas had been present across the site, while gasoline and diesel pump islands had been located on the north-central portion.

3.0 FIELD INVESTIGATION

3.1 SOIL

Testhole drilling and soil sampling were conducted during the Phase II ESA in November 1999. Laboratory analysis of soil samples indicated that twelve of the twenty testholes contained samples that exceeded Manitoba Conservation Level III criteria and CCME Commercial Land Use criteria for BTEX, TVH and TSVH. Figure 3 of the Phase II ESA indicates the location of the testholes and the hydrocarbon concentrations in the soil sample from each hole. The naphthalene concentration in one sample also exceeded the applicable criteria. Overall, the impacted soil covers a "W"-shaped strip of land extending over most of the site. The estimated amount of impacted soil at 1600 Erin Street ranges from 10,000 to 18,000 tonnes.

3.2 GROUNDWATER

Monitoring wells were installed in some testholes during drilling in November 1999. Monitoring and sampling of the groundwater took place shortly thereafter. The laboratory analysis of groundwater showed elevated levels of BTEX, TVH and TSVH in four wells near the centre of the site, but the only sample exceeding MOEE non-potable groundwater criteria was the field duplicate for MW5, in which the benzene concentration was elevated.

4.0 REMEDIAL ACTION PLAN

It is proposed to treat the impacted soil from 1600 Erin Street at a PCS pad on the site of the Maple Leaf asphalt plant at 2245 Brookside Boulevard. The treatment method will conform to the Manitoba Environment Guideline 96-05: Treatment and Disposal of Petroleum Contaminated Soil (June 1996).

4.1 PROCEDURE

Soil treatment will occur in four separate steps over four consecutive summers, beginning in 2002. The first batch of soil, equivalent to one-quarter of the volume of impacted soil, will be excavated from the area shown on Figure 1. Soil samples from the walls and floor of the excavation will be field screened for hydrocarbon vapours during the excavation process, in order to ensure that all the impacted soil is removed. Selected soil samples from the limits of the excavation will also be submitted for laboratory analysis in order to confirm the extent of the final excavation. If the laboratory results indicate that soil samples exceed the applicable criteria, the limits of the excavation will be expanded, with further laboratory analysis of the soil to ensure that the removal of impacted soil is complete. Excavations will not proceed past the property boundary.

The excavated soil will be transported to the PCS treatment pad at 2245 Brookside Boulevard. It will be placed in a 300-mm thick layer and will be turned on a regular basis in order to encourage biodegradation. After one year, the soil being treated will be sampled and analyzed for petroleum hydrocarbon parameters. If the soil is found to satisfy the applicable soil quality criteria, it will be removed from the treatment pad and used as fill at the site of the PCS pad.

The remaining impacted soil at 1600 Erin Street will also be excavated and treated in this manner. Excavation will begin at the northern, upgradient end of the site and will proceed southward, as shown on Figure 1. It was noted in the Phase II ESA that a diesel underground storage tank (UST) was at one time located in the southwest corner of the site; however, Manitoba Conservation has no record of a diesel UST having been removed from the site.

Consequently, before the southern section of the site is excavated, the presence of this UST will be further investigated. If it is still on-site, a licensed petroleum contractor will be hired to remove the tank.

4.2 EQUIPMENT AND PERSONNEL

The landowner, Maple Leaf Construction, will be responsible for the excavation and transport of the impacted soils, as well as the regular turning of the soil at the PCS treatment pad. Maple Leaf Construction will also provide the necessary equipment for these tasks. KGS Group will supervise and direct the excavation activities, collect confirmatory samples at the excavation site, and conduct soil sampling of the treated soil at the PCS pad.

4.3 SOIL QUALITY CRITERIA

Petroleum hydrocarbon concentrations in samples from the excavation side walls and floor, as well as from the treated soil pile, will be compared to the relevant federal criteria. These include:

- For BTEX: CCME Soil Quality Guidelines for the Protection of Environmental and Human Health (Industrial Land Use)
- For F1 through F4 Hydrocarbon Fractions: Canada Wide Standards for Petroleum Hydrocarbons (Industrial Land Use, Exposure Pathway by Eco Soil Contact)

4.4 PROJECT TIME FRAME

As mentioned, excavation and treatment of the first portion of impacted soil will begin in the summer of 2002, with successive batches being excavated in 2003 through 2005. The final batch of soil is projected to be finished treatment in the summer of 2006.

FIGURE



C.P.R. RAILWAY

CLIFTON ST.

ERIN ST.



LEGEND

PROPERTY BOUNDARY
FORMER STRUCTURE

FORMER ASTs

MONITORING WELL

TESTHOLE

FENCE LINE

EXCAVATION LIMITS: CONCENTRATION OF
BTEX, AND/OR TPH, AND/OR TSVH IN SOIL
ELEVATED ABOVE APPLICABLE CRITERIA

- 1 AREA TO BE EXCAVATED IN 2002
- 2 AREA TO BE EXCAVATED IN 2003
- 3 AREA TO BE EXCAVATED IN 2004
- 4 AREA TO BE EXCAVATED IN 2005



NO.	D / R / Y	REVISIONS / ISSUE
0	01/08/02	ISSUED WITH REPORT

A. SECTION LETTER OR DETAIL NUMBER
B. DRAWING WHERE SECTION OR DETAIL
IS DRAWN
OR
DRAWING WHERE SECTION OR DETAIL
WAS INDICATED
SECTION OR DETAIL SHOWN ON
SCALE DRAWING

KGS CONSULTING ENGINEERS
& PROJECT MANAGERS
WINNERS (204) 896-1200
THUNDER BAY (807) 345-2233

MAPLE LEAF
CONSTRUCTION

REMEDIAL ACTION PLAN
1600 ERIN STREET

EXCAVATION LIMITS AND SEQUENCE

DATE	STATUS	BY	DATE
ISSUED	IN	L.B.	01/08/02
APPROVED	CHANGES	K.O.	01/08/02
SCALE	AS SHOWN	DATE	JUL 31 / 2002

02-570-01-02 01

APPENDIX A
PHASE II ENVIRONMENTAL SITE ASSESSMENT

FINAL REPORT

PHASE II ENVIRONMENTAL SITE ASSESSMENT S.E CORNER BROOKSIDE BLVD. AND JEFFERSON AVE. WINNIPEG, MANITOBA

June, 1999
KGS Group Project 99-570-01

Privileged and Confidential

Prepared for:
Mr. Blake Fitzpatrick
Maple Leaf Construction
777 Erin Street
Winnipeg, Manitoba
R3G 2W2

KGS GROUP

KONTZAMANIS ■ GRAUMANN ■ SMITH ■ MACMILLAN INC.
CONSULTING ENGINEERS & PROJECT MANAGERS

June 15, 1999

File No. 98-570-01

Maple Leaf Construction
777 Erin Street
Winnipeg, Manitoba
R3G 2W2

ATTENTION: Mr. Blake Fitzpatrick

RE: Phase II Environmental Site Assessment (ESA)
Bison Diversified Property
S.E. Corner of Brookside Blvd. and Jefferson Ave.
Final Report

Dear Mr. Fitzpatrick:

Please find enclosed two (2) copies of the Final Report for the Phase II Environmental Site Assessment for the Bison Diversified Property located at the southeast corner of Brookside Blvd. And Jefferson Ave. in Winnipeg.

KGS Group sincerely appreciates the opportunity to have been of service on this project. If you have any further questions regarding this report please contact Mr. Kimber Osiowy or the undersigned.

Sincerely,



J. Bert Smith, P.Eng.
Chief Geotechnical Engineer/Hydrogeologist

JDM/
Enclosure

J:\99REPORT\9957001.rpt.doc

EXECUTIVE SUMMARY

A Phase II Environmental Site Assessment (ESA) was performed at the Bison Diversified Property located at the southeast corner of Brookside Boulevard and Jefferson Avenue in Winnipeg, Manitoba by KGS Group to evaluate soil and groundwater conditions in the area. Historically, the property was used as farmland until approximately 1979, after which it received fill materials. Investigations were focused on potential areas of concern such as fill pile locations, which were distributed about the entire property.

KGS Group personnel were on-site May 20, 1999, to conduct a subsurface investigation on the subject property, which included the drilling of eleven (11) testholes, and the conversion of four (4) of the testholes to monitoring wells. Utility locates were performed and cleared between May 18 and 20, 1999.

The soil stratigraphy at the Bison Diversified Property generally consists of an upper granular fill layer (1.06 to 2.29 m thick) composed of fine gravel, cobbles, and concrete rubble. Occasionally, the upper fill unit contains zones of reworked silty clay. A silty clay unit, varying from a light brown colored, moist, soft to firm, low to medium plasticity soil to a dark grey colored, moist, firm to stiff, high plasticity soil, underlies the fill. A minor clayey silt unit (15 to 60 cm thick), light brown in color, moist to wet, was encountered within the silty clay unit in all testholes, at depths ranging from 1.4 to 2.7 m. The maximum depth of investigation at the Bison Diversified site was 4.6 m below grade.

The general direction of groundwater flow at the Bison Diversified Property is north-northeast, based on groundwater elevations within the monitoring wells. At the time of investigation, the water table was located at a depth of 1.86 to 2.0 m below the ground surface, within the silty clay unit. The hydraulic gradient at the site was approximately 0.007 m/m, and an estimated groundwater velocity of 0.09 m/yr was calculated.

Field screening and laboratory results indicate that concentrations of petroleum hydrocarbons in soil, volatile organic compounds in soil, and metals in groundwater are all below applicable environmental guidelines.

Seven (7) soil samples tested for pH and electrical conductance, and one (1) soil sample tested for copper concentration, were elevated slightly above applicable environmental criteria. All of these samples were extracted from the shallow fill soils, above the water table. The pH and electrical conductance criteria are designed to protect vegetation growth, and the exceedance of the copper guideline levels is not considered a threat to human health. The origin of the fill is unknown, and the results are likely a reflection of the soil in its native state. The lack of a clear trend between metal concentrations in the soils and in the groundwater, highlights the relative immobility of metals between the soil above the water table and the dissolved groundwater phase.

Since soils at the Bison Diversified Property revealed only minor exceedances of environmental guideline levels and are not considered threatening to human health, and since migration of contamination off site is not likely, remediation is not recommended. Discussions with Mr. Randy Webber of Manitoba Environment indicated that Manitoba Environment supports this recommendation and will be issuing a letter to this effect.

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1.0 INTRODUCTION

1.1 TERMS OF REFERENCE

Kontzamanis, Graumann, Smith and MacMillan Inc., KGS Group, was retained by Mr. Blake Fitzpatrick to conduct a Phase II Environmental Site Assessment (ESA) for the Bison Diversified Property located at the southeast corner of Brookside Boulevard and Jefferson Avenue (Figure 1). The area of investigation was inclusive of the entire property, though priority was given to areas of concern such as those previously used for stockpiling industrial fill. The purpose of the Phase II investigation was to determine the nature and extent of any potential contamination of the property.

This report summarizes the results of field investigations conducted by KGS Group on May 20 1999 and results of the laboratory analyses conducted by Enviro-Test Laboratories.

1.2 SCOPE OF WORK

The scope of work to be conducted at the subject property was outlined to Mr. Blake Fitzpatrick by KGS group. Authorization to proceed with the Phase II ESA was provided to KGS Group in early May. The investigation was to include the following:

- Drill a minimum of eleven (11) testholes in areas where subsurface contamination may have occurred, such as in the areas where fill material was stockpiled for extended periods of time, as well as downgradient of those sites to determine if any contamination is migrating offsite.
- Converting four (4) of the testholes to groundwater monitoring wells by installing threaded, 50 mm diameter solid and slotted screen (No. 20) PVC pipe to determine the groundwater elevation and flow direction.
- Describe the soil profile encountered in the drill holes, especially for evidence of contamination.
- Collect soil samples at regular intervals for field screening for the presence of hydrocarbon vapors. Submit selected soil samples for analysis.
- Collect four (4) groundwater samples for laboratory analysis to determine if there has been any impact to the local groundwater.
- Measure groundwater levels to determine flow direction, hydraulic conductivities and gradient.

- Prepare a report detailing the results of the investigation, complete with a site plan showing the locations of all testholes and monitoring wells, testhole logs, and laboratory certificates of analysis, and recommendations with respect to the extent of remediation required, if any.

The results of the investigation are discussed in subsequent sections of this report. Tables summarizing the results of the laboratory analyses are provided following the text, as is a site plan illustrating the location of the study area (Figure 1). Testhole logs are provided in Appendix A, and laboratory certificates of analyses are in Appendix B.

1.3 SITE DESCRIPTION

The subject property is located at the southeast corner of Brookside Blvd. and Jefferson Ave. in Winnipeg, Manitoba, as shown on Figure 1. The property is not currently occupied, and has been used as a fill repository in the past.

Surrounding land uses include:

- North: Jefferson Ave., followed by vacant land
- East: Maple Leaf Construction site and concrete dumping site
- South: vacant land
- West: Brookside Blvd., followed by vacant land

1.4 PREVIOUS STUDIES

No previous environmental studies are known to have been conducted at the Bison Diversified Property, southeast corner of Brookside Blvd. and Jefferson Ave., Winnipeg, Manitoba.

2.0 FIELD INVESTIGATION AND LABORATORY PROGRAM

2.1 TESTHOLE DRILLING AND SOIL SAMPLING

Testhole Drilling

Testhole drilling and soil sampling was conducted on May 20, 1999, at locations of concern within the property. Underground utility locates were completed between May 18 and 20, 1999 prior to the commencement of drilling. Eleven (11) testholes were advanced at the site (Figure 1) using an Acker MP-5 truck mounted rotary auger rig with 125 mm diameter solid stem continuous flight augers, owned and operated by Paddock Drilling Ltd. of Brandon, Manitoba. Four (4) of these testholes were converted to monitoring wells. Stratigraphy logs of subsurface soils were recorded at the time of drilling and are included in Appendix A. Testhole locations were chosen to investigate areas of concern where historical air photos showed long-term storage of industrial fill as stockpiles on the site.

Soil Sampling

Soil samples were recovered directly from auger flights at approximately 0.75 m intervals, with additional sampling at stratigraphic changes, and at the discretion of the KGS Group site personnel. Soil samples were placed into heavy polyethylene bags, and tested for volatile hydrocarbon vapour concentrations, using a Photovac Photo-Ionization Detector (PID) with a 10.6 eV lamp and calibrated in the field with an isobutylene standard. Duplicate soil samples were placed into EPA approved, 250 ml clear glass sample containers, stored at 4°C in a cooler chest, and transported to Enviro-Test Laboratories of Winnipeg, Manitoba, an accredited analytical testing laboratory.

Monitoring Well Installation

Groundwater monitoring wells were installed in four (4) of the eleven (11) testholes drilled at the Bison Diversified Property. Monitoring well locations were selected to investigate areas of concern and to provide information on the groundwater flow direction and gradient.

Monitoring well construction consisted of threaded, 50 mm diameter, No. 20 slotted screen fitted with a filter fibre sock and solid threaded Schedule 40 PVC pipe. End plugs and top caps were friction-fit to the ends of each monitoring well. The annulus of each monitoring well was filled with silica sand to approximately 0.3 m above the slotted screen. The remainder of the annulus was backfilled with bentonite. Each monitoring well was fitted with a steel casing flush with the ground surface. All monitoring well materials and installation techniques conform to ASTM Standard D 5092-90. Details of the monitoring well construction are shown on the logs in Appendix A.

Groundwater Monitoring and Sampling

On May 28, 1999, all of the monitoring wells within the study area were checked for the depth to groundwater, and the presence and apparent thickness of any liquid petroleum hydrocarbon (LPH) using an interface probe. In addition, a rising head field permeability test was conducted in one (1) monitoring well (MW-3) to establish the insitu hydraulic conductivity at the site.

Groundwater samples were obtained using dedicated polyethylene disposable bailers. Prior to collecting the groundwater samples, the monitoring wells were purged a minimum of three (3) well volumes or bailed until dry. This procedure was used to ensure the water samples collected were representative of the natural groundwater conditions. Each groundwater sample collected was immediately placed into an appropriate sample container and stored in a cooler at approximately 4°C. The cooler was then transported to Enviro-Test Laboratories.

Elevation Survey

An elevation survey was conducted on May 28, 1999, to establish elevations of the ground surface and water elevations at each monitoring well. The reference point for the survey was a concrete foundation near the Maple Leaf Construction site, about 16 m west of monitoring well 3 (MW-3). The reference point was assigned an assumed elevation of 100.00 m (Figure 1).

2.2 LABORATORY ANALYSES

Soil Samples

A total of eighteen (18) soil samples collected from the subject property were submitted to Enviro-Test Laboratories in Winnipeg, Manitoba for analysis. The analysis included eleven (11) for salinity, ICP metals, hexavalent chromium, and cyanide; four (4) for benzene, toluene, ethylbenzene and xylene (BTEX), total purgeable hydrocarbons (TPH), total extractable hydrocarbons (TEH); two (2) for oil and grease; and one (1) for volatile organic compounds (VOC's) concentrations. The laboratory results are discussed in Section 4.4.

Groundwater Samples

A total of four (4) groundwater samples were also collected from monitoring wells located within the subject property, and submitted to Enviro-Test Laboratories in Winnipeg, Manitoba for analysis of ICP metals. The laboratory results are discussed in Section 4.5.

3.0 PHYSICAL CHARACTERISTICS OF THE SITE

3.1 PHYSIOGRAPHIC SETTING AND CLIMATE

The City of Winnipeg is located at the junction of the Red and Assiniboine Rivers. Surficial deposits in the Winnipeg area are composed of clays, silts, and sands. The land surface in and around Winnipeg is flat-lying to slightly undulating with localized relief rarely in excess of 1.5 to 2 metres. Surface drainage is poor, except where enhanced by engineered structures. All surface drainage at the Bison Diversified Property flows into the drainage ditches at the west and north edges of the property along Brookside Blvd. and Jefferson Ave., respectively.

The mean monthly air temperature in Winnipeg ranges from approximately +26.1°C in the summer period to -23.6°C in the winter. The average annual precipitation is 404 mm.

3.2 REGIONAL GEOLOGY

Surficial geology of the Winnipeg region consists of deep basin Lake Agassiz deposits of massive to finely laminated clays, silts, and sands, generally 15 to 20 m thick. In places, the upper 1 to 3 m of the clay and silt deposits are variably textured due to modification by iceberg scouring that occurred when Lake Agassiz water levels declined during late-glacial times. Beneath the clay is a firm to very stiff layer of plastic silty clay till, generally 1 to 5 metres thick. The underlying bedrock in the Winnipeg region is composed of Ordovician-aged dolomitic limestone and interbedded calcareous shale/limestone/argillaceous dolomite of the Red River and overlying Stony Mountain Formations respectively.

3.3 REGIONAL HYDROGEOLOGY

In the Winnipeg area, a potable water supply is available in the extensive unconfined upper carbonate aquifer. However, relatively few industrial and private wells are developed in the upper 150 meters since drinking water for the greater Winnipeg area is ultimately sourced from Shoal Lake. Regional groundwater flow is westerly toward the Red River from the extensive recharge zones of sand and gravel in the Sandilands area in southeastern Manitoba. Regionally easterly flowing recharge to the Winnipeg and Red River regions from Cretaceous strata west of Winnipeg is relatively more saline than that from the Sandilands. Groundwater from the surficial silty clay is not used as a potable water source in the City of Winnipeg.

3.4 SOIL PROFILE AND DESCRIPTION

The soil stratigraphy within the Bison Diversified Property generally consists of an upper granular fill layer composed of fine gravel, cobbles, and concrete rubble. Occasionally, the upper fill unit contains zones of reworked silty clay and fine gravel, and infrequently has an organic-rich black topsoil horizon developed within it, 4 to 10 cm thick. A silty clay unit, which comprises the remainder of the soil profile at the Bison Diversified site, was encountered below the fill at depths ranging from 1.06 to 2.29 m. This silty clay unit varied from a light brown colored, moist, soft to firm, low to medium plasticity soil to a dark grey colored, moist, firm to stiff, high plasticity soil at greater depth. A minor clayey silt unit was encountered within the silty clay unit in all testholes. The clayey silt was found at depths ranging from 1.4 to 2.7 m, and was a light brown, moist to wet soil zone 15 to 60 cm thick. The maximum depth of investigation at the Bison Diversified site was 4.6 m below grade.

3.5 SITE HYDROGEOLOGY

At the time of investigation, groundwater elevations at the Bison Diversified Property ranged from 98.040 (MW-3) to 99.219 m (MW-2) local elevation throughout the site. This corresponds to a depth of 1.86 to 2.0 m below the ground surface, with the water table located within the silty clay unit. The groundwater contours indicate that groundwater flow is generally north-northeast (Figure 1). Groundwater hydraulic gradient was estimated using the groundwater elevations measured in each well. The gradient is estimated to be approximately 0.007 m/m.

A rising head test was conducted at MW-3, and the results are presented graphically in Appendix C. The calculated hydraulic conductivity was 4.26×10^{-8} m/sec, which is mainly representative of the silty clay encountered at the Bison Diversified Property. Hydraulic conductivities for silty clay typically range from 10^{-7} to 10^{-10} m/sec (Freeze and Cherry, 1979).

Based on field measurements, the calculated hydraulic conductivity, and a conservatively estimated effective porosity of the silty clay of 10%, the groundwater velocity was estimated to be approximately 0.09 m/yr toward the north-northeast.

4.0 FIELD AND LABORATORY RESULTS

4.1 ASSESSMENT CRITERIA

4.1.1 Federal Criteria

The Canadian Council of Ministers of the Environment (CCME) document *"Interim Canadian Environmental Quality Criteria for Contaminated Sites"* (September, 1991) provide numerical values for concentrations of organic and inorganic compounds in soil and water intended to maintain, improve, or protect environmental quality and human health at contaminated sites. They are intended for generic use and do not address site-specific conditions. Remediation criteria are considered generally protective of human health and the environment for specified uses of soil and water at contaminated sites, based on experience and professional judgement.

CCME recently updated twenty (20) parameters (organic and inorganic) in the interim document. The updated parameters are presented in a report titled *"Recommended Canadian Soil Quality Guidelines"*, March, 1997. The updated parameters in the guideline were derived specifically for the protection of ecological receptors in the environment or the protection of human health associated with four (4) land uses: agricultural, residential/parkland, commercial, and industrial. The Bison Diversified Property was assessed as a Commercial Land Use site.

Soil - As the pertinent land use for the Bison Diversified site is Industrial, the applicable CCME guidelines were used to assess soil salinity, BTEX, mineral oil and grease, total metals, and volatile organic compound concentrations in soil. As there are no federal criteria for TPH, or TEH concentrations in soil, the corresponding provincial criteria are used.

Groundwater - The Ontario Ministry of Environment and Energy (MOEE) *"Guideline for Use at Contaminated Sites in Ontario"*, Table B – Groundwater Criteria for a Nonpotable Groundwater Condition (1997) guidelines are presented for specific conditions of nonpotable groundwater at contaminated sites. Since the water within the upper silty clay of the Winnipeg region is not used as a potable water source within the City of Winnipeg, these nonpotable conditions were used to assess groundwater quality at the Bison Diversified Property. Municipal drinking water is obtained via an aqueduct from Shoal Lake.

4.1.2 Provincial Criteria

Soil

Petroleum hydrocarbon impacted sites in Manitoba are usually assessed in relation to Manitoba Environment's *"A Guideline for the Environmental Investigation and Remediation of Petroleum Contaminated Sites in Manitoba"* (July 1993). Manitoba Environment is now utilizing the federal CCME *"Recommended Canadian Soil Quality Guidelines"*, (March 1997) for the assessment of benzene, toluene, ethylbenzene and (m,o,p) xylene concentrations in soils, as well as for soil salinity, total metals, oil and grease, and volatile organic compounds. As there are no federal criteria for TPH or TEH concentrations in soil, the corresponding Manitoba Environment criteria are still used.

The Manitoba Environment guideline utilizes a site sensitivity classification to determine which level of soil remediation criteria to apply to a site. The site sensitivity depends upon the receptor, the sensitivity of the receptor and the likelihood of impact on the receptor. In the guideline, a site is ranked as either high sensitivity (Level I), medium sensitivity (Level II) or low sensitivity (Level III). Based on the site sensitivity assessment conducted, the Bison Diversified site is classified as a Level III site (Low Risk). The corresponding TPH, and TEH assessment criteria are included in Table 2. The site sensitivity assessment is included in Appendix D.

4.2 FIELD OBSERVATIONS

Liquid phase petroleum hydrocarbons were not detected from within any of the monitoring wells installed at the Bison Diversified Property during the groundwater monitoring session on May 28, 1999.

Hydrocarbon staining and a noticeable hydrocarbon odor were not recorded by field personnel from any collected samples. Field screened hydrocarbon vapours were generally below 150 ppm, however occasional samples had headspace readings from 300 to >2,000 ppm; with maximum values detected in TH-4 at a depth of 0.76 m to 2.44 m within the native silty clay.

4.3 RESULTS OF LABORATORY SOIL ANALYSES

Laboratory analyses of the soil samples collected were performed by Enviro-Test Laboratories in Winnipeg, Manitoba. Eleven (11) samples were selected for salinity testing (Table 1), four (4) samples were selected for hydrocarbon analyses, including BTEX, TPH and TEH (Table 2), two (2) samples were selected for mineral oil and grease testing (Table 2), eleven (11) samples were selected for total metals testing (Table 3), and one (1) sample was selected for volatile organic compound (VOC) testing (Table 4).

