

APPENDIX I
Freshwater Habitat Assessment Supporting Documentation

ATTACHMENT A – Watercourse Assessment Forms

ATTACHMENT B – Watercourse Photos

ATTACHMENT C – Water Quality Results

ATTACHMENT D – AGAT QA/QC Forms for Freshwater Samples

Black Point Quarry Project
Guysborough County, NS
SLR Project No.: 210.05913.00000

ATTACHMENT A
Watercourse Assessment Forms

Black Point Quarry Project
Guysborough County, NS
SLR Project No.: 210.05913.00000

11-06

**DNR&E / DFO - NEW BRUNSWICK
STREAM SURVEY and HABITAT ASSESSMENT**

River: Unnamed Watercourse 1 - Fogherly Lake outflow.

Date: 24-Sep-10

Personnel: M. Cameron-MacMillan and B. Cameron

of _____

Stream/River No.
Stream Order No.

Unit No.	Stream Type	Channel Type	Channel End	Length (m)	Area Width (m)		Substrate (%)							Ave Depth - Wet Width (cm)	Undercut Bank 0-50%		Over-Hanging Bank Vegetation 0-50%		Large Woody Debris In-Stream (m)	Embedded (Criteria)	In-Stream Vegetation	Comments
					Wet	Bank Channel	Bedrock	Boeslifer	Rock	Rubble	Gravel	Sand	Fines		L	R	L	R				
1	13	1	187.0			12.0	30.0	0	0	0	0	0	0	100	0	0	40	40	3.0	4	✓	Photos 67 - 71
2	8	1	188.0			1.0	1.0	0	20	15	5	25	35	0	25	25	15	15	0.0	1		Photos 72,73
3	24	1	189.0			2.5	5.0	0	20	10	10	10	10	40	5	5	10	20	0.0	1		Photos 74,75
4	8	1	190.0			1.0	1.0	0	20	15	5	25	35	0	25	25	15	15	0.0	1		Photos 76,77. Debris dam at WPT.189.

Photos 76,77 at WPT.189 (bars of steep dropoff).
Hobbit looks similar as the down stream as we can see.

FASTWATER	STREAM TYPE					CHANNEL TYPE	SUBSTRATE	FLOW TYPE	POOL RATING (reverse side)																					
	6. Sheet (Sdgs)	7. Chute	8. Run	9. Rapid	10. Meander				CRITERIA (NO.)	% OF POOL SITE (LETTER)																				
1. Fall	14. Trench	15. Plunge	16. Bogen	17. Bogen	18. Eddy	19. Gapon	20. Loop Structure	21. Reed Crisp	22. Wood Debris	23. Man-Made Dam	24. Natural Obstacle	1. Mean (if measurement refers to mean area of river)	2. Side Channel (weir diverted by island)	3. Split (if river is split into various different stream types)	4. Bogen	1. Backset, Ledger	2. Boulder	3. Rock	4. Gravel	5. Sand	6. Fines	7. Phos	1. Stream Cover > 30%	2. Stream Cover < 30%	3. Brook/Over Tributary	4. Spring Seep	1. Pool Depth > 1.5m	2. Pool Depth < 1.5m	3. Pool Depth < 1.5m	4. Pool Depth < 1.5m

*For different left and right parameters, values are to be written as L/R.

River: Unnamed Watercourse 1 - Fogherly Lake outflow.

Valley Slope L/M/H (m)	Flood Plain Width (m)	Shade (%)	Vegetation (%)				Stream Banks				Erosion (%)	pH	Water Temperature (°C)	Fish Species	Pool Rating			Turbulence (%)		
			Grasses		Shrubs		Trees		Left Bank (0-50%)						Right Bank (0-50%)		Embanked (Criteria) 1: < 20% 2: 20 - 35% 3: 35 - 50% 4: > 50%		Mean Substrate Size(cm)	Fines (%)
			Bare	Stable	Eroding	Stable	Eroding	Bare	Stable	Eroding										
L 0.1 > 26		50	0	0	40	60	0	0	0	0	50	0	0	0	0					
L 0.3 > 26		80	0	20	20	60	0	0	0	0	50	0	0	0	0					
L 0.2 > 26		80	0	0	40	60	0	0	0	0	50	0	0	0	0					
L 0.3 > 26		80	0	20	20	60	0	0	0	0	50	0	0	0	0					

NOTE: *For selected site only, these columns (reverse side) should be done for a habitat assessment.

RIFLE GRADIENT		GRADIENT %	LIMIT No.	STREAM TYPE	NET WIDTH (m)	DEPTH (cm)			AVERAGE DEPTH SUM/L4		COEFFICIENT P.D. - smooth (0.8 - rough)	LENGTH (km)	FLOAT TIME (sec)			FLOW cm/s
LENGTH (m)	DROP (m)					1/4 way	1/2 way	3/4 way	CENTIMETERS	METERS (m)			1/4 way	1/2 way	3/4 way	

FORMULA (CONST) = W / (M.L.O. - M.O.L.A.) x L / (M.S.)
Where W = width, O = depth, L = length, A = a coefficient for the stream bottom (A = 0.8 for rough bottom, 0.9 for smooth)

- CRITERIA
1. Choose water depth equal to or greater than channel width
 2. Riffle: GRFB - 15 centimeters over a gravel and/or rubble bottom
 3. Side Channels - 100% of banks - 100% of stream type

*For different left and right parameters, values are to be written as L/R.

Adobe form developed by Alison Johnson @ AMEC Frederickton

11-06

**DNR&E / DFO - NEW BRUNSWICK
STREAM SURVEY and HABITAT ASSESSMENT**
Start Point: WPT 180 End Point: WPT 181

of _____

River: Unnamed Watercourse 2 - North watercourse.

