MEL7 Exceedance Communications and Results

From: David Frenette
To: Christine Wilson (Christine.Wilson@aandc-aadnc.gc.ca) ; Erik Allain (Erik.Allain@aandc-aadnc.gc.ca)
Cc: Meliadine Environment
Subject: TR: RE: Issue with Meliadine Sewage Treatment Plant, licence 2BB-MEL1424
Date: Thursday, December 17, 2015 9:42:36 AM
Attachments: image010.png
image011.png
image013.png
image014.png
2015-11-30 STP L1708799_COA.PDF
2015-11-23 STP L1706724_COA.PDF
2015-12-07_STP_L1711774.PDF
image019.png

Hi Christine,

Please see below the answers to your questions,

Regards,

David Frenette
Environmental Coordinator

david.frenette@agnicoeagle.com

T: 819.874.5980 ,3622

Agnico Eagle Mines Limited
765, chemin de la mine Goldex c.p. 87
Val-d'Or, QC, Canada
J9P 4N9

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AGNICO EAGLE

De : Christine Wilson [mailto:Christine.Wilson@aandc-aadnc.gc.ca]
Envoyé : 14 décembre 2015 14:37
À : David Frenette; Erik Allain
Cc : karen.kharatyan@nwb-oen.ca
Objet : Fwd: RE: Issue with Meliadine Sewage Treatment Plant, licence 2BB-MEL1424

Hi David,

Thank you for getting back to me, I do have a few questions upon review of the incident.

- The fecal samples that were found over criteria do not have the actually result included in the table; is there reason this information is not been made available? I would like the lab analysis reports for my files.

Please see attached the results from ALS. Their detection limit for fecal coliforms is >2000 CFU/100ml. We have switched to Multi Lab as they provide the exact number.

- Has the retention basins been utilized?

The November 23 and 30 analysis confirmed that we have an exceedance in fecal coliforms after the ozone treatment, but the effluent was compliant after the UV. So on December 4th, we started to discharge directly after the UV instead of after the ozone in order to discharge a compliant effluent. When the problem was identified and the piping and sump cleaned, we restarted to discharge the effluent after the ozone treatment. The preliminary December 7th sampling results confirmed the effluent was compliant with the licence. We will continue to sample the 2 locations. At the present time we are investigating the reason why the effluent increases in fecal coliforms when, in fact it should destroy more after UV treatment. Additional maintenance is planned for the Ozomax during this month (ie changing of piping, discussion with supplier, etc). Because the effluent was compliant it was not necessary to utilize the retention tanks.

- The "sludge" that was found in the sump # 3- To clarify; some of the water in that sump is directly from the RBC and the remainder is from UV treatment loop?

During the installation of the ozomax last summer, some modifications to the piping were made. During the investigation conducted by the environment department, one of the modifications was identified as a potential cause of the sludge issue present in sump #3. Specifically, the overflow/bypass line from "sump #1" to "sump #3" was identified. This overflow/bypass operates when the 25 micron filter bag becomes clogged and caused sump #1 to overflow. This resulted in untreated effluent bypassing the filtration and disinfection portions of the treatment system, coating the inside of the plumbing with TSS/sludge,thus entering the Ozomax receiving tank. The "bypass" line use are now prevented by ensuring filters are inspected daily and changed regularly to avoid "clogging" . In addition we have adjusted the peak flows by delivering sewage from the portal during "off peak " times. In addition, the sewage from the portal will be brought to the STP daily instead of every two days as in the past (less loading/volume at one time) – so the loading will be more uniform and consistent.

- If this is the case I would say that MEL 7 is at the wrong location. MEL 7 is to be located at the final discharge point, effluent that leaves the treatment facility. Which I understood as being the UV treatment loop, please suggest the correct location for this sampling location inside. I would appreciate a picture of the location (with appropriate signage).

You are correct that the MEL7 was after the UV, but only for a couple days while the piping to the Ozomax was cleaned. After the cleaning, MEL7 becomes the main effluent sample location as you suggested during your October inspection. The sampling point after the UV is referenced in the table previously provided to you as MEL7-a.

- Do you have an update about the bionest system that was installed?

The Bionest system is still being installed and is in the commissioning process. Prior to any discharge the effluent will be sampled to ensure compliance in accordance with the license. In addition you will also be notified 10 days in advance, also in accordance with the license.

I will be leaving the office tomorrow until January 6th, please keep me informed via email during this time. I ask you to contact Erik Allain (on this email) if you require immediate assistance.

Regards,

Christine

Christine Wilson
Water Resource Officer | Agent des ressources hydriques
Indigenous and Northern Affairs | Affaires autochtones et du Nord Canada Kivalliq Regional Office | Bureau régional du Kivalliq
Ikingutigiit Center Suite 1| Centre de Ikingutigiit 1 Suite , PO Box 129 | CP 129
Rankin Inlet, NU X0C 0G0

Phone | Tél. : 867-645-2830
Fax | Téléc. : 867-645-2592
Christine.Wilson@aandc-aadnc.gc.ca

>>> David Frenette <david.frenette@agnicoeagle.com> 12/14/2015 10:53 AM >>>
Hi Christine,

Currently, there are 144 people at camp. Please see below the tables including the MEL-7a sample (sample point just after the UV) and MEL-7 (sample point after the ozone). We'll include this information in the November monthly report as requested.

