
Appendix 12.2.1H Flocculent Study

Treatability Testing of Construction Runoff from New Gold's Blackwater Site- Rev. 0

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Summary

New Gold Inc. is proposing to develop its Blackwater Gold Project. During the construction phase of the proposed project, total suspended solids (TSS) in surface runoff from the site would need to be managed. Overall for this project AMEC was mandated to:

1. Characterize the surface runoff from Blackwater's site for metals and relevant physiochemical properties.
2. Identify chemicals and/or physiochemical parameters of the surface runoff that are above the respective Metal Mining Effluent Regulations (MMER) limits and/or trigger levels.
3. Investigate treatment solutions that could be used to treat those chemicals and/or physiochemical parameters that are established to be above their respective MMER limits and/or trigger values.
4. Submit samples generated upon application of best treatment solution for toxicity testing with *Daphnia magna* and rainbow trout.

Characterization of surface runoff from Blackwater site indicated that of the parameters regulated by MMER, only the TSS content of the samples would need to be addressed. Extensive testing of the samples indicated that the TSS of the received samples could successfully be treated using an engineered settling pond with a retention time of 24 hours.

Provisions should be made for addition of lime and ferric sulphate to the Blackwater construction runoff prior to the inlet of ponds where the overflow will be discharged to surface. Test results suggest that settling alone may be sufficient for normal runoff flowrates. The addition of ferric sulphate and lime may only be required during high flow events. Samples treated with iron and lime at dosages of 10 to 20 mg Fe per litre met all regulated limits including toxicity.

Results also indicate that the addition of a flocculant offers no significant advantage and even reduced settling efficiency in some cases.

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1.0 Introduction

New Gold Inc. is proposing to develop its Blackwater Gold Project, located approximately 160 km southwest of the city of Prince George (Figure 1). During the construction phase of the proposed project, the surface runoff from the site would need to be managed. It is expected that total suspended solids (TSS) content of the surface runoff would need to be treated so that relevant compliance limits can be met.



Figure 1: Location of Blackwater Site

AMEC was mandated to:

- Characterize the surface runoff from Blackwater's site for metals and relevant physiochemical properties.
- Identify chemicals and/or physiochemical parameters of the surface runoff that are above the respective Metal Mining Effluent Regulations (MMER) limits and/or trigger levels.
- Investigate treatment solutions that could be used to treat those chemicals and/or physiochemical parameters that are established to be above their respective MMER limits and/or trigger values.
- Submit samples generated upon application of best treatment solution for toxicity testing with *Daphnia magna* and rainbow trout (*O. mykiss*).

Such testing will aid in drafting of construction water management/treatment and erosion control plans for the site as required for permitting.

2.0 Methodology

2.1 Sample Collection

On July 17th 2013, eight 19-liter pails of raw water samples were collected from New Gold's Blackwater site. The samples were collected by Avison Management Services as per sampling guidelines provided by AMEC (Appendix A). Four pails were collected at location DS-1 and another four were collected at location R1 (Figure 2). To prevent oxidation of the collected samples, the containers were completely filled and covered before shipment. The samples were received at AMEC's water treatment laboratory located in Pointe Claire, Quebec on July 29th.

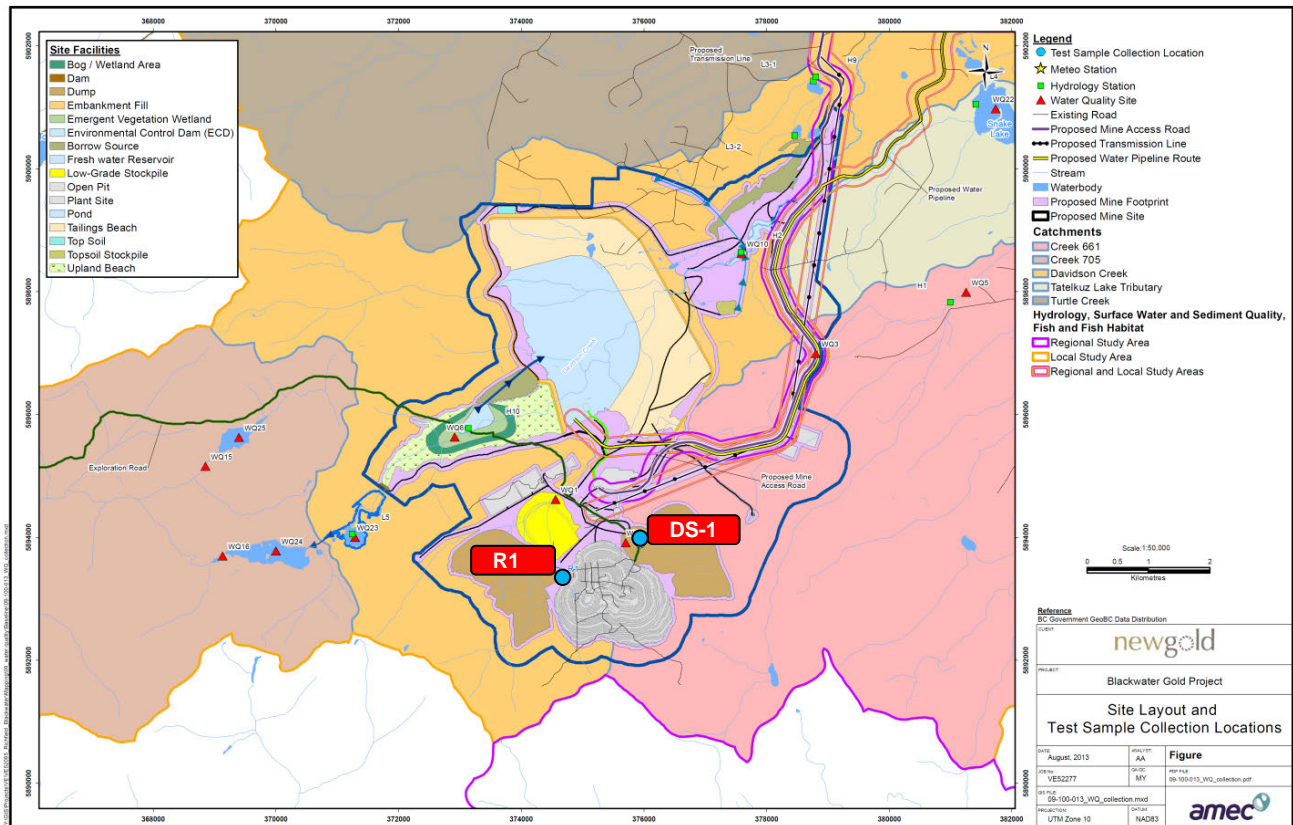


Figure 2: Sampling Locations

2.2 Sample Preparation and Initial Characterisation

Immediately upon reception, the content of all pails for each sampling location were combined and stirred vigorously to yield a single homogenized composite sample for location DS-1 and a single composite sample for location R1. All testing and characterization was performed with these composite samples.

Physico-chemistry parameters (pH, conductivity, ORP, turbidity) and TSS for each sampling site's composite sample were measured at AMEC's lab. Filtered and non-filtered aliquots of the

composite samples were also submitted to an accredited external laboratory (Maxxam) for the analysis of the following parameters:

- Metal Scan (Al, Sb, As, Ba, Be, Bi, Cd, Ca, Cr, Co, Cu, Fe, Li, Mg, Mn, Mo, Ni, Pb, K, Se, Si, Na, Sr, Tl, Zn) by Inductively Coupled plasma mass spectrometry (ICP-MS)
- Hg by Cold Vapor Atomic Absorption
- Total Suspended Solids (TSS)

2.3 Treatment Objective

Bench-scale tests were conducted in order to define the required operating conditions for pH, settling duration and reagent addition to achieve a final target TSS of 15 mg/L. This TSS level is the 30 day average required by Metal Mining Effluent Regulations (MMER) in final effluents from mining operations.

2.4 Treatability Test Plan

Treatability testing of Blackwater samples was accomplished in three phases. The methodologies applied for each of these phases are summarised below. Detailed methodologies for each phase can be found in Appendix B.

All tests were performed with composite samples for each water source.

2.4.1 Phase 1: Flocculant Screening

During the first phase, 8 flocculants (see Table 1) were tested to establish which amongst them is the most effective in removing TSS from Blackwater samples. MagnaFloc 10, MagnaFloc 1011, Flomin 905 MC and Flomin 920 MC were tested because they are known to be broadly effective in removing TSS from a diverse set of samples. MagnaFloc 155, MagnaFloc 368 and ZFloc 558 were tested because they have been shown to be effective in treating some particularly problematic samples. MagnaFloc 333 has previously been shown to be the most effective in removing TSS from Mt. Milligan, a site located in close geographical proximity to Blackwater. However, MagnaFloc 333 is now obsolete and has been replaced by BASF with MagnaFloc 351. Therefore, MagnaFloc 351 was also tested.

The material safety data sheet (MSDS) of the most successful flocculant (Flomin 920 MC) can be found in Appendix C.

Table 1: Flocculants Screened

Flocculant Trade Name	Manufacturer	Charge	Toxicity (LC ₅₀)	
			Fish	Daphnia
			mg/L	
Flomin 905 MC	SNF	Anionic	> 100	> 100
Flomin 920 MC	SNF	Non-ionic	> 10	> 10
Magnafloc 10	BASF	Anionic	> 100	> 100
Magnafloc 1011	BASF	Anionic	357	212
Magnafloc 155	BASF	Anionic	> 100	> 100
Magnafloc 351	BASF	Non-ionic	> 100	> 100
Magnafloc 368	BASF	Cationic	4	1.6
ZFloc 558	Zeroday	Anionic	> 1000	15

Flocculant screening tests were performed on 0.5 L of raw water sample. Each flocculant was dosed at 3 mg/L followed by 5 minutes of mixing. No pH adjustment was made. After 1 hour of settling time, an aliquot of the supernatant was drawn for turbidity analysis.

2.4.2 Phase 2: Flocculant Dosage

The two best performing flocculants from the screening phase were retained for each water source. The dosage of each retained flocculant was optimized by performing additional tests. These tests were performed on 0.5 L of raw water sample. Each flocculant was dosed at 1, 2, 3 or 5 mg/L followed by 5 minutes of mixing. No pH adjustment was made. After 1 hour of settling time, an aliquot of the supernatant was drawn for turbidity analysis.

2.4.3 Phase 3: Flocculant and Coagulant Testing

The final phase involved testing the best flocculant at different testing times and evaluating the addition of coagulants. Settling times of 1 hr, 8 hr and 24 hrs were evaluated. Additional testing was also completed using a coagulant (ferric sulphate) with an alkali (lime [Ca(OH)₂] and caustic [NaOH]). These tests verified the effectiveness of iron (Fe) dosage of 10 mg/L at a pH value of 8.5. TSS and turbidity was measured for all treated samples.

One-hour settling tests were conducted to simulate performance expected from a clarifier in an active treatment system. The 8 hr and 24 hr tests were conducted to simulate performance expected in a settling pond. Experience has shown that quiescent settling in the laboratory can simulate pond settling by applying a time-factor of three. Therefore, a 3-day settling pond can be simulated in the laboratory by allowing the treated samples to settle out for 24 hours. The 8-hr tests represent a pond with 24 hours retention time.

2.4.4 Toxicity Testing

The best and the most applicable treatment scenario from phase 3 was applied to 30 litres of raw water from each source to generate samples for toxicity testing (*Daphnia magna* and rainbow trout). Toxicity testing was performed by an accredited external laboratory (Exova).

3.0 Characterisation of Raw Water Samples

The raw water samples as received were turbid with a brownish solids suspension (Figure 3). Summarized in Table 2 are the physico-chemical parameters and the metal concentrations of the composite raw water samples. Detailed analytical results are presented in Appendix D.



Figure 3: Received Blackwater Sample from Site R1

The metals content of the two samples was well below discharge limits. Of the parameters regulated under MMER, TSS content of both raw waters was above the MMER limit of 15 mg/L. Therefore, characterization of collected samples from the Blackwater site suggests that the construction runoff will need to be treated for TSS content.

Although not regulated under MMER, iron concentrations are relatively high in the total analysis. As the dissolved concentrations are low, this indicates that the Fe is contained in the suspended solids. Similarly, Al concentrations are shown to be contained in suspended solids.

Table 2: Physico-Chemical Parameters and Metals Contents of Received Samples

Metals/ Physicochemical parameters	Units	R1 -Raw		DS1 - Raw		MMER limit	
		Total	Dissolved	Total	Dissolved		
Metals	Aluminum (Al)	mg/L	1.2	0.08	2.4	<0.04	none
	Antimony (Sb)		<0.02	<0.02	<0.02	<0.02	
	Arsenic (As)		<0.05	<0.05	<0.05	<0.05	0.5
	Barium (Ba)		<0.02	<0.02	0.02	<0.02	
	Beryllium (Be)		<0.002	<0.002	<0.002	<0.002	
	Bismuth (Bi)		<0.05	<0.05	<0.05	<0.05	
	Cadmium (Cd)		<0.01	<0.01	<0.01	<0.01	
	Calcium (Ca)		3.9	3.6	11	11	
	Chromium (Cr)		<0.01	<0.01	<0.01	<0.01	
	Cobalt (Co)		<0.01	<0.01	<0.01	<0.01	
	Copper (Cu)		<0.009	<0.009	<0.009	<0.009	0.3
	Iron (Fe)		1.6	0.1	2.9	<0.1	none
	Lithium (Li)		<0.1	<0.1	<0.1	<0.1	
	Magnesium (Mg)		1	0.7	2.3	1.8	
	Manganese (Mn)		0.14	0.03	0.67	<0.01	
	Mercury (Hg)		<0.00001	<0.00001	0.00002	<0.00001	0.0001 ^(*)
	Molybdenum (Mo)		<0.01	<0.01	<0.01	<0.01	
	Nickel (Ni)		<0.01	<0.01	<0.01	<0.01	0.5
	Lead (Pb)		<0.01	<0.01	<0.01	<0.01	0.2
	Potassium (K)		1.1	1.0	1.4	1.1	
Selenium (Se)	<0.05	<0.05	<0.05	<0.05	none		
Silicon (Si)	9.2	6.9	9.4	6.5			
Sodium (Na)	2.9	2.8	4.1	4.1			
Strontium (Sr)	<0.05	<0.05	0.07	0.06			
Thallium (Tl)	<0.01	<0.01	<0.01	<0.01			
Zinc (Zn)	<0.02	<0.02	0.14	0.03	0.5		
Physicochemical	Temperature	°C	23.5		23.3		
	pH		7.06		7.80		6.0 to 9.5
	Conductivity	µs/cm	40		91.3		
	TSS - In house	mg/L	128		147		15
	TSS - Maxam	mg/L	95-110		160		15
	ORP	mV	383		401		
	Turbidity	NTU	33.2		> 100		

Red cells show parameters that exceed an MMER limit or a trigger value.

(*) Trigger limit above which fish tissue analyses for mercury become necessary.

4.0 Treatability Test Results

This section presents the results of the treatability tests performed on Blackwater samples.

4.1 Phase 1: Flocculant Screening

During the first phase, eight flocculants were screened to establish which amongst them is the most effective in removing turbidity from Blackwater samples. In total, 18 tests were performed during this phase (see Table 3). Turbidity results after one hour of settling for all tests performed during this phase as well as that for received raw water samples are presented in Figure 4.

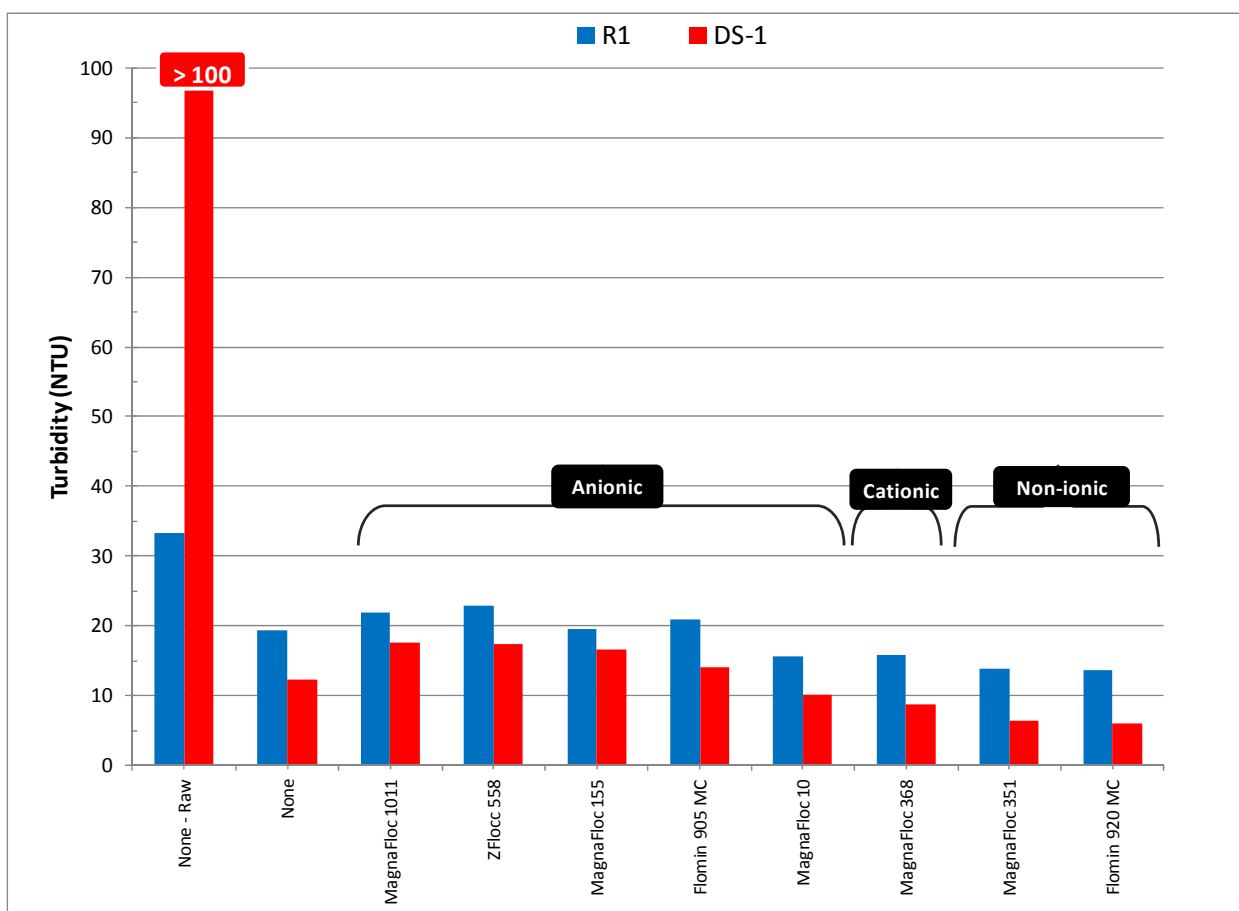


Figure 4: Flocculant Screening Results

Figure 4 demonstrates that the raw sample collected at location DS-1 was far more turbid than the one collected at location R1. However, for equivalent treatment conditions the sample collected at location DS-1 was easier to treat than the one collected at location R1. This relative difficulty in treating the sample collected from location R1 was observed in all phases of testing, except when final samples were prepared for toxicity testing.

Settling alone was able to significantly reduce turbidity for both samples. Addition of anionic flocculants in most cases inhibited the removal of turbidity from Blackwater samples. Addition of non-ionic flocculants (MagnaFloc 351 and Flomin 920 MC) enhanced the removal of

turbidity from Blackwater samples. Overall, for both Blackwater samples, addition of Magnafloc 351 and Flomin 920 MC followed by settling yielded lowest residual turbidities and hence the best treatment performance. Therefore, both Magnafloc 351 and Flomin 920 MC were retained for the next phase of testing.

Table 3: Phase 1 Flocculant Screening Tests and Results

Test	Sample Location	Volume (mL)	Initial pH	Flocculant	Flocculant Concentration (mg/L)	Agitation Time (min)	pH After Agitation	Settling Time (h)	Turbidity (NTU)
R0-D	DS-1	NA	7.1	None - Raw	NA	NA	NA	NA	> 100
F1-D	DS-1	500	7.6	None	0	5	NA	1	12
F2-D	DS-1	500	7.6	MagnaFloc 1011	3	5	7.6	1	18
F3-D	DS-1	500	7.7	ZFlocc 558	3	5	7.6	1	17
F4-D	DS-1	500	7.7	MagnaFloc 155	3	5	7.7	1	17
F5-D	DS-1	500	7.7	Flomin 905 MC	3	5	7.7	1	14
F6-D	DS-1	500	7.6	MagnaFloc 10	3	5	7.7	1	10
F7-D	DS-1	500	7.6	MagnaFloc 368	3	5	7.6	1	8.8
F8-D	DS-1	500	7.7	MagnaFloc 351	3	5	7.7	1	6.4
F9-D	DS-1	500	7.6	Flomin 920 MC	3	5	7.6	1	6.1
R0-R	R1	500	7.8	None - Raw	NA	NA	NA	NA	33
F1-R	R1	500	7.8	None	0	5	NA	1	19
F2-R	R1	500	7.8	MagnaFloc 1011	3	5	7.8	1	22
F3-R	R1	500	7.8	ZFlocc 558	3	5	7.8	1	23
F4-R	R1	500	7.9	MagnaFloc 155	3	5	7.8	1	20
F5-R	R1	500	7.8	Flomin 905 MC	3	5	7.8	1	21
F6-R	R1	500	8.0	MagnaFloc 10	3	5	7.8	1	16
F7-R	R1	500	7.9	MagnaFloc 368	3	5	7.8	1	16
F8-R	R1	500	8.0	MagnaFloc 351	3	5	7.8	1	14
F9-R	R1	500	7.9	Flomin 920 MC	3	5	7.8	1	14

NA : Not Applicable

4.2 Phase 2: Flocculant Dosage

In the second phase, the impact of dosages for the two flocculants retained (Magnafloc 351 and Flomin 920 MC) was evaluated with one hour settling. In total, 18 additional tests were performed during this phase (see Table 4). Turbidity results for all tests performed during this phase as well as that for received raw water samples are presented in Figures 5 and 6.

Results presented in Table 4 and Figures 5 and 6 demonstrate that within the tested dosage range of 1 to 5 mg/L, the settling efficiency was not greatly affected by the flocculant dosage.