Date: 22-Sep-10

Personnel: M. Cameron-MacMillan and B. Cameron

Stream/River No. _____
Stream Order No. _____

Unit No.	Stream Type	Channel Type	Channel End	Length (m)	Ave Width (m)		Substrate (%)							Avg Depth - Wet Width (cm)	Undercut Bank 0-50%			Overhanging Bank Vegetation 0-50%			Large Woody Debris in-Stream (m)	Embedded (Criteria)	In-Stream Vegetation	Comments	
					Wet	Bank Channel	Bedrock	Boulder	Rock	Rubble	Gravel	Sand	Fines		L	R	L	R	L	R					
1	1	1	179.0		15.0																			Dry channel; very little standing water in places.	
2	24	1	181.0	0.8	16.0	0	0	0	0	100				15	15	35	35			20.0	4			Photos 75,76. Intermittent flow.	
3	8	1	181.0	0.5	16.0	0	10	10	30	40	5	5		15	15	35	35			20.0	1			Photos 77,78. Survey ends at dropoff; habitat appears similar to far downstream as can be seen.	

FASTWATER	SLOWWATER	CHANNEL TYPE		POOL RATING (reverse side)	
		FASTWATER	POOLS		
1 Fall 2 Cascade 3 Rile (G/R) [R] 4 Rile (R/R) 5 Rile (S/R)	6 Sheet (Scpp) 7 Chute 8 Run 9 Riprap 10 Meandering 11 Convergence 12 Lateral 13 Beaver 14 Trench 15 Plunge 16 17 Bogan	18 Edge 19 Gabion 20 Log Structure 21 Road Crossing 22 Wood Debris 23 Man-Made Dam 24 Natural Obstacle	1 Mean of measurement refers to mean area of river? 2 Side Channel (water diverted by dike/dam) 3 Soil if river is split into various alluvial stream types 4 Bogan *. Spooly/Lat(L), Right (R) or Middle (M)	Substrate 1 Blockrock, Ledge > 461 mm 2 Boulder a 180 - 170 mm 3 Cobble a 75 - 50 mm 4 Gravel a 2.0 - 2.5 mm 5 Gravel a 0.06 - 0.05 mm 6 Sand a 0.075 - 0.05 mm 7 Fines a 0.075 - 0.05 mm	Pool Rating Criteria (R/R) % OF POOLS IN ALL LETTER a. > 50% b. > 30% c. < 10% a. > 50% b. < 50%

*For different left and right parameters, values are to be written as L/R.

River: Unnamed Watercourse 2 - North watercourse.

Valley Bank Slope Height L/R/W (m)	Flood Shade Flow (%)	Stream Banks						Erosion (%)	O ₂ (Mg/L)	pH	Water Temperature (°C)	Fish Species	Pool Rating		Pool Tail		Turbulence (%)			
		Vegetation (%)		Erosion (%)		Right Bank (0-50%)	Left Bank (0-50%)						Trees	Bare	Grasses	Shrubs		Embedded (Cl/rocks)	Mean Substrate Size(cm)	Flies (%)
		Bare	Grasses	Shrubs	Trees															
		0	1	2	3	4	5						6	7	8	9		10	11	12
H													No.	Letter						
H	0.4	16	65	0	30	0	70	50	0	0	50	0	0	0	3.2	13.7	0			
H	0.4	16	65	0	10	30	60	50	0	0	50	0	0							

NOTE: *For selected site study, these columns (reverse side) should be done for a habitat assessment

WATER FLOW MEASUREMENT

LENGTH (m)	RIFLE GRADIENT		WET WIDTH (m)	STREAM TYPE	DEPTH (cm)	AVERAGE DEPTH (SUM / 4)		COEFFICIENT (0.0 - rough)	LENGTH (m)	FLOAT TIME (sec)			FLOW cm/s
	DROP (m)	GRADIENT (%)				14 way	12 way			34 way	14 way	12 way	

Formula (CMS) $W =$ (cm), $L =$ (m), $A =$ (m²) $V =$ (m³) $Q =$ (m³/s) Where W = width, D = depth, L = length, A is a coefficient for the stream bottom (A = 0.8 for rough bottom, 0.9 for smooth)

CRITERIA	Value
1. Channel water depth equal to or greater than channel width	
2. Riparian zone vegetation is a dense stand of trees and/or shrubs and/or grasses	
3. Slope channels - made up of cobble and/or boulders	
4. Undercut Bank - % of bank overhang (above water edge) for stream type	
5. One-hanging Bank Vegetation - % of vegetation overhang for stream type	
6. Silt - % of silt in stream bed (specify larger substrate, up to 100%)	
7. Woody Debris - total width should be < 10 cm in diameter	

*For different left and right parameters, values are to be written as L/R.

11-06

**DNR&E / DFO - NEW BRUNSWICK
STREAM SURVEY and HABITAT ASSESSMENT**

River: Unnamed Watercourse 3 - Eastern edge of property
Date: 24-Aug-10

Start Point: WPT 171 End Point: WPT 195

Personnel: M. Cameron-MacMillan and B. Cameron

_ of _
Stream/River No.
Stream Order No.

