

**Environmental Site Assessment
Whitehorse, Yukon
Teslin to Morley River**

Te 27, 30, 32, 33, 34, 35, 36

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Table 1 - 1f Analytical Site Data

Executive Summary of Assessment Program

Groundtrax Inc. was retained by Arctic Environmental Services (Action on Waste) to complete a Preliminary Environmental Assessment at former US military sites, which were used as various staging points during the construction of the Alaska Highway. These sites, were located at locations along the stretch of highway between Teslin and Morley River, from 1278 Km to 1250 Km (MP 777). A brief summary of findings and recommendations for each of the sites is contained in this summary.

- all sampling and testing followed proper protocol(CCME EPC - NCS62E Dec 1993 and CCME - TS/WM - TRE013E Mar 1991
- analysis of samples was conducted by a CAEAL accredited laboratory
- all analytical results were compared with the appropriate assessment guideline (CCME, MOEE and Canadian Water Quality Guidelines)
- all data was received and analysed relative to specific site characteristics, use and sensitivity

Site Findings and Recommendations

Site No 1 - Old Camp - km 1278, 796.6 mi.

Results of the surface and subsurface investigation at this site verified that ~~subsurface contamination~~ is present. This was evidenced from results of the soil gas survey (see Table 1) but not substantiated by laboratory results.. The contamination is believed to be as a result of present day use and not as a result of the construction of the Alaska Highway.

Recommendations

Remove all debris from the site and ~~surface staining~~ to a depth of 60 cm and disposed of at a certified disposal site. Post site with "No Litter" and "No Toxic Substances" signs to deter current activities.

Site No 2 - Teslin Gun Club - 1276 Km, 794 mi.

Soil gas survey detected two (2) locations at this site with readings in the upper region that signify potential contamination. ~~These sites are located at~~ SGS No's 6 (507 ppm) and No. 7 (123 ppm). These are the only areas of concern on completion of the investigation of this site. Unable to verify if these readings are a result of construction of the highway or of a more recent origin.

Recommendations

Further delineation at soil gas survey locations No's 6 & 7 required to confirm suspected contamination.

Site No 3 - Oil Tank Station - 793 mi.

No surface or subsurface analytical or soil gas survey data has indicated the presents or potential for any contamination at this site.

Recommendations

Based on the results of our complete investigation, field evidence indicates that this the site shows no evidence of contamination or need for restoration of any kind.

Site No 4 - Camp 8E - 1270 Km - 790 mi.

Based on the analytical and soil gas survey results, it has been established that subsurface contamination exists in the locations of SGS # 7, Test Pit No 3 where **Total Extractable Hydrocarbon results were 947.0 ppm** and possible subsurface contamination at SGS #15 - Test Pit 5. **Subsurface debris in the form of petroleum vessels** were located at test pit # 5. **Several areas of surface staining** were located near the entrance to the site.

Recommendations

Further subsurface investigation of the areas at and around Test Pit's 3 and 5 is recommended because of laboratory results and ~~the discovery of buried petroleum vessels~~. Surface staining should be cleaned up and disposed of and signs posted "No Litter" and "No Toxic Chemical" at the entrance to the site.

Site No 5 - Morley River Lodge - 777 mi.

The only area of concern at this site is in the vicinity of SGS # 8 and it's close proximity to the Morley River, where upper VOC results of **109.0 ppm** were encountered. It is believed this contamination is due to current activity at this site and not as a result of the construction of the Alaska Highway. Minimal surface staining was also encountered at this site.

Recommendations

Remove and dispose of surface stained materials in the area, particularly in the vicinity of SGS # 8 where higher levels of VOC's found.

Site No 6 - Gravel Pit - Km 1256 *1135*

Results of laboratory analysis of soil extracted at SGS # 1 show levels of contamination at **1380 mg/kg**, which are above MOEE guidelines. Surface staining is also visible at this location, as well as old fuel drums (empty) which were found in the south/west end of the investigation site. No other abnormalities were encountered at this site. Contamination is more likely as a result of present day activities.

Recommendations

Excavate and remove the contamination in the area of SGS # 1, as laboratory results have indicated above guideline levels of Total Extractable Hydrocarbons and dispose of the old fuel drums from the site.

Site No 7 - Military Site and Lodge - 1256 Km

The site investigation at this location did not identify any environmental hazards at this site. either as a result of the construction of the Alaska Highway or from present day activities.

Recommendation

No further delineation or restoration is required at this site. Signs should be posted to direct patrons of this site to discard their refuse directly into the landfill, not at the entrance to it.

Alaska Highway (Teslin to Morley River) 7 Preliminary Site Assessments

Introduction

Groundtrax Inc. was retained by Arctic Environmental Services (Action on Waste) to complete a Preliminary Environmental Assessment at former US military sites, which were used as various staging points during the construction of the Alaska Highway. These sites were located at locations along the stretch of highway between Teslin and Morley River, from 1278 Km to 1250 Km (MP 777).

Objectives

To provide:

- a Preliminary Environmental Assessment, including a subsurface investigation to indicate or identify actual and/or potential for on and off site contamination.
- discussion and recommendations further to any potential environmental risk to human health and safety or to the natural environment.

Background

Groundtrax Inc. was awarded nine (9) separate minimally described locations along the Alaska Highway for completion of a Preliminary Environmental Assessment Report for Action on Waste. The purpose of the Assessment was determine the presence or absence of contamination at each site and if present to assess any potential impact of same on sensitive neighbouring receptors.

During the original construction of the Alaska Highway these sites were used to stockpile equipment, fuels, construction materials and accommodations for personnel during the construction of the original highway. Each site (assessed individually, Sites 1 through Site 7) varied in size and distance to the current highway location. Identical activity was not carried out at each of these locations.

Methodology

The assessment process was carried out in two Phases.

- Phase 1 was completed through investigation and evaluation of existing information (obtained from Action on Waste), records review, thorough inspection of each site and the surrounding areas and interviews with current authorities and current community members. Phase 1 was conducted to verify historic and recent past individual site use and establish our Field Program plan.
- Phase 2 was completed through our Field Program and included; soil gas survey including PID readings, excavation of test pits, soil and water sampling, Laboratory chemical analysis, review, interpretation, evaluation and reporting to meet objectives.

Field Program**Soil Gas Survey**

Soil Gas Survey well locations were determined as a result of our Phase 1 investigation of each site. Each located well was measured in feet and sited from a 'location dominant feature' by compass in shooting individual well locate bearings.

A soil gas survey (SGS) was completed at each of the investigation sites, prior to the excavation of test pits. A soil gas survey is used as a sampling selection tool for locating potential contamination areas from "worst case" VOC results. These surveys were used to identify test pit locations for sampling. The surveys were not used to determine hydrocarbon contamination levels but to determine the concentration of combustible vapours, serving as a guide when instituting a sub-surface sampling program.

All survey wells were installed using a KVA portable drill, drilling to a depth of 1.21 m, and inserting 1.90 cm pvc slotted schedule 40 PVC pipe. The pipe was fitted with clear tygon tubing extending approximately 30.4 cm into the pipe and sealed in place. The 15.24 cm length of tygon tubing extending from the pipe for vapour sampling, was sealed. After a 24 hour period, organic vapour survey (OVS) readings were taken with a 2020 Photovac (PID) photoionization detector. All instruments used for the installation of these wells were decontaminated between each well installation to avoid cross contamination.

It should be noted that PID levels do not correspond to laboratory results, and will give different results than a Total Petroleum Hydrocarbon (TPH) analysis. Vapour results received from the Soil Gas Survey Wells, provided the necessary data to locate the 'Worst Case' potential for contaminated soil and water sampling. Test Pits for sample taking were excavated within the area of the Soil Gas Survey wells indicating the 'Worst Case' readings.

Excavation & Test Pits

As a result of the Soil Gas Survey, the 'Worst Case' well locations were identified and test pits were excavated to an average depth of **1.5 meters at all sites**. A Kabota backhoe and bobcat with a 10 ft extendible arm and dig bucket attachment was used for the majority of test pits. Some test pits were dug by hand where the heavy equipment was not accessible or appropriate for soil conditions. Test Pits were taken to an average subsurface depth of 1.5 meters. Visual and olfactory observations were made at each excavation for evidence of contaminants.

Soil & Water Sampling

On completion of each excavation pit, soil samples were collected from areas identifying the 'Worst Case' samples through visual and olfactory evidence and placed in sealable plastic bags. Site soil sample bags were analyzed in the field for VOC readings, using a PID Model 2020 combustible vapour detector using isobutylene calibration gas 101 ppm. This instrument has the capability to eliminate interference due to methane. Headspace concentrations were recorded on field logs. Soil samples were also collected and placed in laboratory supplied containers, placed in coolers on ice and transported under chain of custody to MDS Accredited Laboratory for Chemical Analysis. Sufficient on site sampling, for laboratory analysis, including quality control blanks, was conducted to avoid unnecessary site re-sampling to provide evidence only of the presence or absence of contamination, not to delineate the entire site.

Laboratory & Chemical Analysis

The Phase 1 Investigation completed led Groundtrax staff to select a range of analytical parameters to best assess the sites and meet assessment objectives, including; Total Extractable Hydrocarbons (TEH C6-32), Regulation 347 Leachate to Include Polychlorinated Biphenyl's (PCB's), Oils & grease (O/G), Total Phenols, ICP Metals and Organochlorine Pesticides. No additional potential contaminants were considered relevant in quantiles that may pose a risk from the historic use of these sites. No additional analytical parameters were deemed necessary to meet the Preliminary Environmental Assessment objectives, as requested within the contract.

Review

In order to facilitate comparison to the appropriate Guideline levels for interpretation of analytical results, a site sensitivity analysis was carried out at each site, according to Guideline procedures.

Site classifications and Table chosen for analytical result comparison is included with supporting data, within each report.

Site characteristics, relative to surface and subsurface potential for migration, on and off site sensitive impact receptors, past and current site use and wastes remaining on site **is included in each report.**

A summary of analytical results and headspace results (In mg/Kg from the laboratory, ppm from the PID meter, ug/g from the Guidelines) is included within each report. All three measurement forms are directly comparable in units given.

All of the above components form the basis for the Interpretation, Comments and Recommendations contained within each site report.

Interpretation

All analytical results received from MDS Laboratories are compared where appropriate to the following Assessment Guidelines:

CCME (Interim Canadian Environmental Quality Criteria for Contaminated Sites CCME EPC-CS34, September 1991) base comparison.

CCME does not have guidelines covering Total Petroleum Hydrocarbons (TPH), Total Extractable Hydrocarbons (TEH) - hot and cold or Oils and Grease which were part of the chosen parameters for soil and water analysis; therefore, the new MOEE, Guideline for use at Contaminated Sites in Ontario, June 1996 was chosen for comparison, as considered best current guideline for the assessment purpose.

Canadian Water Quality Guidelines.

All soil and water samples taken were sent Fed-Ex Air Express, Whitehorse direct to our Accredited Laboratory, MDS Environmental Services Limited, Goreway Drive, Mississauga, Ontario for analysis.

Evaluation

The evaluation of data was based on all data acquired through the Phase 1 and Phase 2 stages of the Assessment. All data was reviewed and analysed relative to specific site characteristics, use and sensitivity.

Comments and Recommendations

Comments and recommendations comprise a summary to satisfy the objectives and purpose of the Assessment. It is our attempt to provide a clear and concise assessment of facts as determined reliable by the Assessor.

Limitations and Use of Report

This Report was prepared for the exclusive use of client and is based, in part, on information collected during the preliminary subsurface investigation of the property conducted by Groundtrax Inc., as described within this report.

In evaluating the property, Groundtrax has relied in good faith on Information provided by others considered responsible to provide same. We accept no responsibility for any deficiency, misstatements

or inaccuracies contained in this report as a result of omission, misinterpretation or fraudulent acts of the persons interviewed.

The assessment of environmental conditions and possible hazards at this site has been made using results of chemical analysis for specific parameters in soil and groundwater at specific locations. The site conditions between sampling locations have been inferred based on conditions observed at the sampling locations. Due to the possible variation in fill types and filling practices and on historic land use activities, there may be localised zones of contamination which were not detected during this environmental assessment.

It should be noted that the results of an investigation of this nature should, in no way, be construed as a warranty that the site is free from any and all contamination from past or current practices other than noted in this report.

If new information is discovered during future work, including excavations, borings and or other studies, Groundtrax Inc. should be requested to re-evaluate the conclusions presented in this report and to provide an amendment as required.

Closure

We trust this report satisfies your current requirements. If you have any queries regarding this report, please do not hesitate to contact this office.

Alaska Highway (Teslin to Morley River) 7 Preliminary Site Assessments

1.1 Site No 1 - Old Camp - km 1278, 796.6 ml.

The Old Camp location was indicated at km 1281.9, just East of Teslin according to the work description. On September 10, 1996 the Old Camp was located at km 1278 Alaska Highway. The site is very accessible directly from the highway via a compacted driveway leading into the visible camp area. The assessment covers an area (138 m width and 152.4 m depth) immediately parallel to the highway. The site contains three visible structures still in current occasional use or occupation. Suspected hunting trail guide camp. See photos Appendix A 1

7
7227**1.2 Topography & Soil Structure**

The site area has a natural gently sloping grade from West to East, to the identified wetland area. At each test pit, topsoil was found overlying **medium grained brownish sand** which extended to the depth of excavation of 1.52 metres. The water table was not reached through test pit excavations.

1.3 Site Improvements

At the North end of the property is situated an old log cabin (6.09m x 4.57m), outhouse and a poled lean-to, on the west end of the property is situated an old single storey frame barn with a collapsed log section and corral attached. The barn was locked and miscellaneous contents were observed through openings within the building. Thorough inspection of contents not completed due to locked facility. **See Appendix B1**

1.4 Debris

Potentially hazardous debris in this site includes; two old barrel stoves, two 900 litre empty fuel tank, misc. metal pipes, one half buried 200 litre empty barrel, chain saw parts, cable spools, tarps, rolls of fencing wire, wood, shingles and iron safe (see photos appendix A1). Surface oil staining has been photo recorded from an area directly in front of the cabin, close to the circular driveway. The site debris observed is estimated to originate from recent past site use.

1.5 Vegetation

This site has residual and abundant growth of white pine, low shrubbery and moss. There are areas where the vegetation shows signs of stress. Stressed areas are located mainly to the front of the log cabin near the driveway, in the location of the partially buried 200 litre empty barrel, in the area of the 900 litre empty fuel tank and within the open lean-to maintenance facility.

1.6 Site Receptors

Just to the east of the property there is a low lying wetland area that appears to be fed from the highway culvert and from surface water runoff from the Old Camp. Healthy wetland vegetation is present without stress. This site has been classified as a possible sensitive area due to proximity to this established wetland. **See Appendix B1**

1.7 Site Investigation - week of September 8, 1996

- thirteen wells were installed to a depth of **3 feet**
- thirteen soil gas surveys
- thirteen PID readings from survey wells
- ten test pits were excavated on site to an average depth of **5 feet**
- visual, olfactory and PID inspection of each test pit
- four soil samples from Test Pits 3,6,9,19 and one surface water sample

Well locations were established through our Phase 1 investigation and plotted on the site map using the South/East corner of the log cabin as reference. Distances (feet) and direction (compass bearings) were both plotted from the Cabin reference point to each well location. **see Table 1**

1.8 Site Sensitivity

Groundwater was not present within SGS wells or test pits. No wells within the vicinity of the site. No unique or endangered species were known to inhabit the local vicinity. A wetland lies adjacent to the site with potential impact from site runoff. The site is considered sensitive due to the close proximity and potential for impact, as a result of contaminants if present, from the site.

1.9 Sampling and Analysis

1.9.1 Soil Samples

All soil samples were collected September 10, from selected test pits, as identified 'Worst Case' from the soil gas survey readings. All soil samples were handled by Groundtrax staff to guideline protocol.

1.9.2 Water Samples

All soil and water samples including Quality control blanks were sent to MDS Environmental services, a CAEAL approved laboratory, to have the required analysis completed and result originals returned to Groundtrax Inc. for review and interpretation. **See Table 1**

Only one water sample was collected September 10, from surface water located within the wetland runoff area just east of the site boundary. The water sample was collected slightly down gradient and adjacent to 'worst case' PID reading location. No other suitable surface or groundwater was present for sampling.

After investigation of the site characteristics, normal surface water runoff and groundwater, if and when present, would have the greatest tendency to migrate to this wetland area. All water samples were handled by Groundtrax staff to guideline protocol.

1.10 Laboratory and Soil Gas Survey Results

1.10.1 Soil Gas Survey Results

Soil Gas Survey results using a Photoionization meter (Photovac 2020 PID) have indicated levels of hydrocarbon activity at several areas throughout the investigation site. It should be noted that findings of this type of survey do not correspond to any other test levels or laboratory results, and will give different results than a Total Petroleum Hydrocarbon (TPH) analysis.

VOC levels indicated from the Soil Gas Survey may be a result of surface staining which has migrated into the subsurface, caused by recent past use and the mishandling of various contaminants, i.e. old barrels, chainsaws, and fuel tanks littering the area. It is not considered likely that the VOC readings are a result of historic contamination. See Table 1

Soil Gas Survey Results

No. 1	0.0 ppm	Test Pit # 1	0.0 ppm
No. 3	13.8 ppm	Test Pit # 3	13.8 ppm
No. 4	0.2 ppm		
No. 5	14.7 ppm		
No. 6	11.0 ppm	Test Pit # 6	11.0 ppm
No. 7	0.0 ppm		
No. 8	10.2 ppm	Test Pit # 8	10.2 ppm
No. 9	9.5 ppm	Test Pit # 9	9.5 ppm
No.10	8.9 ppm	Test Pit # 10	8.9 ppm
No.11	0.0 ppm	Test Pit # 11	0.0 ppm
No. 19	16.8 ppm	Test Pit # 18	0.0 ppm
No. 21	7.9 ppm	Test Pit # 19	6.8 ppm
No. 22	0.0 ppm	Test Pit # 20	0.0 ppm

1.10.2 Laboratory Results

Test Pit # 3	TEH	non detect	
	ICP -Metals	below criteria	
	Total Phenols	0.07 mg/kg	CCME Criteria 1.0 ug/g
Surface Water	O/G	non-detect	

Laboratory results do verify some analytical activity below criteria level for phenols at Test Pit 3. All other results returned either Non detect (nd) or below criteria (bc). See Table 1.

1.11 Discussion and Recommendations

Based on the results of our complete investigation, it is considered that the majority of the evidenced potential ~~hydrocarbon~~ contamination is located generally throughout the subsurface of the site, as a result of current site use. VOC reading were evident within most of the survey wells. Analytical results indicated non-detect and verified contaminant levels within acceptable criteria. No health and safety concerns are anticipated within the site as a result of existing evidenced subsurface contamination. Some continuing risk is present to the natural environment on the site and to the adjacent wetlands, as a result of current use of the site.

It is recommended that site restoration take place including; removal of all debris, and surface stained soils to a depth of **60 cm** with disposal of soil staining material to a certified disposal site. It is further recommended that the site be posted after restoration with 'No Litter', 'No Toxic Substances' to further deter current site use practices and reduce the potential of additional impact on the sensitive receptors.

Alaska Highway (Teslin to Morley River) - 7 Preliminary Site Assessments

2.1 Site No 2 - Teslin Gun Club - 1276 km, 794 mi

This investigation on September 11, 1996 identified three sites that are within such close proximity to each other and currently used as one site that this investigation was classified as one, the Teslin Gun Club. They included within the preliminary data provided (Gun Club at km 1278, Sawmill and Pumping Station at mile 794, Canol Pumping Station at mile 793.9, Army Camp near Lumber mill at mile 794.1)

The Teslin Gun Club is located at km 1276 mile marker 794 along the Alaska Highway, travelling east out of the town of Teslin. The site is located on the north side of the highway and is immediately accessible by vehicle via a driveway access and through an fence opening to the site. The site runs parallel to the Alaska Highway. The south property line has a white wooden pole fence almost the entire length of the site. This investigation area covers an area (**229 m** in width and **366 m** in depth)

2.2 Topography & Soil Structure

This site has been completely bulldozed, graded and sloped north to south to a low point at the South West corner near the entrance. The entire site forms a low slope bowl. The perimeter of the site is an elevated embankment with greatest elevation to the North and East. **Soil conditions** varied across the site from sand and gravel to heavy clay, mixed due to site excavation, backfill and grading.

See photos Appendix A2.

2.3 Site Improvements

An old outhouse located at the south upper embankment is the only structure remaining. Several picnic tables and a partially finished concrete walkway slab near the entrance are the only improvements present on the site.

2.4 Debris

There is very little debris at this site with the exception of posts and poles used by visitors for posting targets, spend shell casings from current gun club use, and old plastic containers and cans used as targets. See photos Appendix 2

2.5 Vegetation

This site has sparse ground cover, with patchy growth. Along all four site boundaries, thickly covered mature pine, spruce and poplar trees are present

2.6 Site Receptors

This site has no identified receptors that would play a major part in the investigation of this site. The site has two low bowled areas located at the south west end of the excavated site near the entrance that would be susceptible to collection of surface runoff in wet weather. This site has been classified as a non- sensitive area because of the lack of water courses, wetlands, high water table, endangered species, etc. within estimated impact vicinity of the investigation area.

2.7 Site Investigation

- 16 wells were installed to a depth of 0.9 m
- 16 soil gas surveys were performed
- 16 PID readings were taken from SGS wells
- 18 test pits were excavated on site to an average depth of 1.5 m
- visual and olfactory inspection of each test pit
- 18 PID readings were taken from Test Pits 1 through 18
- 9 soil samples were taken from Test Pits

Well locations were established through the Phase 1 investigation and plotted on the site map (Appendix B 2) using a reference point at the north end of the partially completed concrete walkway located at the south west corner of the site. All distances survey wells were measured in feet, while the direction was shot by compass (see Table 1 A).

2.8 Site Sensitivity

Groundwater was not present within SGS wells or test pits. No wells within the vicinity of the site. No unique or endangered species were known to inhabit the local vicinity. No wetland areas within or adjacent to the site with potential impact from site runoff. The site is considered non-sensitive due to the limited potential for impact, as a result of contaminants if present, from the site.

2.9 Sampling and Analysis

All soil and water samples including Quality control blanks were sent to MDS Environmental services, a CAEAL approved laboratory, to have the required analysis completed and result originals returned to Groundtrax Inc. for review and interpretation.

2.9.1 Soil Samples

All soil samples were collected September 11 from selected test pits, as identified 'Worst Case' from the soil gas survey readings. All soil samples were handled by Groundtrax staff to guideline protocol.

2.9.2 Water Samples

No water samples were collected since there was no groundwater encountered during either the soil gas survey or the excavation of testpits in the area. Also no visible receptors or surface water runoff was present in close proximity to this site

2.10 Laboratory and Soil Gas Survey Results

2.10.1 Soil Gas Survey Results

Soil Gas Survey results, using a Photoionization meter (Photovac 2020 PID), have indicated levels of ~~hydrocarbon activity~~ at several areas throughout the investigation site. It should be noted that findings of this type of survey do not correspond to any other test levels or laboratory results and will give different results than a Total Petroleum Hydrocarbon (TPH) analysis.

PID readings received from the SGS may be a result of buried contaminants deeper than excavated test pits. There were two areas with higher than average results from the soil gas survey. These areas were located at Site 6 indicating PID reading of 507 ppm and Site 7 indicating PID reading of 123 ppm). These two areas may warrant some future investigation. See Table 1 A

Soil Gas Survey Results

No. 1	10.0 ppm	Test Pit # 1	0.0 ppm
No. 2	2.7 ppm	Test Pit # 2	0.0 ppm
No. 3	1.4 ppm	Test Pit # 3	0.0 ppm
No. 4	7.3 ppm	Test Pit # 4	3.1 ppm
No. 5	25.6 ppm	Test Pit # 5	1.2 ppm
No. 6	507.0 ppm	Test Pit # 6	4.9 ppm
No. 7	123.0 ppm	Test Pit # 7	2.3 ppm
No. 8	9.5 ppm	Test Pit # 8	3.9 ppm
No. 9	6.1 ppm	Test Pit # 9	2.0 ppm
No.10	0.0 ppm	Test Pit # 10	3.7 ppm
No.11	17.4 ppm	Test Pit # 11	2.7 ppm
No.12	0.0 ppm	Test Pit # 12	1.7 ppm
No. 13	2.0 ppm	Test Pit # 13	3.0 ppm
No. 14	0.0 ppm	Test Pit # 14	1.7 ppm
No. 15	0.0 ppm	Test Pit # 15	1.3 ppm
No. 16	0.0 ppm	Test Pit # 16	1.2 ppm
		Test Pit # 17	2.6 ppm
		Test Pit # 18	0.9 ppm

2.10.2 Laboratory Results

Test Pit # 1	TEH	non detect	CCME Criteria 1.0 ug/g
	ICP -Metals	below criteria	
	Total Phenols	0.20 mg/kg	
Test Pit # 15	TEH	non detect	CCME Criteria 1.0 ug/g
	ICP Metals	below criteria	
	Total Phenols	0.10 mg/kg	

Laboratory results for this site verify two Test Pit's 1 and 15 have some analytical activity below criteria levels for phenols. The remainder of laboratory sampling returned either non detectable levels (nd) or below criteria levels (bc) for suspected contaminants. See Table 1a.

2.11 Discussion and Recommendations

Based on the results of our complete investigation, field evidence indicates no potential contamination with the exception of a suspect area within the vicinity of Soil Gas Survey # 6 and # 7.

The Soil Gas Survey site # 6 (507 ppm) and # 7(123 ppm) has indicated high PID readings. Even though laboratory results for these two areas have not shown levels of contamination above acceptable criteria, and site risk has not been identified, it is recommended that further delineation of these two areas be undertaken for confirmation only of the suspected potential of contamination due to Organic Vapour Survey (PID) readings.

VOC readings were evident within many of the survey wells. Analytical results indicated non-detect and below acceptable criteria from all soil samples taken. No health and safety concerns are anticipated within the site as a result of the indicated non-detect and below criteria contaminant levels on this site.

Alaska Highway (Teslin to Morley River) - 7 Preliminary Site Assessments

3.1 Site No 3 - Oil Tank Station - 793 ml

The Oil Tank Station was indicated at mile 793.8 East of Teslin according to the work description. The site is located at mile 793 Alaska Highway. The site is surrounded on all four (4) sides by an overgrowth of spruce, pine and poplar trees. Access to this site is via a vehicle trail on the north side of the highway running along the north west side of the site. From the highway you travel approximately 60 metres to gain access to the site through some small overgrowth on the east side of the trail. This site investigation covers an area of **approximately 229 m** in width and **366 m** in depth. The site contains no structures of any type.

3.2 Topography & Soil Conditions

This site has been bulldozed, graded and abandoned for many years. The surrounding embankments on three sides were used to cover the pitted site. Drainage flows from to the South East end and to the South West end of the site towards the highway. Two historic highway entrances are overgrown but visible at the East and West end of the site. Subsurface soil conditions were light sand and gravel. See photos Appendix A3.

3.3 Site Improvements

The site is clear of any site improvements.

3.4 Debris

The site is clear of surface debris. No debris was evidenced within test pits.

3.5 Vegetation

Mature pine, spruce and poplar trees surround the site. The abandoned site is fairly well covered with low patchy growth of willows, sphagnum moss and Labrador tea. This site also shows signs stressed vegetation, throughout the investigation area. (see photos appendix A2)

3.6 Sensitive Receptors

There are no sensitive receptors on the site or within the surrounding area. Site runoff is evident at the South East boundary of the site down a steep embankment towards the Highway ditch running to a culvert. The closest receptor being a beaver dam and creek is approximately 3 km to the East.

3.7 Site Investigation

- 16 wells were installed to a depth of **0.9 m**
- 16 soil gas surveys were completed
- 16 PID readings were taken from SGS 1 through 16
- 12 Test Pits were excavated to an average depth of **1.5 m**
- visual and olfactory inspection of each test pit
- 5 PID readings were taken from Test Pits
- 8 soil samples were taken

Well locations were established through the Phase 1 investigation and plotted on the site map (Appendix B 3) using a reference point at the East end of the site near the entry point (large rock). All distances survey wells were measured in feet, while the direction was shot by compass (see Table 1 B).

3.8 Site Sensitivity

Groundwater was not present within SGS wells or test pits. No wells within the vicinity of the site. No unique or endangered species were known to inhabit the local vicinity. No wetland areas within or adjacent to the site with potential impact from site runoff. The site is considered non-sensitive due to the limited potential for impact, as a result of contaminants if present, from the site.

3.9 Sampling and Analysis

All soil samples including quality control blanks were sent to MDS Environmental Services, a CAEAL approved laboratory to have the required analysis completed and originals returned to Groundtrax Inc. for review and interpretation.

3.9.1 Soil Samples

All soil samples were collected September 11, 1996 from selected Test Pits, as identified 'Worst Case' from the Soil Gas Survey readings. All soil samples were handled by Groundtrax staff to guideline protocol.

3.9.2 Water Samples

No water samples were available for collection from this site.

3.10 Laboratory and Soil Gas Survey Results

3.10.1 Soil Gas Survey Results

Soil Gas Survey results using a Photoionization meter (Photovac 2020 PID) have indicated levels of hydrocarbon activity at several areas throughout the investigation site. It should be noted that findings of this type of survey do not correspond to any other test levels or laboratory results, and will give different results than a Total Petroleum Hydrocarbon (TPH) analysis. See Table 1 B

Results received from the SGS site # 3 indicated the highest PID reading of 11.2 ppm, considered low and may be a result of some activity that took place during the construction of the highway at this location, but laboratory analysis did not concur with these results.

Soil Gas Survey Results

No. 1	0.0 ppm	Test Pit # 1	2.6 ppm
No. 2	0.0 ppm	Test Pit # 2	1.2 ppm
No. 3	11.2 ppm	Test Pit # 3	0.8 ppm
No. 4	7.0 ppm	Test Pit # 4	0.6 ppm
No. 5	0.0 ppm	Test Pit # 5	1.2 ppm
No. 6	5.0 ppm	Test Pit # 6	1.6 ppm
No. 7	0.0 ppm	Test Pit # 7	0.9 ppm
No. 8	0.0 ppm	Test Pit # 8	0.7 ppm
No. 9	0.0 ppm		
No.10	0.0 ppm		
No.11	0.0 ppm	Test Pit # 9	0.7 ppm
No.12	0.0 ppm	Test Pit # 10	1.7 ppm
No.13	0.0 ppm		
No.14	0.0 ppm	Test Pit # 11	0.1 ppm
No.15	0.0 ppm	Test Pit # 12	0.9 ppm
No.16	0.0 ppm		

3.10.2 Laboratory Results

Test Pit # 2	TEH	non-detect	
	ICP Metals	below criteria	
	Total Phenols	0.12 mg/kg	CCME 1.0 ug/g
Test Pit # 5	TEH	non-detect	
	ICP Metals	below criteria	
	Total Phenols	0.15 mg/kg	CCME 1.0 ug/g
Test Pit # 8	TEH	non-detect	
	Total Phenols	0.31 mg/kg	CCME 1.0 ug/g
Test Pit # 10	TEH	non-detect	
	Total Phenols	0.12 mg/kg	CCME 1.0 ug/g

Laboratory results for this site indicated verify four Test Pit's 2,5,8,10 have some analytical activity below criteria levels for phenols. The remainder of laboratory sampling returned either non detectable levels (nd) or below criteria levels (bc) for suspected contaminants. See Table 1b.

3.11 Discussion and Recommendations

The Soil Gas Survey site # 3 PID reading of (11.2 ppm) comprises a single low reading without further analytical or site Vapour readings.

Analytical results indicated non-detect and below acceptable criteria from all soil samples taken. No health and safety concerns are anticipated within the site as a result of the non-detect and below criteria contaminant levels on this site. There are no indications at this site of any surface or subsurface debris that would contribute to contamination or any potential contamination.

Based on the results of our complete investigation, field evidence indicates that the site shows no evidence of contamination or need for restoration of any kind.

Alaska Highway (Teslin to Morley River) 7 Preliminary Site Assessments

4.1 Site No 4 - Camp 8E - 1270 km 790 Mile

Camp 8E was indicated at mile 790.5 East Teslin. The site is located at mile 790 Alaska Highway. The site is visible from the highway. This site is the present location of a working gravel pit. It is accessed from the north side of the main highway via hard packed winding gravel road. The site has a 'No Trespassing' sign at the entrance to the site. There is a road on either side of the pit for vehicular travel around the perimeter. The site can also be traversed by vehicle through the centre of this site. The gravel pit is surrounded on all sides by pine and spruce trees. The investigation of this site covered an area of **73 m in width and 335 m in depth**. See photos Appendix A4.