Salinity

Electrical conductance and pH values, elevated above acceptable CCME criteria, were noted in seven (7) of eleven (11) soil samples submitted to Enviro-Test Laboratories. Samples MW2-1, TH5-1, and TH7-2 had both elevated pH and electrical conductance above CCME guideline levels for commercial/industrial land use. Samples MW3-1, TH3-1, and TH4-1 had pH values elevated above acceptable CCME criteria for commercial/industrial land use. Sample MW4-1 had an electrical conductance value in exceedance of applicable CCME values. Table 1 summarizes these results, and contains the applicable CCME guideline levels.

Petroleum Hydrocarbons

Concentrations of benzene, toluene, ethylbenzene, xylene (BTEX), total purgeable hydrocarbons (TPH), total extractable hydrocarbons (TEH), and mineral oil and grease, in excess of CCME and Manitoba Environment Criteria, were not detected in soil samples. Detailed results with comparative Provincial and Federal guideline levels are provided in Table 2.

Total Metals

Laboratory testing for total metals in soil at the Bison Diversified Property revealed one (1) exceedance of the CCME guidelines for industrial land use. The concentration of copper (in mg/kg of soil) in sample TH5-1 exceeded the CCME guidelines for copper concentrations in industrial sites (Table 3).

Volatile Organic Compounds (VOC)

Concentrations of volatile organic compounds (VOC's) in soil in all cases do not exceed the CCME guidelines for commercial/industrial land use. The laboratory results and associated CCME guidelines for VOC's are shown in Table 4.

4.4 RESULTS OF LABORATORY GROUNDWATER ANALYSIS

Four (4) groundwater samples were collected and tested in the laboratory for a large suite of metals (Table 5). Concentrations of metals in groundwater, in all cases, did not exceed the MOEE criteria for nonpotable groundwater conditions. A copy of the certificate of analysis from Enviro-Test Laboratories is included in Appendix B.

5.0 DISCUSSION

The results of the field investigation and laboratory analyses from the Bison Diversified Property, southeast corner of Brookside Blvd. and Jefferson Ave., indicated that no hydrocarbon impacted soil was present on the property. Although field screening produced high vapour concentrations from soil samples in borehole TH4, laboratory confirmation shows concentrations of BTEX and VOC's well below acceptable CCME guideline levels. The concentrations of TPH and TEH in sample TH4-3 are also below Level III criteria set for industrial land use by Manitoba Environment (Table 2). It is probable that the photo-ionization detector was measuring the concentration of vapors given off by slowly degrading organic matter found in trace quantities in the silty clay of TH4. Furthermore metal concentrations in groundwater were all well below the accepted environmental guidelines for a commercial/industrial site and a nonpotable groundwater condition.

Electrical conductance and pH values from seven (7) soil samples were elevated above CCME recommended criteria (Table 1). All samples with elevated pH or electrical conductance values (MW2-1, MW3-1, MW4-1, TH3-1, TH4-1, TH5-1, and TH7-2) were taken at shallow depths (0.76 m; except for TH7-2 from 1.5 m), within fill material, above the water table. The pH and salinity of these fill materials at the Bison Diversified Property is directly dependent upon the native soil conditions at the location from which they originated. The fact that seven (7) of eleven (11) soils tested for salinity and pH were in exceedance of appropriate CCME guidelines reflects the high porosity but low permeability of clay, in that native soil conditions were maintained even after long periods of storage as fill at the Bison Diversified Property.

One (1) soil sample from the entire property exceeded the recommended guidelines for metal concentrations. The copper concentration in sample TH5-1 was slightly elevated above CCME recommended guidelines for industrial sites (Table 3). Sample TH5-1 was taken from fill material, above the water table. The concentration of copper in sample TH5-1 is not considered a threat to human health. The CCME guideline shown in Table 3 is designed to protect vegetation, soil biota, and wildlife receptors via the soil contact pathway. The copper concentration of 172 mg/kg in the sample is well below the human health guideline level of 20,000 mg/kg for the off-site migration pathway for industrial sites. Discussion with Maple Leaf Construction has indicated that the location of the copper exceedance in TH-5 in the northeast

portion of the site will likely be paved over, minimizing the potential for leaching and migration of copper in the area.

Groundwater flow through the property is toward the north-northeast (Figure 1). Comparisons of metal concentrations in soils and groundwater between wells do not show any clear trends or patterns of concentration changes for any metals between wells (Tables 3 and 5). This is an artifact of the relative immobility of the metals, likely in an adsorbed state in the clayey fill above the water table. Furthermore, the mobility of metals is relatively impaired in less acidic, more basic soil conditions, such as those tested at the Bison Diversified Property (Table 1). The hydraulic conductivity of the silty clay at the site is quite low, and assuming a conservative effective porosity for the clay, groundwater is estimated to move within this site at the rate of approximately 0.09 m/yr. This low rate of groundwater movement would limit the migration of any potential contaminants on the site.

6.0 CONCLUSIONS

From the site investigations and subsequent assessment completed for the Bison Diversified Property, the following conclusions can be drawn.

- Laboratory results for petroleum hydrocarbons in soil, volatile organic compounds in soil, and metals in groundwater indicate that all concentrations of these parameters are below applicable and appropriate environmental guidelines.
- Seven (7) soil samples tested for pH and electrical conductance, and one (1) soil sample tested for copper concentration, were elevated slightly above applicable environmental criteria. All of these samples were extracted from the shallow fill soils, above the water table. The pH and electrical conductance criteria are designed to protect vegetation growth and minor exceedances of these guidelines are not considered a threat to human health. Similarly, the Tier I copper guideline level which was slightly exceeded is set to be protective of soil biota. The copper concentration in the soil sample in question is well below the human health guideline level, and the exceedances of the copper guideline levels is not considered a threat to human health.
- Remediation is not recommended based on the facts that concentrations of petroleum hydrocarbons in soil, volatile organic compounds in soil, and metals in groundwater are all below applicable environmental guidelines, and that the few slight exceedances of pH, electrical conductance, and copper in soils are not considered a threat to human health. Discussions with Mr. Randy Webber of Manitoba Environment have indicated that Manitoba Environment agrees with this recommendation and will be issuing a letter to this effect.

7.0 CLOSURE

The conclusions and recommendations presented in this report are based upon the field and laboratory results completed for this study. The number, locations, and depths of the monitoring wells and testholes were completed within the site in order to obtain the information used to formulate our conclusions. Since the investigation was based on a limited scope of work, if any modifications at the site area are made or additional information becomes available, KGS Group recommends that we be provided the opportunity to review the findings provided herein to determine whether any changes are appropriate.

8.0 REFERENCES

American Society for Testing and Materials, D5092-90, Standard Practice for Design and Installation of Groundwater Monitoring Wells in Aquifers, June 1990.

Canadian Council of Ministers of the Environment. 1991. Interim Environmental Quality for Contaminated Sites. Remediation Criteria for Water.

Canadian Council of Ministers of the Environment. 1997. Recommended Canadian Soil Quality Guidelines.

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Geological Survey of Canada. 1994. Geological Highway Map of Manitoba. Scale 1:1,000,000.

Manitoba Environment. 1993. A Guideline for the Environmental Investigation and Remediation of Petroleum Storage Sites in Manitoba.

Manitoba Mineral Resources Division. 1981. Surficial Geological Map of Manitoba, Scale 1:1,000,000. Map 81-1.

Ontario Ministry of Environment and Energy. 1997. Guideline for Use at Contaminated Sites in Ontario, Table B – Groundwater Criteria for a Nonpotable Groundwater Condition.

Geraghty and Miller Inc. Environmental Services, Modelling Group, AQTESOLV™ Aquifer Test Solver, Version 2.01, February 1995.

TABLES



TABLE 1
SOIL TESTING RESULTS FOR SALINITY EVALUATION

Sample No. (1)	Depth (m)	% Saturation	pH	Electrical Conductance (mS/cm)	SAR
MW1-1	0.0-0.3	55	7.9	0.53	0.66
MW2-1	0.45-0.75	54	8.2	4.4	4.1
MW3-1	0.45-0.75	82	8.4	0.65	3.0
MW4-1	0.45-0.75	67	7.8	7.9	5.2
TH1-1	0.3-0.6	28	7.9	2.0	2.4
TH2-2	1.2-1.5	50	7.9	3.7	2.8
TH3-1	0.45-0.75	54	8.2	2.8	4.8
TH4-1	0.45 - 0.75	50	8.1	0.84	0.46
TH5-1	0.45 - 0.75	62	8.3	6.6	3.7
TH6-2	1.1-1.4	500	7.7	2.6	3.7
TH7-2	1.5-1.8	59	8.2	5.3	5.6
CCME Criteria (2) Commercial/Industrial			6 - 8	4	12

Notes:

1. Soil samples obtained on May 20, 1999.
2. CCME 1991 - Canadian Council of Ministers of the Environment. Interim Canadian Environmental Quality Criteria for Contaminated Sites. Table A-2 Interim Remediation Criteria for Soil for Commercial/Industrial Land Use.

 - Exceedance of CCME Soil Criteria for Commercial/Industrial Land Use

TABLE 2
PETROLEUM HYDROCARBONS IN SOIL

Sample No. (1)	Depth (m)	Soil Type	Field/Vapour Reading (ppm)	Parameter (1,2)						
				Benzene	Toluene	Ethyl-benzene	Xylenes (o, -m, -p)	Total Purgeable (C ₅ -C ₁₀)	Total Extractable (C ₁₁ -C ₃₀)	Mineral Oil and Grease
MW3-2	1.2-1.5	Silty Clay Fill	163	<0.02	<0.02	<0.03	<0.01	<5	69	-
TH1-1	0.3-0.6	Sand Fill	315	<0.02	<0.02	<0.03	<0.01	<5	62	430
TH4-3	2.45-2.75	Clayey Silt	>2,000	<0.02	<0.02	<0.03	<0.01	<5	16	-
TH6-1	0.6-0.9	Silty Clay Fill	182	<0.02	<0.02	<0.03	<0.01	<5	160	-
TH6-3	1.4-1.55	Silty Clay	180	-	-	-	-	-	-	<100
Minimum Detection Limit				0.02	0.02	0.03	0.01	5	10	100
CCME Recommended Guidelines (3)										
Industrial Land Use (6)				5	0.8	20	20	800 (5)	2,000 (5)	5,000 (5)
Commercial Land Use				5	0.8	20	17	150 (6)	2,000 (6)	5,000 (6)
Residential/Parkland Land Use				0.5	0.8	1.2	1.0	100 (7)	500 (7)	1,000 (7)
Agriculture Land Use				0.05	0.10	0.10	0.10			

Notes:

1. All values are expressed in milligrams per kilogram mg/kg.
2. Soil samples obtained on May 20, 1999.
3. CCME - Canadian Council of Ministers of the Environment, "Recommended Canadian Soil Quality Guidelines", March 1997.
4. Manitoba Environment, "Guideline for The Environmental Investigation and Remediation of Petroleum Storage Sites in Manitoba", July 1993.
5. Level III - Low Risk
6. Level II - Medium Risk
7. Level I - High Risk
8. Applicable criteria values are in bold.

- Exceedance of Applicable Criteria

TABLE 3
TOTAL METALS IN SOIL

Parameter (¹)	Sample No. (²)											Detection Limit	CCME Criteria (³)		CCME Recommended Guidelines (⁵)	
	TH4-1	MW1-1	MW2-1	MW3-1	MW4-1	TH1-1	TH2-2	TH3-1	TH5-1	TH6-2	TH7-2		Commercial/ Industrial (⁶)	Commercial	Industrial (⁶)	
Antimony	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	0.1	40	-	-	
Arsenic	3.8	3.7	4.4	5.1	3.5	2.6	2.4	2.2	9.6	1.9	4.5	0.1	50	12	12	
Barium	170	982	267	243	137	287	138	198	359	117	247	0.5	2,000	2000	2,000	
Beryllium	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	8	-	-	
Cadmium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	0.5	20	22	22	
Chromium (+6)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	-	1.4	1.4	
Chromium Total	32.7	28.3	31.1	37.2	30.1	23.1	19.8	18.3	38.8	15	31.4	0.5	800	87	87	
Cobalt	7	7	7	9	7	4	4	4	9	3	7	1	300	-	-	
Copper	23	25	26	23	24	30	16	13	172	10	24	1	500	91	91	
Lead	34	35	122	20	32	13	31	10	248	7	36	5	1,000	260	600	
Mercury	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	10	24	50	
Molybdenum	<1	<1	<1	<1	<1	2	<1	<1	2	<1	<1	1	40	-	-	
Nickel	22	21	22	26	20	20	13	13	50	10	21	2	500	50	50	
Selenium	0.1	0.1	0.3	<0.1	0.3	<0.1	0.4	<0.1	1.2	0.3	0.4	0.1	10	-	-	
Silver	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	40	-	-	
Tin	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	5	300	-	-	
Thallium	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	-	1	1	
Vanadium	49	34	41	54	42	16	27	25	40	20	47	1	200 (⁴)	130	130	
Zinc	60.3	79.2	108	66.7	55.6	52.7	92.8	43.1	179	25.9	61.8	0.5	1,500	360	360	

Notes:

1. All values are expressed in milligrams per kilogram (mg/kg).
2. Soil samples obtained on May 20, 1999.
3. CCME 1991 - Canadian Council of Ministers of the Environment. Interim Canadian Environmental Quality Criteria for Contaminated Sites. Table A-2 Interim Remediation Criteria for Soil for Commercial/Industrial Land Use.
4. Criteria not recommended for commercial/industrial. The residential/parkland value is 200 mg/kg.
5. CCME 1997, 1999 - Canadian Council of Ministers of the Environment. Recommended Canadian Soil Quality Guidelines.
6. Applicable criteria values are in bold.

- Exceedance of Applicable CCME Soil Criteria

TABLE 4
VOLATILE ORGANIC COMPOUNDS IN SOIL

Parameter (^{1,2})	Detection Limit	TH4-2	CCME (^{4,6}) Commercial/ Industrial	CCME Recommended Guidelines (⁵)	
				Commercial	Industrial (⁶)
Dichlorodifluoromethane	0.03	<0.03	-	-	
Chloromethane	0.10	<0.1	50 (⁷)	-	-
Vinyl Chloride	0.02	<0.02	50 (⁷)	-	-
Bromomethane	0.10	<0.1	-	-	-
Chloroethane	0.10	<0.1	50 (⁷)	-	-
Ethanol	3.00	<3	-	-	
Trichlorofluoromethane	0.01	<0.01	-	-	-
Acrotoin	1.00	<1	-	-	
Acetone	1.00	<1	-	-	
1,1-Dichloroethene	0.01	<0.01	50	-	-
Iodomethane	0.01	<0.01	-	-	
Carbon Disulphide	0.01	<0.01	-	-	
Methylene Chloride	0.01	<0.01	50	-	-
Acrylonitrile	1.00	<1	-	-	
trans-1,2-Dichloroethene	0.01	<0.01	50 (⁷)	-	-
Vinyl Acetate	1.00	<1	-	-	
1,1-Dichloroethane	0.01	<0.01	50	-	-
Methyl Ethyl Ketone (MEK)	1.00	<1	-	-	-
Chloroform	0.01	<0.01	50	-	-
1,1,1-Trichloroethane	0.01	<0.01	50	-	-
Carbon Tetrachloride	0.01	<0.01	50	-	-
Benzene	0.01	<0.01	5	5	5
1,2-Dichloroethane	0.02	<0.02	50	-	-
Trichloroethene	0.01	<0.01	50	31	31
1,2-Dichloropropane	0.02	<0.02	50	-	-
Bromodichloromethane	0.01	<0.01	-	-	-
Dibromomethane	0.03	<0.03	-	-	-
2-chloroethylvinylether	0.10	<0.1	-	-	
Methyl Isobutyl Ketone (MIBK)	0.10	<0.1	-	-	-
cis-1,3-Dichloropropane	0.01	<0.01	50 (⁷)	-	-
Toluene	0.01	<0.01	30	0.8	0.8
Ethyl methacrylate	0.10	<0.1	-	-	
trans-1,3-Dichloropropane	0.01	<0.01	50 (⁷)	-	-
2-Hexanone	0.10	<0.1	-	-	-
1,1,2-Trichloroethane	0.02	<0.02	50 (⁷)	-	-
Tetrachloroethene	0.01	<0.01	50	0.5	0.6

TABLE 4 (CONT'D)
VOLATILE ORGANIC COMPOUNDS IN SOIL

Parameter (^{1,2})	Detection Limit	TH4-2	CCME (^{4,6}) Commercial/ Industrial	CCME Recommended Guidelines (⁵)	
				Commercial	Industrial (⁶)
Dibromochloromethane	0.03	<0.03	-	-	-
Ethylene Dibromide	0.01	<0.01	-	-	-
Chlorobenzene	0.01	<0.01	10	-	-
Ethyl Benzene	0.01	<0.01	50	20	20
m,p-xylenes	0.01	<0.01	50	17	20
Bromoform	0.03	<0.03	-	-	-
Styrene	0.01	<0.01	50	-	-
cis-1,4-dichloro-2-butene	0.10	<0.1	50	-	-
1,1,2,2-Tetrachloroethane	0.20	<0.2	50	-	-
1,2,3-trichloropropane	0.05	<0.05	50	-	-
o-xylene	0.01	<0.01	50	17	20
trans-1,4-dichloro-2-butene	0.10	<0.1	50	-	-
1,3-Dichlorobenzene	0.01	<0.01	10	-	-
1,4-Dichlorobenzene	0.01	<0.01	10	-	-
1,2-Dichlorobenzene	0.01	<0.01	10	-	-

Notes:

1. All concentrations in µg/g dry weight.
2. Soil sampled on May 20, 1999.
4. CCME 1991 - Canadian Council of Ministers of the Environment. Interim Canadian Environmental Quality Criteria for Contaminated Sites. Table A-2 Interim Remediation Criteria for Soil for Commercial/Industrial Land Use.
5. CCME 1997, 1999 - Canadian Council of Ministers of the Environment. Recommended Canadian Soil Quality Guidelines
6. Applicable criteria values are in bold.
7. As they are included in aliphatic chlorinated hydrocarbons.

- Exceedance of Applicable CCME Soil Criteria

**TABLE 5
METALS IN GROUNDWATER**

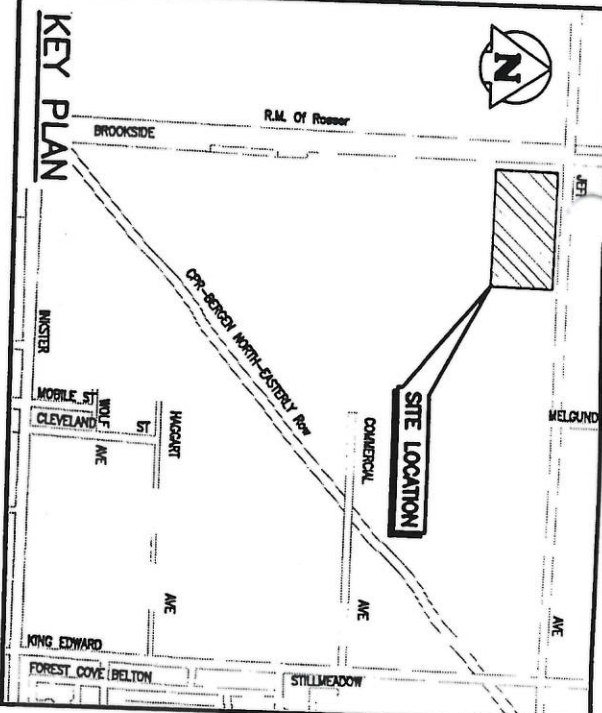
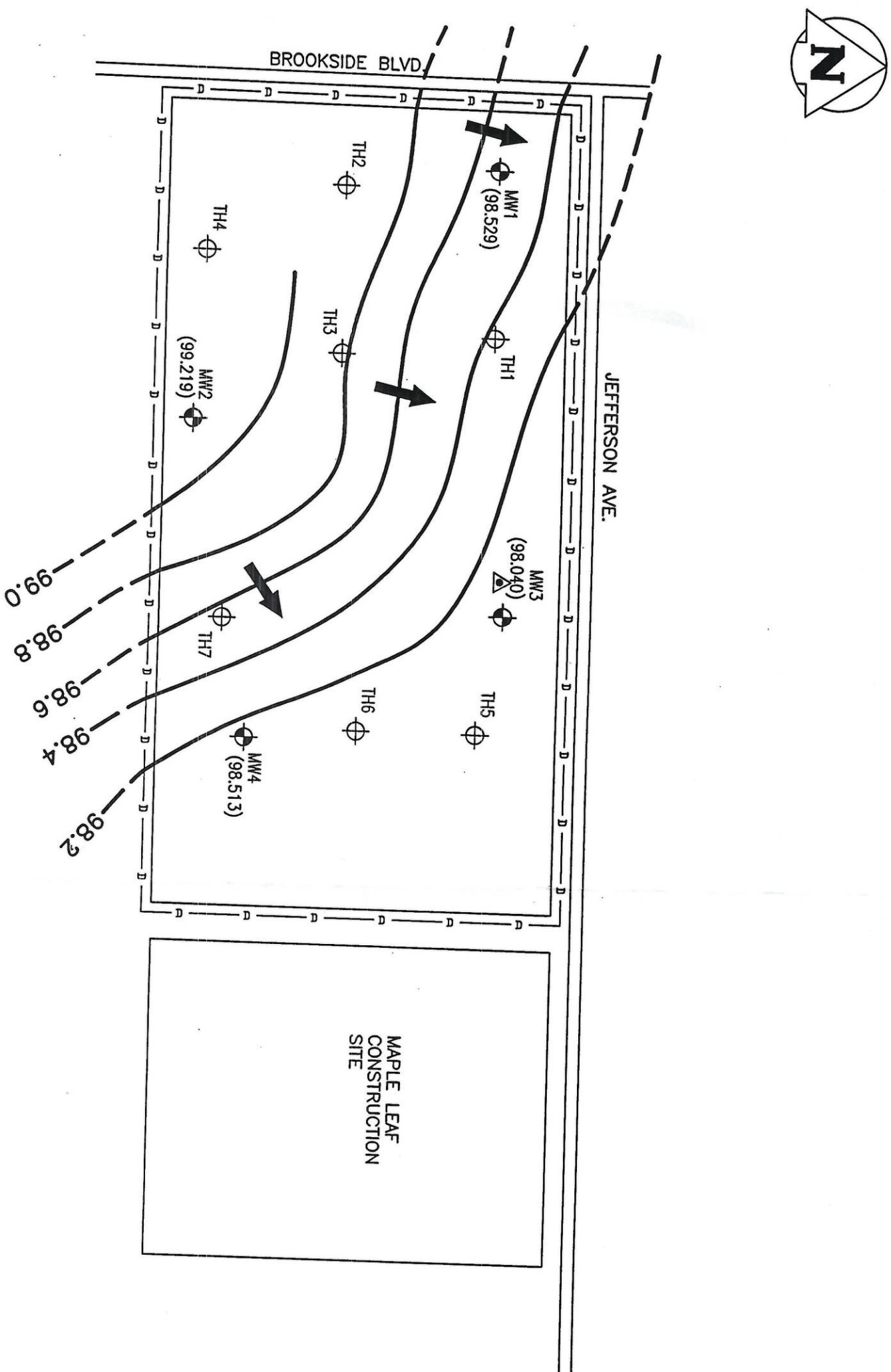
Parameter (1)	Detection Limit	Sample No.				MOEE (1997) (2) Nonpotable Groundwater Criteria
		MW1	MW2	MW3	MW4	
Aluminum	0.02	<0.02	0.02	0.02	0.02	-
Antimony	0.001	0.002	0.002	0.003	0.003	16
Arsenic	0.0005	0.0098	0.0065	0.0064	0.0052	0.48
Barium	0.0003	0.185	0.417	0.216	0.04	23
Beryllium	0.001	<0.001	<0.001	<0.001	<0.001	0.053
Bismuth	0.0001	<0.0001	<0.0001	0.0002	<0.0001	-
Boron	0.01	0.670	0.230	0.25	0.33	50
Cadmium	0.0002	<0.0002	<0.0002	0.0011	0.0005	0.011
Calcium	0.1	187	88.3	-	-	-
Cesium	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-
Chromium	0.002	0.003	0.004	0.004	0.004	2
Cobalt	0.0002	0.0005	0.0003	0.0073	0.0045	0.1
Copper	0.001	0.015	0.008	0.016	0.008	0.023
Iron	0.01	0.32	0.28	0.53	0.42	-
Lead	0.0005	0.0009	0.0007	0.001	0.0012	0.032
Lithium	0.001	0.521	0.259	0.487	0.386	-
Magnesium	0.01	-	380	-	-	-
Manganese	0.0002	0.00221	0.0042	-	1.38	-
Molybdenum	0.0001	0.0065	0.0036	0.0065	0.0102	7.3
Nickel	0.002	0.011	0.006	0.03	0.017	1.6
Phosphorus	0.05	0.09	0.08	0.09	0.11	-
Potassium	0.05	4.98	3.79	15	14.4	-
Rubidium	0.0002	0.00019	0.0019	0.0042	0.0029	-
Selenium	0.002	0.013	0.013	0.01	0.009	0.05
Silver	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	0.0012
Sodium	0.02	-	230	-	-	N/V
Strontium	0.0001	2.24	1.33	-	-	-
Tellurium	0.001	<0.001	<0.001	<0.001	<0.001	-
Thallium	0.0001	<0.0001	<0.0001	0.0002	<0.0001	0.4
Tin	0.0005	0.0013	0.0018	0.004	0.0032	-
Titanium	0.0005	0.0201	0.0045	0.0345	0.0155	-
Tungsten	0.0002	<0.0002	<0.0002	0.0005	0.0003	-
Uranium	0.0001	0.204	0.0454	0.0736	0.0866	-
Vanadium	0.001	0.008	0.021	<0.001	<0.001	0.2
Zinc	0.02	0.14	0.13	0.17	0.02	1.1
Zirconium	0.0002	0.0269	0.0169	0.0015	0.0012	-