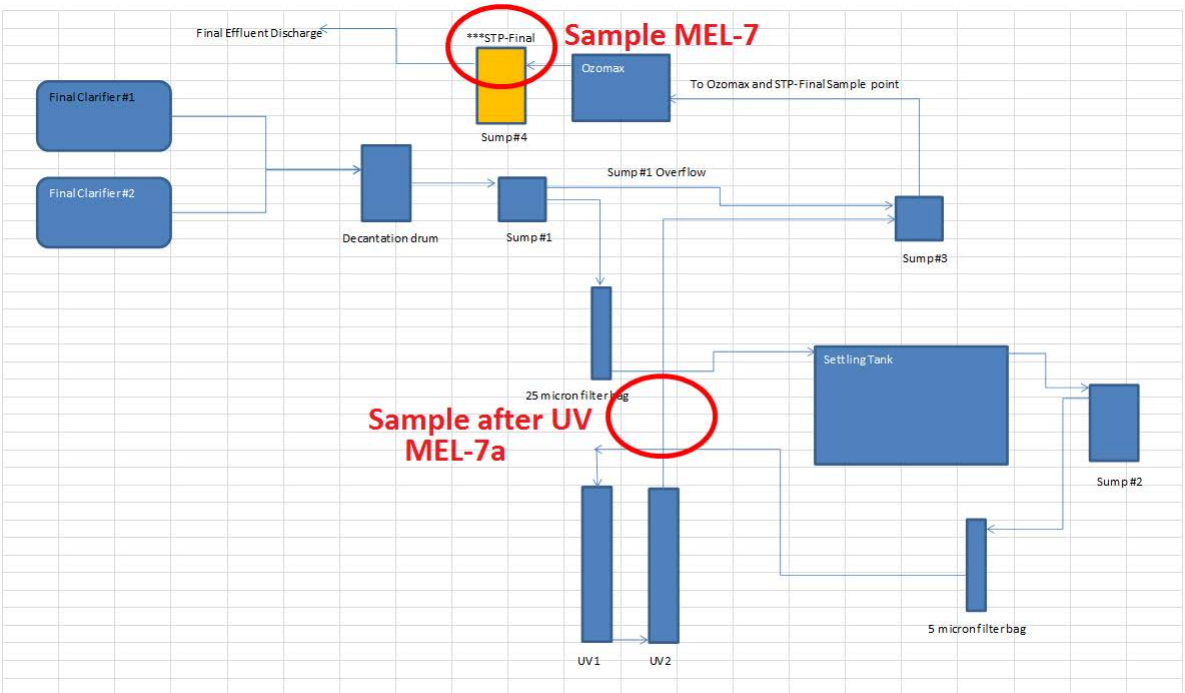
Regards,

MEL-7a_Post UV

		November					December
Parameter	**Limits**	**2015-11-02**	**2015-11-11**	**2015-11-16**	**2015-11-23**	**2015-11-30**	**2015-12-07**
Ammonia as N		38.9					
Biochemical Oxygen Demand	80	16.2	-	15.2	18.1	14.3	IP
Heterotrophic Plate Count (AAHB)		>3000	>3000	2 560.0	>3000	>3000	460.0
Nitrate-N		7.92					
Nitrate and Nitrite as N		10.4					
Nitrite-N		2.47					
Oil & Grease-(IR)	5	2.3					
Phosphorus (P)-Total		13.4					
TKN		40.4					
Total Suspended Solids	100	19.0	16.0	12.0	15.0	15.0	28.0
Transmitance %		29.6	33.6	31.3	33.0	33.7	IP
pH	6.0-9.5	7.6					
Fecal Coliforms	1000	240.0	23.0	430.0	920.0	700.0	20.0
Total Coliforms		430.0	740.0	2 400.0	>2000	>2000	110.0

MEL-7_STP- Post Ozone

Parameter	**Limits**	**2015-11-02**	**2015-11-11**	**2015-11-16**	**2015-11-23**	**2015-11-30**	**2015-12-07**
Ammonia as N		39.3	51.1	56.7	64.0	57.4	49.3
Biochemical Oxygen Demand	80	28.8	14.3	32.8	32.2	20.8	IP
Heterotrophic Plate Count (AAHB)		>3000	740.0	>3000	>3000	>3000	>3000
Nitrate-N		8.35	7.5	9.0	7.3	7.0	8.3
Nitrate and Nitrite as N		10.9	8.96	11.30	8.57	9.79	10.10
Nitrite-N		2.51	1.5	2.3	1.23	2.79	1.9
Oil & Grease-(IR)	5	2.4	2.1	<2.0	<5.0	<2.0	IP
Phosphorus (P)-Total		13.6	13.9	14.2	12.1	13.1	IP
TKN		38.8	54.8	60.6	62.0	64.4	IP
Total Suspended Solids	100	18.0	16.0	11.0	19.0	15.0	21.0
Transmitance %		31.7	31.0	31.6	35.9	36.7	IP
pH	6.0-9.5	7.6	8.0	7.7	7.3	7.5	IP
Fecal Coliforms	1000	430.0	93.0	136.0	>2000	>2000	140.0
Total Coliforms		1 500.0	93.0	-	>2000	>2000	370.0
							**Preliminary data, actually in analysis