4.2 Topography & Soil Structure

The site has been excavated, graded and gravel is being excavated throughout the site. Site drainage flows East to South West and enters a runoff ditch on the Westerly boundary. The subsurface within the site area is substantially gravel base to a depth of **0.5 m**. From **0.5 m to 1.5m** to subsurface consists of closely packed sand and clay mixed.

4.3 Site Improvements

There are no structures present on this site. The site is used as a working gravel pit only.

4.4 Debris

There is no debris visible on this site. There are several surface areas heavily stained from motor oils, either dumped on the ground or spilled as a result of persons changing vehicle oils.

4.5 Vegetation

This site is very lightly covered with sphagnum moss and Labrador tea. The lack of ground cover vegetation is likely do recent and past activity at this site.

4.6 Site Receptors

There are two receptors that are within close proximity to this site. The first receptor can be found just beyond the south west end of the site, over the end bank. This is the location of very wet vegetation that is most likely as a result of surface and subsurface runoff from the site. The second receptor can be found again to the south west, approximately one (1) km from the site. This is a small stream that flows east to west and has an intact beaver dam creating a pond site and expanded wetland area.

4.7 Site Investigation

- 15 wells were installed to **0.9 m**
- 15 Soil Gas Surveys
- 13 PID reading were taken from SGS
- 6 Test pits were excavated to an average depth of **1.5 m**
- visual and olfactory inspection of each test pit
- 6 PID readings were taken from test pits
- 4 Soil samples were taken
- 7 Water samples were taken

Evidenced Suspect Contamination

Within Test Pit # 3 , SGS # 7, a medium grey/green lens of contamination was evident **1.2 m from the surface extending the length of the excavation pit.** Hand samples provided olfactory evidence of a petroleum source.

Within Test Pit # 5, SGS # 15, several fuel containers were uncovered during excavation. A 45 oil drum that had deteriorated into two piece but still had the bung covers in tact, as if the barrel had never been opened. Also unearthed were some grease cylinders and a transmission oil cans

Well locations were established through the Phase 1 investigation and plotted on the site map (Appendix B 4) using a reference point at the i) Entrance Sign for SGS # 1 to #4 ii) S/W access Road, left corner of Pit for SGS # 5 to # 15. All distances to survey wells were measured in feet, while the direction was shot by compass (see Table 1 C).

4.8 Site Sensitivity - High

A watershed runs parallel to the west end site boundary and evidenced runoff from the site creates a potential for impact from surface or subsurface contamination. The gravel base of the site allows for greater movement of contamination if present on the site. The topography and natural drainage of the site allows for greater potential for off site impact on the watershed area. Immediately beyond the Westerly site boundary and watershed area is a stream and dammed area with extended watershed creating a greater potential impact zone from this site.

Groundwater was only encountered within Test Pit 5 but not present within SGS wells. No wells are present within the vicinity of the site. No unique or endangered species were known to habitat the local vicinity.

The site is considered sensitive

4.9 Sampling & Analysis

All samples including quality control blanks were sent to MDS Environmental services, a CAEAL approved laboratory, to have the required analysis completed and result originals returned to Groundtrax Inc. for review and interpretation. **See Table**

4.9.1 Soil Samples

All soil samples were collected September 12th and 13th, 1996, from selected Test Pits, as identified 'Worst Case' from the Soil Gas Surveys. All soil samples were handled by Groundtrax staff to Guideline protocol.

4.9.2 Water Samples

Water samples were collected September 12th and 13th, 1996 in laboratory containers, from groundwater encountered test pit No 5 and from the surface water located at the receptor south west of the site, over the end of the site runoff bank. These samples were handled in the same manner as for the soil samples. All water samples were handled by Groundtrax staff to Guideline protocol.

4.10 Laboratory and Soil Gas Survey Results

4.10.1 Soil Gas Survey Results

Soil Gas Survey results using a Photoionization meter (Photovac 2020 PID) have indicated levels of hydrocarbon activity at several areas throughout the investigation site. It should be noted that findings of this type of survey do not correspond to any other test levels or laboratory results, and will give different results than a Total Petroleum Hydrocarbon (TPH) analysis. See Table 1 B

Results received from the SGS site # 10 indicated the highest PID reading of 13.2 ppm, considered low and may be a result of some activity that took place during the construction of the highway at this location, but laboratory analysis did not concur with these results.

Soil Gas Survey Results

No. 1	2.4 ppm	Test Pit # 1	9.0 ppm
No. 2	9.2 ppm		
No. 3	3.7 ppm		
No. 4	2.7 ppm		
No. 5	8.0 ppm		
No. 6	0.0 ppm	Test Pit # 2	7.9 ppm
No. 7	10.2 ppm		
No. 8	0.0 ppm	Test Pit # 3	10.2 ppm
No. 9	9.7 ppm		
No 10	13.2 ppm		
No 11	3.1 ppm		
No 12	11.4 ppm		
No 13	6.2 ppm	Test Pit # 4	7.3 ppm
No 14	2.5 ppm		
No 15	4.0 ppm	Test Pit # 5	6.9 ppm
		Test Pit # 6	6.8 ppm

4.10.2 Laboratory Results

Test Pit # 1	TEH	non-detect	
	ICP Metals	Below criteria	
	Total Phenols	000.12 mg/kg	CCME Criteria 1.00 ug/g (mg/kg)
Test Pit # 3	TEH	947.00 mg/kg	MOEE Criteria 100 ug/g
	ICP metals	Below criteria	
	Total Phenols	000.07 mg/kg	
Runoff Water	O/G	non-detect	
	ICP Metals	below criteria	
	Total Phenols	non-detect	
	OC Pests	non-detect	
	PAH	Non-detect	

Laboratory results do verify some abnormal activity at two separate areas within the site.
See Table 1 C

All laboratory results for this site indicated non detect (nd) or below criteria (BC) levels for all parameters analyzed, with the exception of Test Pit # 3 soil sample, from the SGS No.7 area.

Total Extractable Hydrocarbons (TEH) results indicated contaminant level of **947 mg/kg** vs MOEE Guideline not to exceed levels of **100 ug/g**. See Table 1C.

4.11 Discussion and Recommendation

Based on the results of the complete investigation, potential subsurface contamination is indicated within the area of Soil Gas Survey # 7 - Test Pit No. 3 and Soil Gas Survey # 15 - Test Pit No. 5.

Surface contamination is indicated by surface oil staining within the entrance area of this site. This surface staining could potentially contaminate ground through migration into the soil and also surface waters due to surface runoff from the site.

Further subsurface investigation is recommended to delineate the area around SGS # 7 - Test Pit No. 3 for Total Extractable Hydrocarbon (TEH) contamination, due to **(PID reading of 10.2 ppm) (TEH of 947 mg/kg with a MOEE Criteria of 100 ug/g for Residential/ Parkland use.**

Subsurface investigation is also recommended to delineate the area around SGS # 15 - Test Pit No. 5 for Total Extractable Hydrocarbon (TEH) contamination, due to **(PID reading of 6.9 ppm)**, unearthed 45 gallon drum and petroleum containers indicating that waste has been buried at this site. Soil sample results indicated non-detect on range of parameters analysed. Further excavation and sampling may evidence further potential contamination within this area.

Further subsurface investigation is recommended to delineate the area around SGS # 5 - Test Pit No. 1 for Total Extractable Hydrocarbons (TEH) contamination, due to **borderline** analytical results for Phenol of **0.12 mg/kg vs acceptable guideline criteria of 1.0 mg/kg**

It is also recommended that the site be posted with 'No Litter Warnings' along with 'No Toxic Chemical' spills warnings with appropriate Fines, to deter continued contamination as identified from surface staining within the entrance area of the site. It is recommended that stained surface soils be excavated and disposed of to an approved waste site.

The West end of the site has been identified as a High Sensitive receptor due to the watershed running parallel to the western site boundary and runoff area for the site. Additional sensitive off site receptors are situated within impact distance of the site. There is no evidence from this assessment that off site impact has occurred to date. Without further site assessment and delineation, the current risk of impact off site is undetermined. Monitoring wells are recommended for placement within the West drainage area of this site.

No health and safety concerns are anticipated within the site to humans as a result of existing evidenced subsurface contamination. There is a continuing risk to the natural environment on and off the site, not only from debris and contaminants located during the investigation, but also from the surface contamination near the entrance to the site.

Alaska Highway (Teslin to Morley River) 7 Preliminary Site Assessments

5.1 Site No 5 - Morley River Lodge Mile 777

This site is located at mile marker 777 at Morley River Lodge on the Alaska Highway. The site is very accessible from the main highway, as it has a well compacted driveway leading into the area of investigation. The site is situated on the south side of the main highway at the Morley River campsite, slightly east of the main lodge. This site investigation covered an area of **76.2 m** in width and **152.4 m** in length. The investigation site was located in the vicinity of the main campground. See Appendix A5.

5.2 Site Improvements

There are no structures evident at this site but there are four (4) structures west of the site that are used by the owners of the property.

5.3 Topography & Soil Structure

The site drains gradually from West to East towards the Morley River. The surface of this site is predominantly gravel base driveway and campsites, with perimeter grass cover overlying dark brown sandy loam and peat bog near the river's edge. The site is gently sloping from **West to East** draining to the Morley River along the entire length of the site.

5.4 Debris

The area of investigation was free of debris. This site was in use at the time of the investigation as a camping area for tourists. All garbage in this area is removed to a disposal site daily while the campground is in operation.

5.5 Vegetation

All natural vegetation covering the area. Mainly spruce and pine trees and low bush was distributed throughout the site. Some grassed areas beneath and through the taller trees. Along the river bank you can find small marshy areas of vegetation.

5.6 Sensitive Receptors

The investigation site is abutting the Morley River on the north bank and runs parallel to the river. From discussions with people local to the area the river is a popular fishing site and the camp site is used by many tourists. Two locations along the river water was tested for oxygen, pH, conductivity, Salinity and temperature condition near the site area. The water conditions in the river at the time of the investigation were as follows:

Site 1

oxygen - 88% - 9.76 mg/l
pH - 7.0 units
Conductivity - 0.102 ms/cm
Salinity - 0.1%
Temperature - 10.3 C

Site 2

oxygen - 88% - 9.92 mg/l
pH - 7.0 units
Conductivity - 0.100 ms/cm
Salinity - 0.1%
Temperature - 10.3 C

The above conditions are considered optimal and with no evidence of impact from the site.

5.7 Site Investigation

The on site investigation of this area consisted of a:

- 10 wells were installed to **0.9 m**
- 10 Soil Gas Surveys
- 10 PID reading were taken from SGS
- 3 Test pits were excavated to an average depth of **1.5 m**
- visual and olfactory inspection of each test pit
- 3 PID readings were taken from test pits
- 2 Soil samples were taken
- No Water samples were taken

Well locations were established through the Phase 1 investigation and plotted on the site map (Appendix B 5) using a reference point at the high end of the sloped driveway, West end driveway approach to the camp sites. All distances to survey wells were measured in feet, while the direction was shot by compass (see Table 1 D)

5.8 Site Sensitivity - High

The camp site lies between the Alaska Highway and the Morley River. Site runoff creates a potential for impact from surface or subsurface contamination. The high water table, and almost level site and soil conditions ranging from peat/loam and clay allow subsurface migration but it is not considered a major off site or receptor risk.

Groundwater was present within SGS wells and test pits. Domestic wells are present at the abutting Morley Lodge property, slightly up-gradient to this site. No unique or endangered species were known to inhabit the local vicinity.

The site is considered sensitive

5.9 Sampling & Analysis

All samples including quality control blanks were sent to MDS Environmental services, a CAEAL approved laboratory, to have the required analysis completed and result originals returned to Groundtrax Inc. for review and Interpretation. **See Table 1d**

Soil Samples

All soil samples were collected September 12th, 1996, from selected Test Pits, as Identified 'Worst Case' from the Soil Gas Surveys. All soil samples were handled by Groundtrax staff to Guideline protocol.

Water Samples

Water samples were collected September 12th and 13th, 1996 in laboratory containers, from groundwater encountered test pit No 5 and from the surface water located at the receptor south west of the site, over the end of the site runoff bank. These samples were handled in the same manner as for the soil samples. All water samples were handled by Groundtrax staff to Guideline protocol.

5.10 Laboratory and Soil Gas Survey Results

5.10.1 Soil Gas Survey Results

Soil Gas Survey results using a Photoionization meter (Photovac 2020 PID) have indicated levels of hydrocarbon activity at several areas throughout the investigation site. It should be noted that findings of this type of survey do not correspond to any other test levels or laboratory results, and will give different results than a Total Petroleum Hydrocarbon (TPH) analysis. See Table 1 B

Results received from the SGS site # 8 indicated the highest PID reading of 109 ppm, this may be a result of some activity that took place after the construction of the highway at this location, but laboratory analysis did not concur with these results.

Soil Gas Survey Results

No. 1	0.0 ppm		
No. 2	0.0 ppm		
No. 3	1.6 ppm	Test Pit # 2	2.1 ppm
No. 4	0.0 ppm		
No. 5	0.8 ppm		
No. 6	0.0 ppm		
No. 7	0.0 ppm		
No. 8	109.0 ppm	Test Pit #1	0.19 ppm
No. 9	1.5 ppm		
No 10	0.0 ppm	Test Pit # 3	2.3 ppm

Soil Gas Survey PID meter results indicate levels of hydrocarbon activity at four of the ten sites surveyed by SGS.

5.10.2 Laboratory Results

Test Pit # 1	TEH	non-detect	
	ICP Metals	below criteria	
	Total Phenols	000.12 mg/kg	CCME Criteria 1.00 ug/g (mg/kg)

Laboratory results do verify some analytical activity below criteria level within Test Pit No. 1. See Table 1 D

5.11 Comments & Recommendations

Based on the results of the complete investigation, potential subsurface contamination is not indicated.

Surface contamination, at Soil Gas Survey # 8 indicating high VOC levels, is suspected to be as a result of current vehicle parking and tourist use at the site; i.e disposing of camp stove fuel. Due to the proximity of this impact to the Morley River and prevalent fish stock, It is recommended that the surface contamination be excavated and disposed of at a certified disposal site. No further remediation or restoration is considered necessary at this site.

No health and safety concerns are anticipated within the site as a result of existing evidenced subsurface contamination. There is still a continuing risk to the natural environment on the site and possibly to the Morley River, which flows adjacent to the Investigation site.

Alaska Highway (Teslin to Morley River) 7 Preliminary Site Assessments

6.1 Site No 6 - Gravel Pit - km 1256

This site is located at km 1256 east of the town of Teslin along the Alaska Highway. The site is very accessible from the South side of the Alaska highway, as it has a well compacted driveway leading into the area of investigation just West of the Morley River Lodge. The area is very accessible by vehicle via a compacted dirt access road which leads to the gravel pit and also branches off to the Morley River waste site. The investigation area consisted of approximately 15.2 m in width and 152.4 m in width. See Appendix A 6.

6.2 Site Improvements

There are no structures evident at this site.

6.3 Topography & Soil Conditions

The excavated gravel pit consists of gravel surface and subsurface, as a result of excavation activities. Water was present in the form of a standing water pond, located at the west side of the investigation area within the lower pit area. Natural drainage indicated by the surrounding region, leads to the conclusion of a predicted south westerly migration path. The excavated low lying gravel pit to the immediate West of the waste site is considered the most likely receptor of any suspected site contamination. The soil conditions are mainly sandy loam mixed with clay and overlain with gravel in the south end of the site, while the north end and centre is mainly peat bog and subsurface sandy loam and clay mixture.

6.4 Debris

The only debris evident at this site are three (3) empty 45 gallon barrels. One barrel is located in close proximity to SGS No.1, while the two remaining barrels are situated at the base of the embankment at the far south east end of the pit. No other debris is evident at this site.

6.5 Vegetation

This site is fairly well covered with small leafy brush and grass and moss. The area at the top of the embankments to the west, north and south are densely populated with pine and spruce trees.

6.6 Wetlands

Approximately half way through the site, there is a small pond on the west side of the site. No fish or amphibious life was evident during the investigation. The pond seems to be fed from surface runoff from the areas north, east and west of the pond. The pond is a contributing factor in creating the marsh like soil conditions south east of the pond. This site has been classified as a possible sensitive area because of the location of this pond, in relationship to the dumping area to the east of the gravel pit. Water conditions in the pond at the time of the investigation were as follows:

oxygen - 124.2%
pH - 7.05 units
Conductivity - 0.292 ms/cm
Salinity - 0.1%
Temperature - 15.4 C
Turbidity - 3 NTC @ 0.30m

6.7 Site Investigation The on site investigation of this area consisted of a:

- soil gas survey (SGS) twelve (12) installations.
- excavation of eight (8) test pits.
- soil and surface water sampling and analysis.

The area of investigation for the soil gas survey was plotted out on a site map (Appendix B6) with distances and direction for SGS 6-12 taken from a large rock located at the north end of the gravel pit and for SGS 1-5 from the bottom of the embankment at the south/east end of the gravel pit for a reference point. All distances to each SGS were measured in feet, while the direction to each SGS was shot by compass (see Table 1e).

6.8 Site Sensitivity

Groundwater was present within some of the SGS wells, but not in the test pits. There is a pond on this site located on the west side of the site. No wells within the vicinity of the site. No unique or endangered species were known to inhabit the local vicinity. This is considered sensitive due to the existence of the pond at this location and because of the close proximity to the dump site to the east of this location.

6.9 Sampling and Analysis

All soil and water samples were sent to a CAEAL approved laboratory (MDS Environmental services) to have the required analysis completed on both water and soil samples collected during the investigation of this site.

6.9.1 Soil Samples

There were four (4) soil and seven (7) water samples collected from selected locations and the pond within the investigation site, and sent for further analysis for predetermined parameters. All soil samples were collected from soil gas survey locations where the results after Photoionization meter (PID) headspace testing returned readings of volatile organic compounds (VOC's). Soil samples were collected from these sites, placed in coolers with ice packs, and then transferred to a refrigerator until they were shipped to the laboratory for analysis.

6.9.2 Water samples

Seven (7) water samples were collected, from pond water located at the west side of the gravel pit. The water samples were collected from this location, due to its location in relation to the investigation site, slightly down gradient and adjacent to the investigation site. It is surmised that this pond receives both surface runoff and groundwater from the surrounding areas. The samples were handled in the same manner as for the soil samples, placed in a cooler with ice packs, transferred to a refrigerator until being shipped to the laboratory for analysis.

6.10 Laboratory and Soil Gas Survey Results

6.10.1 Gas Survey Results

Soil Gas Survey results (Table 1d) using a Photoionization meter (Photovac 2020 PID) have indicated levels of hydrocarbon activity at seven of the twelve sites surveyed by SGS. It should be noted that the findings of this type of survey do not correspond to any other test levels or laboratory results, and will give different results than a Total Petroleum Hydrocarbon (TPH) analysis. Results received from the SGS may be a result of the highway construction, but more than likely the results received are from

people using this site to discard old fuel and lubricant barrels, since this type of barrel was noted at the site.

Soil Gas Survey Results

No 1	0.6 ppm	Test Pit # 1	0.0 ppm
No 2	0.0 ppm	Test Pit #2	0.0 ppm
No 3	0.0 ppm	Test Pit # 3	0.0 ppm
No 4	7.8 ppm		
No 5	10.8 ppm		
No 6	0.0 ppm	Test Pit # 4	0.0 ppm
No 7	8.9 ppm	Test Pit # 5	0.0 ppm
No 8	0.0 ppm	Test Pit # 6	0.0 ppm
No 9	6.2 ppm		
No 10	7.1 ppm	Test Pit # 7	0.0 ppm
No 11	0.0 ppm		
No 12	6.4 ppm	Test Pit # 8	0.0 ppm

6.10.2 Laboratory Results

All results from laboratory testing carried out at this site have returned indicating either non detectable levels (nd) or below criteria levels (bc) of contamination of all samples analyzed for the required parameters, with the exception of one sample taken in the area of SGS No 1. This is also the location that one of the three barrels was located on it's side and caps off. The results of this reading were 1380 mg/kg TEH. Since CCME does not have any criteria for Total Extractable Hydrocarbons, Ontario's MOEE guidelines for use at Contaminated Sites, June 1996 were used for comparison. Results are shown in Table 1e.

Test Pit # 1		1380 mg/kg	MOEE Criteria 100.0ug/g
	ICP Metals	below criteria	
	Total Phenols	0.09 mg/kg	CCME Criteria 1.0 ug/g
Test Pit # 2	TEH	non-detect	
	Total Phenols	0.09 mg/kg	CCME Criteria 1.0 ug/g
Pond Water	O/G	non-detect	
	TEH	non-detect	
	PAH	non-detect	
	ICP Metals	below criteria	
	Total Phenols	non-detect	
	OC Pests	non-detect	

6.11 Comments & Recommendations

Based on results of laboratory testing and soil gas survey results, it is the conclusion of Groundtrax that contamination is present at (SGS No 1). Visual observations of this area show staining to the ground which indicates that contamination is from present day use and not as a result of the highway construction.

It is the recommendation of Groundtrax Inc. that no remediation is required at this site as a result of the Alaska Highway construction but it is suggested that the area located at SGS No 1 be excavated and the contaminated soil from that location be removed and disposed of at a certified disposal site. Also the three barrels located at the southern end of the site be removed and disposed. It should also be kept in

mind that this site is situated in close proximity to a pond that could possibly end up contaminated as a result of this one location of contamination.

No health and safety concerns are anticipated within the site as a result of existing evidenced surface and subsurface contamination. There is potential risk to the natural environment on the site and particularly to the pond located at this site.

Alaska Highway (Teslin to Morley River) 7 Preliminary Site Assessments

7.1 Site No 7 - Military Site and Lodge - 1256 km

This site is located at km 1256 east of the town of Teslin along the Alaska Highway. The site is very accessible from the main highway, as it has a well compacted driveway leading into the area of investigation. The site is situated on the south side of the main highway. The area is very accessible by vehicle by way of a well compacted dirt road which leads to the Morley River dump and also branches off to the gravel pit to the west of the dump site. This site investigation covered an area of **9.1 m** in width and **45.7 m** in depth. The investigation site was located in the second part of the open dumping area, which is located to the rear or south of the actual dump site. See photos Appendix A 7

7.2 Topography & Soil Conditions

This site has been overlain with porous sand to a depth of approximately 1.5 m, which may or may not only be a top cover for previously buried debris at this site. The area sits atop a ridge area and has been excavated out to approximately 3 m in depth to accommodate the dump site. The investigation site was located to the south of the dumping area. The dump sloped from north to south, into the investigation site. No water was present in the form of surface or ground water at this site. The excavated low lying gravel pit to the immediate West of the waste site is considered the most likely receptor of any suspected site contamination.

7.3 Site Improvement

There are no structures evident at this site.

The excavated waste pit consists of sand surface and subsurface, as a result of excavation and fill. No water was present within the pit area. Natural drainage indicated by the surrounding region, leads to the conclusion of a predicted south westerly migration path. The excavated low lying gravel pit to the immediate West of the waste site is considered the most likely receptor of any suspected site contamination.

7.4 Debris

This site is the location where garbage from the Morley River Campsite is disposed of. There are two sections to this dump site. In the first section garbage is dumped into a pile. Just south of this approximately two (2) meters there is a wire fence separating the two sections of the dump. This section is down gradient or south of the first section of dumping area, but contains no refuse. Debris also covers the upper north slope and embankment top.

7.5 Vegetation

No vegetation is visible in the area of investigation. The area has been overlain with four (4) ft of sand and no vegetation is growing out of this. At the top of the surrounding embankment, this area is thickly populated with pine, spruce and alders.

7.6 Wetlands

No wetlands are in close proximity to this site. The Morley river lies of this location, approximately two km's. The site is situated at an elevation substantially higher than the Morley river. No runoff is anticipated from the dump since it has been excavated to except refuse. The only other possible

migration route would be to the west toward the gravel pit. The pond located at the pit is close to .5 km's from the dump site to the east of the gravel pit.

7.7 Site Investigation

The on site investigation of this area consisted of a:

- soil gas survey (SGS) four (4) installations.
- excavation of three (3) test pits.
- soil sampling and analysis.

The area of investigation for the soil gas survey was plotted out on a site map (Appendix B7) with distances and direction for SGS taken from the entrance to the dump site, at the top of the embankment at the north end of the dump for a reference. All distances to each SGS were measured in feet, while the direction to each SGS was shot by compass (see Table 1f).

7.8 Site Sensitivity

Groundwater was not present within the SGS wells or test pits. No wells within the vicinity of the site. No unique or endangered species were known to inhabit the local vicinity. A wetland lies adjacent to the site, approximately 0.5 Km, with potential impact from site runoff. This is considered a sensitive area due to the close proximity of this site to the pond located at the adjacent gravel pit.

7.9 Sampling and Analysis

All soil samples were sent to a CAEAL approved laboratory (MDS Environmental services) to have the required analysis completed on both water and soil samples collected during the investigation of this site.

7.9.1 Soil samples

There were four (4) soil and no water samples collected from selected locations in the second section of the dump site and sent for further analysis for predetermined parameters. All soil samples were collected from soil gas survey locations where the results after Photoionization meter (PID) headspace testing returned readings of volatile organic compounds (VOC's). Soil samples were collected from these sites, placed in coolers with ice packs, and then transferred to a refrigerator until they were shipped to the laboratory for analysis.

7.9.2 Water Samples

No water samples were collected from this site, as there was no groundwater encountered during either the soil gas survey or the excavation of test pits. There was also no visible sign of any surface water in the near vicinity to this site.

7.10 Laboratory and Soil Gas Survey Results

7.10.1 Soil Gas Survey Results

Soil Gas Survey results (Table 1f) using a Photoionization meter (Photovac 2020 PID) have indicated levels of hydrocarbon activity at all four sites surveyed by SGS. It should be noted that findings of this

type of survey do not correspond to any other test levels or laboratory results, and will give different results than a Total Petroleum Hydrocarbon (TPH) analysis. Results received from the SGS may not be a result of the highway construction, but more than likely the results received are from the refuse disposed of at this site.

Soil Gas Survey Results

No. 1	0.0 ppm	Test Pit # 1	6.7 ppm
No. 2	13.8 ppm	Test Pit # 2	5.8 ppm
No. 3	0.2 ppm	Test Pit # 3	4.3 ppm
No. 4	14.7 ppm		

7.10.2 Laboratory Results

All results from laboratory testing carried out at this site have returned indicating either non detectable levels (nd) or below criteria levels (bc) of contamination of all samples analyzed for the required parameters.

Test Pit # 3	TEH	non-detect	
	ICP Metals	below criteria	
	Total Phenols	0.57 mg/kg	CCME Criteria 1.0 ug/g

7.11 Comments & Recommendations

Based on results of laboratory testing and soil gas survey results, it is the conclusion of Groundtrax that this site does have potential for contamination, not caused from past years during road construction but from refuse being disposed of at this site. Visual observation indicate no visible surface staining in the area.

It is the recommendation of Groundtrax Inc. that disposal and security of refuse be upgraded, so that garbage is disposed of into the pit to avoid potential risk to the natural environment. No health and safety related concerns are anticipated within the site as a result of existing evidenced subsurface contamination.

This is a brief description regarding each of the photos in Appendix A1.

Photo P - 1 This photo identifies one oil barrel stove and one 45 gallon fuel drum (empty) in close proximity to the log cabin.

P - 2 900 litre fuel tank placed on its side just to the front of the cabin. Approximate distance 20 feet.

P - 3 Half buried 45 gallon fuel drum. The punctured top allowed some view of the interior. No product was visible within the drum.

P - 4 A second 900 litre fuel tank again in close proximity to the log cabin. Approximate distance 30 feet north/east.

P - 1



P - 2



P - 3



P - 4



Appendix A 2
Photos Site No 2
Teslin Gun Club

This is a brief description regarding each of the photos in Appendix A2.

Photo P1, P2 and P3 All photos were taken from the top of the embankment at the south west end of this site. These photos are views of the investigation area looking from the south/west. The area to the left of the picnic tables in p1 and the area showing at the top of P2 in the open expanse were the investigation areas.

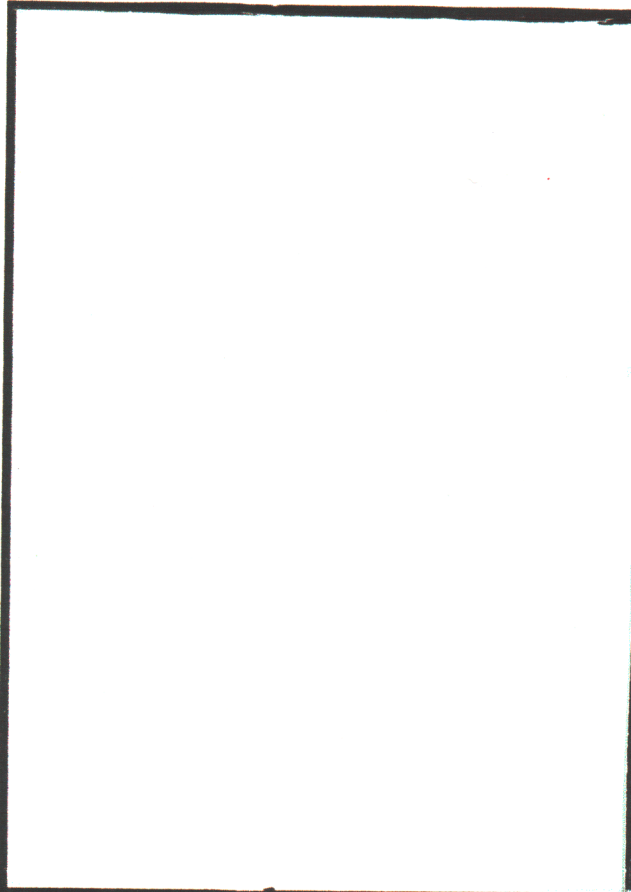
P-1



P-2



P-3



P-4



Appendix A 3
Photos Site No 3
Oil Tank Station

This is a brief description regarding each of the photos in Appendix A3.

Photo P - 1 This photo is a facing out to the approach to this site. The approach was by means of a well travelled trail off on the north side of the highway east of Teslin.

P2,P3 and P4 The three of these photos are of the actual investigation site. P2 is a view of the site, as you look to the south/west of the area. You can also see the Alaska highway at the top of this photo, between the trees. P3 is a second view of this site taken from the north/east end. This photo is directed to the south where a steep embankment slopes down to a gully. The highway is also very visible in this photo. The last photo P4 is a shot of the investigation site taken from the west end..

P - 3



P - 1



P - 2



P - 4



Appendix A 4
Photos Site No 4
Camp 8 E

This is a brief description regarding each of the photos in Appendix A4.

Photos P1, P2, P3 and P4 These are all pictures taken of the surface staining that is most prevalent at the south end of this site, near the entrance to this site. P3 is also a view of the investigation area as seen from the south end of the site. P4 again showing surface staining and also one of the SGS wells at the bottom left of the photo.

Photo P - 1A This photo was taken while a test pit was being excavated in the area of SGS 15. While digging, various fuel and lubricant containers were encountered. This photo identifies a 45 gallon drum that was in two pieces. The important aspect here was that the bung covers were still intact, as if the drum had never been open. Other item uncovered shown in photo 2A were one grease tube and two cans that contained motor oil, hydraulic fluid.

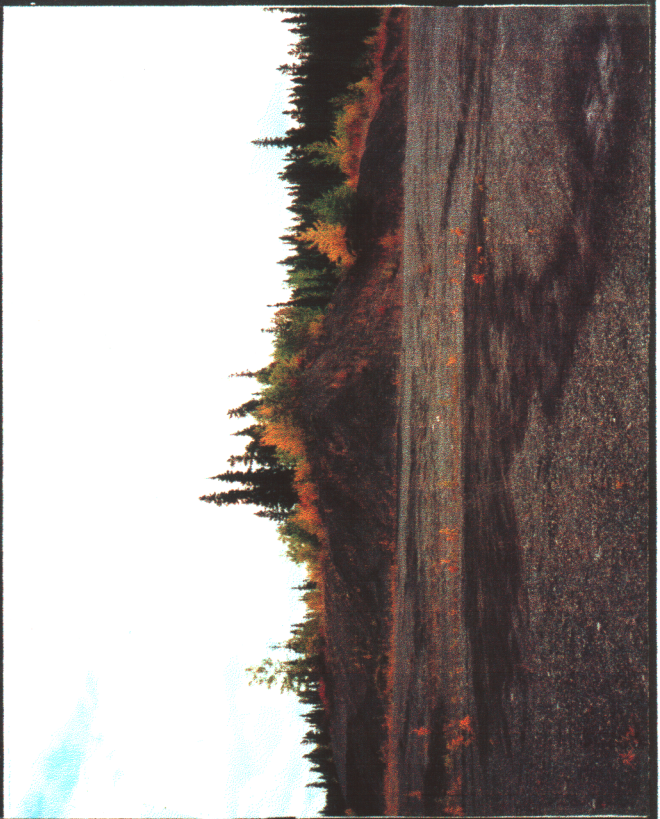
Photo P - 3A This photo was taken at the south/west end of the site, at the bottom of an embankment at this location. Water samples were collected from this area and sent for analysis.