Notes:

1. All Metals as Total, values expressed in milligrams per litre (mg/L). Water samples obtained on May 28, 1999.
 2. MOEE 1997 - Ontario Ministry of Environment and Energy. Guideline for Use at Contaminated Sites in Ontario, Table B - Groundwater Criteria for a Nonpotable Groundwater Condition.
- N/V - No Value

- Exceedance of MOEE (1997), Table B - Nonpotable Groundwater Condition

FIGURES



LEGEND

- DITCH LINE
- MONITORING WELL (GROUNDWATER ELEVATION, LOCAL DATUM MAY 28, 1999)
- TESTHOLE
- INTERPRETED GROUNDWATER CONTOURS (m)
- INTERPRETED GROUNDWATER FLOW DIRECTION
- BENCHMARK

NOTE:

1. LOCAL DATUM ELEVATION 100.00 AT REFERENCE POINT ON CONCRETE PAD LOCATED 15.5m WEST OF MW3.



KGS MAPLE LEAF GROUP CONSTRUCTION

1999 PHASE II ESA - BROOKSIDE BLVD. AND JEFFERSON AVE.

SITE PLAN- LOCATIONS OF TESTHOLES AND MONITORING WELLS AND HYDRAULIC GRADIENTS

JUNE 1999

FIGURE 1

APPENDIX A
TESTHOLE LOGS

CLIENT
MAPLE LEAF CONSTRUCTION
JOB NO. 99-570-01
PROJECT
PHASE II ENVIRONMENTAL SITE ASSESSMENT
SITE
CORNER OF BROOKSIDE BLVD AND JEFFERSON AVE., WINNIPEG
**DATE
DRILLED 20/05/99**

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	FIELD HEADSPACE TEST			
							Photoionizable Vapours (ppm) ●			
							500	1000	1500	2000
SOIL DESCRIPTION										
			<u>TOPSOIL</u>							
			<u>GRANULAR FILL</u>							
			<u>SILTY CLAY FILL</u>							
			<u>CLAYEY SILT FILL</u>							
			<u>SAND FILL</u>							
			<u>SILTY CLAY</u>							
			<u>CLAYEY SILT</u>							
PIEZOMETRIC LOG										
			Solid pipe with bentonite plug backfill -Pipe consists of Schedule 40 PVC 50 mm dia., threaded joints							
			Pipe with silica sand backfill							
			Slotted pipe with 0.65 mm silica sand backfill -No. 10 slotted screen PVC pipe with filter sock, and friction fit PVC end plugs							
			Sloughed material / Soil cuttings backfill							
			Bentonite plug backfill							

SAMPLE TYPE

GRAB FROM BUCKET

SHELBY

SPLIT BARREL

AUGER GRAB
CONTRACTOR
INSPECTOR
APPROVED
KBO
DATE 15/06/99

CLIENT MAPLE LEAF CONSTRUCTION

PROJECT PHASE II ENVIRONMENTAL SITE ASSESSMENT

SITE CORNER OF BROOKSIDE BLVD AND JEFFERSON AVE., WINNIPEG

LOCATION Northwest Corner of Lot

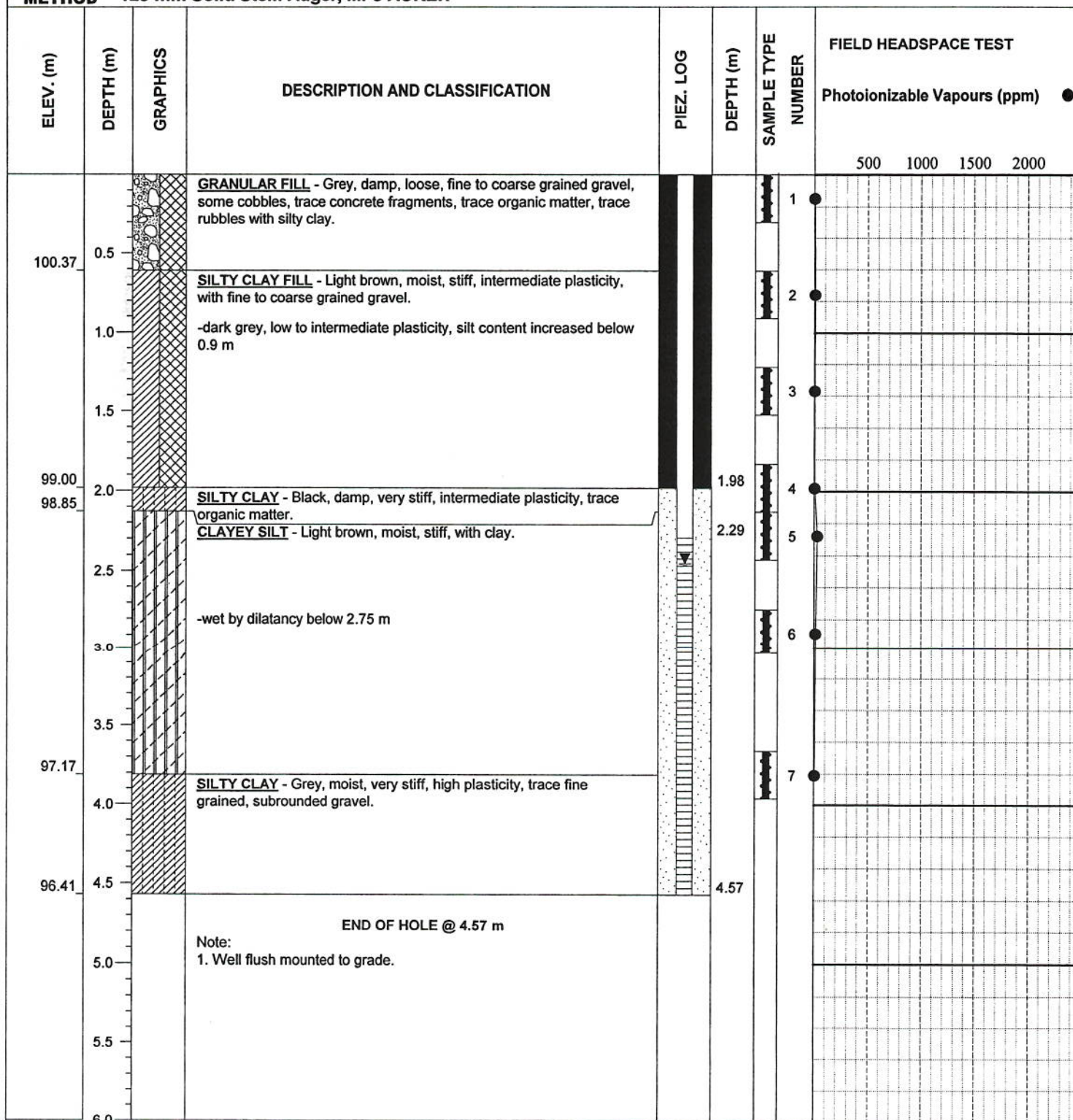
DRILLING METHOD 125 mm Solid Stem Auger, MP5 ACKER

JOB NO. 99-570-01

GROUND ELEV. 100.98 m, local

TOP OF PVC ELEV. 100.77 m

WATER ELEV. 98.53 m, 28/05/99

DATE DRILLED 20/05/99


SAMPLE TYPE



GRAB FROM BUCKET



SHELBY



SPLIT BARREL



AUGER GRAB

CONTRACTOR

Paddock Drilling Ltd.

INSPECTOR

D. KASUR

APPROVED

DATE

16/06/99

CLIENT MAPLE LEAF CONSTRUCTION

PROJECT PHASE II ENVIRONMENTAL SITE ASSESSMENT

SITE CORNER OF BROOKSIDE BLVD AND JEFFERSON AVE., WINNIPEG

LOCATION Centre of Lot, Southern Edge

DRILLING METHOD 125 mm Solid Stem Auger, MP5 ACKER

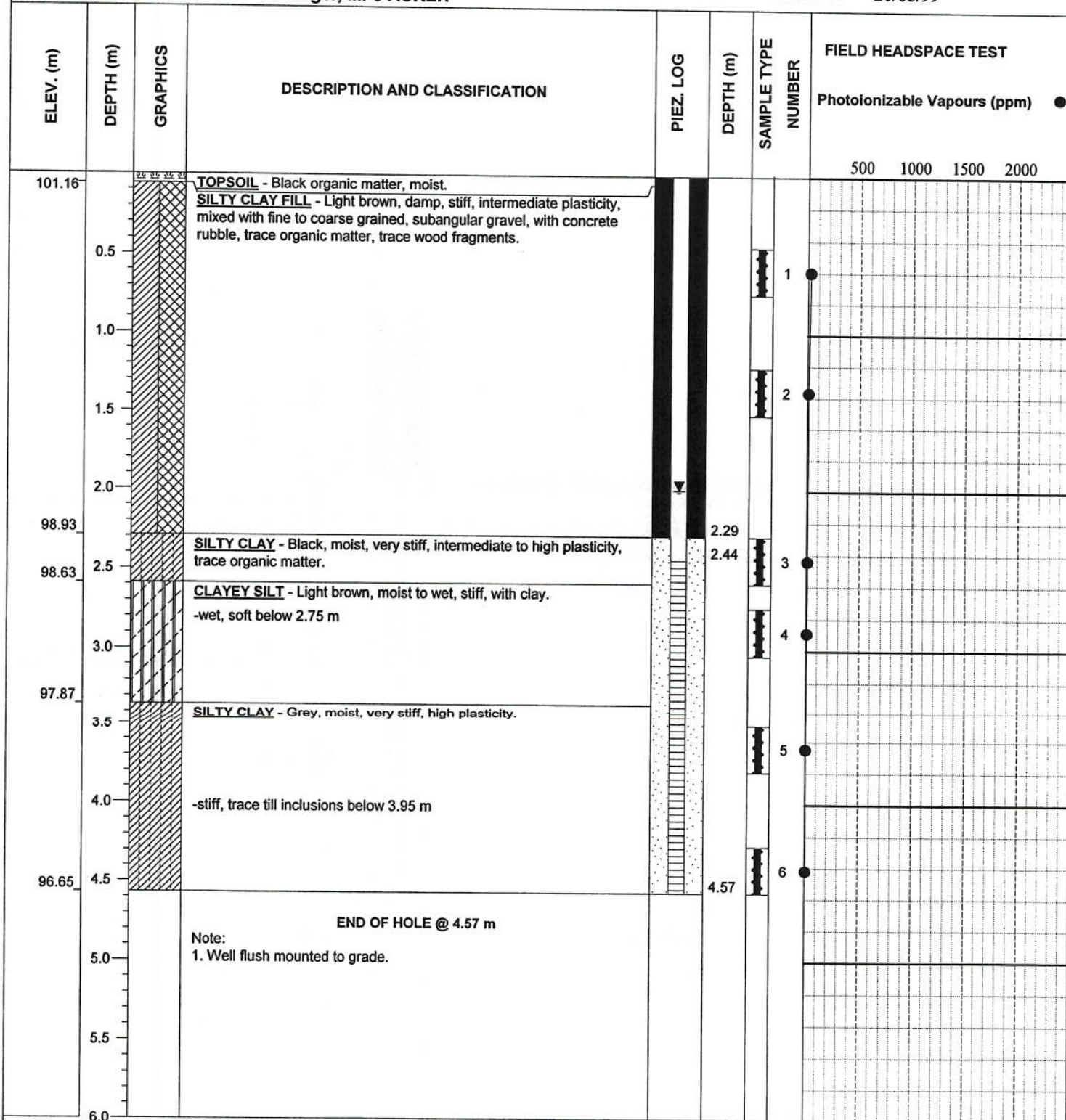
JOB NO. 99-570-01

GROUND ELEV. 101.22 m, local

TOP OF PVC ELEV. 101.13 m

WATER ELEV. 99.22 m, 28/05/99

DATE DRILLED 20/05/99



SAMPLE TYPE



GRAB FROM BUCKET



SHELBY



SPLIT BARREL



AUGER GRAB

CONTRACTOR

Paddock Drilling Ltd.

INSPECTOR

D. KASUR

APPROVED

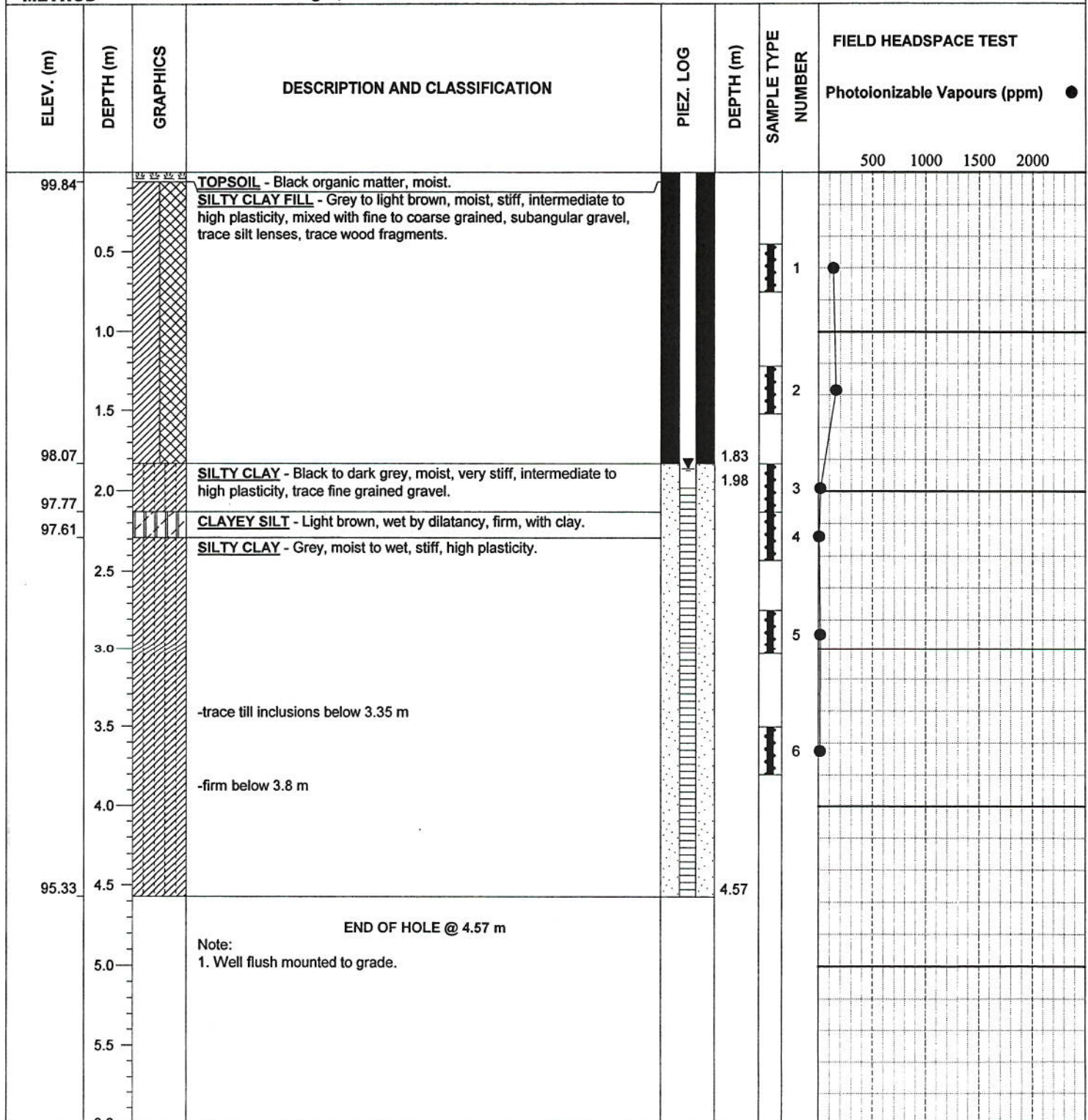
KBO

DATE

16/06/99

CLIENT MAPLE LEAF CONSTRUCTION
PROJECT PHASE II ENVIRONMENTAL SITE ASSESSMENT
SITE CORNER OF BROOKSIDE BLVD AND JEFFERSON AVE., WINNIPEG
LOCATION Northeast Section of Lot
DRILLING METHOD 125 mm Solid Stem Auger, MP5 ACKER

JOB NO. 99-570-01
GROUND ELEV. 99.90 m, local
TOP OF PVC ELEV. 99.87 m
WATER ELEV. 98.04 m, 28/05/99
DATE DRILLED 20/05/99



SAMPLE TYPE GRAB FROM BUCKET SKELBY SPLIT BARREL AUGER GRAB

CONTRACTOR
 Paddock Drilling Ltd.

INSPECTOR
 D. KASUR

APPROVED

KBO

DATE 16/06/99

CLIENT MAPLE LEAF CONSTRUCTION

PROJECT PHASE II ENVIRONMENTAL SITE ASSESSMENT

SITE CORNER OF BROOKSIDE BLVD AND JEFFERSON AVE., WINNIPEG

LOCATION Southeast Corner of Lot

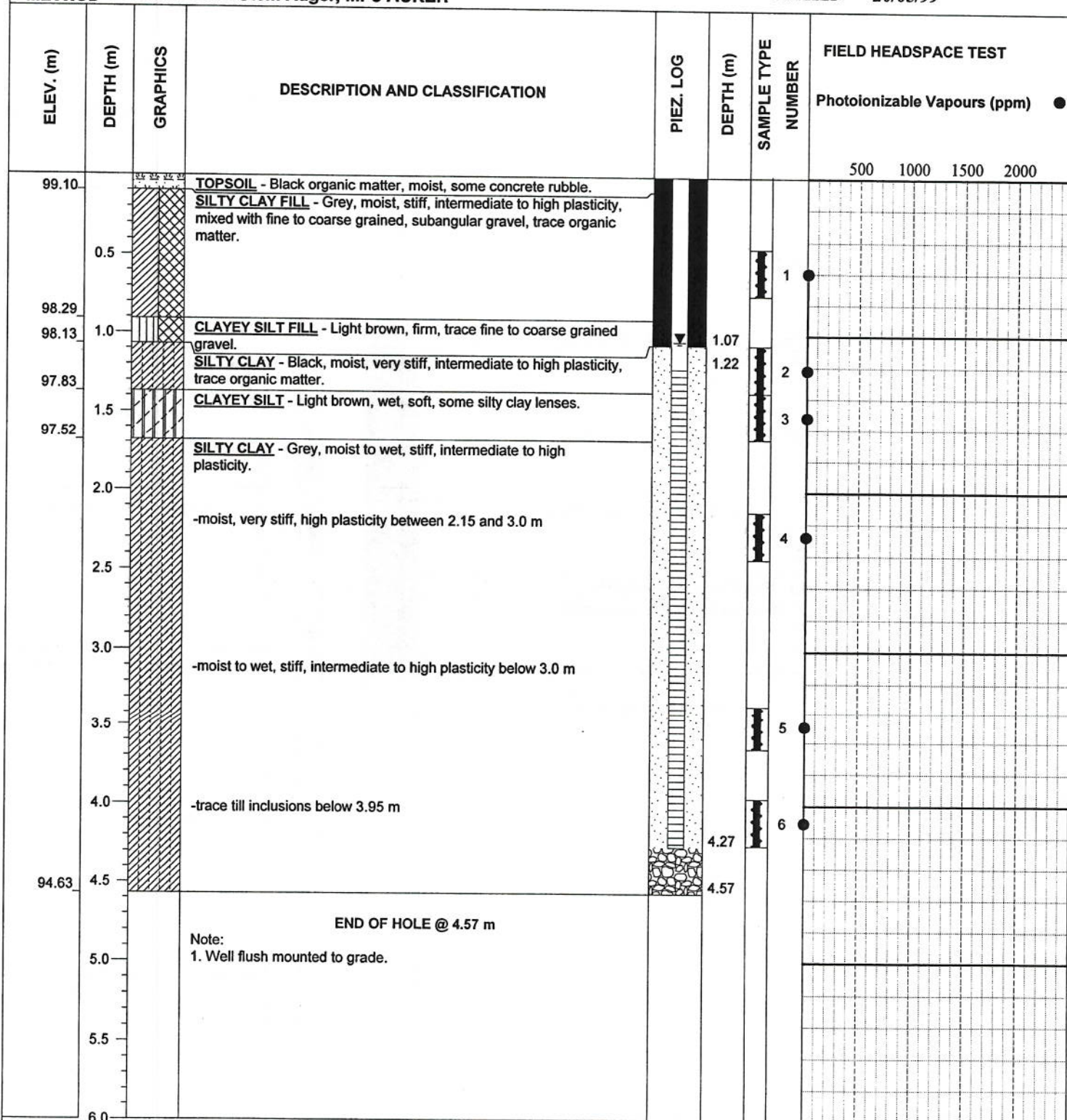
DRILLING METHOD 125 mm Solid Stem Auger, MP5 ACKER

JOB NO. 99-570-01

GROUND ELEV. 99.20 m, local

TOP OF PVC ELEV. 99.16 m

WATER ELEV. 98.15 m, 28/05/99

DATE DRILLED 20/05/99

SAMPLE TYPE


GRAB FROM BUCKET



SHELBY



SPLIT BARREL



AUGER GRAB

CONTRACTOR

Paddock Drilling Ltd.

INSPECTOR

D. KASUR

APPROVED

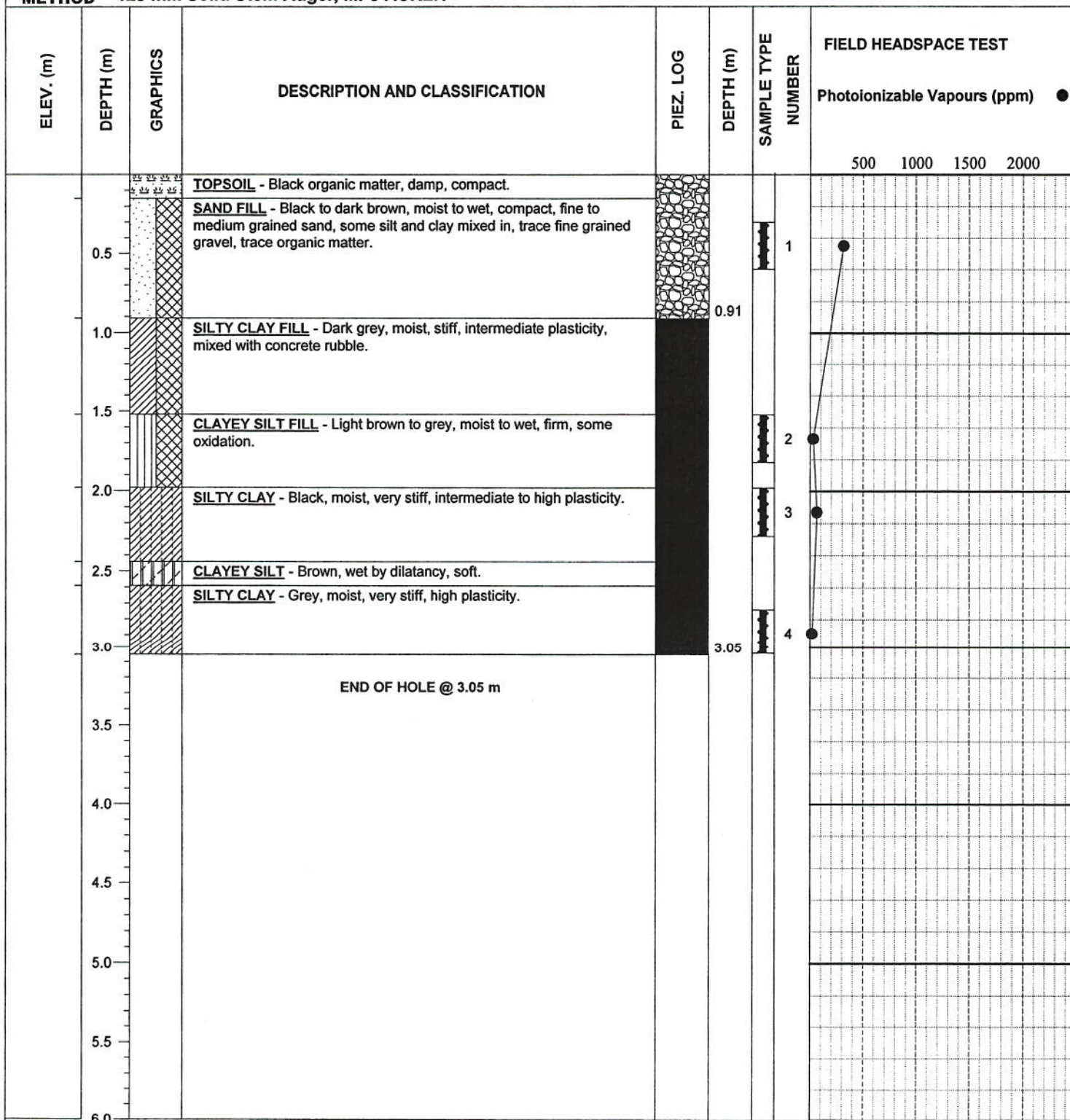
KPO

DATE

16/06/99

CLIENT MAPLE LEAF CONSTRUCTION
PROJECT PHASE II ENVIRONMENTAL SITE ASSESSMENT
SITE CORNER OF BROOKSIDE BLVD AND JEFFERSON AVE., WINNIPEG
LOCATION Northwest Section of Lot
DRILLING METHOD 125 mm Solid Stem Auger, MP5 ACKER

JOB NO. 99-570-01
GROUND ELEV. -
TOP OF PVC ELEV. -
WATER ELEV. -
DATE DRILLED 20/05/99



SAMPLE TYPE ☒ GRAB FROM BUCKET ☐ SHELBY ☐ SPLIT BARREL ☐ AUGER GRAB

CONTRACTOR
 Paddock Drilling Ltd.