Unit No.	Stream Type	Channel Type	Chainage End	Length (m)	Are Width (m)		Substrate (%)								Ave Depth - Wet Width (cm)	Undercut Bank 0-50%		Over-Hanging Bank Vegetation 0-50%			Large Woody Debris In-Stream (m)	Embedded (Criteria)	In-Stream Vegetation	Comments
					Wet	Bank Channel	Bedrock	Boulder	Rock	Rubble	Gravel	Sand	Fines	L		R	L	R	L	R				
1	13	1			20.0	25.0	0	10	30	50	10	0	0	0	0	0	0	2	2	25.0	4	✓	Beaver pond at downstream end of unit 1.	
-	-	-																					Remainder of survey completed 24 September.	
2	8	1	193.0		1.4	2.2	0	0	0	0	0	0	30	70	0	0	10	10	5.0	4	✓	Unit starts at WPT192. Fen habitat. Photos 80,81		
3	4/8	1	194.0		0.8	2.5	0	0	0	20	30	30	20	20	5	5	10	10	0.0	2		Photos 82,83		
4	8	1	195.0		0.5	1.3	0	0	0	10	30	60	5	5	5	2	2	2	0.0	4		Photos 84, 85		

FASTWATER	STREAM TYPE					CHANNEL TYPE				SUBSTRATE				FLOW TYPE		POOL RATING (reverse side)		
	6 Sheet (ledge)	7 Chute	8 Run	9 Rapid	5 Rills (S&B)	14 Trench	15 Plunge	16	17 Bogam	18 Eddy	19 Gabion	20 Log Structure	21 Road Crossing	22 Wood Debris	23 Man-Made Dam	24 Natural Deadwater	CRITERIA (NO.)	% OF POOLS IN SITE (ETTER)
1 Fall	2 Cascade	3 Rills (GR&B)	4 Rills (R/B)	5 Rills (S&B)													Pool Depth > 1.5 m 1 - Instream Cover > 30% 2 - Instream Cover < 30% Pool Depth 5 to 1.5 m 1 - Instream Cover > 30% 4 - Instream Cover > 30%	e - > 30% d - 10% to 30% c - < 10% e - > 50% d - < 50%

*For different left and right parameters, values are to be written as L/R.

River: Unnamed Watercourse 3 - Eastern edge of property

Valley Bank Slope Height L/H (m)	Flood Plain Width (m)	Shade (%)	Stream Banks						0 ⁷ (Mg/L)	pH	Water Temperature (°C)	Fish Species	Pool Rating			Pool Tail		Turbulence (%)					
			Vegetation (%)		Erosion (%)		Right Bank (0-50%)	Letter					Embedded Criteria	Mean Substrate Size (cm)	Fines (%)								
			Bare	Grasses/Shrubs	Trees	Le/R Bank (0-50%)										Stable	Eroding		Bare Stable	Eroding			
L 0 30	5	0	30	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L 0.2 30	30	0	60	30	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
L 0.4 12	90	0	10	10	80	0	0	10	40	0	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
L 0.3 30	90	0	10	0	90	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0

NOTE: * For selected site study, these columns (reverse side) should be done for a habitat assessment

LENGTH (m)	RIFFLE GRADIENT		UNIT No.	STREAM TYPE	NET WIDTH (m)	DEPTH (cm)			AVERAGE DEPTH SUM / 4			COEFFICIENT (0.8 - rough) (0.6 - rough)	LENGTH (m)	FLOAT TIME (sec)			FLOW (m ³ /sec)	
	DROP (m)	GRADIENT (%)				1/4 WY	1/2 WY	3/4 WY	1/4 WY	1/2 WY	3/4 WY			AVERAGE				

Formula: $CAS = \frac{W}{L} \times \frac{D}{L} \times \frac{A}{L}$ Where: W = width, D = depth, L = length, A is a coefficient for the stream bottom (A = 0.8 for rough bottom, 0.9 for smooth)

CRITERIA

- Channel depth equal to or greater than channel width
- Bank cover - % of bank overhang above water edge for stream type
- Bank Vegetation - % of vegetation overhang for stream type
- Visual Embedment - % of sands or fines surrounding the larger substrates, up to 100%
- Woolly Debris - total width should be > 10 cm in diameter

*For different left and right parameters, values are to be written as L/R.

ATTACHMENT B
Watercourse Photos

Black Point Quarry Project
Guysborough County, NS
SLR Project No.: 210.05913.00000



Photo D.2-1. Unnamed Watercourse 2, Unit 2



Photo D.2-2. Unnamed Watercourse 2, Unit 2



Photo D.2-3. Unnamed Watercourse 2, Unit 3



Photo D.2-4. Unnamed Watercourse 2, Unit 3



Photo D.2-5. Unnamed Watercourse 1, Unit 1



Photo D.2-6. Unnamed Watercourse 1, Unit 1



Photo D.2-7. Unnamed Watercourse 1, Unit 1



Photo D.2-8. Unnamed Watercourse 1, Unit 1



Photo D.2-9. Unnamed Watercourse 1, Unit 1



Photo D.2-10. Unnamed Watercourse 1, Unit 2



Photo D.2-11. Unnamed Watercourse 1, Unit 2



Photo D.2-12. Unnamed Watercourse 1, Unit 3



Photo D.2-13. Unnamed Watercourse 1, Unit 3



Photo D.2-14. Unnamed Watercourse 1, Unit 4



Photo D.2-15. Unnamed Watercourse 1, Unit 4



Photo D.2-16. Unnamed Watercourse 1, start of steep dropoff



Photo D.2-17. Unnamed Watercourse 1, start of steep dropoff



Photo D.2-18. Unnamed Watercourse 3, Unit 2



Photo D.2-19. Unnamed Watercourse 3, Unit 2



Photo D.2-20. Unnamed Watercourse 3, Unit 3



Photo D.2-21. Unnamed Watercourse 3, Unit 3



Photo D.2-22. Unnamed Watercourse 3, Unit 4



Photo D.2-23. Unnamed Watercourse 3, Unit 4

ATTACHMENT C
Water Quality Results

Black Point Quarry Project
Guysborough County, NS
SLR Project No.: 210.05913.00000

Table D.3-1. Analytical Results of Water Quality, Three Unnamed Watercourses and Fogherty Lake, 2010.