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AGNICO EAGLE

De : Christine Wilson [mailto:Christine.Wilson@aandc-aadnc.gc.ca]
Envoyé : 11 décembre 2015 10:24
À : Christine Wilson; David Frenette
Cc : Jeffrey Pratt; Kevin Buck
Objet : Re: Issue with Meliadine Sewage Treatment Plant, licence 2BB-MEL1424

Hi David,

Thank you for this could you please forward the sampling results that where taken on the dates of non-compliance and the most recent results (if you don't have them please send them along when they arrive.)

How many people are currently onsite? Please propose an additional monitoring station as you mentioned after UV before ozone, say MEL 7A or as you prefer and include that point in the monthly report.

I will follow up with you further once I return to the office.

Again thank you for keeping me informed,

Christine

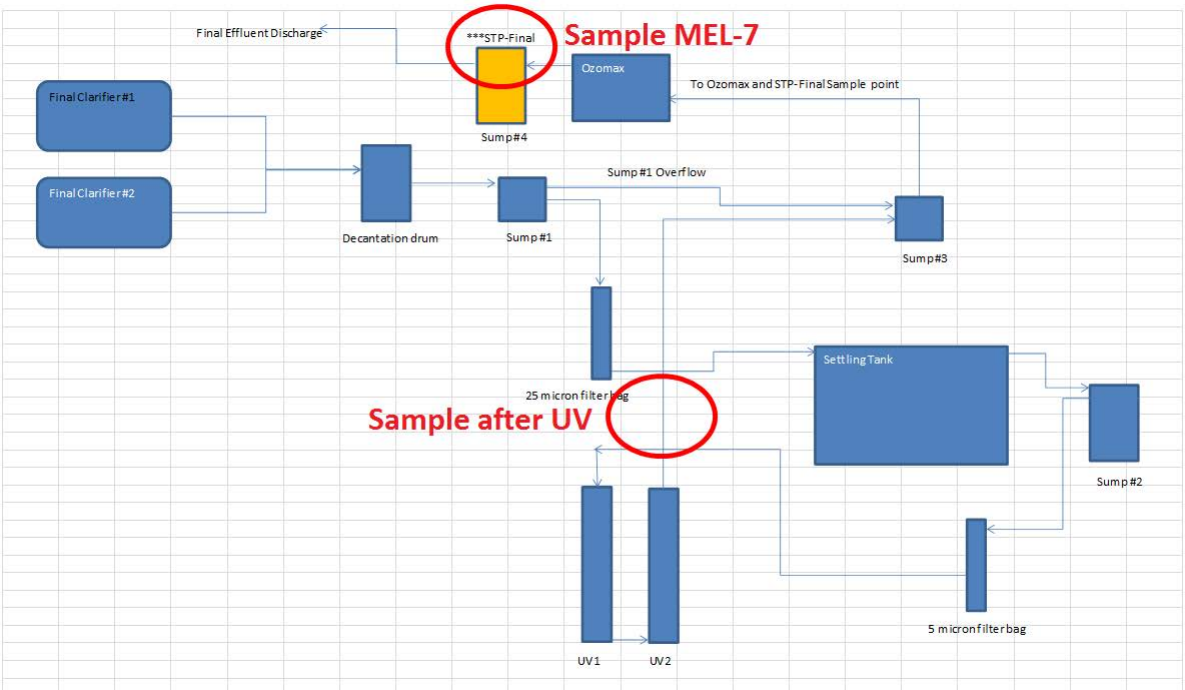
Sent from my BlackBerry 10 smartphone on the Bell network.

From: David Frenette
Sent: Friday, December 11, 2015 7:36 AM
To: Christine Wilson
Cc: Jeffrey Pratt; Kevin Buck
Subject: Issue with Meliadine Sewage Treatment Plant, licence 2BB-MEL1424

Hi Christine,

The November Nunavut Water Board (NWB) report related to the licence 2BB-MEL1424 will be submitted soon, but we want to inform you in advance about an issue we have had with the STP. As described in the October report submitted to the NWB and following the discussion during your last visit on site, the sample point MEL7 was located inside the STP building and after the last disinfection treatment (ozone). To evaluate the effect of the ozone in the water, we continued to take samples after the UV disinfection too.