INSPECTOR
 D. KASUR

APPROVED

K80

DATE 16/06/99

CLIENT MAPLE LEAF CONSTRUCTION

JOB NO. 99-570-01

PROJECT PHASE II ENVIRONMENTAL SITE ASSESSMENT

**GROUND
ELEV.** -

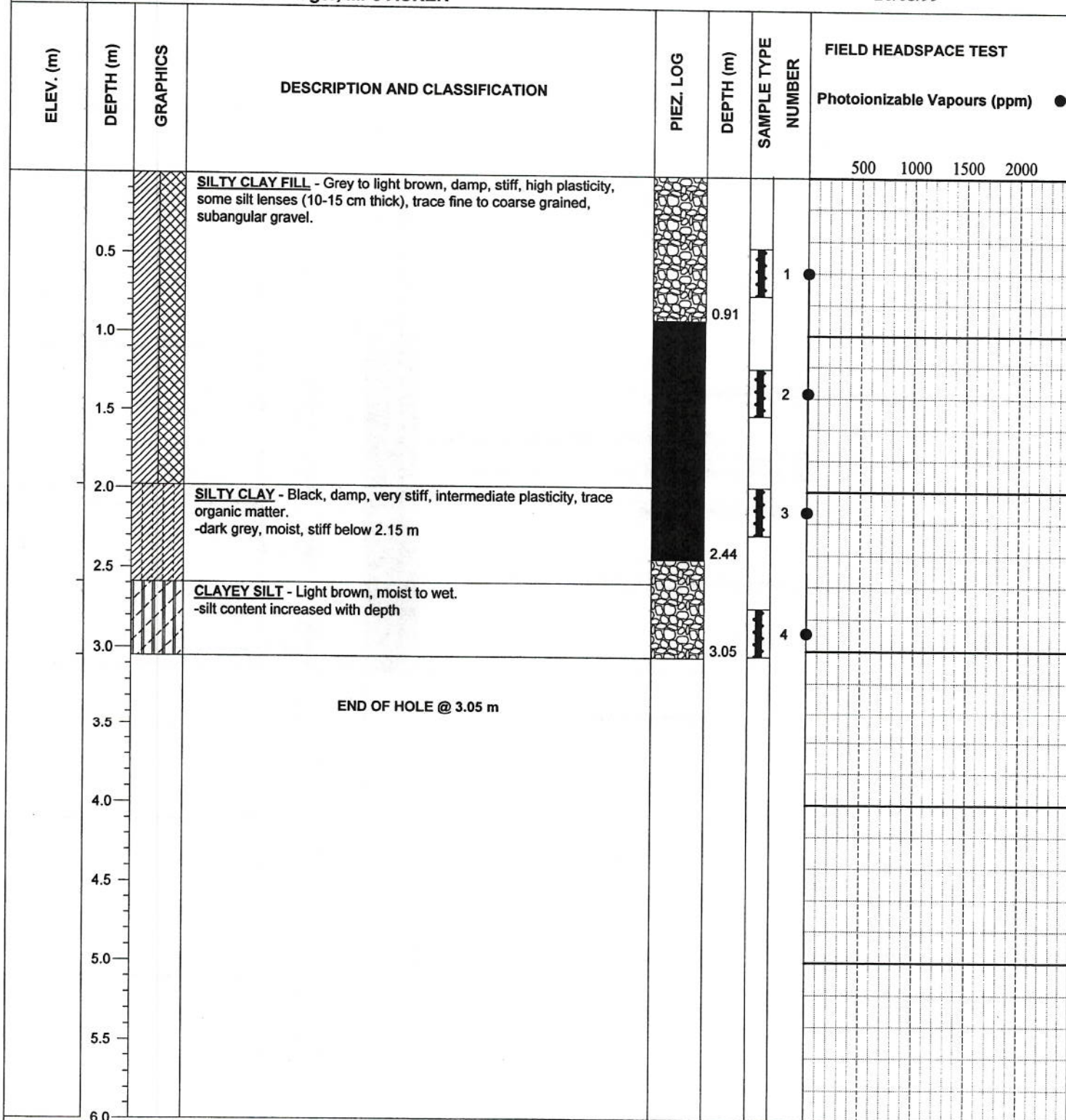
SITE CORNER OF BROOKSIDE BLVD AND JEFFERSON AVE., WINNIPEG

**TOP OF PVC
ELEV.** -

LOCATION West Side of Lot

**WATER
ELEV.** -

**DRILLING
METHOD** 125 mm Solid Stem Auger, MP5 ACKER

**DATE
DRILLED** 20/05/99


SAMPLE TYPE	GRAB FROM BUCKET	SHELBY	SPLIT BARREL	AUGER GRAB
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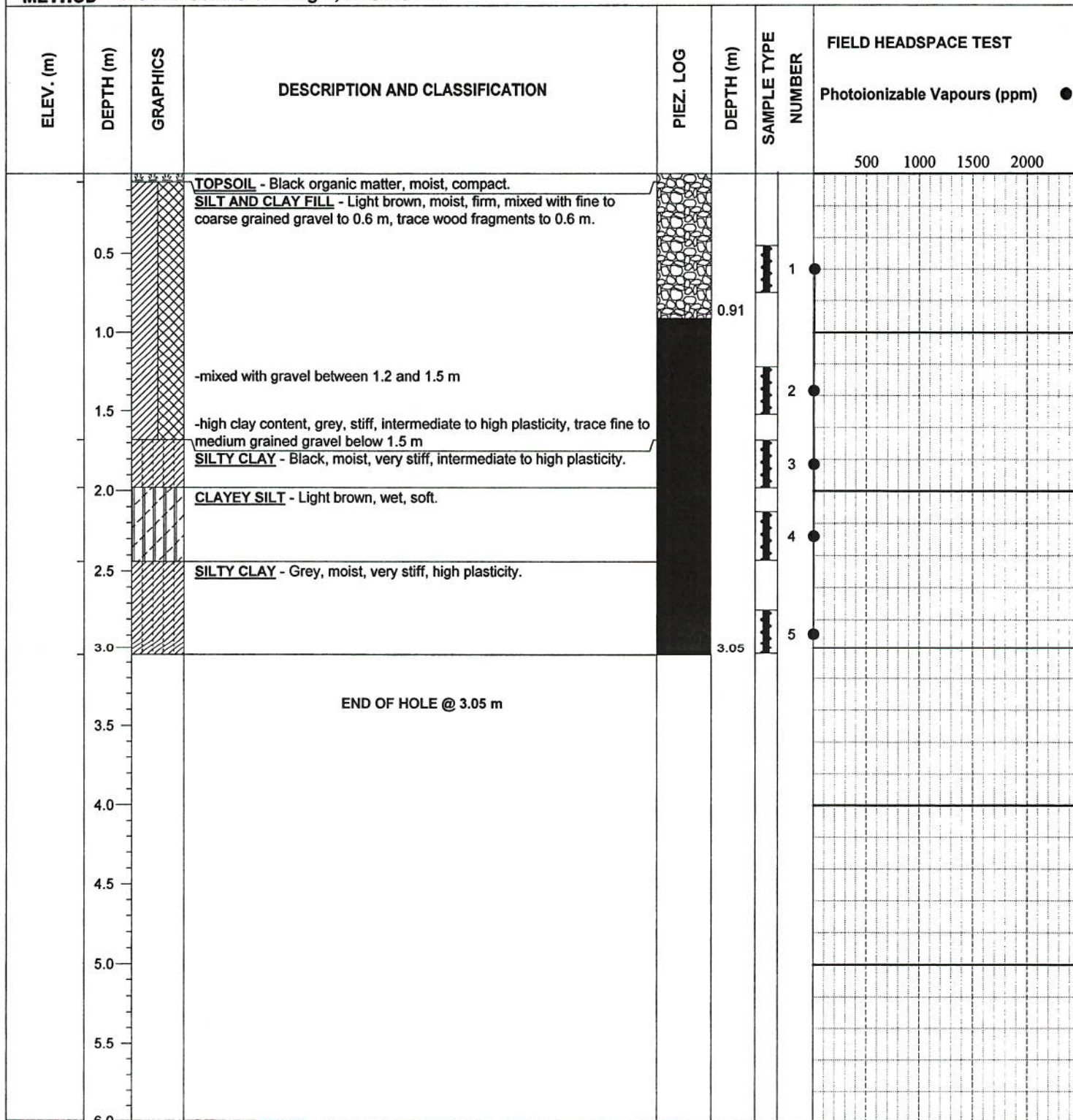
CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
D. KASUR

APPROVED *K80* **DATE** 16/06/99

CLIENT MAPLE LEAF CONSTRUCTION
PROJECT PHASE II ENVIRONMENTAL SITE ASSESSMENT
SITE CORNER OF BROOKSIDE BLVD AND JEFFERSON AVE., WINNIPEG
LOCATION West Side of Lot
DRILLING METHOD 125 mm Solid Stem Auger, MP5 ACKER

JOB NO. 99-570-01
GROUND ELEV. -
TOP OF PVC ELEV. -
WATER ELEV. -
DATE DRILLED 20/05/99



SAMPLE TYPE ☒ GRAB FROM BUCKET ☒ SHELBY ☐ SPLIT BARREL ☐ AUGER GRAB

CONTRACTOR
 Paddock Drilling Ltd.

INSPECTOR
 D. KASUR

APPROVED

KBO

DATE 16/06/99

CLIENT MAPLE LEAF CONSTRUCTION

PROJECT PHASE II ENVIRONMENTAL SITE ASSESSMENT

SITE CORNER OF BROOKSIDE BLVD AND JEFFERSON AVE., WINNIPEG

LOCATION Southwest Corner of Lot

DRILLING METHOD 125 mm Solid Stem Auger, MP5 ACKER

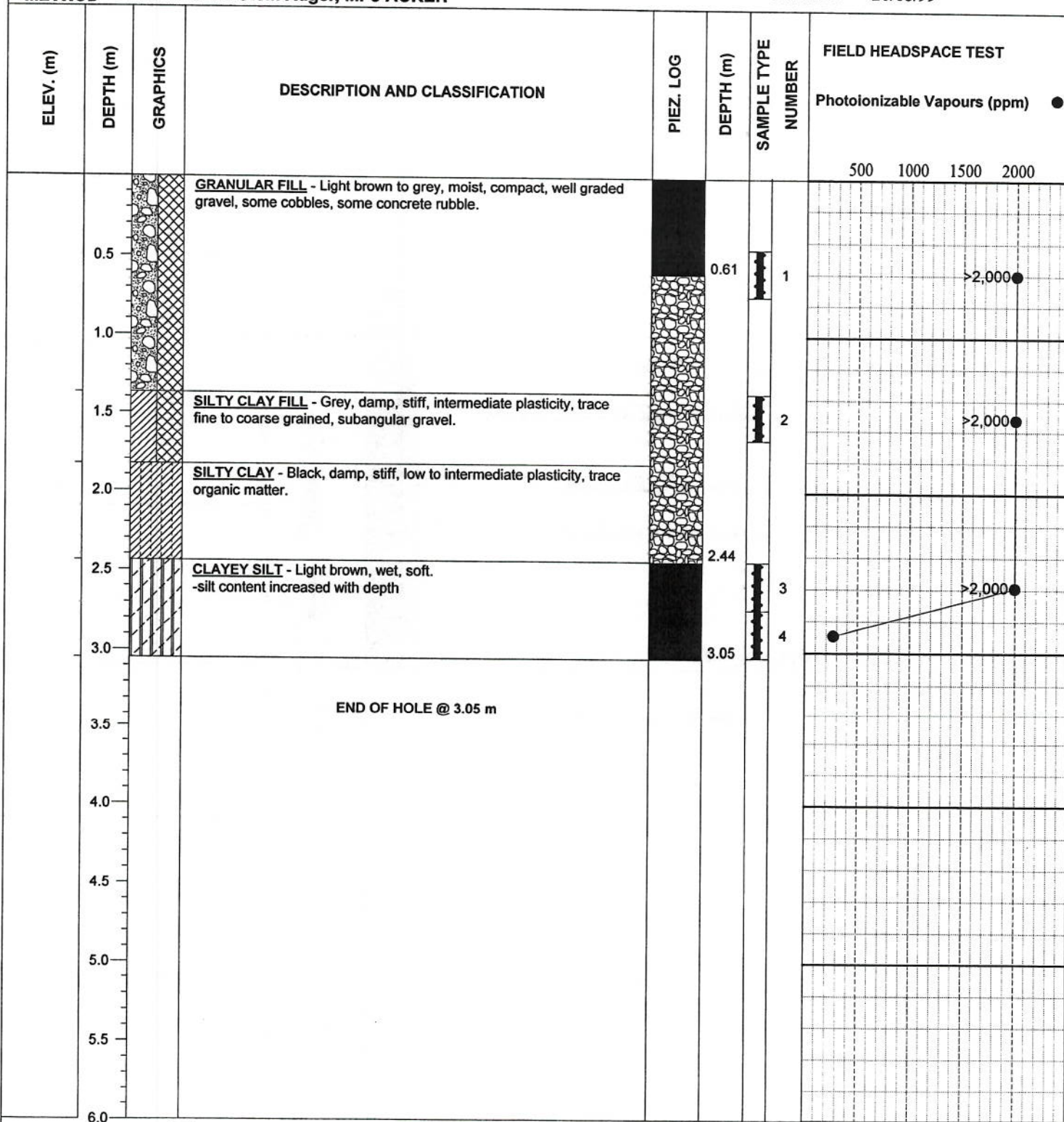
JOB NO. 99-570-01

GROUND ELEV. -

TOP OF PVC ELEV. -

WATER ELEV. -

DATE DRILLED 20/05/99



SAMPLE TYPE



GRAB FROM BUCKET



SHELBY



SPLIT BARREL



AUGER GRAB

CONTRACTOR

Paddock Drilling Ltd.

INSPECTOR

D. KASUR

APPROVED

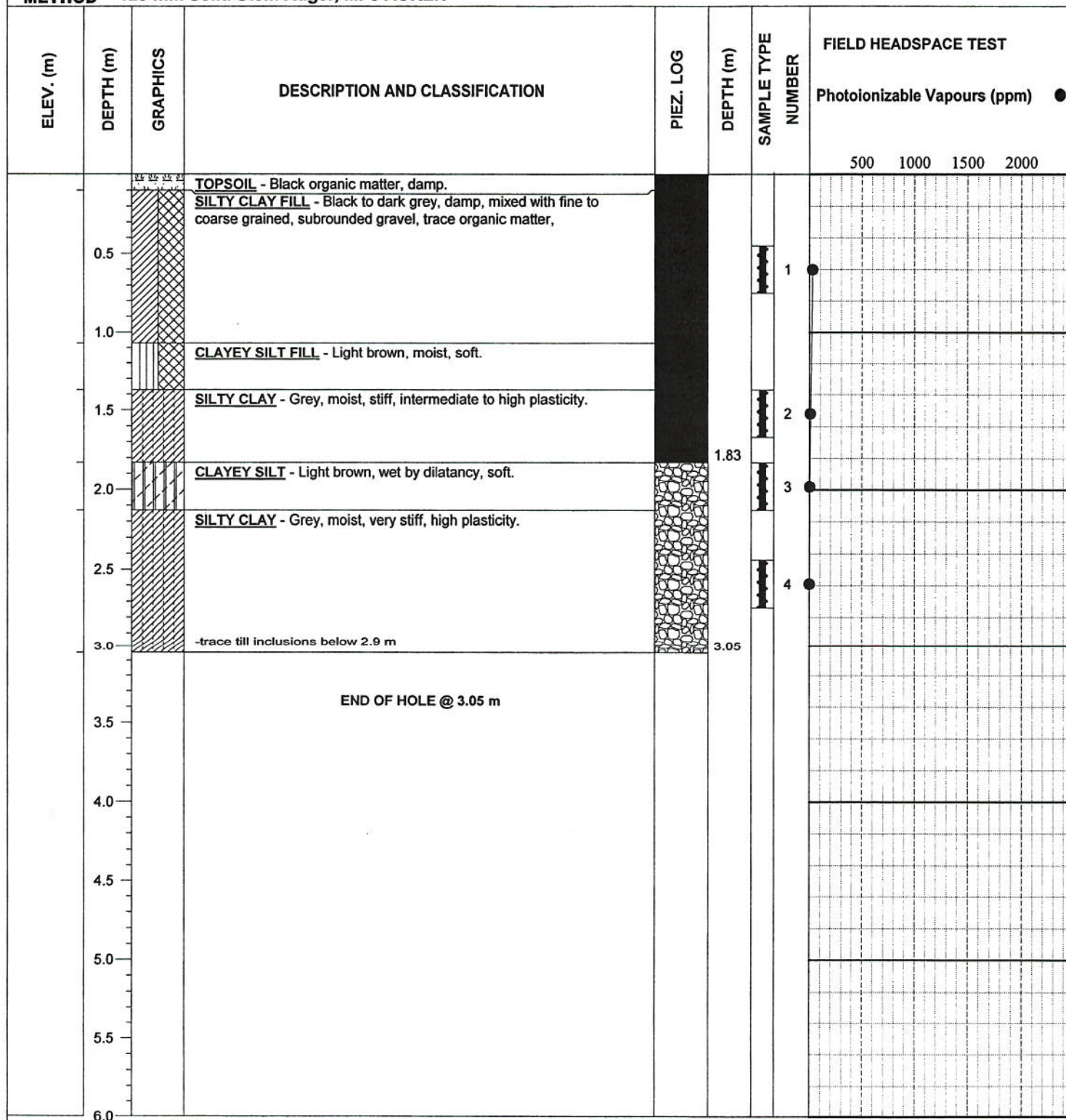
KBO

DATE

16/06/99

CLIENT MAPLE LEAF CONSTRUCTION
PROJECT PHASE II ENVIRONMENTAL SITE ASSESSMENT
SITE CORNER OF BROOKSIDE BLVD AND JEFFERSON AVE., WINNIPEG
LOCATION Northeast Corner of Lot
DRILLING METHOD 125 mm Solid Stem Auger, MP5 ACKER

JOB NO. 99-570-01
GROUND ELEV. -
TOP OF PVC ELEV. -
WATER ELEV. -
DATE DRILLED 20/05/99



SAMPLE TYPE GRAB FROM BUCKET SKELBY SPLIT BARREL AUGER GRAB

CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
D. KASUR

APPROVED

DATE 16/06/99

CLIENT MAPLE LEAF CONSTRUCTION

PROJECT PHASE II ENVIRONMENTAL SITE ASSESSMENT

SITE CORNER OF BROOKSIDE BLVD AND JEFFERSON AVE., WINNIPEG

LOCATION East Side of Lot

DRILLING METHOD 125 mm Solid Stem Auger, MP5 ACKER

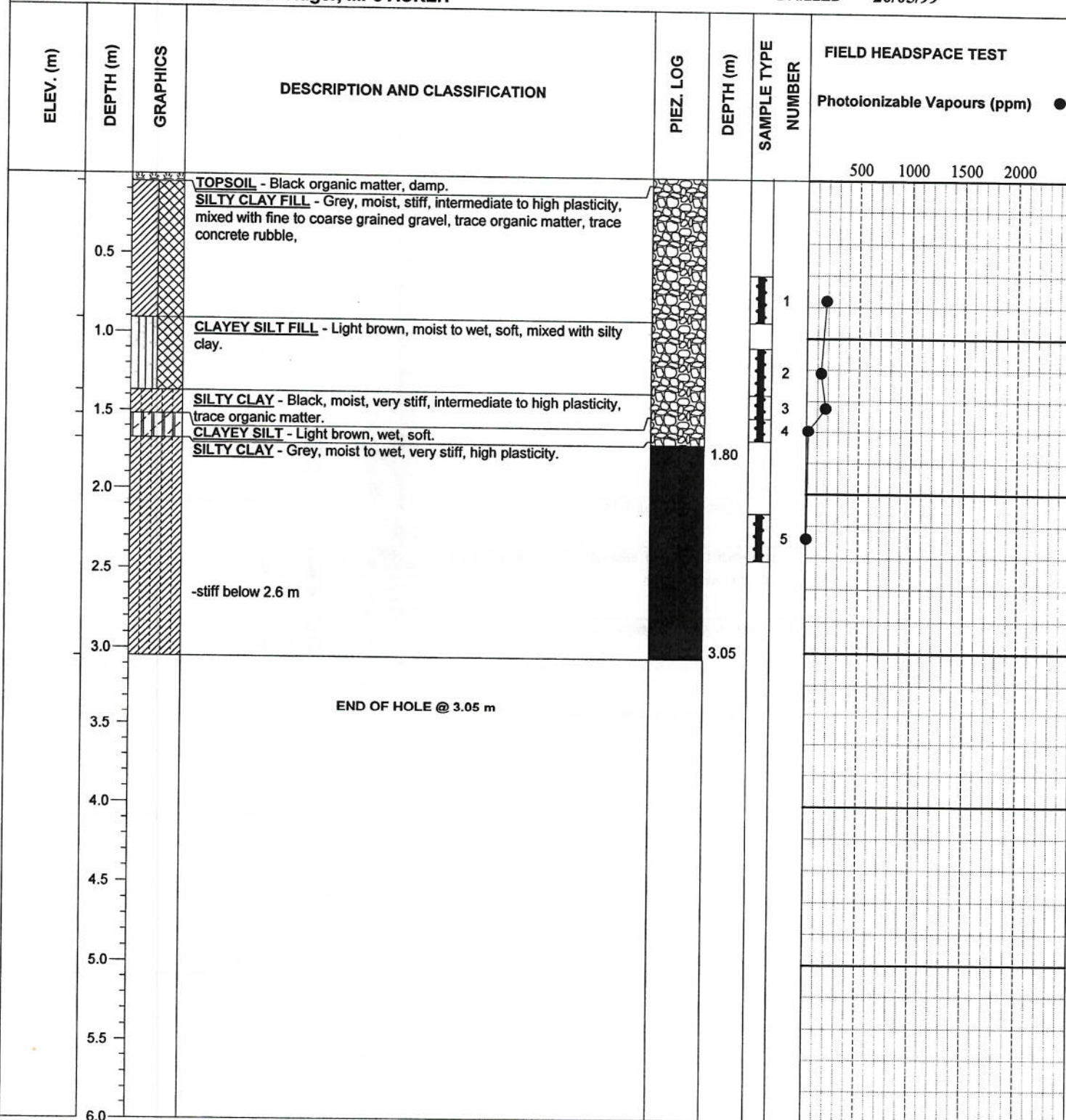
JOB NO. 99-570-01

GROUND ELEV. -

TOP OF PVC ELEV. -

WATER ELEV. -

DATE DRILLED 20/05/99



SAMPLE TYPE



GRAB FROM BUCKET



SHELBY



SPLIT BARREL



AUGER GRAB

CONTRACTOR

Paddock Drilling Ltd.