The two flocculants yielded very similar results. Therefore, to select which of the two to carry to the next phase of testing, the relative cost of the two flocculants was considered. Flomin 920 MC is commercially available through SNF at \$4.85 per kg. Magnafloc 351 is commercially priced by BASF at \$5.35 per kg. Flomin 920 MC was retained for the next phase of testing.

Table 4: Phase 2 Flocculant Dosage Tests and Results

Test	Sample Location	Volume (mL)	Initial pH	Flocculant	Flocculant Concentration	Agitation Time (min)	pH after agitation	Settling time (h)	Turbidity (NTU)
R0-D	DS-1	NA	7.06	None-Raw	NA	NA	NA	NA	100
D1-D	DS-1	500	7.61	None	0	5	NA	1	12
D2-D	DS-1	500	7.08	Flomin 920 MC	1	5	7.05	1	6.2
D3-D	DS-1	500	6.81		2	5	6.75	1	7.0
D4-D	DS-1	500	7.57		3	5	7.59	1	6.1
D5-D	DS-1	500	6.77		5	5	6.74	1	6.7
D6-D	DS-1	500	6.98		MagnaFloc 351	1	5	7.17	1
D7-D	DS-1	500	6.75	2		5	6.57	1	5.7
D8-D	DS-1	500	7.68	3		5	7.67	1	6.4
D9-D	DS-1	500	6.66	5		5	6.8	1	6.1
R0-R	R1	NA	7.06	None-Raw	NA	NA	NA	NA	33.2
D1-R	R1	500	7.82	None	0	5	NA	1	19.3
D2-R	R1	500	7.07	Flomin 920 MC	1	5	7.12	1	12.6
D3-R	R1	500	7.14		2	5	6.95	1	12.8
D4-R	R1	500	7.86		3	5	7.83	1	13.7
D5-R	R1	500	6.86		5	5	6.8	1	15.5
D6-R	R1	500	7.06		MagnaFloc 351	1	5	7.03	1
D7-R	R1	500	7.1	2		5	6.67	1	14.9
D8-R	R1	500	7.96	3		5	7.84	1	13.8
D9-R	R1	500	6.98	5		5	6.86	1	14.5

NA: Not Applicable

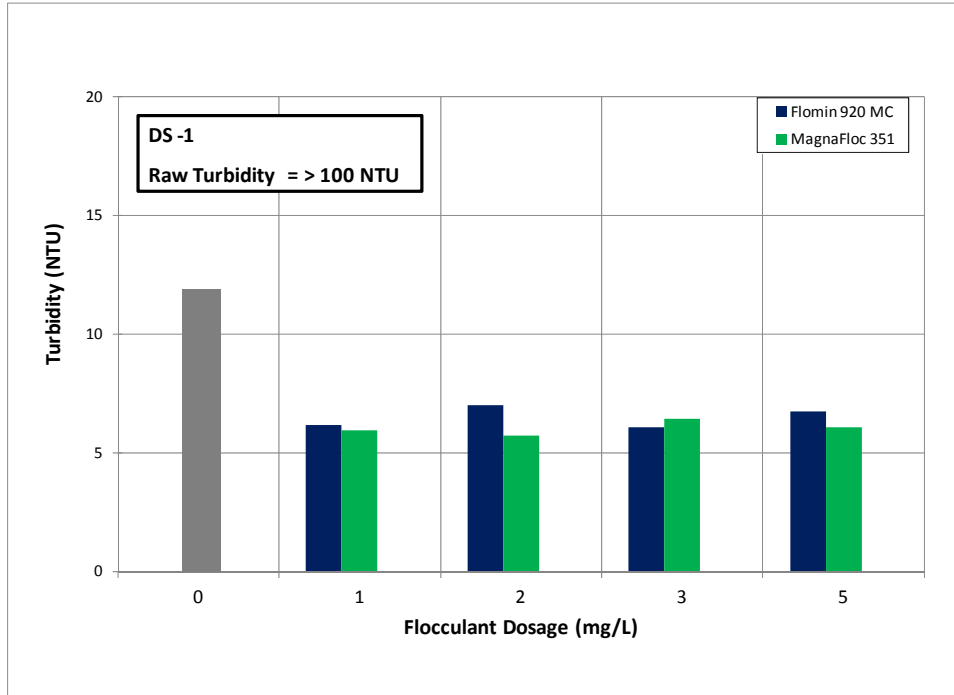


Figure 5: Impact of Flocculant Dosage in Removing Turbidity from Sample DS-1

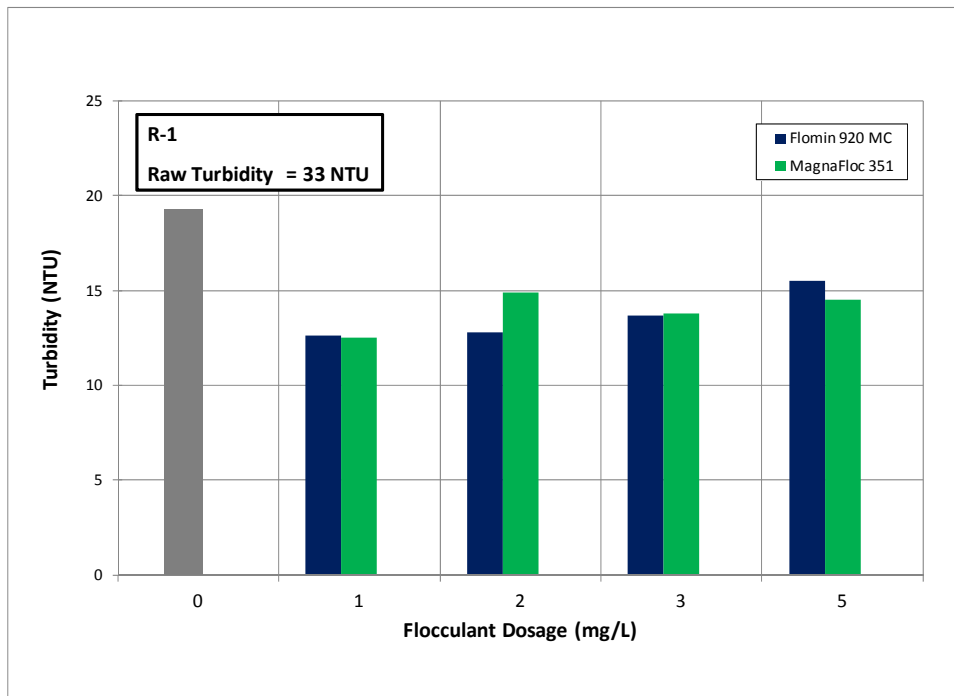


Figure 6: Impact of Flocculant Dosage in Removing Turbidity from Sample R1

4.3 Phase 3: TSS Reduction - Flocculant and Coagulant Testing

The final phase explored the suitability of the following treatment scenarios in removing TSS from received Blackwater samples:

1. Settling alone
2. Flocculant addition (Flomin 920 MC at 3 mg/L) followed by settling
3. Coagulant addition (Fe^{3+} at 10 mg/L), controlled to pH 8.5 with lime addition, followed by settling
4. Coagulant addition (Fe^{3+} at 10 mg/L), controlled to pH 8.5 with caustic, followed by settling

Experience has shown that quiescent settling in laboratory containers could simulate pond settling by applying a time-factor of three. Therefore, a 3-day settling pond can be simulated in the laboratory by allowing the treated samples to settle out for 24 hours. A one-day pond is simulated by an 8-hr settling time. The one-hour settling tests represent the expected results from a clarifier in an active treatment system, as opposed to a pond. Performance of scenarios 1, 2, and 3 above was evaluated after settling durations of 1 hr, 8 hr, and 24 hrs. Performance of scenario 4 was only evaluated after 1 hr and 8 hr of settling as it was eliminated early due to poor performance.

In total, 22 additional tests were performed (see Table 5). TSS results for all tests performed during this phase as well as that for received raw water samples are presented in Figures 7 and 8.

Consistent with testing performed in earlier phases, R1 was harder to treat even though the raw waters contained lower levels of suspended solids (Figures 7 and 8). Therefore, results obtained with R1 are used as a basis to select treatment scenarios that can be successfully applied to Blackwater runoff to ensure that TSS in treated waters meet the limit of 15 mg/L.

The results presented in Figure 8 suggest that at least 8 hrs of quiescent settling are required in the lab with settling alone to achieve the target TSS level. Eight hours of settling are also required if a flocculant is added. However, the results obtained after eight hours of settling with the addition of flocculant were worse than those obtained with settling alone. Addition of Fe^{3+} as a coagulant at pH 8.5 followed by settling achieved the target TSS level in a duration of one hour. For coagulation tests, better performance was always observed when the alkali used for pH adjustment purposes was lime instead of caustic.

Due to capital and operational investment required, the temporary nature of the construction phase, and the fact that settling alone appears a feasible option, it was decided that the use of a clarifier would not be pursued. As of this point, only treatment scenarios that simulated settling in a pond were considered. The results indicate that a settling pond with a 24-hour retention time should be sufficient to remove the TSS to meet the 15 mg/L limit, although the final TSS content was close (9.6 mg/L). The results also show that the addition of ferric sulphate with lime significantly improved settling and clarification efficiency.

Table 5: Phase 3 Testing and Results

Test	Sample Location	Treatment System	Flocculant Concentration (mg/L)	Ca(OH) ₂ (mg/L)	NaOH (1.0 N) (mL)	Fe ³⁺ Concentration (mg/L)	Agitation Time (min)	Settling Time (h)	Final ORP (mv)	Final Conductivity (µs/cm)	Final Temperature (°C)	pH	TSS (mg/L)	Solids Production (*) (mg/L)	Turbidity (NTU)
R0-D	DS-1	None-Raw	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	147	NA	NA
T1-D	DS-1	Settling Alone	0	0	0	0	5		386	91	24	7.0	12.4	n.m.	20.1
T2-D	DS-1	Flomin 920 MC	3	0	0	0	5	1	328	88	25	7.1	4.0	n.m.	7.7
T3-D	DS-1	Fe ³⁺ (Lime pH control)	0	36	0	10	5		234	177	23	8.5	3.6	197.5	1.6
T4-D	DS-1	Fe ³⁺ (Caustic pH control)	0	0	1.45	10	5		305	207	22	8.6	4.4	206.3	1.3
T5-D	DS-1	Settling Alone	0	0	0	0	5		n.m.	n.m.	n.m.	n.m.	5.2	n.m.	n.m.
T6-D	DS-1	Flomin 920 MC	3	0	0	0	5	8	330	90	24	6.9	2.4	n.m.	3.9
T7-D	DS-1	Fe ³⁺ (Lime pH control)	0	38.8	0	10	5		267	194	22	8.6	< D. L.	n.m.	0.8
T8-D	DS-1	Fe ³⁺ (Caustic pH control)	0	0	1.5	10	5		252	201	22	8.5	3.6	n.m.	1.4
T9-D	DS-1	Settling Alone	0	0	0	0	5		339	89	25	7.0	4.0	157.2	3.8
T10-D	DS-1	Flomin 920 MC	3	0	0	0	5	24	337	91	25	7.0	2.0	165.5	2.9
T11-D	DS-1	Fe ³⁺ (Lime pH control)	0	42	0	10	5		282	206	24	7.4	1.2	221.6	0.5
R0-R	R1	None-Raw	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	128	NA	NA
T1-R	R1	Settling Alone	0	0	0	0	5		388	40	24	7.2	22.4	NA	24.4
T2-R	R1	Flomin 920 MC	3	0	0	0	5	1	338	39	25	7.2	16	NA	17.0
T3-R	R1	Fe ³⁺ (Lime pH control)	0	23	0	10	5		293	106	23	8.6	< D. L.	224.7	0.7
T4-R	R1	Fe ³⁺ (Caustic pH control)	0	0	1	10	5		265	124	23	8.5	13.2	160.2	4.1
T5-R	R1	Settling Alone	0	0	0	0	5		n.m.	n.m.	n.m.	n.m.	9.6	n.m.	n.m.
T6-R	R1	Flomin 920 MC	3	0	0	0	5	8	321	39	24	7.1	10.5	NA	10.7
T7-R	R1	Fe ³⁺ (Lime pH control)	0	41.6	0	10	5		220	156	23	8.6	1.6	161.0	1.0
T8-R	R1	Fe ³⁺ (Caustic pH control)	0	0	1.5	10	5		203	174	23	8.6	3.6	n.m.	2.2
T9-R	R1	Settling Alone	0	0	0	0	5		333	39	25	7.1	6.8	187.2	9.4
T10-R	R1	Flomin 920 MC	3	0	0	0	5	24	331	39	25	7.0	4.0	156.8	8.3
T11-R	R1	Fe ³⁺ (Lime pH control)	0	41.7	0	10	5		181	155	24.3	8.2	< D. L.	228.2	0.41

N.A. =not applicable

n.m. = not measured

D.L. = detection limit

(*) Discussed in further detail in section 4.4

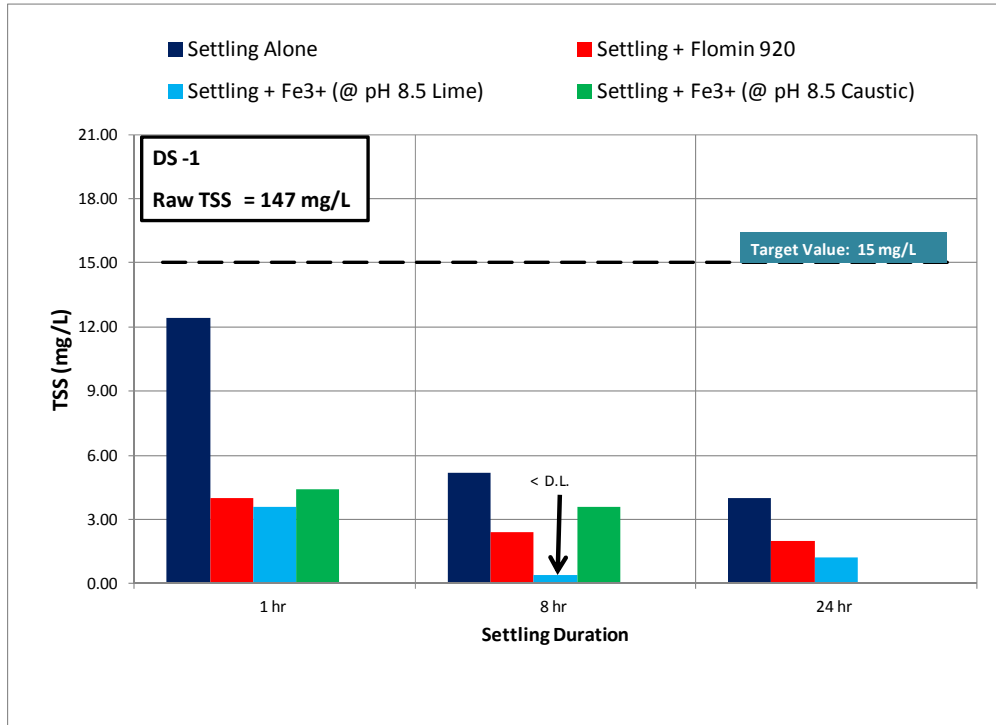


Figure 7: Effectiveness of Treatment Scenarios in Removing TSS from Sample DS-1

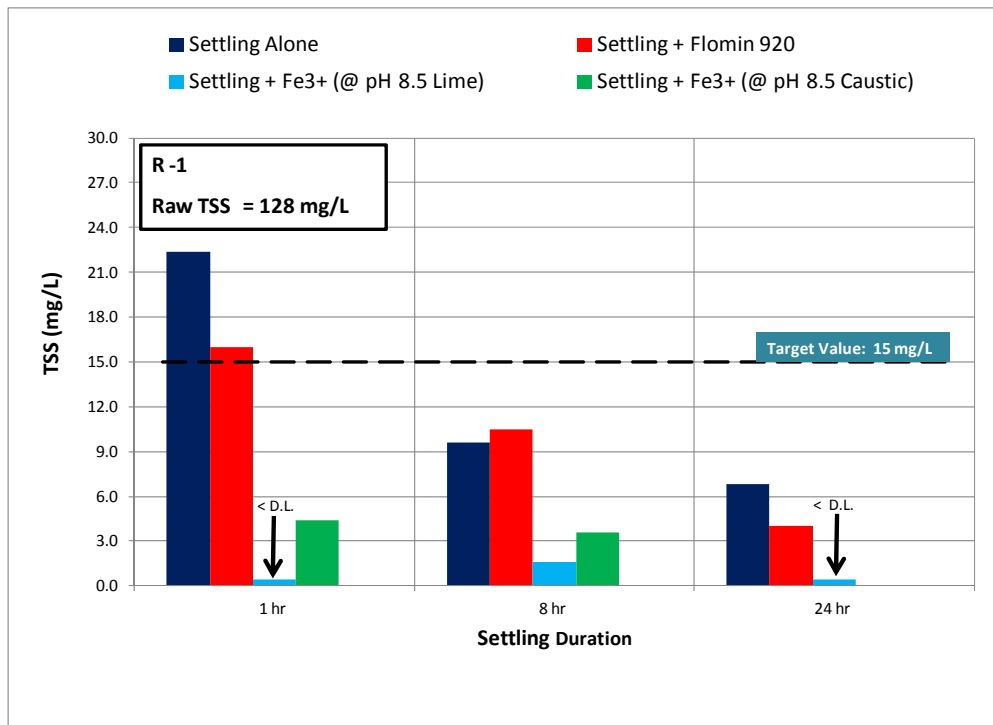


Figure 8: Effectiveness of Treatment Scenarios in Removing TSS from Sample R1

For these treatment scenarios, it was also of interest to establish the final metal contents of the respective treated samples. Therefore, a number of additional tests were performed to generate treated samples that could be submitted for metals scan using ICP-MS. Conditions with which these tests were performed can be found in Appendix E. Summary of the metal scans is presented in Table 6. Detailed analytical results are presented in Appendix E.

Table 6: Metals in Treated Blackwater Samples

Parameter	Treated DS-1				Treated R1				MMER monthly average limit
	24H	24H-FLOCC	8H-Fe-LIME		24H	24H-FLOCC	8H-Fe-LIME		
	Total	Total	Total	Dissolved	Total	Total	Total	Dissolved	
mg/L									
Aluminum (Al)	0.062	0.059	0.025	<0.030	0.290	0.180	0.019	<0.030	
Antimony (Sb)	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001		
Arsenic (As)	0.003	0.003	<0.001		0.002	0.002	<0.001		0.50
Barium (Ba)	0.004	0.004	0.003		0.007	0.006	0.004		
Beryllium (Be)	<0.002	<0.002	<0.002		<0.002	<0.002	<0.002		
Bismuth (Bi)	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001		
Cadmium (Cd)	<0.0002	<0.0002	<0.0002	n.m.	<0.0002	<0.0002	<0.0002	n.m.	
Calcium (Ca)	10.0	10.0	34.0		3.9	3.9	28.0		
Chromium (Cr)	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		
Cobalt (Co)	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001		
Cooper (Cu)	0.004	0.011	0.008		0.007	0.003	0.002		0.30
Iron (Fe)	0.063	0.060	0.270	<0.100	0.430	0.280	0.270	<0.100	
Lithium (Li)	< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		
Magnesium (Mg)	1.70	1.70	1.70		0.76	0.76	0.86		
Manganese (Mn)	0.005	0.008	0.008		0.015	0.008	0.002		
Mercury (Hg)	<0.00001	<0.00001	<0.00001		<0.00001	<0.00001	<0.00001		0.0001
Molybdenum (Mo)	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001		
Nickel (Ni)	<0.002	<0.002	<0.002		<0.002	<0.002	<0.002		0.50
Lead (Pb)	<0.0005	<0.0005	<0.0005		0.0010	0.0008	<0.0005		0.20
Potassium (K)	1.00	0.99	0.97	n.m.	0.98	0.95	1.10	n.m.	
Selenium (Se)	<0.003	<0.003	<0.003		<0.003	<0.003	<0.003		
Silicon (Si)	6.3	6.2	4.3		7.7	7.7	5.0		
Sodium (Na)	3.9	3.9	3.8		2.8	2.9	2.9		
Strontium (Sr)	0.059	0.059	0.070		0.040	0.040	0.048		
Thallium (Tl)	<0.002	<0.002	<0.002		<0.002	<0.002	<0.002		
Zinc (Zn)	0.012	0.012	<0.007		0.010	0.009	<0.007		0.50

Treatment Scenario coding: 24H: 24 hr quiescent settling alone; 24H-FLOCC: Flomin 920 (3 mg/L) addition followed by 24 hr quiescent settling; 8H-Fe-Lime: 10 mg/L Fe³⁺, at pH 8.5 with lime, followed by 8 hrs of settling. n.m. = not measured

The analytical results suggest that the metal content of all treated samples do not pose a concern. All metals regulated by MMER were measured at levels considerably below their respective limits. Adding ferric sulphate and lime to pH 8.5 followed by 8 hours of settling yielded the lowest levels of MMER regulated metals.

Settling results show that a 1-day retention time in a settling pond may be sufficient to allow the site runoff to meet the TSS limit of 15 mg/L. The results varied between the two collected samples and the actual construction runoff may contain greater concentrations of TSS than those collected on site in 2013. Ferric sulphate addition showed excellent results and is expected to properly treat construction runoff from the site in worse conditions, if these occur.

4.4 Solids Production

The solids produced during testing were measured at the end of most tests. The bulk of the mass of solids produced is from the TSS themselves and will vary as per the variability of the runoff. The raw waters from these tests contained approximately 0.15 g/L of solids. With a coagulant and lime added, this will increase marginally. The best available estimate of solids production that can be obtained from these samples is a conservative value of 0.2 g/L or 0.2 kg/m³ of treated water.

The corresponding sludge volumes were difficult to quantify in the laboratory due to the small volume formed from a 1-L sample. To convert the mass of sludge produced to a volume, an estimate of solid content of the settled solids is required. Through experience with similar projects, 2 to 6% solids are expected. This represents 3 to 10 L of sludge formed in the pond per cubic meter of water treated (or 3 to 10 m³ per 1000 m³).

These values can be used to estimate the rate of filling in the ponds by factoring in the total predicted runoff over a period of time. Depending on the pond configuration, the frequency required for pond dredging can then be scheduled in advance. Obviously, a smaller pond will need to be dredged more frequently than a large one.

