srk consulting

SRK Consulting (Canada) Inc
202-5204 50th Avenue
Yellowknife, NT X1A 1E2

T: +1 867 873 8670
F: +1 866 380 3458

yellowknife@srk.com
www.srk.com

Memo

To:	Johan Skoglund	**Date:**	July 20, 2013
Company:	Nyrstar	**From:**	Arlene Laudrum
Copy to:	Randi Hay, DFO	**Project #:**	1CB002.002
Subject:	Nanisivik concrete pad soil management plan		

This memo provides the soil management plan for the use of the existing concrete pad (the Pad) during remediation of the contaminated soil at the former bulk fuel storage facility. Approval to use the Pad has been obtained from DFO for the period June 1, 2013 and August 1, 2014.

1 Modifications

The modifications made to the Pad for use as a temporary soil storage area are illustrated on the figure in Attachment A and the photos in Attachment B. The modifications include sealing cracks and holes in the pad and structures to divert and capture surface runoff water.

Soil removed from the cracks and holes may have elevated concentrations of lead and zinc. The soil has been containerized and it will be disposed of off-site if laboratory results determine elevated concentrations are present.

2 Soil Management

The Pad is used for the temporary storage of the following materials:

- Oversized rocks recovered from the vibrating screening process with limited aggregates of soil remaining on the surface[1,2], and
- Soil removed from the treatment facilities determined to have petroleum hydrocarbon F2 concentrations not exceeding 520 ppm.

3 Monitoring

To monitor the impact of the use of the Pad as a temporary storage area soil samples will be collected from the down gradient (north) end of the storage area in July and August 2013 and prior to decommission the area in July 2014.

To establish baseline soil conditions prior to the use of the Pad soil samples were collected from the soil at the down gradient face area being used where surface runoff water from the temporary soil storage area would report to. The soil adhering to oversized rocks and from the former access ramp at the south end of the Pad were also characterized. The results presented are Table 1. The laboratory certificate is included in Attachment C.

[1] Analytical results for swab tests collected from the oversized rock in 2012 reported total petroleum hydrocarbon concentrations below the analytical detection limit of 100 ppm.
[2] Analytical results for soil adhering to the oversized rock in 2012 reported total petroleum hydrocarbon concentrations of less than 220 ppm, including an F2 concentration of 170 ppm.

Table 1: Baseline Characterization Samples

Location	Sample number	F2 (ppm)	F3 (ppm)	F4 (ppm)	Lead (ppm)	Zinc (ppm)
North end of storage area at sump (west of access ramp)	13300	<30	894	<50	-	-
Soil adhering to oversized rock in 2013	13301	149	81	<50	-	-
Access ramp at north end of storage area	13302	<30	<50	<50	141	2370
North end of storage area east of access ramp	13303	<30	<50	<50	-	-
Former access ramp at south end of Pad	13307	-	-	-	155	727

- ALS laboratory certificate L13327696

3.1 Water Management Structures

Ditches and berms to divert and contain water have been established on and adjacent to the Pad. These structures are monitored during rainfall events and repaired as required to maintain drainage patterns during the active field season.

4 Winterization

Prior to demobilization for winter the condition of the ditches and berms will to be photographed and weak areas reinforced in an effort to accommodate the spring runoff. Stockpiles of similar quality material (grain size and petroleum hydrocarbon concentrations) will be merged and leveled to discourage the accumulation of snow and resulting melt water.

5 Restoration

Prior to August 1, 2014 all materials stored on the Pad will be relocated to the working areas identified in the *Nanisivik Mine Contaminated Soil Remediation 2012 Progress Report* (SRK and WESA March 2013).

Regards

SRK Consulting (Canada) Inc.