Sample Name				GRQ-1	GRQ-2	GRQ-3	GRQ-4
Location			CCME FWAL	Unnamed Watercourse 3 East stream	Fogherty Lake	Unnamed Watercourse 2 North stream	Unnamed Watercourse 1 Fogherty Lake outflow
Parameter	Unit	RDL	Guideline	24-Aug-10	27-Aug-10	22-Sep-10	22-Sep-10
Field Parameters							
pH			6.5-9	3.41	2.94	3.15	2.95
Water Temperature	°C			21.4	22.7	14.9	16
Conductivity	µS/cm			62	43	91	53
% Dissolved Oxygen	%			79.2	100.6	79.8	47
Dissolved Oxygen	mg/L			6.67	8.67	8.47	4.52
General Chemistry							
pH			6.5-9	4.3	4.3	3.9	4.2
Reactive Silica as SiO2	mg/L	0.5		7.2	0.9	10.2	1.8
Chloride	mg/L	1		14	10	18	13
Fluoride	mg/L	0.1	0.12	<0.1	<0.1	0.4	<0.1
Sulphate	mg/L	2		<2	<2	<2	<2
Alkalinity	mg/L	5		<5	<5	<5	<5
True Color	TCU	5	Narrative	395	198	411	195
Turbidity	NTU	0.1	Narrative	1	0.7	2.8	0.7
Electrical Conductivity	umho/cm	1		59	52	102	61
Nitrate + Nitrite as N	mg/L	0.05		<0.05	<0.05	0.24	<0.05
Nitrate as N	mg/L	0.05	2.9	<0.05	<0.05	0.24	<0.05
Nitrite as N	mg/L	0.05	0.06	<0.05	<0.05	<0.05	<0.05
Ammonia as N	mg/L	0.03	Fact Sheet	<0.03	0.03	0.06	0.11
Total Organic Carbon	mg/L	0.5		35.6	15.4	46.6	17.5
Ortho-Phosphate as P	mg/L	0.01		<0.01	<0.01	0.02	<0.01
Total Sodium	mg/L	0.1		8.8	6.8	10	6.8
Total Potassium	mg/L	0.1		0.3	0.4	0.4	0.5
Total Calcium	mg/L	0.1		0.5	0.3	0.5	0.4
Total Magnesium	mg/L	0.1		0.7	0.6	1.1	0.6
Bicarb. Alkalinity (as CaCO3)	mg/L	5		<5	<5	<5	<5
Carb. Alkalinity (as CaCO3)	mg/L	10		<10	<10	<10	<10
Hydroxide	mg/L	5		<5	<5	<5	<5
Calculated TDS	mg/L	1		26	19	33	22
Hardness	mg/L			4.1	3.2	5.8	3.5
Langelier Index (@20C)	NA			-6.84	-7.05	-7.25	-7.03
Langelier Index (@ 4C)	NA			-7.16	-7.37	-7.57	-7.35
Saturation pH (@ 20C)	NA			11.1	11.3	11.1	11.2
Saturation pH (@ 4C)	NA			11.5	11.7	11.5	11.5
Anion Sum	me/L			0.39	0.28	0.52	0.37
Cation sum	me/L			0.68	0.47	0.84	0.49
% Difference/ Ion Balance (NS)	%			26.2	25.2	23.3	14.8
Total Suspended Solids	mg/L	5	Narrative	n/a	n/a	<5	<5
Total Phosphorous as P	mg/L	0.002	Fact Sheet	0.157	0.035	0.03	0.012

Table D.3-1. Analytical Results of Water Quality, Three Unnamed Watercourses and Fogherty Lake, 2010.

Sample Name				GRQ-1	GRQ-2	GRQ-3	GRQ-4
Location			CCME FWAL	Unnamed Watercourse 3 East stream	Fogherty Lake	Unnamed Watercourse 2 North stream	Unnamed Watercourse 1 Fogherty Lake outflow
Total Metals							
Total Aluminum	ug/L	5	5.0	1050	335	1050	272
Total Antimony	ug/L	2		<2	<2	<2	<2
Total Arsenic	ug/L	2	5.0	<2	<2	5	<2
Total Barium	ug/L	5		<5	<5	16	<5
Total Beryllium	ug/L	2		<2	<2	<2	<2
Total Bismuth	ug/L	2		<2	<2	<2	<2
Total Boron	ug/L	5		14	11	20	14
Total Cadmium	ug/L	0.017	0.017	0.025	0.023	0.102	<0.017
Total Chromium	ug/L	1		4	<1	<1	<1
Total Cobalt	ug/L	1		<1	<1	<1	<1
Total Copper	ug/L	2	2	<2	<2	<2	<2
Total Iron	ug/L	50	300	976	319	936	415
Total Lead	ug/L	0.5	1	3.1	2.6	2.2	0.7
Total Manganese	ug/L	2		37	16	87	15
Total Molybdenum	ug/L	2	73	<2	<2	<2	<2
Total Nickel	ug/L	2	25	<2	<2	<2	<2
Total Selenium	ug/L	1	1.0	1	<1	<1	<1
Total Silver	ug/L	0.1	0.1	<0.1	<0.1	<0.1	<0.1
Total Strontium	ug/L	5		<5	<5	9	<5
Total Thallium	ug/L	0.1	0.8	<0.1	<0.1	<0.1	<0.1
Total Tin	ug/L	2		<2	<2	<2	<2
Total Titanium	ug/L	2		5	2	5	<2
Total Uranium	ug/L	0.1		0.3	0.1	0.3	<0.1
Total Vanadium	ug/L	2		<2	<2	<2	<2
Total Zinc	ug/L	5	30	9	26	20	10
Mercury	mg/L	0.00005	0.000026	<0.00005	<0.00005	<0.00005	<0.00005

APPENDIX D

AGAT QA/QC Forms for Freshwater Samples

Black Point Quarry Project
Guysborough County, NS
SLR Project No.: 210.05913.00000

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL
580 MAIN STREET, SUITE 105
SAINT JOHN, NB E2K1J5