4.5 Toxicity Testing

Although results indicate that settling alone may allow Blackwater to meet discharge limits for TSS, the addition of ferric sulphate and lime showed a clear improvement in treated water quality and may be required during high-flow events. In order to ensure that the addition of reagents to the raw waters would not cause any toxicity concerns, the most effective treatment scenario was planned to be repeated with a large volume of raw water.

To generate the simulated treated water for toxicity testing, 30 litres of each raw water source was mixed with ferric sulphate and lime to attain a 10 mg/L iron dosage and a pH of 8.5. The treated samples were then allowed to settle for 8 hr. Results are shown in Table 7.

Following this treatment, the supernatant water quality from R1 was as expected from previous tests. As shown in Table 7 for sample Tox1-R, the final TSS was of 1.6 mg/L. The treated water from DS1 did not meet expectations and even exceeded the limit of 15 mg/L (Tox1-D). Instead of sending this sample for toxicity testing, the sample was re-mixed and another 10 mg/L Fe was added (Tox2-D). As shown, this second treatment resulted in a final TSS of 1.2 mg/L, which is more than acceptable.

Table 7: Preparation of Treated Samples for Toxicity Testing

Test	Sample Location	Treatment System	Fe ³⁺	Lime	Agitation	Settling	Final	Final	Final	pH	TSS	Turbidity
			Concentration (mg/L)	Consumption (mg/L)	Time (min)	Time (h)	ORP (mv)	Conductivity (µs/cm)	Temperature (°C)		(mg/L)	(NTU)
Tox1-D	DS-1	Fe ³⁺	10	28	5	8	131	172	23	8.6	16.0	5.4
Tox2-D	DS-1	(Lime pH control)	20	33	5	8	224	254	23	8.7	1.2	1.2
Tox1-R	R1		10	29	5	8	265	126	23	8.4	1.6	0.9

Red cell shows a final TSS that exceeded the target level of 7.5 mg/L.

The exact cause of the discrepancy in the settling performance of sample DS-1 is unknown. The samples were almost 40 days old by the time they were treated for toxicity testing and had been stirred vigorously each time testing was completed. It is possible that attrition of agglomerated solids resulted from the repeated agitation of the sample. This initial agglomeration could have occurred during sample transport or could represent the natural condition of the solids as they are expected on site. It should be noted that the final sample used for toxicity testing did not settle in the mixing tank as per previous samples, suggesting that this sample would not have met limits by settling alone.

Whatever the cause, there was no significant effect on the treatability of sample R1. Also, these tests showed that if settling becomes difficult, increasing the iron dosage to 20 mg/L will resolve the issue.

After settling, aliquots of the treated supernatant from tests Tox1-R and Tox2-D were sent for metal scan analyses. The results are summarized in Table 8 with detailed analytical results presented in Appendix F. Large samples of these treated supernatants were sent for toxicity testing with the results summarized in Table 9 and details presented in Appendix G.

The metal scan analyses and toxicity tests showed that treated Blackwater samples met all regulations with respect to metal content and toxicity. Therefore, Blackwater samples that have been treated with 10 to 20 mg/L Fe³⁺ to a pH of 8.5 followed by a day of settling in field conditions are expected to yield an effluent that is non-toxic and in full compliance with MMR.

Table 8: Metals in Treated Samples for Toxicity Testing

Parameter	Treated DS-1		Treated R1		MMER monthly average limit
	TOX2-DS-1		TOX1-R		
	Total	Dissolved	Total	Dissolved	
mg/L					
Aluminum (Al)	0.021	0.020	0.037	0.013	
Antimony (Sb)	<0.001	<0.001	<0.001	<0.001	
Arsenic (As)	<0.001	<0.001	<0.001	<0.001	0.5
Barium (Ba)	0.003	0.003	0.004	0.004	
Beryllium (Be)	<0.002	<0.002	<0.002	<0.002	
Bismuth (Bi)	<0.001	<0.001	<0.001	<0.001	
Boron (B)	<0.050	<0.050	<0.050	<0.050	
Cadmium (Cd)	<0.0002	<0.0002	<0.0002	<0.0002	
Calcium (Ca)	39.0	39.0	17.0	16.0	
Chromium (Cr)	<0.005	<0.005	<0.005	<0.005	
Cobalt (Co)	<0.001	<0.001	<0.001	<0.001	
Cooper (Cu)	0.002	0.002	0.002	0.002	0.3
Iron (Fe)	0.60	0.07	0.74	0.08	
Lithium (Li)	< 0.010	< 0.010	< 0.010	< 0.010	
Magnesium (Mg)	2.10	2.00	0.88	0.80	
Manganese (Mn)	0.005	0.002	0.006	0.001	
Mercury (Hg)	<0.00001	n.m.	<0.00001	n.m.	0.0001
Molybdenum (Mo)	<0.001	<0.001	<0.001	<0.001	
Nickel (Ni)	<0.002	<0.002	<0.002	<0.002	0.5
Lead (Pb)	<0.0005	<0.0005	<0.0005	<0.0005	0.2
Potassium (K)	1.40	1.30	1.10	0.98	
Selenium (Se)	<0.003	<0.003	<0.003	<0.003	
Silicon (Si)	3.40	3.30	6.40	6.20	
Silver (Ag)	<0.001	<0.001	<0.001	<0.001	
Sodium (Na)	4.40	4.20	3.10	2.90	
Strontium (Sr)	0.079	0.083	0.053	0.047	
Thallium (Tl)	<0.002	<0.002	<0.002	<0.002	
Titanium	< 0.010	< 0.010	< 0.010	< 0.010	
Uranium (U)	<0.001	<0.001	<0.001	<0.001	
Vanadium (V)	0.003	0.002	0.004	0.003	
Zinc (Zn)	0.007	<0.007	<0.007	<0.007	0.5

n.m. = not measured

Table 9: Toxicity of Treated Blackwater Samples

Test	Sample Location	Treatment System	Fe+3	Settling	pH	Toxicity	
			Concentration	Time		Daphnia EC ₅₀	Rainbow Trout
			(mg/L)	(h)		%	Single point
Tox2-D	DS-1	Fe ³⁺ (Lime pH control)	10	8	8.7	> 100 ^(a)	Not toxic ^(b)
Tox1-R	R1		20		8.4	> 100 ^(a)	Not toxic ^(b)

(a) Zero immobility with exposure to 100% of the treated sample; (b) Zero mortality with exposure to 100% of treated sample.

5.0 Full Scale Considerations

The results from this study show that the only potential concern with the water quality in the expected runoff during Blackwater construction is total suspended solids. The test results suggest that it will be possible to remove these solids using an engineered pond with a 24-hour retention time for the design flowrate. Results suggest that settling alone may allow for sufficient TSS removal to meet the target limit of 15 mg/L. Treatment efficiency was considerably improved when ferric sulphate was used to coagulate the suspended solids at a pH of 8.5, controlled with lime. An iron dosage of 10 mg/L was sufficient for all but one test where a dosage of 20 mg/L was required. In practice, optimisation of this dosage in the field will determine if 20 mg/L is required.

Provisions should be made for addition of lime and ferric sulphate to the Blackwater construction runoff prior to the inlet of ponds where the overflow will be discharged to surface. Test results suggest that settling alone may be sufficient for normal runoff flowrates. The addition of ferric sulphate and lime may only be required during high flow events.

Results also indicate that the addition of a flocculant offers no significant advantage and even reduced settling efficiency in some cases.

6.0 Closing

We hope that this report meets your expectations. Please do not hesitate to contact the undersigned with any questions or for additional information. We thank you for providing us this opportunity to offer you our services.

AMEC Environment & Infrastructure A division of AMEC Americas Limited

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Appendix A
Sampling Methodology

Appendix B

Treatment Protocols

Characterisation and Treatment Protocols

The protocols below were used to characterize and treat received Blackwater samples. All treatment tests were performed with the laboratory setup shown in Figure B1.



Figure B1: Laboratory set-up

Runoff Water Characterisation:

1. Combine the raw water samples and mix vigorously
2. Take well mixed samples to measure turbidity and TSS
3. Measure temperature, pH, conductivity and ORP
4. Take a sample of non-filtered water and a sample of filtered water (through 0.45 μm filter) for ICP-MS scan by an accredited external lab
5. Take a sample of non-filtered water and a sample of filtered water (through 0.45 μm filter) for Hg cold vapour AA assay by an accredited external lab
6. Take a sample of non-filtered water for TSS analysis by an accredited external lab

Phase 1 Flocculant Screening Protocol:

1. Transfer 0.5 L of well mixed raw water into a 0.6 L beaker
2. Agitate the sample with a stirrer
3. Measure the initial pH of the sample
4. Add the 3 ml of 0.05% of flocculant, if required, into the raw water
5. Mix the slurry for 5 minutes
6. Record the pH
7. Allow the slurry to settle for 1 hour for all tests
8. Take a 20 mL sample of the supernatant to measure turbidity
9. Repeat test for all conditions listed in the table below:

Test	Sample Location	Volume (mL)	Flocculant	Flocculant Concentration (mg/L)	Agitation Time (min)
R0-D	DS-1	NA	None - Raw	NA	NA
F1-D	DS-1	500	None	0	5
F2-D	DS-1	500	MagnaFloc 1011	3	5
F3-D	DS-1	500	ZFloc 558	3	5
F4-D	DS-1	500	MagnaFloc 155	3	5
F5-D	DS-1	500	Flomin 905 MC	3	5
F6-D	DS-1	500	MagnaFloc 10	3	5
F7-D	DS-1	500	MagnaFloc 368	3	5
F8-D	DS-1	500	MagnaFloc 351	3	5
F9-D	DS-1	500	Flomin 920 MC	3	5
R0-R	R1	500	None - Raw	NA	NA
F1-R	R1	500	None	0	5
F2-R	R1	500	MagnaFloc 1011	3	5
F3-R	R1	500	ZFloc 558	3	5
F4-R	R1	500	MagnaFloc 155	3	5
F5-R	R1	500	Flomin 905 MC	3	5
F6-R	R1	500	MagnaFloc 10	3	5
F7-R	R1	500	MagnaFloc 368	3	5
F8-R	R1	500	MagnaFloc 351	3	5
F9-R	R1	500	Flomin 920 MC	3	5

Phase 2 Flocculant Dosage Optimization:

1. Transfer 0.5 L of well mixed raw water into a 0.6 L beaker
2. Agitate the sample with a stirrer
3. Measure the initial pH of the sample

4. Add the 1 or 2 or 3 or 5 ml of 0.05% of flocculant, if required, into the raw water
5. Mix the slurry for 5 minutes
6. Record the pH
7. Allow the slurry to settle for 1 hour for all tests
8. Take a 20 mL sample of the supernatant to measure turbidity
9. Repeat test for all conditions listed in table below:

Test	Sample Location	Volume (mL)	Flocculant	Flocculant Concentration
R0-D	DS-1	NA	None-Raw	NA
D1-D	DS-1	500	None	0
D2-D	DS-1	500	Flomin 920 MC	1
D3-D	DS-1	500		2
D4-D	DS-1	500		3
D5-D	DS-1	500		5
D6-D	DS-1	500		1
D7-D	DS-1	500	MagnaFloc 351	2
D8-D	DS-1	500		3
D9-D	DS-1	500		5
R0-R	R1	NA	None-Raw	NA
D1-R	R1	500	None	0
D2-R	R1	500	Flomin 920 MC	1
D3-R	R1	500		2
D4-R	R1	500		3
D5-R	R1	500		5
D6-R	R1	500		1
D7-R	R1	500	MagnaFloc 351	2
D8-R	R1	500		3
D9-R	R1	500		5

Phase 3 Coagulant and Flocculant treatment:

1. Transfer 1.5 L of well mixed raw water into a 2 L beaker
2. Agitate the sample with a overhead stirrer
3. Measure the initial pH, conductivity, ORP and temperature of the sample
4. If required, add appropriate volume of ferric sulphate solution to achieve ferric dosages of 10 mg/L.
5. If required, adjust the pH of solution to 8.5 with lime or caustic.
6. Mix the slurry for 5 minutes and, if relevant, note the amount of lime or caustic required to maintain the pH set point for this duration.
7. If required, add the appropriate mls of 0.05% flocculant into the raw water to achieve optimized dosage

8. Mix the slurry for 5 minutes
9. Allow the slurry to settle for 1 hour or 8 hours or 24 hours
10. Take a 20 mL sample of the supernatant with a syringe just below the surface of the water to measure turbidity
11. Take another 200 or 250 mL sample of the supernatant with a syringe just below the surface of the water for TSS determination
12. Note the final measurements for pH, conductivity, ORP and temperature
13. Filter the rest of treated slurry on a pre-weighed Whatman filter paper #40 to measure the solids production
14. Dry the paper and solids at 70°C until constant weight and calculate solids production
15. Repeat test for all conditions listed in table below:

Test	Sample Location	Treatment	System	Flocculant	Fe ³⁺	Agitation
				Concentration (mg/L)	Concentration (mg/L)	Time (min)
R0-D	DS-1	None-Raw		NA	NA	NA
T1-D	DS-1	None		0	0	5
T2-D	DS-1	Flomin 920 MC		3	0	5
T3-D	DS-1	Fe ³⁺ (Lime pH control)		0	10	5
T4-D	DS-1	Fe ³⁺ (Caustic pH control)		0	10	5
T5-D	DS-1	None		0	0	5
T6-D	DS-1	Flomin 920 MC		3	0	5
T7-D	DS-1	Fe ³⁺ (Lime pH control)		0	10	5
T8-D	DS-1	Fe ³⁺ (Caustic pH control)		0	10	5
T9-D	DS-1	None		0	0	5
T10-D	DS-1	Flomin 920 MC		3	0	5
T11-D	DS-1	Fe ³⁺ (Lime pH control)		0	10	5
R0-R	R1	None-Raw		NA	NA	NA
T1-R	R1	None		0	0	5
T2-R	R1	Flomin 920 MC		3	0	5
T3-R	R1	Fe ³⁺ (Lime pH control)		0	10	5
T4-R	R1	Fe ³⁺ (Caustic pH control)		0	10	5
T5-R	R1	No		0	0	5
T6-R	R1	Flomin 920 MC		3	0	5
T7-R	R1	Fe ³⁺ (Lime pH control)		0	10	5
T8-R	R1	Fe ³⁺ (Caustic pH control)		0	10	5
T9-R	R1	No		0	0	5
T10-R	R1	Flomin 920 MC		3	0	5
T11-R	R1	Fe ³⁺ (Lime pH control)		0	10	5

Appendix C

Flocculant and Reagent MSDS



Material Safety Data Sheet

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY

Product name : **Flomin 920 (MC)**

Company : SNF Canada Ltd.
2525, place Léon-Trépanier
Trois Rivières, Quebec, G9A 5E1 Canada

Telephone : (819)-378-1331
Telefax : (819)-372-1092
E-mail :

Emergency telephone number : CANUTEC: 1-613-996-6666

Product Use : Processing aid for industrial applications.

2. HAZARDS IDENTIFICATION

Canada Hazard Identification

Canadian WHMIS Class: Not controlled

Emergency Overview

Aqueous solutions or powders that become wet render surfaces extremely slippery.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Identification : Non-ionic water-soluble polymer

Regulated Components

None.

4. FIRST AID MEASURES

Inhalation : Move to fresh air.

Skin contact : Wash with water and soap as a precaution. In case of persistent skin irritation, consult a physician.

Eye contact : Rinse thoroughly with plenty of water, also under the eyelids. In case of persistent eye irritation, consult a physician.

Ingestion : The product is not considered toxic based on studies on laboratory animals.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : Water. Water spray. Foam. Carbon dioxide (CO₂). Dry powder.

Precautions : Aqueous solutions or powders that become wet render surfaces extremely slippery.

Special protective equipment for firefighters : No special protective equipment required.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions : No special precautions required.

Environmental precautions : As with all chemical products, do not flush into surface water.

Methods for cleaning up : Do not flush with water Clean up promptly by sweeping or vacuum. Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling

Safe handling advice : Avoid contact with skin and eyes. Avoid dust formation. Do not breathe dust. Wash hands before breaks and at the end of workday.

Storage

Keep in a dry cool place (0 - 30 °C).

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Limits

No exposure limits noted for ingredient(s).

Engineering measures

Use local exhaust if dusting occurs. Natural ventilation is adequate in absence of dusts.

Personal protective equipment

Respiratory protection : Dust safety masks are recommended where concentration of total dust is more than 10 mg/m³.

Hand protection : Rubber gloves.

Eye protection : Safety glasses with side-shields. Do not wear contact lenses where this product is used.

Skin and body protection : Chemical resistant apron or protective suit if splashing or repeated contact with solution is likely.

Hygiene measures

Wash hands before breaks and at the end of workday. Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form : Granular solid

Color : White

Odor : None

pH : 4 - 6 @ 5 g/l

Melting point/range : Not applicable

Flash point : Not applicable

Autoignition temperature (°C): Not applicable

Water solubility : See Technical Bulletin

LogPow : 0

10. STABILITY AND REACTIVITY

Stability : Stable. Hazardous polymerisation does not occur.

Materials to avoid : Oxidizing agents may cause exothermic reactions.

Hazardous decomposition products : Thermal decomposition may produce. Nitrogen oxides (NO_x). Carbon oxides (CO_x).

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral : LD50/oral/rat > 5000 mg/kg.

Skin : The results of testing on rabbits showed this material to be non-toxic even at high dose levels.

Inhalation : Based on studies on similar products, this material is not expected to be toxic.

Irritation

Skin : By analogy with similar products, this product is not expected to be irritating.

Eyes : By analogy with similar products tested according to the Draize technique this material should produce no corneal or iridial effects and only slight transitory conjunctival effects similar to those which all granular materials have on conjunctivae.

Sensitization

By analogy with similar products, this product is not expected to be sensitizing.

Chronic toxicity :

By analogy with similar products, this product is not expected to demonstrate chronic toxic effects.

12. ECOLOGICAL INFORMATION

Aquatic toxicity

Toxicity to fish : LC50/96 hours > 10 mg/l (OECD 203).

Toxicity to daphnia : EC(I)50/Daphnia m./48 hours > 10 mg/l (OECD 202).

Toxicity to algae : IC50/Scenedesmus subspicatus/72 hours > 100 mg/l. (OECD 201).

Environmental fate

Persistence and degradability : Not readily biodegradable.

Hydrolysis : Does not hydrolyse.

LogPow : 0

Bioaccumulation : Does not bioaccumulate.

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products :

In accordance with local, state and federal regulations.

Contaminated packaging :

Rinse empty containers with water and use the rinse water to prepare the working solution. Can be landfilled or incinerated, when in compliance with local, state and federal regulations.

14. TRANSPORT INFORMATION

TDG (Canada)

Remarks: Not classified as dangerous in the meaning of TDG (Canada) regulations.

IMDG/IMO

Not classified as dangerous in the meaning of IMO/IMDG regulations.

ICAO/IATA

Not classified as dangerous in the meaning of ICAO/IATA regulations.

15. REGULATORY INFORMATION

Canadian WHMIS Class:

Not controlled.

Canadian Ingredients Disclosure List:

None listed.

International Inventories

Canada (DSL) : All components of this product are either listed on the inventory or are exempt from listing.

USA (TSCA): All components of this product are either listed on the inventory or are exempt from listing.

European Union (EINECS/ELINCS) :

All components of this product are either listed on the inventory or are exempt from listing.

Australia (AICS) : All components of this product are either listed on the inventory or are exempt from listing.

China (IECSC) : All components of this product are either listed on the inventory or are exempt from listing.

Japan (ENCS) : All components of this product are either listed on the inventory or are exempt from listing.

Korea (ECL) : All components of this product are either listed on the inventory or are exempt from listing.

Philippines (PICCS) : All components of this product are either listed on the inventory or are exempt from listing.

16. OTHER INFORMATION

This MSDS was prepared in accordance with the following :

ISO 11014-1: Material Safety Data Sheet for Chemical Products

ANSI Z400.1-2004; Material Safety Data Sheets - Preparation

Contact :

Regulatory Affairs Manager: (912)-880-8014

The data in this Material Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process. This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience is gained

Material Safety Data Sheet

FERRIC SULFATE

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: FERRIC SULFATE

Synonyms: Iron (III) Sulfate

Chemical Family: Inorganic salt

Application: Water treatment (potable and waste water). Odor removal.

Supplied By: CNS Inc.
159 Père Divet
Sept-îles, Qc
G4R 3P5
Tel: 418-932-5876 FAX: 418-968-3917

Revision date: 20/04/2011

2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients	Percentage (W/W)	LD50s and LC50s Route & Species:
Ferric sulfate 10028-22-5	40-70	Oral LD50 (Rat) = 500 mg/kg
Sulphuric Acid 7664-93-9	1-5	Oral LD50 (Rat) 2140 mg/kg Inhalation LC50 (Rat) 510 mg/m ³ (2-hour exposure) LC50 (Rat): 255 mg/m ³ (equivalent 4-hour exposure) LC50 (Mouse): 160 mg/m ³ (equivalent 4-hour exposure).

Note: No additional remark.

3. HAZARDS IDENTIFICATION

Potential Acute Health Effects:

Eye Contact: Causes moderate eye irritation.

Skin Contact: Causes moderate skin irritation.

Inhalation: May irritate mouth, nose, and throat. Inhalation of mist will irritate mucous membranes.

Ingestion: May be harmful if swallowed.

4. FIRST AID MEASURES

Eye Contact: In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Skin Contact: Flush skin with large amounts of water. If irritation persists, get medical attention. Remove contaminated clothing and launder before reuse.

Inhalation: Remove person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, get immediate medical attention.

Ingestion: Do NOT induce vomiting. Never give anything by mouth to an unconscious or convulsing person. Seek immediate medical attention. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs.

Notes to Physician: Treatment based on sound judgment of physician and individual reactions of patient.

5. FIRE FIGHTING MEASURES

Flash Point: None.

Flash Point Method: Not applicable.

Autoignition Temperature: Not available.

Flammable Limits in Air (%): Not Available.

Extinguishing Media: Use extinguishing media appropriate for surrounding fire.

Special Exposure Hazards: Under fire conditions, toxic, corrosive fumes are emitted. Sulfuric acid could react with metal to produce hydrogen.

Hazardous Decomposition/Combustion Materials (under fire conditions): Oxides of sulphur.

Special Protective Equipment: Wear protective clothing and self-contained breathing apparatus.