Arlene Laudrum, PGeol
Principal Consultant

Enclosures:

Appendix A: Modification to Pad Design Figure
Appendix B: Photographs
Appendix C: Laboratory Certificate

Appendix A: Modification to Pad Design Figure

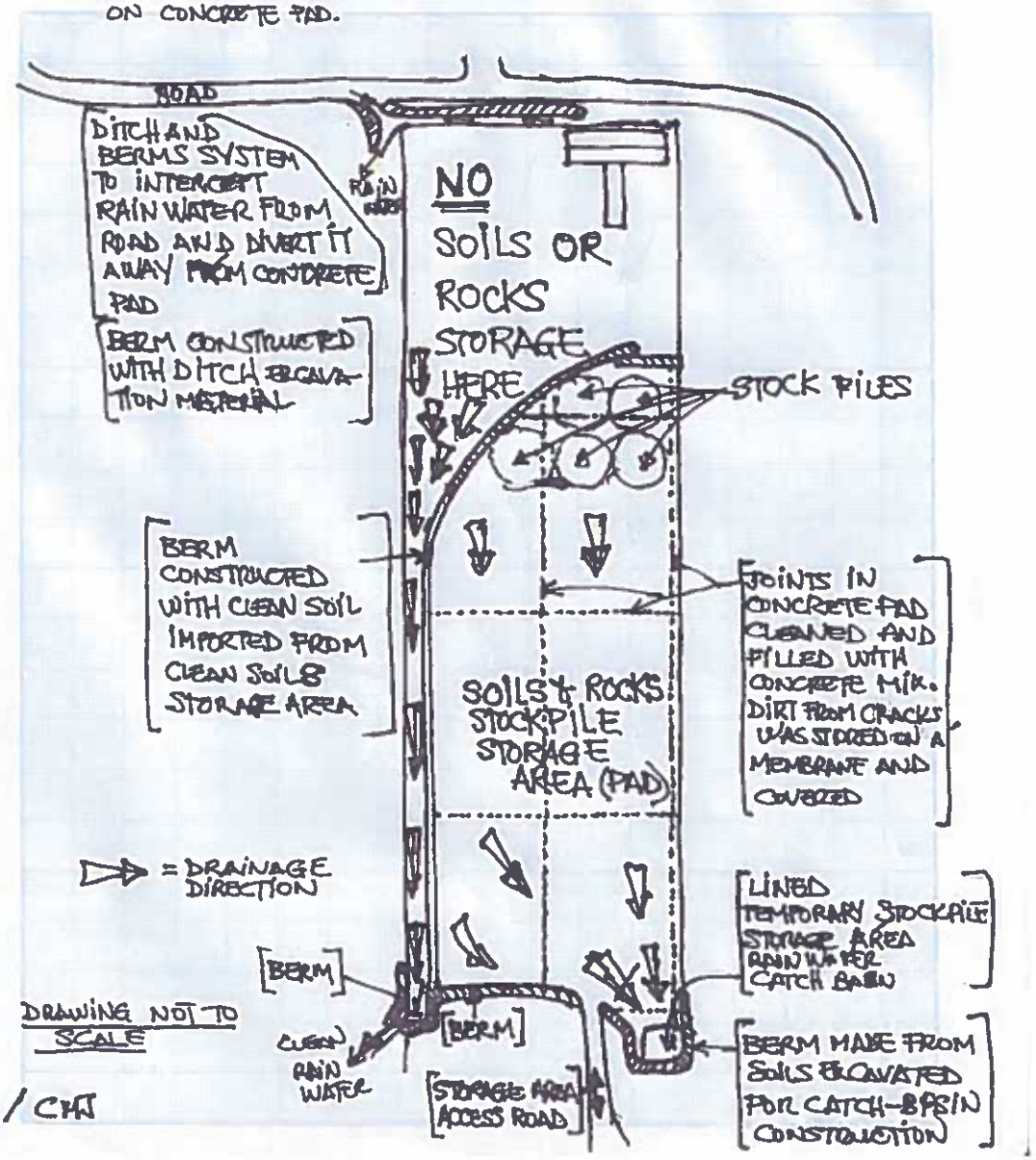
SRK Consulting
Engineers and Scientists

Project No. _____ Site NANISIVIK MINE

Prepared by DANIEL FOURTEUK (EIT) Date JUNE 28, 2013

Approved by _____ Date _____

Subject TEMPORARY SOILS AND ROCKS STOCKPILE ON CONCRETE PAD. Sheet 1 of 1



DF / CMI

Nanisivik fuel tank farm reclamation

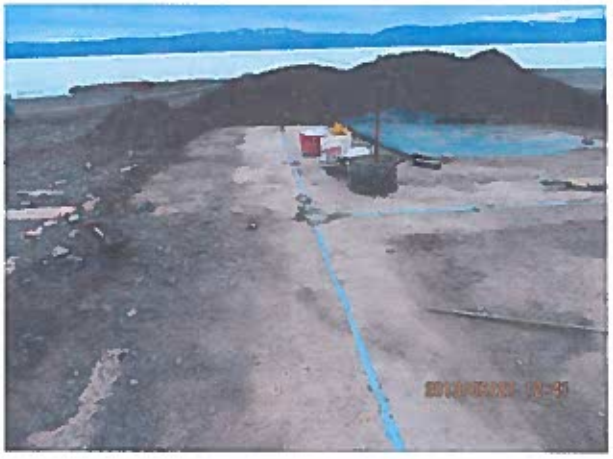
Concrete Pad Preparation June 2013

Activity
Joints on the concrete pad are cleared of fill

Key Issues
- Residual lead and zinc concentrate could be present in joints. Removal of the fill from the cracks reduces risk of soil placed here from picking up lead and zinc concentrate.
- Joints allow water to flow under the pad. Sealing the joints directs surface water flow to a low point on the pad where it can be monitored and managed.

Activity
Material removed from joints and holes is picked up

Key Issues
- Material in joints is assumed to be contaminated with lead and zinc concentrate.
- The material collected is stored separately and will be disposed of in an approved area depending on laboratory test results.



Activity