ATTENTION TO: CHYANN KIRBY

PROJECT NO: GRQ

AGAT WORK ORDER: 10X432414

WATER ANALYSIS REVIEWED BY: Mike Earp, Operations Manager

DATE REPORTED: Sep 10, 2010

PAGES (INCLUDING COVER): 8

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (902) 468-8718, or at 1-888-468-8718

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

Certificate of Analysis

AGAT WORK ORDER: 10X432414

PROJECT NO: GRQ

 11 Morris Drive, Unit 122
 Dartmouth, Nova Scotia
 CANADA B3B 1M2
 TEL (902)468-8718
 FAX (902)468-8924
<http://www.agatlabs.com>

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO: CHYANN KIRBY

Standard Water Analysis + FWAL Metals (Total), Hg

DATE SAMPLED: Aug 24, 2010

DATE RECEIVED: Sep 02, 2010

DATE REPORTED: Sep 10, 2010

SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	GRQ-1	GRQ-2
				1970509	1970510
pH				4.3	4.3
Reactive Silica as SiO ₂	mg/L		0.5	7.2	0.9
Chloride	mg/L		1	14	10
Fluoride	mg/L		0.1	<0.1	<0.1
Sulphate	mg/L		2	<2	<2
Alkalinity	mg/L		5	<5	<5
True Color	TCU		5	395	198
Turbidity	NTU		0.1	1.0	0.7
Electrical Conductivity	umho/cm		1	59	52
Nitrate + Nitrite as N	mg/L		0.05	<0.05	<0.05
Nitrate as N	mg/L		0.05	<0.05	<0.05
Nitrite as N	mg/L		0.05	<0.05	<0.05
Ammonia as N	mg/L		0.03	<0.03	0.03
Total Organic Carbon	mg/L		0.5	35.6	15.4
Ortho-Phosphate as P	mg/L		0.01	<0.01	<0.01
Total Sodium	mg/L		0.1	8.8	6.8
Total Potassium	mg/L		0.1	0.3	0.4
Total Calcium	mg/L		0.1	0.5	0.3
Total Magnesium	mg/L		0.1	0.7	0.6
Bicarb. Alkalinity (as CaCO ₃)	mg/L		5	<5	<5
Carb. Alkalinity (as CaCO ₃)	mg/L		10	<10	<10
Hydroxide	mg/L		5	<5	<5
Calculated TDS	mg/L		1	26	19
Hardness	mg/L			4.1	3.2
Langelier Index (@20C)	NA			-6.84	-7.05
Langelier Index (@ 4C)	NA			-7.16	-7.37
Saturation pH (@ 20C)	NA			11.1	11.3
Saturation pH (@ 4C)	NA			11.5	11.7
Anion Sum	me/L			0.39	0.28
Cation sum	me/L			0.68	0.47
% Difference/ Ion Balance (NS)	%			26.2	25.2
Total Aluminum	ug/L		5	1050	335
Total Antimony	ug/L		2	<2	<2

Certified By:





Certificate of Analysis

AGAT WORK ORDER: 10X432414

PROJECT NO: GRQ

11 Morris Drive, Unit 122
 Dartmouth, Nova Scotia
 CANADA B3B 1M2
 TEL (902)468-8718
 FAX (902)468-8924
<http://www.agatlabs.com>

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO: CHYANN KIRBY

Standard Water Analysis + FWAL Metals (Total), Hg					
DATE SAMPLED: Aug 24, 2010		DATE RECEIVED: Sep 02, 2010		DATE REPORTED: Sep 10, 2010	
		SAMPLE TYPE: Water			
Parameter	Unit	G / S	RDL	GRQ-1	GRQ-2
				1970509	1970510
Total Arsenic	ug/L		2	<2	<2
Total Barium	ug/L		5	<5	<5
Total Beryllium	ug/L		2	<2	<2
Total Bismuth	ug/L		2	<2	<2
Total Boron	ug/L		5	14	11
Total Cadmium	ug/L		0.017	0.025	0.023
Total Chromium	ug/L		1	4	<1
Total Cobalt	ug/L		1	<1	<1
Total Copper	ug/L		2	<2	<2
Total Iron	ug/L		50	976	319
Total Lead	ug/L		0.5	3.1	2.6
Total Manganese	ug/L		2	37	16
Total Molybdenum	ug/L		2	<2	<2
Total Nickel	ug/L		2	<2	<2
Total Selenium	ug/L		1	1	<1
Total Silver	ug/L		0.1	<0.1	<0.1
Total Strontium	ug/L		5	<5	<5
Total Thallium	ug/L		0.1	<0.1	<0.1
Total Tin	ug/L		2	<2	<2
Total Titanium	ug/L		2	5	2
Total Uranium	ug/L		0.1	0.3	0.1
Total Vanadium	ug/L		2	<2	<2
Total Zinc	ug/L		5	9	26
Mercury	mg/L		0.00005	<0.00005	<0.00005

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 10X432414

PROJECT NO: GRQ

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CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO: CHYANN KIRBY

Total Phosphorus (Low Level)					
DATE SAMPLED: Aug 24, 2010		DATE RECEIVED: Sep 02, 2010		DATE REPORTED: Sep 10, 2010	
				SAMPLE TYPE: Water	
Parameter	Unit	G / S	RDL	GRQ-1	GRQ-2
Total Phosphorus	mg/L		0.002	0.157	0.035