NFPA RATINGS FOR THIS PRODUCT ARE: HEALTH 2, FLAMMABILITY 0, INSTABILITY 1

HMIS RATINGS FOR THIS PRODUCT ARE: HEALTH 2, FLAMMABILITY 0, REACTIVITY 1

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures: Ventilate spill area if possible. Wear appropriate protective equipment.

Environmental Precautionary Measures: Prevent entry into sewers or streams, dike if needed. Notify the appropriate authorities.

Procedure for Clean Up: Stop leak only if safe to do so. Isolate hazard area and restrict access. Neutralize with lime slurry, limestone, or soda ash. This will generate carbon dioxide, so additional ventilation may be necessary. Absorb with an inert dry material and place in an appropriate waste disposal container. Flush area with water to remove trace residue.

7. HANDLING AND STORAGE

Handling: Avoid breathing vapors, mist, fume or dust. Avoid contact with eyes, skin and clothing. Handle and open containers with care. Use caution when handling any chemical substance. Keep the containers closed when not in use. Empty containers may contain hazardous product residues. When cleaning, decontaminating or performing maintenance on tanks, containers, piping systems and accessories, and in any other situations where airborne contaminants and/or dust could be generated, use protective equipment to protect against ingestion or inhalation. Hepa or air supplied respirator, full Tyvek coveralls with head cover, or chemical suits, gloves and boots are suggested.

Storage: Store in a cool, dry, well ventilated area. Do not store in metal containers, because the metal will dissolve and generate hydrogen. Vent rubber lined steel containers to avoid pressure build up if the lining fails. Avoid storage with incompatible materials. Keep containers tightly closed. Store only in dry rubber-lined, plastic, FRP or stainless steel (304, 316). Store between 10°C (50°F) - 30°C (86°F). Product should be used within one (1) year.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls:

Local exhaust ventilation as necessary to maintain exposures to within applicable limits.

Respiratory Protection: If airborne concentrations exceed the Occupational Exposure Limit, use a NIOSH/MSHA approved full facepiece respirator with acid gas cartridges.

Gloves:

Impervious gloves. Neoprene gloves.

Skin Protection: Skin contact should be prevented through the use of suitable protective clothing, gloves and footwear, selected for conditions of use and exposure potential. Consideration must be given both to durability as well as permeation resistance.

Eyes: Chemical goggles; also wear a face shield if splashing hazard exists.

Other Personal Protection Data: Ensure that eyewash stations and safety showers are proximal to the work-station location.

Ingredients	Exposure Limit - ACGIH	Exposure Limit - OSHA	Immediately Dangerous to Life or Health - IDLH
Ferric sulfate	1 mg/m ³	Not available.	Not Available.
Sulphuric Acid	0.2 mg/m ³ TLV-TWA	1 mg/m ³ TWA	15 mg/m ³

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Liquid.

Colour: Reddish Brown

Odour: Acidic

pH <2.0

Specific Gravity: 1.38 - 1.59

Boiling Point: 110°C

Freezing/Melting Point: <-32°C

Vapour Pressure: Not Available.

Vapour Density: Not Available.

% Volatile by Volume: ~50

Evaporation Rate: Not Available.

Solubility: Soluble in water.

VOCs: Not Available.

Viscosity: Not Available.

Molecular Weight: Not Available.

Other: Not Available.

10. STABILITY AND REACTIVITY

Chemical Stability: Stable.

Hazardous Polymerization: Will not occur.

Conditions to Avoid: Excessive heat.

Materials to Avoid: Strong acids. Strong bases. Corrosive to some metals. Strongly corrosive to mild steel.

Hazardous Decomposition Products: Thermal decomposition above 600°C will evolve toxic and irritant vapors (sulfur oxides).

Additional Information:

No additional remark.

11. TOXICOLOGICAL INFORMATION

Principle Routes of Exposure

Ingestion: May be harmful if swallowed.

Skin Contact: Causes moderate skin irritation.

Inhalation: May irritate mouth, nose, and throat. Inhalation of mist will irritate mucous membranes.

Eye Contact: Causes moderate eye irritation.

Additional Information:

Acute Test of Product:

Acute Oral LD50: Not Available.
Acute Dermal LD50: Not Available.
Acute Inhalation LC50: Not Available.

Carcinogenicity:

Ingredients	IARC - Carcinogens	ACGIH - Carcinogens
Ferric sulfate	Not listed.	Not listed.
Sulphuric Acid	Group 1	A2

Carcinogenicity Comment: Epidemiological studies of workers chronically exposed to sulfuric acid have suggested an increased risk for upper respiratory cancers. The International Agency for Research in Cancer has concluded that occupational exposure to strong inorganic acid mists containing sulphuric acid is carcinogenic to man, however, sulfuric acid itself is not considered a confirmed human carcinogen at this time. The epidemiological studies which provided the basis for the IARC assessment were confounded by exposure to alkyl sulphates (known animal carcinogens), other chemicals, and smoking. Based on the evidence from all human and animal studies, no definitive relationship has been shown between increased risk of respiratory tract cancer and sulfuric acid alone. Sulfuric acid can react with other substances to form mutagenic and possibly carcinogenic products such as alkyl sulfates.

Reproductive Toxicity/ Teratogenicity/ Embryotoxicity/ Mutagenicity: Not Available.

12. ECOLOGICAL INFORMATION

Ecotoxicological Information:

Ingredients	Ecotoxicity - Fish Species Data	Acute Crustaceans Toxicity:	Ecotoxicity - Freshwater Algae Data
Ferric sulfate	LC50 96 h (Gambusia affinis) 37.2 mg/L static	Not Available.	Not Available.
Sulphuric Acid	LC50 (Brachydanio rerio) 500 mg/L LC50 (Oncorhynchus mykiss) 2.8 ug/L (96hr)	Not Available.	Not Available.

Other Information:

No additional remark.

13. DISPOSAL CONSIDERATIONS

Disposal of Waste Method: Any residues and/or rinse waters from cleaning of tanks, containers, piping systems and accessories may be a hazardous characteristic waste and must be properly disposed in accordance with all federal, provincial and local laws.

Contaminated Packaging: Empty containers should be recycled or disposed of through an approved waste management facility.

14. TRANSPORT INFORMATION

DOT (U.S.):

DOT Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (FERRIC SULFATE)

DOT Hazardous Class 8

DOT UN Number: UN3264

DOT Packing Group: III

DOT Reportable Quantity (lbs): Not Available.

Note: No additional remark.

Marine Pollutant: No.

TDG (Canada):

TDG Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (FERRIC SULFATE)

Hazard Class: 8

UN Number: UN3264

14. TRANSPORT INFORMATION

Packing Group: III

Note: No additional remark.

Marine Pollutant: No.

15. REGULATORY INFORMATION

U.S. TSCA Inventory Status: All components of this product are either on the Toxic Substances Control Act (TSCA) Inventory List or exempt.

Canadian DSL Inventory Status: All components of this product are either on the Domestic Substances List (DSL), the Non-Domestic Substances List (NDSL) or exempt.

Note: Not available.

U.S. Regulatory Rules

Ingredients	CERCLA/SARA - Section 302:	SARA (311, 312) Hazard Class:	CERCLA/SARA - Section 313:
Ferric sulfate	Not Listed.	Listed	Not Listed.
Sulphuric Acid	Listed	Listed	Listed

California Proposition 65: Not Listed.

MA Right to Know List: Listed.

New Jersey Right-to-Know List: Listed.

Pennsylvania Right to Know List: Listed.

WHMIS Hazardous Class:

E CORROSIVE MATERIAL





MATERIAL SAFETY DATA SHEET

SECTION I - CHEMICAL PRODUCT AND COMPANY INFORMATION

Product Name: HIGH CALCIUM HYDRATED LIME	WHMIS – CLASSIFICATION: D2A: MATERIALS CAUSING OTHER TOXIC EFFECTS E: CORROSIVE MATERIAL
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MANUFACTURER'S AND SUPPLIER'S NAME:

GRAYMONT (NB) INC	4634, Route 880, Havelock, New Brunswick, E4Z 5K8.
GRAYMONT (PA) INC.	194, Match Factory Place, Bellefonte, Pennsylvania, 16823
GRAYMONT (QC) INC.	25 – 206, rue De Lauzon, Boucherville, Québec, J4B 1E7.
GRAYMONT (WESTERN CANADA) INC.	#260 – 4311, 12 th Street N.E., Calgary, Alberta, T2E 4P9
GRAYMONT (WESTERN US) INC.	3950 South, 700 East, Suite 301, Salt Lake City, Utah, 84107
GRAYMONT (WI) INC.	Foot of Hill Avenue, Superior, Wisconsin, 54880

EMERGENCY TEL. No.: (613) 996 – 6666 CANUTEC (Canada) (800) 424 – 9300 CHEMTREC (US)

Chemical Name Calcium hydroxide	Chemical Family Alkaline earth hydroxide	Chemical Formula Complex mixture - mostly Ca(OH)₂
Molecular Weight Ca(OH)₂ = 74.096	Trade Name and Synonyms Hydrated Lime, Lime, Slaked lime, Lime Putty, Lime Slurry, Milk of Lime, Calcium Hydroxide	Material Use Neutralization, Flocculation, Stabilization, absorption

SECTION II - COMPOSITION AND INFORMATION ON INGREDIENTS

Hazardous Ingredients	Approximate Concentration (% by weight)	C.A.S. Number	Exposure limits (mg/m ³)					
			OSHA PEL	ACGIH TLV	RSST VEMP	MSHA PEL	NIOSH REL	NIOSH IDLH
(Complex Mixture)	(% by weight)		(TWA) 8/40h	(TWA) 8/40h	(TWA) 8/40h	(TWA) 8/40h	(TWA) 10/40h	
Calcium hydroxide	92 to 100	1305-62-0	15 (T) 5 (R)	5	5	5	5	N/A
Crystalline Silica, Quartz	0 à 0.1 Or 0.1 à 1 (Note 1)	14808-60-7	30/(%SiO₂)+2 (T) 10/(%SiO₂)+2 (R)	0.025 (R)	0.1 (R)	30/(%SiO₂)+2 (T) 10/(%SiO₂)+2 (R)	0.05 (R)	50

(Note 1): Concentration of crystalline silica in a series of lime products will vary from source to source. It was not detected on some samples (< 0.1% w/w). Therefore two ranges are being disclosed. (Note 2): ACGIH TLV Version 1973 has been adopted by the Mine Safety Health Administration (MSHA) as the regulatory Exposure Standard. (Note 3): (T) Total Dust; (R): Respirable Dust.

SECTION III - PHYSICAL AND CHEMICAL DATA				
Physical State Gas <input type="checkbox"/> Liquid <input type="checkbox"/> Solid <input checked="" type="checkbox"/>	Odor and Appearance Slight earthy odor – Fine white powder		Odor Threshold (p.p.m.) Not applicable	Specific Gravity 2.3 – 2.4
Vapor Pressure (mm) Not applicable	Vapor Density (Air = 1) Not applicable	Evaporation Rate Not applicable	Boiling Point (°C) Not applicable	Melting Point (°C) Not applicable
Solubility in Water (20°C) 0.165g/100g solution	Volatiles (% by volume) Not applicable	pH (25 °C) Sat. soln Ca(OH)₂ 12.45	Bulk Density (kg/m ³) 320 - 690	Coefficient of water/oil distribution Not applicable

SECTION IV - FIRE OR EXPLOSION HAZARD DATA			
Flammability Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, under which conditions?			
Extinguishing Media Calcium Hydroxide does not burn. Use extinguishing media appropriate to surrounding fire conditions.			
Special Fire Fighting Procedures Not applicable			
Flash point (°C) and Method Not applicable	Upper flammable limit (% by volume) Not applicable	Lower flammable limit (% by volume) Not applicable	
Auto Ignition Temperature (°C) Not applicable	TDG Flammability Classification Non-flammable	Hazardous Combustion Products None	
Dangerous Combustion Products None			
EXPLOSION DATA			
Sensitivity to Chemical Impact Not applicable	Rate of Burning Not applicable	Explosive Power Not applicable	Sensitivity to Static Discharge Not applicable

SECTION V - REACTIVITY DATA

Chemical Stability

Yes No

If no, under which conditions?

Absorbs carbon dioxide in the air to form calcium carbonate.

Incompatibility to other substances

Yes No

If so, which ones?

Boron tri-fluoride, chlorine tri-fluoride, ethanol, fluorine, hydrogen fluoride, phosphorus pentoxide; and acids (violent reaction with generating heat and possible explosion in confined area).

Reactivity

Yes No

If so, under which conditions?

Reacts violently with strong acids. Reacts chemically with acids and many other compounds and chemical elements to form calcium based compounds. Explosive when mixed with nitro organic compounds.

Hazardous Decomposition Products

Thermal decomposition at 540°C will produce calcium oxide and water.

Hazardous Polymerization Products

Will not occur.**SECTION VI - TOXICOLOGICAL PROPERTIES**

Route of Entry

 Skin Contact Skin Absorption Eye Contact Acute Inhalation Chronic Inhalation Ingestion

Effects of Acute Exposure to Product

Skin

Severe irritation of mucous and skin, removes natural skin oils.

Eyes

Severe eye irritation, intense watering of the eyes, possible lesions, possible blindness when exposed for prolonged period. Eye irritation data: Eye-Rabbit-10mg/ 24 h – Severe.

Inhalation

If inhaled in form of dust, irritation of breathing passages, cough, sneezing.

Ingestion

If ingested: pain, vomiting blood, diarrhea, collapse, drop in blood pressure (indicates perforation of esophagus or stomach).

Effects of Chronic Exposure to Product:

Contact dermatitis. Following repeated or prolonged contact, this product can cause redness, desquamation and fissures. This product may contain trace amounts of crystalline silica. Excessive inhalation of respirable crystalline silica dust may result in respiratory disease, including silicosis, pneumoconiosis and pulmonary fibrosis.LD₅₀ of Product (Specify Species and Route)**7340 mg/kg (Rat, Oral)****7300 mg/kg (Mouse, Oral)**

Irritancy of Product

Severe to moist tissues

Exposure limits of Product

UnavailableLC₅₀ of Product (Specify Species)**Unavailable**

Sensitization to Product

None

Synergistic materials

None reported

SECTION VI - TOXICOLOGICAL PROPERTIES (Cont'd)

Carcinogenicity Reproductive effects Tératogenicity Mutagenicity

Calcium Hydroxide is not listed as a carcinogen by ACGIH, MSHA, OSHA, NTP, DFG, RSST or IARC. It may, however, contain trace amounts of Crystalline Silica listed carcinogens by these organizations.

Crystalline Silica, which inhaled in the form of quartz or crystobalite from occupational sources, is classified by IARC as carcinogenic to humans. (Group 1)

Silica, crystalline (Airborne particles of respirable size) is regulated under California's Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Crystalline Silica is listed as a chemical known to the State to cause cancer.

NIOSH considers crystalline silica to be potential occupational carcinogen as defined by the OSHA carcinogen policy [29 CFR 1990]. (Ca).

NTP lists respirable Crystalline Silica as known to be human carcinogens based on sufficient evidence of carcinogenicity in humans. (K).

ACGIH lists respirable Crystalline Silica (quartz) as suspected human carcinogen. (A2).

DFG lists respirable Crystalline Silica as a substance that causes cancer in man (1)

RSST lists respirable Crystalline Silica (quartz) as suspected human carcinogen.

SECTION VII - PREVENTIVE MEASURES

Personal Protective Equipment (PPE)	Wear clean, dry gloves, full length pants over boots, long sleeved shirt buttoned at the neck, head protection and approved eye protection selected for the working conditions.
Gloves (Specify)	Gauntlets Cuff style.
Respiratory (Specify)	Respirator Recommendations for Calcium Hydroxide: Not available. Respirator Recommendations for Calcium Oxide: NIOSH approved respirator. <u>Up to 10 mg/m³</u>: (APF = 5) Any quarter-mask respirator. <u>Up to 20 mg/m³</u>: (APF = 10) Any particulate respirator equipped with an N95, R95 or P95 filter except quarter-mask respirator. Any supplied-air respirator. <u>Up to 25 mg/m³</u>: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode. Any powered, air purifying respirator with a high-efficiency particulate filter.
Eyes (Specify)	ANSI, CSA or ASTM approved safety glasses with side shields. Tight fitting dust goggles should be worn when excessive (visible) dust conditions are present. Do not wear contact lenses without tight fitting goggles when handling this chemical.
Footwear (Specify)	Resistant to caustics.
Clothing (Specify)	Fully covering skin. Remove when wet or contaminated. Change daily.
Other (Specify)	Evaluate degree of exposure and use PPE if necessary. After handling lime, employees must shower. If exposed daily, use oil, Vaseline, silicone base crème etc. to protect exposed skin, particularly neck, face and wrists.
Engineering Controls (e.g. ventilation, enclosed process, specify)	Enclose dust sources; use exhaust ventilation (dust collector) at handling points, keep levels below Max. Concentration Permitted.

SECTION VII - PREVENTIVE MEASURES (Cont'd)

Leak and Spill Procedure

Limit access to trained personnel. Use industrial vacuums for large spills. Ventilate area.

Waste Disposal

Transport to disposal area or bury. Review Federal, Provincial and local Environmental regulations.

Handling Procedures and Equipment

Avoid skin and eye contact. Minimize dust generation. Wear protective goggles and in cases of insufficient ventilation, use NIOSH approved dust respirator. An eye wash station and safety shower should be readily available where this material or its water dispersions are used. Contact lenses should not be worn when working with this chemical.

Storage Requirements

Keep tightly closed containers in a cool, dry and well-ventilated area, away from acids. Keep out of reach of children.

Special Shipment Information

Calcium Hydroxide is neither regulated by the Transportation of Dangerous Goods (TDG) Regulations (Canada) nor by the Hazardous Materials Regulations (USA).

SECTION VIII - FIRST AID MEASURES

Skin

Carefully and gently brush the contaminated body surfaces in order to remove all traces of lime. Use a brush, cloth or gloves. Remove all lime-contaminated clothing. Rinse contaminated area with lukewarm water for 15 to 20 minutes. Consult a physician if exposed area is large or if irritation persists.

Eyes

Immediately rinse contaminated eye(s) with gently running lukewarm water (saline solution is preferred) for 15 to 20 minutes. In the case of an embedded particle in the eye, or chemical burn, as assessed by first aid trained personnel, contact a physician.

Inhalation

Move source of dust or move victim to fresh air. Obtain medical attention immediately. If victim does not breathe, give artificial respiration.

Ingestion

If victim is conscious, give 300 ml (10 oz) of water, followed by diluted vinegar (1 part vinegar, 2 parts water) or fruit juice to neutralize the alkali. Do not induce vomiting. Contact a physician immediately.

General Advise

Consult a physician for all exposures except minor instances of inhalation.

SECTION IX - REGULATORY INFORMATION

Superfund Amendments and Reauthorization Act of 1986 (SARA Title III). / The Emergency Planning and "Community Right-to-Know" Act (EPCRA). / Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). / Resource Conservation and Recovery Act (RCRA).

Component Calcium Hydroxide has been reviewed against the following regulatory listings:

- SARA Section 302 – Emergency Planning Notification. Extremely Hazardous Substances (EHS) List and Threshold Planning Quantity (TPQ). (40 CFR, Part 355, Section 30) : Not listed.
- SARA Section 304 – Emergency Release Notification. Extremely Hazardous Substances (EHS) and Reportable Quantity (RQ) List. (40 CFR, Part 355, Section 40) : Not listed.
- SARA Section 311/312 – Hazard Categories (40 CFR, Part 370) : This product is regulated under CFR 1910.1200 (OSHA Hazard Communication) as Immediate (Acute) Health Hazards – Irritant.
- SARA Section 313 – Toxics Release Inventory (TRI). Toxic Chemical List (40 CFR, Part 372). Not listed.
- CERCLA – Hazardous Substance (40 CFR, Part 302): Not listed in Table 302.4.
- RCRA – Hazardous Waste Number (40 CFR, Part 261, Subpart D): Not listed.
- RCRA – Hazardous Waste Classification (40 CFR, Part 261, Subpart C): Not classified.

CWA 311. - Clean Water Act List of Hazardous Substances.

Calcium Hydroxide has been withdrawn from the Clean Water Act (CWA) list of hazardous substances. (11/13/79) (44FR65400)

California Proposition 65.

Component Calcium Hydroxide does not appear on the above regulatory listing. This product may contain small amounts of crystalline silica. Silica, crystalline (Airborne particles of respirable size) is regulated under California's Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Crystalline silica is listed as a chemical known to the State to cause cancer.

Transportation - Hazardous Materials Regulations (USA) & Transportation of Dangerous Goods (TDG) Regulations (Can).

Calcium Hydroxide does not appear on the above regulatory listings

Toxic Substances Control Act (TSCA).

All naturally occurring components of this product are automatically included in the USEPA TSCA Inventory List per 40 CFR 710.4 (b). All other components are listed on the USEPA TSCA Chemical Substances Inventory. Calcium Hydroxide is subject to inventory update reporting (IUR).

Canadian Environmental Protection Act (CEPA) – Substances Lists (DSL/NDSL).

Calcium Hydroxide is specified on the public Portion of the Domestic Substances List (DSL).

ANSI/NSF 60 - Drinking Water Treatment Additives.

Hydrated Lime has been investigated with respect to elements identified by EPA as toxic and it has been classified for use in direct contact with drinking water (in accordance with Standard ANSI/NSF 60). For a list of classified products, refer to Underwriters Laboratories Inc.'s Online Certifications Directory.



FDA - U.S. Food and Drug Administration, Department of Health and Human Services.

Calcium Hydroxide has been determined as "Generally Recognized As Safe" (GRAS) by FDA. See 21CFR184.1205. (CFR Title 21 Part 184 - - Direct food substances affirmed as generally recognized as safe).

SECTION X - OTHER INFORMATION

<p>Hazardous Materials Identification System (U.S.)</p>		<p>National Fire Protection Association (U.S.) NFPA 704</p> <p>Health Hazard</p>	<p>Fire Hazard</p>  <p>Instability / Thermal Hazard</p> <p>Specific hazard</p>
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<p>WHMIS – Classification: “E” Corrosive Materials.</p>	<p>WHMIS – Classification: “D2A” Materials causing other toxic effects.</p>
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<p>Symbol:</p> 	<p>Symbol:</p> 
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Additional Information/Comments:
The technical data contained herein is given as information only and is believed to be reliable. GRAYMONT makes no guarantee of results and assumes no obligation or liability in connection therewith.