The issue we had is that the results of sampling on Nov 23 and 30 after the UV disinfection were compliant with the License criteria. However sample results after the ozone treatment (which is considered as MEL7) exceeded the limit for the fecal coliforms (>2000 CFU/100ml) for both Nov 23 and 30. We quickly stopped passing the treated water through the ozone and started to investigate the problem. We found sludge inside the piping and a sump that are located between the UV and the ozone treatment tank. These elements were cleaned and now we think the problem is resolved. Resampling occurred on Dec 7 and the draft results received on Dec 9 indicate compliance with the License criteria (140 CFU/100ml). Again, we noted that the fecal coliforms were only 20 CFU/100ml after the UV treatment but rose to 140 CFU/100ml after the ozone. We are continuing the investigation as to why this would occur. We will continue to sample the 2 locations and in case the fecal count increases after the ozone treatment, we'll discharge directly after the UV to avoid recontamination of the water once treated. This information will be included in the November NWB Report which will be completed in the near future.



David Frenette
Environmental Coordinator

david.frenette@agnicoeagle.com

T: 819.874.5980 ,3622

Agnico Eagle Mines Limited

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AGNICO EAGLE

Agnico-Eagle - Meliadine Gold Project
ATTN: PHILIP ROY
PO Box 99
Rankin Inlet NU X0C 0G0

Date Received: 25-NOV-15
Report Date: 07-DEC-15 14:36 (MT)
Version: FINAL

Client Phone: 867-759-3002

Certificate of Analysis

Lab Work Order #: L1706724

Project P.O. #: 437548
Job Reference:
C of C Numbers:
Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1706724-1 STP-FINAL							
Sampled By: PR on 23-NOV-15 @ 07:40							
Matrix: WATER							
Meliadine Sewage Treatment Plant							
% Transmittance by Spectrometry							
Transmittance, UV (254 nm)	35.9		1.0	% T		25-NOV-15	R3326325
Ammonia by colour							
Ammonia, Total (as N)	64.0		5.0	mg/L		30-NOV-15	R3322988
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	32.2	DLA	6.0	mg/L		26-NOV-15	R3323566
Fecal Coliforms high in water							
Fecal Coliforms	>2000	PEHR	10	CFU/100mL	25-NOV-15	25-NOV-15	R3320035
Note: Atypical colonies present.							
Heterotrophic Plate Count							
Heterotrophic Plate Count	>3000		10	CFU/mL	25-NOV-15	25-NOV-15	R3320629
Nitrate in Water by IC							
Nitrate (as N)	7.34		0.040	mg/L		26-NOV-15	R3322197
Nitrate+Nitrite							
Nitrate and Nitrite as N	8.57		0.070	mg/L		30-NOV-15	
Nitrite in Water by IC							
Nitrite (as N)	1.23		0.020	mg/L		26-NOV-15	R3322197
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		01-DEC-15	R3323732
Phosphorus, Total							
Phosphorus (P)-Total	12.1		0.10	mg/L		30-NOV-15	R3322201
Total Coliform by Membrane Filtration							
Total Coliforms	>2000	PEHR	10	CFU/100mL	25-NOV-15	25-NOV-15	R3320040
Note: Atypical colonies present.							
Total Kjeldahl Nitrogen							
Total Kjeldahl Nitrogen	62.0		4.0	mg/L	27-NOV-15	01-DEC-15	R3323063
Total Suspended Solids							
Total Suspended Solids	19.0		5.0	mg/L		30-NOV-15	R3322885
pH							
pH	7.34		0.10	pH units		01-DEC-15	R3323899
L1706724-2 STP-POST UV							
Sampled By: PR on 23-NOV-15 @ 07:35							
Matrix: WATER							
Miscellaneous Parameters							
Transmittance, UV (254 nm)	33.0		1.0	% T		25-NOV-15	R3326325
Biochemical Oxygen Demand	18.1	DLA	6.0	mg/L		26-NOV-15	R3323566
Fecal Coliforms	920	PEHR	10	CFU/100mL	25-NOV-15	25-NOV-15	R3320035
Note: Atypical colonies present.							
Heterotrophic Plate Count	>3000		10	CFU/mL	25-NOV-15	25-NOV-15	R3320629
Total Coliforms	>2000	PEHR	10	CFU/100mL	25-NOV-15	25-NOV-15	R3320040
Note: Atypical colonies present.							
Total Suspended Solids	15.0		5.0	mg/L		30-NOV-15	R3322885
L1706724-3 STP-IN							
Sampled By: PR on 23-NOV-15 @ 07:50							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	550	DLA	100	mg/L		26-NOV-15	R3323566
Total Suspended Solids	334		5.0	mg/L		30-NOV-15	R3322885