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

Quality Assurance

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

AGAT WORK ORDER: 10X432414

PROJECT NO: GRQ

ATTENTION TO: CHYANN KIRBY

Water Analysis															
RPT Date: Sep 10, 2010			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Standard Water Analysis + FWAL Metals (Total), Hg															
pH	1	1965945	6.9	7.0	1.4%	<	100%	80%	120%		80%	120%		80%	120%
Reactive Silica as SiO2	1	1976151	13.2	13.1	0.8%	< 0.5	103%	80%	120%		80%	120%	102%	80%	120%
Chloride	1	1962422	10	10	0.0%	< 1	94%	80%	120%		80%	120%	100%	80%	120%
Fluoride	1	1962422	< 0.1	< 0.1	0.0%	< 0.1	98%	80%	120%		80%	120%	87%	80%	120%
Sulphate	1	1962422	5	5	0.0%	< 2	100%	80%	120%		80%	120%	102%	80%	120%
Alkalinity	1	1965945	8	8	0.0%	< 5	99%	80%	120%		80%	120%	97%	80%	120%
True Color	1	1965027	< 5	< 5	0.0%	< 5	95%	80%	120%		80%	120%		80%	120%
Turbidity	1	1965027	0.3	0.3	0.0%	< 0.1	88%	80%	120%		80%	120%		80%	120%
Electrical Conductivity	1	1965945	184	187	1.6%	< 1	99%	80%	120%		80%	120%		80%	120%
Nitrate as N	1	1962422	0.08	0.09	11.8%	< 0.05	104%	80%	120%		80%	120%	83%	80%	120%
Nitrite as N	1	1962422	< 0.05	< 0.05	0.0%	< 0.05	110%	80%	120%		80%	120%	101%	80%	120%
Total Organic Carbon	1	1976101	2.4	2.1	13.3%	< 0.5	103%	80%	120%		80%	120%	93%	80%	120%
Ortho-Phosphate as P	1	1976151	< 0.01	0.01		< 0.01	99%	80%	120%		80%	120%	94%	80%	120%
Total Sodium	90810	1977594	32.5	31.2	4.1%	< 0.1	115%	80%	120%	108%	90%	110%	97%	80%	120%
Total Potassium	90810	1977594	1.4	1.5	6.9%	< 0.1	103%	90%	110%	103%	90%	110%	82%	80%	120%
Total Calcium	90810	1977594	10.3	10.5	1.9%	< 0.1	102%	90%	110%	103%	90%	110%	117%	80%	120%
Total Magnesium	90810	1977594	1.7	1.6	6.1%	< 0.1	113%	80%	120%	104%	90%	110%	91%	80%	120%
Total Aluminum	90810	1977594	288	294	2.1%	< 5	117%	80%	120%	108%	90%	110%	114%	80%	120%
Total Antimony	90810	1977594	< 2	< 2	0.0%	< 2	83%	80%	120%	110%	90%	110%	98%	80%	120%
Total Arsenic	90810	1977594	74	73	1.4%	< 2	98%	90%	110%	95%	90%	110%	92%	80%	120%
Total Barium	90810	1977594	22	22	0.0%	< 5	99%	90%	110%	98%	90%	110%	83%	80%	120%
Total Beryllium	90810	1977594	< 2	< 2	0.0%	< 2	109%	90%	110%	106%	90%	110%	100%	80%	120%
Total Bismuth	90810	1977594	< 2	< 2	0.0%	< 2	95%	90%	110%	93%	90%	110%	93%	70%	130%
Total Boron	90810	1977594	53	53	0.0%	< 5	110%	90%	110%	110%	90%	110%	103%	80%	120%
Total Cadmium	90810	1977594	0.156	0.157	0.6%	< 0.017	97%	90%	110%	102%	90%	110%	98%	80%	120%
Total Chromium	90810	1977594	< 1	< 1	0.0%	< 1	105%	90%	110%	104%	90%	110%	87%	80%	120%
Total Cobalt	90810	1977594	< 1	< 1	0.0%	< 1	109%	90%	110%	103%	90%	110%	80%	80%	120%
Total Copper	90810	1977594	4	4	0.0%	< 2	105%	90%	110%	102%	90%	110%	84%	80%	120%
Total Iron	90810	1977594	282	274	2.9%	< 50	100%	90%	110%	100%	90%	110%	80%	80%	120%
Total Lead	90810	1977594	5.5	6.3	13.6%	< 0.5	100%	90%	110%	103%	90%	110%	104%	80%	120%
Total Manganese	90810	1977594	33	34	3.0%	< 2	104%	90%	110%	102%	90%	110%	85%	80%	120%
Total Molybdenum	90810	1977594	32	32	0.0%	< 2	93%	90%	110%	101%	90%	110%	103%	70%	130%
Total Nickel	90810	1977594	< 2	< 2	0.0%	< 2	106%	90%	110%	104%	90%	110%	85%	80%	120%
Total Selenium	90810	1977594	< 1	< 1	0.0%	< 1	97%	90%	110%	98%	90%	110%	90%	80%	120%
Total Silver	90810	1977594	< 0.1	< 0.1	0.0%	< 0.1	99%	90%	110%	90%	90%	110%	85%	80%	120%
Total Strontium	90810	1977594	74	73	1.4%	< 5	94%	90%	110%	97%	90%	110%	85%	80%	120%
Total Thallium	90810	1977594	< 0.1	< 0.1	0.0%	< 0.1	102%	90%	110%	104%	90%	110%	99%	80%	120%
Total Tin	90810	1977594	< 2	< 2	0.0%	< 2	91%	90%	110%	101%	90%	110%	98%	80%	120%
Total Titanium	90810	1977594	19	15	23.5%	< 2	104%	90%	110%	100%	90%	110%	91%	80%	120%

Quality Assurance

 CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL
 PROJECT NO: GRQ

 AGAT WORK ORDER: 10X432414
 ATTENTION TO: CHYANN KIRBY

Water Analysis (Continued)