Photo P - 4A This photo was taken at a location south/west of the site and approximately one kilometre away. This picture shows where the road has been washed out and a beaver has constructed a dam at the site.

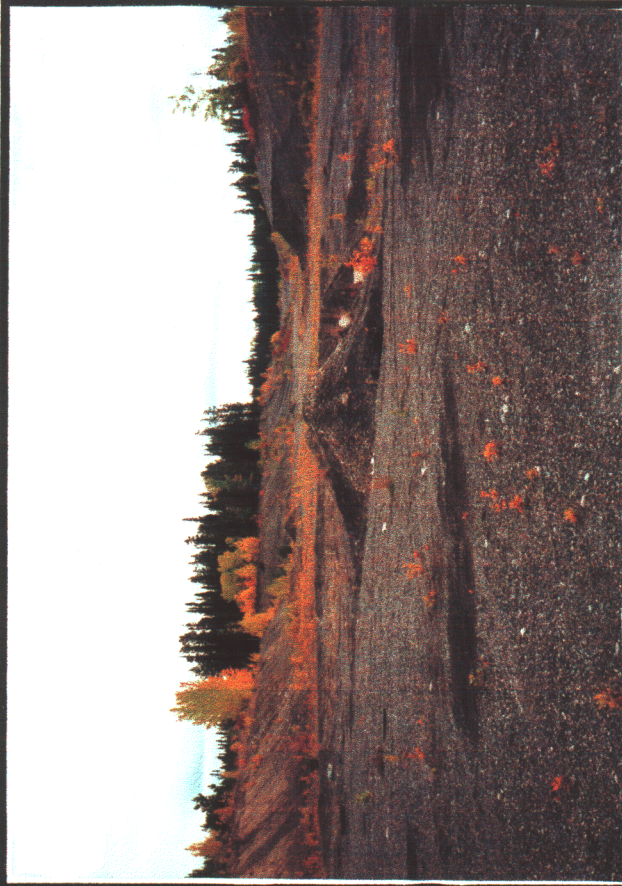
P - 1



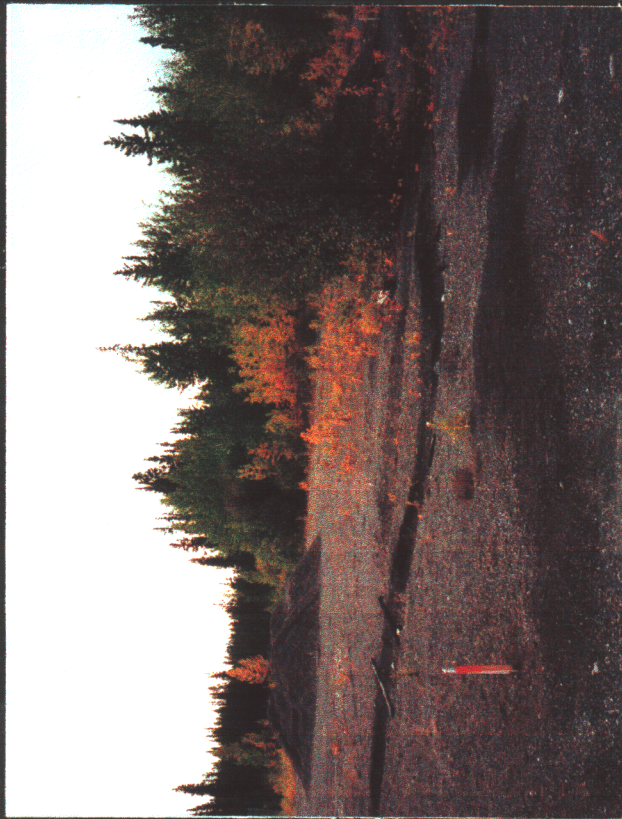
P - 2



P - 3



P - 4



P - 3 A



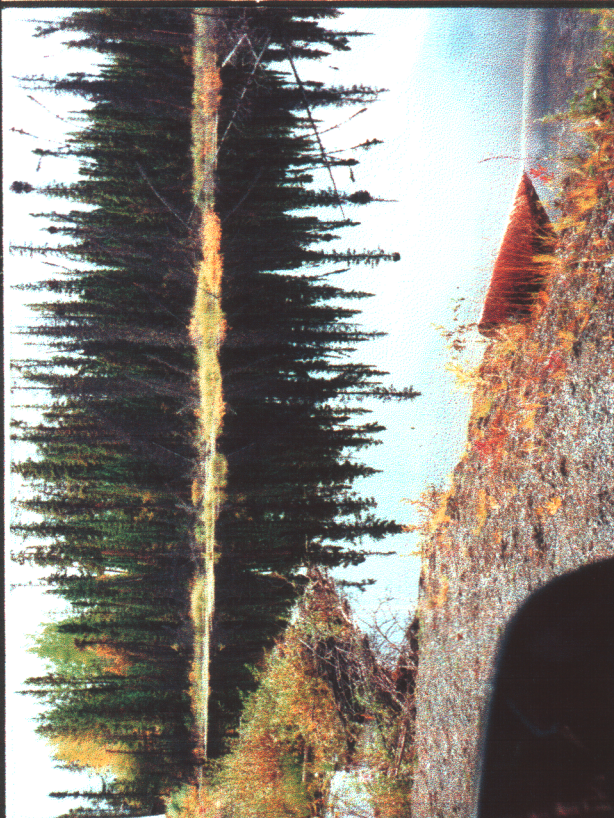
P - 1 A



P - 2 A



P - 4 A



Appendix A 5
Photos Site No 5
Morley River Lodge

This is a brief description regarding each of the photos in Appendix A5.

Photo P - 1 This photo is a view of the investigation site as seen from the west end of the camping area.

P - 2 This is a shot of the Morley River from the south/east side of the camping area. As you look at the bare pine tree directly to the front in this photo, just behind and left of the tree is a location where high VOC's were picked up.

P - 3 A second look at the site from the west end. This photo shows an area of staining in the foreground and to the left of the photo. Probable cause, vehicles parking in the camping area.

P - 4 This last picture was taken during the excavation of one of the test pits at this site.

P - 1



P - 2



P - 3



P - 4



Appendix A 6
Photos Site No 6
Dumping Area and
Gravel Pit

This is a brief description regarding each of the photos in Appendix A6.

Photo P - 1 This photo is a view of the investigation site taken at the approach to the area from the north end. Extremely visible in this photo is the reference point that was used in order to take directions to the SGS's and also was used for measurements to the wells. Also shown in this photo is the standing water pond that is located on this site. The pond can be seen directly to the front of the large rock and just at the bottom of the embankment at the top right of the photo.

As you look to the top of this photo, you will see a high embankment at the southern end of the site. This is also the general direction to the Morley River, some distance to the south of this site.

P - 2 This photo was taken from the top of the high embankment at the south end of the site. The gentle slope to the right of this picture is the general direction to the dump site to the east.

P - 3 P3 was taken from the south/west end of the investigation site and identifies the back portion of the site and also shows a 45 gallon fuel drum that was disposed of at this site. This drum did have product in it, that had leaked into the soil.

P - 4 A second shot of the fuel drum, this time from the south/east end of the site.

P - 1



P - 2



P - 3



P - 4



Appendix A 7
Photos Site No 7
Military Site and Lodge

This is a brief description regarding each of the photos in Appendix A7.

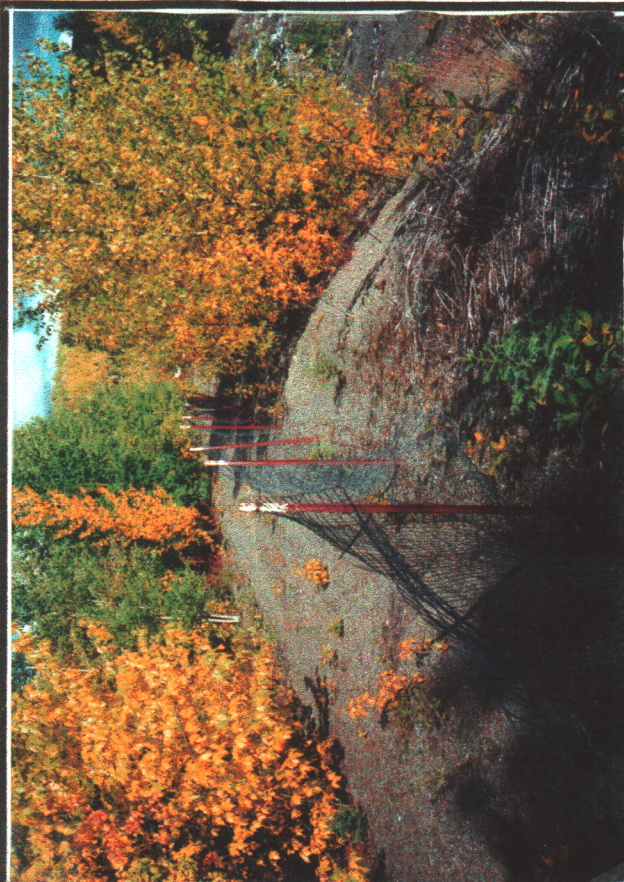
Photo P - 1 This is a photo of the entrance to the dump from the north. Visible in this photo is garbage that has been dumped at the top of the dumping area. As you look directly to the centre and rear of this photo, the wooded area in this general location is littered with debris and garbage, most probably from wildlife in the local area retrieving it from the dump.

P - 2 This was taken of the site of the SGS for this site. It is located directly to the rear or south of the actual dump area. This area is also slightly down gradient from the dump site and a possible area of migration from the dump site.

P - 3 This photo depicts the fenced off area around the dump site. This was where Groundtrax entered the investigation site.

P - 4 This photo was taken of the area to the west of the dump site is the general direction to the gravel pit to the west.

P - 3



P - 1

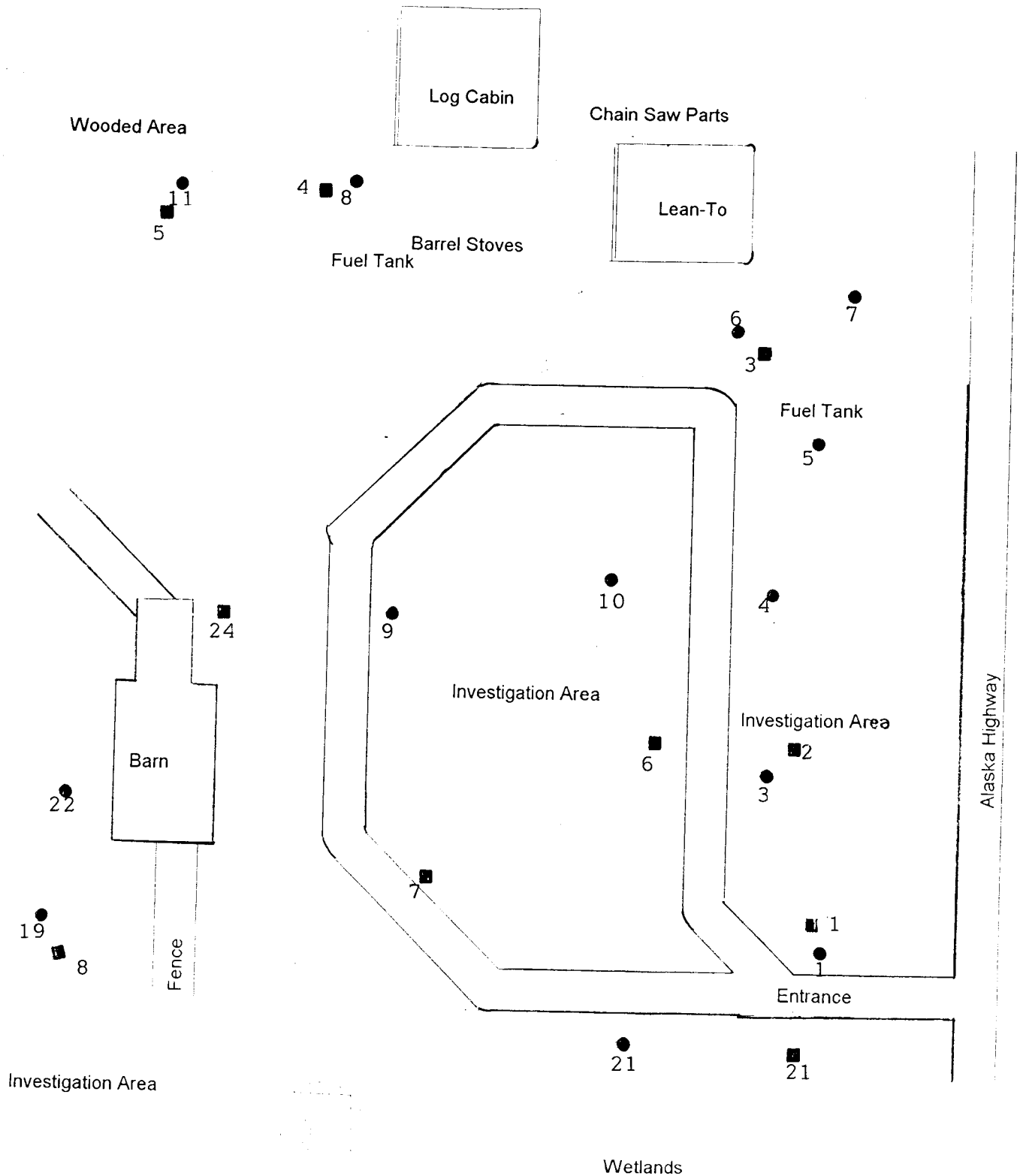


P - 4



P - 2





Legend: SGS - ○
Test Pit - ■



Groundtrax (Yukon) Inc.

Project: Yukon Environmental Site Investigation

Project No 96-139

Drawing No 96-139-1

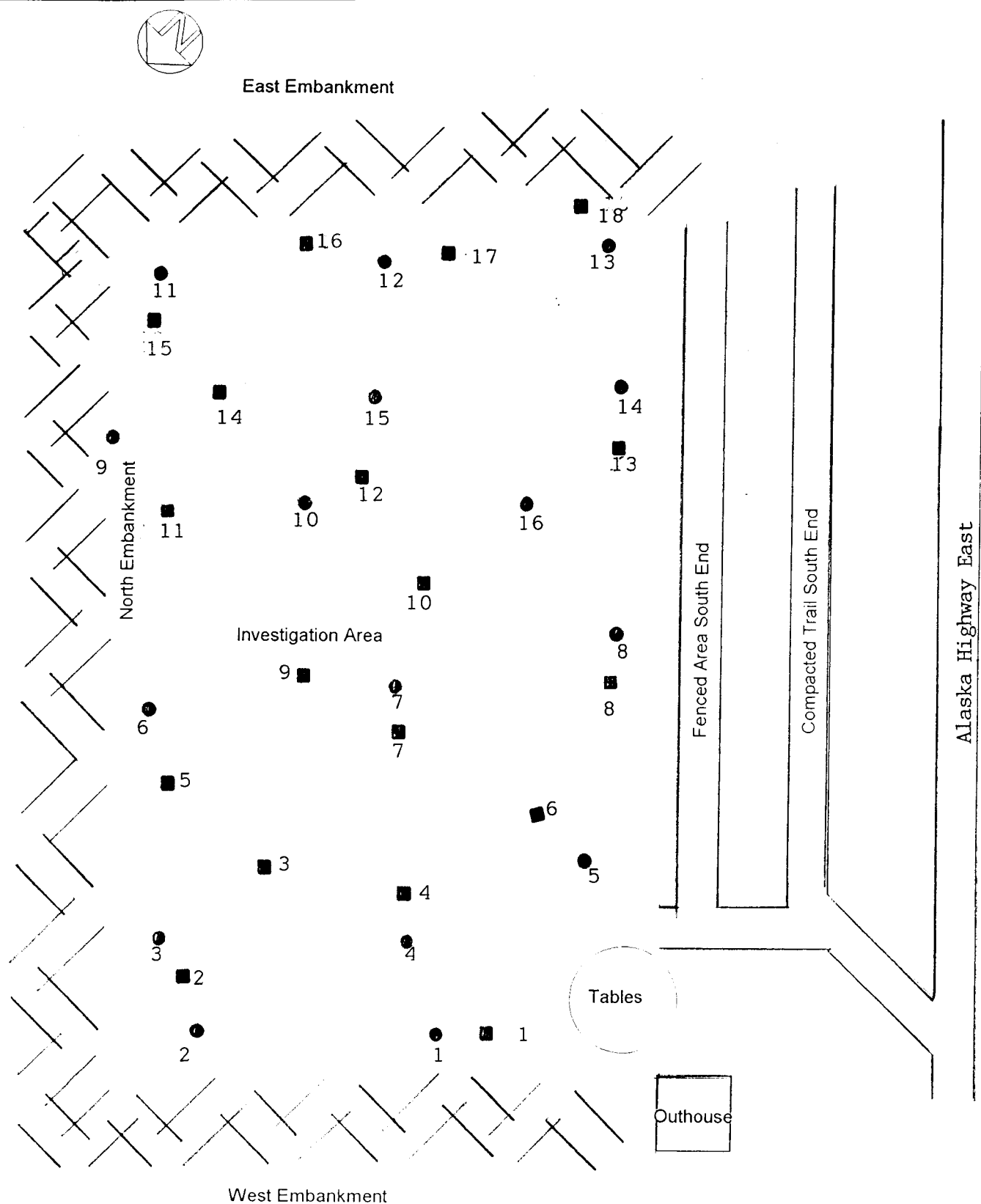
Drawing Site No 1

Scale NTS

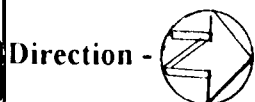
Date October 1996

Sheet No 1

Appendix B 2
Area Map Site No 2
Teslin Gun Club



Legend: SGS - ○
Test Pit - ■



Groundtrax (Yukon) Inc.

Project: Yukon Environmental Site Investigation

Project No 96-139

Drawing No 96-139-2

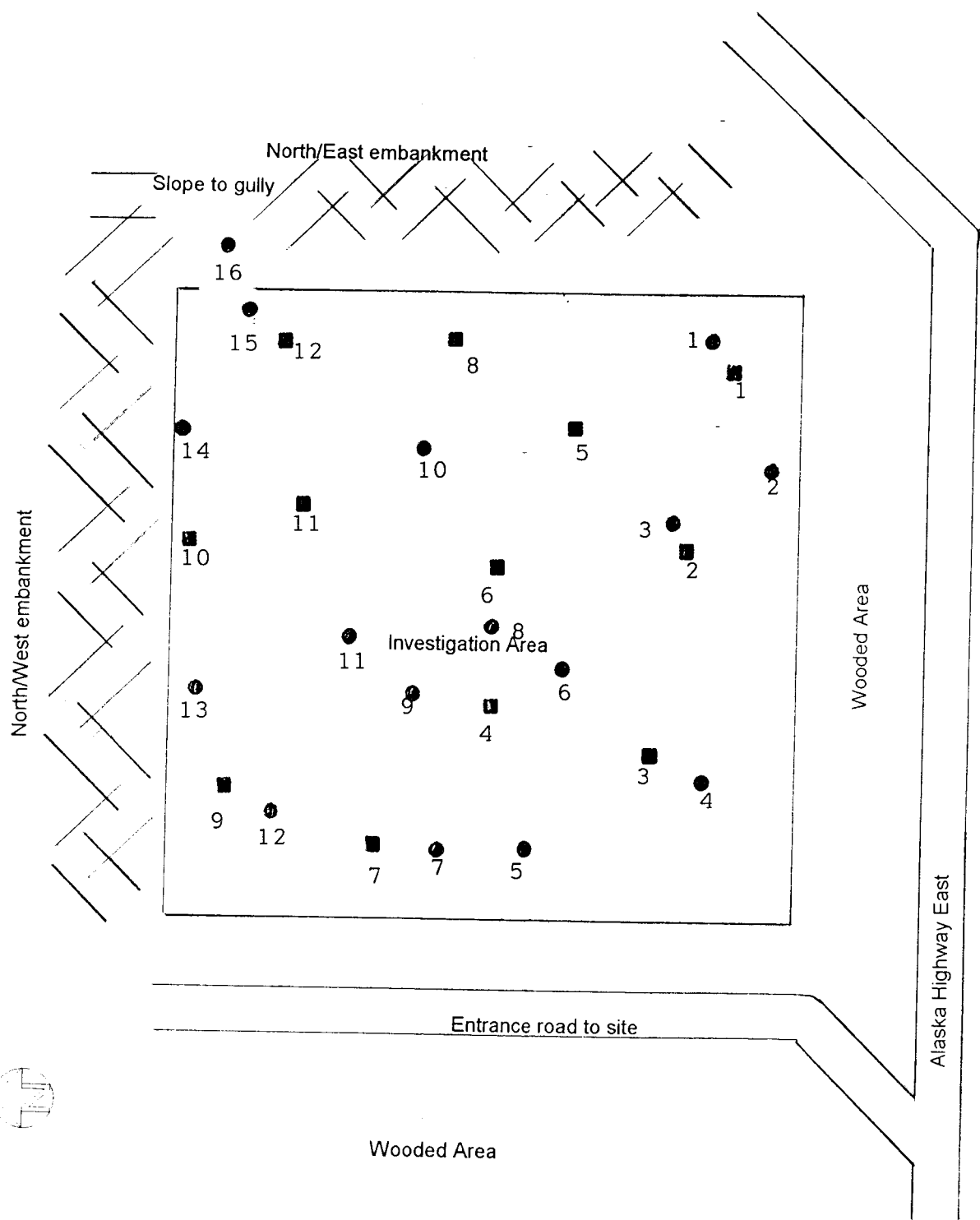
Drawing Site No 2

Scale NTS

Date October 1996

Sheet No 1

Appendix B 3
Area Map Site No 3
Oil Tank Station



Legend: SGS - ○
Test Pit - ■



Groundtrax (Yukon) Inc.

Project: Yukon Environmental Site Investigation

Project No 96-139

Drawing No 96-139-3

Drawing Site No 3

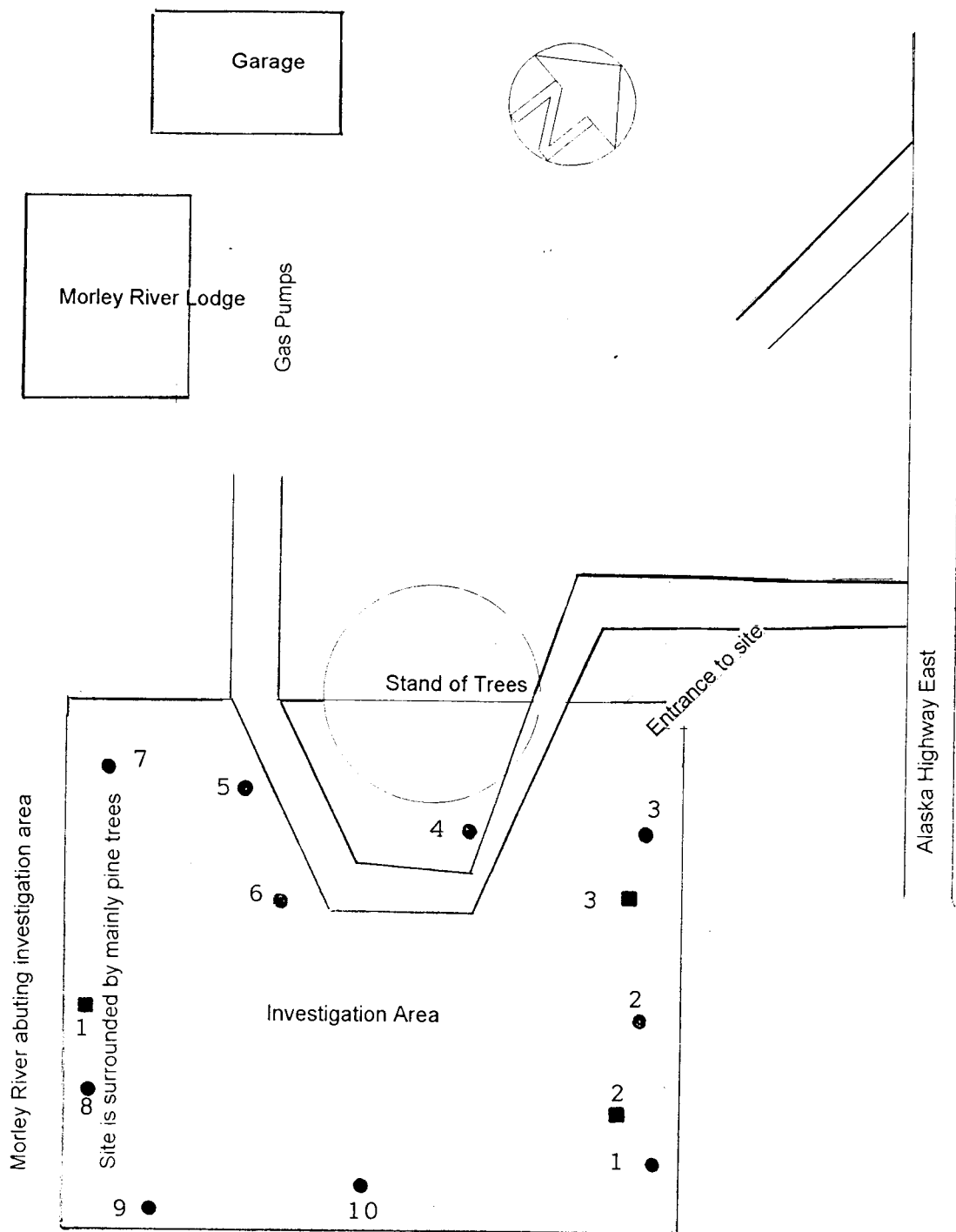
Scale NTS

Date October 1996

Sheet No 1

Appendix B 4
Area Map Site No 4
Camp 8 E

Appendix B 5
Area Map Site No 5
Morley River Lodge



Legend: SGS - ○
Test Pit - ■

Direction - *(Handwritten arrow pointing right)*

Groundtrax (Yukon) Inc.

Project: Yukon Environmental Site Investigation

Project No 96-139

Drawing No 96-139-5

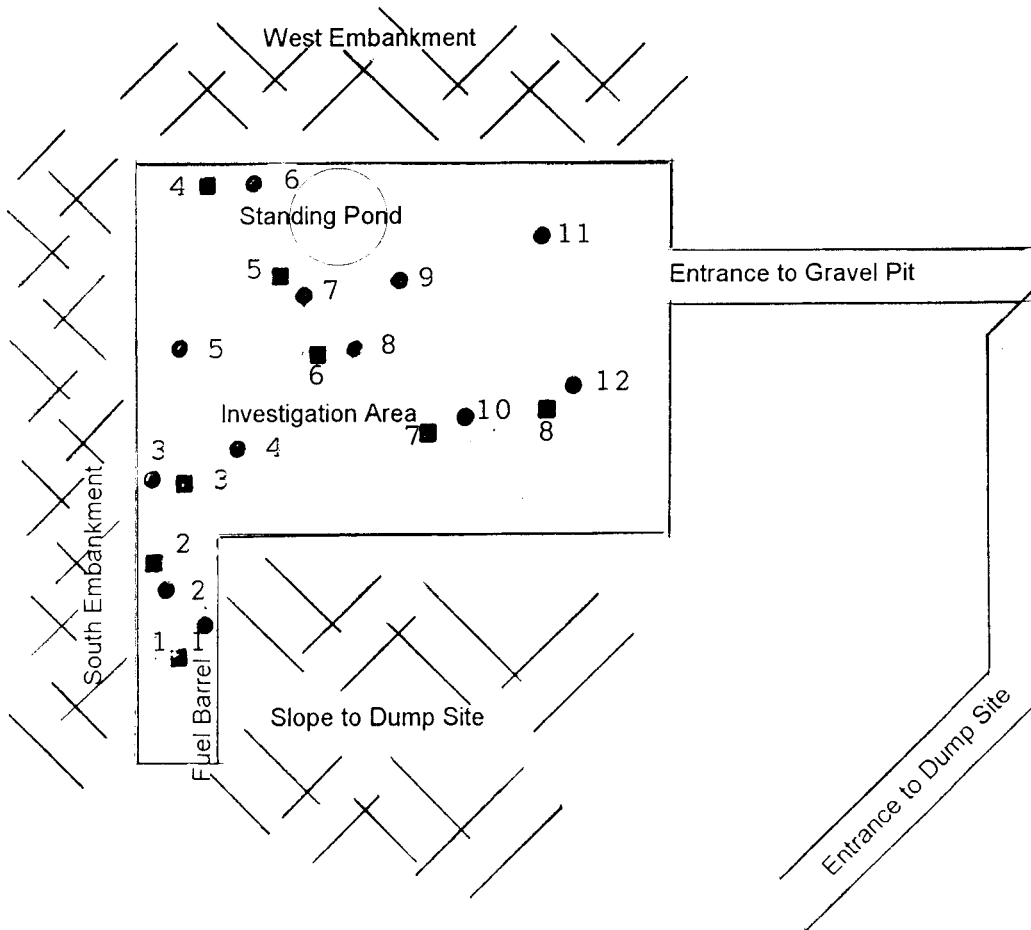
Drawing Site No 5

Scale: NTS

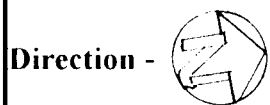
Date October 1996

Sheet No 1

Appendix B 6
Area Map Site No 6
Dumping area and
Gravel Pit



Legend: SGS - ○
Test Pit - ■



Groundtrax (Yukon) Inc.

Project: Yukon Environmental Site Investigation

Project No 96-139

Drawing No 96-139-6

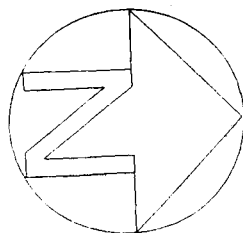
Drawing Site No 6

Scale NTS

Date October 1996

Sheet No 1

Appendix B 7
Area Map Site No 7
Military Site and Lodge



Morley River located South of site

Wooded Area

Entrance to gravel pit

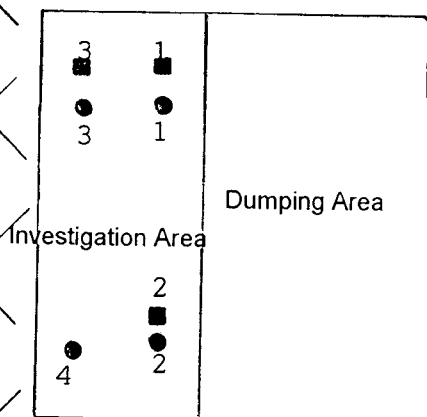
Trail to Gravel Pit

Alaska Highway East

Dumping Area

Wooded Area

Wooded Area



South Embankment

Legend: SGS - ○
Test Pit - ■

Direction -



Groundtrax (Yukon) Inc.

Project: Yukon Environmental Site Investigation

Project No 96-139

Drawing No 96-139-7

Drawing Site No 7

Scale: NTS

Date October 1996

Sheet No 1

ISBN 0-7778-4052-9

**GUIDELINE
FOR USE AT
CONTAMINATED SITES
IN ONTARIO**

JUNE 1996



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PIBS 3161E01

Generic approach

6.4 Which depth of soil restoration will be used?

Proponents may generally select one of two options for the depth of soil restoration to take place at a site. When the vertical extent of the contamination extends more than 1.5 metres below the final site grade, the proponent may choose to do either a full depth restoration or a stratified restoration. Full depth restoration means that soil quality is restored for the full vertical and lateral extent to which contamination is found at the site.

A stratified restoration involves use of two different sets of criteria at a site. For each chemical parameter of concern, one criterion is used for soil at and above 1.5 metres and another is used for soil below 1.5 metres. This condition is referred to as a stratified site condition. For a stratified site condition, the quality of the soils at and above 1.5 metres should not exceed the criteria provided in Table A or B, and the quality of the soils below 1.5 metres should not exceed the levels provided in Table C or D. When a stratified site condition exists at a site, the subsurface soils must remain at a depths greater than 1.5 metres. If subsurface soils are brought to and left at surface, or within 1.5 metres of the surface, further management of these soils will be required.