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
FC-MF-HIGH-WP	Water	Fecal Coliforms high in water	APHA 9222D
An aliquot of sample water (usually 100 mL) is passed through a sterile .45 micron membrane filter. The filter is placed on selective media and incubated at 44.5°C for 24 – 2 hours. Colonies exhibiting characteristic morphology for the target group on the filter after incubation are counted and results are reported as Colony Forming Units (CFU) per 100 mL. The detection limit for this test is 1 when 100 mL of sample is processed, and is adjusted accordingly, with report notes as required, when less than 100 mL is processed.			
HPC-PP-WP	Water	Heterotrophic Plate Count	APHA 9215B
A 0.1 mL aliquot of sample is mixed with plate count agar and incubated at 35°C for 48 – 2 hours. All colonies are counted.			
N-TOTKJ-WP	Water	Total Kjeldahl Nitrogen	Quickchem method 10-107-06-2-E Lachat
Samples are digested with a sulphuric acid solution, cooled, diluted with water, and analyzed for ammonia. Total Kjeldahl nitrogen is the sum of free-ammonia and organic nitrogen compounds which are converted to ammonium sulphate through this digestion process. Analysis is performed by Flow Injection Analysis (FIA). The pH of the digested sample is raised to a known, basic pH by neutralization with a concentrated buffer solution. This neutralization converts the ammonium cation to ammonia. The ammonia produced is heated with saliclyate and hypochlorite to produce blue colour which is proportional to the ammonia concentration.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
PH-WP	Water	pH	APHA 4500H
The pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aquesous matrices is determined gravimetrically after drying the residue at 103 105°C.			
TC-MF-HIGH-WP	Water	Total Coliform by Membrane Filtration	APHA 9222B
An aliquot of sample water (usually 100 mL) is passed through a sterile .45 micron membrane filter. The filter is placed on selective media and incubated at 35°C for 23 – 1 hours. Colonies exhibiting characteristic morphology for the target group on the filter after incubation are counted and results are reported as Colony Forming Units (CFU) per 100 mL. The detection limit for this test is 1 when 100 mL of sample is processed, and is adjusted accordingly, with report notes as required, when less than 100 mL is processed.			
UV-%TRANS-WP	Water	% Transmittance by Spectrometry	APHA 5910B
This method indicates the total concentration of UV-absorbing compounds found in water and wastewater. The analysis is carried out using procedures adapted from APHA 5910 B. The sample is filtered through a 0.45 um filter and measured for % transmittance in a quartz cell at 254 nm and reported as % Transmittance .The analysis is carried out without pH adjustment.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

** 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
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
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
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
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.

ALS Environmental

L1706724-COFC

COC # _____

Page 1 of 1

Report To		Re	Service Requested (Rush for routine analysis subject to availability)
Company:	Agnico-Eagle	☑ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Philip Roy / Alexandre Gauthier / Justin MacMillan	☑ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	Meliadine Gold Project, M+T Expediting	Email 1:	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Rankin Inlet X0C 0G0	Email 2: meli.environment@agnicoeagle.com	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
		Email 3:	
Phone:	Fax:	Email 4:	Analysis Request
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #:	
Company:		PO / AFE: W 10547	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q 28906 // PO# 437548	
Lab Work Order # (lab use only)		ALS Contact: Judy Dalmaijer	Sampler: PR

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	AEM-STP-WP	BOD, TSS,	HPC/Total Coliforms/Fecal Coliforms, TSS, %UV, BOD	Nb of containers or bottles
	STP-Final	23-Nov-15	7:40	Water	X			7
	STP-Post UV	23-Nov-15	7:35	Water			X	4
	STP-IN	23-Nov-15	7:50	Water		X		2

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

perform membrane filtration on bacteriology samples from all STP sample points (CFU/mL) with dilution

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Philip Roy	23-Nov-15	8:18	GG	23 NOV 15	17:35	8 °C				

GENF 18.01 Front

Agnico-Eagle - Meliadine Gold Project
ATTN: PHILIP ROY
PO Box 99
Rankin Inlet NU X0C 0G0