RPT Date: Sep 10, 2010			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits		
								Lower	Upper		Lower	Upper		Lower	Upper	
Total Uranium	90810	1977594	16.9	17.0	0.6%	< 0.1	102%	90%	110%	106%	90%	110%	100%	80%	120%	
Total Vanadium	90810	1977594	< 2	< 2	0.0%	< 2	104%	90%	110%	99%	90%	110%	80%	80%	120%	
Total Zinc	90810	1977594	19	19	0.0%	< 5	103%	90%	110%	102%	90%	110%	84%	80%	120%	
Mercury	1	1968366	< 0.00005	< 0.00005	0.0%	< 0.00005	103%	80%	120%		80%	120%	89%	80%	120%	
Standard Water Analysis + FWAL Metals (Total), Hg																
Ammonia as N	1	1965026	<0.05	<0.05	0.0%	< 0.03	92%	80%	120%		80%	120%	102%	80%	120%	
Total Phosphorus (Low Level)																
Total Phosphorus	1	1970509	0.157	0.136	14.3%	< 0.006	93%	90%	110%	96%	90%	110%	87%	80%	120%	

Certified By:



Method Summary

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

AGAT WORK ORDER: 10X432414

PROJECT NO: GRQ

ATTENTION TO: CHYANN KIRBY

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
pH	INOR-121-6001	SM 4500 H+B	PC-TITRATE
Reactive Silica as SiO ₂	INORG-121-6028	SM 4110 B	COLORIMETER
Chloride	INORG-121-6005	SM 4110 B	IC
Fluoride	INORG-121-6005	SM 4110 B	IC
Sulphate	INORG-121-6005	SM 4110 B	IC
Alkalinity	INORG-121-6001	SM 2320 B	PC-TITRATE
True Color	INORG-121-6014	EPA 110.2	NEPHELOMETER
Turbidity	INORG-121-6022	SM 2130 B	NEPHELOMETER
Electrical Conductivity	INOR-121-6001	SM 2510 B	PC-TITRATE
Nitrate + Nitrite as N	INORG-121-6005	SM 4110 B	IC
Nitrate as N	INORG-121-6005	SM 4110 B	IC
Nitrite as N	INORG-121-6005	SM 4110 B	IC
Ammonia as N	INORG-121-6003	SM 4500-NH ₃ G	COLORIMETER
Total Organic Carbon	INORG-121-6026	SM 5310 B	TOC ANALYZER
Ortho-Phosphate as P	INORG-121-6005	SM 4110 B	COLORIMETER
Total Sodium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Potassium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Calcium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Magnesium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Bicarb. Alkalinity (as CaCO ₃)	INORG-121-6001	SM 2320 B	PC-TITRATE
Carb. Alkalinity (as CaCO ₃)	INORG-121-6001	SM 2320 B	PC-TITRATE
Hydroxide	INORG-121-6001	SM 2320 B	PC-TITRATE
Calculated TDS			
Hardness			
Langelier Index (@20C)			CALCULATION
Langelier Index (@ 4C)			CALCULATION
Saturation pH (@ 20C)			CALCULATION
Saturation pH (@ 4C)			CALCULATION
Anion Sum			
Cation sum			
% Difference/ Ion Balance (NS)			
Total Aluminum	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Antimony	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Arsenic	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Barium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Beryllium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Bismuth	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Boron	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Cadmium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS

Method Summary

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

AGAT WORK ORDER: 10X432414

PROJECT NO: GRQ

ATTENTION TO: CHYANN KIRBY

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total Chromium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Cobalt	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Copper	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Iron	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Lead	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Manganese	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Molybdenum	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Nickel	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Selenium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Silver	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Strontium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Thallium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Tin	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Titanium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Uranium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Vanadium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Zinc	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Mercury	INOR-121-6100 & INOR-121-6107	SM 3112 B	CVAAS
Total Phosphorus	INOR-93-1022	SM 4500-P B&E	SPECTROPHOTOMETER



Laboratories

Arrival Condition: **SCY** Good
Arrival Temperature: **15.0**
Notes:

Poor (complete notes)
AGAT Job Number: **10x132444**

Unit 122 - 11 Morris Dr.
Dartmouth, NS B3B 1M2
Phone: 902-468-8718 • Fax: 902-468-8924
www.agatlabs.com
http://webearth.agatlabs.com

CHAIN OF CUSTODY RECORD

Report To:
Company: **AMEC**
Contact: **Chyann Kirby**
Address: **Saint John's NB**
Phone: **(506) 652-9497** FAX:
PO#:
AGAT Quotation:
Client Project Name/ #: **GRA**

Report Information
1. Name: **Chyann Kirby**
Email: **chyann.kirby@amec.com**
2. Name: **Maureen Cameron-MacMillan**
Email: **maureen.cameron@amec.com**

Invoice To: Same (N) Circle
Company:
Contact:
Address:
Phone:
PO#/Credit Card #:

Regulatory Requirements (Check)
 List Guidelines on Report
 Do Not List Guidelines on Report
 PIRI Site Info (check all that apply):
 Tier 1 Res. Pot. Coarse
 Tier 2 Com N/Pot. Fine
 Gas Fuel Lube
 CCME CDWQ
 Ind NSDFOSP
 Com HRM 101
 Res/ip Storm Water
 Ag HRM 101
 FWAL Waste Water
 Sediment
 Other

Turnaround Time (TAT) Business Days
Regular TAT: 5 - 7 days
Rush TAT: 1 day 2 days 3 - 4 days
Date Required:
Time Required:

Report Format
 Single PDF sample per page
 Multiple PDF samples per page
 Excel format included

Sample Identification	Date/Time Sampled	Sample Matrix	# of Containers	Comments - Site/Sample Info/Containment	Lab Filtration Required	Standard Water Analysis + MS	Metals	(circle - Not/Not or Available)	Mercury	BOD	pH	TSS	TKN	Anions	Total Phosphorus	Phenols	TPH/BTEX (PRI) Tier 1	TPH/BTEX-Fractionation Tier 2	VOC	THM	PAH	PCB	Other:	Hazardous (Y/N)	Lab Sample #
GRA-1	24 Aug	SW	6		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>													
GRA-2	27 Aug	SW	6		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>													