Sources Used:
 NFPA, NLA, TDG, CSST, RSST, (LSRO-FASEB), Hazardous Products Act, Environment Canada, Enviroguide, OSHA, ACGIH, IARC, NIOSH, CFR, NTP, HSDB, EPA SRS, RTECS, DFG, Chemistry and Technology of Lime and Limestone (John Wiley and Sons, Inc.), Lime and Limestone (WILEY-VCH).

SECTION XI - PREPARATION INFORMATION

<p>Prepared by: GRAYMONT (QC) INC. Quality Assurance & Technical Services</p>	<p>Telephone number: (450) 449-2262</p>	<p>Date : June 2011</p>
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An electronic version of this MSDS is available at: www.graymont.com under the PRODUCTS section.

Appendix D

Certificates of Analysis – Raw Water

Attention: Serge Payant
AMEC
MONTRÉAL
1425, Route Transcanadienne
Suite 400
Dorval, PQ
CANADA H9P 2W9

Votre # de commande: P12-1100
Votre # du projet: VE52277820006
Adresse du site: BLACKWATER
Votre # Bordereau: c#945840, c#94584-01-01

Date du rapport: 2013/07/31

CERTIFICAT D'ANALYSES

DE DOSSIER MAXXAM: B344982

Reçu: 2013/07/29, 16:20

Matrice: EAU
Nombre d'échantillons reçus: 2

Analyses	Quantité	Date de l' extraction	Date Analyisé	Méthode de laboratoire	Référence primaire
Métaux extractibles totaux par ICP	2	2013/07/30	2013/07/31	STL SOP-00006	MA.200- Mét 1.2

* Les données brutes sont utilisées pour le calcul du RPD (% d'écart relatif). L'arrondissement des résultats finaux peut expliquer la variation apparente.

clé de cryptage



Maxxam
31 Jul 2013 13:23:43 -04:00

Veillez adresser toute question concernant ce certificat d'analyse à votre chargé(e) de projets

Rita Kurdoghlianian, Chargée de projets
Email: RKurdoghlianian@maxxam.ca
Phone# (514) 448-9001 Ext:4272

=====
Ce rapport a été produit et distribué en utilisant une procédure automatisée sécuritaire.
Maxxam a mis en place des procédures qui protègent contre l'utilisation non autorisée de la signature électronique et emploie les "signataires" requis, conformément à la section 5.10.2 de la norme ISO/CEI 17025:2005(E). Veuillez vous référer à la page des signatures de validation pour obtenir les détails des validations pour chaque division.

Dossier Maxxam: B344982
Date du rapport: 2013/07/31

AMEC
Votre # du projet: VE52277820006
Adresse du site: BLACKWATER
Votre # de commande: P12-1100

MÉTAUX EXTRACTIBLES TOTAUX (EAU)

Identification Maxxam		V31660	V31661		
Date d'échantillonnage		2013/07/29	2013/07/29		
# Bordereau		c#94584-01-01	c#94584-01-01		
	UNITÉS	R1-F	DS1-F	LDR	Lot CQ

MÉTAUX					
Aluminium (Al)	mg/L	0.08	<0.04	0.04	1183822
Antimoine (Sb)	mg/L	<0.02	<0.02	0.02	1183822
Arsenic (As)	mg/L	<0.05	<0.05	0.05	1183822
Baryum (Ba)	mg/L	<0.02	<0.02	0.02	1183822
Béryllium (Be)	mg/L	<0.002	<0.002	0.002	1183822
Bismuth (Bi)	mg/L	<0.05	<0.05	0.05	1183822
Cadmium (Cd)	mg/L	<0.01	<0.01	0.01	1183822
Calcium (Ca)	mg/L	3.6	11	0.5	1183822
Chrome (Cr)	mg/L	<0.01	<0.01	0.01	1183822
Cobalt (Co)	mg/L	<0.01	<0.01	0.01	1183822
Cuivre (Cu)	mg/L	<0.009	<0.009	0.009	1183822
Fer (Fe)	mg/L	0.1	<0.1	0.1	1183822
Lithium (Li)	mg/L	<0.1	<0.1	0.1	1183822
Magnésium (Mg)	mg/L	0.7	1.8	0.5	1183822
Manganèse (Mn)	mg/L	0.03	<0.01	0.01	1183822
Molybdène (Mo)	mg/L	<0.01	<0.01	0.01	1183822
Nickel (Ni)	mg/L	<0.01	<0.01	0.01	1183822
Plomb (Pb)	mg/L	<0.01	<0.01	0.01	1183822
Potassium (K)	mg/L	1.0	1.1	0.5	1183822
Sélénium (Se)	mg/L	<0.05	<0.05	0.05	1183822
Silicium (Si)	mg/L	6.9	6.5	0.1	1183822
Sodium (Na)	mg/L	2.8	4.1	0.5	1183822
Strontium (Sr)	mg/L	<0.05	0.06	0.05	1183822
Thallium (Tl)	mg/L	<0.01	<0.01	0.01	1183822
Zinc (Zn)	mg/L	<0.02	0.03	0.02	1183822

LDR = Limite de détection rapportée
Lot CQ = Lot Contrôle Qualité

Dossier Maxxam: B344982
Date du rapport: 2013/07/31

AMEC
Votre # du projet: VE52277820006
Adresse du site: BLACKWATER
Votre # de commande: P12-1100

REMARQUES GÉNÉRALES

État des échantillons à l'arrivée: BON

MÉTAUX EXTRACTIBLES TOTAUX (EAU)

Veillez noter que les résultats n'ont pas été corrigés ni pour la récupération des échantillons de contrôle qualité, ni pour le blanc de méthode.

Les résultats ne se rapportent qu'aux échantillons soumis pour analyse

AMEC

Attention: Serge Payant

Votre # du projet: VE52277820006

P.O. #: P12-1100

Adresse du site: BLACKWATER

Rapport Assurance Qualité

Dossier Maxxam: B344982

Lot Lot Num Init	Type CQ	Groupe	Date Analyisé aaaa/mm/jj	Valeur	Réc	UNITÉS		
1183822 JS2	MRC	Aluminium (Al)	2013/07/31		108	%		
		Antimoine (Sb)	2013/07/31		93	%		
		Arsenic (As)	2013/07/31		101	%		
		Baryum (Ba)	2013/07/31		110	%		
		Béryllium (Be)	2013/07/31		108	%		
		Cadmium (Cd)	2013/07/31		101	%		
		Chrome (Cr)	2013/07/31		105	%		
		Cobalt (Co)	2013/07/31		108	%		
		Cuivre (Cu)	2013/07/31		100	%		
		Fer (Fe)	2013/07/31		103	%		
		Manganèse (Mn)	2013/07/31		110	%		
		Molybdène (Mo)	2013/07/31		108	%		
		Nickel (Ni)	2013/07/31		102	%		
		Plomb (Pb)	2013/07/31		107	%		
		Sélénium (Se)	2013/07/31		102	%		
		Strontium (Sr)	2013/07/31		106	%		
		Thallium (Tl)	2013/07/31		107	%		
		Zinc (Zn)	2013/07/31		101	%		
		Blanc fortifié		Aluminium (Al)	2013/07/31		97	%
				Antimoine (Sb)	2013/07/31		104	%
				Arsenic (As)	2013/07/31		95	%
				Baryum (Ba)	2013/07/31		102	%
				Béryllium (Be)	2013/07/31		101	%
				Bismuth (Bi)	2013/07/31		102	%
				Cadmium (Cd)	2013/07/31		98	%
				Calcium (Ca)	2013/07/31		95	%
				Chrome (Cr)	2013/07/31		100	%
Cobalt (Co)	2013/07/31				95	%		
Cuivre (Cu)	2013/07/31				94	%		
Fer (Fe)	2013/07/31				96	%		
Lithium (Li)	2013/07/31				104	%		
Magnésium (Mg)	2013/07/31				97	%		
Manganèse (Mn)	2013/07/31				103	%		
Molybdène (Mo)	2013/07/31				104	%		
Nickel (Ni)	2013/07/31				94	%		
Plomb (Pb)	2013/07/31				102	%		
Potassium (K)	2013/07/31				96	%		
Sélénium (Se)	2013/07/31				95	%		
Silicium (Si)	2013/07/31				97	%		
Sodium (Na)	2013/07/31				100	%		
Strontium (Sr)	2013/07/31				99	%		
Thallium (Tl)	2013/07/31				102	%		
Zinc (Zn)	2013/07/31				93	%		
Blanc de méthode				Aluminium (Al)	2013/07/31	<0.04		mg/L
				Antimoine (Sb)	2013/07/31	<0.02		mg/L
		Arsenic (As)	2013/07/31	<0.05		mg/L		
		Baryum (Ba)	2013/07/31	<0.02		mg/L		
		Béryllium (Be)	2013/07/31	<0.002		mg/L		
		Bismuth (Bi)	2013/07/31	<0.05		mg/L		
		Cadmium (Cd)	2013/07/31	<0.01		mg/L		
		Calcium (Ca)	2013/07/31	<0.5		mg/L		
		Chrome (Cr)	2013/07/31	<0.01		mg/L		
		Cobalt (Co)	2013/07/31	<0.01		mg/L		
		Cuivre (Cu)	2013/07/31	<0.009		mg/L		
		Fer (Fe)	2013/07/31	<0.1		mg/L		

AMEC
 Attention: Serge Payant
 Votre # du projet: VE52277820006
 P.O. #: P12-1100
 Adresse du site: BLACKWATER

Rapport Assurance Qualité (Suite)

Dossier Maxxam: B344982

Lot Lot			Date Analysé	Valeur	Réc	UNITÉS
Num Init	Type CQ	Groupe	aaaa/mm/jj			
1183822	JS2	Blanc de méthode	2013/07/31	<0.1		mg/L
		Lithium (Li)	2013/07/31	<0.5		mg/L
		Magnésium (Mg)	2013/07/31	<0.01		mg/L
		Manganèse (Mn)	2013/07/31	<0.01		mg/L
		Molybdène (Mo)	2013/07/31	<0.01		mg/L
		Nickel (Ni)	2013/07/31	<0.01		mg/L
		Plomb (Pb)	2013/07/31	<0.01		mg/L
		Potassium (K)	2013/07/31	<0.5		mg/L
		Sélénium (Se)	2013/07/31	<0.05		mg/L
		Silicium (Si)	2013/07/31	<0.1		mg/L
		Sodium (Na)	2013/07/31	<0.5		mg/L
		Strontium (Sr)	2013/07/31	<0.05		mg/L
		Thallium (Tl)	2013/07/31	<0.01		mg/L
		Zinc (Zn)	2013/07/31	<0.02		mg/L

MRC: Un échantillon de concentration connue préparé dans des conditions rigoureuses par un organisme externe. Utilisé pour vérifier la justesse de la méthode.
 Blanc fortifié: Un blanc, d'une matrice exempte de contaminants, auquel a été ajouté une quantité connue d'analyte provenant généralement d'une deuxième source. Utilisé pour évaluer la précision de la méthode.
 Blanc de méthode: Une partie aliquote de matrice pure soumise au même processus analytique que les échantillons, du prétraitement au dosage. Sert à évaluer toutes contaminations du laboratoire.
 Réc = Récupération

Page des signatures de validation

Dossier Maxxam: B344982

Les résultats analytiques ainsi que les données de contrôle-qualité contenus dans ce rapport furent vérifiés et validés par les personnes suivantes:



Maria Chrifi Alaoui, B.Sc., Chimiste

Maxxam a mis en place des procédures qui protègent contre l'utilisation non autorisée de la signature électronique et emploie les "signataires" requis, conformément à la section 5.10.2 de la norme ISO/CEI 17025:2005(E). Veuillez vous référer à la page des signatures de validation pour obtenir les détails des validations pour chaque division.

Attention: Serge Payant
AMEC
MONTRÉAL
1425, Route Transcanadienne
Suite 400
Dorval, PQ
CANADA H9P 2W9

Votre # de commande: P12-1100
Votre # du projet: VE52277820006
Adresse du site: BLACKWATER
Votre # Bordereau: c#903941, c#90394-13-01

Date du rapport: 2013/08/06

CERTIFICAT D'ANALYSES

DE DOSSIER MAXXAM: B344986

Reçu: 2013/07/29, 16:20

Matrice: EAU
Nombre d'échantillons reçus: 2

Analyses	Quantité	Date de l' extraction	Date Analysé	Méthode de laboratoire	Référence primaire
Matières en suspension	2	2013/08/01	2013/08/01	STL SOP-00015	MA. 104 - S.S. 1.1
Métaux extractibles totaux par ICP	2	2013/08/01	2013/08/06	STL SOP-00006	MA.200- Mét 1.2

* Les données brutes sont utilisées pour le calcul du RPD (% d'écart relatif). L'arrondissement des résultats finaux peut expliquer la variation apparente.

clé de cryptage



Maxxam
06 Aug 2013 14:56:56 -04:00

Veuillez adresser toute question concernant ce certificat d'analyse à votre chargé(e) de projets

Rita Kurdoghlianian, Chargée de projets
Email: RKurdoghlianian@maxxam.ca
Phone# (514) 448-9001 Ext:4272

=====
Ce rapport a été produit et distribué en utilisant une procédure automatisée sécuritaire.
Maxxam a mis en place des procédures qui protègent contre l'utilisation non autorisée de la signature électronique et emploie les "signataires" requis, conformément à la section 5.10.2 de la norme ISO/CEI 17025:2005(E). Veuillez vous référer à la page des signatures de validation pour obtenir les détails des validations pour chaque division.

Dossier Maxxam: B344986
Date du rapport: 2013/08/06

AMEC
Votre # du projet: VE52277820006
Adresse du site: BLACKWATER
Votre # de commande: P12-1100

MÉTAUX EXTRACTIBLES TOTAUX (EAU)

Identification Maxxam		V31698	V31699		
Date d'échantillonnage		2013/07/29	2013/07/29		
# Bordereau		c#90394-13-01	c#90394-13-01		
	UNITÉS	R1	DS1	LDR	Lot CQ

MÉTAUX					
Aluminium (Al)	mg/L	1.2	2.4	0.04	1185124
Antimoine (Sb)	mg/L	<0.02	<0.02	0.02	1185124
Arsenic (As)	mg/L	<0.05	<0.05	0.05	1185124
Baryum (Ba)	mg/L	<0.02	0.02	0.02	1185124
Béryllium (Be)	mg/L	<0.002	<0.002	0.002	1185124
Bismuth (Bi)	mg/L	<0.05	<0.05	0.05	1185124
Cadmium (Cd)	mg/L	<0.01	<0.01	0.01	1185124
Calcium (Ca)	mg/L	3.9	11	0.5	1185124
Chrome (Cr)	mg/L	<0.01	<0.01	0.01	1185124
Cobalt (Co)	mg/L	<0.01	<0.01	0.01	1185124
Cuivre (Cu)	mg/L	<0.009	<0.009	0.009	1185124
Fer (Fe)	mg/L	1.6	2.9	0.1	1185124
Lithium (Li)	mg/L	<0.1	<0.1	0.1	1185124
Magnésium (Mg)	mg/L	1.0	2.3	0.5	1185124
Manganèse (Mn)	mg/L	0.14	0.67	0.01	1185124
Mercure (Hg)	mg/L	<0.0001	0.0002	0.0001	1185124
Molybdène (Mo)	mg/L	<0.01	<0.01	0.01	1185124
Nickel (Ni)	mg/L	<0.01	<0.01	0.01	1185124
Plomb (Pb)	mg/L	<0.01	<0.01	0.01	1185124
Potassium (K)	mg/L	1.1	1.4	0.5	1185124
Sélénium (Se)	mg/L	<0.05	<0.05	0.05	1185124
Silicium (Si)	mg/L	9.2	9.4	0.1	1185124
Sodium (Na)	mg/L	2.9	4.1	0.5	1185124
Strontium (Sr)	mg/L	<0.05	0.07	0.05	1185124
Thallium (Tl)	mg/L	<0.01	<0.01	0.01	1185124
Zinc (Zn)	mg/L	<0.02	0.14	0.02	1185124

LDR = Limite de détection rapportée
Lot CQ = Lot Contrôle Qualité

Dossier Maxxam: B344986
 Date du rapport: 2013/08/06

AMEC
 Votre # du projet: VE52277820006
 Adresse du site: BLACKWATER
 Votre # de commande: P12-1100

PARAMÈTRES CONVENTIONNELS (EAU)

Identification Maxxam		V31698	V31698	V31699		
Date d'échantillonnage		2013/07/29	2013/07/29	2013/07/29		
# Bordereau		c#90394-13-01	c#90394-13-01	c#90394-13-01		
	UNITÉS	R1	R1	DS1	LDR	Lot CQ
			Dup. de Lab.			

CONVENTIONNELS						
Matières en suspension (MES)	mg/L	95	110	160	2	1185352

LDR = Limite de détection rapportée
 Lot CQ = Lot Contrôle Qualité

Dossier Maxxam: B344986
Date du rapport: 2013/08/06

AMEC
Votre # du projet: VE52277820006
Adresse du site: BLACKWATER
Votre # de commande: P12-1100

REMARQUES GÉNÉRALES

État des échantillons à l'arrivée: BON

MÉTAUX EXTRACTIBLES TOTAUX (EAU)

Veillez noter que les résultats n'ont pas été corrigés ni pour la récupération des échantillons de contrôle qualité, ni pour le blanc de méthode.

PARAMÈTRES CONVENTIONNELS (EAU)

Veillez noter que les résultats n'ont pas été corrigés ni pour la récupération des échantillons de contrôle qualité, ni pour le blanc de méthode.

Les résultats ne se rapportent qu'aux échantillons soumis pour analyse

AMEC
 Attention: Serge Payant
 Votre # du projet: VE52277820006
 P.O. #: P12-1100
 Adresse du site: BLACKWATER

Rapport Assurance Qualité

Dossier Maxxam: B344986

Lot			Date					
Lot				Analysé				
Num Init	Type CQ	Groupe		aaaa/mm/jj	Valeur	Réc	UNITÉS	
1185124 JS2	MRC	Aluminium (Al)		2013/08/02		125 (1)	%	
		Antimoine (Sb)		2013/08/02		107	%	
		Arsenic (As)		2013/08/02		111	%	
		Baryum (Ba)		2013/08/02		120 (1)	%	
		Béryllium (Be)		2013/08/02		123 (1)	%	
		Cadmium (Cd)		2013/08/02		116 (1)	%	
		Chrome (Cr)		2013/08/02		111	%	
		Cobalt (Co)		2013/08/02		117 (1)	%	
		Cuivre (Cu)		2013/08/02		115 (1)	%	
		Fer (Fe)		2013/08/02		118 (1)	%	
		Manganèse (Mn)		2013/08/02		117 (1)	%	
		Molybdène (Mo)		2013/08/02		123 (1)	%	
		Nickel (Ni)		2013/08/02		111	%	
		Plomb (Pb)		2013/08/02		119 (1)	%	
		Sélénium (Se)		2013/08/02		109	%	
		Strontium (Sr)		2013/08/02		119 (1)	%	
		Thallium (Tl)		2013/08/02		125 (1)	%	
		Zinc (Zn)		2013/08/02		109	%	
		Blanc fortifié	Aluminium (Al)		2013/08/02		110	%
			Antimoine (Sb)		2013/08/02		111	%
			Arsenic (As)		2013/08/02		106	%
	Baryum (Ba)			2013/08/02		106	%	
	Béryllium (Be)			2013/08/02		108	%	
	Bismuth (Bi)			2013/08/02		107	%	
	Cadmium (Cd)			2013/08/02		106	%	
	Calcium (Ca)			2013/08/02		107	%	
	Chrome (Cr)			2013/08/02		105	%	
	Cobalt (Co)			2013/08/02		103	%	
	Cuivre (Cu)			2013/08/02		105	%	
	Fer (Fe)			2013/08/02		105	%	
	Lithium (Li)			2013/08/02		108	%	
	Magnésium (Mg)			2013/08/02		109	%	
	Manganèse (Mn)			2013/08/02		111	%	
	Mercuré (Hg)			2013/08/02		98	%	
	Molybdène (Mo)			2013/08/02		110	%	
	Nickel (Ni)			2013/08/02		107	%	
	Plomb (Pb)			2013/08/02		106	%	
	Potassium (K)			2013/08/02		108	%	
	Sélénium (Se)			2013/08/02		103	%	
	Silicium (Si)		2013/08/02		106	%		
	Sodium (Na)		2013/08/02		110	%		
	Strontium (Sr)		2013/08/02		109	%		
Thallium (Tl)		2013/08/02		107	%			
Zinc (Zn)		2013/08/02		100	%			
Blanc de méthode	Aluminium (Al)		2013/08/02		<0.04		mg/L	
	Antimoine (Sb)		2013/08/02		<0.02		mg/L	
	Arsenic (As)		2013/08/02		<0.05		mg/L	
	Baryum (Ba)		2013/08/02		<0.02		mg/L	
	Béryllium (Be)		2013/08/02		<0.002		mg/L	
	Bismuth (Bi)		2013/08/02		<0.05		mg/L	
	Cadmium (Cd)		2013/08/02		<0.01		mg/L	
	Calcium (Ca)		2013/08/02		<0.5		mg/L	
	Chrome (Cr)		2013/08/02		<0.01		mg/L	
	Cobalt (Co)		2013/08/02		<0.01		mg/L	
	Cuivre (Cu)		2013/08/02		<0.009		mg/L	

AMEC
 Attention: Serge Payant
 Votre # du projet: VE52277820006
 P.O. #: P12-1100
 Adresse du site: BLACKWATER

Rapport Assurance Qualité (Suite)

Dossier Maxxam: B344986

Lot Lot Num Init	Type CQ	Groupe	Date Analysé aaaa/mm/jj	Valeur	Réc	UNITÉS
1185124 JS2	Blanc de méthode	Fer (Fe)	2013/08/02	<0.1		mg/L
		Lithium (Li)	2013/08/02	<0.1		mg/L
		Magnésium (Mg)	2013/08/02	<0.5		mg/L
		Manganèse (Mn)	2013/08/02	<0.01		mg/L
		Mercuré (Hg)	2013/08/02	<0.0001		mg/L
		Molybdène (Mo)	2013/08/02	<0.01		mg/L
		Nickel (Ni)	2013/08/02	<0.01		mg/L
		Plomb (Pb)	2013/08/02	<0.01		mg/L
		Potassium (K)	2013/08/02	<0.5		mg/L
		Sélénium (Se)	2013/08/02	<0.05		mg/L
		Silicium (Si)	2013/08/02	<0.1		mg/L
		Sodium (Na)	2013/08/02	<0.5		mg/L
		Strontium (Sr)	2013/08/02	<0.05		mg/L
		Thallium (Tl)	2013/08/02	<0.01		mg/L
		Zinc (Zn)	2013/08/02	<0.02		mg/L
1185352 FSI	Blanc fortifié	Matières en suspension (MES)	2013/08/01		97	%
	Blanc fortifié DUP	Matières en suspension (MES)	2013/08/01		100	%
	Blanc de méthode	Matières en suspension (MES)	2013/08/01	<2		mg/L

MRC: Un échantillon de concentration connue préparé dans des conditions rigoureuses par un organisme externe. Utilisé pour vérifier la justesse de la méthode.
 Blanc fortifié: Un blanc, d'une matrice exempte de contaminants, auquel a été ajouté une quantité connue d'analyte provenant généralement d'une deuxième source. Utilisé pour évaluer la précision de la méthode.
 Blanc de méthode: Une partie aliquote de matrice pure soumise au même processus analytique que les échantillons, du prétraitement au dosage. Sert à évaluer toutes contaminations du laboratoire.
 Réc = Récupération
 (1) La récupération ou l'écart relatif (RPD) pour ce composé est en dehors des limites de contrôle, mais l'ensemble du contrôle qualité rencontre les critères d'acceptabilité pour cette analyse

Page des signatures de validation

Dossier Maxxam: B344986

Les résultats analytiques ainsi que les données de contrôle-qualité contenus dans ce rapport furent vérifiés et validés par les personnes suivantes:



Miryam Assayag



Maria Chrifi Alaoui, B.Sc., Chimiste

Maxxam a mis en place des procédures qui protègent contre l'utilisation non autorisée de la signature électronique et emploie les "signataires" requis, conformément à la section 5.10.2 de la norme ISO/CEI 17025:2005(E). Veuillez vous référer à la page des signatures de validation pour obtenir les détails des validations pour chaque division.