Date Received: 01-DEC-15
Report Date: 11-DEC-15 15:30 (MT)
Version: FINAL

Client Phone: 867-759-3002

Certificate of Analysis

Lab Work Order #: L1708799

Project P.O. #: 437548
Job Reference:
C of C Numbers:
Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1708799-1 STP-FINAL							
Sampled By: AG on 30-NOV-15 @ 08:10							
Matrix: WATER							
Meliadine Sewage Treatment Plant							
% Transmittance by Spectrometry							
Transmittance, UV (254 nm)	36.7		1.0	% T		02-DEC-15	R3329009
Ammonia by colour							
Ammonia, Total (as N)	57.4		5.0	mg/L		02-DEC-15	R3324319
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	20.8	DLA	6.0	mg/L		02-DEC-15	R3326654
Fecal Coliforms high in water							
Fecal Coliforms	>2000	MBHT	10	CFU/100mL	01-DEC-15	01-DEC-15	R3323952
Note: Atypical colonies present.							
Heterotrophic Plate Count							
Heterotrophic Plate Count	>3000	PEHR	10	CFU/mL	01-DEC-15	01-DEC-15	R3324689
Nitrate in Water by IC							
Nitrate (as N)	7.00		0.040	mg/L		01-DEC-15	R3323970
Nitrate+Nitrite							
Nitrate and Nitrite as N	9.79		0.070	mg/L		02-DEC-15	
Nitrite in Water by IC							
Nitrite (as N)	2.79		0.020	mg/L		01-DEC-15	R3323970
Phosphorus, Total							
Phosphorus (P)-Total	13.1		0.10	mg/L		04-DEC-15	R3324937
Total Coliform by Membrane Filtration							
Total Coliforms	>2000	MBHT	10	CFU/100mL	01-DEC-15	01-DEC-15	R3323957
Note: Atypical colonies present.							
Total Kjeldahl Nitrogen							
Total Kjeldahl Nitrogen	64.4		4.0	mg/L	03-DEC-15	04-DEC-15	R3325046
Total Suspended Solids							
Total Suspended Solids	15.0		5.0	mg/L		03-DEC-15	R3325024
pH							
pH	7.54		0.10	pH units		03-DEC-15	R3325173
Miscellaneous Parameters							
Oil and Grease, Total	<2.0		2.0	mg/L	07-DEC-15	07-DEC-15	R3327266
L1708799-2 STP-POST UV							
Sampled By: AG on 30-NOV-15 @ 08:05							
Matrix: WATER							
Miscellaneous Parameters							
Transmittance, UV (254 nm)	33.7		1.0	% T		02-DEC-15	R3329009
Biochemical Oxygen Demand	14.3	DLA	2.0	mg/L		02-DEC-15	R3326654
Total Suspended Solids	15.0		5.0	mg/L		03-DEC-15	R3325024
Total and Fecal Coliform MF and HPC							
Fecal Coliforms high in water							
Fecal Coliforms	700	MBHT	10	CFU/100mL	01-DEC-15	01-DEC-15	R3323952
Note: Atypical colonies present.							
Heterotrophic Plate Count							
Heterotrophic Plate Count	>3000	PEHR	10	CFU/mL	01-DEC-15	01-DEC-15	R3324689
Total Coliform by Membrane Filtration							
Total Coliforms	>2000	MBHT	10	CFU/100mL	01-DEC-15	01-DEC-15	R3323957
Note: Atypical colonies present.							
L1708799-3 STP-IN							
Sampled By: AG on 30-NOV-15 @ 08:00							
Matrix: WATER							
Miscellaneous Parameters							
Biochemical Oxygen Demand	325	DLA	50	mg/L		02-DEC-15	R3326654

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1708799-3 STP-IN Sampled By: AG on 30-NOV-15 @ 08:00 Matrix: WATER							
Total Suspended Solids	136		5.0	mg/L		03-DEC-15	R3325024

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
MBHT	The APHA 30 hour hold time was exceeded for microbiological testing. Samples processed within 48 hours from time of sampling may be valid in some cases (refer to Health Canada guidance).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
FC-MF-HIGH-WP	Water	Fecal Coliforms high in water	APHA 9222D
An aliquot of sample water (usually 100 mL) is passed through a sterile .45 micron membrane filter. The filter is placed on selective media and incubated at 44.5°C for 24 – 2 hours. Colonies exhibiting characteristic morphology for the target group on the filter after incubation are counted and results are reported as Colony Forming Units (CFU) per 100 mL. The detection limit for this test is 1 when 100 mL of sample is processed, and is adjusted accordingly, with report notes as required, when less than 100 mL is processed.			
HPC-PP-WP	Water	Heterotrophic Plate Count	APHA 9215B
A 0.1 mL aliquot of sample is mixed with plate count agar and incubated at 35°C for 48 – 2 hours. All colonies are counted.			
N-TOTKJ-WP	Water	Total Kjeldahl Nitrogen	Quickchem method 10-107-06-2-E Lachat
Samples are digested with a sulphuric acid solution, cooled, diluted with water, and analyzed for ammonia. Total Kjeldahl nitrogen is the sum of free-ammonia and organic nitrogen compounds which are converted to ammonium sulphate through this digestion process. Analysis is performed by Flow Injection Analysis (FIA). The pH of the digested sample is raised to a known, basic pH by neutralization with a concentrated buffer solution. This neutralization converts the ammonium cation to ammonia. The ammonia produced is heated with saliclyate and hypochlorite to produce blue colour which is proportional to the ammonia concentration.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
OGG-TOT-WT	Water	Oil and Grease, Total	APHA 5520 B
The procedure involves an extraction of the entire water sample with hexane. This extract is then evaporated to dryness, and the residue weighed to determine Oil and Grease.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
PH-WP	Water	pH	APHA 4500H
The pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aquesous matrices is determined gravimetrically after drying the residue at 103 105°C.			
TC-MF-HIGH-WP	Water	Total Coliform by Membrane Filtration	APHA 9222B
An aliquot of sample water (usually 100 mL) is passed through a sterile .45 micron membrane filter. The filter is placed on selective media and incubated at 35°C for 23 – 1 hours. Colonies exhibiting characteristic morphology for the target group on the filter after incubation are counted and results are reported as Colony Forming Units (CFU) per 100 mL. The detection limit for this test is 1 when 100 mL of sample is processed, and is adjusted accordingly, with report notes as required, when less than 100 mL is processed.			
UV-%TRANS-WP	Water	% Transmittance by Spectrometry	APHA 5910B
This method indicates the total concentration of UV-absorbing compounds found in water and wastewater. The analysis is carried out using procedures			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

adapted from APHA 5910 B. The sample is filtered through a 0.45 um filter and measured for % transmittance in a quartz cell at 254 nm and reported as % Transmittance .The analysis is carried out without pH adjustment.