Joints are sealed with concrete and sealant and a surface water collection area prepared

Key Issues
- The pad is sloped such that water runs to the northwest. A berm and lined collection area is prepared.
- The joints, cracks and holes are filled with sealant or cement to prevent surface water from going under the pad.

Nanisivik fuel tank farm reclamation

Concrete Pad Preparation June 2013

Activity
Water diversion berms established

Key Issues
- To reduce excess surface water from flowing across the pad and coming into contact with potentially contaminated materials a berm is constructed on the north and east side of the pad.

Activity
Initially, surface water from above the site would flow onto the pad.

Key Issues
- Surface runoff from above the pad was entering the area

Activity
A ditch and berm were installed to divert water away from the pad

Key Issues
- Reduce amount of surface water entering the pad.
- Reduce traffic entering the area and possibly tracking contaminated material with the tires.

SRK CONSULTING (CANADA) INC.
ATTN: Arlene Laudrum
202 - 5204 50th Avenue
Yellowknife NT X1A 1E2

Date Received: 16-JUL-13
Report Date: 19-JUL-13 17:30 (MT)
Version: FINAL

Client Phone: 867-766-6332

Certificate of Analysis

Lab Work Order #: L1332796

Project P.O. #: 1CB002.002
Job Reference: NANISIVIK
C of C Numbers: 123422, 123423
Legal Site Desc:

Andre Langlais
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1332796-1	L1332796-2	L1332796-3	L1332796-4	L1332796-8
	Description	S	S	S	S	S
	Sampled Date	27-JUN-13	27-JUN-13	27-JUN-13	27-JUN-13	28-JUN-13
	Sampled Time					
	Client ID	13300	13301	13302	13303	13307
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	6.20	5.40	2.95	7.76	
	pH (1:2 soil:water) (pH)			8.95		8.94
Metals	Lead (Pb) (mg/kg)			141		155
	Zinc (Zn) (mg/kg)			2370		727
Hydrocarbons	F2 (C10-C16) (mg/kg)	<30	149	<30	<30	
	F3 (C16-C34) (mg/kg)	894	81	<50	<50	
	F4 (C34-C50) (mg/kg)	<50	<50	<50	<50	
	Chrom. to baseline at nC50	YES	YES	YES	YES	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Lead (Pb)	DUP-H	L1332796-3, -8

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
F2F4-TUMB-H/A-FID-VA	Soil	Petroleum Hydrocarbon by Tumbler GCFID	CCME PETROLEUM HYDROCARBONS

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.

MET-200.2-CCMS-VA	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MOISTURE-VA	Soil	Moisture content	ASTM D2974-00 Method A

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

PH-1:2-VA	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60ºC) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

123422 123423

Reference Information

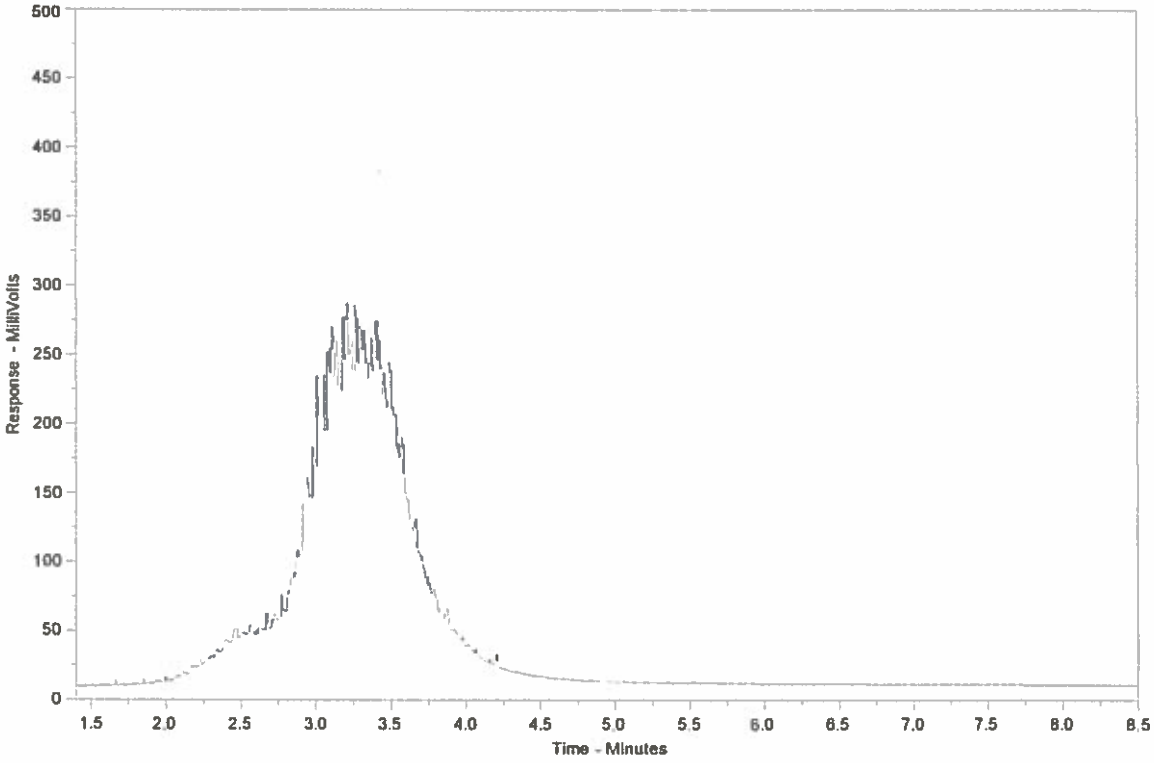
GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
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.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1332796-C-1
Client Sample ID: 13300



nC10	nC16	nC34	nC50
174°C	287°C	461°C	575°C
346°F	549°F	861°F	1067°F
← Gasoline →		← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