The 1.5 metre mark, which establishes the depth above and below which different criteria may be used, is measured from the final grade elevation excluding the thickness of any non-soil surface treatment such as asphalt, concrete, aggregate, etc..

Three generic criteria components were examined when the surface soil criteria were developed. These are the soil ingestion/dermal contact component, the terrestrial ecological protection component and the soil vapour to indoor air component. Exposure scenarios for soil ingestion/dermal contact, which estimate the effect of the chemical on human health, have been adjusted to reflect the changes in frequency and intensity of exposure likely to be associated with different site uses (i.e. residential, commercial) and soil accessibility. The terrestrial ecological component and the soil vapour to indoor air component were not applied to subsurface soils.

The generic criteria for surface and subsurface soil were developed to provide protection against the potential for vapour movement to indoor air (basement)

Generic approach

if vapour is emanating from contaminated groundwater or contaminated soil in close proximity to a basement. Potential vapour movement from contaminated soil or groundwater will not adversely affect air quality when living space is located above or below the 1.5 metre level if the generic soil quality criteria are met. An additional 1.5 metre envelope of surface soil quality is not required below a basement floor.

Soil texture

Criteria for some of the organic and inorganic parameters listed in Tables A to D have different values for coarse and fine textured soil/overburden. Texture influences the availability of, or the ease with which plants and animals will take in, contaminants which have adhered to soil particles. Contaminants which adhere to coarse material are usually more available for uptake than those which adhere to fine textured material. The numerical values of the criteria for coarse materials, therefore, tend to be smaller than those for fine materials.

Coarse textured soil/overburden is defined as material having greater than 70 percent (by dry weight) particles equal to or larger than 50μ diameter (sand). Materials with less than 70 percent sand-sized particles are medium/fine textured.

The generic criteria for coarse textured material must be used if a laboratory texture analysis has not been completed, unless the texture can be easily and clearly distinguished from a field examination. A sieve analysis is usually used to accurately determine the particle size fractions, and to allow selection of the appropriate criteria based on texture. At some sites there may be significant lateral and vertical differences in the texture. Normally, when greater than 2/3 of the soil/overburden (surface to bedrock) is of a particular type, the site will be composed of that type of material. However, consideration should be given to choosing the most permeable material at a site (even if less than 2/3) in situations where migration of contaminants from the site could be affected by the location of this material at the site.

Soil pH

Generic approach

The generic criteria are meant to be used when surface soil pH falls between five and nine, and when the pH of overburden at depth (greater than 1.5 metres) falls between five and 11. When the pH is beyond these ranges, contaminant mobility may be affected and will require further investigation.

Table A

Surface soil and groundwater criteria for agricultural,
residential/parkland, industrial/commercial land use for a
potable groundwater condition

Soil criteria for inorganics in this table apply only where soil pH is 5.0 To 9.0.				
Table A:	Soil remediation criteria (ug/g)			Potable groundwater criteria (ug/l)
Chemical compound	Agricultural land use	Residential/ parkland land use	Industrial/ commercial land use	All land use categories
MOLYBDENUM	5.0	40	40	7300
NAPHTHALENE	4.6	4.6	4.6	21
NICKEL	(200) 150	(200) 150	(200) 150	100
PENTACHLOROPHENOL	5.0	5.0	5.0	30
PETROLEUM HYDROCARBONS (gas/diesel)	100	100	100	1000
PETROLEUM HYDROCARBONS (heavy oils)	1000	1000	1000	1000
PHENANTHRENE	40	40	40	63
PHENOL	40	40	40	4200
POLYCHLORINATED BIPHENYLS	0.5	5.0	25	0.2
PYRENE	1.3	1.3	1.3	0.2
SELENIUM	2.0	10	10	10
SILVER	(25) 20	(25) 20	(50) 40	1.2
STYRENE	(1.7) 1.2	(1.7) 1.2	(1.7) 1.2	100
TETRACHLOROETHANE, 1,1,1,2-	(0.06) 0.019	(0.06) 0.019	(0.06) 0.019	5.0
TETRACHLOROETHANE, 1,1,2,2-	0.01	0.01	0.01	1.0
TETRACHLOROETHYLENE	0.45	0.45	0.45	5.0
THALLIUM	4.1	4.1	32	2.0
TOLUENE	2.1	2.1	2.1	24
TRICHLOROBENZENE, 1,2,4-	30	30	30	70
TRICHLOROETHANE, 1,1,1-	(34) 26	(34) 26	(34) 26	200
TRICHLOROETHANE, 1,1,2-	0.28	0.28	0.28	5.0
TRICHLOROETHYLENE	(2.6) 1.1	(2.6) 1.1	(2.6) 1.1	50
TRICHLOROPHENOL, 2,4,5-	3.2	3.2	3.2	200
TRICHLOROPHENOL 2,4,6-	0.66	0.66	0.66	2.0
VANADIUM	(250) 200	(250) 200	(250) 200	200
VINYL CHLORIDE	(0.0048) 0.003	(0.0048) 0.003	(0.0048) 0.003	(1.3) 0.5
XYLENES	25	25	25	300

Table B

Surface soil and groundwater criteria for residential/parkland,
industrial/commercial land use for a nonpotable groundwater
condition

Soil criteria for inorganics in this table apply only where soil pH is 5.0 To 9.0			
Table B:	Soil remediation criteria (ug/g)		Nonpotable groundwater criteria (ug/l)
Chemical compound	Residential/ parkland land use	Industrial/ commercial land use	Both land use categories
MOLYBDENUM	40	40	7300
NAPHTHALENE	40	40	(6200) 5900
NICKEL	(200) 150	(200) 150	1600
PENTACHLOROPHENOL	5.0	5.0	130
PETROLEUM HYDROCARBONS(gas/diesel)	1000	1000	N/V
PETROLEUM HYDROCARBONS(heavy oils)	1000	5000	N/V
PHENANTHRENE	40	40	63
PHENOL	40	40	26000
POLYCHLORINATED BIPHENYLS	5.0	25	0.2
PYRENE	1.3	1.3	0.2
SELENIUM	10	10	50
SILVER	(25) 20	(50) 40	1.2
STYRENE	(2.8) 1.2	(2.8) 1.2	(5900) 940
TETRACHLOROETHANE, 1,1,1,2-	(0.06) 0.019	(0.06) 0.019	(38) 6.0
TETRACHLOROETHANE, 1,1,2,2-	(0.043) 0.037	(0.043) 0.037	(140) 22
TETRACHLOROETHYLENE	0.45*	0.45*	5.0*
THALLIUM	4.1	32	400
TOLUENE	(59) 34	(59) 34	(37000) 5900
TRICHLOROENZENE, 1,2,4-	30	30	500
TRICHLOROETHANE, 1,1,1,-	(34)* 26*	(34)* 26*	200*
TRICHLOROETHANE, 1,1,2-	2.3	3.1	(50000) 16000
TRICHLOROETHYLENE	(2.6)* 1.1*	(2.6)* 1.1*	50*
TRICHLOROPHENOL, 2,4,5-	10	10	630
TRICHLOROPHENOL 2,4,6-	10	10	9700
VANADIUM	(250) 200	(250) 200	200
VINYL CHLORIDE	(0.0048) 0.003	(0.0048) 0.003	(1.3) 0.5
XYLENES	(53) 34	(53) 34	(35000) 5600
ZINC	(800) 600	(800) 600	1100

Table C

Subsurface soil criteria for residential/parkland,
industrial/commercial land use for a potable groundwater
condition

Soil criteria for inorganics in this table apply only where soil pH is 5.0 To 11.0		
Table C:	Soil remediation criteria (ug/g)	
Chemical compound	Residential/ parkland land use	Industrial/ commercial land use
DINITROPHENOL, 2,4-	0.2*	0.2*
DINITROTOLUENE, 2,4-	0.66*	0.66*
DIOXIN/FURAN (ng TEQ/g soil)	1.0*	N/V
ENDOSULFAN	0.18*	0.18*
ENDRIN	0.05*	0.05*
ETHYLBENZENE	0.28*	0.28*
ETHYLENE DIBROMIDE	0.012	0.012
FLUORANTHENE	840	840
FLUORENE	340*	340*
HEPTACHLOR	0.15	0.15
HEPTACHLOR EPOXIDE	0.09	0.33
HEXACHLOROBENZENE	0.76	2.8
HEXACHLOROBUTADIENE	2.2	2.2
HEXACHLOROCYCLOHEXANE, GAMMA	0.49	0.49*
HEXACHLOROETHANE	8.5	8.5
INDENO(1,2,3-cd)PYRENE	19	53
LEAD	1000	N/V
MERCURY	57	57
METHOXYCHLOR	4.0*	4.0*
METHYL ETHYL KETONE	0.27*	0.27*
METHYL ISOBUTYL KETONE	0.48*	0.48*
METHYL MERCURY	18**	18**
METHYL TERT BUTYL ETHER	5.7*	5.7*
METHYLENE CHLORIDE	1.1*	1.1*
METHYLNAPHTHALENE, 2-(*1-)	1.2*	1.2*
MOLYBDENUM	550	550
NAPHTHALENE	4.6*	4.6*
NICKEL	710	710
PENTACHLOROPHENOL	12	43
PETROLEUM HYDROCARBONS(gas/diesel)	100*	100*

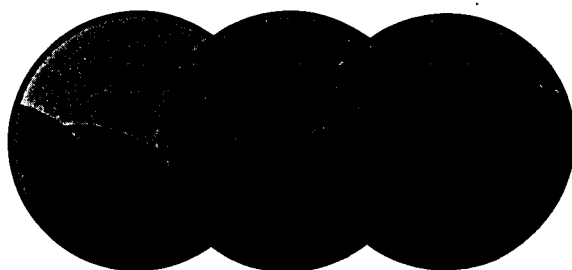
CCME

Canadian Council of Ministers
of the Environment Le Conseil canadien
des ministres
de l'environnement

Interim Canadian Environmental Quality Criteria for Contaminated Sites

Report CCME EPC-CS34
September 1991

The National
Contaminated Sites
Remediation Program



Assessment and Remediation Criteria Tables

Table A-1. Interim Assessment Criteria for Soil and Water

	Soil	Water
General Parameters		
pH	6 to 8	---
conductivity	2 dS/m	---
sodium adsorption ratio	5	---
Inorganic Parameters		
antimony	20 ¹	---
arsenic	5	5
barium	200	50
beryllium	4	---
boron (hot water soluble)	1	---
cadmium	0.5	1
chromium (*6)	2.5	---
chromium (total)	20	15
cobalt	10	10
copper	30	25
cyanide (free)	0.25	40
cyanide (total)	2.5	40
fluoride (total)	200	---
lead	25	10
mercury	0.1	0.1
molybdenum	2	5
nickel	20	10
selenium	1	1

Notes: All values in µg/g dry weight or µg/L unless otherwise stated.

Interim assessment criteria are largely based on ambient or background concentrations for most general and inorganic parameters and on analytical detection limits for most organic parameters.

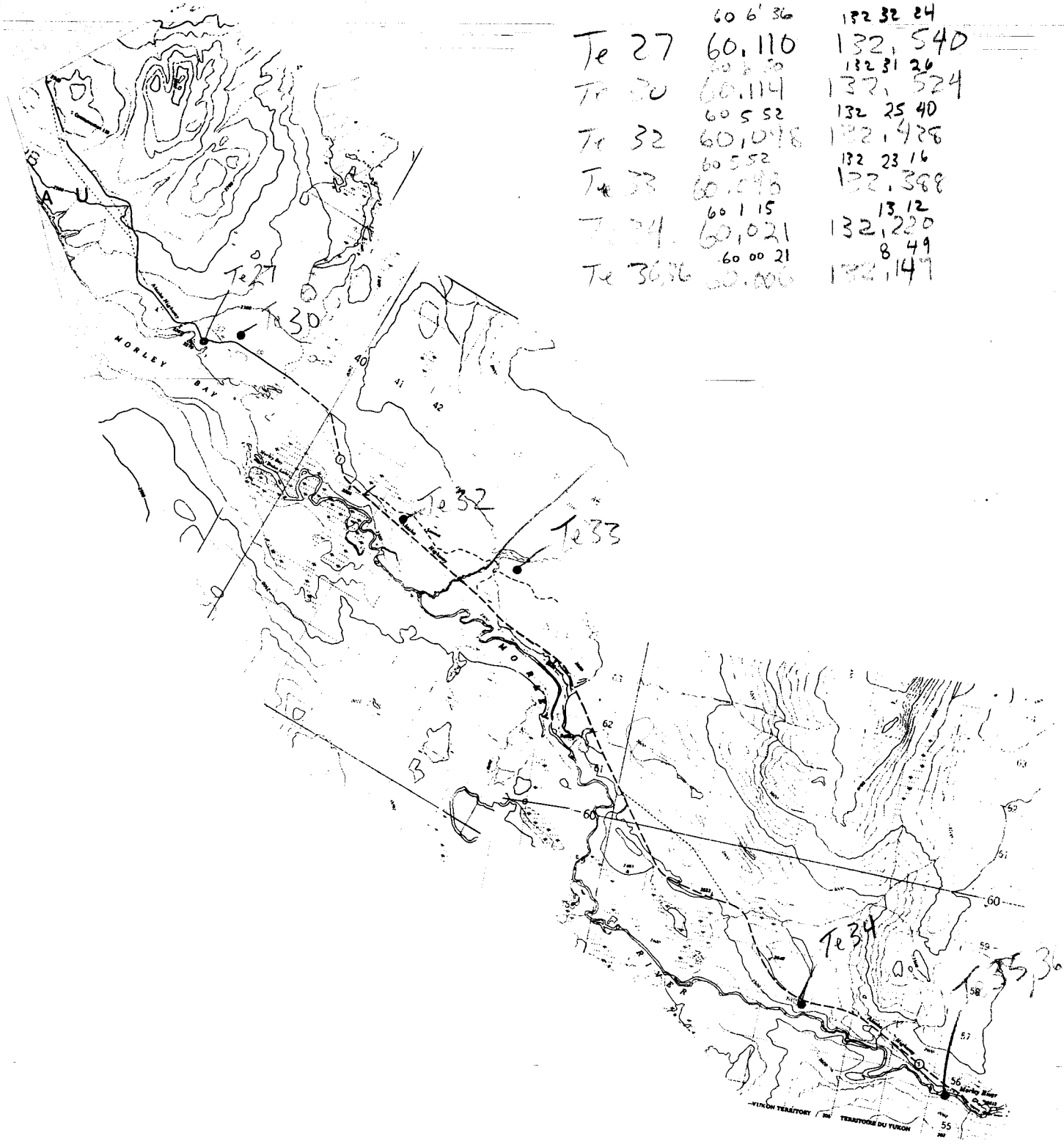
--- value not established.

See page 7 for numbered footnotes.

Table A-1. Interim Assessment Criteria for Soil and Water (Continued)

	Soil	Water
Inorganic Parameters (cont'd)		
silver	2	5
sulphur (elemental)	250	---
thallium	0.5	---
tin	5	10
vanadium	25	---
zinc	60	50
Monocyclic Aromatic Hydrocarbons		
benzene	0.05	0.5
chlorobenzene	0.1	0.1
1,2-dichlorobenzene	0.1	0.2
1,3-dichlorobenzene	0.1	0.2
1,4-dichlorobenzene	0.1	0.2
ethylbenzene	0.1	0.5
styrene	0.1	0.5
toluene	0.1	0.5
xylene	0.1	0.5
Phenolic Compounds		
non-chlorinated ² (each)	0.1	0.1
chlorophenols ³ (each)	0.05	1.0
Polycyclic Aromatic Hydrocarbons (PAHs)		
benzo(a)anthracene	0.1	0.01
benzo(a)pyrene	0.1	0.01
benzo(b)fluoranthene	0.1	0.01
benzo(k)fluoranthene	0.1	0.01
dibenz(a,h)anthracene	0.1	0.01
indeno(1,2,3-c,d)pyrene	0.1	0.1
naphthalene	0.1	0.2
phenanthrene	0.1	0.2
pyrene	0.1	0.2
Chlorinated Hydrocarbons		
chlorinated aliphatics ⁴ (each)	0.1	0.1
chlorobenzenes ⁵ (each)	0.05	0.3
hexachlorobenzene	0.1	0.1
hexachlorocyclohexane	0.01	---
PCBs ⁶	0.1	0.1
PCDDs and PCDFs ⁷	0.00001	---

Appendix E
Alaska Highway
Site Map



Te 27	60 6' 36 60.110	132 32 24 132,540
Te 30	60 5 52 60.114	132 31 26 132,524
Te 32	60 5 52 60.1018	132 25 40 132,428
Te 33	60 5 52 60.096	132 23 16 132,388
Te 34	60 1 15 60.021	13 12 132,220
Te 36	60 00 21 60.006	8 49 132,147

Groundtrax (Yukon) Inc.

Project: Yukon Environmental Site Investigation

Project No 96-139

Drawing No 96-139-8

Drawing Alaska Hgy

Scale: NTS

Date October 1996

Sheet No 1



MDS
Environmental Services Limited

Client: Groundtrax Inc.
12 Loyalist Drive, Box 613
Brighton, ONT, CANADA
K0K 1H0

Date Submitted: September 18/96
Date Reported: September 26/96
MDS Ref#: 966350
MDS Quote#: 96L-274-JM

Fax: 613-475-4448

Client Ref#: 96-139
Sampled By: Tom

Attn: Tom McMullin

Certificate of Analysis

Analysis Performed: Polychlorinated Biphenyls(PCB)

Methodology: 1) The determination of PCB's in acetic acid leachate by
solvent extraction, dried over Na₂SO₄, Florisil cleanup
followed by GC/ECD analysis.
U.S. EPA Method No. 3510/3620/3630/3660
U.S. EPA Method No. 8080A/608
Method 1618 Revision A, July 1989

Instrumentation: 1) GC/ECD2, Hewlett-Packard 5890II GC, Dual ECD, A/S

Sample Description: Acetic Acid Leachate

QA/QC: Refer to CERTIFICATE OF QUALITY CONTROL report.

Results: Refer to REPORT of ANALYSIS attached.

Certified By
Brad Newman
Services Manager

Certified By
T. Munshaw, M.Sc., C.Chem
Director, Laboratory Operations

Certificate of Quality Control

Client : Groundtrax Inc.
Contact: Tom McMullin

Date Reported: September 26/96
MDS Ref # : 966350
MDS Quote#: 96L-274-JM

Client Ref#: 96-139

Analysis of Acetic Acid Leachate

Parameter	SAMPLE ID (spike)	LOQ	Units	Process Blank			Process % Recovery			Matrix Spike				Overall QC Acceptable	
				Result	Upper Limit	Accept	Result	Lower Limit	Upper Limit	Accept	Result	Target	Lower Limit		Upper Limit
Total PCB Congeners	TP-2-780.2	0.1	ug/L	nd	0.3	yes	103	70	130	yes	ns	ns	ns	ns	yes

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence
* = Unavailable due to dilution required for analysis

na = Not Applicable
ns = Insufficient Sample Submitted
nd = parameter not detected
TR = trace level less than LOQ

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Client Ref#: 96-139

Parameter	Date Sampled >	LOQ	Units	TP-11-793. 8 96/09/14	TP-12-793. 8 96/09/14	TP-2-780.2 96/09/14	TP-2-780.2 Replicate	TP-3-777
Total PCB Congeners		0.1	ug/L	nd	nd	nd	nd	nd

Page 1 of 3

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Client Ref#: 96-139

Parameter	Date Sampled >	LOQ	Units	TP-3-793.9 (G) 96/09/12	TP-4-780.2 96/09/14	TP-4-793.8 96/09/14	TP-5-790.5 96/09/14	TP-6-790.5 96/09/14
Total PCB Congeners		0.1	ug/L	nd	nd	nd	nd	nd

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence.
nd = parameter not detected ! = LOQ higher than listed due to dilution () Adjusted LOQ

Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Acetic Acid Leachate

Client Ref#: 96-139

Parameter	LOQ	Units	TP-6-796.6	TP-7-793.8 96/09/14			
Total PCB Congeners	0.1	ug/L	nd	nd			

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence.
nd = parameter not detected ! = LOQ higher than listed due to dilution () Adjusted LOQ



Client: Groundtrax Inc.
12 Loyalist Drive, Box 613
Brighton, ONT, CANADA
K0K 1H0

Fax: 613-475-4448

Attn: Tom McMullin

Date Submitted: September 18/96
Date Reported: September 26/96
MDS Ref#: 966350
MDS Quote#: 96L-274-JM

Client Ref#: 96-139
Sampled By: Tom

Certificate of Analysis

Analysis Performed: Arsenic and Selenium by Graphite Furnace
Ion Chromatography Anion 347 Scan(NO2 & NO3)
Regulation 347 ICP Scan
Fluoride, by Electrode
Mercury, Cold Vapour AA, Digestion Required
Cyanide, Free

Methodology:

- 1) Arsenic and Selenium analysis in acetic acid leachate,
by Graphite Furnace Atomic Absorption.
U.S. EPA Method No. 206.2
U.S. EPA Method No. 270.2
- 2) Analysis of nitrate and nitrite in acetic acid leachate
by Ion Chromatography.
U.S. EPA Method No. 300.0
Standard Methods(1985) No. 429.0
- 3) Analysis of trace metals in acetic acid leachate by
Inductively Coupled Plasma Spectrophotometry.
U.S. EPA Method No. 200.7
(Ministry of Environment ELSCAN)



Client: Groundtrax Inc.
12 Loyalist Drive, Box 613
Brighton, ONT, CANADA
K0K 1H0

Fax: 613-475-4448

Attn: Tom McMullin

Date Submitted: September 18/96
Date Reported: September 26/96
MDS Ref#: 966350
MDS Quote#: 96L-274-JM

Client Ref#: 96-139
Sampled By: Tom

Certificate of Analysis

Methodology: (Cont'd)

- 4) Analysis of fluoride in acetic acid leachate by Ion Selective Electrode.
U.S. EPA Method No. 340.2
- 5) Cold Vapour Atomic Absorption Analysis of acetic acid leachate for mercury.
U.S. EPA Method No. 245.2
(Reference - Varian Method No. AA-51)
- 6) Determination of Free Cyanide in acetic acid leachate by distillation followed by colourimetric analysis in a continuous liquid flow.
U.S. EPA Method No. 335.3

Instrumentation:

- 1) Thermo Jarrell Ash Smith-Hieftje 22 AA / CTF 188 Atomizer
- 2) Dionex Ion Chromatograph, Series 4500i
- 3) Thermo Jarrell Ash ICAP 61E Plasma Spectrophotometer
- 4) Hach One Laboratory pH Meter - Ion Selective Electrode
- 5) Varian SpectrAA 400 Plus AA/Vapour Accessory VGA 76
- 6) Technicon Autoanalyzer



Client: Groundtrax Inc.
12 Loyalist Drive, Box 613
Brighton, ONT, CANADA
K0K 1H0

Fax: 613-475-4448

Attn: Tom McMullin

Date Submitted: September 18/96
Date Reported: September 26/96
MDS Ref#: 966350
MDS Quote#: 96L-274-JM

Client Ref#: 96-139
Sampled By: Tom

Certificate of Analysis

Instrumentation: (Cont'd)

Sample Description: Acetic Acid Leachate

QA/QC: Refer to CERTIFICATE OF QUALITY CONTROL report.

Results: Refer to REPORT of ANALYSIS attached.

Certified By
Brad Newman
Service Manager

Certified By
T. Munshaw, M.Sc., C.Chem
Director, Laboratory Operations

Certificate of Quality Control

Date Reported: September 26/96
MDS Ref # : 966350
MDS Quote#: 96L-274-JM

Client : Groundtrax Inc.
Contact: Tom McMullin

Client Ref#: 96-139

Analysis of Acetic Acid Leachate

Parameter	SAMPLE ID (spike)	LOQ	Units	Process Blank			Process % Recovery			Matrix Spike				Overall		
				Result	Upper Limit	Accept	Result	Lower Limit	Upper Limit	Accept	Result	Target	Lower Limit	Upper Limit	Accept	QC
Arsenic	TP-2-780.2	0.01	mg/L	nd(b)	0.04	yes	101	70	130	yes	0.10	0.10	0.04	0.16	yes	yes
Selenium	TP-2-780.2	0.01	mg/L	nd(b)	0.04	yes	92	70	130	yes	0.10	0.1	0.06	0.14	yes	yes
Nitrite(as N) and Nitrate(as N)	na	0.25	mg/L	nd(b)	0.5	yes	116	80	120	yes	na	na	na	na	na	yes
	TP-2-780.2	0.25	mg/L	nd(b)	0.5	yes	84	80	120	yes	0.47	0.40	0.24	0.56	yes	yes
Barium	na	0.01	mg/L	nd(b)	0.02	yes	105	80	120	yes	na	na	na	na	na	yes
Boron	TP-2-780.2	0.05	mg/L	nd(b)	0.1	yes	103	80	120	yes	1.10	1.0	0.4	1.4	yes	yes
Cadmium	TP-2-780.2	0.005	mg/L	0.006(b)	0.01	yes	108	80	120	yes	1.12	1.0	0.4	1.4	yes	yes
Chromium	TP-2-780.2	0.05	mg/L	nd(b)	0.1	yes	105	80	120	yes	1.12	1.0	0.4	1.4	yes	yes
Lead	TP-2-780.2	0.05	mg/L	nd(b)	0.1	yes	110	80	120	yes	1.13	1.0	0.2	1.8	yes	yes
Silver	na	0.03	mg/L	nd(b)	0.05	yes	95	80	120	yes	na	na	na	na	na	yes
Uranium	na	0.02	mg/L	nd(b)	0.04	yes	109	80	120	yes	na	na	na	na	na	yes
Fluoride	TP-2-780.2	0.02	mg/L	nd(b)	0.04	yes	110	89	112	yes	1.03	1.0	0.6	1.4	yes	yes
Mercury	na	0.1	ug/L	nd	0.2	yes	97	79	120	yes	na	na	na	na	na	yes
Mercury	na	0.1	ug/L	nd	0.2	yes	97	79	120	yes	na	na	na	na	na	yes
Mercury	na	0.1	ug/L	nd	0.2	yes	97	79	120	yes	na	na	na	na	na	yes
Mercury	na	0.1	ug/L	nd	0.2	yes	97	79	120	yes	na	na	na	na	na	yes
Mercury	na	0.1	ug/L	nd	0.2	yes	97	79	120	yes	na	na	na	na	na	yes
Cyanide, Free	na	0.002	mg/L	na	na	na	92	77	127	yes	na	na	na	na	na	yes

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence

* = Unavailable due to dilution required for analysis

na = Not Applicable

ns = Insufficient Sample Submitted

nd = parameter not detected

TR = trace level less than LOQ

(b) = Analyte results on REPORT of ANALYSIS have been background corrected for the process blank.

Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Acetic Acid Leachate

Client Ref#: 96-139

Parameter Date Sampled >	LOQ	Units	TP-10-793. 9(G) 96/09/14	TP-11-793. 8 96/09/14	TP-12-793. 8 96/09/14	TP-2-780.2 96/09/14	TP-2-780.2 Replicate
Arsenic	0.01	mg/L	nd	nd	nd	nd	nd
Selenium	0.01	mg/L	nd	nd	nd	nd	nd
Nitrite(as N)	0.25	mg/L	nd	nd	nd	nd	nd
Nitrite(as N) and Nitrate(as N)	0.25	mg/L	nd	nd	nd	nd	nd
Barium	0.01	mg/L	0.64	0.74	0.84	0.14	0.15
Boron	0.05	mg/L	nd	nd	nd	nd	nd
Cadmium	0.005	mg/L	nd	nd	nd	nd	nd
Chromium	0.05	mg/L	nd	nd	nd	nd	nd
Lead	0.05	mg/L	nd	0.09	nd	nd	nd
Silver	0.03	mg/L	nd	nd	nd	nd	nd
Uranium	0.02	mg/L	nd	nd	nd	nd	nd
Fluoride	0.02	mg/L	0.03	nd	nd	nd	nd
Mercury	0.1	ug/L	nd	nd	nd	nd	-
Cyanide, Free	0.002	mg/L	nd	nd	nd	nd	-

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence.

- = Not Requested

nd = parameter not detected ! = LOQ higher than listed due to dilution () Adjusted LOQ

Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Acetic Acid Leachate

Client Ref#: 96-139

Parameter	LOQ	Units	TP-3-777	TP-3-793.9 (G) 96/09/12	TP-4-780.2 96/09/14	TP-4-793.8 96/09/14	TP-5-790.5 96/09/14
Arsenic	0.01	mg/L	nd	nd	nd	nd	nd
Selenium	0.01	mg/L	nd	nd	nd	nd	nd
Nitrite(as N)	0.25	mg/L	nd	nd	nd	nd	nd
Nitrite(as N) and Nitrate(as N)	0.25	mg/L	nd	nd	nd	nd	nd
Barium	0.01	mg/L	0.18	0.51	0.16	0.11	0.25
Boron	0.05	mg/L	nd	nd	nd	nd	nd
Cadmium	0.005	mg/L	nd	nd	nd	nd	nd
Chromium	0.05	mg/L	nd	nd	nd	nd	nd
Lead	0.05	mg/L	nd	nd	nd	nd	nd
Silver	0.03	mg/L	nd	nd	nd	nd	nd
Uranium	0.02	mg/L	nd	nd	nd	nd	nd
Fluoride	0.02	mg/L	nd	nd	nd	nd	nd
Mercury	0.1	ug/L	nd	nd	nd	nd	nd
Cyanide, Free	0.002	mg/L	nd	nd	nd	nd	nd

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence.
nd = parameter not detected ! = LOQ higher than listed due to dilution () Adjusted LOQ

Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

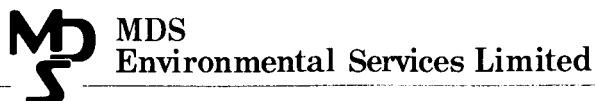
Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Acetic Acid Leachate

Client Ref#: 96-139

Parameter	LOQ	Units	TP-6-790.5	TP-6-796.6	TP-7-793.8		
Date Sampled >			96/09/14		96/09/14		
Arsenic	0.01	mg/L	nd	nd	nd		
Selenium	0.01	mg/L	nd	nd	nd		
Nitrite(as N)	0.25	mg/L	nd	nd	nd		
Nitrite(as N) and Nitrate(as N)	0.25	mg/L	nd	nd	nd		
Barium	0.01	mg/L	0.41	0.16	1.13		
Boron	0.05	mg/L	nd	nd	nd		
Cadmium	0.005	mg/L	nd	nd	nd		
Chromium	0.05	mg/L	nd	nd	nd		
Lead	0.05	mg/L	0.10	nd	0.06		
Silver	0.03	mg/L	nd	nd	nd		
Uranium	0.02	mg/L	nd	nd	nd		
Fluoride	0.02	mg/L	nd	0.02	nd		
Mercury	0.1	ug/L	nd	nd	nd		
Cyanide, Free	0.002	mg/L	nd	nd	nd		

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence.
nd = parameter not detected ! = LOQ higher than listed due to dilution () Adjusted LOQ



Client: Groundtrax Inc.
12 Loyalist Drive, Box 613
Brighton, ONT, CANADA
K0K 1H0

Date Submitted: September 18/96
Date Reported: September 26/96
MDS Ref#: 966350
MDS Quote#: 96L-274-JM

Fax: 613-475-4448

Client Ref#: 96-139

Attn: Tom McMullin

Sampled By: Tom

Certificate of Analysis

Analysis Performed: Lithium, Flame AA
Silica
Zinc by ICP
RCAP MS Package, 22 Element ICP-MS Scan
Total Phenolics, Autoanalyzer
Total Oil & Grease(Mineral/Vegetable/Animal)

Methodology:

- 1) Analysis of lithium in water by Flame Emission Spectrophotometry.
U.S. EPA Method No. 200.0
- 2) Analysis of silicon in water by ICPAES and conversion to silica.
Standard Methods(17th ed.) No. 4500-Si G
- 3) Analysis of trace zinc in water by Inductively Coupled Plasma Spectrophotometry.
U.S. EPA Method No. 200.7
(Ministry of Environment ELSCAN)
- 4) Analysis of trace metals in water by Inductively Coupled Plasma Mass Spectrophotometry.
U.S. EPA Method No. 200.8(Modification)



Client: Groundtrax Inc.
12 Loyalist Drive, Box 613
Brighton, ONT, CANADA
K0K 1H0

Date Submitted: September 18/96
Date Reported: September 26/96
MDS Ref#: 966350
MDS Quote#: 96L-274-JM

Fax: 613-475-4448

Client Ref#: 96-139
Sampled By: Tom

Attn: Tom McMullin

Certificate of Analysis

Methodology: (Cont'd)

- 5) Analysis of total phenolics in water using distillation followed by colourimetric determination in a continuous flow.
U.S. EPA Method No. 420.2
Refer - Method No. 1102002 Issue 101290
- 6) Determination of total oil & grease in water, using solvent extraction with Freon, and analysed by Infrared Spectroscopy.
U.S. EPA Method No. 418.1

Instrumentation:

- 1) Thermo Jarrell Ash Smith-Hieftje 22 Atomic Absorption Spectrometer
- 2, 3) Thermo Jarrell Ash ICAP 61E Plasma Spectrophotometer
- 4) PE Sciex ELAN 6000 ICP-MS Spectrometer
- 5) Technicon Autoanalyzer
- 6) Miran Infrared Analyzer, Model 1A - FF

Client: Groundtrax Inc.
12 Loyalist Drive, Box 613
Brighton, ONT, CANADA
K0K 1H0

Date Submitted: September 18/96
Date Reported: September 26/96
MDS Ref#: 966350
MDS Quote#: 96L-274-JM

Fax: 613-475-4448

Client Ref#: 96-139
Sampled By: Tom

Attn: Tom McMullin

Certificate of Analysis

Instrumentation: (Cont'd)

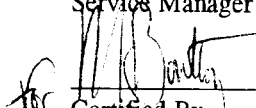
Sample Description: Water

QA/QC: Refer to CERTIFICATE OF QUALITY CONTROL report.