** 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
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
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
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
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.

ALS Environmental

L1708799-COFC

COC # _____

Page 1 of 1

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	Agnico-Eagle	☑ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Philip Roy / Alexandre Gauthier / Justin MacMillan	☑ PDF ☐ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	Meliadine Gold Project, M+T Expediting	Email 1:		○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Rankin Inlet X0C 0G0	Email 2: meli.environment@agnicoeagle.com		○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
		Email 3:		
Phone:	Fax:	Email 4:		Analysis Request
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information		
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #:		
Company:		PO / AFE: W 10547		
Contact:		LSD:		
Address:				
Phone:	Fax:	Quote #: Q 28906 // PO# 437548		
Lab Work Order # (lab use only)		ALS Contact: Judy Dalmaijer	Sampler: AG	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	AEM-STP-WP	BOD, TSS.	HPC/Total Coliforms/Fecal Coliforms, TSS, NUV, BOD	Nb of containers or bottles
[redacted]	STP-Final	30-Nov-15	8:10	Water	X			7
[redacted]	STP-Post UV	30-Nov-15	8:05	Water			X	4
[redacted]	STP-IN	30-Nov-15	8:00	Water		X		2

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

perform membrane filtration on bacteriology samples from all STP sample points (CFU/mL) with dilution

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Alexandre Gauthier	30-Nov-15	8:00		1 DEC 15	12:30	8 °C				

GENF 18.01 Front

Agnico-Eagle - Meliadine Gold Project
ATTN: PHILIP ROY
PO Box 99
Rankin Inlet NU X0C 0G0

Date Received: 08-DEC-15
Report Date: 16-DEC-15 14:03 (MT)
Version: FINAL

Client Phone: 867-759-3002

Certificate of Analysis

Lab Work Order #: L1711774
Project P.O. #: 437548
Job Reference:
C of C Numbers:
Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1711774-1 STP-FINAL							
Sampled By: JM on 07-DEC-15 @ 07:20							
Matrix: Water							
Meliadine Sewage Treatment Plant							
% Transmittance by Spectrometry							
Transmittance, UV (254 nm)	41.4		1.0	% T		09-DEC-15	R3335656
Ammonia by colour							
Ammonia, Total (as N)	49.3		5.0	mg/L		09-DEC-15	R3328845
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	27.3	DLA	6.0	mg/L		09-DEC-15	R3332913
Fecal Coliforms high in water							
Fecal Coliforms	140	MBHT	10	CFU/100mL	08-DEC-15	08-DEC-15	R3327608
Note: Atypical colonies present.							
Heterotrophic Plate Count							
Heterotrophic Plate Count	>3000	PEHR	10	CFU/mL	08-DEC-15	08-DEC-15	R3328261
Nitrate in Water by IC							
Nitrate (as N)	8.25		0.040	mg/L		08-DEC-15	R3327966
Nitrate+Nitrite							
Nitrate and Nitrite as N	10.1		0.070	mg/L		10-DEC-15	
Nitrite in Water by IC							
Nitrite (as N)	1.88		0.020	mg/L		08-DEC-15	R3327966
Phosphorus, Total							
Phosphorus (P)-Total	10.6		0.10	mg/L		14-DEC-15	R3330901
Total Coliform by Membrane Filtration							
Total Coliforms	370	MBHT	10	CFU/100mL	08-DEC-15	08-DEC-15	R3327675
Note: Atypical colonies present.							
Total Kjeldahl Nitrogen							
Total Kjeldahl Nitrogen	50.0		4.0	mg/L	11-DEC-15	14-DEC-15	R3331413
Total Suspended Solids							
Total Suspended Solids	21.0		5.0	mg/L		09-DEC-15	R3327851
pH							
pH	7.40		0.10	pH units		10-DEC-15	R3332514
Miscellaneous Parameters							
Oil and Grease, Total	<2.0		2.0	mg/L	11-DEC-15	11-DEC-15	R3333594
L1711774-2 STP-POST UV							
Sampled By: JM on 07-DEC-15 @ 07:15							
Matrix: Water							
Miscellaneous Parameters							
Transmittance, UV (254 nm)	38.0		1.0	% T		09-DEC-15	R3335656
Biochemical Oxygen Demand	14.9	DLA	6.0	mg/L		09-DEC-15	R3332913
Heterotrophic Plate Count	460	PEHR	10	CFU/mL	08-DEC-15	08-DEC-15	R3328261
Total Suspended Solids	28.0		5.0	mg/L		09-DEC-15	R3327851
Total and Fecal Coliform MF and HPC							
Fecal Coliforms high in water							
Fecal Coliforms	20	MBHT	10	CFU/100mL	08-DEC-15	08-DEC-15	R3327608
Total Coliform by Membrane Filtration							
Total Coliforms	110	MBHT	10	CFU/100mL	08-DEC-15	08-DEC-15	R3327675
Note: Atypical colonies present.							
L1711774-3 STP-IN							
Sampled By: JM on 07-DEC-15 @ 07:10							
Matrix: Water							
Miscellaneous Parameters							
Biochemical Oxygen Demand	310	DLA	100	mg/L		09-DEC-15	R3332913
Total Suspended Solids	147		5.0	mg/L		09-DEC-15	R3327851