INSPECTOR

D. KASUR

APPROVED

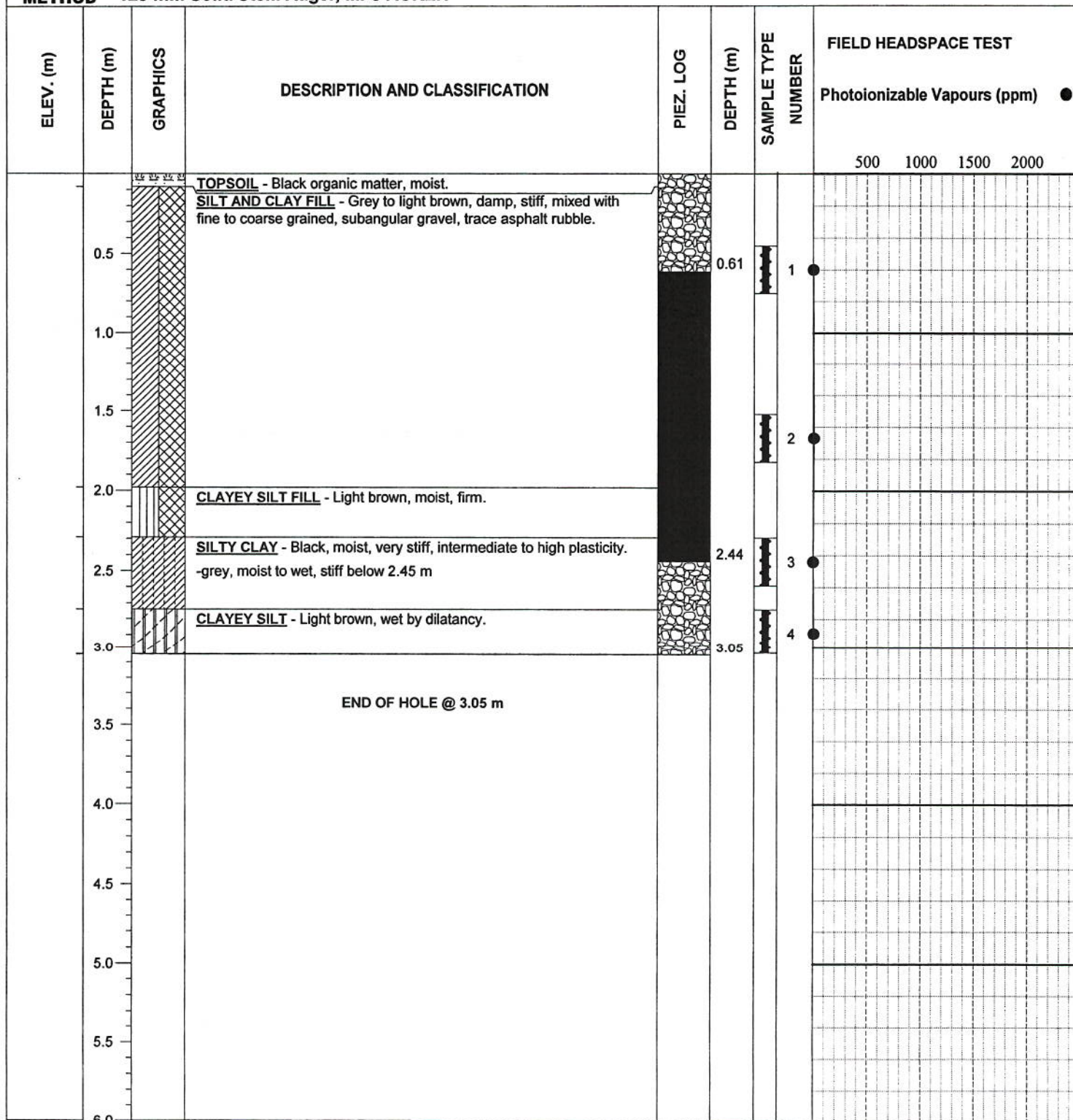
KBO

DATE

16/06/99

CLIENT MAPLE LEAF CONSTRUCTION
PROJECT PHASE II ENVIRONMENTAL SITE ASSESSMENT
SITE CORNER OF BROOKSIDE BLVD AND JEFFERSON AVE., WINNIPEG
LOCATION Southern Edge, near Corner of Lot
DRILLING METHOD 125 mm Solid Stem Auger, MP5 ACKER

JOB NO. 99-570-01
GROUND ELEV. -
TOP OF PVC ELEV. -
WATER ELEV. -
DATE DRILLED 20/05/99



SAMPLE TYPE  GRAB FROM BUCKET  SHELBY  SPLIT BARREL  AUGER GRAB

CONTRACTOR
 Paddock Drilling Ltd.

INSPECTOR
 D. KASUR

APPROVED

K30

DATE 16/06/99

APPENDIX B

**LABORATORY CERTIFICATES OF ANALYSIS
FROM ENVIRO-TEST LABORATORIES**

JUN 10 1999

KT



Enviro-Test

LABORATORIES



Manitoba Technology Centre Ltd.

FAX: 896 0754

FAX and Mail

CHEMICAL ANALYSIS REPORT

KGS Group Consultants
3227 Roblin Blvd
Winnipeg MB R3R 0C2

DATE: June 4 1999

ATTN:

Lab Work Order #: W990507586 Submitted By: Osiowy K
Project Reference: 99-570-01
Project P.O. #: Date Received: 99/ 5/28

Comments:

APPROVED BY:


Shirley Dzogan
Project Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY.
ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU
REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

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 ANALYSIS REPORT

FAX and Mail
Page 2
W990507586 CONT...

LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	METHOD #	ANALYZED	ANALYST
99-A25125								
	MW 1							
		Sample Type: Water - Ground						
		Collected: 99/ 5/28						
		Inorganics						
		Aluminum - Total	< 0.02	0.02	mg/L	A510.03	99/ 6/ 1	DAG
		Antimony - Total	0.002	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Arsenic - Total	0.0098	0.0005	mg/L	A510.03	99/ 6/ 1	DAG
		Barium - Total	0.185	0.0003	mg/L	A510.03	99/ 6/ 1	DAG
		Beryllium - Total	< 0.001	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Bismuth - Total	< 0.0001	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Boron - Total	0.67	0.01	mg/L	A510.03	99/ 6/ 1	DAG
		Cadmium - Total	< 0.0002	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
		Calcium - Total	187.	0.1	mg/L	A510.03	99/ 6/ 1	DAG
		Cesium - Total	< 0.0001	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Chromium - Total	0.003	0.002	mg/L	A510.03	99/ 6/ 1	DAG
		Cobalt - Total	0.0005	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
		Copper - Total	0.015	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Iron - Total	0.32	0.01	mg/L	A510.03	99/ 6/ 1	DAG
		Lead - Total	0.0009	0.0005	mg/L	A510.03	99/ 6/ 1	DAG
		Lithium - Total	0.521	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Magnesium - Total	881.	0.02	mg/L	A500.06	99/ 6/ 3	TEP
		Manganese - Total	0.0221	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
		Molybdenum - Total	0.0065	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Nickel - Total	0.011	0.002	mg/L	A510.03	99/ 6/ 1	DAG
		Phosphorus - Total	0.09	0.05	mg/L	A510.03	99/ 6/ 1	DAG
		Potassium - Total	4.98	0.05	mg/L	A510.03	99/ 6/ 1	DAG
		Rubidium - Total	0.0019	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
		Selenium - Total	0.013	0.002	mg/L	A510.03	99/ 6/ 1	DAG
		Silver - Total	< 0.0004	0.0004	mg/L	A510.03	99/ 6/ 1	DAG
		Sodium - Total	945.	0.2	mg/L	A500.06	99/ 6/ 3	TEP
		Strontium - Total	2.24	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Tellurium - Total	< 0.001	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Thallium - Total	< 0.0001	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Tin - Total	0.0013	0.0005	mg/L	A510.03	99/ 6/ 1	DAG
		Titanium - Total	0.0201	0.0005	mg/L	A510.03	99/ 6/ 1	DAG
		Tungsten - Total	< 0.0002	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
		Uranium - Total	0.204	0.0001	mg/L	A510.03	99/ 6/ 1	DAG

ENVIRO-TEST ANALYSIS REPORT

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LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	METHOD #	ANALYZED	ANALYST
		Vanadium - Total	0.008	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Zinc - Total	0.14	0.02	mg/L	A510.03	99/ 6/ 1	DAG
		Zirconium - Total	0.0269	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
COMMENTS FOR LAB NUMBER 99-A25125								
LAB COMMENT Additional acid was required to bring the pH of the sample to less than 2 pH units.								
99-A25126								
		MW 2						
		Sample Type: Water - Ground						
		Collected: 99/ 5/28						
		Inorganics						
		Aluminum - Total	0.02	0.02	mg/L	A510.03	99/ 6/ 1	DAG
		Antimony - Total	0.002	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Arsenic - Total	0.0065	0.0005	mg/L	A510.03	99/ 6/ 1	DAG
		Barium - Total	0.417	0.0003	mg/L	A510.03	99/ 6/ 1	DAG
		Beryllium - Total	< 0.001	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Bismuth - Total	< 0.0001	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Boron - Total	0.23	0.01	mg/L	A510.03	99/ 6/ 1	DAG
		Cadmium - Total	< 0.0002	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
		Calcium - Total	88.3	0.1	mg/L	A510.03	99/ 6/ 1	DAG
		Cesium - Total	< 0.0001	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Chromium - Total	0.004	0.002	mg/L	A510.03	99/ 6/ 1	DAG
		Cobalt - Total	0.0003	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
		Copper - Total	0.008	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Iron - Total	0.28	0.01	mg/L	A510.03	99/ 6/ 1	DAG
		Lead - Total	0.0007	0.0005	mg/L	A510.03	99/ 6/ 1	DAG
		Lithium - Total	0.259	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Magnesium - Total	380.	0.01	mg/L	A510.03	99/ 6/ 1	DAG
		Manganese - Total	0.0042	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
		Molybdenum - Total	0.0036	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Nickel - Total	0.006	0.002	mg/L	A510.03	99/ 6/ 1	DAG

ENVIRO-TEST ANALYSIS REPORT

FAX and Mail
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W990507586 CONT...

LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	METHOD #	ANALYZED	ANALYST
		Phosphorus - Total	0.08	0.05	mg/L	A510.03	99/ 6/ 1	DAG
		Potassium - Total	3.79	0.05	mg/L	A510.03	99/ 6/ 1	DAG
		Rubidium - Total	0.0019	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
		Selenium - Total	0.013	0.002	mg/L	A510.03	99/ 6/ 1	DAG
		Silver - Total	< 0.0004	0.0004	mg/L	A510.03	99/ 6/ 1	DAG
		Sodium - Total	230.	0.02	mg/L	A510.03	99/ 6/ 1	DAG
		Strontium - Total	1.33	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Tellurium - Total	< 0.001	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Thallium - Total	< 0.0001	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Tin - Total	0.0018	0.0005	mg/L	A510.03	99/ 6/ 1	DAG
		Titanium - Total	0.0045	0.0005	mg/L	A510.03	99/ 6/ 1	DAG
		Tungsten - Total	< 0.0002	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
		Uranium - Total	0.0454	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Vanadium - Total	0.021	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Zinc - Total	0.13	0.02	mg/L	A510.03	99/ 6/ 1	DAG
		Zirconium - Total	0.0169	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
COMMENTS FOR LAB NUMBER 99-A25126								
LAB COMMENT Additional acid was required to bring the pH of the sample to less than 2 pH units.								
99-A25127	MW 3	Sample Type: Water - Ground Collected: 99/ 5/28						
		Inorganics						
		Aluminum - Total	0.02	0.02	mg/L	A510.03	99/ 6/ 1	DAG
		Antimony - Total	0.003	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Arsenic - Total	0.0064	0.0005	mg/L	A510.03	99/ 6/ 1	DAG
		Barium - Total	0.216	0.0003	mg/L	A510.03	99/ 6/ 1	DAG
		Beryllium - Total	< 0.001	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Bismuth - Total	0.0002	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Boron - Total	0.25	0.01	mg/L	A510.03	99/ 6/ 1	DAG

ENVIRO-TEST ANALYSIS REPORT

FAX and Mail
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LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	METHOD #	ANALYZED	ANALYST
		Cadmium - Total	0.0011	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
		Calcium - Total	615.	0.05	mg/L	A500.06	99/ 6/ 3	TEP
		Cesium - Total	< 0.0001	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Chromium - Total	0.004	0.002	mg/L	A510.03	99/ 6/ 1	DAG
		Cobalt - Total	0.0073	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
		Copper - Total	0.016	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Iron - Total	0.53	0.01	mg/L	A510.03	99/ 6/ 1	DAG
		Lead - Total	0.0010	0.0005	mg/L	A510.03	99/ 6/ 1	DAG
		Lithium - Total	0.487	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Magnesium - Total	1240	0.02	mg/L	A500.06	99/ 6/ 3	TEP
		Manganese - Total	1.84	0.005	mg/L	A500.06	99/ 6/ 3	TEP
		Molybdenum - Total	0.0065	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Nickel - Total	0.030	0.002	mg/L	A510.03	99/ 6/ 1	DAG
		Phosphorus - Total	0.09	0.05	mg/L	A510.03	99/ 6/ 1	DAG
		Potassium - Total	15.0	0.05	mg/L	A510.03	99/ 6/ 1	DAG
		Rubidium - Total	0.0042	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
		Selenium - Total	0.010	0.002	mg/L	A510.03	99/ 6/ 1	DAG
		Silver - Total	< 0.0004	0.0004	mg/L	A510.03	99/ 6/ 1	DAG
		Sodium - Total	1650	0.2	mg/L	A500.06	99/ 6/ 3	TEP
		Strontium - Total	4.74	0.001	mg/L	A500.06	99/ 6/ 3	TEP
		Tellurium - Total	< 0.001	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Thallium - Total	0.0002	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Tin - Total	0.0040	0.0005	mg/L	A510.03	99/ 6/ 1	DAG
		Titanium - Total	0.0345	0.0005	mg/L	A510.03	99/ 6/ 1	DAG
		Tungsten - Total	0.0005	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
		Uranium - Total	0.0736	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Vanadium - Total	< 0.001	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Zinc - Total	0.17	0.02	mg/L	A510.03	99/ 6/ 1	DAG
		Zirconium - Total	0.0015	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
99-A25128								
MW 4								
		Sample Type: Water - Ground						
		Collected: 99/ 5/28						
		Inorganics						
		Aluminum - Total	0.02	0.02	mg/L	A510.03	99/ 6/ 1	DAG
		Antimony - Total	0.003	0.001	mg/L	A510.03	99/ 6/ 1	DAG

ENVIRO-TEST ANALYSIS REPORT

FAX and Mail
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LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	METHOD #	ANALYZED	ANALYST
		Arsenic - Total	0.0052	0.0005	mg/L	A510.03	99/ 6/ 1	DAG
		Barium - Total	0.0400	0.0003	mg/L	A510.03	99/ 6/ 1	DAG
		Beryllium - Total	< 0.001	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Bismuth - Total	< 0.0001	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Boron - Total	0.33	0.01	mg/L	A510.03	99/ 6/ 1	DAG
		Cadmium - Total	0.0005	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
		Calcium - Total	500.	0.05	mg/L	A500.06	99/ 6/ 3	TEP
		Cesium - Total	< 0.0001	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Chromium - Total	0.004	0.002	mg/L	A510.03	99/ 6/ 1	DAG
		Cobalt - Total	0.0045	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
		Copper - Total	0.008	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Iron - Total	0.42	0.01	mg/L	A510.03	99/ 6/ 1	DAG
		Lead - Total	0.0012	0.0005	mg/L	A510.03	99/ 6/ 1	DAG
		Lithium - Total	0.386	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Magnesium - Total	694.	0.02	mg/L	A500.06	99/ 6/ 3	TEP
		Manganese - Total	1.38	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
		Molybdenum - Total	0.0102	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Nickel - Total	0.017	0.002	mg/L	A510.03	99/ 6/ 1	DAG
		Phosphorus - Total	0.11	0.05	mg/L	A510.03	99/ 6/ 1	DAG
		Potassium - Total	14.4	0.05	mg/L	A510.03	99/ 6/ 1	DAG
		Rubidium - Total	0.0029	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
		Selenium - Total	0.009	0.002	mg/L	A510.03	99/ 6/ 1	DAG
		Silver - Total	< 0.0004	0.0004	mg/L	A510.03	99/ 6/ 1	DAG
		Sodium - Total	1190	0.2	mg/L	A500.06	99/ 6/ 3	TEP
		Strontium - Total	4.23	0.001	mg/L	A500.06	99/ 6/ 3	TEP
		Tellurium - Total	< 0.001	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Thallium - Total	< 0.0001	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Tin - Total	0.0032	0.0005	mg/L	A510.03	99/ 6/ 1	DAG
		Titanium - Total	0.0155	0.0005	mg/L	A510.03	99/ 6/ 1	DAG
		Tungsten - Total	0.0003	0.0002	mg/L	A510.03	99/ 6/ 1	DAG
		Uranium - Total	0.0866	0.0001	mg/L	A510.03	99/ 6/ 1	DAG
		Vanadium - Total	< 0.001	0.001	mg/L	A510.03	99/ 6/ 1	DAG
		Zinc - Total	0.02	0.02	mg/L	A510.03	99/ 6/ 1	DAG
		Zirconium - Total	0.0012	0.0002	mg/L	A510.03	99/ 6/ 1	DAG

ENVIRO-TEST LABORATORIES TEST METHODOLOGIES

Metals, by Plasma-Mass Spectrometer (ICP-MS)

ETL Method Number: A510.03

References: EPA 200.8

Principle of Method:

The sample is diluted to reduce the dissolved solids content, then nebulized. The resulting aerosol is transported through a Radio Frequency generated plasma, where it is ionized. The ions are extracted from the center of the plasma using a series of progressively increasing vacuums and directed into the quadrupole of the mass spectrometer by an ion lens. In the quadrupole, the ions are separated according to mass/charge ratio and passed through the discrete dynode detector for quantitation by the computer system.

For dissolved metals, the sample is filtered, then acidified prior to analysis. For extractable metals, the sample is acidified prior to analysis, but not filtered. For total metals, a portion of the acidified sample is digested with nitric acid in a microwave digestion unit prior to analysis.

Metals, Total and Extractable in Water

ETL Method Number: A500.06

References: EPA 200.7, EPA 3015 modified

Principle of Method:

Acidified water samples are nebulized using a concentric glass nebulizer. The aerosol is transported through an inductively coupled plasma. Emission spectra are produced as the sample is heated to 6000 - 8000 degrees Kelvin within the plasma. Emission intensities at specific wavelengths are measured simultaneously, one for each element of interest. These intensities are converted to concentration values by the computer operating system. Samples to be analyzed for "Dissolved" are filtered prior to analysis.

JUN 11 1999

ETL

Enviro-Test
LABORATORIES

MTC

Manitoba Technology Centre Ltd.

FAX: 896 0754

FAX and Mail

CHEMICAL ANALYSIS REPORT

KGS Group Consultants
3227 Roblin Blvd
Winnipeg MB R3R 0C2

DATE: June 3 1999

ATTN: KASUR D

Lab Work Order #: W990507156 Submitted By: Kasur D

Project Reference: 99-570-01

Project P.O. #: _____ Date Received: 99/ 5/21

Comments:

APPROVED BY:

Paul Nicolas

Paul Nicolas

Project Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY.
ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU
REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

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 ANALYSIS REPORT

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LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	METHOD #	ANALYZED	ANALYST
99-A23781 TH4-1 Sample Type: Soil Collected: 99/ 5/20		Other Analysis Miscellaneous Analysis	See Attached	***		A999.01	99/ 6/ 1	JCD
99-A23782 MW1-1 Sample Type: Soil Collected: 99/ 5/20		Other Analysis Miscellaneous Analysis	See Attached	***		A999.01	99/ 6/ 1	JCD
99-A23783 MW2-1 Sample Type: Soil Collected: 99/ 5/20		Other Analysis Miscellaneous Analysis	See Attached	***		A999.01	99/ 6/ 1	JCD
99-A23784 MW3-1 Sample Type: Soil Collected: 99/ 5/20		Other Analysis Miscellaneous Analysis	See Attached	***		A999.01	99/ 6/ 1	JCD

ENVIRO-TEST ANALYSIS REPORT

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LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	METHOD #	ANALYZED	ANALYST
99-A23785	MW4-1	Sample Type: Soil Collected: 99/ 5/20 Other Analysis Miscellaneous Analysis	See Attached	***		A999.01	99/ 6/ 1	JCD
99-A23786	TH1-1	Sample Type: Soil Collected: 99/ 5/20 Other Analysis Miscellaneous Analysis	See Attached	***		A999.01	99/ 6/ 1	JCD
99-A23787	TH2-2	Sample Type: Soil Collected: 99/ 5/20 Other Analysis Miscellaneous Analysis	See Attached	***		A999.01	99/ 6/ 1	JCD
99-A23788	TH3-1	Sample Type: Soil Collected: 99/ 5/20 Other Analysis Miscellaneous Analysis	See Attached	***		A999.01	99/ 6/ 1	JCD

ENVIRO-TEST ANALYSIS REPORT

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LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	METHOD #	ANALYZED	ANALYST
99-A23789 TH5-1 Sample Type: Soil Collected: 99/ 5/20 Other Analysis Miscellaneous Analysis			See Attached	***		A999.01	99/ 6/ 1	JCD
99-A23790 TH6-2 Sample Type: Soil Collected: 99/ 5/20 Other Analysis Miscellaneous Analysis			See Attached	***		A999.01	99/ 6/ 1	JCD
99-A23791 TH7-2 Sample Type: Soil Collected: 99/ 5/20 Other Analysis Miscellaneous Analysis			See Attached	***		A999.01	99/ 6/ 1	JCD

ENVIRO-TEST CHEMICAL ANALYSIS REPORT ATTACHMENT

LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	EXTRACTED	ANALYZED	BY
W99050571	TH 4-1 Sample Type:SOIL Collected:05/20/99	Cyanide, (Total Prep.)	done		done	05/31/99	06/04/99 06/01/99	EDM EDM EDM
		Cyanide, (Total)	<0.5	0.5	mg/kg			
		Chromium +6	<0.01	0.01	mg/kg			
		CCME Metals						
		Arsenic (As)	3.8	0.1	mg/kg		05/31/99	EDM
		Mercury (Hg)	<0.01	0.01	mg/kg		05/31/99	EDM
		Silver (Ag)	<1	1	mg/kg		05/31/99	EDM
		Barium (Ba)	170	0.5	mg/kg		05/31/99	EDM
		Beryllium (Be)	<1	1	mg/kg		05/31/99	EDM
		Cadmium (Cd)	<0.5	0.5	mg/kg		05/31/99	EDM
		Cobalt (Co)	7	1	mg/kg		05/31/99	EDM
		Chromium (Cr)	32.7	0.5	mg/kg		05/31/99	EDM
		Copper (Cu)	23	1	mg/kg		05/31/99	EDM
		Molybdenum (Mo)	<1	1	mg/kg		05/31/99	EDM
		Nickel (Ni)	22	2	mg/kg		05/31/99	EDM
		Lead (Pb)	34	5	mg/kg		05/31/99	EDM
		Tin (Sn)	<5	5	mg/kg		05/31/99	EDM
		Thallium (Tl)	<1	1	mg/kg		05/31/99	EDM
		Vanadium (V)	49	1	mg/kg		05/31/99	EDM
		Zinc (Zn)	60.3	0.5	mg/kg		05/31/99	EDM
		Antimony (Sb)	<0.1	0.1	mg/kg		05/31/99	EDM
		Selenium (Se)	0.1	0.1	mg/kg		05/31/99	EDM
W99050571	MW 1-1 Sample Type:SOIL Collected:05/20/99	Cyanide, (Total Prep.)	done		done	05/31/99	06/04/99 06/01/99	EDM EDM EDM
		Cyanide, (Total)	<0.5	0.5	mg/kg			
		Chromium +6	<0.01	0.01	mg/kg			
		CCME Metals						
		Arsenic (As)	3.7	0.1	mg/kg		05/31/99	EDM
		Mercury (Hg)	<0.01	0.01	mg/kg		05/31/99	EDM
		Silver (Ag)	<1	1	mg/kg		05/31/99	EDM
		Barium (Ba)	982	0.5	mg/kg		05/31/99	EDM
		Beryllium (Be)	<1	1	mg/kg		05/31/99	EDM
		Cadmium (Cd)	<0.5	0.5	mg/kg		05/31/99	EDM
		Cobalt (Co)	7	1	mg/kg		05/31/99	EDM
		Chromium (Cr)	28.3	0.5	mg/kg		05/31/99	EDM
		Copper (Cu)	25	1	mg/kg		05/31/99	EDM
		Molybdenum (Mo)	<1	1	mg/kg		05/31/99	EDM
		Nickel (Ni)	21	2	mg/kg		05/31/99	EDM
		Lead (Pb)	35	5	mg/kg		05/31/99	EDM
		Tin (Sn)	<5	5	mg/kg		05/31/99	EDM
		Thallium (Tl)	<1	1	mg/kg		05/31/99	EDM
		Vanadium (V)	34	1	mg/kg		05/31/99	EDM
		Zinc (Zn)	79.2	0.5	mg/kg		05/31/99	EDM
		Antimony (Sb)	<0.1	0.1	mg/kg		05/31/99	EDM
		Selenium (Se)	0.1	0.1	mg/kg		05/31/99	EDM
W99050571	MW 2-1 Sample Type:SOIL	Cyanide, (Total Prep.)	done		done	05/31/99	06/04/99 06/01/99	EDM EDM EDM
		Cyanide, (Total)	<0.5	0.5	mg/kg			
		Chromium +6	<0.01	0.01	mg/kg			
		CCME Metals						
		Arsenic (As)	4.4	0.1	mg/kg		05/31/99	EDM
		Mercury (Hg)	<0.01	0.01	mg/kg		05/31/99	EDM
		Silver (Ag)	<1	1	mg/kg		05/31/99	EDM
		Barium (Ba)	267	0.5	mg/kg		05/31/99	EDM
		Beryllium (Be)	<1	1	mg/kg		05/31/99	EDM
		Cadmium (Cd)	<0.5	0.5	mg/kg		05/31/99	EDM
		Cobalt (Co)	7	1	mg/kg		05/31/99	EDM
		Chromium (Cr)	31.1	0.5	mg/kg		05/31/99	EDM
		Copper (Cu)	26	1	mg/kg		05/31/99	EDM
		Molybdenum (Mo)	<1	1	mg/kg		05/31/99	EDM
		Nickel (Ni)	22	2	mg/kg		05/31/99	EDM
		Lead (Pb)	122	5	mg/kg		05/31/99	EDM
		Tin (Sn)	<5	5	mg/kg		05/31/99	EDM
		Thallium (Tl)	<1	1	mg/kg		05/31/99	EDM
		Vanadium (V)	41	1	mg/kg		05/31/99	EDM