Results: Refer to REPORT of ANALYSIS attached.



Certified By
Brad Newman
Service Manager



Certified By
T. Munshaw, M.Sc., C.Chem
Director, Laboratory Operations

Certificate of Quality Control

Client : Groundtrax Inc.
Contact: Tom McMullin

Date Reported: September 26/96
MDS Ref # : 966350
MDS Quote#: 96L-274-JM

Client Ref#: 96-139

Analysis of Water

Parameter	SAMPLE ID (spike)	LOQ	Units	Process Blank			Process % Recovery			Matrix Spike			Overall QC		
				Result	Upper Limit	Accept	Result	Lower Limit	Upper Limit	Accept	Result	Target		Lower Limit	Upper Limit
Lithium	na	0.01	mg/L	nd(b)	0.02	yes	96	90	110	yes	na	na	na	na	yes
Silica(as SiO2)	na	0.5	mg/L	nd(b)	1.0	yes	99	80	120	yes	na	na	na	na	yes
Zinc	780.46	0.005	mg/L	0.008(b)	0.01	yes	103	80	120	yes	0.978	1.0	0.6	1.4	yes
Aluminium	780.46	0.01	mg/L	nd(b)	0.03	yes	111	85	115	yes	0.10	0.100	0.050	0.140	yes
Antimony	780.46	0.002	mg/L	nd(b)	0.004	yes	100	85	115	yes	0.100	0.100	0.050	0.140	yes
Arsenic	780.46	0.002	mg/L	nd(b)	0.004	yes	101	85	115	yes	0.096	0.100	0.050	0.140	yes
Barium	780.46	0.005	mg/L	nd(b)	0.01	yes	101	85	115	yes	0.098	0.100	0.050	0.140	yes
Beryllium	780.46	0.005	mg/L	nd(b)	0.01	yes	105	85	115	yes	0.116	0.100	0.050	0.140	yes
Bismuth	780.46	0.002	mg/L	nd(b)	0.004	yes	102	85	115	yes	0.101	0.100	0.050	0.140	yes
Cadmium	780.46	0.0003	mg/L	nd(b)	0.0006	yes	100	85	115	yes	0.1020	0.100	0.050	0.140	yes
Chromium	780.46	0.002	mg/L	nd(b)	0.004	yes	104	85	115	yes	0.107	0.100	0.050	0.140	yes
Cobalt	780.46	0.001	mg/L	nd(b)	0.002	yes	105	85	115	yes	0.107	0.100	0.050	0.140	yes
Copper	780.46	0.002	mg/L	nd(b)	0.004	yes	106	85	115	yes	0.105	0.100	0.050	0.140	yes
Lead	780.46	0.0001	mg/L	0.0005(b)	0.002	yes	102	85	115	yes	0.1020	0.100	0.050	0.140	yes
Manganese	780.46	0.002	mg/L	nd(b)	0.004	yes	105	85	115	yes	0.110	0.100	0.050	0.140	yes
Molybdenum	780.46	0.002	mg/L	nd(b)	0.004	yes	101	85	115	yes	0.102	0.100	0.050	0.140	yes
Nickel	780.46	0.002	mg/L	nd(b)	0.004	yes	104	85	115	yes	0.106	0.100	0.050	0.140	yes
Selenium	780.46	0.002	mg/L	nd(b)	0.004	yes	97	85	115	yes	0.097	0.100	0.050	0.140	yes
Silver	780.46	0.0005	mg/L	nd(b)	0.001	yes	97	85	115	yes	0.0921	0.100	0.050	0.140	yes
Strontium	780.46	0.005	mg/L	nd(b)	0.01	yes	104	85	115	yes	0.105	0.100	0.050	0.140	yes

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence

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ns = Insufficient Sample Submitted

nd = parameter not detected

TR = trace level less than LOQ

(b) = Analyte results on REPORT of ANALYSIS have been background corrected for the process blank.

Certificate of Quality Control

Date Reported: September 26/96
 MDS Ref # : 966350
 MDS Quote#: 96L-274-JM

Client : Groundtrax Inc.
 Contact: Tom McMullin

Client Ref#: 96-139

Analysis of Water

Parameter	SAMPLE ID (spike)	LOQ	Units	Process Blank			Process % Recovery			Matrix Spike				Overall QC Acceptable		
				Result	Upper Limit	Accept	Result	Lower Limit	Upper Limit	Accept	Result	Target	Lower Limit		Upper Limit	
Thallium	780.46	0.0001	mg/L	nd(b)	0.0002	yes	101	85	115	yes	0.1020	0.100	0.050	0.140	yes	yes
Tin	780.46	0.002	mg/L	nd(b)	0.004	yes	100	85	115	yes	0.097	0.100	0.050	0.140	yes	yes
Titanium	780.46	0.002	mg/L	nd(b)	0.004	yes	104	85	115	yes	0.105	0.100	0.050	0.140	yes	yes
Uranium	780.46	0.0001	mg/L	nd(b)	0.0002	yes	103	85	115	yes	0.1050	0.100	0.050	0.140	yes	yes
Vanadium	780.46	0.002	mg/L	nd(b)	0.004	yes	105	85	115	yes	0.106	0.100	0.050	0.140	yes	yes
Phenols	na	1.0	ug/L	nd	2.0	yes	95	85	114	yes	na	na	na	na	na	yes
Total Oil & Grease	na	1.0	mg/L	nd	2.0	yes	101	87	120	yes	na	na	na	na	na	yes

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence

* = Unavailable due to dilution required for analysis

na = Not Applicable

ns = Insufficient Sample Submitted

nd = parameter not detected

TR = trace level less than LOQ

Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Water

Client Ref#: 96-139

Parameter	LOQ	Units	780.46	780.46 Replicate	790.5	796.6	
Lithium	0.01	mg/L	nd	nd	nd	-	
Silica(as SiO ₂)	0.5	mg/L	1.2	1.3	19.2	-	
Zinc	0.005	mg/L	nd	nd	0.088	-	
Aluminum	0.01	mg/L	nd	nd	0.12	-	
Antimony	0.002	mg/L	nd	nd	nd	-	
Arsenic	0.002	mg/L	nd	nd	nd	-	
Barium	0.005	mg/L	0.070	0.071	0.070	-	
Beryllium	0.005	mg/L	nd	nd	nd	-	
Bismuth	0.002	mg/L	nd	nd	nd	-	
Cadmium	0.0003	mg/L	nd	nd	nd	-	
Chromium	0.002	mg/L	0.009	0.009	0.009	-	
Cobalt	0.001	mg/L	nd	nd	nd	-	
Copper	0.002	mg/L	nd	nd	0.002	-	
Lead	0.0001	mg/L	nd	nd	nd	-	
Manganese	0.002	mg/L	nd	nd	0.003	-	
Molybdenum	0.002	mg/L	0.002	0.002	0.002	-	
Nickel	0.002	mg/L	nd	nd	nd	-	
Selenium	0.002	mg/L	nd	nd	nd	-	
Silver	0.0005	mg/L	nd	nd	nd	-	
Strontium	0.005	mg/L	0.321	0.333	0.181	-	
Thallium	0.0001	mg/L	nd	nd	nd	-	
Tin	0.002	mg/L	nd	nd	nd	-	
Titanium	0.002	mg/L	nd	nd	0.006	-	
Uranium	0.0001	mg/L	0.0014	0.0013	0.0006	-	
Vanadium	0.002	mg/L	nd	nd	0.003	-	
Phenols	1.0	ug/L	nd	-	nd	-	
Total Oil & Grease	1.0	mg/L	nd	-	nd	nd	

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence.

- = Not Requested

nd = parameter not detected ! = LOQ higher than listed due to dilution () Adjusted LOQ



Client: Groundtrax Inc.
12 Loyalist Drive, Box 613
Brighton, ONT, CANADA
K0K 1H0

Fax: 613-475-4448

Attn: Tom McMullin

Date Submitted: September 18/96
Date Reported: October 1/96
MDS Ref#: 966350
MDS Quote#: 96L-274-JM

Client Ref#: 96-139
Sampled By: Tom

Certificate of Analysis

Analysis Performed: EPA 608 Priority Pollutant Pesticides/PCB


Methodology: 1) Determination of EPA 608 pesticides by solvent
extraction, dry over Na₂SO₄, Florisil cleanup, GC-ECD
with confirmation on GC-ITD.
U.S. EPA Method No. 3510/3620/8080A/608
EPLSOP PST-08-WT
Method 1618 Revision A, July 1989

Instrumentation: 1) Hewlett-PackardII GC, Dual ECD, NPD/Varian 3400, GC-ITD


Sample Description: Water

QA/QC: Refer to CERTIFICATE OF QUALITY CONTROL report.

Results: Refer to REPORT of ANALYSIS attached.



Certified By
Brad Newman
Service Manager



Certified By
T. Munshaw, M.Sc., C.Chem
Director, Laboratory Operations

Certificate of Quality Control

Client : Groundtrax Inc.
Contact: Tom McMullin

Date Reported: October 1/96
MDS Ref # : 966350
MDS Quote#: 96L-274-JM

Client Ref#: 96-139

Analysis of Water

Parameter	SAMPLE ID (spike)	LOQ	Units	Process Blank			Process % Recovery			Matrix Spike				Overall QC Acceptable	
				Result	Upper Limit	Accept	Result	Lower Limit	Upper Limit	Accept	Result	Target	Lower Limit		Upper Limit
4,4'-DDD	780.46	0.018	ug/L	nd	0.090	yes	103	60	130	yes	ns	ns	ns	ns	yes
4,4'-DDE	780.46	0.015	ug/L	nd	0.075	yes	102	60	130	yes	ns	ns	ns	ns	yes
4,4'-DDT	780.46	0.018	ug/L	nd	0.090	yes	88	50	130	yes	ns	ns	ns	ns	yes
Aldrin	780.46	0.012	ug/L	nd	0.060	yes	98	65	120	yes	ns	ns	ns	ns	yes
Alpha-BHC	780.46	0.017	ug/L	nd	0.085	yes	100	50	120	yes	ns	ns	ns	ns	yes
Beta-BHC	780.46	0.008	ug/L	nd	0.040	yes	105	50	120	yes	ns	ns	ns	ns	yes
Chlordane	780.46	0.600	ug/L	nd	3.0	yes	na	na	na	na	ns	ns	ns	ns	yes
Delta-BHC	780.46	0.012	ug/L	nd	0.060	yes	105	60	120	yes	ns	ns	ns	ns	yes
Dieldrin	780.46	0.018	ug/L	nd	0.090	yes	102	50	120	yes	ns	ns	ns	ns	yes
Endosulfan I	780.46	0.012	ug/L	nd	0.060	yes	100	40	120	yes	ns	ns	ns	ns	yes
Endosulfan II	780.46	0.014	ug/L	nd	0.070	yes	101	40	120	yes	ns	ns	ns	ns	yes
Endosulfan Sulfate	780.46	0.022	ug/L	nd	0.110	yes	100	30	120	yes	ns	ns	ns	ns	yes
Endrin Aldehyde	780.46	0.021	ug/L	nd	0.135	yes	94	50	120	yes	ns	ns	ns	ns	yes
Endrin	780.46	0.027	ug/L	nd	0.135	yes	112	50	135	yes	ns	ns	ns	ns	yes
Hepachlor Epoxide	780.46	0.009	ug/L	nd	0.045	yes	99	65	120	yes	ns	ns	ns	ns	yes
Hepachlor	780.46	0.008	ug/L	nd	0.040	yes	98	50	120	yes	ns	ns	ns	ns	yes
Lindane(gamma BHC)	780.46	0.016	ug/L	nd	0.080	yes	95	60	130	yes	ns	ns	ns	ns	yes
MethoxyChlor	780.46	0.017	ug/L	nd	0.085	yes	91	50	130	yes	ns	ns	ns	ns	yes
Total PCB Congeners	780.46	0.100	ug/L	nd	0.50	yes	117	70	130	yes	ns	ns	ns	ns	yes
Toxaphene	780.46	0.900	ug/L	nd	4.5	yes	na	na	na	na	ns	ns	ns	ns	yes

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence

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ns = Insufficient Sample Submitted

nd = parameter not detected

TR = trace level less than LOQ

Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: October 1/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Water

Client Ref#: 96-139

Parameter	LOQ	Units	780.46	780.46	790.5		
			Replicate				
4,4'-DDD	0.018	ug/L	nd	nd	nd		
4,4'-DDE	0.015	ug/L	nd	nd	nd		
4,4'-DDT	0.018	ug/L	nd	nd	nd		
Aldrin	0.012	ug/L	nd	nd	nd		
Alpha-BHC	0.017	ug/L	nd	nd	nd		
Beta-BHC	0.008	ug/L	nd	nd	nd		
Chlordane	0.600	ug/L	nd	nd	nd		
Delta-BHC	0.012	ug/L	nd	nd	nd		
Dieldrin	0.018	ug/L	nd	nd	nd		
Endosulfan I	0.012	ug/L	nd	nd	nd		
Endosulfan II	0.014	ug/L	nd	nd	nd		
Endosulfan Sulfate	0.022	ug/L	nd	nd	nd		
Endrin	0.027	ug/L	nd	nd	nd		
Endrin Aldehyde	0.021	ug/L	nd	nd	nd		
Heptachlor	0.008	ug/L	nd	nd	nd		
Heptachlor Epoxide	0.009	ug/L	nd	nd	nd		
Lindane(gamma BHC)	0.016	ug/L	nd	nd	nd		
MethoxyChlor	0.017	ug/L	nd	nd	nd		
Total PCB Congeners	0.100	ug/L	nd	nd	nd		
Toxaphene	0.900	ug/L	nd	nd	nd		

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence.
nd = parameter not detected ! = LOQ higher than listed due to dilution () Adjusted LOQ



Client: Groundtrax Inc.
12 Loyalist Drive, Box 613
Brighton, ONT, CANADA
K0K 1H0

Fax: 613-475-4448
Attn: Tom McMullin

Date Submitted: September 18/96
Date Reported: September 23/96
MDS Ref#: 966350
MDS Quote#: 96L-274-JM

Client Ref#: 96-139
Sampled By: Tom

Certificate of Analysis

Analysis Performed: Extractable Hydrocarbon Analysis(C6-C32)


Methodology: 1) The characterization of HydroCarbon in
water GC analysis, following a solvent extraction.
U.S. EPA Method No.8011(microextraction)

Instrumentation: 1) GC/FID/FID, Hewlett-PackardII GC, Dual injector, Dual FID, A/S


Sample Description: Water

QA/QC: Refer to CERTIFICATE OF QUALITY CONTROL report.

Results: Refer to REPORT of ANALYSIS attached.



Certified By
Brad Newman
Service Manager



Certified By
T. Munshaw, M.Sc., C.Chem
Director, Laboratory Operations

Certificate of Quality Control

Client : Groundtrax Inc.
Contact: Tom McMullin

Date Reported: September 23/96
MDS Ref # : 966350
MDS Quote#: 96L-274-JM

Client Ref#: 96-139

Analysis of Water

Parameter	SAMPLE ID (spike)	LOQ	Units	Process Blank			Process % Recovery			Matrix Spike				Overall	
				Result	Upper Limit	Accept	Result	Lower Limit	Upper Limit	Accept	Result	Target	Lower Limit	Upper Limit	Accept
Total Extractable Hydrocarbons(C6-C32)	na	0.20	mg/L	nd	1.0	yes	111	70	120	yes	na	na	na	na	yes

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence

* = Unavailable due to dilution required for analysis

na = Not Applicable

ns = Insufficient Sample Submitted

nd = parameter not detected

TR = trace level less than LOQ

Client: Groundtrax Inc.
12 Loyalist Drive, Box 613
Brighton, ONT, CANADA
K0K 1H0

Fax: 613-475-4448

Attn: Tom McMullin

Date Submitted: September 18/96
Date Reported: October 3/96
MDS Ref#: 966350
MDS Quote#: 96L-274-JM

Client Ref#: 96-139
Sampled By: Tom

Certificate of Analysis

Analysis Performed: Polynuclear Aromatic Hydrocarbons(PAH's)(CCME Criteria)


Methodology: 1) Determination of CCME Criteria PAH's(Table A1) from
water by solvent extraction, silica gel cleanup and
GC/MS(SIM) analysis.
U.S. EPA SW-846 Method No. 3510
U.S. EPA SW-846 Method No. 3630
U.S. EPA SW-846 Method No. 8270

Instrumentation: 1) GC/MSD, Hewlett-Packard 5890II GC, 5971A MSD, Chemserver


Sample Description: Water

QA/QC: Refer to CERTIFICATE OF QUALITY CONTROL report.

Results: Refer to REPORT of ANALYSIS attached.



Certified By
Brad Newman
Service Manager



Certified By
T. Munshaw, M.Sc., C.Chem
Director, Laboratory Operations

Certificate of Quality Control

Date Reported: October 3/96
MDS Ref # : 966350
MDS Quote#: 96L-274-JM

Client : Groundtrax Inc.
Contact: Tom McMullin

Client Ref#: 96-139

Analysis of Water

Parameter	SAMPLE ID (spike)	LOQ	Units	Process Blank		Process % Recovery			Matrix Spike				Overall QC Acceptable		
				Result	Upper Limit	Accept	Result	Lower Limit	Upper Limit	Accept	Result	Target		Lower Limit	Upper Limit
Benzo(a) anthracene	780.46	0.01	ug/L	nd	0.02	yes	97	60	120	yes	ns	ns	ns	ns	yes
Benzo(a) Pyrene	780.46	0.01	ug/L	nd	0.02	yes	102	60	120	yes	ns	ns	ns	ns	yes
Benzo(b) Fluoranthene	780.46	0.01	ug/L	nd	0.02	yes	104	60	120	yes	ns	ns	ns	ns	yes
Benzo(k) Fluoranthene	780.46	0.01	ug/L	nd	0.02	yes	99	60	120	yes	ns	ns	ns	ns	yes
Dibenzo(a,h) Anthracene	780.46	0.01	ug/L	nd	0.02	yes	95	60	120	yes	ns	ns	ns	ns	yes
Indeno(1,2,3-cd) Pyrene	780.46	0.10	ug/L	nd	0.20	yes	99	60	120	yes	ns	ns	ns	ns	yes
Naphthalene	780.46	0.05	ug/L	0.08	0.10	yes	85	50	120	yes	ns	ns	ns	ns	yes
Phenanthrene	780.46	0.05	ug/L	nd	0.10	yes	92	60	120	yes	ns	ns	ns	ns	yes
Pyrene	780.46	0.05	ug/L	nd	0.10	yes	98	60	120	yes	ns	ns	ns	ns	yes
x-surrogate STD-Acenaphthylene-d8	780.46	na	%	na	na	na	81	50	130	yes	ns	ns	ns	ns	yes
x-surrogate STD-Anthracene-d10	780.46	na	%	na	na	na	85	60	130	yes	ns	ns	ns	ns	yes
x-surrogate STD-p-Terphenyl-d14	780.46	na	%	na	na	na	97	60	130	yes	ns	ns	ns	ns	yes
x-surrogate STD-Pyrene-d10	780.46	na	%	na	na	na	92	60	130	yes	ns	ns	ns	ns	yes

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TR = trace level less than LOQ

Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: October 3/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Water

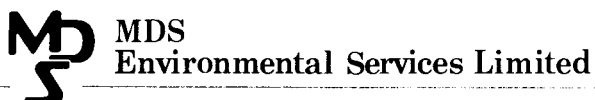
Client Ref#: 96-139

Parameter	LOQ	Units	780.46	780.46	790.5		
				Replicate			
Benzo(a) anthracene	0.01	ug/L	nd	nd	nd		
Benzo(a) Pyrene	0.01	ug/L	nd	nd	nd		
Benzo(b) Fluoranthene	0.01	ug/L	nd	nd	nd		
Benzo(k) Fluoranthene	0.01	ug/L	nd	nd	nd		
Dibenzo(a,h) Anthracene	0.01	ug/L	nd	nd	nd		
Indeno(1,2,3-cd) Pyrene	0.10	ug/L	nd	nd	nd		
Naphthalene	0.05	ug/L	0.07	0.06	0.08		
Phenanthrene	0.05	ug/L	nd	nd	nd		
Pyrene	0.05	ug/L	nd	nd	nd		
x-surrogate STD-Acenaphthylene-d8	na	%	86.8	80.1	82.8		
x-surrogate STD-Anthracene-d10	na	%	90.6	86.8	89.4		
x-surrogate STD-p-Terphenyl-d14	na	%	98.7	93.6	95.6		
x-surrogate STD-Pyrene-d10	na	%	94.7	92.4	93.6		

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence.

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nd = parameter not detected ! = LOQ higher than listed due to dilution () Adjusted LOQ



Client: Groundtrax Inc.
12 Loyalist Drive, Box 613
Brighton, ONT, CANADA
K0K 1H0

Date Submitted: September 18/96
Date Reported: September 26/96
MDS Ref#: 966350
MDS Quote#: 96L-274-JM

Fax: 613-475-4448

Client Ref#: 96-139
Sampled By: Tom

Attn: Tom McMullin

Certificate of Analysis

Analysis Performed: Extractable Hydrocarbon Analysis(C6-C32)


Methodology: 1) The characterization of HydroCarbon in
soil by GC analysis, following a solvent extraction.
U.S. EPA Method No.8011(microextraction)

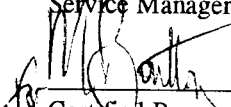
Instrumentation: 1) GC/FID/FID, Hewlett-PackardII GC, Dual injector, Dual FID, A/S

Sample Description: Soil

QA/QC: Refer to CERTIFICATE OF QUALITY CONTROL report.

Results: Refer to REPORT of ANALYSIS attached.



Certified By
Brad Newman
Service Manager

Certified By
T. Munshaw, M.Sc., C.Chem
Director, Laboratory Operations

Certificate of Quality Control

Client : Groundtrax Inc.
Contact: Tom McMullin

Date Reported: September 26/96
MDS Ref # : 966350
MDS Quote#: 96L-274-JM

Client Ref#: 96-139

Analysis of Soil, expressed on a dry weight basis

Parameter	SAMPLE ID (spike)	LOQ	Units	Process Blank			Process % Recovery			Matrix Spike				Overall		
				Result	Upper Limit	Accept	Result	Lower Limit	Upper Limit	Accept	Result	Target	Lower Limit	Upper Limit	Accept	QC Acceptable
Total Extractable Hydrocarbons(C6-C32)	TP-1-780.2	40.0	mg/kg	nd	200	yes	103	70	120	yes	1220	1200	720	1440	yes	yes
Total Extractable Hydrocarbons(C6-C32)	TP-19-796. 6	40.0	mg/kg	nd	200	yes	99	70	120	yes	1220	1200	720	1440	yes	yes

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence

* = Unavailable due to dilution required for analysis

na = Not Applicable

ns = Insufficient Sample Submitted

nd = parameter not detected

TR = trace level less than LOQ

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Client Ref#: 96-139

[illegible]

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence.
na = Not Applicable
nd = parameter not detected ! = LOQ higher than listed due to dilution () Adjusted LOQ

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Client Ref#: 96-139

[illegible]

Page 2 of 6

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Client Ref#: 96-139

[illegible]

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence.
na = Not Applicable
nd = parameter not detected ! = LOQ higher than listed due to dilution () Adjusted LOQ

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Client Ref#: 96-139

[illegible]

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence.
ED? = Contaminant elutes in the diesel range but does not match reference standard.
na = Not Applicable
nd = parameter not detected ! = LOQ higher than listed due to dilution () Adjusted LOQ

Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

[illegible]

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence.
na = Not Applicable
nd = parameter not detected ! = LOQ higher than listed due to dilution () Adjusted LOQ

Report of Analysis

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Client Ref#: 96-139

Parameter	LOQ	Units	TP-7-793.9 (G) 96/09/14	TP-8-793.8 96/09/14	TP-9-796.6		
Date Sampled >							
Resemblance	na	na	na	na	na		
Total Extractable Hydrocarbons(C6-C32)	40.0	mg/kg	nd	nd	nd		

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na = Not Applicable
nd = parameter not detected ! = LOQ higher than listed due to dilution () Adjusted LOQ

Client: Groundtrax Inc.
12 Loyalist Drive, Box 613
Brighton, ONT, CANADA
K0K 1H0

Fax: 613-475-4448

Attn: Tom McMullin

Date Submitted: September 18/96
Date Reported: October 1/96
MDS Ref#: 966350
MDS Quote#: 96L-274-JM

Client Ref#: 96-139
Sampled By: Tom

Certificate of Analysis

Analysis Performed: Polynuclear Aromatic Hydrocarbons(PAH's)


Methodology: 1) Determination of PAH's from soil by solvent extraction,
GPC and silica gel column cleanups and GC/MS analysis.
U.S. EPA SW-846 Method No. 8270
U.S. EPA SW-846 Method No. 3640
U.S. EPA SW-846 Method No. 3630

Instrumentation: 1) GC/MSD, Hewlett-Packard 5890II GC, 5971A MSD, Chemserver


Sample Description: Soil

QA/QC: Refer to CERTIFICATE OF QUALITY CONTROL report.

Results: Refer to REPORT of ANALYSIS attached.



Certified By
Brad Newman
Service Manager



Certified By
T. Munshaw, M.Sc., C.Chem
Director, Laboratory Operations

Certificate of Quality Control

Client : Groundtrax Inc.
Contact: Tom McMullin

Date Reported: October 1/96
MDS Ref # : 966350
MDS Quote#: 96L-274-JM

Client Ref#: 96-139

Analysis of Soil, expressed on a dry weight basis

Parameter	SAMPLE ID (spike)	LOQ	Units	Process Blank			Process % Recovery			Matrix Spike				Overall QC Acceptable		
				Result	Upper Limit	Accept	Result	Lower Limit	Upper Limit	Accept	Result	Target	Lower Limit		Upper Limit	
1-Chloronaphthalene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	91	50	130	yes	0.61	0.80	0.40	1.12	yes	yes
1-Methylnaphthalene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	86	50	130	yes	0.64	0.80	0.40	1.12	yes	yes
2-Chloronaphthalene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	90	50	130	yes	0.63	0.80	0.40	1.12	yes	yes
2-Methylnaphthalene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	93	50	130	yes	0.65	0.80	0.40	1.12	yes	yes
Acenaphthene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	83	50	130	yes	0.60	0.80	0.40	1.12	yes	yes
Acenaphthylene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	80	50	130	yes	0.59	0.80	0.40	1.12	yes	yes
Anthracene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	93	60	130	yes	0.64	0.80	0.50	1.12	yes	yes
Benzo(a) anthracene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	96	60	130	yes	0.74	0.80	0.50	1.12	yes	yes
Benzo(a) Pyrene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	95	60	130	yes	0.68	0.80	0.50	1.12	yes	yes
Benzo(b) Fluoranthene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	93	60	130	yes	0.68	0.80	0.50	1.12	yes	yes
Benzo(ghi) Perylene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	100	60	130	yes	0.69	0.80	0.50	1.12	yes	yes
Benzo(k) Fluoranthene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	96	60	130	yes	0.71	0.80	0.50	1.12	yes	yes
Chrysene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	92	60	130	yes	0.83	0.80	0.50	1.12	yes	yes
Dibenzo(a,h) Anthracene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	105	60	130	yes	0.74	0.80	0.50	1.12	yes	yes
Fluoranthene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	90	60	130	yes	0.68	0.80	0.50	1.12	yes	yes
Fluorene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	78	50	130	yes	0.56	0.80	0.40	1.12	yes	yes
Indeno(1,2,3-cd) Pyrene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	103	60	130	yes	0.75	0.80	0.50	1.12	yes	yes
Naphthalene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	87	50	130	yes	0.58	0.80	0.40	1.12	yes	yes
Perylene	TP-2-780.2	0.10	ug/g	nd	0.60	yes	95	60	130	yes	0.77	0.80	0.50	1.12	yes	yes
Phenanthrene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	86	60	130	yes	0.67	0.80	0.50	1.12	yes	yes

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence

* = Unavailable due to dilution required for analysis

na = Not Applicable

ns = Insufficient Sample Submitted

nd = parameter not detected

TR = trace level less than LOQ

Certificate of Quality Control

Client : Groundtrax Inc.
Contact: Tom McMullin

Date Reported: October 1/96
MDS Ref # : 966350
MDS Quote#: 96L-274-JM

Client Ref#: 96-139

Analysis of Soil, expressed on a dry weight basis

Parameter	SAMPLE ID (spike)	LOQ	Units	Process Blank			Process % Recovery				Matrix Spike				Overall			
				Result	Upper		Accept	Result	Lower		Upper	Limit	Accept	Target	Lower		Upper	QC
					Limit	Limit			Limit	Limit					Limit	Limit		
Pyrene	TP-2-780.2	0.10	ug/g	nd	0.50	yes	85	60	130	yes	0.72	0.80	0.50	1.12	yes	yes		
x-surrogate STD-Acenaphthylene-d8	na	na	%	na	na	na	78	50	130	yes	na	na	na	na	na	yes		
x-surrogate STD-Anthracene-d10	na	na	%	na	na	na	93	60	130	yes	na	na	na	na	na	yes		
x-surrogate STD-p-Terphenyl-d14	na	na	%	na	na	na	95	60	130	yes	na	na	na	na	na	yes		
x-surrogate STD-Pyrene-d10	na	na	%	na	na	na	88	60	130	yes	na	na	na	na	na	yes		

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Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: October 1/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	TP-10-793. 9(G) 96/09/14	TP-11-793. 8 96/09/14	TP-2-780.2 96/09/14	TP-2-780.2 Replicate	TP-2-793.8 96/09/14
Date Sampled >							
1-Chloronaphthalene	0.10	ug/g	nd	nd	nd	nd	nd
1-Methylnaphthalene	0.10	ug/g	nd	nd	nd	nd	nd
2-Chloronaphthalene	0.10	ug/g	nd	nd	nd	nd	nd
2-Methylnaphthalene	0.10	ug/g	nd	nd	nd	nd	nd
Acenaphthene	0.10	ug/g	nd	nd	nd	nd	nd
Acenaphthylene	0.10	ug/g	nd	nd	nd	nd	nd
Anthracene	0.10	ug/g	nd	nd	nd	nd	nd
Benzo(a) anthracene	0.10	ug/g	nd	nd	nd	nd	nd
Benzo(a) Pyrene	0.10	ug/g	nd	nd	nd	nd	nd
Benzo(b) Fluoranthene	0.10	ug/g	nd	nd	nd	nd	nd
Benzo(ghi) Perylene	0.10	ug/g	nd	nd	nd	nd	nd
Benzo(k) Fluoranthene	0.10	ug/g	nd	nd	nd	nd	nd
Chrysene	0.10	ug/g	nd	nd	nd	nd	nd
Dibenzo(a,h) Anthracene	0.10	ug/g	nd	nd	nd	nd	nd
Fluoranthene	0.10	ug/g	nd	nd	nd	nd	nd
Fluorene	0.10	ug/g	nd	nd	nd	nd	nd
Indeno(1,2,3-cd) Pyrene	0.10	ug/g	nd	nd	nd	nd	nd
Naphthalene	0.10	ug/g	nd	nd	nd	nd	nd
Perylene	0.10	ug/g	nd	nd	nd	nd	nd
Phenanthrene	0.10	ug/g	nd	nd	nd	nd	nd
Pyrene	0.10	ug/g	nd	nd	nd	nd	nd
x-surrogate STD-Acenaphthylene-d8	na	%	79.5	83.4	85.7	80.9	85.6
x-surrogate STD-Anthracene-d10	na	%	89.4	95.4	96.6	92.1	99.8
x-surrogate STD-p-Terphenyl-d14	na	%	90.5	92.3	95.1	95.8	96.1
x-surrogate STD-Pyrene-d10	na	%	81.9	83.9	83.3	87.6	87.2