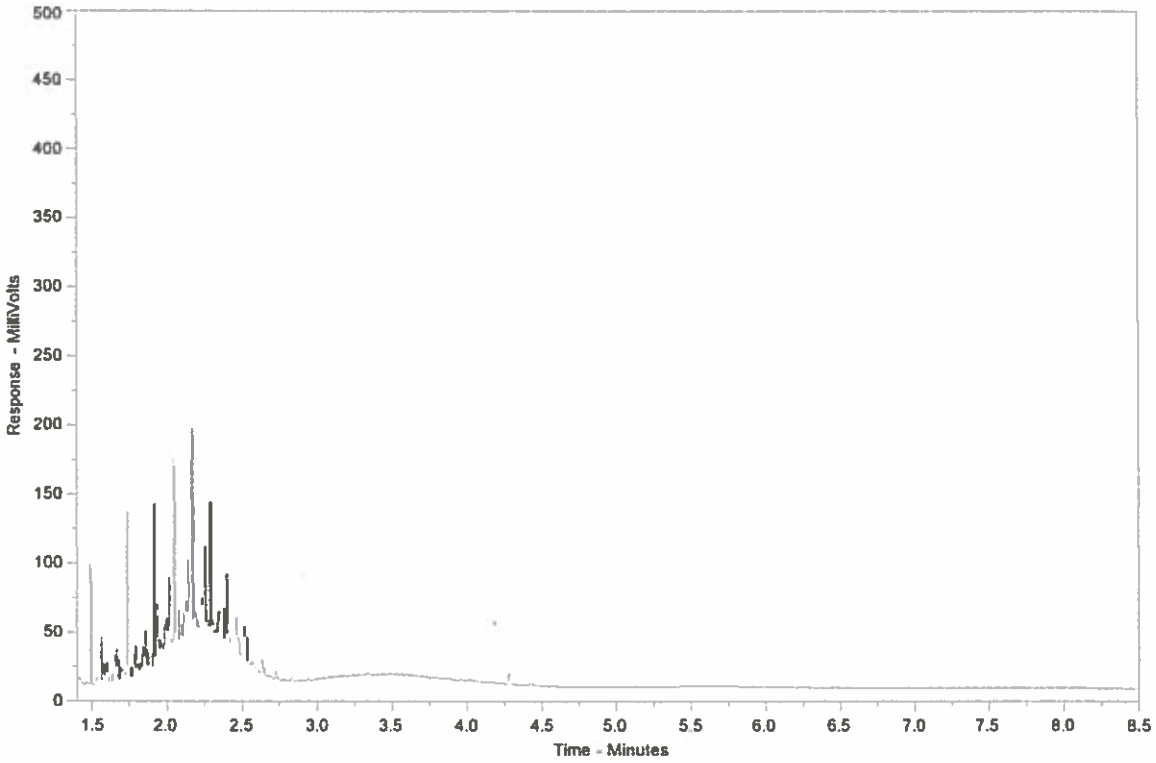
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1332796-C-2
Client Sample ID: 13301



