ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Certificate of Analysis

GOLDER ASSOCIATES LTD.
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Report Date: 19-AUG-09 17:49 (MT)
Version: FINAL

Lab Work Order #: L802785 **Date Received:** 08-AUG-09

Project P.O. #: 09-1426-015/9000
Job Reference: 09-1426-0015
Legal Site Desc: LAND FARM AREA AT MELIADINE SITE
CofC Numbers:
Other Information:

Comments:

J.M Weeks

JANINE WEEKS
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ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L802785-1
	Description	SOIL
	Sampled Date	08-AUG-09
	Sampled Time	
	Client ID	SOIL LINE MELIADINE LAND FARM SITE
Grouping	**Analyte**	
SOIL		
Physical Tests	% Moisture (%)	14.5
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050
	Ethylbenzene (mg/kg)	<0.010
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20
	Styrene (mg/kg)	<0.050
	Toluene (mg/kg)	<0.050
	ortho-Xylene (mg/kg)	<0.050
	meta- & para-Xylene (mg/kg)	<0.050
	Xylenes (mg/kg)	<0.10
	Surrogate: 4-Bromofluorobenzene (SS) (%)	108
	Surrogate: Fluorobenzene (SS) (%)	90
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10
	F1-BTEX (mg/kg)	<10
	F2 (C10-C16) (mg/kg)	76
	F3 (C16-C34) (mg/kg)	209
	F4 (C34-C50) (mg/kg)	<50
	F4G-SG (mg/kg)	<500
	Chrom. to baseline at nC50	NO
	Surrogate: 2,4-Dichlorotoluene (SS) (%)	87

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
F1-BTX-CALC-VA	Soil	F1-Total BTX	CCME CWS PHC TIER 1 (2001)

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10) and F1-BTEX, a subsample of the sediment/soil is extracted with methanol and analysed by purge & trap GC/FID. The F1-BTEX result is then calculated as follows:

F1-BTEX: F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).

F1-MET-PT-FID-VA	Soil	CCME by Purge and Trap with GCMS	EPA 8260B & 524.2

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10), a subsample of the sediment/soil is extracted with methanol and analysed by purge & trap GC/FID.

Notes:
1. F1 (C6-C10): Sum of all hydrocarbons that elute between nC6 and nC10.
2. Reported results are expressed as milligrams per dry kilogram.
3. This method is validated for use.
4. Data from analysis of quality control samples is available upon request.

F2F4-TUMB-H/A-FID-VA	Soil	Petroleum Hydrocarbon by Tumbler GCFID	CCME

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For C10 to C50 hydrocarbons (F2, F3, F4) and gravimetric heavy hydrocarbons (F4G-sg), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds. F2, F3 & F4 are analyzed by on-column GC/FID, and F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where F4 (C34-C50) and F4G-sg results are reported for a sample, the larger of the reported values is used for comparison against the relevant CCME standard for F4.
7. The gravimetric heavy hydrocarbon results (F4G-sg), cannot be added to the C6 to C50 hydrocarbon results.
8. This method is validated for use.
9. Data from analysis of quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram.

MOISTURE-VA	Soil	Moisture content	ASTM METHOD D2974-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

OGG-F4G-TUMB-SG-VA	Soil	CWS F4G with Silica Gel	CCME

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For gravimetric heavy hydrocarbons (F4G-sg), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds prior to gravimetric analysis.

Notes:
1. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
3. Where F4 (C34-C50) and F4G-sg results are reported for a sample, the larger of the reported values is used for comparison against the relevant CCME standard for F4.
4. The gravimetric heavy hydrocarbon (F4G-sg) result cannot be added to the C6 to C50 hydrocarbons results.
5. This method is validated for use.
6. Data from analysis of quality control samples is available upon request.
7. Reported results are expressed as milligrams per dry kilogram.

VOC7-MET-PT-MS-VA	Soil	BTEX by MeOH with Purge and Trap GCMS	EPA 8260B & 524.2

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

Volatile Organic Compounds (VOC) are extracted from sediment or soil with methanol, following a procedure from the British Columbia Ministry of Water Land and Air Protection (BCWLAP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999). Aliquots of the extract are analyzed by Purge and Trap by gas chromatography with mass spectrometric detection (GC/MS), using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260B, published by the United States Environmental Protection Agency (EPA). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation. Where required to achieve lower detection limits for select regulations, additional analysis using headspace-GCMS may be employed.

VOC7/VOC-SURR-MS-VA	Soil	VOC7 and/or VOC Surrogates for Soils	EPA METHODS 8260B & 524.2
XYLENES-CALC-VA	Soil	Sum of Xylene Isomer Concentrations	EPA 8260B & 524.2

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in environmental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.