ENVIRO-TEST CHEMICAL ANALYSIS REPORT ATTACHMENT

LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	EXTRACTED	ANALYZED	BY
W99050571	MW 2-1 Sample Type:SOIL Collected:05/20/99	CCME Metals						
		Zinc (Zn)	108	0.5	mg/kg		05/31/99	EDM
		Antimony (Sb)	<0.1	0.1	mg/kg		05/31/99	EDM
		Selenium (Se)	0.3	0.1	mg/kg		05/31/99	EDM
W99050571	MW 3-1 Sample Type:SOIL	Cyanide, (Total Prep.)	done		done	05/31/99		EDM
		Cyanide, (Total)	<0.5	0.5	mg/kg		06/04/99	EDM
		Chromium + 6	<0.01	0.01	mg/kg		06/01/99	EDM
		CCME Metals						
		Arsenic (As)	5.1	0.1	mg/kg		05/31/99	EDM
		Mercury (Hg)	<0.01	0.01	mg/kg		05/31/99	EDM
		Silver (Ag)	<1	1	mg/kg		05/31/99	EDM
		Barium (Ba)	243	0.5	mg/kg		05/31/99	EDM
		Beryllium (Be)	<1	1	mg/kg		05/31/99	EDM
		Cadmium (Cd)	<0.5	0.5	mg/kg		05/31/99	EDM
		Cobalt (Co)	9	1	mg/kg		05/31/99	EDM
		Chromium (Cr)	37.2	0.5	mg/kg		05/31/99	EDM
		Copper (Cu)	23	1	mg/kg		05/31/99	EDM
		Molybdenum (Mo)	<1	1	mg/kg		05/31/99	EDM
		Nickel (Ni)	26	2	mg/kg		05/31/99	EDM
		Lead (Pb)	20	5	mg/kg		05/31/99	EDM
		Tin (Sn)	<5	5	mg/kg		05/31/99	EDM
		Thallium (Tl)	<1	1	mg/kg		05/31/99	EDM
		Vanadium (V)	54	1	mg/kg		05/31/99	EDM
		Zinc (Zn)	66.7	0.5	mg/kg		05/31/99	EDM
		Antimony (Sb)	<0.1	0.1	mg/kg		05/31/99	EDM
		Selenium (Se)	<0.1	0.1	mg/kg		05/31/99	EDM
W99050571	MW 4-1 Sample Type:SOIL	Cyanide, (Total Prep.)	done		done	05/31/99		EDM
		Cyanide, (Total)	<0.5	0.5	mg/kg		06/04/99	EDM
		Chromium + 6	<0.01	0.01	mg/kg		06/01/99	EDM
		CCME Metals						
		Arsenic (As)	3.5	0.1	mg/kg		05/31/99	EDM
		Mercury (Hg)	<0.01	0.01	mg/kg		05/31/99	EDM
		Silver (Ag)	<1	1	mg/kg		05/31/99	EDM
		Barium (Ba)	137	0.5	mg/kg		05/31/99	EDM
		Beryllium (Be)	<1	1	mg/kg		05/31/99	EDM
		Cadmium (Cd)	<0.5	0.5	mg/kg		05/31/99	EDM
		Cobalt (Co)	7	1	mg/kg		05/31/99	EDM
		Chromium (Cr)	30.1	0.5	mg/kg		05/31/99	EDM
		Copper (Cu)	24	1	mg/kg		05/31/99	EDM
		Molybdenum (Mo)	<1	1	mg/kg		05/31/99	EDM
		Nickel (Ni)	20	2	mg/kg		05/31/99	EDM
		Lead (Pb)	32	5	mg/kg		05/31/99	EDM
		Tin (Sn)	<5	5	mg/kg		05/31/99	EDM
		Thallium (Tl)	<1	1	mg/kg		05/31/99	EDM
		Vanadium (V)	42	1	mg/kg		05/31/99	EDM
		Zinc (Zn)	55.6	0.5	mg/kg		05/31/99	EDM
		Antimony (Sb)	<0.1	0.1	mg/kg		05/31/99	EDM
		Selenium (Se)	0.3	0.1	mg/kg		05/31/99	EDM
W99050571	TH 1-1 Sample Type:SOIL	Cyanide, (Total Prep.)	done		done	05/31/99		EDM
		Cyanide, (Total)	<0.5	0.5	mg/kg		06/04/99	EDM
		Chromium + 6	<0.01	0.01	mg/kg		06/01/99	EDM
		CCME Metals						
		Arsenic (As)	2.6	0.1	mg/kg		05/31/99	EDM
		Mercury (Hg)	<0.01	0.01	mg/kg		05/31/99	EDM
		Silver (Ag)	<1	1	mg/kg		05/31/99	EDM
		Barium (Ba)	287	0.5	mg/kg		05/31/99	EDM
		Beryllium (Be)	<1	1	mg/kg		05/31/99	EDM
		Cadmium (Cd)	<0.5	0.5	mg/kg		05/31/99	EDM
		Cobalt (Co)	4	1	mg/kg		05/31/99	EDM
		Chromium (Cr)	23.1	0.5	mg/kg		05/31/99	EDM

ENVIRO-TEST CHEMICAL ANALYSIS REPORT ATTACHMENT

LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	EXTRACTED	ANALYZED	BY
W99050571	TH 1-1 Sample Type:SOIL Collected:05/20/99	CCME Metals						
		Copper (Cu)	30	1	mg/kg		05/31/99	EDM
		Molybdenum (Mo)	2	1	mg/kg		05/31/99	EDM
		Nickel (Ni)	20	2	mg/kg		05/31/99	EDM
		Lead (Pb)	13	5	mg/kg		05/31/99	EDM
		Tin (Sn)	<5	5	mg/kg		05/31/99	EDM
		Thallium (Tl)	<1	1	mg/kg		05/31/99	EDM
		Vanadium (V)	16	1	mg/kg		05/31/99	EDM
		Zinc (Zn)	52.7	0.5	mg/kg		05/31/99	EDM
		Antimony (Sb)	<0.1	0.1	mg/kg		05/31/99	EDM
		Selenium (Se)	<0.1	0.1	mg/kg		05/31/99	EDM
W99050571	TH 2-2 Sample Type:SOIL	Cyanide, (Total Prep.)	done		done	05/31/99		EDM
		Cyanide, (Total)	<0.5	0.5	mg/kg		06/04/99	EDM
		Chromium + 6	<0.01	0.01	mg/kg		06/01/99	EDM
		CCME Metals						
		Arsenic (As)	2.4	0.1	mg/kg		05/31/99	EDM
		Mercury (Hg)	<0.01	0.01	mg/kg		05/31/99	EDM
		Silver (Ag)	<1	1	mg/kg		05/31/99	EDM
		Barium (Ba)	138	0.5	mg/kg		05/31/99	EDM
		Beryllium (Be)	<1	1	mg/kg		05/31/99	EDM
		Cadmium (Cd)	<0.5	0.5	mg/kg		05/31/99	EDM
		Cobalt (Co)	4	1	mg/kg		05/31/99	EDM
		Chromium (Cr)	19.3	0.5	mg/kg		05/31/99	EDM
		Copper (Cu)	16	1	mg/kg		05/31/99	EDM
		Molybdenum (Mo)	<1	1	mg/kg		05/31/99	EDM
		Nickel (Ni)	13	2	mg/kg		05/31/99	EDM
		Lead (Pb)	31	5	mg/kg		05/31/99	EDM
		Tin (Sn)	<5	5	mg/kg		05/31/99	EDM
		Thallium (Tl)	<1	1	mg/kg		05/31/99	EDM
		Vanadium (V)	27	1	mg/kg		05/31/99	EDM
		Zinc (Zn)	92.8	0.5	mg/kg		05/31/99	EDM
		Antimony (Sb)	<0.1	0.1	mg/kg		05/31/99	EDM
		Selenium (Se)	0.4	0.1	mg/kg		05/31/99	EDM
W99050571	TH 3-1 Sample Type:SOIL	Cyanide, (Total Prep.)	done		done	05/31/99		EDM
		Cyanide, (Total)	<0.5	0.5	mg/kg		06/04/99	EDM
		Chromium + 6	<0.01	0.01	mg/kg		06/01/99	EDM
		CCME Metals						
		Arsenic (As)	2.2	0.1	mg/kg		05/31/99	EDM
		Mercury (Hg)	<0.01	0.01	mg/kg		05/31/99	EDM
		Silver (Ag)	<1	1	mg/kg		05/31/99	EDM
		Barium (Ba)	198	0.5	mg/kg		05/31/99	EDM
		Beryllium (Be)	<1	1	mg/kg		05/31/99	EDM
		Cadmium (Cd)	<0.5	0.5	mg/kg		05/31/99	EDM
		Cobalt (Co)	4	1	mg/kg		05/31/99	EDM
		Chromium (Cr)	18.3	0.5	mg/kg		05/31/99	EDM
		Copper (Cu)	13	1	mg/kg		05/31/99	EDM
		Molybdenum (Mo)	<1	1	mg/kg		05/31/99	EDM
		Nickel (Ni)	13	2	mg/kg		05/31/99	EDM
		Lead (Pb)	10	5	mg/kg		05/31/99	EDM
		Tin (Sn)	<5	5	mg/kg		05/31/99	EDM
		Thallium (Tl)	<1	1	mg/kg		05/31/99	EDM
		Vanadium (V)	25	1	mg/kg		05/31/99	EDM
		Zinc (Zn)	43.1	0.5	mg/kg		05/31/99	EDM
		Antimony (Sb)	<0.1	0.1	mg/kg		05/31/99	EDM
		Selenium (Se)	<0.1	0.1	mg/kg		05/31/99	EDM
W99050571	TH 5-1 Sample Type:SOIL	Cyanide, (Total Prep.)	done		done	05/31/99		EDM
		Cyanide, (Total)	<0.5	0.5	mg/kg		06/04/99	EDM
		Chromium + 6	<0.01	0.01	mg/kg		06/01/99	EDM
		CCME Metals						
		Arsenic (As)	9.6	0.1	mg/kg		05/31/99	EDM

ENVIRO-TEST CHEMICAL ANALYSIS REPORT ATTACHMENT

LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	EXTRACTED	ANALYZED	BY
W99050571	TH 5-1 Sample Type:SOIL	CCME Metals						
		Mercury (Hg)	<0.01	0.01	mg/kg		05/31/99	EDM
		Silver (Ag)	<1	1	mg/kg		05/31/99	EDM
		Barium (Ba)	359	0.5	mg/kg		05/31/99	EDM
		Beryllium (Be)	<1	1	mg/kg		05/31/99	EDM
		Cadmium (Cd)	0.6	0.5	mg/kg		05/31/99	EDM
		Cobalt (Co)	9	1	mg/kg		05/31/99	EDM
		Chromium (Cr)	38.8	0.5	mg/kg		05/31/99	EDM
		Copper (Cu)	172	1	mg/kg		05/31/99	EDM
		Molybdenum (Mo)	2	1	mg/kg		05/31/99	EDM
		Nickel (Ni)	50	2	mg/kg		05/31/99	EDM
		Lead (Pb)	248	5	mg/kg		05/31/99	EDM
		Tin (Sn)	<5	5	mg/kg		05/31/99	EDM
		Thallium (Tl)	<1	1	mg/kg		05/31/99	EDM
		Vanadium (V)	40	1	mg/kg		05/31/99	EDM
		Zinc (Zn)	179	0.5	mg/kg		05/31/99	EDM
		Antimony (Sb)	0.1	0.1	mg/kg		05/31/99	EDM
		Selenium (Se)	1.2	0.1	mg/kg		05/31/99	EDM
W99050571	TH 6-2 Sample Type:SOIL	Cyanide, (Total Prep.)	done		done	05/31/99		EDM
		Cyanide, (Total)	<0.5	0.5	mg/kg		06/04/99	EDM
		Chromium + 6	<0.01	0.01	mg/kg		06/01/99	EDM
		CCME Metals						
		Arsenic (As)	1.9	0.1	mg/kg		05/31/99	EDM
		Mercury (Hg)	<0.01	0.01	mg/kg		05/31/99	EDM
		Silver (Ag)	<1	1	mg/kg		05/31/99	EDM
		Barium (Ba)	117	0.5	mg/kg		05/31/99	EDM
		Beryllium (Be)	<1	1	mg/kg		05/31/99	EDM
		Cadmium (Cd)	<0.5	0.5	mg/kg		05/31/99	EDM
		Cobalt (Co)	3	1	mg/kg		05/31/99	EDM
		Chromium (Cr)	15	0.5	mg/kg		05/31/99	EDM
		Copper (Cu)	10	1	mg/kg		05/31/99	EDM
		Molybdenum (Mo)	<1	1	mg/kg		05/31/99	EDM
		Nickel (Ni)	10	2	mg/kg		05/31/99	EDM
		Lead (Pb)	7	5	mg/kg		05/31/99	EDM
		Tin (Sn)	<5	5	mg/kg		05/31/99	EDM
		Thallium (Tl)	<1	1	mg/kg		05/31/99	EDM
		Vanadium (V)	20	1	mg/kg		05/31/99	EDM
		Zinc (Zn)	25.9	0.5	mg/kg		05/31/99	EDM
		Antimony (Sb)	<0.1	0.1	mg/kg		05/31/99	EDM
		Selenium (Se)	0.3	0.1	mg/kg		05/31/99	EDM
W99050571	TH 7-2 Sample Type:SOIL	Cyanide, (Total Prep.)	done		done	05/31/99		EDM
		Cyanide, (Total)	<0.5	0.5	mg/kg		06/04/99	EDM
		Chromium + 6	<0.01	0.01	mg/kg		06/01/99	EDM
		CCME Metals						
		Arsenic (As)	4.5	0.1	mg/kg		05/31/99	EDM
		Mercury (Hg)	<0.01	0.01	mg/kg		05/31/99	EDM
		Silver (Ag)	<1	1	mg/kg		05/31/99	EDM
		Barium (Ba)	247	0.5	mg/kg		05/31/99	EDM
		Beryllium (Be)	<1	1	mg/kg		05/31/99	EDM
		Cadmium (Cd)	<0.5	0.5	mg/kg		05/31/99	EDM
		Cobalt (Co)	7	1	mg/kg		05/31/99	EDM
		Chromium (Cr)	31.4	0.5	mg/kg		05/31/99	EDM
		Copper (Cu)	24	1	mg/kg		05/31/99	EDM
		Molybdenum (Mo)	<1	1	mg/kg		05/31/99	EDM
		Nickel (Ni)	21	2	mg/kg		05/31/99	EDM
		Lead (Pb)	36	5	mg/kg		05/31/99	EDM
		Tin (Sn)	<5	5	mg/kg		05/31/99	EDM
		Thallium (Tl)	<1	1	mg/kg		05/31/99	EDM
		Vanadium (V)	47	1	mg/kg		05/31/99	EDM
		Zinc (Zn)	61.8	0.5	mg/kg		05/31/99	EDM
		Antimony (Sb)	<0.1	0.1	mg/kg		05/31/99	EDM
		Selenium (Se)	0.4	0.1	mg/kg		05/31/99	EDM

EDMONTON TEST METHODOLOGIES**Acid Digestion**

Preparation: Microwave digestion of sample in a closed vessel with concentrated nitric acid on a wet or dry soil/solids

Reference: E.P.A. SW 846 Method 3051

Arsenic (As)

Instrumentation: Continuous hydride by Flameless Atomic Absorption Spectrometry

Reference: US EPA SW 846 ; APHA 3114C

Cyanide, (Total Prep.)**Cyanide, (Total)****Chromium +6**

Preparation: Deionized water extraction

Instrumental Method: Ion Chromatography with UV/VIS Detector
Diphenylcarbazide @ 540nm

Method Reference: Cr+6 APHA 3500 E EPA 218.6

Mercury (Hg)

Instrumentation: Continuous cold vapour atomic absorption spectrometry

Reference: US EPA SW 846; APHA 3112B

ICP Method Descriptions

Metals by Inductively Coupled Plasma in digests of soils/solids

Metals by Inductively Coupled Plasma-Mass Spec. in digests of soils/solids

METHOD REFERENCE: E.P.A. SW846 Method 6010/200.8 and 3051.

NOTE: Wavelengths selected for analysis are the determination of the laboratory

NOTE: Masses selected for analysis are the determination of the laboratory

*The actual detection limits reported will vary with the

digestion extraction ratio.

NOTE: Wavelengths/mass and detection limits may vary with matrix and sample composition.

Antimony (Sb)

Instrumentation: Continuous hydride by Flameless Atomic Absorption Spectrometry.

Reference: US EPA SW 846 ; APHA 3114C

Sample Preparation

PREPARATION METHOD: Sample is air dried and ground to pass a 2 mm sieve

Selenium (Se)

Instrumentation: Continuous hydride by Flameless Atomic Absorption Spectrometry

Reference: US EPA SW 846 ; APHA 3114C

Hydride Metals Preparation

Preparation: Digestion with permanganate/persulphate, nitric, and sulphuric acid
Addition of hydrochloric acid and cysteine prior to analysis.

Reference: US EPA SW 846, APHA 3114

Mercury Cold Vapor Prep.

Preparation: Digestion with permanganate, nitric, and sulphuric acids.

Reference: US EPA SW 846 / APHA 3112B

THIS IS THE LAST PAGE OF THE EDMONTON METHODOLOGIES.

EDMONTON TO WINNIPEG SUMMARY REPORT

ETL WPG WO#	W990507156	ETL WPG SMP ID	ETL EDM SMP ID	CUSTOMER SMP ID
		W99050571	E905909-01	TH 4-1
		W99050571	E905909-02	MW 1-1
		W99050571	E905909-03	MW 2-1
		W99050571	E905909-04	MW 3-1
		W99050571	E905909-05	MW 4-1
		W99050571	E905909-06	TH 1-1
		W99050571	E905909-07	TH 2-2
		W99050571	E905909-08	TH 3-1
		W99050571	E905909-09	TH 5-1
		W99050571	E905909-10	TH 6-2
		W99050571	E905909-11	TH 7-2

JUN 11 1999

ETL

Enviro-Test

LABORATORIES

Manitoba Technology Centre Ltd.

MTC

D2a

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FAX and Mail

CHEMICAL ANALYSIS REPORT

KGS Group Consultants
3227 Roblin Blvd
Winnipeg MB R3R 0C2

DATE: June 9 1999

ATTN: KASUR D

Lab Work Order #: W990507155 Submitted By: Kasur D
Project Reference: 99-570-01
Project P.O. #: 99-570-01 Date Received: 99/ 5/21

Comments:

APPROVED BY:

Paul Nicolas

Paul Nicolas

Project Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY.
ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU
REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

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 ANALYSIS REPORT

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LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	METHOD #	ANALYZED	ANALYST
99-A23775	MW3-2	Sample Type: Soil Collected: 99/ 5/20						
		Other Analysis						
		Benzene	< 0.02	0.02	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Ethyl Benzene	< 0.03	0.03	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Extracted Date BTEX & TVH	Done On	***			99/ 5/25	TSG
		Extracted Date TEH	Done On	***			99/ 5/25	TSG
		Hydrocarbons Total Ext.	69.	5.	mg/Kg DWt*	A782.03	99/ 5/27	MDM
		Moisture Content	22.04	0.01	%		99/ 5/25	TSG
		Toluene	< 0.02	0.02	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Volatile Hydrocarbons Tot	< 5	5.	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Xylene - meta and para	< 0.01	0.01	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Xylene - ortho	< 0.01	0.01	mg/kg DWt*	A751.04	99/ 5/25	TJJ
COMMENTS FOR LAB NUMBER 99-A23775								
SAMPLE COMMENT (ORGANIC)								
* DWt = Dry Weight								
99-A23776	TH1-1	Sample Type: Soil Collected: 99/ 5/20						
		Other Analysis						
		Benzene	< 0.02	0.02	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Ethyl Benzene	< 0.03	0.03	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Extracted Date BTEX & TVH	Done On	***			99/ 5/25	TSG
		Extracted Date TEH	Done On	***			99/ 5/25	TSG
		Hydrocarbons Total Ext.	62.	5.	mg/Kg DWt*	A782.03	99/ 5/27	MDM
		Mineral Oil & Grease	430	100	mg/kg	A716.01	99/ 5/27	MDM
		Moisture Content	16.35	0.01	%		99/ 5/25	TSG
		Toluene	< 0.02	0.02	mg/kg DWt*	A751.04	99/ 5/25	TJJ

ENVIRO-TEST ANALYSIS REPORT

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LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	METHOD #	ANALYZED	ANALYST
		Volatile Hydrocarbons Tot	< 5	5.	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Xylene - meta and para	< 0.01	0.01	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Xylene - ortho	< 0.01	0.01	mg/kg DWt*	A751.04	99/ 5/25	TJJ
COMMENTS FOR LAB NUMBER 99-A23776								
SAMPLE COMMENT (ORGANIC) * DWt = Dry Weight								
99-A23777	TH4-2	Sample Type: Soil Collected: 99/ 5/20						
		Other Analysis Miscellaneous Analysis	See Attached	***		A999.01	99/ 6/ 3	JCD
99-A23778	TH4-3	Sample Type: Soil Collected: 99/ 5/20						
		Other Analysis						
		Benzene	< 0.02	0.02	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Ethyl Benzene	< 0.03	0.03	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Extracted Date BTEX & TVH	Done On	***			99/ 5/25	TSG
		Extracted Date TEH	Done On	***			99/ 5/25	TSG
		Hydrocarbons Total Ext.	16.	5.	mg/Kg DWt*	A782.03	99/ 5/27	MDM
		Moisture Content	21.20	0.01	%		99/ 5/25	TSG
		Toluene	< 0.02	0.02	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Volatile Hydrocarbons Tot	< 5	5.	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Xylene - meta and para	< 0.01	0.01	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Xylene - ortho	< 0.01	0.01	mg/kg DWt*	A751.04	99/ 5/25	TJJ

ENVIRO-TEST ANALYSIS REPORT

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LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	METHOD #	ANALYZED	ANALYST
COMMENTS FOR LAB NUMBER 99-A23778								
SAMPLE COMMENT (ORGANIC) * DWt = Dry Weight								
99-A23779	TH6-1	Sample Type: Soil Collected: 99/ 5/20						
	Other Analysis							
	Benzene	< 0.02	0.02	mg/kg DWt*	A751.04	99/ 5/25	TJJ	
	Ethyl Benzene	< 0.03	0.03	mg/kg DWt*	A751.04	99/ 5/25	TJJ	
	Extracted Date BTEX & TVH	Done On	***			99/ 5/25	TSG	
	Extracted Date TEH	Done On	***			99/ 5/25	TSG	
	Hydrocarbons Total Ext.	160	5.	mg/Kg DWt*	A782.03	99/ 5/27	MDM	
	Moisture Content	23.70	0.01	%		99/ 5/25	TSG	
	Toluene	< 0.02	0.02	mg/kg DWt*	A751.04	99/ 5/25	TJJ	
	Volatile Hydrocarbons Tot	< 5	5.	mg/kg DWt*	A751.04	99/ 5/25	TJJ	
	Xylene - meta and para	< 0.01	0.01	mg/kg DWt*	A751.04	99/ 5/25	TJJ	
	Xylene - ortho	< 0.01	0.01	mg/kg DWt*	A751.04	99/ 5/25	TJJ	
COMMENTS FOR LAB NUMBER 99-A23779								
SAMPLE COMMENT (ORGANIC) * DWt = Dry Weight								
99-A23780	TH6-3	Sample Type: Soil Collected: 99/ 5/20						

ENVIRO-TEST ANALYSIS REPORT

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LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	METHOD #	ANALYZED	ANALYST
		Other Analysis Mineral Oil & Grease Moisture Content	< 100 21.23	100 0.01	mg/kg %	A716.01	99/ 5/27 99/ 5/25	MDM TSG

ENVIRONMENTAL TEST LABORATORIES TEST METHODOLOGIES

BTEX and TVH in Soil

ETL Method Number: A751.04

Reference: Modified EPA SW-846 Method 5021/8015 and 8020

Principle of Method:

Extracts are prepared by weighing 8-10 grams into a 20 mL vial and extracting with methanol. An aliquot of the methanol is injected into water along with an internal standard. The headspace is analyzed by a gas chromatograph equipped with a Tekmar 7000/7050 autosampler and photoionization detector (PID) flame ionization detector (FID) in series. The benzene, toluene, ethyl benzene, meta, para and ortho xylene compounds are identified by their retention times and quantified by internal standard methods using the measurement of peak area relative to calibration standards using the PID responses. The total volatile hydrocarbons are a semi-quantitative result based on the sum of peak areas in the C5-C10 carbon range using the FID response.

Total Extractable Hydrocarbons in Water, Soil and Sediment

ETL Method Number: A782.03

Reference: Modified EPA SW-846
Methods 3510, 3550A and 8000A

Principle of Method:

This is the semi-quantitative determination of total extractable hydrocarbons (TEH) C11-C30 in water, soil and sediment samples. A water sample volume of 240 mLs in a 250 mL glass amber bottle is shaken with 2-4 mL hexane for one hour on a wrist action shaker, then sonicated for 5 minutes. A soil/sediment sample of 25 grams is weighed out with sodium sulphate and extracted with 10 mLs hexane/acetone for one hour on a wrist action shaker, then sonicated for 5 minutes. After extraction, the solvent layer is drawn off and analysed against a calibrated diesel standard on a gas chromatograph equipped with a flame ionization detector. All results are reported on a dry weight basis. By special request, the result can be calculated on C10-C24 to meet specific regulations.

Oil & Grease, Mineral and Total Recoverable

ETL Method Number A716.01

Reference: USEPA Method #9071A-1 September 1994

Principle of Method:

Equal amounts of soil and anhydrous sodium sulphate are Soxhlet extracted with methylene chloride. Silica gel is placed into the solvent extract which is stirred, evaporated, and dried. Oil & Grease is determined gravimetrically.