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

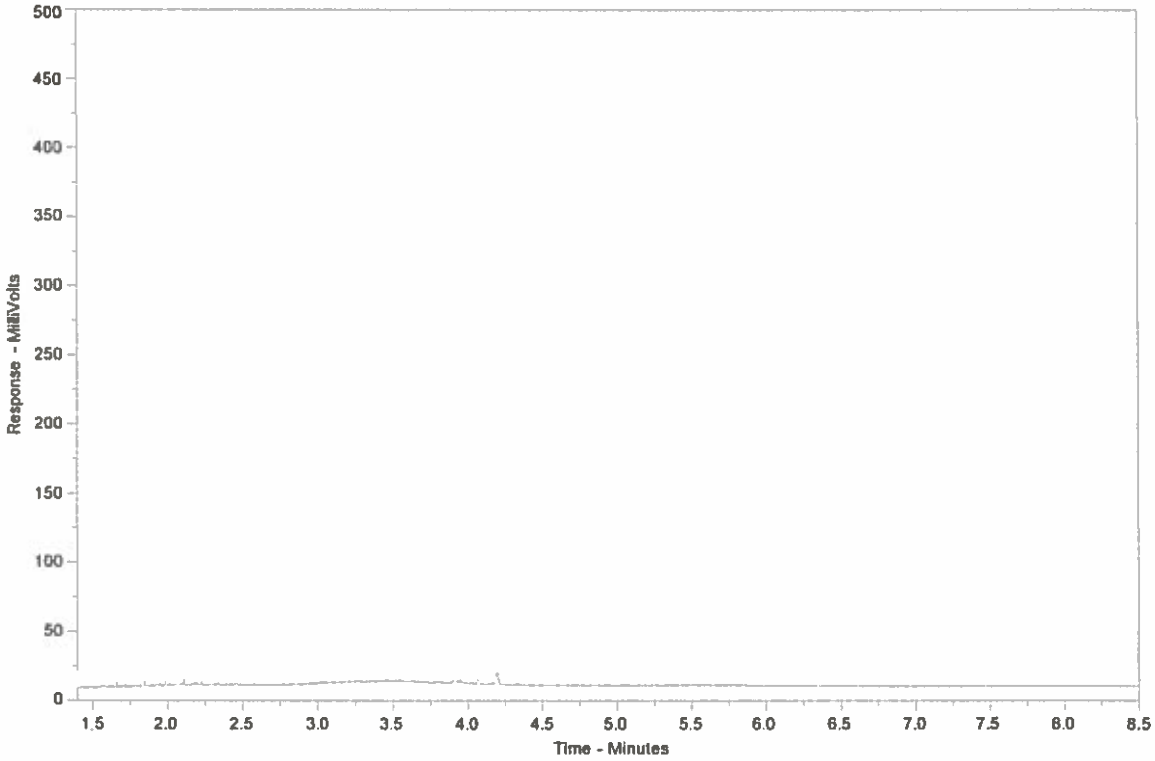
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1332796-C-3
Client Sample ID: 13302



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

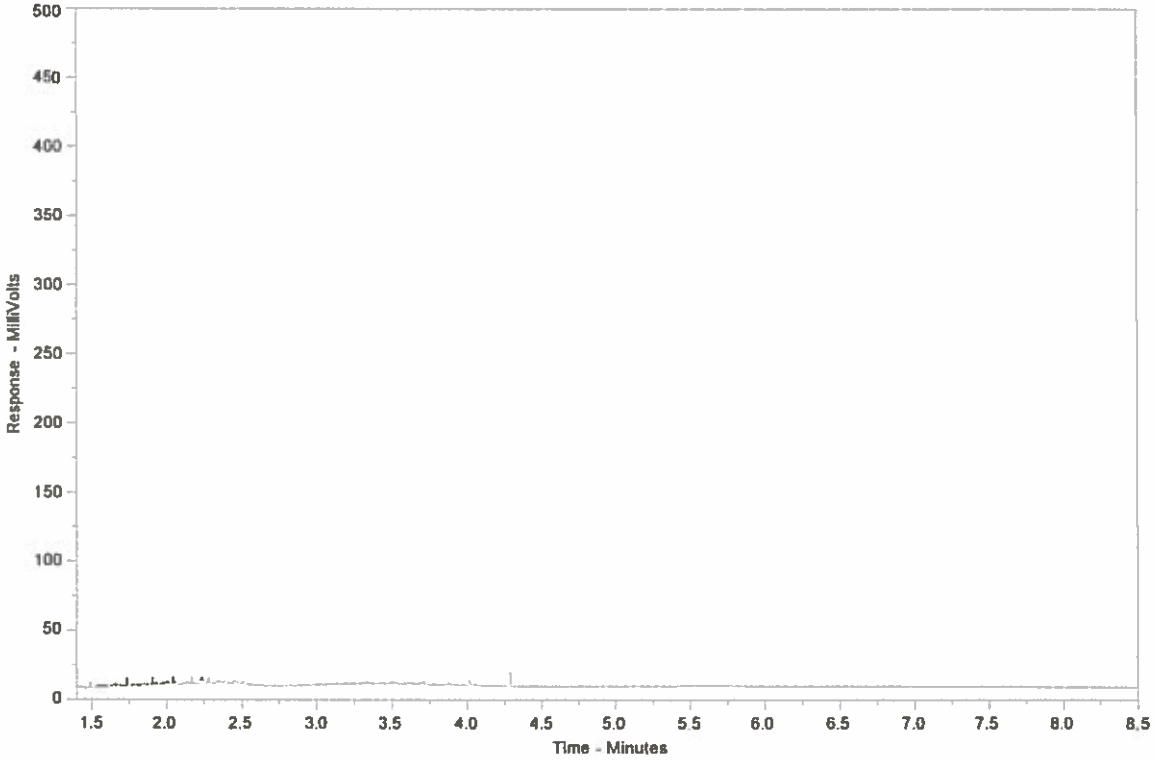
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1332796-C-4
Client Sample ID: 13303