Attention: Serge Payant
AMEC
MONTRÉAL
1425, Route Transcanadienne
Suite 400
Dorval, PQ
CANADA H9P 2W9

Votre # de commande: P12-1100
Votre # du projet: VE-52277820006
Adresse du site: BLACK WATER
Votre # Bordereau: C82805, C-82805-53-01

Date du rapport: 2013/08/13

CERTIFICAT D'ANALYSES

DE DOSSIER MAXXAM: B348271

Reçu: 2013/08/12, 11:50

Matrice: EAU
Nombre d'échantillons reçus: 4

Analyses	Quantité	Date de l' extraction	Date Analyisé	Méthode de laboratoire	Référence primaire
Mercure par vapeur froide AA	4	2013/08/12	2013/08/13	STL SOP-00042	MA.200-Hg 1.1

* Les données brutes sont utilisées pour le calcul du RPD (% d'écart relatif). L'arrondissement des résultats finaux peut expliquer la variation apparente.

clé de cryptage



Maxxam
13 Aug 2013 16:15:32 -04:00

Veillez adresser toute question concernant ce certificat d'analyse à votre chargé(e) de projets

Rita Kurdoghlianian, Chargée de projets
Email: RKurdoghlianian@maxxam.ca
Phone# (514) 448-9001 Ext:4272

=====
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Dossier Maxxam: B348271
Date du rapport: 2013/08/13

AMEC
Votre # du projet: VE-52277820006
Adresse du site: BLACK WATER
Votre # de commande: P12-1100

MÉTAUX (EAU)

Identification Maxxam		V47668	V47669	V47670	V47671		
Date d'échantillonnage		2013/08/12	2013/08/12	2013/08/12	2013/08/12		
# Bordereau		C-82805-53-01	C-82805-53-01	C-82805-53-01	C-82805-53-01		
	UNITÉS	R1	R1-F	DS1	DS1-F	LDR	Lot CQ

MÉTAUX							
Mercure (Hg)	mg/L	<0.00001	<0.00001	0.00002	<0.00001	0.00001	1189766

LDR = Limite de détection rapportée
Lot CQ = Lot Contrôle Qualité

Dossier Maxxam: B348271
Date du rapport: 2013/08/13

AMEC
Votre # du projet: VE-52277820006
Adresse du site: BLACK WATER
Votre # de commande: P12-1100

REMARQUES GÉNÉRALES

État des échantillons à l'arrivée: BON

MÉTAUX (EAU)

Veillez noter que les résultats n'ont pas été corrigés ni pour la récupération des échantillons de contrôle qualité, ni pour le blanc de méthode.

Les résultats ne se rapportent qu'aux échantillons soumis pour analyse

AMEC
 Attention: Serge Payant
 Votre # du projet: VE-52277820006
 P.O. #: P12-1100
 Adresse du site: BLACK WATER

Rapport Assurance Qualité

Dossier Maxxam: B348271

Lot			Date			
Lot			Analysé			
Num Init	Type CQ	Groupe	aaaa/mm/jj	Valeur	Réc	UNITÉS
1189766 ALE	MRC	Mercure (Hg)	2013/08/13		86	%
	Blanc fortifié	Mercure (Hg)	2013/08/13		106	%
	Blanc de méthode	Mercure (Hg)	2013/08/13	<0.00001		mg/L

MRC: Un échantillon de concentration connue préparé dans des conditions rigoureuses par un organisme externe. Utilisé pour vérifier la justesse de la méthode.
 Blanc fortifié: Un blanc, d'une matrice exempte de contaminants, auquel a été ajouté une quantité connue d'analyte provenant généralement d'une deuxième source. Utilisé pour évaluer la précision de la méthode.
 Blanc de méthode: Une partie aliquote de matrice pure soumise au même processus analytique que les échantillons, du prétraitement au dosage. Sert à évaluer toutes contaminations du laboratoire.
 Réc = Récupération

Page des signatures de validation

Dossier Maxxam: B348271

Les résultats analytiques ainsi que les données de contrôle-qualité contenus dans ce rapport furent vérifiés et validés par les personnes suivantes:



Maria Chrifi Alaoui, B.Sc., Chimiste

Maxxam a mis en place des procédures qui protègent contre l'utilisation non autorisée de la signature électronique et emploie les "signataires" requis, conformément à la section 5.10.2 de la norme ISO/CEI 17025:2005(E). Veuillez vous référer à la page des signatures de validation pour obtenir les détails des validations pour chaque division.

Appendix E

Metals in Treated Blackwater Samples

Metals in Treated Blackwater Samples Following Some Phase 3 Test

The following phase 3 tests were repeated with the purposes of generating treated samples that could be submitted for metal scan analysis:

Test	Sample Location	Treatment System	Flocculant Concentration (mg/L)	Ca(OH) ₂ (mg/L)	NaOH (1.0 N) (mL)	Fe ³⁺ Concentration (mg/L)	Agitation Time (min)	Settling Time (h)	Final ORP (mv)	Final Conductivity (µs/cm)	Final Temperature (°C)	pH	Turbidity (NTU)
1H-Fe-LIME	DS-1	Fe ³⁺ (Lime pH control)	0	37	0	10	5	1	150	194	24	8.5	5.4
1H-Fe-NaOH		Fe ³⁺ (Caustic pH control)	0	0	1.5	10	5		150	208	24	8.5	4.0
8H-Fe-LIME		Fe ³⁺ (Lime pH control)	0	45	0	10	5	8	146	214	23	8.5	0.7
24H		Settling Alone	0	0	0	0	5		342	97	24	6.1	1.9
24H-FLOCC		Flomin 920 MC	3	0	0	0	5	24	324	94	24	6.3	1.4
1H-Fe-LIME	R1	Fe ³⁺ (Lime pH control)	0	36	0	10	5	1	186	143	23	8.6	2.4
1H-Fe-NaOH		Fe ³⁺ (Caustic pH control)	0	0	1.3	10	5		154	167	24	8.4	3.0
8H-Fe-LIME		Fe ³⁺ (Lime pH control)	0	46	0	10	5	8	206	171	23	8.5	0.6
24H		Settling Alone	0	0	0	0	5		281	42	24	6.8	8.1
24H-FLOCC		Flomin 920 MC	3	0	0	0	5	24	293	41	24	6.9	6.1

The metal scan analyses for samples treated with the tests listed in the table above are summarized in the following table:

Metals	Treated DS-1					Treated R1							MMER limit
	24H	24H-FLOCC	1H-Fe-LIME	8H-Fe-LIME	1H-Fe-NaOH	24H	24H-FLOCC	8H-Fe-LIME	R1-1H-Fe-LIME	R1-1H-Fe-NaOH			
	Total	Total	Total	Total	Dissolved	Total	Total	Total	Total	Total			
mg/L													
Aluminum (Al)	0.062	0.059	0.092	0.025	< 0.030	0.091	0.290	0.180	0.019	< 0.030	0.041	0.056	
Antimony (Sb)	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	
Arsenic (As)	0.0027	0.0027	< 0.001	< 0.001		< 0.001	0.0021	0.0019	< 0.001		< 0.001	< 0.001	0.5
Barium (Ba)	0.0040	0.0039	0.0039	0.0030		0.0028	0.0067	0.0059	0.0035		0.0038	0.0023	
Beryllium (Be)	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	
Bismuth (Bi)	< 0.001	< 0.001	< 0.001	< 0.001	n.m.	< 0.001	< 0.001	< 0.001	< 0.001	n.m.	< 0.001	< 0.001	
Cadmium (Cd)	< 0.0002	< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	
Calcium (Ca)	10	10	27	34		9.2	3.9	3.9	28		20	3.2	
Chromium (Cr)	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	
Cobalt (Co)	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	
Copper (Cu)	0.0044	0.011	0.0028	0.0084		0.0033	0.0068	0.0033	0.0020		0.0057	0.0096	0.3
Iron (Fe)	0.063	0.06	1.70	0.27	< 0.1	2	0.43	0.28	0.27	< 0.1	1.2	1.6	
Lithium (Li)	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	
Magnesium (Mg)	1.7	1.7	1.8	1.7		1.6	0.8	0.8	0.9		0.8	0.6	
Manganese (Mn)	0.0049	0.0078	0.026	0.0076		0.024	0.015	0.0076	0.0020		0.0087	0.013	
Mercury (Hg)	< 0.00001	< 0.00001	< 0.00001	< 0.00001		< 0.00001	< 0.00001	< 0.00001	< 0.00001		< 0.00001	< 0.00001	0.0001
Molybdenum (Mo)	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	
Nickel (Ni)	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	0.5
Lead (Pb)	< 0.0005	< 0.0005	< 0.0005	< 0.0005	n.m.	< 0.0005	< 0.0005	< 0.0005	< 0.0005	n.m.	< 0.0005	< 0.0005	0.2
Potassium (K)	1.0	1.0	1.5	1.0		1.1	1.0	1.0	1.1		1.2	1.0	
Selenium (Se)	< 0.003	< 0.003	< 0.003	< 0.003		< 0.003	< 0.003	< 0.003	< 0.003		< 0.003	< 0.003	
Silicon (Si)	6.3	6.2	5.0	4.3		4.8	7.7	7.7	5.0		5.8	5.4	
Sodium (Na)	3.9	3.9	3.9	3.8		26.0	2.8	2.9	2.9		2.9	25.0	
Strontium (Sr)	0.059	0.059	0.066	0.070		0.05	0.040	0.040	0.048		0.045	0.026	
Thallium (Tl)	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	
Zinc (Zn)	0.012	0.012	0.01	< 0.007		0.02	0.010	0.0085	< 0.007		0.0076	0.021	0.5

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Votre # de commande: P12-1100
Votre # du projet: VE-52277820006
Adresse du site: BLACK WATER
Votre # Bordereau: c#828055

Date du rapport: 2013/08/21

CERTIFICAT D'ANALYSES

DE DOSSIER MAXXAM: B349529

Reçu: 2013/08/15, 14:30

Matrice: EAU
Nombre d'échantillons reçus: 8

Analyses	Quantité	Date de l' extraction	Date Analyisé	Méthode de laboratoire	Référence primaire
Mercure par vapeur froide AA	8	2013/08/19	2013/08/20	STL SOP-00042	MA.200-Hg 1.1
Métaux extractibles totaux(basse limite)	8	2013/08/19	2013/08/20	STL SOP-00006	MA.200- Mét 1.2

* Les données brutes sont utilisées pour le calcul du RPD (% d'écart relatif). L'arrondissement des résultats finaux peut expliquer la variation apparente.

clé de cryptage



Maxxam
21 Aug 2013 16:38:14 -04:00

Veuillez adresser toute question concernant ce certificat d'analyse à votre chargé(e) de projets

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Dossier Maxxam: B349529
Date du rapport: 2013/08/21

AMEC
Votre # du projet: VE-52277820006
Adresse du site: BLACK WATER
Votre # de commande: P12-1100

MÉTAUX (EAU)

Identification Maxxam		V53265	V53266	V53267	V53268	V53269		
Date d'échantillonnage		2013/08/14	2013/08/14	2013/08/14	2013/08/14	2013/08/14		
# Bordereau		c#828055	c#828055	c#828055	c#828055	c#828055		
	UNITÉS	DS1-24H	DS1-24H-FLOCC	DS1-1H-FE3-LIME	DS1-1H-FE+3-NAOH	R1-24H	LDR	Lot CQ

MÉTAUX								
Mercuré (Hg)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	1193203

LDR = Limite de détection rapportée
Lot CQ = Lot Contrôle Qualité

Identification Maxxam		V53270	V53271	V53272		
Date d'échantillonnage		2013/08/14	2013/08/14	2013/08/14		
# Bordereau		c#828055	c#828055	c#828055		
	UNITÉS	R1-24H-FLOCC	R1-1H-FE3-LIME	R1-1H-FE3-NAOH	LDR	Lot CQ

MÉTAUX						
Mercuré (Hg)	mg/L	<0.00001	<0.00001	<0.00001	0.00001	1193203

LDR = Limite de détection rapportée
Lot CQ = Lot Contrôle Qualité

Dossier Maxxam: B349529
Date du rapport: 2013/08/21

AMEC
Votre # du projet: VE-52277820006
Adresse du site: BLACK WATER
Votre # de commande: P12-1100

MÉTAUX EXTRACTIBLES TOTAUX (EAU)

Identification Maxxam		V53265	V53266	V53267	V53268	V53269		
Date d'échantillonnage		2013/08/14	2013/08/14	2013/08/14	2013/08/14	2013/08/14		
# Bordereau		c#828055	c#828055	c#828055	c#828055	c#828055		
	UNITÉS	DS1-24H	DS1-24H-FLOCC	DS1-1H-FE3-LIME	DS1-1H-FE+3-NAOH	R1-24H	LDR	Lot CQ

MÉTAUX ICP-MS								
Aluminium (Al)	ug/L	62	59	92	91	290	10	1193115
Antimoine (Sb)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1193115
Arsenic (As)	ug/L	2.7	2.7	1.0	<1.0	2.1	1.0	1193115
Baryum (Ba)	ug/L	4.0	3.9	3.9	2.8	6.7	2.0	1193115
Béryllium (Be)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1193115
Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1193115
Cadmium (Cd)	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	1193115
Calcium (Ca)	ug/L	10000	10000	27000	9200	3900	500	1193115
Chrome (Cr)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	1193115
Cobalt (Co)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1193115
Cuivre (Cu)	ug/L	4.4	11	2.8	3.3	6.8	1.0	1193115
Fer (Fe)	ug/L	63	60	1700	1800	430	60	1193115
Lithium (Li)	ug/L	<10	<10	<10	<10	<10	10	1193115
Magnésium (Mg)	ug/L	1700	1700	1800	1600	760	100	1193115
Manganèse (Mn)	ug/L	4.9	7.8	26	24	15	1.0	1193115
Molybdène (Mo)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1193115
Nickel (Ni)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1193115
Plomb (Pb)	ug/L	<0.50	<0.50	<0.50	<0.50	0.99	0.50	1193115
Potassium (K)	ug/L	1000	990	1500	1100	980	500	1193115
Sélénium (Se)	ug/L	<3.0	<3.0	<3.0	<3.0	<3.0	3.0	1193115
Silicium (Si)	ug/L	6300	6200	5000	4800	7700	100	1193115
Sodium (Na)	ug/L	3900	3900	3900	26000	2800	500	1193115
Strontium (Sr)	ug/L	59	59	66	50	40	2.0	1193115
Thallium (Tl)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	1193115
Zinc (Zn)	ug/L	12	12	10	20	10	7.0	1193115

LDR = Limite de détection rapportée
Lot CQ = Lot Contrôle Qualité

Dossier Maxxam: B349529
Date du rapport: 2013/08/21

AMEC
Votre # du projet: VE-52277820006
Adresse du site: BLACK WATER
Votre # de commande: P12-1100

MÉTAUX EXTRACTIBLES TOTAUX (EAU)

Identification Maxxam		V53270	V53271	V53272		
Date d'échantillonnage		2013/08/14	2013/08/14	2013/08/14		
# Bordereau		c#828055	c#828055	c#828055		
	UNITÉS	R1-24H-FLOCC	R1-1H-FE3-LIME	R1-1H-FE3-NAOH	LDR	Lot CQ

MÉTAUX ICP-MS						
Aluminium (Al)	ug/L	180	41	56	10	1193115
Antimoine (Sb)	ug/L	<1.0	<1.0	<1.0	1.0	1193115
Arsenic (As)	ug/L	1.9	<1.0	<1.0	1.0	1193115
Baryum (Ba)	ug/L	5.9	3.8	2.3	2.0	1193115
Béryllium (Be)	ug/L	<2.0	<2.0	<2.0	2.0	1193115
Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	1193115
Cadmium (Cd)	ug/L	<0.20	<0.20	<0.20	0.20	1193115
Calcium (Ca)	ug/L	3900	20000	3200	500	1193115
Chrome (Cr)	ug/L	<5.0	<5.0	<5.0	5.0	1193115
Cobalt (Co)	ug/L	<1.0	<1.0	<1.0	1.0	1193115
Cuivre (Cu)	ug/L	3.3	5.7	9.6	1.0	1193115
Fer (Fe)	ug/L	280	1200	1600	60	1193115
Lithium (Li)	ug/L	<10	<10	<10	10	1193115
Magnésium (Mg)	ug/L	760	810	620	100	1193115
Manganèse (Mn)	ug/L	7.6	8.7	13	1.0	1193115
Molybdène (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	1193115
Nickel (Ni)	ug/L	<2.0	<2.0	<2.0	2.0	1193115
Plomb (Pb)	ug/L	0.82	<0.50	<0.50	0.50	1193115
Potassium (K)	ug/L	950	1200	1000	500	1193115
Sélénium (Se)	ug/L	<3.0	<3.0	<3.0	3.0	1193115
Silicium (Si)	ug/L	7700	5800	5400	100	1193115
Sodium (Na)	ug/L	2900	2900	25000	500	1193115
Strontium (Sr)	ug/L	40	45	26	2.0	1193115
Thallium (Tl)	ug/L	<2.0	<2.0	<2.0	2.0	1193115
Zinc (Zn)	ug/L	8.5	7.6	21	7.0	1193115

LDR = Limite de détection rapportée
Lot CQ = Lot Contrôle Qualité

Dossier Maxxam: B349529
Date du rapport: 2013/08/21

AMEC
Votre # du projet: VE-52277820006
Adresse du site: BLACK WATER
Votre # de commande: P12-1100

REMARQUES GÉNÉRALES

État des échantillons à l'arrivée: BON

MÉTAUX (EAU)

Veillez noter que les résultats n'ont pas été corrigés ni pour la récupération des échantillons de contrôle qualité, ni pour le blanc de méthode.

MÉTAUX EXTRACTIBLES TOTAUX (EAU)

Veillez noter que les résultats n'ont pas été corrigés ni pour la récupération des échantillons de contrôle qualité, ni pour le blanc de méthode.

Les résultats ne se rapportent qu'aux échantillons soumis pour analyse

AMEC

Attention: Serge Payant

Votre # du projet: VE-52277820006

P.O. #: P12-1100

Adresse du site: BLACK WATER

Rapport Assurance Qualité

Dossier Maxxam: B349529

Lot	Date					
Lot	Analysé			Valeur	Réc	UNITÉS
Num Init	aaaa/mm/jj	Type CQ	Groupe			
1193115 MCA	2013/08/20	MRC	Antimoine (Sb)		100	%
			Béryllium (Be)		93	%
		Blanc fortifié	Cobalt (Co)		96	%
			Manganèse (Mn)		97	%
			Thallium (Tl)		98	%
			Aluminium (Al)		99	%
			Antimoine (Sb)		105	%
			Arsenic (As)		101	%
			Baryum (Ba)		100	%
			Béryllium (Be)		100	%
			Bismuth (Bi)		102	%
			Cadmium (Cd)		101	%
			Calcium (Ca)		98	%
			Chrome (Cr)		97	%
			Cobalt (Co)		95	%
			Cuivre (Cu)		94	%
			Fer (Fe)		98	%
			Lithium (Li)		103	%
			Magnésium (Mg)		98	%
			Manganèse (Mn)		101	%
			Molybdène (Mo)		104	%
			Nickel (Ni)		96	%
			Plomb (Pb)		103	%
			Potassium (K)		97	%
			Sélénium (Se)		97	%
			Silicium (Si)		104	%
			Sodium (Na)		100	%
			Strontium (Sr)		102	%
			Thallium (Tl)		101	%
			Zinc (Zn)		97	%
		Blanc de méthode	Aluminium (Al)		<10	ug/L
			Antimoine (Sb)		<1.0	ug/L
			Arsenic (As)		<1.0	ug/L
			Baryum (Ba)		<2.0	ug/L
Béryllium (Be)			<2.0	ug/L		
Bismuth (Bi)			<1.0	ug/L		
Cadmium (Cd)			<0.20	ug/L		
Calcium (Ca)			<500	ug/L		
Chrome (Cr)			<5.0	ug/L		
Cobalt (Co)			<1.0	ug/L		
Cuivre (Cu)			<1.0	ug/L		
Fer (Fe)			<60	ug/L		
Lithium (Li)			<10	ug/L		
Magnésium (Mg)			<100	ug/L		
Manganèse (Mn)			<1.0	ug/L		
Molybdène (Mo)			<1.0	ug/L		
Nickel (Ni)			<2.0	ug/L		
Plomb (Pb)			<0.50	ug/L		
Potassium (K)		<500	ug/L			
Sélénium (Se)		<3.0	ug/L			
Silicium (Si)		<100	ug/L			
Sodium (Na)		<500	ug/L			
Strontium (Sr)		<2.0	ug/L			
Thallium (Tl)		<2.0	ug/L			
Zinc (Zn)		<7.0	ug/L			

AMEC
 Attention: Serge Payant
 Votre # du projet: VE-52277820006
 P.O. #: P12-1100
 Adresse du site: BLACK WATER

Rapport Assurance Qualité (Suite)

Dossier Maxxam: B349529

Lot Lot			Date Analysé		Réc	UNITÉS
Num Init	Type CQ	Groupe	aaaa/mm/jj	Valeur		
1193203 ALE	MRC	Mercure (Hg)	2013/08/20		89	%
	Blanc fortifié	Mercure (Hg)	2013/08/20		98	%
	Blanc de méthode	Mercure (Hg)	2013/08/20	<0.00001		mg/L

MRC: Un échantillon de concentration connue préparé dans des conditions rigoureuses par un organisme externe. Utilisé pour vérifier la justesse de la méthode.