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Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: October 1/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	TP-3-777	TP-3-793.9 (G) 96/09/12	TP-4-780.2 96/09/14	TP-4-793.8 96/09/14	TP-5-790.5 96/09/14
1-Chloronaphthalene	0.10	ug/g	nd	nd	nd	nd	nd
1-Methylnaphthalene	0.10	ug/g	nd	nd	nd	nd	nd
2-Chloronaphthalene	0.10	ug/g	nd	nd	nd	nd	nd
2-Methylnaphthalene	0.10	ug/g	nd	nd	nd	nd	nd
Acenaphthene	0.10	ug/g	nd	nd	nd	nd	nd
Acenaphthylene	0.10	ug/g	nd	nd	nd	nd	nd
Anthracene	0.10	ug/g	nd	nd	nd	nd	nd
Benzo(a) anthracene	0.10	ug/g	nd	nd	nd	nd	nd
Benzo(a) Pyrene	0.10	ug/g	nd	nd	nd	nd	nd
Benzo(b) Fluoranthene	0.10	ug/g	nd	nd	nd	nd	nd
Benzo(ghi) Perylene	0.10	ug/g	nd	nd	nd	nd	nd
Benzo(k) Fluoranthene	0.10	ug/g	nd	nd	nd	nd	nd
Chrysene	0.10	ug/g	nd	nd	nd	nd	nd
Dibenzo(a,h) Anthracene	0.10	ug/g	nd	nd	nd	nd	nd
Fluoranthene	0.10	ug/g	nd	nd	nd	nd	nd
Fluorene	0.10	ug/g	nd	nd	nd	nd	nd
Indeno(1,2,3-cd) Pyrene	0.10	ug/g	nd	nd	nd	nd	nd
Naphthalene	0.10	ug/g	nd	nd	nd	nd	nd
Perylene	0.10	ug/g	nd	nd	nd	nd	nd
Phenanthrene	0.10	ug/g	nd	nd	nd	nd	nd
Pyrene	0.10	ug/g	nd	nd	nd	nd	nd
x-surrogate STD-Acenaphthylene-d8	na	%	80.0	65.4	81.1	78.0	81.0
x-surrogate STD-Anthracene-d10	na	%	94.0	89.8	94.0	91.5	98.8
x-surrogate STD-p-Terphenyl-d14	na	%	93.9	92.6	96.7	94.8	95.1
x-surrogate STD-Pyrene-d10	na	%	86.0	81.6	83.4	82.3	83.3

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Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: October 1/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	TP-6-790.5	TP-6-796.6	TP-7-793.8	TP-8-793.8	
Date Sampled >			96/09/14		96/09/14	96/09/14	
1-Chloronaphthalene	0.10	ug/g	nd	nd	nd	nd	
1-Methylnaphthalene	0.10	ug/g	nd	nd	nd	nd	
2-Chloronaphthalene	0.10	ug/g	nd	nd	nd	nd	
2-Methylnaphthalene	0.10	ug/g	nd	nd	nd	nd	
Acenaphthene	0.10	ug/g	nd	nd	nd	nd	
Acenaphthylene	0.10	ug/g	nd	nd	nd	nd	
Anthracene	0.10	ug/g	nd	nd	nd	nd	
Benzo(a) anthracene	0.10	ug/g	nd	nd	nd	nd	
Benzo(a) Pyrene	0.10	ug/g	nd	nd	nd	nd	
Benzo(b) Fluoranthene	0.10	ug/g	nd	nd	nd	nd	
Benzo(ghi) Perylene	0.10	ug/g	nd	nd	nd	nd	
Benzo(k) Fluoranthene	0.10	ug/g	nd	nd	nd	nd	
Chrysene	0.10	ug/g	nd	nd	nd	nd	
Dibenzo(a,h) Anthracene	0.10	ug/g	nd	nd	nd	nd	
Fluoranthene	0.10	ug/g	nd	nd	nd	nd	
Fluorene	0.10	ug/g	nd	nd	nd	nd	
Indeno(1,2,3-cd) Pyrene	0.10	ug/g	nd	nd	nd	nd	
Naphthalene	0.10	ug/g	nd	nd	nd	nd	
Perylene	0.10	ug/g	nd	nd	nd	nd	
Phenanthrene	0.10	ug/g	nd	nd	nd	nd	
Pyrene	0.10	ug/g	nd	nd	nd	nd	
x-surrogate STD-Acenaphthylene-d8	na	%	83.8	72.6	84.4	67.7	
x-surrogate STD-Anthracene-d10	na	%	96.1	88.0	94.3	89.8	
x-surrogate STD-p-Terphenyl-d14	na	%	96.3	89.5	93.2	92.2	
x-surrogate STD-Pyrene-d10	na	%	83.6	83.1	80.5	82.2	

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MDS
Environmental Services Limited

Client: Groundtrax Inc.
12 Loyalist Drive, Box 613
Brighton, ONT, CANADA
K0K 1H0

Fax: 613-475-4448

Attn: Tom McMullin

Date Submitted: September 18/96
Date Reported: September 26/96
MDS Ref#: 966350
MDS Quote#: 96L-274-JM

Client Ref#: 96-139
Sampled By: Tom

Certificate of Analysis

Analysis Performed: Lithium, Flame AA, Digestion Required
Arsenic and Selenium by Graphite Furnace
Antimony, Graphite Furnace
Thallium, Graphite Furnace, Digestion Required
18 element ICP Scan, Digestion Required
ICP #4(U,W,Th)
Silica by ICP, Digestion Required
Total Phenolics, Autoanalyzer, Distillation Required
Moisture Content
Acetic Acid Extraction(For Inorganics)

Methodology:

- 1) Analysis of lithium in soil by Flame Emission Spectrophotometry.
U.S. EPA Method No. 7000
- 2) Arsenic and Selenium analysis in soil by Graphite Furnace Atomic Absorption Spectroscopy.
U.S. EPA Method No. 7060
U.S. EPA Method No. 7740
- 3) Analysis of antimony in soils by Graphite Furnace Atomic Absorption Spectroscopy.
U.S. EPA Method No. 7041



Client: Groundtrax Inc.
12 Loyalist Drive, Box 613
Brighton, ONT, CANADA
K0K 1H0

Fax: 613-475-4448

Attn: Tom McMullin

Date Submitted: September 18/96
Date Reported: September 26/96
MDS Ref#: 966350
MDS Quote#: 96L-274-JM

Client Ref#: 96-139
Sampled By: Tom

Certificate of Analysis

Methodology: (Cont'd)

- 4) Analysis of thallium in soil by Graphite Furnace Atomic Absorption.
U.S. EPA Method No. 7841
- 5) Analysis of trace metals in soil by Inductively Coupled Plasma Spectrophotometry.
U.S. EPA Method No. 6010
(Ministry of Environment ELSCAN)
- 6) Analysis of trace metals(extended scan #4) in soil by Inductively Coupled Plasma Spectrophotometry.
U.S. EPA Method No. 6010
(Ministry of Environment ELSCAN)
- 7) Analysis of silicon in solids by ICPAES and conversion to silica.
Standard Methods(1985)425A(Modification)
- 8) Analysis of total phenolics in soil by colourimetry in a continuous liquid flow.
U.S. EPA Method No. 420.2
Std Method(17th ed.) 5530B(Modification)
Refer - Method No. 1102002 Issue 101290



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K0K 1H0

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Certificate of Analysis

Methodology: (Cont'd)

- 9) Determination of the moisture content of soil by weight.
ASTM Method No. D2216-80
- 10) Acetic Acid leach of solids.
Environmental Protection Act, Reg. 347
(Ref-Canadian General Stds 164-GP-1MP)

Instrumentation:

- 1) Thermo Jarrell Ash Smith-Hieftje 22 Atomic Absorption Spectrometer
- 2, 3, 4) Thermo Jarrell Ash Smith-Hieftje 22 AA / CTF 188 Atomizer
- 5, 6, 7) Thermo Jarrell Ash ICAP 61E Plasma Spectrophotometer
- 8) Technicon Autoanalyzer
- 9) Precision Mechanical Convention Oven/Sartorius Basic Balance
- 10) Rotorack at 10 RPM/Filtration Apparatus

Sample Description:

Soil

QA/QC:

Refer to CERTIFICATE OF QUALITY CONTROL report.

Results:

Refer to REPORT of ANALYSIS attached.

Certified By
Brad Newman
Service Manager

Certified By
T. Munshaw, M.Sc., C.Chem
Director, Laboratory Operations

Certificate of Quality Control

Client : Groundtrax Inc.
Contact: Tom McMullin

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Analysis of Soil, expressed on a dry weight basis

Parameter	SAMPLE ID (spike)	LOQ	Units	Process Blank			Process % Recovery			Matrix Spike				Overall QC Acceptable
				Result	Upper Limit	Accept	Result	Lower Limit	Upper Limit	Result	Target	Lower Limit	Upper Limit	
Lithium	na	0.5	mg/kg	nd(b)	1.0	yes	95	90	110	yes	na	na	na	yes
Arsenic	TP-1-780.2	2.0	mg/kg	nd(b)	4.0	yes	105	70	120	yes	12.1	6.0	14.0	yes
Selenium	TP-1-780.2	1.0	mg/kg	nd(b)	2.0	yes	105	70	120	yes	11.1	6.0	14.0	yes
Antimony	TP-1-780.2	2.0	mg/kg	nd(b)	4.0	yes	101	80	120	yes	12.8	6.0	14.0	yes
Thallium	TP-1-780.2	0.1	mg/kg	nd(b)	0.4	yes	100	80	120	yes	12.4	6.0	14.0	yes
Aluminium	TP-1-780.2	1.0	mg/kg	nd(b)	4.0	yes	106	80	120	yes	*	*	*	yes
Barium	na	0.2	mg/kg	nd(b)	0.6	yes	105	80	120	yes	na	na	na	yes
Beryllium	TP-1-780.2	0.5	mg/kg	nd(b)	1.5	yes	108	80	120	yes	315	100.0	450.0	yes
Bismuth	TP-1-780.2	2.5	mg/kg	nd(b)	7.5	yes	107	80	120	yes	310	150.0	350.0	yes
Boron	na	0.5	mg/kg	nd(b)	4.0	yes	103	80	120	yes	na	na	na	yes
Cadmium	na	0.5	mg/kg	nd(b)	2.0	yes	108	80	120	yes	na	na	na	yes
Chromium	TP-1-780.2	0.3	mg/kg	nd(b)	0.9	yes	108	80	120	yes	322	150.0	350.0	yes
Cobalt	TP-1-780.2	0.3	mg/kg	nd(b)	0.9	yes	108	80	120	yes	316	150.0	350.0	yes
Copper	TP-1-780.2	0.2	mg/kg	nd(b)	0.8	yes	104	80	120	yes	320	150.0	350.0	yes
Iron	TP-1-780.2	0.3	mg/kg	nd(b)	1.2	yes	105	80	120	yes	*	*	*	yes
Lead	TP-1-780.2	1.0	mg/kg	nd(b)	4.0	yes	109	80	120	yes	317	150.0	350.0	yes
Manganese	TP-1-780.2	0.3	mg/kg	nd(b)	0.9	yes	107	80	120	yes	331	100.0	450.0	yes
Molybdenum	TP-1-780.2	0.5	mg/kg	nd(b)	1.5	yes	108	80	120	yes	321	150.0	350.0	yes
Nickel	TP-1-780.2	0.5	mg/kg	nd(b)	1.5	yes	108	80	120	yes	314	150.0	350.0	yes
Silver	na	0.5	mg/kg	nd(b)	1.5	yes	95	80	120	yes	na	na	na	yes

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(b) = Analyte results on REPORT of ANALYSIS have been background corrected for the process blank.

Certificate of Quality Control

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Date Reported: September 26/96
MDS Ref # : 966350
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Client Ref#: 96-139

Analysis of Soil, expressed on a dry weight basis

Parameter	SAMPLE ID (spike)	LOQ	Units	Process Blank			Process % Recovery				Matrix Spike				Overall QC Acceptable		
				Result	Upper		Accept	Result	Lower		Upper Limit	Accept	Result	Lower		Upper Limit	
					Limit				Limit					Limit			
Tin	TP-1-780.2	2.5	mg/kg	nd(b)	7.5	yes	105	80	120	yes	291	150.0	350.0	yes	yes		
Vanadium	TP-1-780.2	0.5	mg/kg	nd(b)	1.5	yes	105	80	120	yes	325	250.0	350.0	yes	yes		
Zinc	TP-1-780.2	0.3	mg/kg	nd(b)	1.2	yes	108	80	120	yes	306	250.0	350.0	yes	yes		
Uranium	na	5.0	mg/kg	nd(b)	10.0	yes	100	90	110	yes	na	na	na	na	yes		
Silica(as SiO2)	na	1.0	mg/kg	nd(b)	2.0	yes	99	80	120	yes	na	na	na	na	yes		
Phenols	na	0.05	mg/kg	nd	0.10	yes	na	na	na	na	na	na	na	na	yes		

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MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	Field Bln k 793.9	Field Bln k 796.6	TP-1-777	TP-1-780.2 96/09/14	TP-1-780.2 Replicate
Lithium	0.5	mg/kg	-	-	4.1	5.7	5.7
Antimony	2.0	mg/kg	-	-	nd	nd	nd
Arsenic	2.0	mg/kg	-	-	nd	nd	nd
Selenium	1.0	mg/kg	-	-	nd	nd	nd
Thallium	0.1	mg/kg	-	-	nd	nd	nd
Aluminum	1.0	mg/kg	-	-	6080	7130	6780
Barium	0.2	mg/kg	-	-	127	118	111
Beryllium	0.5	mg/kg	-	-	nd	nd	nd
Bismuth	2.5	mg/kg	-	-	nd	nd	nd
Boron	0.5	mg/kg	-	-	nd	nd	nd
Cadmium	0.5	mg/kg	-	-	nd	nd	nd
Chromium	0.3	mg/kg	-	-	21.3	14.3	12.7
Cobalt	0.3	mg/kg	-	-	5.9	6.5	6.0
Copper	0.2	mg/kg	-	-	19.8	26.9	24.7
Iron	0.3	mg/kg	-	-	13600	15300	14500
Lead	1.0	mg/kg	-	-	nd	nd	nd
Manganese	0.3	mg/kg	-	-	262	305	290
Molybdenum	0.5	mg/kg	-	-	nd	nd	nd
Nickel	0.5	mg/kg	-	-	29.4	29.5	24.6
Silica(as SiO ₂)	1.0	mg/kg	-	-	313	167	178
Silver	0.5	mg/kg	-	-	nd	nd	nd
Thorium	2.5	mg/kg	-	-	na	na	na
Tin	2.5	mg/kg	-	-	nd	nd	nd
Tungsten	2.5	mg/kg	-	-	na	na	na
Uranium	5.0	mg/kg	-	-	nd	nd	nd
Vanadium	0.5	mg/kg	-	-	26.4	28.0	25.9
Zinc	0.3	mg/kg	-	-	30.1	46.7	32.7

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- = Not Requested

na = Not Applicable

nd = parameter not detected ! = LOQ higher than listed due to dilution () Adjusted LOQ

Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	TP-1-780.4 6 96/09/13	TP-1-790.5 96/09/14	TP-1-793.9 (G) 96/09/12	TP-10-793. 8 96/09/14	TP-10-793. 9(G) 96/09/14
Date Sampled >							
Lithium	0.5	mg/kg	5.5	5.4	3.5	-	-
Antimony	2.0	mg/kg	nd	nd	nd	-	-
Arsenic	2.0	mg/kg	2.4	2.6	nd	-	-
Selenium	1.0	mg/kg	nd	nd	nd	-	-
Thallium	0.1	mg/kg	nd	nd	nd	-	-
Aluminum	1.0	mg/kg	7110	7120	6160	-	-
Barium	0.2	mg/kg	95.0	87.3	121	-	-
Beryllium	0.5	mg/kg	nd	nd	nd	-	-
Bismuth	2.5	mg/kg	nd	nd	nd	-	-
Boron	0.5	mg/kg	nd	nd	nd	-	-
Cadmium	0.5	mg/kg	nd	nd	nd	-	-
Chromium	0.3	mg/kg	17.1	20.2	23.3	-	-
Cobalt	0.3	mg/kg	7.2	7.6	6.2	-	-
Copper	0.2	mg/kg	29.0	29.0	13.9	-	-
Iron	0.3	mg/kg	17000	15900	13800	-	-
Lead	1.0	mg/kg	nd	nd	nd	-	-
Manganese	0.3	mg/kg	363	348	302	-	-
Molybdenum	0.5	mg/kg	0.7	1.1	nd	-	-
Nickel	0.5	mg/kg	31.1	34.2	33.7	-	-
Silica(as SiO2)	1.0	mg/kg	295	194	302	-	-
Silver	0.5	mg/kg	nd	nd	nd	-	-
Thorium	2.5	mg/kg	na	na	na	-	-
Tin	2.5	mg/kg	nd	nd	nd	-	-
Tungsten	2.5	mg/kg	na	na	na	-	-
Uranium	5.0	mg/kg	nd	nd	nd	-	-
Vanadium	0.5	mg/kg	27.0	26.0	23.9	-	-
Zinc	0.3	mg/kg	81.8	35.0	28.3	-	-

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Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Client Ref#: 96-139

[illegible]

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence.
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Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	TP-11-793. 8 96/09/14	TP-12-793. 8 96/09/14	TP-13-793. 9(G) 96/09/14	TP-15-793. 9(G) 96/09/14	TP-18-793. 9
Date Sampled >							
Lithium	0.5	mg/kg	-	-	-	7.1	-
Antimony	2.0	mg/kg	-	-	-	nd	-
Arsenic	2.0	mg/kg	-	-	-	3.0	-
Selenium	1.0	mg/kg	-	-	-	nd	-
Thallium	0.1	mg/kg	-	-	-	nd	-
Aluminum	1.0	mg/kg	-	-	-	9340	-
Barium	0.2	mg/kg	-	-	-	154	-
Beryllium	0.5	mg/kg	-	-	-	nd	-
Bismuth	2.5	mg/kg	-	-	-	nd	-
Boron	0.5	mg/kg	-	-	-	nd	-
Cadmium	0.5	mg/kg	-	-	-	nd	-
Chromium	0.3	mg/kg	-	-	-	27.3	-
Cobalt	0.3	mg/kg	-	-	-	8.8	-
Copper	0.2	mg/kg	-	-	-	29.4	-
Iron	0.3	mg/kg	-	-	-	18600	-
Lead	1.0	mg/kg	-	-	-	nd	-
Manganese	0.3	mg/kg	-	-	-	404	-
Molybdenum	0.5	mg/kg	-	-	-	nd	-
Nickel	0.5	mg/kg	-	-	-	41.1	-
Silica(as SiO ₂)	1.0	mg/kg	-	-	-	395	-
Silver	0.5	mg/kg	-	-	-	nd	-
Thorium	2.5	mg/kg	-	-	-	na	-
Tin	2.5	mg/kg	-	-	-	nd	-
Tungsten	2.5	mg/kg	-	-	-	na	-
Uranium	5.0	mg/kg	-	-	-	nd	-
Vanadium	0.5	mg/kg	-	-	-	34.0	-
Zinc	0.3	mg/kg	-	-	-	41.5	-

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Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

[illegible]

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence.
- = Not Requested

Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	TP-19-796. 6	TP-2-780.2 96/09/14	TP-2-780.2 Replicate	TP-2-780.4 6 96/09/13	TP-2-793.8 96/09/14
Lithium	0.5	mg/kg	-	-	-	-	5.6
Antimony	2.0	mg/kg	-	-	-	-	nd
Arsenic	2.0	mg/kg	-	-	-	-	2.7
Selenium	1.0	mg/kg	-	-	-	-	nd
Thallium	0.1	mg/kg	-	-	-	-	nd
Aluminum	1.0	mg/kg	-	-	-	-	837 #
Barium	0.2	mg/kg	-	-	-	-	127
Beryllium	0.5	mg/kg	-	-	-	-	nd
Bismuth	2.5	mg/kg	-	-	-	-	nd
Boron	0.5	mg/kg	-	-	-	-	nd
Cadmium	0.5	mg/kg	-	-	-	-	nd
Chromium	0.3	mg/kg	-	-	-	-	25.3
Cobalt	0.3	mg/kg	-	-	-	-	8.7
Copper	0.2	mg/kg	-	-	-	-	25.9
Iron	0.3	mg/kg	-	-	-	-	1760
Lead	1.0	mg/kg	-	-	-	-	nd
Manganese	0.3	mg/kg	-	-	-	-	412
Molybdenum	0.5	mg/kg	-	-	-	-	0.8
Nickel	0.5	mg/kg	-	-	-	-	43.4
Silica(as SiO2)	1.0	mg/kg	-	-	-	-	319
Silver	0.5	mg/kg	-	-	-	-	nd
Thorium	2.5	mg/kg	-	-	-	-	na
Tin	2.5	mg/kg	-	-	-	-	nd
Tungsten	2.5	mg/kg	-	-	-	-	na
Uranium	5.0	mg/kg	-	-	-	-	nd
Vanadium	0.5	mg/kg	-	-	-	-	29.4
Zinc	0.3	mg/kg	-	-	-	-	53.5

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Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Client Ref#: 96-139

Parameter	LOQ	Units	TP-19-796. 6	TP-2-780.2 96/09/14	TP-2-780.2 Replicate	TP-2-780.4 6 96/09/13	TP-2-793.8 96/09/14
Phenols	0.05	mg/kg	-	-	-	0.09	0.12
Moisture Content	0.01	%	11.4	2.65	-	3.73	5.57
Final pH(following Acetic Leach)	0.01	Units	-	5.36	na	-	-
Initial pH(previous to Acetic Leach)	0.01	Units	-	8.06	na	-	-
Volume of Acetic Acid Used	0.01	ml	-	6.70	na	-	-

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Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	TP-3-777	TP-3-780.2 96/09/14	TP-3-780.4 6 96/09/13	TP-3-790.5 96/09/14	TP-3-793.9 (G) 96/09/12
Lithium	0.5	mg/kg	-	-	-	15.8	-
Antimony	2.0	mg/kg	-	-	-	nd	-
Arsenic	2.0	mg/kg	-	-	-	2.8	-
Selenium	1.0	mg/kg	-	-	-	nd	-
Thallium	0.1	mg/kg	-	-	-	nd	-
Aluminum	1.0	mg/kg	-	-	-	9650	-
Barium	0.2	mg/kg	-	-	-	265	-
Beryllium	0.5	mg/kg	-	-	-	nd	-
Bismuth	2.5	mg/kg	-	-	-	nd	-
Boron	0.5	mg/kg	-	-	-	nd	-
Cadmium	0.5	mg/kg	-	-	-	nd	-
Chromium	0.3	mg/kg	-	-	-	26.4	-
Cobalt	0.3	mg/kg	-	-	-	9.4	-
Copper	0.2	mg/kg	-	-	-	37.1	-
Iron	0.3	mg/kg	-	-	-	—	-
Lead	1.0	mg/kg	-	-	-	nd	-
Manganese	0.3	mg/kg	-	-	-	419	-
Molybdenum	0.5	mg/kg	-	-	-	nd	-
Nickel	0.5	mg/kg	-	-	-	43.2	-
Silica(as SiO2)	1.0	mg/kg	-	-	-	321	-
Silver	0.5	mg/kg	-	-	-	nd	-
Thorium	2.5	mg/kg	-	-	-	na	-
Tin	2.5	mg/kg	-	-	-	nd	-
Tungsten	2.5	mg/kg	-	-	-	na	-
Uranium	5.0	mg/kg	-	-	-	nd	-
Vanadium	0.5	mg/kg	-	-	-	33.0	-
Zinc	0.3	mg/kg	-	-	-	70.1	-

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Report of Analysis

Report Date: September 26/96
MDS Ref # : 966350
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Client Ref#: 96-139

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MDS Environmental Services Limited.

Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	TP-3-796.6	TP-4-780.2	TP-4-780.4 6	TP-4-793.8	TP-4-793.9 (G)
				96/09/14	96/09/13	96/09/14	96/09/14
Lithium	0.5	mg/kg	16.5	-	-	-	6.2
Antimony	2.0	mg/kg	nd	-	-	-	nd
Arsenic	2.0	mg/kg	7.6	-	-	-	3.4
Selenium	1.0	mg/kg	nd	-	-	-	nd
Thallium	0.1	mg/kg	0.1	-	-	-	nd
Aluminum	1.0	mg/kg	-	-	-	-	-
Barium	0.2	mg/kg	379	-	-	-	97.2
Beryllium	0.5	mg/kg	nd	-	-	-	nd
Bismuth	2.5	mg/kg	nd	-	-	-	nd
Boron	0.5	mg/kg	nd	-	-	-	nd
Cadmium	0.5	mg/kg	nd	-	-	-	nd
Chromium	0.3	mg/kg	74.7	-	-	-	15.4
Cobalt	0.3	mg/kg	25.3	-	-	-	8.0
Copper	0.2	mg/kg	83.0	-	-	-	41.9
Iron	0.3	mg/kg	-	-	-	-	-
Lead	1.0	mg/kg	nd	-	-	-	nd
Manganese	0.3	mg/kg	1350	-	-	-	342
Molybdenum	0.5	mg/kg	1.4	-	-	-	1.2
Nickel	0.5	mg/kg	127	-	-	-	29.4
Silica(as SiO2)	1.0	mg/kg	23.8	-	-	-	142
Silver	0.5	mg/kg	nd	-	-	-	nd
Thorium	2.5	mg/kg	na	-	-	-	na
Tin	2.5	mg/kg	nd	-	-	-	nd
Tungsten	2.5	mg/kg	na	-	-	-	na
Uranium	5.0	mg/kg	nd	-	-	-	nd
Vanadium	0.5	mg/kg	75.0	-	-	-	31.3
Zinc	0.3	mg/kg	116	-	-	-	40.5

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Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

[illegible]

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Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	TP-5-790.5 96/09/14	TP-5-793.8 96/09/14	TP-5-793.9 (G) 96/09/14	TP-6-790.5 96/09/14	TP-6-793.9 (G) 96/09/14
Date Sampled >							
Lithium	0.5	mg/kg	-	7.6	-	-	-
Antimony	2.0	mg/kg	-	nd	-	-	-
Arsenic	2.0	mg/kg	-	3.2	-	-	-
Selenium	1.0	mg/kg	-	nd	-	-	-
Thallium	0.1	mg/kg	-	nd	-	-	-
Aluminum	1.0	mg/kg	-	-	-	-	-
Barium	0.2	mg/kg	-	202	-	-	-
Beryllium	0.5	mg/kg	-	nd	-	-	-
Bismuth	2.5	mg/kg	-	nd	-	-	-
Boron	0.5	mg/kg	-	nd	-	-	-
Cadmium	0.5	mg/kg	-	nd	-	-	-
Chromium	0.3	mg/kg	-	36.0	-	-	-
Cobalt	0.3	mg/kg	-	10.3	-	-	-
Copper	0.2	mg/kg	-	35.4	-	-	-
Iron	0.3	mg/kg	-	-	-	-	-
Lead	1.0	mg/kg	-	nd	-	-	-
Manganese	0.3	mg/kg	-	484	-	-	-
Molybdenum	0.5	mg/kg	-	0.7	-	-	-
Nickel	0.5	mg/kg	-	48.8	-	-	-
Silica(as SiO2)	1.0	mg/kg	-	351	-	-	-
Silver	0.5	mg/kg	-	nd	-	-	-
Thorium	2.5	mg/kg	-	na	-	-	-
Tin	2.5	mg/kg	-	nd	-	-	-
Tungsten	2.5	mg/kg	-	na	-	-	-
Uranium	5.0	mg/kg	-	nd	-	-	-
Vanadium	0.5	mg/kg	-	39.1	-	-	-
Zinc	0.3	mg/kg	-	53.4	-	-	-

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Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	TP-6-793.9 (G) Replicate	TP-6-796.6	TP-7-793.8 96/09/14	TP-7-793.8 Replicate	TP-7-793.9 (G) 96/09/14
Lithium	0.5	mg/kg	-	-	-	-	-
Antimony	2.0	mg/kg	-	-	-	-	-
Arsenic	2.0	mg/kg	-	-	-	-	-
Selenium	1.0	mg/kg	-	-	-	-	-
Thallium	0.1	mg/kg	-	-	-	-	-
Aluminum	1.0	mg/kg	-	-	-	-	-
Barium	0.2	mg/kg	-	-	-	-	-
Beryllium	0.5	mg/kg	-	-	-	-	-
Bismuth	2.5	mg/kg	-	-	-	-	-
Boron	0.5	mg/kg	-	-	-	-	-
Cadmium	0.5	mg/kg	-	-	-	-	-
Chromium	0.3	mg/kg	-	-	-	-	-
Cobalt	0.3	mg/kg	-	-	-	-	-
Copper	0.2	mg/kg	-	-	-	-	-
Iron	0.3	mg/kg	-	-	-	-	-
Lead	1.0	mg/kg	-	-	-	-	-
Manganese	0.3	mg/kg	-	-	-	-	-
Molybdenum	0.5	mg/kg	-	-	-	-	-
Nickel	0.5	mg/kg	-	-	-	-	-
Silica(as SiO2)	1.0	mg/kg	-	-	-	-	-
Silver	0.5	mg/kg	-	-	-	-	-
Thorium	2.5	mg/kg	-	-	-	-	-
Tin	2.5	mg/kg	-	-	-	-	-
Tungsten	2.5	mg/kg	-	-	-	-	-
Uranium	5.0	mg/kg	-	-	-	-	-
Vanadium	0.5	mg/kg	-	-	-	-	-
Zinc	0.3	mg/kg	-	-	-	-	-

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence.

- = Not Requested

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Client Ref#: 96-139

[illegible]

- = Not Requested

MDS Environmental Services Limited.

Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	TP-8-793.8 96/09/14	TP-9-796.6			
Date Sampled >							
Lithium	0.5	mg/kg	-	-			
Antimony	2.0	mg/kg	-	-			
Arsenic	2.0	mg/kg	-	-			
Selenium	1.0	mg/kg	-	-			
Thallium	0.1	mg/kg	-	-			
Aluminum	1.0	mg/kg	-	-			
Barium	0.2	mg/kg	-	-			
Beryllium	0.5	mg/kg	-	-			
Bismuth	2.5	mg/kg	-	-			
Boron	0.5	mg/kg	-	-			
Cadmium	0.5	mg/kg	-	-			
Chromium	0.3	mg/kg	-	-			
Cobalt	0.3	mg/kg	-	-			
Copper	0.2	mg/kg	-	-			
Iron	0.3	mg/kg	-	-			
Lead	1.0	mg/kg	-	-			
Manganese	0.3	mg/kg	-	-			
Molybdenum	0.5	mg/kg	-	-			
Nickel	0.5	mg/kg	-	-			
Silica(as SiO2)	1.0	mg/kg	-	-			
Silver	0.5	mg/kg	-	-			
Thorium	2.5	mg/kg	-	-			
Tin	2.5	mg/kg	-	-			
Tungsten	2.5	mg/kg	-	-			
Uranium	5.0	mg/kg	-	-			
Vanadium	0.5	mg/kg	-	-			
Zinc	0.3	mg/kg	-	-			

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Report of Analysis

Report Date: September 26/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Client Ref#: 96-139

[illegible]

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Client: Groundtrax Inc.
12 Loyalist Drive, Box 613
Brighton, ONT, CANADA
K0K 1H0

Date Submitted: September 18/96
Date Reported: September 30/96
MDS Ref#: 966350
MDS Quote#: 96L-274-JM

Fax: 613-475-4448

Client Ref#: 96-139

Attn: Tom McMullin

Sampled By: Tom

Certificate of Analysis

Analysis Performed: EPA608 Priority Pollutant pesticides/PCB
Moisture Content

Methodology: 1) Determination of EPA-608 Pesticides/PCBs by solvent
extraction, dry over Na₂SO₄, Florisil cleanup, GC-ECD
with confirmation on GC-ITD.
U.S. EPA Method No. 3510/3620/8080A/608
EPLSOP PST-08-WT
Method 1618 Revision A, July 1989
2) Determination of the moisture content of soil by weight.
ASTM Method No. D2216-80

Instrumentation: 1) Hewlett-PackardII GC, Dual ECD, NPD/Varian 3400, GC-ITD
2) Precision Mechanical Convention Oven/Sartorius Basic Balance

Sample Description: Soil

QA/QC: Refer to CERTIFICATE OF QUALITY CONTROL report.