nC10	nC16	nC34	nC50
174°C	287°C	461°C	575°C
346°F	549°F	698°F	1067°F
← Gasoline →		← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at left.

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CHAIN OF CUSTODY

123422

Exova Accutest

☑ 146 Colonnade Rd., Unit 8, Ottawa, ON K2E 7Y1, Ph: (613) 727-5692 Fax: (613) 727-5222
☐ 608 Norris Court, Kingston, ON K7P 2R9, Ph: (613) 634-9307 Fax: (613) 634-9308
☐ 380 Vansickle Rd., Unit 630, St. Catharines, ON L2R 6P7, Ph: (905) 680-8887 Fax: (905) 680-4256

LABORATORY USE ONLY
Report #: _____

Company Name: CanZinco c/o Nyrstar	Address: 2840-650 W Georgia St
Report Attention: Johan Skoglund	City/Prov: Vancouver BC Postal Code: V6B 4N8
Phone: 604 336 8309 Ext:	Project #: Nanisivik * Quotation #: 130338
* Waterworks Name:	* Waterworks Number:

☐ Fax Results to: _____
☑ E-mail Results to: jlaudrum@srk.com jfauteux@groupe cmj.com
☑ Copy of Results to: _____

Note that for drinking water samples, all exceedances will be reported where (and how) the applicable legislation requires.

Invoice to: (if different from above)
same

L1332796

SAMPLE ANALYSIS REQUIRED

⇦ Indicate: F=Filtered or P=Preserved

Sample ID	* Date/Time Collected	Sample Matrix i.e. Water, Soil, Paint	* Sample Type (see Codes below)	* MOE Reportable? Y=Yes N=No	# of Containers	** Service Required R=Rush S=Standard	F2-F4	Pb, Zn							Criteria Required (i.e. Reg. 170, Reg. 153, CCME, PWQO etc.) Include sub-categories if appropriate	Laboratory Identification
13300	June 27/13	S			2	S	X								CCME	
13301					2		X								CL	
13302					3		X	X								
13303					2		X									
13304					2		X									
13305					2		X									
13306					2		X									
13307	June 28/13				1	S		X								
13308					2	S	X									
13309					2	S	X									

L1332796-COFC

Sample Type Codes for Drinking Water Systems: RW = Raw Water, RWFC = Raw Water For Consumption, TW = Treated Water at point of entry to distribution, DW = Distribution/Plumbing Water
"MOE Reportable" refers to the requirements under the SDWA for immediate reporting of results, which are indicators of adverse water quality, to the Owner/Operator, MOE, and MOH Medical Officer.