Blanc fortifié: Un blanc, d'une matrice exempte de contaminants, auquel a été ajouté une quantité connue d'analyte provenant généralement d'une deuxième source. Utilisé pour évaluer la précision de la méthode.

Blanc de méthode: Une partie aliquote de matrice pure soumise au même processus analytique que les échantillons, du prétraitement au dosage. Sert à évaluer toutes contaminations du laboratoire.

Réc = Récupération

Page des signatures de validation

Dossier Maxxam: B349529

Les résultats analytiques ainsi que les données de contrôle-qualité contenus dans ce rapport furent vérifiés et validés par les personnes suivantes:



Kathie Quevillon, B.Sc., Chimiste



Maria Chrifi Alaoui, B.Sc., Chimiste

Maxxam a mis en place des procédures qui protègent contre l'utilisation non autorisée de la signature électronique et emploie les "signataires" requis, conformément à la section 5.10.2 de la norme ISO/CEI 17025:2005(E). Veuillez vous référer à la page des signatures de validation pour obtenir les détails des validations pour chaque division.

Attention: Serge Payant
AMEC
MONTRÉAL
1425, Route Transcanadienne
Suite 400
Dorval, PQ
CANADA H9P 2W9

Votre # de commande: P12-1100
Votre # du projet: VE52277820006
Adresse du site: BLACKWATER
Votre # Bordereau: C#828055

Date du rapport: 2013/09/06

CERTIFICAT D'ANALYSES

DE DOSSIER MAXXAM: B352454

Reçu: 2013/08/27, 16:10

Matrice: EAU

Nombre d'échantillons reçus: 4

Analyses	Quantité	Date de l' extraction	Date Analysé	Méthode de laboratoire	Référence primaire
Mercure par vapeur froide AA	2	2013/09/03	2013/09/04	STL SOP-00042	MA.200-Hg 1.1
Métaux dissous par ICP-MS	2	2013/09/04	2013/09/04	STL SOP-00006	MA.200- Mét 1.2
Métaux extractibles totaux(basse limite)	2	2013/08/30	2013/08/30	STL SOP-00006	MA.200- Mét 1.2

* Les données brutes sont utilisées pour le calcul du RPD (% d'écart relatif). L'arrondissement des résultats finaux peut expliquer la variation apparente.

clé de cryptage



Maxxam

06 Sep 2013 14:35:58 -04:00

Veillez adresser toute question concernant ce certificat d'analyse à votre chargé(e) de projets

Rita Kurdoghlianian, Chargée de projets
Email: RKurdoghlianian@maxxam.ca
Phone# (514) 448-9001 Ext:4272

=====
Ce rapport a été produit et distribué en utilisant une procédure automatisée sécuritaire.
Maxxam a mis en place des procédures qui protègent contre l'utilisation non autorisée de la signature électronique et emploie les "signataires" requis, conformément à la section 5.10.2 de la norme ISO/CEI 17025:2005(E). Veuillez vous référer à la page des signatures de validation pour obtenir les détails des validations pour chaque division.

Dossier Maxxam: B352454
 Date du rapport: 2013/09/06

AMEC
 Votre # du projet: VE52277820006
 Adresse du site: BLACKWATER
 Votre # de commande: P12-1100

MÉTAUX (EAU)

Identification Maxxam		V66617	V66618		
Date d'échantillonnage		2013/08/27	2013/08/27		
# Bordereau		2	2		
	UNITÉS	DS1-8H-FE+3-LIME	R1-8H-FE+3-LIME	LDR	Lot CQ

MÉTAUX					
Mercure (Hg)	mg/L	<0.00001	<0.00001	0.00001	1200181
LDR = Limite de détection rapportée Lot CQ = Lot Contrôle Qualité					

Dossier Maxxam: B352454
Date du rapport: 2013/09/06

AMEC
Votre # du projet: VE52277820006
Adresse du site: BLACKWATER
Votre # de commande: P12-1100

MÉTAUX DISSOUS (EAU)

Identification Maxxam		V66619	V66620		
Date d'échantillonnage		2013/08/27	2013/08/27		
# Bordereau		2	2		
	UNITÉS	DS1-8H-FE+3-LIME-F	R1-8H-FE+3-LIME-F	LDR	Lot CQ

MÉTAUX					
Aluminium (Al)	mg/L	<0.03	<0.03	0.03	1200608
Fer (Fe)	mg/L	<0.1	<0.1	0.1	1200608

LDR = Limite de détection rapportée
Lot CQ = Lot Contrôle Qualité

Dossier Maxxam: B352454
Date du rapport: 2013/09/06

AMEC
Votre # du projet: VE52277820006
Adresse du site: BLACKWATER
Votre # de commande: P12-1100

MÉTAUX EXTRACTIBLES TOTAUX (EAU)

Identification Maxxam		V66617	V66618		
Date d'échantillonnage		2013/08/27	2013/08/27		
# Bordereau		2	2		
	UNITÉS	DS1-8H-FE+3-LIME	R1-8H-FE+3-LIME	LDR	Lot CQ

MÉTAUX ICP-MS					
Aluminium (Al)	ug/L	25	19	10	1199407
Antimoine (Sb)	ug/L	<1.0	<1.0	1.0	1199407
Argent (Ag)	ug/L	<1.0	<1.0	1.0	1199407
Arsenic (As)	ug/L	<1.0	<1.0	1.0	1199407
Baryum (Ba)	ug/L	3.0	3.5	2.0	1199407
Béryllium (Be)	ug/L	<2.0	<2.0	2.0	1199407
Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	1199407
Bore (B)	ug/L	<50	<50	50	1199407
Cadmium (Cd)	ug/L	<0.20	<0.20	0.20	1199407
Calcium (Ca)	ug/L	34000	28000	500	1199407
Chrome (Cr)	ug/L	<5.0	<5.0	5.0	1199407
Cobalt (Co)	ug/L	<1.0	<1.0	1.0	1199407
Cuivre (Cu)	ug/L	8.4	2.0	1.0	1199407
Fer (Fe)	ug/L	270	270	60	1199407
Lithium (Li)	ug/L	<10	<10	10	1199407
Magnésium (Mg)	ug/L	1700	860	100	1199407
Manganèse (Mn)	ug/L	7.6	2.0	1.0	1199407
Molybdène (Mo)	ug/L	<1.0	<1.0	1.0	1199407
Nickel (Ni)	ug/L	<2.0	<2.0	2.0	1199407
Plomb (Pb)	ug/L	<0.50	<0.50	0.50	1199407
Potassium (K)	ug/L	970	1100	500	1199407
Sélénium (Se)	ug/L	<3.0	<3.0	3.0	1199407
Silicium (Si)	ug/L	4300	5000	100	1199407
Sodium (Na)	ug/L	3800	2900	500	1199407
Strontium (Sr)	ug/L	70	48	2.0	1199407
Thallium (Tl)	ug/L	<2.0	<2.0	2.0	1199407
Titane (Ti)	ug/L	<10	<10	10	1199407
Uranium (U)	ug/L	<1.0	<1.0	1.0	1199407
Vanadium (V)	ug/L	<2.0	3.8	2.0	1199407
Zinc (Zn)	ug/L	<7.0	<7.0	7.0	1199407

LDR = Limite de détection rapportée
Lot CQ = Lot Contrôle Qualité

Dossier Maxxam: B352454
Date du rapport: 2013/09/06

AMEC
Votre # du projet: VE52277820006
Adresse du site: BLACKWATER
Votre # de commande: P12-1100

REMARQUES GÉNÉRALES

État des échantillons à l'arrivée: BON

MÉTAUX (EAU)

Veillez noter que les résultats n'ont pas été corrigés ni pour la récupération des échantillons de contrôle qualité, ni pour le blanc de méthode.

MÉTAUX DISSOUS (EAU)

Veillez noter que les résultats n'ont pas été corrigés ni pour la récupération des échantillons de contrôle qualité, ni pour le blanc de méthode.

MÉTAUX EXTRACTIBLES TOTAUX (EAU)

Veillez noter que les résultats n'ont pas été corrigés ni pour la récupération des échantillons de contrôle qualité, ni pour le blanc de méthode.

Les résultats ne se rapportent qu'aux échantillons soumis pour analyse

AMEC
 Attention: Serge Payant
 Votre # du projet: VE52277820006
 P.O. #: P12-1100
 Adresse du site: BLACKWATER

Rapport Assurance Qualité
 Dossier Maxxam: B352454

Lot Lot Num Init	Type CQ	Groupe	Date Analysé aaaa/mm/jj	Valeur	Réc	UNITÉS		
1199407 JF1	Blanc fortifié	Aluminium (Al)	2013/08/30		109	%		
		Antimoine (Sb)	2013/08/30		113	%		
		Argent (Ag)	2013/08/30		107	%		
		Arsenic (As)	2013/08/30		109	%		
		Baryum (Ba)	2013/08/30		100	%		
		Béryllium (Be)	2013/08/30		100	%		
		Bismuth (Bi)	2013/08/30		104	%		
		Bore (B)	2013/08/30		108	%		
		Cadmium (Cd)	2013/08/30		105	%		
		Calcium (Ca)	2013/08/30		106	%		
		Chrome (Cr)	2013/08/30		101	%		
		Cobalt (Co)	2013/08/30		95	%		
		Cuivre (Cu)	2013/08/30		94	%		
		Fer (Fe)	2013/08/30		100	%		
		Lithium (Li)	2013/08/30		99	%		
		Magnésium (Mg)	2013/08/30		100	%		
		Manganèse (Mn)	2013/08/30		106	%		
		Molybdène (Mo)	2013/08/30		108	%		
		Nickel (Ni)	2013/08/30		98	%		
		Plomb (Pb)	2013/08/30		102	%		
		Potassium (K)	2013/08/30		101	%		
		Sélénium (Se)	2013/08/30		107	%		
		Silicium (Si)	2013/08/30		100	%		
		Sodium (Na)	2013/08/30		104	%		
		Strontium (Sr)	2013/08/30		102	%		
		Thallium (Tl)	2013/08/30		103	%		
		Titane (Ti)	2013/08/30		111	%		
		Uranium (U)	2013/08/30		105	%		
		Vanadium (V)	2013/08/30		110	%		
		Zinc (Zn)	2013/08/30		99	%		
		Blanc de méthode		Aluminium (Al)	2013/08/30	<10		ug/L
				Antimoine (Sb)	2013/08/30	<1.0		ug/L
				Argent (Ag)	2013/08/30	<1.0		ug/L
Arsenic (As)	2013/08/30			<1.0		ug/L		
Baryum (Ba)	2013/08/30			<2.0		ug/L		
Béryllium (Be)	2013/08/30			<2.0		ug/L		
Bismuth (Bi)	2013/08/30			<1.0		ug/L		
Bore (B)	2013/08/30			<50		ug/L		
Cadmium (Cd)	2013/08/30			<0.20		ug/L		
Calcium (Ca)	2013/08/30			<500		ug/L		
Chrome (Cr)	2013/08/30			<5.0		ug/L		
Cobalt (Co)	2013/08/30			<1.0		ug/L		
Cuivre (Cu)	2013/08/30			<1.0		ug/L		
Fer (Fe)	2013/08/30			<60		ug/L		
Lithium (Li)	2013/08/30			<10		ug/L		
Magnésium (Mg)	2013/08/30			<100		ug/L		
Manganèse (Mn)	2013/08/30			<1.0		ug/L		
Molybdène (Mo)	2013/08/30			<1.0		ug/L		
Nickel (Ni)	2013/08/30			<2.0		ug/L		
Plomb (Pb)	2013/08/30			<0.50		ug/L		
Potassium (K)	2013/08/30			<500		ug/L		
Sélénium (Se)	2013/08/30	<3.0		ug/L				
Silicium (Si)	2013/08/30	<100		ug/L				
Sodium (Na)	2013/08/30	<500		ug/L				
Strontium (Sr)	2013/08/30	<2.0		ug/L				

AMEC
 Attention: Serge Payant
 Votre # du projet: VE52277820006
 P.O. #: P12-1100
 Adresse du site: BLACKWATER

Rapport Assurance Qualité (Suite)

Dossier Maxxam: B352454

Lot Lot Num Init	Type CQ	Groupe	Date Analysé aaaa/mm/jj	Valeur	Réc	UNITÉS
1199407 JF1	Blanc de méthode	Thallium (Tl)	2013/08/30	<2.0		ug/L
		Titane (Ti)	2013/08/30	<10		ug/L
		Uranium (U)	2013/08/30	<1.0		ug/L
		Vanadium (V)	2013/08/30	<2.0		ug/L
		Zinc (Zn)	2013/08/30	<7.0		ug/L
1200181 ALE	Blanc fortifié Blanc de méthode	Mercure (Hg)	2013/09/04		104	%
		Mercure (Hg)	2013/09/04	<0.00001		mg/L
1200608 JF1	Blanc fortifié	Aluminium (Al)	2013/09/04		100	%
		Fer (Fe)	2013/09/04		101	%
	Blanc de méthode	Aluminium (Al)	2013/09/04	<0.03		mg/L
		Fer (Fe)	2013/09/04	<0.1		mg/L

Blanc fortifié: Un blanc, d'une matrice exempte de contaminants, auquel a été ajouté une quantité connue d'analyte provenant généralement d'une deuxième source. Utilisé pour évaluer la précision de la méthode.
 Blanc de méthode: Une partie aliquote de matrice pure soumise au même processus analytique que les échantillons, du prétraitement au dosage. Sert à évaluer toutes contaminations du laboratoire.
 Réc = Récupération

Page des signatures de validation

Dossier Maxxam: B352454

Les résultats analytiques ainsi que les données de contrôle-qualité contenus dans ce rapport furent vérifiés et validés par les personnes suivantes:



Kathie Quévillon, B.Sc., Chimiste



Maria Chrifi Alaoui, B.Sc., Chimiste

Maxxam a mis en place des procédures qui protègent contre l'utilisation non autorisée de la signature électronique et emploie les "signataires" requis, conformément à la section 5.10.2 de la norme ISO/CEI 17025:2005(E). Veuillez vous référer à la page des signatures de validation pour obtenir les détails des validations pour chaque division.

Appendix F
Certificates of Analysis – Metal Scans of Samples Submitted for Toxicity
Testing

Attention: Serge Payant
AMEC
MONTRÉAL
1425, Route Transcanadienne
Suite 400
Dorval, PQ
CANADA H9P 2W9

Votre # de commande: P12-1100
Votre # du projet: VE522778200 06
Adresse du site: BLACKWATER
Votre # Bordereau: c#968930, c#96893-01-01

Date du rapport: 2013/09/11

CERTIFICAT D'ANALYSES

DE DOSSIER MAXXAM: B354701

Reçu: 2013/09/04, 10:55

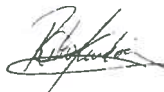
Matrice: EAU

Nombre d'échantillons reçus: 4

Analyses	Quantité	Date de l' extraction	Date Analysé	Méthode de laboratoire	Référence primaire
Mercure par vapeur froide AA	2	2013/09/10	2013/09/11	STL SOP-00042	MA.200-Hg 1.1
Métaux extractibles totaux(basse limite)	4	2013/09/09	2013/09/09	STL SOP-00006	MA.200- Mét 1.2

* Les données brutes sont utilisées pour le calcul du RPD (% d'écart relatif). L'arrondissement des résultats finaux peut expliquer la variation apparente.

clé de cryptage



Rita Kurdoghlian

11 Sep 2013 17:01:47 -04:00

Veuillez adresser toute question concernant ce certificat d'analyse à votre chargé(e) de projets

Rita Kurdoghlian, Chargée de projets
Email: RKurdoghlian@maxxam.ca
Phone# (514) 448-9001 Ext:4272

=====
Ce rapport a été produit et distribué en utilisant une procédure automatisée sécuritaire.

Maxxam a mis en place des procédures qui protègent contre l'utilisation non autorisée de la signature électronique et emploie les "signataires" requis, conformément à la section 5.10.2 de la norme ISO/CEI 17025:2005(E). Veuillez vous référer à la page des signatures de validation pour obtenir les détails des validations pour chaque division.

Dossier Maxxam: B354701
Date du rapport: 2013/09/11

AMEC
Votre # du projet: VE522778200 06
Adresse du site: BLACKWATER
Votre # de commande: P12-1100

MÉTAUX (EAU)

Identification Maxxam		V76921	V76921	V76922	V76922		
Date d'échantillonnage		2013/08/29	2013/08/29	2013/08/29	2013/08/29		
# Bordereau		c#96893-01-01	c#96893-01-01	c#96893-01-01	c#96893-01-01		
	UNITÉS	TOX-R1	TOX-R1 Dup. de Lab.	TOX2-DS1	TOX2-DS1 Dup. de Lab.	LDR	Lot CQ

MÉTAUX							
Mercure (Hg)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	1203540
LDR = Limite de détection rapportée Lot CQ = Lot Contrôle Qualité							

Dossier Maxxam: B354701
Date du rapport: 2013/09/11

AMEC
Votre # du projet: VE522778200 06
Adresse du site: BLACKWATER
Votre # de commande: P12-1100

MÉTAUX EXTRACTIBLES TOTAUX (EAU)

Identification Maxxam		V76921	V76922	V76923	V76924		
Date d'échantillonnage		2013/08/29	2013/08/29	2013/08/29	2013/08/29		
# Bordereau		c#96893-01-01	c#96893-01-01	c#96893-01-01	c#96893-01-01		
	UNITÉS	TOX-R1	TOX2-DS1	TOX-R1F	TOX2-D1F	LDR	Lot CQ

MÉTAUX ICP-MS							
Aluminium (Al)	ug/L	37	21	13	20	10	1202892
Antimoine (Sb)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	1202892
Argent (Ag)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	1202892
Arsenic (As)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	1202892
Baryum (Ba)	ug/L	4.3	3.0	3.5	2.6	2.0	1202892
Béryllium (Be)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	1202892
Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	1202892
Bore (B)	ug/L	<50	<50	<50	<50	50	1202892
Cadmium (Cd)	ug/L	<0.20	<0.20	<0.20	<0.20	0.20	1202892
Calcium (Ca)	ug/L	17000	38000	16000	39000	500	1202892
Chrome (Cr)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	1202892
Cobalt (Co)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	1202892
Cuivre (Cu)	ug/L	1.8	1.8	1.5	1.6	1.0	1202892
Fer (Fe)	ug/L	740	600	77	67	60	1202892
Lithium (Li)	ug/L	<10	<10	<10	<10	10	1202892
Magnésium (Mg)	ug/L	880	2100	800	2000	100	1202892
Manganèse (Mn)	ug/L	5.6	5.3	1.1	1.9	1.0	1202892
Molybdène (Mo)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	1202892
Nickel (Ni)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	1202892
Plomb (Pb)	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	1202892
Potassium (K)	ug/L	1100	1400	980	1300	500	1202892
Sélénium (Se)	ug/L	<3.0	<3.0	<3.0	<3.0	3.0	1202892
Silicium (Si)	ug/L	6400	3400	6200	3300	100	1202892
Sodium (Na)	ug/L	3100	4400	2900	4200	500	1202892
Strontium (Sr)	ug/L	53	79	47	83	2.0	1202892
Thallium (Tl)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	1202892
Titane (Ti)	ug/L	<10	<10	<10	<10	10	1202892
Uranium (U)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	1202892
Vanadium (V)	ug/L	3.9	3.4	2.6	2.1	2.0	1202892
Zinc (Zn)	ug/L	<7.0	7.3	<7.0	<7.0	7.0	1202892

LDR = Limite de détection rapportée
Lot CQ = Lot Contrôle Qualité

Dossier Maxxam: B354701
Date du rapport: 2013/09/11

AMEC
Votre # du projet: VE522778200 06
Adresse du site: BLACKWATER
Votre # de commande: P12-1100

REMARQUES GÉNÉRALES

État des échantillons à l'arrivée: BON

MÉTAUX (EAU)

Veillez noter que les résultats n'ont pas été corrigés ni pour la récupération des échantillons de contrôle qualité, ni pour le blanc de méthode.

MÉTAUX EXTRACTIBLES TOTAUX (EAU)

Veillez noter que les résultats n'ont pas été corrigés ni pour la récupération des échantillons de contrôle qualité, ni pour le blanc de méthode.