Results: Refer to REPORT of ANALYSIS attached.

Certified By
Brad Newman
Service Manager

Certified By
T. Munshaw, M.Sc., C.Chem
Director, Laboratory Operations

Certificate of Quality Control

Client : Groundtrax Inc.
Contact: Tom McMullin

Date Reported: September 30/96
MDS Ref # : 966350
MDS Quote#: 96L-274-JM

Client Ref#: 96-139

Analysis of Soil, expressed on a dry weight basis

Parameter	SAMPLE ID (spike)	LOQ	Units	Process Blank			Process % Recovery				Matrix Spike				Overall QC Acceptable
				Result	Upper Limit	Accept	Result	Lower Limit	Upper Limit	Accept	Result	Target	Lower Limit	Upper Limit	
4,4'-DDD	TP-2-780.2	0.60	ng/g	nd	3.0	yes	98	50	120	yes	48.2	50.06	25.03	75.08	yes
4,4'-DDE	TP-2-780.2	0.60	ng/g	nd	3.0	yes	90	60	130	yes	47.4	50.06	25.03	75.08	yes
4,4'-DDT	TP-2-780.2	1.80	ng/g	nd	9.0	yes	93	50	130	yes	48.2	50.06	25.03	75.08	yes
Aldrin	TP-2-780.2	0.60	ng/g	nd	3.0	yes	96	65	120	yes	46.4	50.06	25.03	75.08	yes
Alpha-BHC	TP-2-780.2	0.60	ng/g	nd	3.0	yes	87	50	120	yes	44.7	50.06	25.03	75.08	yes
Beta-BHC	TP-2-780.2	0.60	ng/g	nd	3.0	yes	97	50	120	yes	43.2	50.06	25.03	75.08	yes
Chlordane	na	60.00	ng/g	nd	300.0	yes	na	na	na	na	na	na	na	na	yes
Delta-BHC	TP-2-780.2	1.20	ng/g	nd	6.0	yes	97	60	120	yes	47.7	50.06	25.03	75.08	yes
Dieldrin	TP-2-780.2	0.30	ng/g	nd	1.5	yes	98	50	120	yes	50.1	50.06	25.03	75.08	yes
Endosulfan I	TP-2-780.2	0.60	ng/g	nd	3.0	yes	90	40	120	yes	47.0	50.06	25.03	75.08	yes
Endosulfan II	TP-2-780.2	0.60	ng/g	nd	3.0	yes	90	40	120	yes	47.5	50.06	25.03	75.08	yes
Endosulfan Sulfate	TP-2-780.2	0.60	ng/g	nd	3.0	yes	93	30	120	yes	47.9	50.06	25.03	75.08	yes
Endrin Aldehyde	TP-2-780.2	0.90	ng/g	nd	4.5	yes	61	50	120	yes	26.4	50.06	25.03	75.08	yes
Endrin	TP-2-780.2	0.90	ng/g	nd	4.5	yes	108	50	135	yes	54.5	50.06	25.03	75.08	yes
Heptachlor Epoxide	TP-2-780.2	0.60	ng/g	nd	3.0	yes	93	65	120	yes	47.1	50.06	25.03	75.08	yes
Heptachlor	TP-2-780.2	1.80	ng/g	nd	9.0	yes	109	50	120	yes	48.0	50.06	25.03	75.08	yes
Lindane(gamma BHC)	TP-2-780.2	0.60	ng/g	nd	3.0	yes	75	65	120	yes	41.5	50.06	25.03	75.08	yes
MethoxyChlor	TP-2-780.2	2.40	ng/g	nd	12.0	yes	89	50	130	yes	45.3	50.06	25.03	75.08	yes
Total PCB Congeners	na	10.00	ng/g	nd	50.0	yes	87	70	130	yes	na	na	na	na	yes
Toxaphene	na	90.00	ng/g	nd	450.0	yes	na	na	na	na	na	na	na	na	yes

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence

* = Unavailable due to dilution required for analysis

na = Not Applicable

ns = Insufficient Sample Submitted

nd = parameter not detected

TR = trace level less than LOQ

Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 30/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	Field Blk k 793.9	Field Blk k 796.6	TP-1-777	TP-1-780.2 96/09/14	TP-1-780.2 Replicate
4,4'-DDD	0.60	ng/g	-	-	-	-	-
4,4'-DDE	0.60	ng/g	-	-	-	-	-
4,4'-DDT	1.80	ng/g	-	-	-	-	-
Aldrin	0.60	ng/g	-	-	-	-	-
Alpha-BHC	0.60	ng/g	-	-	-	-	-
Beta-BHC	0.60	ng/g	-	-	-	-	-
Chlordane	60.00	ng/g	-	-	-	-	-
Delta-BHC	1.20	ng/g	-	-	-	-	-
Dieldrin	0.30	ng/g	-	-	-	-	-
Endosulfan I	0.60	ng/g	-	-	-	-	-
Endosulfan II	0.60	ng/g	-	-	-	-	-
Endosulfan Sulfate	0.60	ng/g	-	-	-	-	-
Endrin	0.90	ng/g	-	-	-	-	-
Endrin Aldehyde	0.90	ng/g	-	-	-	-	-
Heptachlor	1.80	ng/g	-	-	-	-	-
Heptachlor Epoxide	0.60	ng/g	-	-	-	-	-
Lindane(gamma BHC)	0.60	ng/g	-	-	-	-	-
MethoxyChlor	2.40	ng/g	-	-	-	-	-
Total PCB Congeners	10.00	ng/g	-	-	-	-	-
Toxaphene	90.00	ng/g	-	-	-	-	-
Moisture Content	0.01	%	5.34	11.7	8.18	2.70	2.86

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence.

- = Not Requested

Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 30/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	TP-1-780.4 6 96/09/13	TP-1-790.5 96/09/14	TP-1-793.9 (G) 96/09/12	TP-10-793. 8 96/09/14	TP-10-793. 9(G) 96/09/14
Date Sampled >							
4,4'-DDD	0.60	ng/g	-	-	-	-	nd
4,4'-DDE	0.60	ng/g	-	-	-	-	nd
4,4'-DDT	1.80	ng/g	-	-	-	-	nd
Aldrin	0.60	ng/g	-	-	-	-	nd
Alpha-BHC	0.60	ng/g	-	-	-	-	nd
Beta-BHC	0.60	ng/g	-	-	-	-	nd
Chlordane	60.00	ng/g	-	-	-	-	nd
Delta-BHC	1.20	ng/g	-	-	-	-	nd
Dieldrin	0.30	ng/g	-	-	-	-	nd
Endosulfan I	0.60	ng/g	-	-	-	-	nd
Endosulfan II	0.60	ng/g	-	-	-	-	nd
Endosulfan Sulfate	0.60	ng/g	-	-	-	-	nd
Endrin	0.90	ng/g	-	-	-	-	nd
Endrin Aldehyde	0.90	ng/g	-	-	-	-	nd
Heptachlor	1.80	ng/g	-	-	-	-	nd
Heptachlor Epoxide	0.60	ng/g	-	-	-	-	nd
Lindane(gamma BHC)	0.60	ng/g	-	-	-	-	nd
MethoxyChlor	2.40	ng/g	-	-	-	-	nd
Total PCB Congeners	10.00	ng/g	-	-	-	-	nd
Toxaphene	90.00	ng/g	-	-	-	-	nd
Moisture Content	0.01	%	4.09	2.65	7.75	7.07	6.02

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence.

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nd = parameter not detected ! = LOQ higher than listed due to dilution () Adjusted LOQ

Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 30/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	TP-11-793. 8 96/09/14	TP-12-793. 8 96/09/14	TP-13-793. 9(G) 96/09/14	TP-15-793. 9(G) 96/09/14	TP-18-793. 9
Date Sampled >							
4,4'-DDD	0.60	ng/g	nd	nd	-	-	-
4,4'-DDE	0.60	ng/g	nd	nd	-	-	-
4,4'-DDT	1.80	ng/g	nd	nd	-	-	-
Aldrin	0.60	ng/g	nd	nd	-	-	-
Alpha-BHC	0.60	ng/g	nd	nd	-	-	-
Beta-BHC	0.60	ng/g	nd	nd	-	-	-
Chlordane	60.00	ng/g	nd	nd	-	-	-
Delta-BHC	1.20	ng/g	nd	nd	-	-	-
Dieldrin	0.30	ng/g	nd	nd	-	-	-
Endosulfan I	0.60	ng/g	nd	nd	-	-	-
Endosulfan II	0.60	ng/g	nd	nd	-	-	-
Endosulfan Sulfate	0.60	ng/g	nd	nd	-	-	-
Endrin	0.90	ng/g	nd	nd	-	-	-
Endrin Aldehyde	0.90	ng/g	nd	nd	-	-	-
Heptachlor	1.80	ng/g	nd	nd	-	-	-
Heptachlor Epoxide	0.60	ng/g	nd	nd	-	-	-
Lindane(gamma BHC)	0.60	ng/g	nd	nd	-	-	-
MethoxyChlor	2.40	ng/g	nd	nd	-	-	-
Total PCB Congeners	10.00	ng/g	nd	nd	-	-	-
Toxaphene	90.00	ng/g	nd	nd	-	-	-
Moisture Content	0.01	%	5.47	5.85	6.67	5.18	8.21

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Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 30/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	TP-19-796. 6	TP-2-780.2 96/09/14	TP-2-780.2 Replicate	TP-2-780.4 6 96/09/13	TP-2-793.8 96/09/14
4,4'-DDD	0.60	ng/g	nd	nd	nd	-	-
4,4'-DDE	0.60	ng/g	nd	nd	nd	-	-
4,4'-DDT	1.80	ng/g	nd	nd	nd	-	-
Aldrin	0.60	ng/g	nd	nd	nd	-	-
Alpha-BHC	0.60	ng/g	nd	nd	nd	-	-
Beta-BHC	0.60	ng/g	nd	nd	nd	-	-
Chlordane	60.00	ng/g	nd	nd	nd	-	-
Delta-BHC	1.20	ng/g	nd	nd	nd	-	-
Dieldrin	0.30	ng/g	nd	nd	nd	-	-
Endosulfan I	0.60	ng/g	nd	nd	nd	-	-
Endosulfan II	0.60	ng/g	nd	nd	nd	-	-
Endosulfan Sulfate	0.60	ng/g	nd	nd	nd	-	-
Endrin	0.90	ng/g	nd	nd	nd	-	-
Endrin Aldehyde	0.90	ng/g	nd	nd	nd	-	-
Heptachlor	1.80	ng/g	nd	nd	nd	-	-
Heptachlor Epoxide	0.60	ng/g	nd	nd	nd	-	-
Lindane(gamma BHC)	0.60	ng/g	nd	nd	nd	-	-
MethoxyChlor	2.40	ng/g	nd	nd	nd	-	-
Total PCB Congeners	10.00	ng/g	nd	nd	nd	-	-
Toxaphene	90.00	ng/g	nd	nd	nd	-	-
Moisture Content	0.01	%	11.4	2.65	-	3.73	5.57

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Report of Analysis

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Contact: Tom McMullin

Report Date: September 30/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	TP-3-777	TP-3-780.2	TP-3-780.4 6	TP-3-790.5	TP-3-793.9 (G)
				96/09/14	96/09/13	96/09/14	96/09/12
4,4'-DDD	0.60	ng/g	nd	-	-	-	nd
4,4'-DDE	0.60	ng/g	nd	-	-	-	nd
4,4'-DDT	1.80	ng/g	nd	-	-	-	nd
Aldrin	0.60	ng/g	nd	-	-	-	nd
Alpha-BHC	0.60	ng/g	nd	-	-	-	nd
Beta-BHC	0.60	ng/g	nd	-	-	-	nd
Chlordane	60.00	ng/g	nd	-	-	-	nd
Delta-BHC	1.20	ng/g	nd	-	-	-	nd
Dieldrin	0.30	ng/g	nd	-	-	-	nd
Endosulfan I	0.60	ng/g	nd	-	-	-	nd
Endosulfan II	0.60	ng/g	nd	-	-	-	nd
Endosulfan Sulfate	0.60	ng/g	nd	-	-	-	nd
Endrin	0.90	ng/g	nd	-	-	-	nd
Endrin Aldehyde	0.90	ng/g	nd	-	-	-	nd
Heptachlor	1.80	ng/g	nd	-	-	-	nd
Heptachlor Epoxide	0.60	ng/g	nd	-	-	-	nd
Lindane(gamma BHC)	0.60	ng/g	nd	-	-	-	nd
MethoxyChlor	2.40	ng/g	nd	-	-	-	nd
Total PCB Congeners	10.00	ng/g	nd	-	-	-	nd
Toxaphene	90.00	ng/g	nd	-	-	-	nd
Moisture Content	0.01	%	3.51	1.37	3.40	8.02	5.81

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Report of Analysis

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Contact: Tom McMullin

Report Date: September 30/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	TP-3-796.6	TP-4-780.2 96/09/14	TP-4-780.4 6 96/09/13	TP-4-793.8 96/09/14	TP-4-793.9 (G) 96/09/14
4,4'-DDD	0.60	ng/g	-	nd	-	nd	-
4,4'-DDE	0.60	ng/g	-	nd	-	nd	-
4,4'-DDT	1.80	ng/g	-	nd	-	nd	-
Aldrin	0.60	ng/g	-	nd	-	nd	-
Alpha-BHC	0.60	ng/g	-	nd	-	nd	-
Beta-BHC	0.60	ng/g	-	nd	-	nd	-
Chlordane	60.00	ng/g	-	nd	-	nd	-
Delta-BHC	1.20	ng/g	-	nd	-	nd	-
Dieldrin	0.30	ng/g	-	nd	-	nd	-
Endosulfan I	0.60	ng/g	-	nd	-	nd	-
Endosulfan II	0.60	ng/g	-	nd	-	nd	-
Endosulfan Sulfate	0.60	ng/g	-	nd	-	nd	-
Endrin	0.90	ng/g	-	nd	-	nd	-
Endrin Aldehyde	0.90	ng/g	-	nd	-	nd	-
Heptachlor	1.80	ng/g	-	nd	-	nd	-
Heptachlor Epoxide	0.60	ng/g	-	nd	-	nd	-
Lindane(gamma BHC)	0.60	ng/g	-	nd	-	nd	-
MethoxyChlor	2.40	ng/g	-	nd	-	nd	-
Total PCB Congeners	10.00	ng/g	-	nd	-	nd	-
Toxaphene	90.00	ng/g	-	nd	-	nd	-
Moisture Content	0.01	%	15.1	2.68	10.4	4.35	6.96

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Report of Analysis

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Report Date: September 30/96
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MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	TP-5-790.5	TP-5-793.8	TP-5-793.9 (G)	TP-6-790.5	TP-6-793.9 (G)
Date Sampled >			96/09/14	96/09/14	96/09/14	96/09/14	96/09/14
4,4'-DDD	0.60	ng/g	nd	-	-	nd	-
4,4'-DDE	0.60	ng/g	nd	-	-	nd	-
4,4'-DDT	1.80	ng/g	nd	-	-	nd	-
Aldrin	0.60	ng/g	nd	-	-	nd	-
Alpha-BHC	0.60	ng/g	nd	-	-	nd	-
Beta-BHC	0.60	ng/g	nd	-	-	nd	-
Chlordane	60.00	ng/g	nd	-	-	nd	-
Delta-BHC	1.20	ng/g	nd	-	-	nd	-
Dieldrin	0.30	ng/g	nd	-	-	nd	-
Endosulfan I	0.60	ng/g	nd	-	-	nd	-
Endosulfan II	0.60	ng/g	nd	-	-	nd	-
Endosulfan Sulfate	0.60	ng/g	nd	-	-	nd	-
Endrin	0.90	ng/g	nd	-	-	nd	-
Endrin Aldehyde	0.90	ng/g	nd	-	-	nd	-
Heptachlor	1.80	ng/g	nd	-	-	nd	-
Heptachlor Epoxide	0.60	ng/g	nd	-	-	nd	-
Lindane(gamma BHC)	0.60	ng/g	nd	-	-	nd	-
MethoxyChlor	2.40	ng/g	nd	-	-	nd	-
Total PCB Congeners	10.00	ng/g	nd	-	-	nd	-
Toxaphene	90.00	ng/g	nd	-	-	nd	-
Moisture Content	0.01	%	9.25	7.23	6.09	2.87	9.07

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Report of Analysis

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Contact: Tom McMullin

Report Date: September 30/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	TP-6-793.9 (G) Replicate	TP-6-796.6	TP-7-793.8 96/09/14	TP-7-793.8 Replicate	TP-7-793.9 (G) 96/09/14
4,4'-DDD	0.60	ng/g	-	nd	nd	-	-
4,4'-DDE	0.60	ng/g	-	nd	nd	-	-
4,4'-DDT	1.80	ng/g	-	nd	nd	-	-
Aldrin	0.60	ng/g	-	nd	nd	-	-
Alpha-BHC	0.60	ng/g	-	nd	nd	-	-
Beta-BHC	0.60	ng/g	-	nd	nd	-	-
Chlordane	60.00	ng/g	-	nd	nd	-	-
Delta-BHC	1.20	ng/g	-	nd	nd	-	-
Dieldrin	0.30	ng/g	-	nd	nd	-	-
Endosulfan I	0.60	ng/g	-	nd	nd	-	-
Endosulfan II	0.60	ng/g	-	nd	nd	-	-
Endosulfan Sulfate	0.60	ng/g	-	nd	nd	-	-
Endrin	0.90	ng/g	-	nd	nd	-	-
Endrin Aldehyde	0.90	ng/g	-	nd	nd	-	-
Heptachlor	1.80	ng/g	-	nd	nd	-	-
Heptachlor Epoxide	0.60	ng/g	-	nd	nd	-	-
Lindane(gamma BHC)	0.60	ng/g	-	nd	nd	-	-
MethoxyChlor	2.40	ng/g	-	nd	nd	-	-
Total PCB Congeners	10.00	ng/g	-	nd	nd	-	-
Toxaphene	90.00	ng/g	-	nd	nd	-	-
Moisture Content	0.01	%	9.43	13.2	7.30	7.95	7.64

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence.

- = Not Requested

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Report of Analysis

Client : Groundtrax Inc.
Contact: Tom McMullin

Report Date: September 30/96
MDS Ref # : 966350
MDS Quote #: 96L-274-JM

Analysis of Soil, expressed on a dry weight basis

Client Ref#: 96-139

Parameter	LOQ	Units	TP-8-793.8	TP-9-796.6			
Date Sampled >			96/09/14				
4,4'-DDD	0.60	ng/g	-	-			
4,4'-DDE	0.60	ng/g	-	-			
4,4'-DDT	1.80	ng/g	-	-			
Aldrin	0.60	ng/g	-	-			
Alpha-BHC	0.60	ng/g	-	-			
Beta-BHC	0.60	ng/g	-	-			
Chlordane	60.00	ng/g	-	-			
Delta-BHC	1.20	ng/g	-	-			
Dieldrin	0.30	ng/g	-	-			
Endosulfan I	0.60	ng/g	-	-			
Endosulfan II	0.60	ng/g	-	-			
Endosulfan Sulfate	0.60	ng/g	-	-			
Endrin	0.90	ng/g	-	-			
Endrin Aldehyde	0.90	ng/g	-	-			
Heptachlor	1.80	ng/g	-	-			
Heptachlor Epoxide	0.60	ng/g	-	-			
Lindane(gamma BHC)	0.60	ng/g	-	-			
MethoxyChlor	2.40	ng/g	-	-			
Total PCB Congeners	10.00	ng/g	-	-			
Toxaphene	90.00	ng/g	-	-			
Moisture Content	0.01	%	7.51	12.8			

LOQ = Limit of Quantitation = lowest level of the parameter that can be quantified with confidence.

- = Not Requested

QUALITY ASSURANCE/QUALITY CONTROL

1.0 MDS ENVIRONMENTAL'S APPROACH TO QA/QC

1.1 Introduction

Reliable analytical measurement of environmental samples is essential to all environmental programs. The need for data reliability and defensibility becomes critical on projects with potential legal/liability concerns. It is therefore imperative that the laboratory chosen for this program not only be capable of providing reliable, precise, accurate analytical measurements, but be able to monitor and document their reliability, accuracy and precision. The key for MDS Environmental in providing this service as well as the documentation, is to have a Quality Assurance Program.

In keeping with MDS Environmental's commitment to quality, we are the only Canadian laboratory with a quality control officer. The responsibilities of this position include:

- Auditing the laboratory practices of each location to ensure compliance with our QA/QC plan.
- Ensuring that all certification and accreditation is maintained.
- Assessing the quality of testing by submitting blind samples to each lab.

Two concepts are involved in Quality Assurance: Quality Control (the mechanism established to control errors) and Quality Assessment (the system used to verify that the analytical process is operating properly and within acceptable limits).

1.2 MDS Environmental's Quality Assurance Program

MDS Environmental's Quality Assurance Program is an essential part of the company's operating plan and it is an essential part of every analytical protocol. It is used to detect and correct problems in the measurement process and to demonstrate attainment of a measurable state of statistical control. This document provides an overview of MDS Environmental's Quality Assurance Program.

MDS Environmental's complete Quality Assurance Manual is available upon review upon request.

The complete document is several inches thick and is available for viewing any time at any MDS Environmental location.

1.2.1 Objectives and Goals

The Quality Assurance Program (QAP) assures the accuracy, precision, and reliability of the analytical data produced by MDS Environmental. Management, administrative, statistical, investigative, preventive, and corrective techniques are employed to achieve this objective through the following goals.

Quality Goals

- To develop and implement approved methods capable of meeting MDS Environmental client needs for precision, accuracy, sensitivity, and specificity.
- To ensure that all MDS Environmental staff receive training in quality technology enabling them to carry out their QAP responsibilities.
- To establish and keep under review a baseline of quality performance against which the effectiveness of quality improvement efforts are measured.
- To monitor the routine operational performance of the laboratory through participation in appropriate interlaboratory testing programs and to provide for corrective actions as necessary.
- To improve and validate laboratory methodologies by participation in method validation studies.

Quality Tactics

This section lists the tactics MDS Environmental follows to achieve the QAP goals.

- Quality activities emphasize the prevention of quality problems rather than detection and correction of problems after they occur.
- All employees undergo training programs commensurate with their positions, duties, and responsibilities.
- MDS Environmental uses only published and approved methods.
- MDS Environmental retains copies of all test and analytical reports in a manner and for a period specified by regulatory or accrediting bodies.
- MDS Environmental has a comprehensive calibration program involving all instrumentation used for making analytical determinations.

- MDS Environmental uses appropriate, reagents and chemicals, certified when necessary, and appropriate calibrated glassware, certified when necessary.
- MDS Environmental establishes and maintains a total interlaboratory quality management system to assure continued precision and accuracy of laboratory results.
- MDS Environmental participates in interlaboratory testing programs on its own initiative and as prescribed by accrediting organizations.

1.2.2 Quality Assurance/Quality Control (QA/QC) Activities

- All analytical services are based upon accepted (MOE, U.S. EPA) procedures and are fully validated prior to use.
- Analytical standards are prepared from neat solids or from certified solutions.
- Calibration standards are validated against external reference standards wherever possible.
- Extensive use is made of Standard Reference Material (SRM) for routine procedure evaluation.
- Surrogate standards are used.
- Routine submission of blind samples is standard practice.
- Analytical sequences are predefined and ensure all results are traceable to calibration and QC data.
- Hard copy reports displaying all of the required data are generated for each instrument analysis.
- Analytical results are determined only from instrument responses that fall within the demonstrated calibration range.
- Acceptable QC sample performance must be demonstrated prior to the authorization of data, (data are subjected to 3 levels of QC review: technician, supervisor, and manager).
- On-going method and instrument performance records are maintained for all analysis.

- A QC certificate is issued with each project. The QA/QC data reported is specific to your project, and it consists of:
 - full spike/recovery determination (measures matrix effects)
 - blanks
 - standard reference material (measures method performance)
 - replicate analysis (measures reproducibility)
- Records containing all pertinent data are securely archived for seven years.

1.3 QA/QC Performance

As indicated in 1.2, MDS Environmental bases its analytical performance on the Quality Assurance Manual.

The results of performance standards, calibration standards, standard reference materials, and other QC standards, can be provided on a parameter-by-parameter basis. Since no specific parameters or QC performance data were requested, MDS Environmental will not add to the length of this quote by providing such details. We will provide them upon request.

1.4 SUBCONTRACTING

MDS Environmental is a full service, well-equipped laboratory network. MDS Environmental's capacity and expertise is such that very little of the testing requested should have to be subcontracted.

However, if a situation arose where MDS Environmental had to subcontract any testing, we would consult our files on the status of other environmental testing laboratories. MDS Environmental maintains a file on these labs, with information on the status of turnaround times, QA/QC related problems, capacity status, and other information. Based on this knowledge, we would select a lab that has QA/QC performance most similar to our own, and which has the best likelihood of meeting TAT requirements.

Once a selection was made, MDS Environmental would require duplicate testing, blind check sample testing, and other QA/QC checks to ensure that the performance of the subcontractor is acceptable, monitored, and reported to our client.

LABORATORY CERTIFICATION AND ACCREDITATION

Each Canadian laboratory in the MDS Environmental network is accredited by the Standards Council of Canada/Canadian Association Environmental Analytical Laboratories (CAEAL) program. This is the only national Canadian program that formally accredits analytical laboratories.

In addition to our Canadian accreditation, MDS is accredited/certified by various agencies in the United States. These include:

MDSE Toronto (formerly EPL) is certified by New York State, through the Department of Health. This certification covers bottled water, potable water, effluent, soil, air samples and a range of other environmental analyses. Certification by New York State is regarded as a primary certification by a large number of other states. This certification has enabled MDSE Toronto's data to be formally accepted in twenty four additional states.

MDSE Halifax (formerly Fenwick) is certified by the State of New Hampshire, through the Department of Environmental Science, for both potable water and wastewater analysis.

MDS Laboratories, Reading Pennsylvania: In addition to our Canadian operations, MDS operates an environmental laboratory in Reading, PA. This facility is certified for environmental and industrial hygiene work in Pennsylvania, New York and New Jersey.

MDS has performed extensive testing for the Province of Ontario as well as all Atlantic Canada provinces. In many instances, successful performance on pre-qualification interlaboratory studies was key in MDS being awarded government contracts. MDS has also performed testing for numerous departments of the Federal Government of Canada.

MDS Laboratories has been used as the analytical laboratory for Environment Canada's Enforcement Program in Ontario for the past three years, and in 1994, following an audit/assessment of several laboratories, MDSE was selected as the Enforcement Branch's laboratory of choice.

MDSE laboratories are routinely used as the QA laboratory on major projects such as Smithville, and as the referee laboratory in data disputes between government and private laboratories.

MDS Environmental has also been audited by many organizations. As part of our work with Dow Chemicals and with other members of the Organic Chemical Manufacturing Sector, MDS Environmental has had to pass the Responsible Care requirements, which include a thorough audit. Similarly, MDS Environmental passed an intensive audit with the Ford Motor Company before being selected as one of two Canadian laboratories working with Ford. A list of audits is available upon request.

Summary of the MDS Environmental Services Ltd. Technical Staff Qualifications

MDSE Toronto

November 1995

Name	Position	Degree	Year	University	Yrs experience Lab/Environment	Qualifications
Hugh Crosthwait	V.P. & General Manager	M.Sc., MBA	1972	U. of T./York U.	10	Former Consultant, General Manager Clinical Lab
Jim Bishop	V.P. Bus. Development	B.Sc., C.Chem.	1966	Univ. Alberta	27	Formerly Director Water Resources and Lab Director, MOE.
Brian Cann	V.P. Sales & Marketing	BA	1973	Univ. Toronto	14	Director of Clinical Lab Operations
Tim Munshaw	Director, Lab Services	M.Sc., C.Chem.	1981	York University	12	Formerly Manager of env. lab at Mann Testing
Valerie Geldart	Sr. Sales Manager	B.Sc. (Chem)	1986	Mt. St. Vincent	7	Organics by GC & GC/MS. Former Lab Mgr Fenwick, Dartmouth
Grace Simonetti	Tech. Sales Rep.	B.Sc.	1984	Univ. Toronto	11	Technical background in wastewater consulting
Nick Boulton	Manager Customer Service	B.Sc., C.Chem.	1979	McMaster Univ.	15	Former TSL Lab Manager
Eva Cottenden	Service Manager	C. Eng.	1986	Ryerson	4	Manual conventionals & metals analyses, formerly at TSL labs
Samar Habash	Service Manager	B.Sc.	1984	McMaster Univ.	8	Technical Rep. for large environmental lab
Jay Marteniuk	Sales Manager	B.Sc. (Env)	1993	Waterloo Univ.	1	Sales Rep. for Great Lakes Charter Operation
Brad Newman	Service Manager	B.Sc.	1987	Trent Univ.	7	Inorganic Analysis
Bonnie Engel	Systems Manager	B.Sc.	1980	Univ. Guelph	11	QA/QC, ICAP, PC networks, ITC lab, LIMS.
Ian Webber	Consultant	Ph.D.	1975	Carleton Univ.	18	Former BC Hydro, PCB expert, represents EPL in N.Y. State
Julius Fulop	Supervisor Organic	M.Sc. (Chem)	1987	Brock University	6	Apotex Inc., & Mann Testing, pesticides, organics
Luc Dionne	Supervisor Inorganic	C.Eng.	1983	Ryerson	9	Formerly at Occup. Health Lab Ministry of Labour, XRAL & Mann
Lukose Mathew	Section Head	Ph.D. (Chem)	1989	McMaster Univ.	3	Volatile organic analyses, GC/MS.
Harry Chung	Section Head	B.Sc. (Chem)	1986	Carleton Univ.	6	Formerly Mann & Bondar-Clegg. ICAP/AA specialty.
G. Blazejewski	Senior Chemist	M.Sc. C. Chem.	1978	Poland	13	GC/MS specialty for MISA and EPA priority pollutants
Nur Ali Abdi	Chemist	B.Sc. (Chem)	1985	Somalia	2	Sample preparation, inorganics.
Abdi Mohamud	Chemist	B.Sc. (Chem)	1986	Somali	5	Inorganics, sample preparation, MOE Lab Technician 3
Paul Campanelli	Chemist	B.Sc. (Chem)	1987	Univ. Toronto	6	CFC specialist, formerly at Beak & Zenon
Renate Bruni	Technician	B.Tech.	1988	Niagara	8	Organic analysis - pesticides & PCB
Randy Ellwood	Technician	Env. Diploma	1991	Fanshawe College	2	Former QA technician Esso Petroleum
Brook Hatton	Technician	B.Tech.	1988	Seneca	5	Volatile/Anion Analyses
Marg Hergesell	Technician	M.Sc.	1972	Poland	10	Sample preparation organics, data management
Farl Dehdezi	Technician	B.Sc.	1977	Iran	2	Inorganics, sample preparation, MOE Lab Technician 2
Lisa Cormier	Technician	Env. Diploma	1989	Canadore College	2	Toxicity testing at MOE and Creel Supervisor UMA.
Kevin Comerford	Technician	B.Sc.	1990	Waterloo Univ.	2	Sample preparation, sample reception
Nader Morcos	Technician	M.Sc., C.Chem.	1984	Cairo	12	Biomedical chem experience, whole rock analysis
Yasmin Bhaluani	Data Clerk	Env. Diploma	1979	Humber College	20	Extensive data entry experience.
Anna Didiano	Data Clerk	Diploma	1990	Humber College	3	Data entry experience at TSL.