Sampled By: Print: A Laudrum Sig: A Laudrum	Date/Time: 28/6/13	Relinquished By: Print: A Laudrum Sig: A Laudrum	Date/Time: 28/6/13	Comments	Cooler Temp (°C) on Receipt
Work Authorized By (signature): Print: A Laudrum Sig: A Laudrum	Date/Time: 28/6/13	Received By Lab: Print: Brit Sig:	Date/Time: July 16 10:00		23.9 °C

* Indicates a required field. If not complete, analysis will proceed only on verification of missing information. A quotation number is required, if one was provided.
** There may be surcharges applied to "Rush" service. Please check with lab prior to submission of samples for rush analysis to confirm availability and pricing.

AFCOCR.2

Copies: White - Laboratory, Yellow - With Report, Pink - Sampler

CHAIN OF CUSTODY

123423

Exova Accutest

☒ 146 Colonnade Rd., Unit 8, Ottawa, ON K2E 7Y1, Ph: (613) 727-5692 Fax: (613) 727-5222

☐ 608 Norris Court, Kingston, ON K7P 2R9, Ph: (613) 634-9307 Fax: (613) 634-9308

☐ 380 Vansickle Rd., Unit 630, St. Catharines, ON L2R 6P7, Ph: (905) 680-8887 Fax: (905) 680-4256

LABORATORY USE ONLY
Report #: _____

Company Name: Canzinco c/o Nyrstar	Address:	☐ Fax Results to:
Report Attention: Johan Skoglund	City/Prov: Postal Code:	☑ E-mail Results to: Alaudrum
Phone: Ext:	Project # Nanisivik * Quotation # 133 130339	☐ Copy of Results to: Hauteux
* Waterworks Name:	* Waterworks Number:	*Note that for drinking water samples, all exceedances will be reported where (and how) the applicable legislation requires.*

Invoice to: (if different from above) L1332796
Same

SAMPLE ANALYSIS REQUIRED

⇦ Indicate: F=Filtered or P=Preserved

Sample ID	* Date/Time Collected	Sample Matrix i.e. Water, Soil, Paint	* Sample Type (see Codes below)	* MOE Reportable? Y = Yes N = No	# of Containers	** Service Required R=Rush S=Standard	XF2-F4	Criteria Required (i.e. Reg. 170, Reg. 153, CCME, PWQO etc.) Include sub-categories if appropriate	Laboratory Identification
133390	June 28/13	S			2	S	X	CCME CL	

L1332796-COFC

Sample Type Codes for Drinking Water Systems: **RW** = Raw Water, **RWFC** = Raw Water For Consumption, **TW** = Treated Water at point of entry to distribution, **DW** = Distribution/Plumbing Water
"MOE Reportable" refers to the requirements under the SDWA for immediate reporting of results, which are indicators of adverse water quality, to the Owner/Operator, MOE, and MOH Medical Officer.

Sampled By: Print: Alaudrum Sig: Alaudrum	Date/Time: 28/6/13	Relinquished By: Print: Alaudrum Sig: Alaudrum	Date/Time: 28/6/13	Comments	Cooler Temp (°C) on Receipt
Work Authorized By (signature): Print: Alaudrum Sig: Alaudrum	Date/Time: 28/6/13	Received By Lab: Print: Britt Sig:	Date/Time: July 16 10:00		23.9 °C

* Indicates a required field. If not completed, analysis will proceed only on verification of missing information. A quotation number is required, if one was provided.
** There may be surcharges applied to "Rush" service. Please check with lab prior to submission of samples for rush analysis to confirm availability and pricing.

AFCOCR.2

Copies: White - Laboratory, Yellow - With Report, Pink - Sampler