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
MBHT	The APHA 30 hour hold time was exceeded for microbiological testing. Samples processed within 48 hours from time of sampling may be valid in some cases (refer to Health Canada guidance).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
FC-MF-HIGH-WP	Water	Fecal Coliforms high in water	APHA 9222D
An aliquot of sample water (usually 100 mL) is passed through a sterile .45 micron membrane filter. The filter is placed on selective media and incubated at 44.5°C for 24 – 2 hours. Colonies exhibiting characteristic morphology for the target group on the filter after incubation are counted and results are reported as Colony Forming Units (CFU) per 100 mL. The detection limit for this test is 1 when 100 mL of sample is processed, and is adjusted accordingly, with report notes as required, when less than 100 mL is processed.			
HPC-PP-WP	Water	Heterotrophic Plate Count	APHA 9215B
A 0.1 mL aliquot of sample is mixed with plate count agar and incubated at 35°C for 48 – 2 hours. All colonies are counted.			
N-TOTKJ-WP	Water	Total Kjeldahl Nitrogen	Quickchem method 10-107-06-2-E Lachat
Samples are digested with a sulphuric acid solution, cooled, diluted with water, and analyzed for ammonia. Total Kjeldahl nitrogen is the sum of free-ammonia and organic nitrogen compounds which are converted to ammonium sulphate through this digestion process. Analysis is performed by Flow Injection Analysis (FIA). The pH of the digested sample is raised to a known, basic pH by neutralization with a concentrated buffer solution. This neutralization converts the ammonium cation to ammonia. The ammonia produced is heated with saliclyate and hypochlorite to produce blue colour which is proportional to the ammonia concentration.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
OGG-TOT-WT	Water	Oil and Grease, Total	APHA 5520 B
The procedure involves an extraction of the entire water sample with hexane. This extract is then evaporated to dryness, and the residue weighed to determine Oil and Grease.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
PH-WP	Water	pH	APHA 4500H
The pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aquesous matrices is determined gravimetrically after drying the residue at 103 105°C.			
TC-MF-HIGH-WP	Water	Total Coliform by Membrane Filtration	APHA 9222B
An aliquot of sample water (usually 100 mL) is passed through a sterile .45 micron membrane filter. The filter is placed on selective media and incubated at 35°C for 23 – 1 hours. Colonies exhibiting characteristic morphology for the target group on the filter after incubation are counted and results are reported as Colony Forming Units (CFU) per 100 mL. The detection limit for this test is 1 when 100 mL of sample is processed, and is adjusted accordingly, with report notes as required, when less than 100 mL is processed.			
UV-%TRANS-WP	Water	% Transmittance by Spectrometry	APHA 5910B
This method indicates the total concentration of UV-absorbing compounds found in water and wastewater. The analysis is carried out using procedures			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

adapted from APHA 5910 B. The sample is filtered through a 0.45 um filter and measured for % transmittance in a quartz cell at 254 nm and reported as % Transmittance .The analysis is carried out without pH adjustment.

** 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
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
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
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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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.

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # L1711774

Page 1 of 1

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Agnico-Eagle	☑ Standard ☐ Other	◉ Regular (Standard Turnar
Contact:	Philip Roy / Alexandre Gauthier / Justin MacMillan	☑ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Day
Address:	Meliadine Gold Project, M+T Expediting	Email 1:	○ Emergency (1-2 Bus. Day
	Rankin Inlet X0C 0G0	Email 2: meli.environment@agnicoeagle.com	○ Same Day or Weekend E
		Email 3:	
Phone:	Fax:	Email 4:	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #:	
Company:		PO / AFE: W 10547	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q 28906 // PO# 437548	
Lab Work Order # (lab use only)		ALS Contact: Judy Dalmaijer	Sampler: JM

L1711774-COFC

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	AEM-STP-WP	BOD, TSS,	HPC/Total Coliforms/Fecal Coliforms, TSS, %UV, BOD	Nb of containers or bottles
	STP-Final	07-Dec-15	7:20	Water	X			7
	STP-Post UV	07-Dec-15	7:15	Water			X	4
	STP-IN	07-Dec-15	7:10	Water		X		2

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

perform membrane filtration on bacteriology samples from all STP sample points (CFU/mL) with dilution

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Justin MacMillan	7-Dec-15	8:00		12-40	12-08-15	4 °C				