Fenwick Laboratories Halifax

Name	Position	Degree	Year	University	Yrs experience Lab/Environment	Qualifications
Murray Hartwell	Mgr., Lab. Operations	M.Sc. (Chem)	1979	Dalhousie Univ.	18	Formerly Safety Manager ICI, Research Manager
Robert Boss	Director, Logistics & Tech.	B.Sc. (Chem)	1976	Mount Allison Univ.	18	Manager, Inorganics
Jerry Arenovich	Supervisor, Inorganics	C.Eng. (Tech)	1980	Lakehead Univ.	12	Former Supervisor Inorganics RPC, NB
Suzann Sykes	Client Services	B.Sc. (Chem) MBA	1978	SMU Dalhousie	16	Former Asst Brewmaster, Mgr of QC Moosehead
Suzann Rogers	Sample Receiving	Med. Lab Tech	1990	NSIT	3	Sample reception, data entry, sample prep
Gail Rich	Sample Receiving	B.Sc. (Bio)	1989	MSVU	1	Sample reception, data entry, sample prep
Engelina Crouse	Chemist	Chem. Tech Diploma	1987	NSAC	7	Organic GC/FID, hydrocarbon characterization
Scott Cantwell	Chemist	Chem. Tech Diploma	1992	YCCB	2	Organic GC/FID, hydrocarbon characterization
Bruce Phillips	Chemist	B.Sc. (Bio)	1990	SMU	4	Organics TPH PT GC/MS, PCB
Joel Hill	Chemist	B.Sc. (Chem)	1990	MSVU	4	Organics PAH GC/MS, GC, FID
Greg Gilbert	Chemist	Chem. Tech Diploma	1987	Algonquin College	7	Organics GC/ECD/FID/P&T Inorganics
Stephanie Turner	Lab Assistant			SMU	1	Organics sample prep
Roland Daigle	Lab Assistant	B.Sc. (Chem)	1967	Univ. Moncton	20	Inorganic ICP-MS, AAS, Organic prep
Dianthe Louer	Lab Assistant	B.Sc. (Bio)	1993	MSVU	1	Organics oil & grease sample prep
Sadie Barkhouse	Chemist	B.Sc.N. (Nursing)	1973	Dalhousie Univ.	7	Inorganics Cobas, pH, Cond., PSA, MOEE 347
Ann Buck	Chemist	Chem. Tech Diploma	1982	NSAC	10	Inorganics Cobas, Auto Analyzers, ICP Speciman Receiving
Linda McDowell	Chemist	M.Sc. (Chem)	1987	Dalhousie Univ.	7	Inorganics ICP-MS, Organics GC/ECD, FID, P&T, GC/MS
Lecia Bronson	Chemist	Bio. Tech Diploma	1988	NSAC	6	Inorganics Cobas, Auto Analyzers
Rhonda Sieniewicz	Lab Assistant	Chem. Tech Diploma	1983	SIAT	5	Inorganics Cobas, PSA, sample prep
Julie Marr	Mgr., Shellfish Research	Ph.D.	1989	McMaster Univ.	11	Res. Mgr, Ocean Chem, marine toxins, PAH, LC, CE, GC, MS
Jim King	Shellfish Research	Ph.D.	1986	Dalhousie Univ.	12	Former M.M. Dillon Lab Manager, Quality Assurance
Jaroslav Kraovec	Shellfish Research	Ph.D.		Czechoslovakia		
Greg Peters	Research and Develop.	Ph.D.	1994	Queens Univ.	6	

MDSE London

Name	Position	Degree	Yrs experience Lab/Environment	
Joseph Latella	General Manager	B.Sc. Chem.	23	Tech. Mgr. Lawrason's Chem, Oakite Chem
Lorraine DaSilva	QA/QC Officer	B.Sc. Chem.	15	Org. Instrument GC., GC-MS, QC Mgr.
John Beens	Inorganics Supervisor	Chem. Tech.	35	Chem Tech in Netherlands, Hamilton, London
Gerald Allen	Customer Service	Chem. Tech.	31	MacLaren Eng. Draftsman, Field Services
Kathryn Hughes	Customer Service	B.A. Psych.	23	Kellogg's Lab Tech.
Don Castonguay	Systems Admin.	Comp. Science	7	MOE London, LIMS Development
Alisa Enright	Chemist	B.Sc. Zoology	15	A.A. (metals), Rio Algoma
Joseph Soltys	Chemist	B.Sc. Chem.	5	Org. Inst. -GC, GC-MS, computer development
Laird Story	Chemist	B.Sc. Chem.	11	Org. Inst. -GC, GC-MS (volatiles)
Kimberly Bennett	Technologist	Chem. Tech	5	Organic/Inorganic Prep Labs
Helen Marie Bourdeau	Technologist	Chem. Tech	15	RTech. in hosp., Inorg. & Org. Labs
Paul Clark	Technologist	Envlr. Tech	7	Org. & Inorg. Prep. Labs, Auto Anal.
Elizabeth Dawidek	Technologist	Chem. Tech	6	Org. & Inorg. Prep. & Instrument, O&G Inst.
Catherine Learn	Technologist	Chem. Tech	8	Org. & Inorg. prep, Technicon, Lachat AA
Shelyn Ponsford	Technologist	B.Sc. Mar. Bio.	8	Org. Prep., Field Service
David Stallard	Technologist	Chem. Tech	16	Org. & Inorg. Inst. - AA, ICP, GFAA Auto. Anal.
Peter Stasny	Technologist	Chem. Tech	5	Inorg. Prep. Lab.
Joan Wood	Technologist	M.Sc. Plt. Sc.	16	Inorg Prep., Reg. 347 Leach., Part. Size

Leachate Regulation 347

The following information in a brief description about Regulation 347 Leachate.

Explanation 12 – Leachate Toxic Wastes

Wastes that contain the contaminants listed in Schedule 4 of Regulation 347 (Appendix 8) such that they can leach out in concentrations that exceed 100 times the concentrations shown in the Schedule are Hazardous. This criteria applies to both liquid and solid wastes. The Leachate Extraction Procedure, included as part of Regulation 347, is used to make this determination.

For Leachate Toxic wastes the small quantity exemption is 5 kg of wastes per month. If you generate more than 5 kg in a one month period, or accumulate more than 5 kg on your site over any period, registration is required. Empty containers and liners are not hazardous.

If you generate a waste that is Leachate Toxic, you will need to specify the following Waste Characteristic and appropriate MOEE Waste Class on the Generator Registration Report.

Waste Characteristic - Leachate Toxic (T)

Waste Class - Select the 3-digit Waste Class number from Appendix 2 beside the listing that best describes your waste. Add the letter "T" to this number to specify the above Waste Characteristic, for example, 131T.

APPENDIX 8

SCHEDULE 4

LEACHATE QUALITY CRITERIA

Reference Number	Contaminant	Concentration (milligrams per litre)
ON4001	2,4,5-TP / Silvex / 2-(2,4,5-Trichlorophenoxy)propionic acid	0.01
ON4002	2,4-D	0.1
ON4003	Aldrin + Dieldrin	0.0007
ON4004	Arsenic	0.05
ON4005	Barium	1.0
ON4006	Boron	5.0
ON4007	Cadmium	0.005
ON4008	Carbaryl / 1-Naphthyl-N-methyl carbamate / Sevin	0.07
ON4009	Chlordane	0.007
ON4010	Chromium	0.05
ON4011	Cyanide (free)	0.2
ON4012	DDT	0.03
ON4013	Diazinon / Phosphordithioic acid, O,O-diethyl O-(2-isopropyl-6-methyl-4-pyrimidinyl) ester	0.014
ON4014	Endrin	0.0002
ON4015	Fluoride	2.4
ON4016	Heptachlor + Heptachlor epoxide	0.003
ON4017	Lead	0.05
ON4018	Lindane	0.004
ON4019	Mercury	0.001
ON4020	Methoxychlor / 1,1,1-Trichloro-2, 2-bis(p-methoxyphenyl)ethane	0.1
ON4021	Methyl Parathion	0.007
ON4022	Nitrate + Nitrite	10.0
ON4023	Nitrilotriacetic acid	0.05
ON4024	Nitrite	1.0
ON4025	PCBs	0.003
ON4026	Parathion	0.035
ON4027	Selenium	0.01
ON4028	Silver	0.05
ON4029	Toxaphene	0.005
ON4030	Trihalomethanes	0.35
ON4031	Uranium	0.02

REFERENCE NUMBER	CONTAMINANT	CONCENTRATION (milligrams per litre)
ON4010	Chromium	0.05
ON4011	Cyanide (free)	0.2
ON4012	DDT	0.03
ON4013	Diazinon / Phosphordithioic acid, O,O-diethyl 0-(2-isopropyl-6-methyl-4-pyrimidinyl) ester	0.0002
ON4014	Endrin	0.0002
ON4015	Fluoride	2.4
ON4016	Heptachlor + Heptachlor epoxide	0.003
ON4017	Lead	0.05
ON4018	Lindane	0.004
ON4019	Mercury	0.001
ON4020	Methoxychlor / 1,1,1-Trichloro-2, 2-bis(p-methoxyphenyl)ethane	0.1
ON4021	Methyl Parathion	0.007
ON4022	Nitrate + Nitrite	10.0
ON4023	Nitrilotriacetic acid	0.05
ON4024	Nitrite	1.0
ON4025	PCBs	0.003
ON4026	Parathion	0.035
ON4027	Selenium	0.01
ON4028	Silver	0.05
ON4029	Toxaphene	0.005
ON4030	Trihalomethanes	0.35
ON4031	Uranium	0.02

LEACHATE EXTRACTION PROCEDURE

(1) Sampling

Collect a sufficient amount of sample to provide approximately 100 g of solid material, using techniques which ensure that the sample is representative of the waste.

(2) Equipment

- 2.1 Sieve, 9.5 mm mesh opening, stainless steel or plastic material.
- 2.2 Stainless steel filtration unit, 142 mm diameter, minimum 1L capacity, capable of sustaining a pressure of 5 kg/cm², applied to the solution to be filtered.
- 2.3 Membrane filter, 142 mm diameter, 0.45 µm diameter pore size, made of synthetic organic material such as cellulose acetate, cellulose nitrate, nylon or polycarbonate and which is compatible with the leachate to be filtered. Teflon is recommended for organic constituents.
- 2.4 Glass fibre prefilter, 124 mm diameter, 3 µm to 12 µm pore size range.
- 2.5 Vacuum filtration unit, 90 mm diameter.
- 2.6 Membrane filter 90 mm diameter as per Step 2.3.
- 2.7 Glass fibre filter 70 mm diameter as per Step 2.4.
- 2.8 Solid waste rotary extractor—a device that rotates the bottles end over end about a central axis through 360°, with a speed of 10 rpm. The dimensions of the box will depend on the needs of each laboratory. (Figure 1).
- 2.9 Structural Integrity Tester with a 3.18 cm diameter hammer weighing 0.33 kilogram and having a free fall of 15.24 cm. (Figure 2).
- 2.10 pH meter, with a readability of 0.01 pH unit and accuracy of ±0.1 pH units.
- 2.11 Cylindrical bottles, wide mouth, 1250 mL capacity, polyethylene or glass with Teflon lined cap for inorganic constituents; glass with Teflon-lined cap or Teflon bottles for organic constituents.

2.12 Cleaning Procedure

All glassware and equipment that comes into contact with the sample should be cleaned in the following way before each use:

- 2.12.1 Wash with a non-phosphate detergent solution.
- 2.12.2 Rinse twice with tap water.
- 2.12.3 Rinse twice with reagent water.
- 2.12.4 Wash with 10% nitric acid.
- 2.12.5 Rinse several times with reagent water.
- 2.12.6 Store bottles filled with 10% nitric acid, until ready to use.
- 2.12.7 Rinse several times with reagent water before use.
- 2.12.8 Rinse clean oven dried bottles with methylene chloride, followed by methanol, for organic constituents.

(3) Reagents

- 3.1 Acetic acid, 0.5 N. Dilute 29.4 mL of concentrated acetic acid (ACS grade) to 1000 mL with reagent water.
- 3.2 Reagent water, Type IV (ASTM Specification D 1193). For organic parameters, the reagent water should be free of any organic substances to be analyzed (ASTM Type I).
- 3.3 Nitric acid, 10% (v/v). Add 100 mL of concentrated nitric acid (ACS grade) to 900 mL of reagent water.
- 3.4 Nitrogen gas, pre-purified, scrubbed through a molecular sieve.

(4) Separation Procedure

If the sample contains a distinct liquid and a solid phase, separate it into its component phases using the following procedure:

- 4.1 Determine the dry weight of the solids in the sample at 60°C, using a well homogenised sample. Use this weight to determine the amount of material to be filtered.
- 4.2 Assemble the filtration unit with a filter bed consisting of a 0.45 µm pore size membrane filter and a coarse glass fibre pre-filter upstream of the membrane filter (per manufacturer's instructions).
- 4.3 Select one or more blank filters from each batch of filters. Filter 50 mL portions of reagent water through each test filter and analyze the filtrate for the analytical parameters of interest. Note the volume required to reduce the blank values to acceptable levels.
- 4.4 Wash each filter used in the leach procedure with at least this predetermined volume of water. Filter under pressure until no water flows through the filtrate outlet.
- 4.5 Remove the moist filter bed from the filtration unit and determine its weight to the nearest ± 0.01 g.
- 4.6 Re-assemble the filtration unit, replacing the filter bed, as before.
- 4.7 Comminute the sample, with a mortar and pestle, to a size that will pass through the opening of the filtration unit (less than 9.5 mm).
- 4.8 Agitate the sample by hand and pour a representative aliquot of the solid and liquid phases into the opening of the filtration unit. Filter a sufficient amount of the sample to provide at least 60 g of dry solid material.
- 4.9 Pressurize the reservoir very slowly with nitrogen gas by means of the regulating valve on the nitrogen gas cylinder, until liquid begins to flow freely from the filtrate outlet.
- 4.10 Increase the pressure step-wise in increments of 0.5 kg/sq. cm to a maximum of 5 kg/sq. cm, as the flow diminishes. Continue filtration until the liquid flow ceases or the pressurizing gas begins to exit from the filtrate outlet of the filter unit.
- 4.11 De-pressurize the filtration unit slowly using the release valve on the filtration unit. Remove and weigh the solid material together with the filter bed to ± 0.01 g. Record the weight of the solid material.
- 4.12 Measure and record the volume and pH of the liquid phase. Store the liquid at 4°C under nitrogen until required in Step 5.13.
- 4.13 Discard the solid portion, if the weight is less than 0.5% (w/v) of the aliquot taken. If not, proceed to Step 5.1.

Note: For mixtures containing coarse grained solids, where separation can be performed without imposing a 5 kg/sq. cm differential pressure, a vacuum filtration unit with a filter bed as per Step 4.2 may be used. Vacuum filtration must not be used, if volatile organic compounds are to be analysed.

(5) Extraction Procedure

- 5.1 Prepare a solid sample for extraction by crushing, cutting or grinding, to pass through a 9.5 mm mesh sieve. If the original sample contains both liquid and solid phases, use the solid material from Step 4.13. The structural integrity procedure, Step 6, should be used for monolithic wastes which are expected to maintain their structural integrity in a landfill, (e.g. some slags and treated solidified wastes).

Note: Do not allow the solid waste material to dry prior to the extraction step.

- 5.2 Determine the moisture content of the de-watered sample, by drying a suitable aliquot to constant weight at 60°C in an oven. Discard the dried solid material.
- 5.3 Place the equivalent of 50 g dry weight of the de-watered undried material into a 1250 mL wide mouth cylindrical bottle. Use additional bottles, if a larger volume of leachate is required for the analysis.
- 5.4 Add 800 mL (less the moisture content of the sample in mL) of reagent water to the bottle.
- 5.5 Cap the bottle and agitate it in the rotary extractor for 15 minutes before pH measurement.
- 5.6 Measure and record the pH of the solution in the bottle using a pH meter, calibrated with buffers at pH 7.00 and pH 4.00. The solution should be stirred during the pH measurement.
- 5.7 Proceed to Step 5.10.1, if the pH is less than 5.2.
- 5.8 Add a sufficient volume of 0.5N acetic acid if the pH is greater than 5.2 to bring the pH to 5.0 ± 0.2 .

Note: Maximum Amount of Acid: No more than 4 mL of 0.5N acetic acid per gram of dry weight of sample may be added during the entire procedure. If the pH is not lowered to 5.0 ± 0.2 with this amount, proceed with the extraction.

- 5.9 Cap the bottle and place it in the tumbling apparatus. Rotate the bottle and its contents at 10 rpm for 24 hours at room temperature (20°C to 25°C).
- 5.10 Monitor, and manually adjust the pH during the course of the extraction, if it is greater than 5.0 ± 0.2 . The following procedure should be carefully followed:
- 5.10.1 Measure the pH of the solution after 1 hour, 3 hours and 6 hours from the starting time. If the pH is above 5.2, reduce it to 5.0 ± 0.2 by addition of 0.5N acetic acid. If the pH is below 5.0 ± 0.2 , do not make any adjustments.
- 5.10.2 Adjust the volume of the solution to 1000 mL with reagent water, if the pH is below 5.0 ± 0.2 after 6 hours.
- 5.10.3 Measure and reduce the pH to 5.0 ± 0.2 , if required, after 22 hours and continue the extraction for an additional 2 hours.

- 5.11 Add enough reagent water at the end of the extraction period so that the total volume of liquid is 1000 mL. Record the amount of acid added and the final pH of the solution.
- 5.12 Separate the material into its component liquid and solid phases as described under the Separation Procedure, Step 4. Discard the solid portion.

Note: It may be necessary to centrifuge the suspension at high speed before filtration, for leachates containing very fine grained particles.

- 5.13 Calculate the amount of free liquid from Step 4.12 corresponding to 50 g of the dry solid material. Add this amount to the leachate from Step 5.12.

Note: If the analysis is not performed immediately, store separate aliquots of the leachate at 4°C, after adding appropriate preservatives for the analytical parameters of interest (See "A Guide to the Collection and Submission of Samples for Laboratory Analysis", Ontario Ministry of the Environment, July 1979).

- 5.14 Analyze the combined solutions from Step 5.13 for contaminants listed in Schedule 4, that are likely to be present.
- 5.15 Report concentrations of contaminants in the combined leachate and the free liquid solution as mg/L.
- 5.16 Carry a blank sample through the entire procedure, using dilute acetic acid at 5.0 ± 0.2 .

(6) Structural Integrity Procedure

This procedure may be required prior to extraction for some samples as indicated in Step 5.1. It may be omitted for wastes with known high structural integrity.

Procedure

- 6.1 Fill the sample holder with the material to be tested. If the sample of the waste is a large monolithic block, cut a portion from the block measuring 3.3 cm in diameter by 7.1 cm in length. For a treated waste (e.g. solidified waste) samples may be cast in a form with the above dimensions for the purposes of conducting this test. In such cases, the waste should be allowed to cure for 30 days prior to further testing.
- 6.2 Place the sample holder in the structural integrity tester, then raise the hammer to its maximum height and allow it to fall. Repeat this procedure 14 times.
- 6.3 Remove the material from the sample holder, and proceed to Step 5.2. If the sample has not disintegrated, it may be sectioned; alternatively use the entire sample (after weighing) and a sufficiently large bottle as the extraction vessel. The volume of reagent water to be initially added is 16 mL/g of dry sample weight. The maximum amount of 0.5N acetic acid to be added is 4 mL/g of dry sample weight. The final volume of the leachate should be 20 mL/g of dry sample weight.

Table 1
Old Camp

Date of Assessment	Site Location	Area of Survey	Test Pit	Parameters	Analytical Results	SGS	Soil Gas Survey		Analytical Results	Criteria CCME/MOEE
							Distances in Feet	Compass Bearings		
10 Sept, 96	796.6 mi	450' x 500'	No 1	PID	0.0 ppm	No 1	142	70.5°	0.0 ppm	
						No 3	89	69°	13.8 ppm	
			No 2	TEH	nd	No 4	79	72°	0.2 ppm	MOEE100ug/g
				ICP Metals	bc	No 5	60	76°	14.7 ppm	
				Phenols	0.07mg/kg	No 6	29	70°	11.0 ppm	CCME 1.0 ug/g
				PID	13.8 ppm	No 7	29	46°	0.0 ppm	
						No 8	26	106°	10.2 ppm	
			No 3	PAH	nd	No 9	82	100°	9.5 ppm	CCME 1.0 ug/g
				OC Pests	nd	No 10	89	88°	8.9 ppm	
				Reg 347	nd	No 11	50	152°	0.0 ppm	
				PID	11 ppm	No 19	171	114°	16.8 ppm	
						No 21	169	82°	7.9 ppm	
			No 4	PID	10.2 ppm	No 22	126	122°	0.0 ppm	
			No 5	TEH	nd					MOEE100ug/g
				PID	9.5 ppm					
			No 6	PID	8.9 ppm					

Table 1 Old Camp									
Date of Assessment	Site Location	Area of Survey	Test Pit	Parameters	Analytical Results	SGS	Soil Gas Survey		Criteria CCME/MOEE
							Distances in Feet	Compass Bearings	
10 Sept. 96	796.6 mi	450' x 500'	No 7	PID	0.0 ppm				PID
			No 8	PID	0.0 ppm				
			No 21	TEH	nd				MOEE 100ug/g
				OC Pests	nd				
				PID	16.8 ppm				
			No 24	PID	0.0 ppm				
			Surface Water	O/G	nd				
Notes: nd = parameters not detected bc = parameters are below criteria ppm = parts per million O/G = oil & grease									

Table 1a
Analytical Data Site No 2
Teslin Gun Club

Table 1a
Teslin Gun Club

Date of Assessment	Site Location	Area of Survey	Test Pit	Parameters	Analytical Results	SGS	Soil Gas Survey		Analytical Results	Criteria CCME/MOEE
							Distances in Feet	Compass Bearings		
11 Sept, 96	794 mi	750' x 1200'	No 1	PID	0.0 ppm	No 1	155	8°	10.0 ppm	
				TEH	nd	No 2	234	16°	2.7 ppm	MOEE 100ug/g
				ICP Metals	bc	No 3	271	23°	1.4 ppm	
				Phenols	0.20mg/kg	No 4	191	40°	7.3 ppm	CCME 1.0 ug/g
						No 5	92	76°	25.6 ppm	
			No 2	PID	0.0 ppm	No 6	227	68°	507 ppm	
						No 7	128	90°	123 ppm	
			No 3	PID	0.0 ppm	No 8	191	122°	9.5 ppm	
				PAH	nd	No 9	355	90°	6.1 ppm	
				OC Pests	nd	No 10	396	98°	0.0 ppm	CCME 1.0 ug/g
				Reg 347	nd	No 11	653	91°	17.4 ppm	
						No 12	677	105°	0.0 ppm	
			No 4	PID	3.1 ppm	No 13	689	116°	2.0 ppm	
				TEH	nd	No 14	510	111°	0.0 ppm	MOEE 100ug/g
				ICP Metals	bc	No 15	534	98°	0.0 ppm	
				Phenols	nd	No 16	491	116°	0.0 ppm	CCME 1.0 ug/g
			No 5	PID	1.2 ppm					
				TEH	nd					MOEE 100ug/g

Table 1a
Teslin Gun Club

Date of Assessment	Site Location	Area of Survey	Test Pit	Parameters	Analytical Results	SGS	Soil Gas Survey		Analytical Results	Criteria CCME/MOEE
							Distances in Feet	Compass Bearings		
11 Sept, 96	794 mi	750' x 1200'	No 6	PID	4.9 ppm				PID	
				TEH	nd					MOEE 100ug/g
			No 7	PID	2.3 ppm					
				TEH	nd					MOEE 100ug/g
			No 8	PID	3.9 ppm					
			No 9	PID	2.0 ppm					
			No 10	PID	3.7 ppm					
				PAH	nd					CCME 1.0 ug/g
				OC Pests	nd					
				Reg 347	nd					
			No 11	PID	2.7 ppm					
			No 12	PID	1.7 ppm					

Table 1a
Teslin Gun Club

Date of Assessment	Site Location	Area of Survey	Test Pit	Parameters	Analytical Results	SGS	Soil Gas Survey		Analytical Results	Criteria CCME/MOEE
							Distances in Feet	Compass Bearings		
11 Sept, 96	794 mi	750' x 1200'	No 13	PID	3.0 ppm				PID	
				TEH	nd					MOEE 100ug/g
			No 14	PID	1.7 ppm					
			No 15	PID	1.3 ppm					CCME 1.0 ug/g
				TEH	nd					MOEE 100ug/g
				ICP Metals	bc					
				Phenols	0.10mg/kg					
			No 16	PID	1.2 ppm					
			No 17	PID	2.6 ppm	No 22				
			No 18	PID	0.9 ppm					MOEE 100ug/g

Notes: nd = parameters not detected

bc = parameters are below criteria

ppm = parts per million

Table 1b
Analytical Data Site No 3
Oil Tank Station

Table 1b
Oil Pumping Station

Date of Assessment	Site Location	Area of Survey	Test Pit	Parameters	Analytical Results	SGS	Soil Gas Survey	Criteria CCME/MOEE
							Distance in Feet	Compass Bearing
11 Sept/96	1276 km	750'x1200'	No 1	PID	2.6 ppm	No 1	507	239°
						No 2	515	258°
			No 2	PID	1.2 ppm	No 3	498	262°
				TEH	nd	No 4	454	274°
				ICP Metals	bc	No 5	375	278°
				Phenols	0.12mg/kg	No 6	331	275°
						No 7	271	246°
			No 3	PID	0.08 ppm	No 8	237	274°
						No 9	169	250°
			No 4	PID	0.6 ppm	No 10	97	288°
				PAH	nd	No 11	48	290°
				OC Pests	nd	No 12	29	246°
				Reg 347	nd	No 13	4	198°
						No 14	24	206°
			No 5	PID	1.2 ppm	No 15	116	253°
				TEH	nd	No 16	116	198°
				ICP Metals	bc			
				Phenols	0.15 mg/kg			

		No 6	PID	1.6 ppm						
		No 7	PID	0.9 ppm						
			PAH	nd						CCME 1.0 ug/g
			OC Pests	nd						
			Reg 347	bc						
		No 8	PID	0.7 ppm						
			TEH	nd						MOEE 100ug/g
			Phenols	0.31 mg/g						CCME 1.0 ug/g
			PAH	nd						CCME 1.0 ug/g
		No 9	PID	0.7 ppm						
		No 10	PID	1.0 ppm						
			TEH	nd						MOEE 100ug/g
			Phenols	0.12 mg/kg						CCME 1.0 ug/g
		No 11	PID	0.1 ppm						
			PAH	nd						CCME 1.0 ug/g
			OC Pests	nd						
			Reg 347	nd						
		No 12	PID	0.9 ppm						

[illegible]

Table 1c
Analytical Data Site No 4
Camp 8 E

Table 1 c
Camp 8 E

Date of Assessment	Site Location	Area of Survey	Test Pit	Parameters	Analytical Results	SGS	Soil Gas Survey		Analytical Results	Criteria CCME/MOEE
							Distance in Feet	Compass Bearing		
12/13 Sep/96	1270 km	240'x1100'	No 1	PID	9.0 ppm	No 1	142	180°	2.4 ppm	
				TEH	nd	No 2	239	204°	9.2 ppm	MOEE 100 ug/g
				ICP Metals	bc	No 3	275	170°	3.7 ppm	
				Phenols	0.12 mg/kg	No 4	300	108°	2.7 ppm	CCME 1.0 ug/g
						No 5	97	112°	8.0 ppm	
			No 2	PID	7.9 ppm	No 6	189	118°	0.0 ppm	
						No 7	222	106°	8.9 ppm	
			No 3	PID	0.08 ppm	No 8	280	118°	0.0 ppm	
				TEH	947 mg/kg	No 9	338	110°	9.7 ppm	MOEE 100ug/g
				ICP Metals	bc	No 10	515	113°	13.2 ppm	
				Phenols	0.07mg/kg	No 11	515	115°	3.1 ppm	CCME 1.0 ug/g
						No 12	174	117°	11.4 ppm	
			No 4	PID	7.3	No 13	621	119°	6.2 ppm	
						No 14	556	116°	2.5 ppm	
			No 5	PID	6.9 ppm	No 15	471	115°	4.0 ppm	
				PAH	nd					CCME 1.0 ug/g
				OC Pests	nd					
				Reg 347	nd					

			No 6	PID	6.8 ppm								
				PAH	nd								CCME 0.1 ug/g
				OC Pests	nd								
				Reg 347	nd								
			Water	TEH	nd								MOEE (NV)
				PAH	nd								CCME 0.01ug/l
			Water Surface	O/G									
				ICP Metals	bc								
				Phenols	nd								CCME 0.1 ug/l
				OC Pests	nd								
				PAH	nd								CCME 0.01ug/l

Notes: nd = non detect

bc = below criteria

ppm = parts per million

Table 1d
Analytical Data Site No 5
Morley River Lodge

Table 1d
Morley River Lodge

Date of Assessment	Site Location	Area of Survey	Test Pit	Parameters	Analytical Results	SGS	Soil Gas Survey		Analytical Results	Criteria CCME/MOEE
							Distance in Feet	Compass Bearing		
12 Sept/96	1250km	250' x 500'	No 1	PID	1.9 ppm	No 1	280	97°	0.0 ppm	
				TEH	nd	No 2	210	93°	0.0 ppm	MOEE 100ug/g
				ICP Metals	bc	No 3	137	85°	1.6 ppm	
				Phenols	0.12 mg/kg	No 4	84	110°	0.0 ppm	CCME 1.0 ug/g
						No 5	38	210°	0.8 ppm	
			No 2	PID	2.1 ppm	No 6	133	132°	0.0 ppm	
						No 7	157	146°	0.0 ppm	
			No 3	PID	0.08 ppm	No 8	198	129°	109.0 ppm	
				PAH	nd	No 9	319	98°	1.5 ppm	CCME 0.1 ug/g
				OC Pests	nd	No 10	319	112°	0.0 ppm	
				Reg 347	nd					

Notes: nd = non detect
bc = below criteria
ppm = parts per million

Table 1e
Analytical Data Site No 6
Dumping Area and
Gravel Pit

Table 1e
Gravel Pit

Date of Assessment	Site Location	Area of Survey	Test Pit	Parameters	Analytical Results	SGS	Soil Gas Survey		Analytical Results	Criteria CCME/MOEE
							Distance in Feet	Compass Bearing		
12 Sept/96	1256 km	50' x 500'	No 1	PID	0.0 ppm	No 1	384	51°	0.6 ppm	
				TEH	1380 mg/kg	No 2	468	38°	0.0 ppm	MOEE 100 ug/g
				ICP Metals	bc2	No 3	483	342°	0.0 ppm	
				Phenols	0.09 mg/kg	No 4	468	353°	7.8 ppm	CCME 1.0 ug/g
						No 5	459	351°	10.8 ppm	
			No 2	PID	0.0 ppm	No 6	338	234°	0.0 ppm	
				TEH	nd	No 7	304	226°	8.9 ppm	MOEE 100ug/g
				Phenols	0.09 mg/kg	No 8	210	223°	0.0 ppm	CCME 1.0 ug/g
						No 9	210	231°	6.2 ppm	
			No 3	PID	0.0 ppm	No 10	125	230°	7.1 ppm	
				TEH	nd	No 11	67	259°	0.0 ppm	MOEE 100ug/g
						No 12	55	238°	6.4 ppm	
			No 4	PID	0.0 ppm					
				TEH	nd					MOEE 100ug/g
			No 5	PID	0.0 ppm					
			No 6	PID	0.0 ppm					

		No 7	PID	0.0 ppm					
		No 8	PID	0.0 ppm					
		Pond Water	O/G	nd					
			TEH	nd					MOEE (NV)
			PAH	nd					CCME 0.01ug/l
			ICP Metals	bc					
			Phenols	nd					CCME 0.1 ug/l
			OC Pests	nd					
Notes: nd = non detect bc = below criteria ppm = parts per million nv = no value									

Table 1f
Analytical Data Site No 7
Military Site and Lodge

Table 1f
Military Site and Lodge

Date of Assessment	Site Location	Area of Survey	Test Pit	Parameters	Analytical Results	SGS	Soil Gas Survey		Analytical Results	Criteria CCME/MOEE
							Distance in Feet	Compass Bearing		
13Sept/96	125 km	50' X 150'	No 1	PID	6.7 ppm	No 1	133	243°	0.0 ppm	
				TEH	nd	No 2	140	239°	13.8 ppm	MOEE 100ug/g
				ICP Metals	bc	No 3	181	240°	0.2 ppm	
				Phenols	nd	No 4	176	246°	14.7 ppm	CCME 1.0 ug/g
			No 2	PID	5.8 ppm					
				PAH	nd					
				OC Pests	nd					
				Reg 347	nd					
			No 3	PID	4.3 ppm					
				TEH	nd					MOEE 100ug/g
				Phenols	0.57 mg/kg					CCME 1.0 ug/g

Notes: nd = non detect
bc = below criteria
ppm = parts per million