Les résultats ne se rapportent qu'aux échantillons soumis pour analyse

AMEC
 Attention: Serge Payant
 Votre # du projet: VE522778200 06
 P.O. #: P12-1100
 Adresse du site: BLACKWATER

Rapport Assurance Qualité

Dossier Maxxam: B354701

Lot Lot Num Init	Type CQ	Groupe	Date Analysé aaaa/mm/jj	Valeur	Réc	UNITÉS		
1202892 JF1	Blanc fortifié	Aluminium (Al)	2013/09/09		102	%		
		Antimoine (Sb)	2013/09/09		110	%		
		Argent (Ag)	2013/09/09		104	%		
		Arsenic (As)	2013/09/09		103	%		
		Baryum (Ba)	2013/09/09		97	%		
		Béryllium (Be)	2013/09/09		104	%		
		Bismuth (Bi)	2013/09/09		103	%		
		Bore (B)	2013/09/09		109	%		
		Cadmium (Cd)	2013/09/09		99	%		
		Calcium (Ca)	2013/09/09		99	%		
		Chrome (Cr)	2013/09/09		97	%		
		Cobalt (Co)	2013/09/09		94	%		
		Cuivre (Cu)	2013/09/09		95	%		
		Fer (Fe)	2013/09/09		102	%		
		Lithium (Li)	2013/09/09		98	%		
		Magnésium (Mg)	2013/09/09		98	%		
		Manganèse (Mn)	2013/09/09		101	%		
		Molybdène (Mo)	2013/09/09		105	%		
		Nickel (Ni)	2013/09/09		95	%		
		Plomb (Pb)	2013/09/09		99	%		
		Potassium (K)	2013/09/09		98	%		
		Sélénium (Se)	2013/09/09		99	%		
		Silicium (Si)	2013/09/09		112	%		
		Sodium (Na)	2013/09/09		103	%		
		Strontium (Sr)	2013/09/09		102	%		
		Thallium (Tl)	2013/09/09		99	%		
		Titane (Ti)	2013/09/09		105	%		
		Uranium (U)	2013/09/09		99	%		
		Vanadium (V)	2013/09/09		100	%		
		Zinc (Zn)	2013/09/09		97	%		
		Blanc de méthode		Aluminium (Al)	2013/09/09	<10		ug/L
				Antimoine (Sb)	2013/09/09	<1.0		ug/L
				Argent (Ag)	2013/09/09	<1.0		ug/L
Arsenic (As)	2013/09/09			<1.0		ug/L		
Baryum (Ba)	2013/09/09			<2.0		ug/L		
Béryllium (Be)	2013/09/09			<2.0		ug/L		
Bismuth (Bi)	2013/09/09			<1.0		ug/L		
Bore (B)	2013/09/09			<50		ug/L		
Cadmium (Cd)	2013/09/09			<0.20		ug/L		
Calcium (Ca)	2013/09/09			<500		ug/L		
Chrome (Cr)	2013/09/09			<5.0		ug/L		
Cobalt (Co)	2013/09/09			<1.0		ug/L		
Cuivre (Cu)	2013/09/09			<1.0		ug/L		
Fer (Fe)	2013/09/09			<60		ug/L		
Lithium (Li)	2013/09/09			<10		ug/L		
Magnésium (Mg)	2013/09/09			<100		ug/L		
Manganèse (Mn)	2013/09/09			<1.0		ug/L		
Molybdène (Mo)	2013/09/09			<1.0		ug/L		
Nickel (Ni)	2013/09/09			<2.0		ug/L		
Plomb (Pb)	2013/09/09			<0.50		ug/L		
Potassium (K)	2013/09/09			<500		ug/L		
Sélénium (Se)	2013/09/09	<3.0		ug/L				
Silicium (Si)	2013/09/09	<100		ug/L				
Sodium (Na)	2013/09/09	<500		ug/L				
Strontium (Sr)	2013/09/09	<2.0		ug/L				

AMEC
 Attention: Serge Payant
 Votre # du projet: VE522778200 06
 P.O. #: P12-1100
 Adresse du site: BLACKWATER

Rapport Assurance Qualité (Suite)

Dossier Maxxam: B354701

Lot Lot			Date Analysé	Valeur	Réc	UNITÉS
Num Init	Type CQ	Groupe	aaaa/mm/jj			
1202892 JF1	Blanc de méthode	Thallium (Tl)	2013/09/09	<2.0		ug/L
		Titane (Ti)	2013/09/09	<10		ug/L
		Uranium (U)	2013/09/09	<1.0		ug/L
		Vanadium (V)	2013/09/09	<2.0		ug/L
		Zinc (Zn)	2013/09/09	<7.0		ug/L
1203540 ALE	MRC	Mercure (Hg)	2013/09/11		89	%
	Blanc fortifié	Mercure (Hg)	2013/09/11		102	%
	Blanc de méthode	Mercure (Hg)	2013/09/11	<0.00001		mg/L

MRC: Un échantillon de concentration connue préparé dans des conditions rigoureuses par un organisme externe. Utilisé pour vérifier la justesse de la méthode.
 Blanc fortifié: Un blanc, d'une matrice exempte de contaminants, auquel a été ajouté une quantité connue d'analyte provenant généralement d'une deuxième source. Utilisé pour évaluer la précision de la méthode.
 Blanc de méthode: Une partie aliquote de matrice pure soumise au même processus analytique que les échantillons, du prétraitement au dosage. Sert à évaluer toutes contaminations du laboratoire.
 Réc = Récupération

Page des signatures de validation

Dossier Maxxam: B354701

Les résultats analytiques ainsi que les données de contrôle-qualité contenus dans ce rapport furent vérifiés et validés par les personnes suivantes:



Kathie Quevillon, B.Sc., Chimiste



Maria Chrifi Alaoui, B.Sc., Chimiste

Maxxam a mis en place des procédures qui protègent contre l'utilisation non autorisée de la signature électronique et emploie les "signataires" requis, conformément à la section 5.10.2 de la norme ISO/CEI 17025:2005(E). Veuillez vous référer à la page des signatures de validation pour obtenir les détails des validations pour chaque division.

Appendix G

Certificates of Analysis – Toxicity Testing

Exova
237 rue de Liverpool
Saint-Augustin-de-Desmaures
Québec
Canada
G3A 2C8

Sans Frais: +1 (866) 365-2310
T: +1 (418) 878-4927
F: +1 (418) 878-7185
E: ventes@exova.com
W: www.exova.com

Exova
121 Boulevard Hymus
Pointe-Claire
Québec
Canada
H9R 1E6

T: +1 (514) 697-3273
F: +1 (514) 697-2090
E: ventes@exova.com
W: www.exova.com



Certificate of Analysis

Request number: **13-558980**



Date Received: 2013-09-04

Date Certificate Issued: 2013-09-17

Certificate Version: 1

- Official Certificate of Analysis
 Preliminary Certificate of Analysis

Client

AMEC Environnement - Earth & environment

1868, boul. des Sources, Bureau 400
Pointe-Claire, Québec, Canada
H9R 5R2
Telephone : (514) 429-6555
Fax : (514) 429-6500

P.O. Number	Your project ID.	Project Manager
12-1051	Blackwater (VE 52277 8200 06)	M. Usman Khan

Comments

The criteria from the "Politique de protection des sols et de réhabilitation des terrains contaminés" included in this certificate are for information only. The A criteria for all metals correspond to those of the "Basses-Terres du St-Laurent" region. The D criteria correspond to the "Règlement sur l'enfouissement des sols contaminés". These criteria are included in this certificate for information only.

This version replaces and cancels all earlier version.

NA : Information Not Available

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Certificate of Analysis

Client: **AMEC Environnement - Earth & environment** Request Number: **13-558980**

P.O. Number	Your Project ID.	Project Manager
12-1051	Blackwater (VE 52277 8200 06)	M. Usman Khan

Sample(s)

Lab. No.	2431390	2431410
Your Reference	TOX-R1	TOX2-DS1
Matrix	Wastewater	Wastewater
Sampled by	NA	NA
Site sampled	Point-Claire	Point-Claire
Date sampled	2013-09-03	2013-09-03
Date received	2013-09-04	2013-09-04

Parameter(s)

Method

Reference

Résultats toxicité truite

QE006-01 (Accredited)

LC50-96h

% mortality at 100% v/v

CI 95% lower

CI 95% upper

Code Statistical method

Toxic units

Conclusion

Analysis details

Preparation	-	-
Analysis	-	-
Sequential No.	NA	NA
% v/v	NA	NA
% mort 96h	0	0
	NA	NA
	NA	NA
	NA	NA
U.T.	NA	NA
Conclusion	Not lethal	Not lethal
Analysis details	APPENDIX	APPENDIX

Résultats toxicité daphnie

QE007-01 / QE008-01 (Accredited)

LC50-48h

% mortality at 100% v/v

CI 95% lower

CI 95% upper

Code Statistical method

Toxic units

Conclusion

Analysis details

Preparation	-	-
Analysis	-	-
Sequential No.	NA	NA
% v/v	>100	>100
% mort 48h	NA	NA
	NA	NA
	NA	NA
	AUCUN	AUCUN
U.T.	<1.0	<1.0
Conclusion	Not lethal	Not lethal
Analysis details	APPENDIX	APPENDIX

Terms and conditions: <http://www.exova.ca/terms&conditions>

Certificate of Analysis No. 559772 - Revision 1 - Page 2 of 3



This certificate must not be reproduced, except in its entirety, without written consent from the laboratory. The official version of this certificate is protected and cannot be modified. The above-mentioned samples will be retained for a period of 30 days following the issue of this certificate with the exception of microbiology samples or as instructed by the client. Results pertain only to the samples submitted for analysis.

Exova
237 rue de Liverpool
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Certificate of Analysis

Client: **AMEC Environnement - Earth & environment** Request Number: **13-558980**

P.O. Number	Your Project ID.	Project Manager
12-1051	Blackwater (VE 52277 8200 06)	M. Usman Khan

Sample(s)

Lab. No.	2431390	2431410
Your Reference	TOX-R1	TOX2-DS1
Matrix	Wastewater	Wastewater
Sampled by	NA	NA
Site sampled	Point-Claire	Point-Claire
Date sampled	2013-09-03	2013-09-03
Date received	2013-09-04	2013-09-04

Parameter(s)

Method
Reference

Comments:

2431390	TOX-R1	Daphnia - Type d'essai : CL50, Truites - Type d'essai : Concentration unique
2431410	TOX2-DS1	Daphnia - Type d'essai : CL50, Truites - Type d'essai : Concentration unique

Note 1: Results and comments, if any, relate only to samples submitted for analysis at the Saint-Augustin-de-Desmaures laboratory.


Linda Bouchard, biologist

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Certificate of Analysis No. 559772 - Revision 1 - Page 3 of 3



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Annexe

Client: AMEC Environnement - Earth & environment Numéro de demande: 13-558980

BIOESSAI Truite arc-en-ciel

No. Labo.: 2431410
 Votre référence: TOX2-DS1
 Matrice: Eau usée
 Prélevé par: NA
 Lieu de prélèvement: Point-Claire

Méthode d'échantillonnage: Grab
 Prélevé le (date et heure): 2013-09-03
 Reçu le (date et heure): 2013-09-04 15:30:00
 Etat de l'échantillon à la réception: Conform

Date et heure début d'analyse (0hrs): 2013-09-05 15:30 Date et heure fin d'analyse (96h): 2013-09-09 15:30

Analysé par: JB JG

Organismes: *Oncorhynchus mykiss* ; Acclimatation: ≥ 2 semaines
 % de mortalité 7 jours avant l'essai : <1

Lot: PAV130809
 Poids moyen des poissons témoins (g): 0.43 Minimum: 0.31 Maximum: 0.54
 ± écart type: 0.08
 Longueur moyenne des poissons témoins (mm): 35.2 Minimum: 31 Maximum: 41
 ± écart type: 3.4
 Nombre de Truite/récipient: 10
 Densité de chargement (g/L): 0.43
 Volume des solutions d'essai (L): 10
 Hauteur des solutions d'essai (cm): 22
 Photopériode: 16hrs lumière / 8hrs obscurité
 Eau de dilution: Eau municipale déchlorée
 Pré-aération de l'échantillon: 30 minutes
 Débit de pré-aération et d'aération (mL/min/L ±1): 6.5
 Pré-traitement d'échantillon: NA
 Méthode / Référence: SPE1/RM/13, 2000, mod. 05/2007
 Aucune modification à la méthode

concentration de l'échantillon (% v/v)	nombre de poissons 0 hrs	volume (L)	atypique ou stressé 96hrs (nombre)	atypique ou stressé 96hrs (%)	mortalité 96hrs (nombre)	mortalité 96hrs (%)	température (°C)		pH		oxygène dissous (mg/L)		conductivité (µS/cm)		
							0hrs	96hrs	0hrs	96hrs	0hrs	96hrs		0hrs	
0	10	10	0	0	0	0	15.0	15.6	7.9	7.8	9.2	9.6	296		
100	10	10	0	0	0	0	15.9	15.4	8.6	7.7	8.8	9.1	264		
Caractéristiques de l'échantillon avant le début de l'analyse							Apparence Yellow, clear		15.6		8.6		8.5		262

Essai de référence (Phénol)
 Date de l'essai de référence: 2013-08-30
 CL50-96h (mg/L de Phénol): 10.82
 I.C. à 95% inf.: 9.00
 I.C. à 95% sup.: 13.00

Moyenne géométrique: 9.11
 Limite de contrôle inférieure: 6.58
 Limite de contrôle supérieure: 11.63

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Les échantillons mentionnés plus haut seront conservés pendant 30 jours à partir de la date d'émission de Certificat, à l'exception des paramètres microbiologiques ou selon les Instructions écrites du client.

Annexe

Client: AMEC Environnement - Earth & environment

Numéro de demande:

13-558980

BIOESSAI *Daphnia magna*

No. Labo.: 2431410
 Votre référence: TOX2-DS1
 Matrice: Eau usée
 Prélevé par: NA
 Lieu de prélèvement: Point-Claire

Méthode d'échantillonnage: Grab
 Prélevé le (date et heure): 2013-09-03
 Reçu le (date et heure): 2013-09-04 15:30:00
 Etat de l'échantillon à la réception: Conform

Date et heure début d'analyse (0hrs): 2013-09-05 15:00 Date et heure fin d'analyse (48hrs): 2013-09-07 15:00

CE50-48h (% v/v): >100
 I.C. à 95% inférieure: NA
 I.C. à 95% supérieure: NA
 Méthode de calcul: Aucune méthode utilisée

Analysé par: NB GF

Organismes: *Daphnia magna* (<24 heures)
 <1% de mortalité des génitrices 7 jours avant l'essai

Nombre moyen de néonates par couvée: 20
 Âge à la première couvée (jours): 7
 Nombre de *Daphnia*/récepteur: 10
 Densité de chargement (mL/*Daphnia*): 30
 Volume des solutions d'essai (mL): 300
 Photopériode: 16hrs lumière / 8hrs obscurité
 Eau de dilution: Eau municipale déchlorée, dureté ajustée
 Dureté de l'eau d'élevage et de dilution (mg/L CaCO₃): 182
 Pré-aération de l'échantillon: 0 minute
 Débit de pré-aération (mL/min/L ±1): NA
 Dureté de l'échantillon (mg/L CaCO₃): 170
 Dureté de l'échantillon ajusté (mg/L CaCO₃): NA
 Pré-traitement d'échantillon: NA
 Méthode / Référence: SPE1/RM/14, 2000

Aucune modification à la méthode

concentration de l'échantillon (% v/v)	nombre de <i>Daphnia</i> 0hrs	immobilité 48hrs (nombre)	immobilité 48hrs (%)	mortalité 48hrs (nombre)	mortalité 48hrs (%)	température (°C)		pH		oxygène dissous (mg/L)		conductivité (µS/cm)	
						0hrs	48hrs	0hrs	48hrs	0hrs	48hrs		
0	10	0	0	0	0	19.6	19.3	8.0	8.1	8.4	8.3	556	
6.25	10	0	0	0	0	19.6	19.2	8.0	8.1	8.4	8.8	541	
12.5	10	0	0	0	0	19.6	19.1	8.2	8.1	8.4	8.0	527	
25	10	0	0	0	0	19.7	19.0	8.3	8.1	8.4	8.4	493	
50	10	0	0	0	0	19.8	18.9	8.4	8.1	8.2	8.5	432	
100	10	0	0	0	0	20.0	19.0	8.8	8.1	8.1	8.6	307	
Caractéristiques de l'échantillon avant le début de l'analyse						Apparence							
						Beige, clear		20.2		8.5		7.7	305

Essai de référence (Bichromate de potassium)

Date de l'essai de référence: 2013-09-03
 CL50-48h (mg/L de Cr): 0.267
 I.C. à 95% inf.: 0.245
 I.C. à 95% sup.: 0.292

Moyenne géométrique: 0.308
 Limite de contrôle inférieure: 0.210
 Limite de contrôle supérieure: 0.406

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Les échantillons mentionnés plus haut seront conservés pendant 30 jours à partir de la date d'émission de Certificat, à l'exception des paramètres microbiologiques ou selon les instructions écrites du client.

Annexe

Client: AMEC Environnement - Earth & environment Numéro de demande: 13-558980

BIOESSAI Truite arc-en-ciel

No. Labo.: 2431390
 Votre référence: TOX-R1
 Matrice: Eau usée
 Prélevé par: NA
 Lieu de prélèvement: Point-Claire
 Méthode d'échantillonnage: Grab
 Prélevé le (date et heure): 2013-09-03
 Reçu le (date et heure): 2013-09-04 15:30:00
 Etat de l'échantillon à la réception: Conform

Date et heure début d'analyse (0hrs): 2013-09-05 15:30 Date et heure fin d'analyse (96h): 2013-09-09 15:30

Analysé par: JB JG

Organismes: *Oncorhynchus mykiss*; Acclimatation: ≥ 2 semaines
 % de mortalité 7 jours avant l'essai : <1
 # Lot: PAV130809
 Poids moyen des poissons témoins (g): 0.41 Minimum: 0.32 Maximum: 0.53
 ± écart type: 0.08
 Longueur moyenne des poissons témoins (mm): 36.5 Minimum: 34 Maximum: 40
 ± écart type: 2.2
 Nombre de Truite/récipient: 10
 Densité de chargement (g/L): 0.41
 Volume des solutions d'essai (L): 10
 Hauteur des solutions d'essai (cm): 22
 Photopériode: 16hrs lumière / 8hrs obscurité
 Eau de dilution: Eau municipale déchlorée
 Pré-aération de l'échantillon: 30 minutes
 Débit de pré-aération et d'aération (mL/min/L ±1): 6.5
 Pré-traitement d'échantillon: NA
 Méthode / Référence: SPE1/RM/13, 2000, mod. 05/2007
 Aucune modification à la méthode

concentration de l'échantillon (% v/v)	nombre de poissons 0 hrs	volume (L)	atypique ou stressé 96hrs (nombre)	atypique ou stressé 96hrs (%)	mortalité 96hrs (nombre)	mortalité 96hrs (%)	température (°C)		pH		oxygène dissous (mg/L)		conductivité (µS/cm)		
							0hrs	96hrs	0hrs	96hrs	0hrs	96hrs		0hrs	
0	10	10	0	0	0	0	14.9	15.9	8.0	7.9	9.6	9.7	296		
100	10	10	0	0	0	0	15.6	15.5	7.7	7.6	9.4	9.5	129		
Caractéristiques de l'échantillon avant le début de l'analyse							Apparence Yellow, clear		15.7		7.9		8.4		127

Essai de référence (Phénol) 2013-08-30 Moyenne géométrique: 9.11
 Date de l'essai de référence: 2013-08-30 Limite de contrôle inférieure: 6.58
 CL50-96h (mg/L de Phénol): 10.82 Limite de contrôle supérieure: 11.63
 I.C. à 95% inf.: 9.00
 I.C. à 95% sup.: 13.00

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Annexe

Client: AMEC Environnement - Earth & environment **Numéro de demande:** 13-558980

BIOESSAI *Daphnia magna*

No. Labo.: 2431390 Voire référence: TOX-R1 Matrice: Eau usée Prélevé par: NA Lieu de prélèvement: Point-Claire	Méthode d'échantillonnage: Grab Prélevé le (date et heure): 2013-09-03 Reçu le (date et heure): 2013-09-04 15:30:00 Etat de l'échantillon à la réception: Conform
---	--

Date et heure début d'analyse (0hrs): 2013-09-07 14:30 **Date et heure fin d'analyse (48hrs):** 2013-09-09 14:30

CE50-48h (% v/v): >100
I.C. à 95% inférieure: NA
I.C. à 95% supérieure: NA
Méthode de calcul: Aucune méthode utilisée

Analysé par: JG NB

Organismes: *Daphnia magna* (<24 heures)
 <1% de mortalité des génitrices 7 jours avant l'essai
Nombre moyen de néonates par couvée: 20
Age à la première couvée (jours): 7
Nombre de Daphnia/récipient: 10
Densité de chargement (mL/Daphnia): 30
Volume des solutions d'essai (mL): 300
Photopériode: 16hrs lumière / 8hrs obscurité
Eau de dilution: Eau municipale déchlorée, dureté ajustée
Dureté de l'eau d'élevage et de dilution (mg/L CaCO3): 182
Pré-aération de l'échantillon: 0 minute
Débit de pré-aération (mL/min/L ±1): NA
Dureté de l'échantillon (mg/L CaCO3): 130
Dureté de l'échantillon ajusté (mg/L CaCO3): NA
Pré-traitement d'échantillon: NA
Méthode / Référence: SPE1/RM/14, 2000
 Aucune modification à la méthode

concentration de l'échantillon (% v/v)	nombre de Daphnia 0hrs	immobilité 48hrs (nombre)	immobilité 48hrs (%)	mortalité 48hrs (nombre)	mortalité 48hrs (%)	température (°C)		pH		oxygène dissous (mg/L)		conductivité (µS/cm)
						0hrs	48hrs	0hrs	48hrs	0hrs	48hrs	
0	10	0	0	0	0	20.0	19.4	8.0	7.9	8.3	8.4	564
6.25	10	0	0	0	0	19.9	19.2	8.0	7.9	8.7	8.3	542
12.5	10	0	0	0	0	19.9	19.2	8.1	7.8	8.0	8.4	515
25	10	0	0	0	0	19.9	19.2	8.1	7.8	8.3	8.4	466
50	10	0	0	0	0	20.0	19.2	8.1	7.8	8.3	8.4	363
100	10	0	0	0	0	20.2	19.4	8.0	7.5	8.5	8.5	152
Caractéristiques de l'échantillon avant le début de l'analyse		Apparence				20.4		7.6		8.3		151
		Beige, clear										

Essai de référence (Bichromate de potassium)	
Date de l'essai de référence: 2013-09-03	Moyenne géométrique: 0.308
CL50-48h (mg/L de Cr): 0.267	Limite de contrôle inférieure: 0.210
I.C. à 95% inf.: 0.245	Limite de contrôle supérieure: 0.406
I.C. à 95% sup.: 0.292	

Ce certificat ne doit pas être reproduit, sinon en entier, sans l'autorisation écrite du laboratoire. La version officielle de ce certificat est protégée contre toutes modifications.

Les échantillons mentionnés plus haut seront conservés pendant 30 jours à partir de la date d'émission de Certificat, à l'exception des paramètres microbiologiques ou selon les instructions écrites du client.