ENVIRO-TEST CHEMICAL ANALYSIS REPORT ATTACHMENT

LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	EXTRACTED	ANALYZED	BY	
W99050715 TH4-2 Sample Type:SOIL Collected:05/20/99		Vol. Organics (MS):Solids						EDM	
		Dichlorodifluoromethane	< 30	30	ug/kg	06/01/99	06/01/99	EDM	
		Chloromethane	< 100	100	ug/kg	06/01/99	06/01/99	EDM	
		Vinyl chloride	< 20	20	ug/kg	06/01/99	06/01/99	EDM	
		Bromomethane	< 100	100	ug/kg	06/01/99	06/01/99	EDM	
		Chloroethane	< 100	100	ug/kg	06/01/99	06/01/99	EDM	
		Ethanol	< 3000	3000	ug/kg	06/01/99	06/01/99	EDM	
		Trichlorofluoromethane	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		Acrolein	< 1000	1000	ug/kg	06/01/99	06/01/99	EDM	
		Acetone	< 1000	1000	ug/kg	06/01/99	06/01/99	EDM	
		1,1-Dichloroethene	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		Iodomethane	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		Carbon disulfide	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		Methylene chloride	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		Acrylonitrile	< 1000	1000	ug/kg	06/01/99	06/01/99	EDM	
		trans-1,2-Dichloroethene	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		Vinyl acetate	< 1000	1000	ug/kg	06/01/99	06/01/99	EDM	
		1,1-Dichloroethane	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		2-Butanone (MEK)	< 1000	1000	ug/kg	06/01/99	06/01/99	EDM	
		Chloroform	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		1,1,1-Trichloroethane	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		Carbon tetrachloride	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		Benzene	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		1,2-Dichloroethane	< 20	20	ug/kg	06/01/99	06/01/99	EDM	
		Trichloroethene	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		1,2-Dichloropropane	< 20	20	ug/kg	06/01/99	06/01/99	EDM	
		Bromodichloromethane	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		Dibromomethane	< 30	30	ug/kg	06/01/99	06/01/99	EDM	
		2-Chloroethylvinylether	< 100	100	ug/kg	06/01/99	06/01/99	EDM	
		4-Methyl-2-pentanone (MIBK)	< 100	100	ug/kg	06/01/99	06/01/99	EDM	
		cis-1,3-Dichloropropene	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		Toluene	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		Ethyl methacrylate	< 100	100	ug/kg	06/01/99	06/01/99	EDM	
		trans-1,3-Dichloropropene	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		2-Hexanone	< 100	100	ug/kg	06/01/99	06/01/99	EDM	
		1,1,2-Trichloroethane	< 20	20	ug/kg	06/01/99	06/01/99	EDM	
		Tetrachloroethylene	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		Dibromochloromethane	< 30	30	ug/kg	06/01/99	06/01/99	EDM	
		Ethylene dibromide	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		Chlorobenzene	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		Ethylbenzene	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		m + p-Xylenes	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		o-Xylene	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		Styrene	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		cis-1,4-Dichloro-2-butene	< 100	100	ug/kg	06/01/99	06/01/99	EDM	
		Bromoform	< 30	30	ug/kg	06/01/99	06/01/99	EDM	
		1,1,2,2-Tetrachloroethane	< 200	200	ug/kg	06/01/99	06/01/99	EDM	
		1,2,3-Trichloropropane	< 50	50	ug/kg	06/01/99	06/01/99	EDM	
		trans-1,4-Dichloro-2-butene	< 100	100	ug/kg	06/01/99	06/01/99	EDM	
		1,3-Dichlorobenzene	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		1,4-Dichlorobenzene	< 10	10	ug/kg	06/01/99	06/01/99	EDM	
		1,2-Dichlorobenzene	< 10	10	ug/kg	06/01/99	06/01/99	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

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Vol. Organics (MS):Solids

Preparation Method: Automated headspace

Instrument Method: GC/MS analysis

Method Reference: Extraction Method: EPA 5021 (modified)
Analytical Method: EPA 8240 (modified)

Interferences: *** Values for 1,1,2,2-tetrachloroethane and trichloroethene may not accurately reflect concentrations present in the sample(s) due to the decomposition of the former to the latter when exposed to heat and pressure. (See MOEE Method PETHC-E3132A, 1.5.1.5 Dehydrohalogenation)

THIS IS THE LAST PAGE OF THE EDMONTON METHODOLOGIES.



EnviroTest

LABORATORIES



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JUN 9 1999

CHEMICAL ANALYSIS REPORT

KGS Group Consultants
3227 Roblin Blvd
Winnipeg MB R3R 0C2

DATE: June 3 1999

ATTN: KASUR D

Lab Work Order #: W990507155 Submitted By: Kasur D
Project Reference: 99-570-01
Project P.O. #: 99-570-01 Date Received: 99/ 5/21

Comments:

APPROVED BY:

Paul Nicolas

Paul Nicolas
Project Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY.
ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU
REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

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 ANALYSIS REPORT

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LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	METHOD #	ANALYZED	ANALYST
99-A23775	MW3-2	Sample Type: Soil Collected: 99/ 5/20						
		Other Analysis						
		Benzene	< 0.02	0.02	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Ethyl Benzene	< 0.03	0.03	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Extracted Date BTEX & TVH	Done On	***			99/ 5/25	TSG
		Extracted Date TEH	Done On	***			99/ 5/25	TSG
		Hydrocarbons Total Ext.	69.	5.	mg/Kg DWt*	A782.03	99/ 5/27	MDM
		Moisture Content	22.04	0.01	%		99/ 5/25	TSG
		Toluene	< 0.02	0.02	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Volatile Hydrocarbons Tot	< 5	5.	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Xylene - meta and para	< 0.01	0.01	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Xylene - ortho	< 0.01	0.01	mg/kg DWt*	A751.04	99/ 5/25	TJJ
COMMENTS FOR LAB NUMBER 99-A23775								
SAMPLE COMMENT (ORGANIC)								
* DWt = Dry Weight								
99-A23776	TH1-1	Sample Type: Soil Collected: 99/ 5/20						
		Other Analysis						
		Benzene	< 0.02	0.02	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Ethyl Benzene	< 0.03	0.03	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Extracted Date BTEX & TVH	Done On	***			99/ 5/25	TSG
		Extracted Date TEH	Done On	***			99/ 5/25	TSG
		Hydrocarbons Total Ext.	62.	5.	mg/Kg DWt*	A782.03	99/ 5/27	MDM
		Mineral Oil & Grease	430	100	mg/kg	A716.01	99/ 5/27	MDM
		Moisture Content	16.35	0.01	%		99/ 5/25	TSG
		Toluene	< 0.02	0.02	mg/kg DWt*	A751.04	99/ 5/25	TJJ

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LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	METHOD #	ANALYZED	ANALYST
		Volatile Hydrocarbons Tot	< 5	5.	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Xylene - meta and para	< 0.01	0.01	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Xylene - ortho	< 0.01	0.01	mg/kg DWt*	A751.04	99/ 5/25	TJJ
COMMENTS FOR LAB NUMBER 99-A23776 * Dwt = Dry Weight SAMPLE COMMENT (ORGANIC)								
99-A23777	TH4-2	Sample Type: Soil Collected: 99/ 5/20						
		Other Analysis Miscellaneous Analysis	See Attached	***		A999.01	99/ 6/ 3	JCD
99-A23778	TH4-3	Sample Type: Soil Collected: 99/ 5/20						
		Other Analysis						
		Benzene	< 0.02	0.02	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Ethyl Benzene	< 0.03	0.03	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Extracted Date BTEX & TVH	Done On	***			99/ 5/25	TSG
		Extracted Date TEH	Done On	***			99/ 5/25	TSG
		Hydrocarbons Total Ext.	16.	5.	mg/Kg DWt*	A782.03	99/ 5/27	MDM
		Moisture Content	21.20	0.01	%		99/ 5/25	TSG
		Toluene	< 0.02	0.02	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Volatile Hydrocarbons Tot	< 5	5.	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Xylene - meta and para	< 0.01	0.01	mg/kg DWt*	A751.04	99/ 5/25	TJJ
		Xylene - ortho	< 0.01	0.01	mg/kg DWt*	A751.04	99/ 5/25	TJJ

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LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	METHOD #	ANALYZED	ANALYST
COMMENTS FOR LAB NUMBER 99-A23778								
SAMPLE COMMENT (ORGANIC) * Dwt = Dry Weight								
99-A23779	TH6-1	Sample Type: Soil Collected: 99/ 5/20						
	Other Analysis							
	Benzene	< 0.02	0.02	mg/kg Dwt*	A751.04	99/ 5/25	TJJ	
	Ethyl Benzene	< 0.03	0.03	mg/kg Dwt*	A751.04	99/ 5/25	TJJ	
	Extracted Date BTEX & TVH	Done On	***			99/ 5/25	TSG	
	Extracted Date TEH	Done On	***			99/ 5/25	TSG	
	Hydrocarbons Total Ext.	160	5.	mg/Kg Dwt*	A782.03	99/ 5/27	MDM	
	Moisture Content	23.70	0.01	%		99/ 5/25	TSG	
	Toluene	< 0.02	0.02	mg/kg Dwt*	A751.04	99/ 5/25	TJJ	
	Volatile Hydrocarbons Tot	< 5	5.	mg/kg Dwt*	A751.04	99/ 5/25	TJJ	
	Xylene - meta and para	< 0.01	0.01	mg/kg Dwt*	A751.04	99/ 5/25	TJJ	
	Xylene - ortho	< 0.01	0.01	mg/kg Dwt*	A751.04	99/ 5/25	TJJ	
COMMENTS FOR LAB NUMBER 99-A23779								
SAMPLE COMMENT (ORGANIC) * Dwt = Dry Weight								
99-A23780	TH6-3	Sample Type: Soil Collected: 99/ 5/20						

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LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	METHOD #	ANALYZED	ANALYST
		Other Analysis Mineral Oil & Grease Moisture Content	< 100 21.23	100 0.01	mg/kg %	A716.01	99/ 5/27 99/ 5/25	MDM TSG

ENVIRC TEST LABORATORIES TEST METHODOLOGIES

BTEX and TVH in Soil

ETL Method Number: A751.04

Reference: Modified EPA SW-846 Method 5021/8015 and 8020

Principle of Method:

Extracts are prepared by weighing 8-10 grams into a 20 mL vial and extracting with methanol. An aliquot of the methanol is injected into water along with an internal standard. The headspace is analyzed by a gas chromatograph equipped with a Tekmar 7000/7050 autosampler and photoionization detector (PID) flame ionization detector (FID) in series. The benzene, toluene, ethyl benzene, meta, para and ortho xylene compounds are identified by their retention times and quantified by internal standard methods using the measurement of peak area relative to calibration standards using the PID responses. The total volatile hydrocarbons are a semi-quantitative result based on the sum of peak areas in the C5-C10 carbon range using the FID response.

Total Extractable Hydrocarbons in Water, Soil and Sediment

ETL Method Number: A782.03

Reference: Modified EPA SW-846
Methods 3510, 3550A and 8000A

Principle of Method:

This is the semi-quantitative determination of total extractable hydrocarbons (TEH) C11-C30 in water, soil and sediment samples. A water sample volume of 240 mLs in a 250 mL glass amber bottle is shaken with 2-4 mL hexane for one hour on a wrist action shaker, then sonicated for 5 minutes. A soil/sediment sample of 25 grams is weighed out with sodium sulphate and extracted with 10 mLs hexane/acetone for one hour on a wrist action shaker, then sonicated for 5 minutes. After extraction, the solvent layer is drawn off and analysed against a calibrated diesel standard on a gas chromatograph equipped with a flame ionization detector. All results are reported on a dry weight basis. By special request, the result can be calculated on C10-C24 to meet specific regulations.

Oil & Grease, Mineral and Total Recoverable

ETL Method Number A716.01

Reference:USEPA Method #9071A-1 September 1994

Principle of Method:

Equal amounts of soil and anhydrous sodium sulphate are soxhlet extracted with methylene chloride. Silica gel is placed into the solvent extract which is stirred, evaporated, and dried. Oil & Grease is determined gravimetrically.

ID: Diesel Working Std (C155B)

250 uL of C155A (Stock Solution) diluted to 10 mL of hexane.

Injection Date : 5/25/99 10:18:53 AM

Seq. Line : 2

Sample Name : Diesel Std

Vial : 2

Acq. Operator : M. Michalchuk

Inj : 1

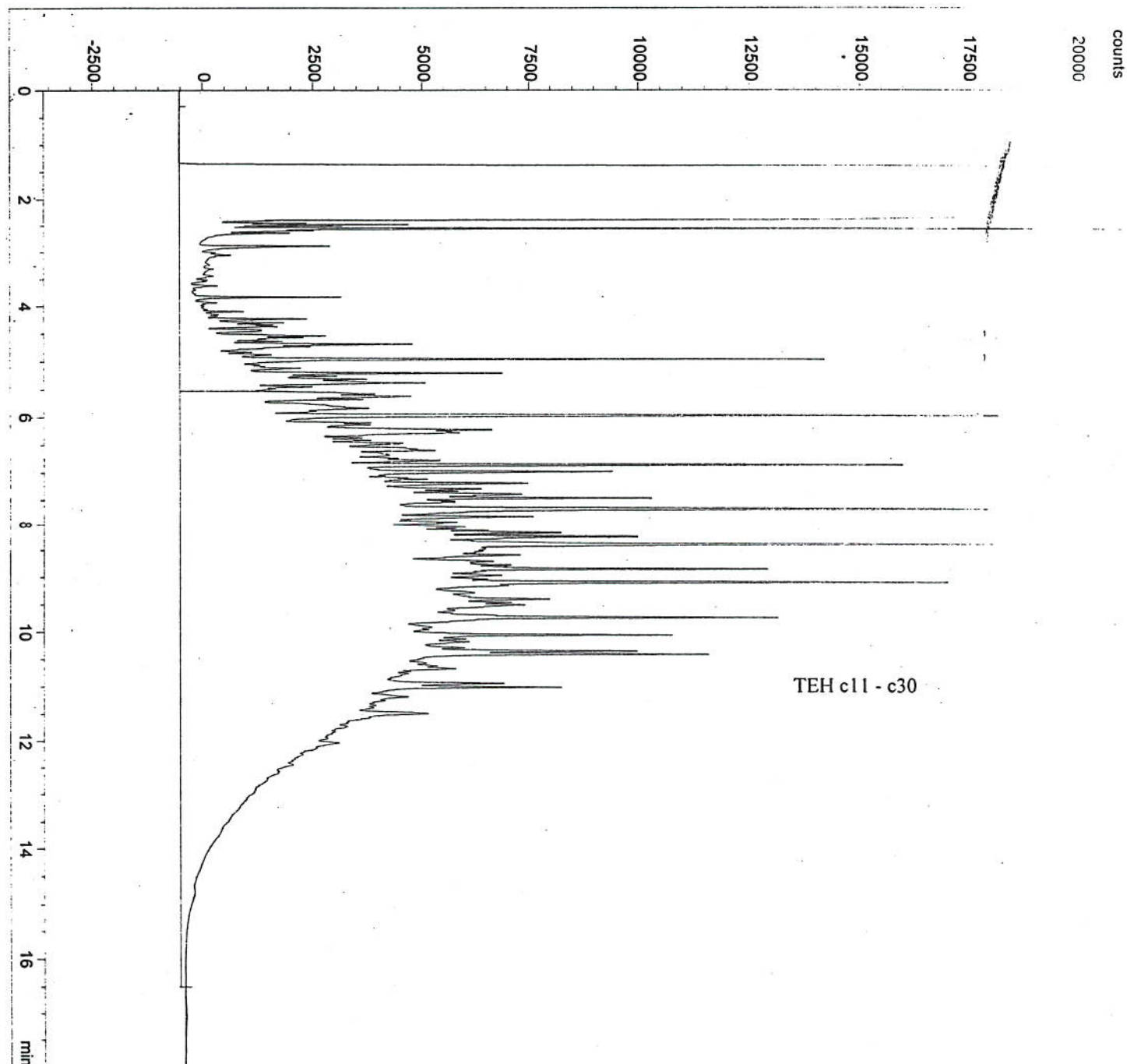
Inj Volume : 1 µl

Sequence File : C:\HPCHEM\2\SEQUENCE\MAY25MM.S

Method : C:\HPCHEM\2\METHODS\TEH SOIL.M

Last changed : 5/19/99 10:51:41 AM by M. Michalchuk

Method for analysis of TEH (C11-C30) in soils using DB1 capillary column with modified temperature program. (40 C for 2 min. 20 C/min to 300 C for 4 min)



Injection Date : 5/25/99 11:11:44 AM

Seq. Line : 3

Sample Name : Gas Std

Vial : 3

Acq. Operator : M. Michalchuk

Inj : 1

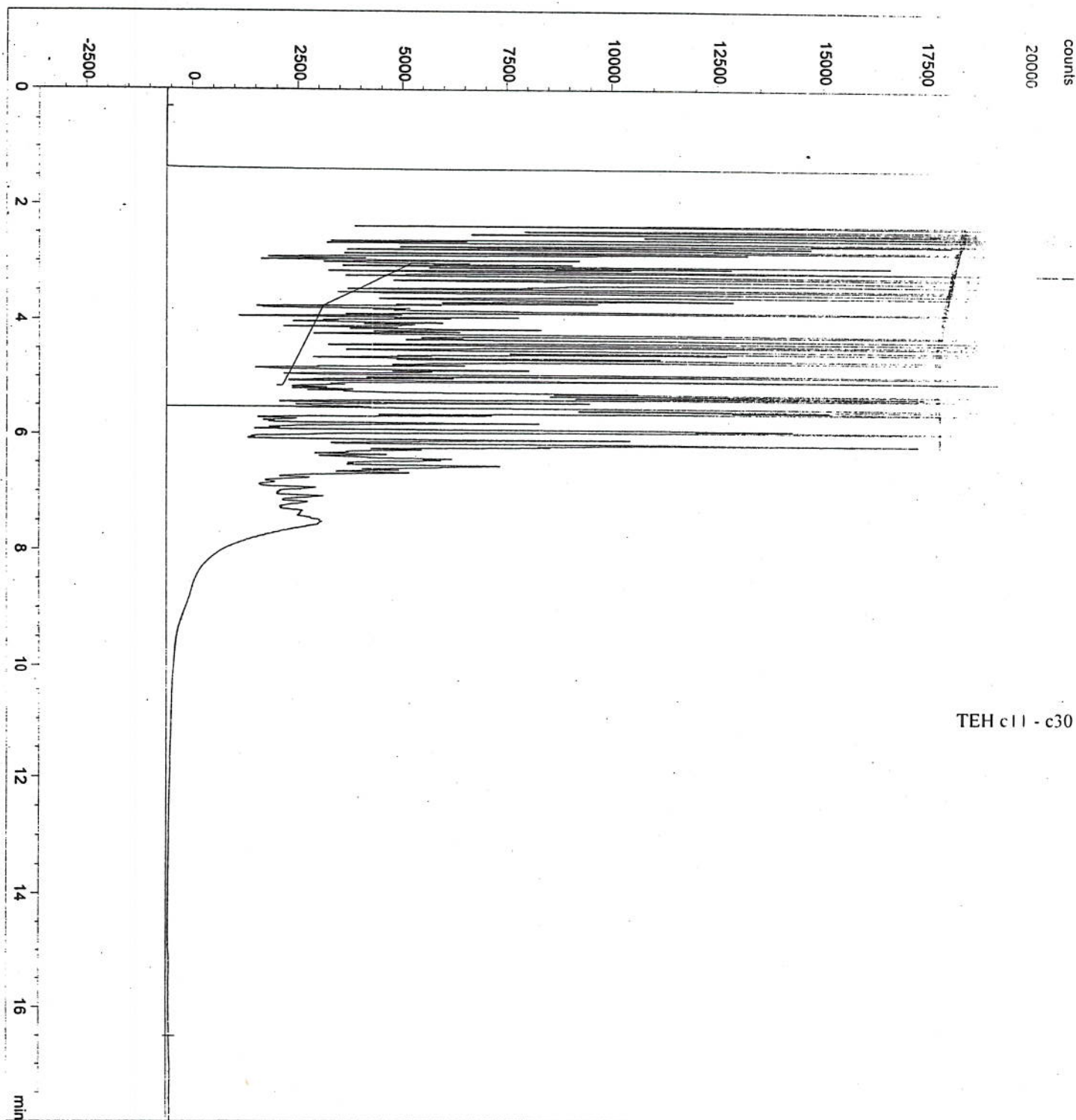
Inj Volume : 1 μ l

Sequence File : C:\HPCHEM\2\SEQUENCE\MAY25MM.S

Method : C:\HPCHEM\2\METHODS\TEH SOIL.M

Last changed : 5/19/99 10:51:41 AM by M. Michalchuk

Method for analysis of TEH (C11-C30) in soils using DB1 capillary column
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min)

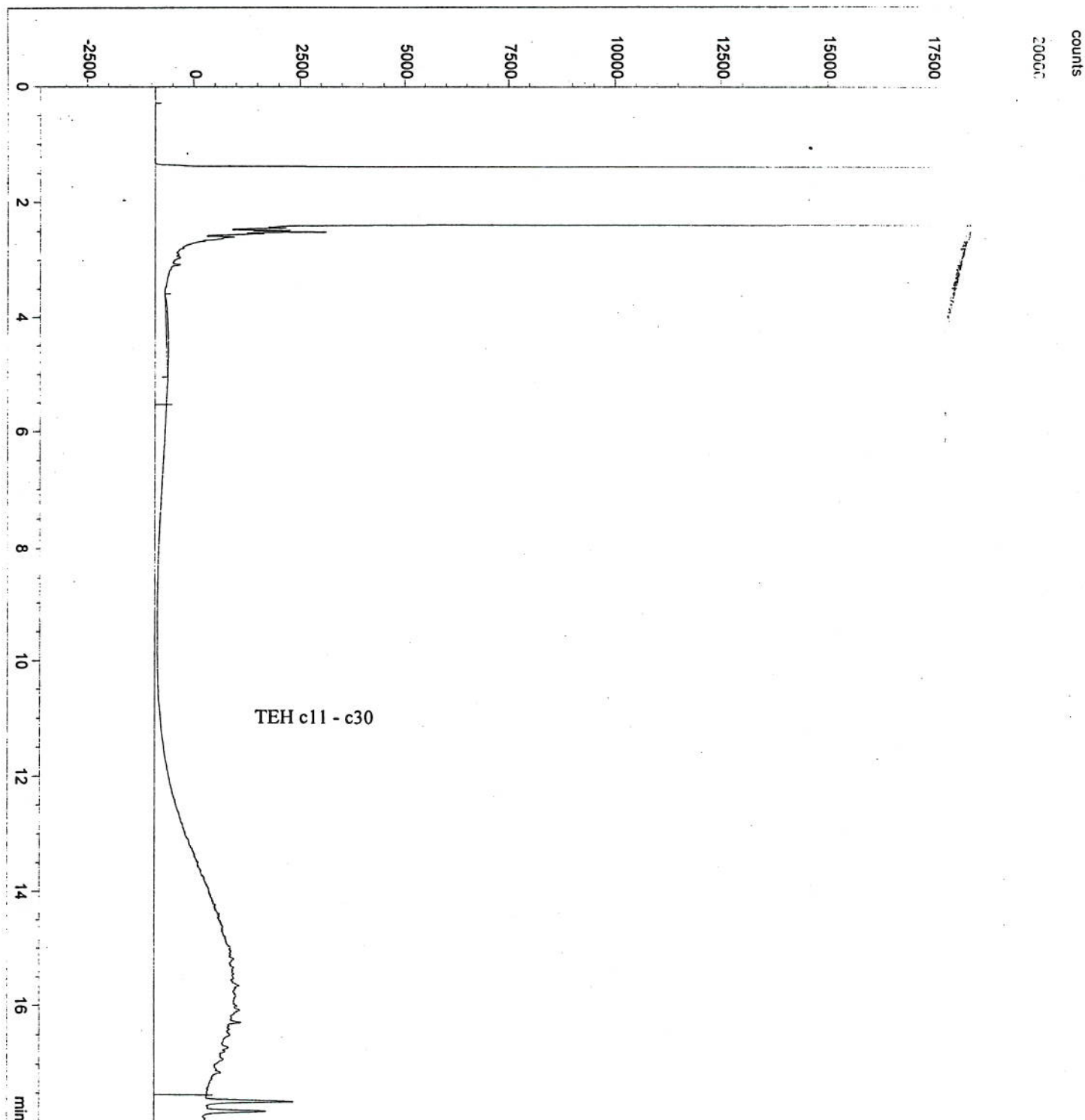


=====

Injection Date	: 5/26/99 5:39:56 PM	Seq. Line	: 22
Sample Name	: 99-23775	Vial	: 29
Acq. Operator	: M. Michalchuk	Inj	: 1
		Inj Volume	: 1 μ l

Sequence File : C:\HPCHEM\2\SEQUENCE\MAY25MM.S
Method : C:\HPCHEM\2\METHODS\TEH SOIL.M
Last changed : 5/19/99 10:51:41 AM by M. Michalchuk
Method for analysis of TEH (C11-C30) in soils using DB1 capillary column
with modified temperature program. (40 C for 2 min. 20 C/min to 300 C for 4
min)

=====



Injection Date : 5/26/99 6:08:30 PM

Seq. Line : 23

Sample Name : 99-23776

Vial : 30

Acq. Operator : M. Michalchuk

Inj : 1

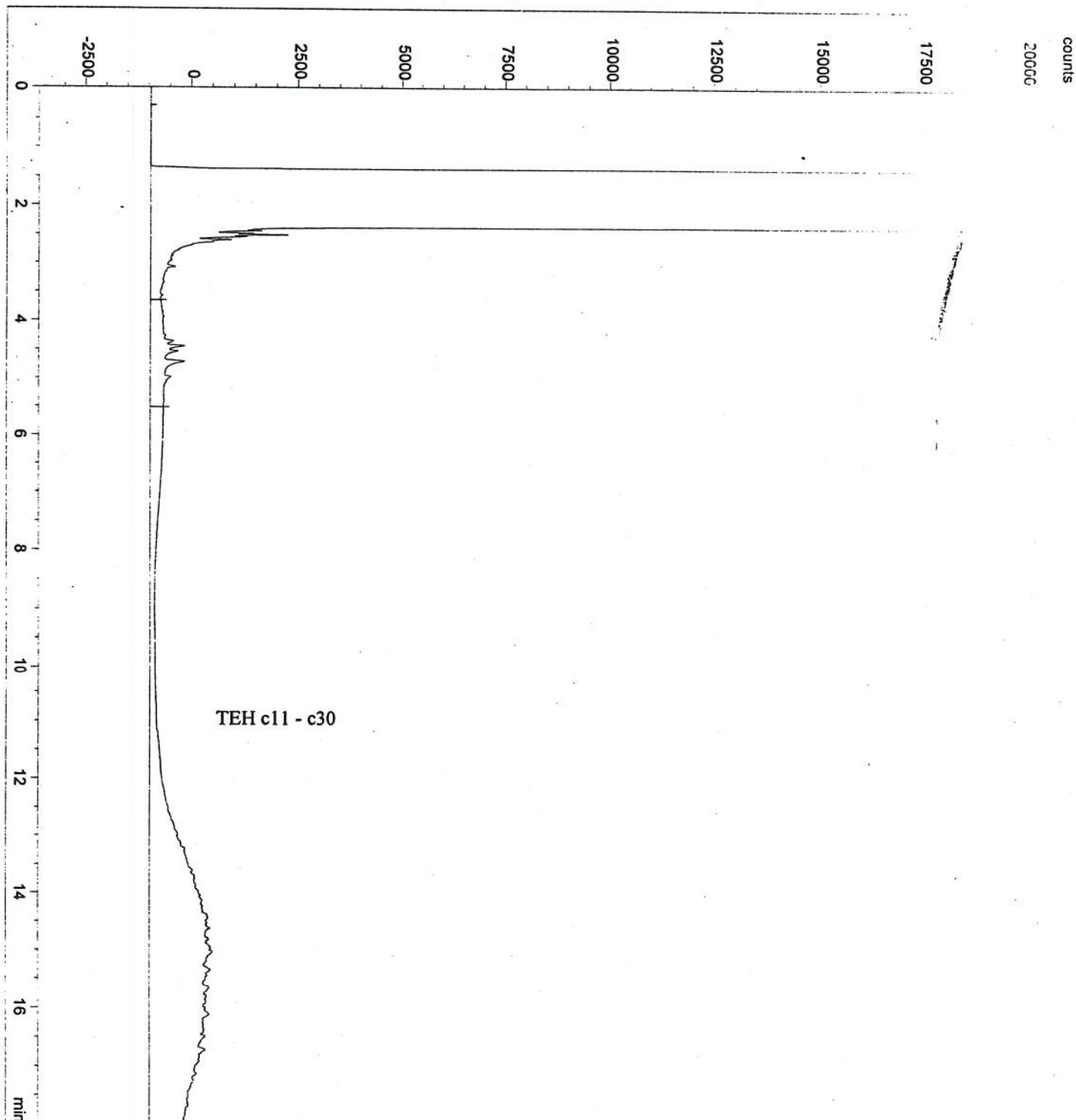
Inj Volume : 1 µl

Sequence File : C:\HPCHEM\2\SEQUENCE\MAY25MM.S

Method : C:\HPCHEM\2\METHODS\TEH SOIL.M

Last changed : 5/19/99 10:51:41 AM by M. Michalchuk

Method for analysis of TEH (C11-C30) in soils using DB1 capillary column
with modified temperature program. (40 C for 2 min. 20 C/min to 300 C for 4
min)

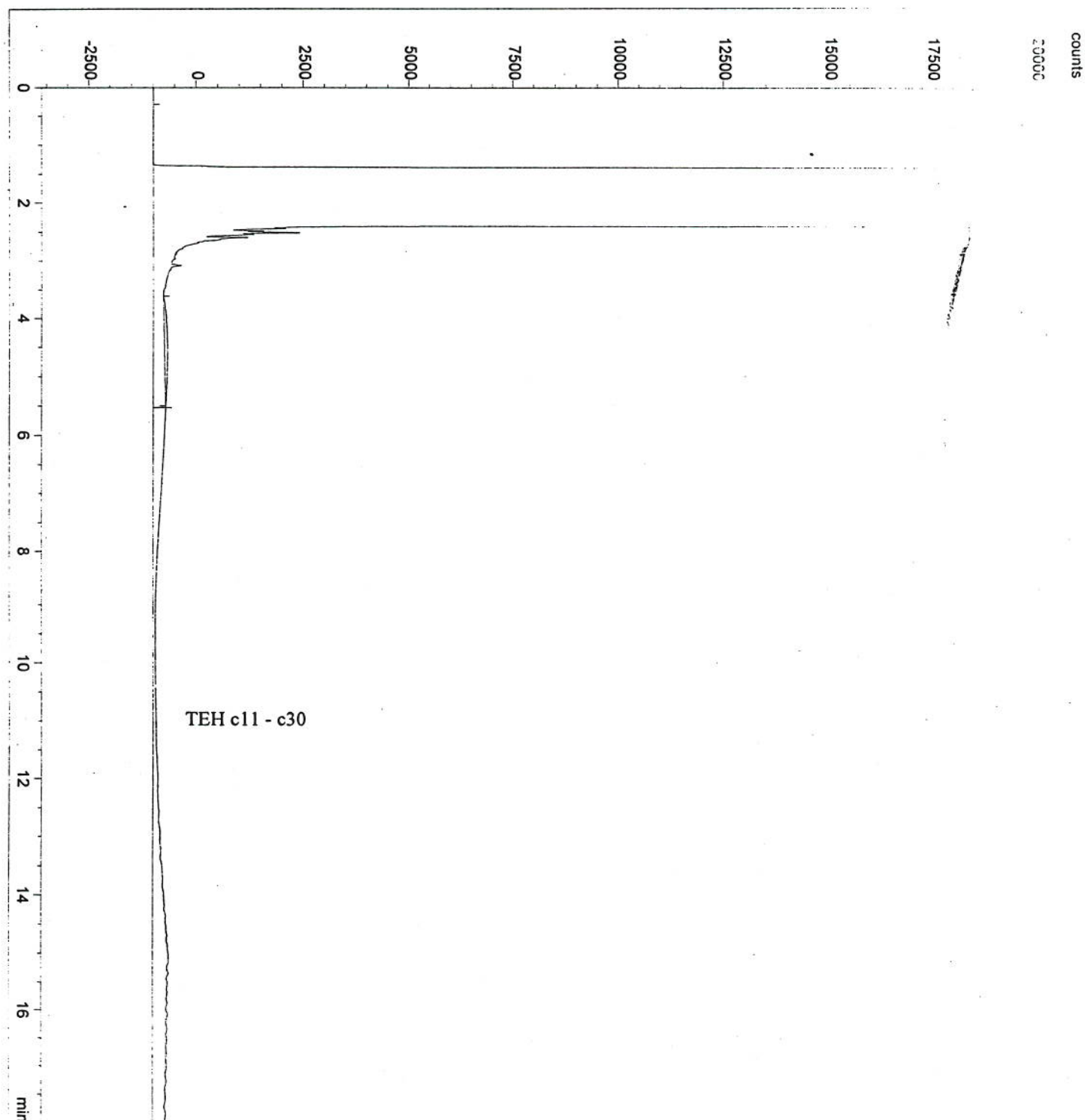


=====

Injection Date	: 5/26/99 6:37:24 PM	Seq. Line	: 24
Sample Name	: 99-23778	Vial	: 31
Acq. Operator	: M. Michalchuk	Inj	: 1
		Inj Volume	: 1 μ l

Sequence File : C:\HPCHEM\2\SEQUENCE\MAY25MM.S
Method : C:\HPCHEM\2\METHODS\TEH SOIL.M
Last changed : 5/19/99 10:51:41 AM by M. Michalchuk
Method for analysis of TEH (C11-C30) in soils using DB1 capillary column
with modified temperature program. (40 C for 2 min. 20 C/min to 300 C for 4
min)

=====



Injection Date : 5/26/99 9:27:53 PM

Seq. Line : 30

Sample Name : 99-23779

Vial : 34

Acq. Operator : M. Michalchuk

Inj : 1

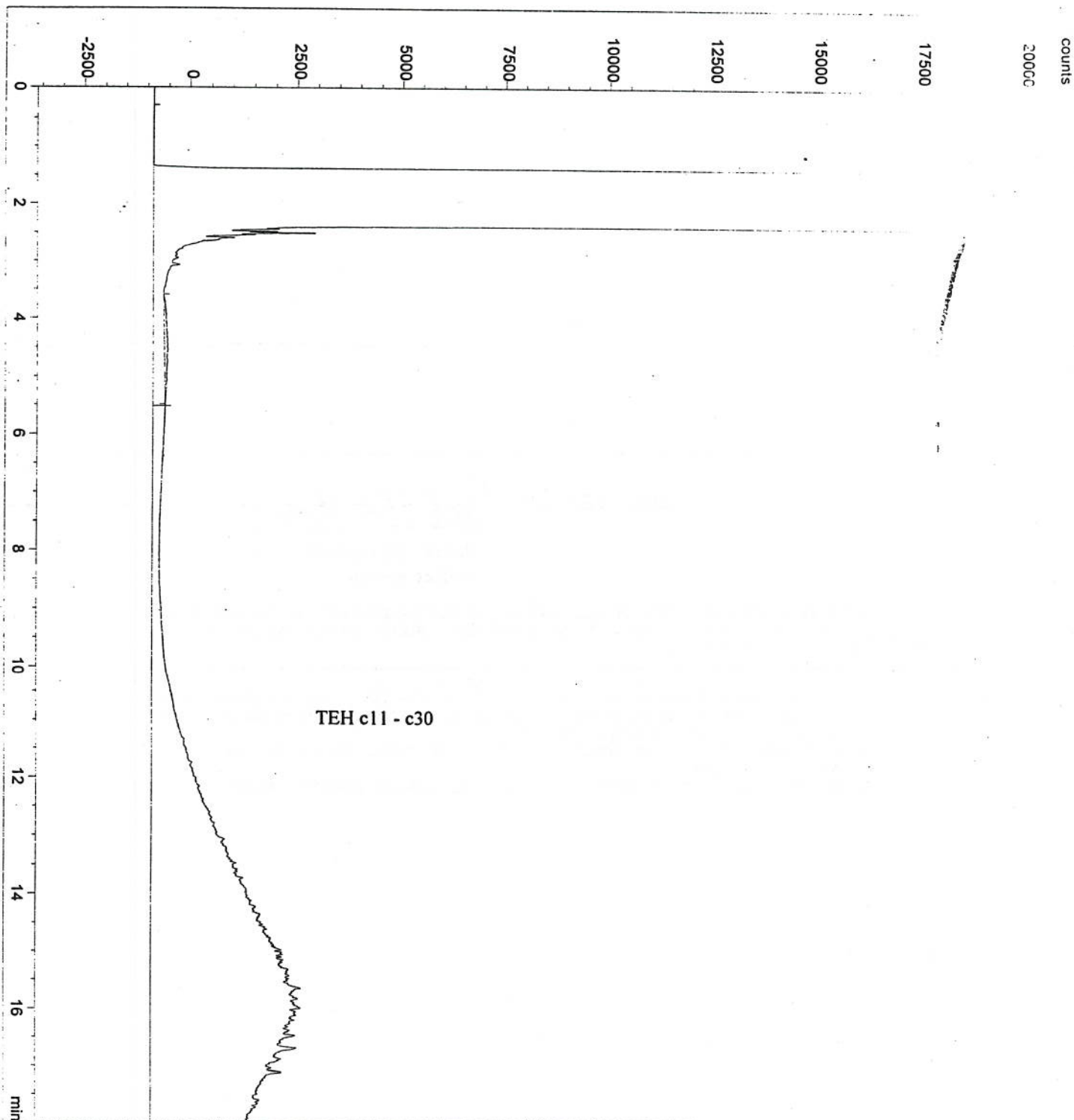
Inj Volume : 1 μ l

Sequence File : C:\HPCHEM\2\SEQUENCE\MAY25MM.S

Method : C:\HPCHEM\2\METHODS\TEH_SOIL.M

Last changed : 5/19/99 10:51:41 AM by M. Michalchuk

Method for analysis of TEH (C11-C30) in soils using DB1 capillary column
with modified temperature program. (40 C for 2 min. 20 C/min to 300 C for 4
min)



JUN 7 1999



EnviroTest

LABORATORIES



Manitoba Technology Centre Ltd.

FAX: 896 0754

FAX and Mail

CHEMICAL ANALYSIS REPORT

KGS Group Consultants
3227 Roblin Blvd
Winnipeg MB R3R 0C2

DATE: June 1 1999

ATTN: KASUR D

Lab Work Order #: W990507156 Submitted By: Kasur D
Project Reference: 99-570-01
Project P.O. #: Date Received: 99/ 5/21

Comments:

APPROVED BY:

Paul Nicolas

Paul Nicolas
Project Manager

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LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	METHOD #	ANALYZED	ANALYST
99-A23781 TH4-1 Sample Type: Soil Collected: 99/ 5/20 Other Analysis Miscellaneous Analysis			See Attached	***		A999.01	99/ 6/ 1	JCD
99-A23782 MW1-1 Sample Type: Soil Collected: 99/ 5/20 Other Analysis Miscellaneous Analysis			See Attached	***		A999.01	99/ 6/ 1	JCD
99-A23783 MW2-1 Sample Type: Soil Collected: 99/ 5/20 Other Analysis Miscellaneous Analysis			See Attached	***		A999.01	99/ 6/ 1	JCD
99-A23784 MW3-1 Sample Type: Soil Collected: 99/ 5/20 Other Analysis Miscellaneous Analysis			See Attached	***		A999.01	99/ 6/ 1	JCD

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LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	METHOD #	ANALYZED	ANALYST
99-A23785	MW4-1	Sample Type: Soil Collected: 99/ 5/20 Other Analysis Miscellaneous Analysis	See Attached	***		A999.01	99/ 6/ 1	JCD
99-A23786	TH1-1	Sample Type: Soil Collected: 99/ 5/20 Other Analysis Miscellaneous Analysis	See Attached	***		A999.01	99/ 6/ 1	JCD
99-A23787	TH2-2	Sample Type: Soil Collected: 99/ 5/20 Other Analysis Miscellaneous Analysis	See Attached	***		A999.01	99/ 6/ 1	JCD
99-A23788	TH3-1	Sample Type: Soil Collected: 99/ 5/20 Other Analysis Miscellaneous Analysis	See Attached	***		A999.01	99/ 6/ 1	JCD

ETL

Enviro-Test

LABORATORIES

124 Veterinary Road, Saskatoon, SK., S7N 5E3

Tel.: 1-800-667-7645 FAX: 306-668-8383

A DIVISION OF AGSPEC ANALYTICAL SERVICES LIMITED

ANALYSIS REPORT

For:

ETL

Date: 05/31/1999

745 Logan Avenue

Winnipeg, MB R3E 3L5

PROJECT: W990507156

Page # 1

Lab #	Client ID	Sat Paste %	pH	ECe mS/cm	Na mg/L	Ca mg/L	Mg mg/L	K mg/L	SAR
050228001	TH 4-1	50	8.1	0.84	21.5	84.2	49.1	16.1	0.46
050228002	MW 1-1	55	7.9	0.53	23.9	51.5	28.3	15.5	0.66
S9050228003	MW 2-1	54	8.2	4.4	434	357	287	36.0	4.1
050228004	MW 3-1	82	8.4	0.65	90.6	26.0	27.1	5.50	2.3
050228005	MW 4-1	67	7.8	7.9	784	564	692	34.0	5.2
S9050228006	TH 1-1	28	7.9	2.0	161	138	116	10.4	2.4
050228007	TH 2-2	50	7.9	3.7	273	214	322	18.0	2.8
050228008	TH 3-1	54	8.2	2.8	353	112	176	11.5	4.8
S9050228009	TH 5-1	62	8.3	6.6	531	556	613	41.0	3.7
S9050228010	TH 6-2	500	7.7	2.6	278	147	164	26.5	3.7
050228011	TH 7-2	59	8.2	5.3	594	331	323	25.0	5.6

Methods: BASIC SAL. SAL3S

File # S9050228

INTS May 31/99

APPENDIX C
HYDRAULIC CONDUCTIVITY GRAPH

Client: Maple Leaf Construction

Company: **KGS Group**

Location: Brookside and Jefferson

Project: 99-570-01

Maple Leaf Const. – Bison Diversified

DATA SET:
9957001.DAT
06/15/99

AQUIFER MODEL:

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:

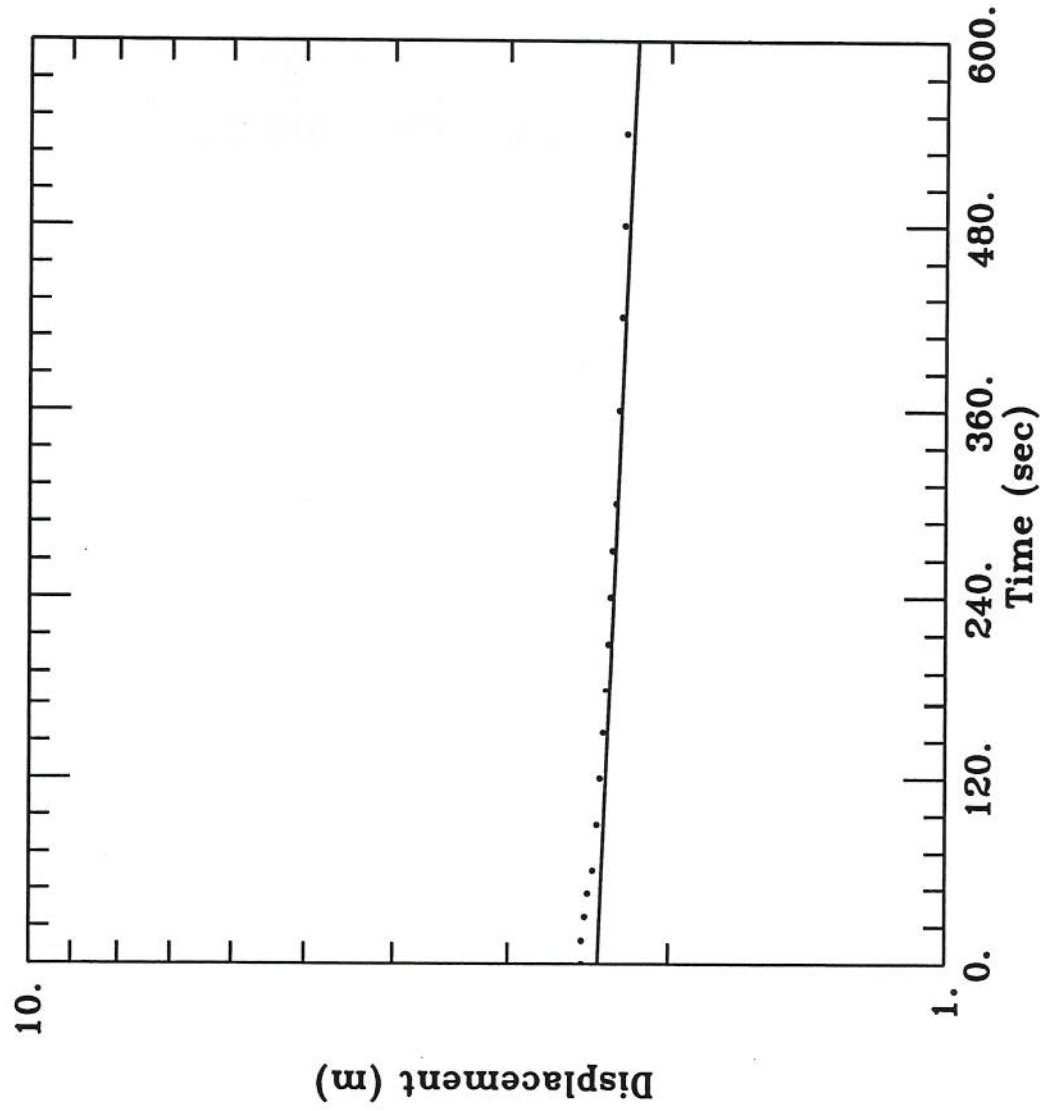
test date: May 28/99
test well: MW 3

TEST DATA:

$H_0 = 2.488 \text{ m}$
 $r_c = 0.025 \text{ m}$
 $r_w = 0.0635 \text{ m}$
 $L = 2.74 \text{ m}$
 $b = 2.74 \text{ m}$
 $H = 1.832 \text{ m}$

PARAMETER ESTIMATES:

$$K = 4.26 \times 10^{-8} \text{ m/sec}$$

$$y_0 = 2.387 \text{ m}$$


AQTESOLV

APPENDIX D

**MANITOBA ENVIRONMENT SITE SENSITIVITY ASSESSMENT
MANITOBA ENVIRONMENT
REMEDATION CRITERIA
SITE SENSITIVITY ASSESSMENT**

1. SITE INFORMATION

SITE DESCRIPTION

- Used as a fill repository

SURROUNDING LAND USE

North: Jefferson Ave., followed by vacant land
East: Maple Leaf Construction and concrete dumping site
South: vacant land
West: Brookside Blvd., followed by vacant land

GROUNDWATER USAGE

- Shallow groundwater is not used as a Potable source of water.

SURFACE WATER

- Surface drainage is toward two drainage ditches located along the north and west sides of the site

NEARBY UNDERGROUND STRUCTURES

- underground utilities: none located on site

OTHER SPECIAL ENVIRONMENTAL CONDITIONS

- None

SUBSURFACE CONDITIONS

Soil type: granular fill with rubble and reworked silty clay; silty clay; clayey silt.
Water table: Occurs approximately at 1.86 m to 2.0 m below surface.

2. SENSITIVITY ASSESSMENT

a) Ingestion

RECEPTOR	RECEPTOR SENSITIVITY	LIKELIHOOD OF IMPACT	SENSITIVITY RANKING
Groundwater	Low	Low	Low

SITE SENSITIVITY RANKING - LOW

b) Inhalation (Vapours From Soil)

RECEPTOR	RECEPTOR SENSITIVITY	LIKELIHOOD OF IMPACT	SENSITIVITY RANKING
Commercial Industrial	/ Low	Low	Low

SITE SENSITIVITY RANKING - INHALATION (SOIL): LOW

c) Inhalation (Vapours From Groundwater)

RECEPTOR	RECEPTOR SENSITIVITY	LIKELIHOOD OF IMPACT	SENSITIVITY RANKING
Commercial/ Industrial	Low	Low	Low

SITE SENSITIVITY RANKING - INHALATION (GROUNDWATER): LOW

3. CLEAN-UP CRITERIA - SOIL

Site sensitivity ranking is LOW
-soil remediation to Level III

APPENDIX E
SITE RECONNAISSANCE CHECKLIST

SITE RECONNAISSANCE CHECKLIST

Client: *Maple Leaf Construction*
Job No. : *99-570-01*
Project: *Phase II ESA*
Location of Site: *Corner Brookside + Jefferson S.E. corner*
Date of Visit: *May 20/99*
Climatic Conditions:

1.0 PRESENT SITE DEVELOPMENT

Site Description: *vacant land*
Roads: *none*
Dwellings: *none*
Underground Utilities: *none*
Power Lines: *none*
Structures: *none*
Public Buildings: *none*
Right-of-ways: *none*
Underground storage tanks: *none*
Wells: *none*
Accessibility of drilling equipment: *fair*

2.0 SURFACE CONDITIONS

Topography: undulating

Direction of runoff: towards ditches W edge and N edge and (E. end of lot -
low lying area)

Vegetation: grasses + shrubs

Surface erosion: none

Outcrops: none

Swamps: none

Marsh areas: ~~none~~ east end

Seeps: none

Ponded areas: east end

Streams: none

Springs: none

Evidence of flooding: none

Diversion ditches: along Brookside Blvd. and Jefferson Ave. (W. + N. sides)

Sink holes: none

Excavations: none

3.0 WASTE EVIDENCE

Discoloured soil: none

Odours: none

Waste material: concrete rubble

Drums, barrels, containers: some scrap metal

Construction material: yes

Transformers: none

Petroleum storage: none

Chemical storage: none

Waste piles: yes

Vegetation damage: none

Oily sheens or discoloration of ponded water: none

4.0 INSIDE BUILDINGS(S) INSPECTION

Ceiling tile:

Pipe wrap:

Wall board:

Floor tile:

Electrical equipment:

Insulation:

Chemical and/or fuel storage:

N/A

5.0 ADJACENT LAND USE

North: Jefferson Ave. followed by vacant land

South: vacant land

East: maple leaf const. site and concrete dumping site

West: Brookside Blvd. followed by vacant land.

Ponded water: none

Dwellings: none

Roads/utilities: ~~see~~ North - Jefferson west - Brookside

Structures: none

Public buildings: none

Right-of-ways: none