Sample Relinquished by (print name)	Date/Time	Sample Relinquished by (sign)	Sample Received by (print name)	Date/Time	Sample Received by (sign)
Maureen Cameron-MacMillan	01 Sept	<i>[Signature]</i>	H. L. Dimichiel	Sept 3	<i>[Signature]</i>

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL
580 MAIN STREET, SUITE 105
SAINT JOHN, NB E2K1J5

ATTENTION TO: CHYANN KIRBY

PROJECT NO: GRQ

AGAT WORK ORDER: 10X438935

WATER ANALYSIS REVIEWED BY: Jason Coughtrey, Inorganic Supervisor

DATE REPORTED: Oct 06, 2010

PAGES (INCLUDING COVER): 9

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (902) 468-8718, or at 1-888-468-8718

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

Certificate of Analysis

AGAT WORK ORDER: 10X438935

PROJECT NO: GRQ

 11 Morris Drive, Unit 122
 Dartmouth, Nova Scotia
 CANADA B3B 1M2
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<http://www.agatlabs.com>

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO: CHYANN KIRBY

Standard Water Analysis + Metals (Total)

DATE SAMPLED: Sep 22, 2010

DATE RECEIVED: Sep 28, 2010

DATE REPORTED: Oct 06, 2010

SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	GRQ-3	GRQ-4
				2018956	2018959
pH		6.5-9		3.9	4.2
Reactive Silica as SiO ₂	mg/L		0.5	10.2	1.8
Chloride	mg/L		1	18	13
Fluoride	mg/L	0.12	0.1	0.4	<0.1
Sulphate	mg/L		2	<2	<2
Alkalinity	mg/L		5	<5	<5
True Color	TCU	Narrative	5	411	195
Turbidity	NTU	Narrative	0.1	2.8	0.7
Electrical Conductivity	umho/cm		1	102	61
Nitrate + Nitrite as N	mg/L		0.05	0.24	<0.05
Nitrate as N	mg/L	2.9	0.05	0.24	<0.05
Nitrite as N	mg/L	0.06	0.05	<0.05	<0.05
Ammonia as N	mg/L	Fact Sheet	0.03	0.06	0.11
Total Organic Carbon	mg/L		0.5	46.6	17.5
Ortho-Phosphate as P	mg/L		0.01	0.02	<0.01
Total Sodium	mg/L		0.1	10.0	6.8
Total Potassium	mg/L		0.1	0.4	0.5
Total Calcium	mg/L		0.1	0.5	0.4
Total Magnesium	mg/L		0.1	1.1	0.6
Bicarb. Alkalinity (as CaCO ₃)	mg/L		5	<5	<5
Carb. Alkalinity (as CaCO ₃)	mg/L		10	<10	<10
Hydroxide	mg/L		5	<5	<5
Calculated TDS	mg/L		1	33	22
Hardness	mg/L			5.8	3.5
Langelier Index (@20C)	NA			-7.25	-7.03
Langelier Index (@ 4C)	NA			-7.57	-7.35
Saturation pH (@ 20C)	NA			11.1	11.2
Saturation pH (@ 4C)	NA			11.5	11.5
Anion Sum	me/L			0.52	0.37
Cation sum	me/L			0.84	0.49
% Difference/ Ion Balance (NS)	%			23.3	14.8
Total Aluminum	ug/L	5.0	5	1050	272
Total Antimony	ug/L		2	<2	<2

Certified By:





Certificate of Analysis

AGAT WORK ORDER: 10X438935

PROJECT NO: GRQ

11 Morris Drive, Unit 122
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 CANADA B3B 1M2
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<http://www.agatlabs.com>

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO: CHYANN KIRBY

Standard Water Analysis + Metals (Total)

DATE SAMPLED: Sep 22, 2010

DATE RECEIVED: Sep 28, 2010

DATE REPORTED: Oct 06, 2010

SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	GRQ-3	GRQ-4
				2018956	2018959
Total Arsenic	ug/L	5.0	2	5	<2
Total Barium	ug/L		5	16	<5
Total Beryllium	ug/L		2	<2	<2
Total Bismuth	ug/L		2	<2	<2
Total Boron	ug/L		5	20	14
Total Cadmium	ug/L	0.017	0.017	0.102	<0.017
Total Chromium	ug/L		1	<1	<1
Total Cobalt	ug/L		1	<1	<1
Total Copper	ug/L	2	2	<2	<2
Total Iron	ug/L	300	50	936	415
Total Lead	ug/L	1	0.5	2.2	0.7
Total Manganese	ug/L		2	87	15
Total Molybdenum	ug/L	73	2	<2	<2
Total Nickel	ug/L	25	2	<2	<2
Total Selenium	ug/L	1.0	1	<1	<1
Total Silver	ug/L	0.1	0.1	<0.1	<0.1
Total Strontium	ug/L		5	9	<5
Total Thallium	ug/L	0.8	0.1	<0.1	<0.1
Total Tin	ug/L		2	<2	<2
Total Titanium	ug/L		2	5	<2
Total Uranium	ug/L		0.1	0.3	<0.1
Total Vanadium	ug/L		2	<2	<2
Total Zinc	ug/L	30	5	20	10
Mercury	mg/L	0.026	0.00005	<0.00005	<0.00005

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to NS - FWAL(ug/L)

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 10X438935

PROJECT NO: GRQ

11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
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<http://www.agatlabs.com>

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO: CHYANN KIRBY

Water Analysis - Various Inorganics

DATE SAMPLED: Sep 22, 2010

DATE RECEIVED: Sep 28, 2010

DATE REPORTED: Oct 06, 2010

SAMPLE TYPE: Water

Parameter	Unit	G / S	RDL	GRQ-3	GRQ-4
				2018956	2018959
Total Suspended Solids	mg/L	Narrative	5	<5	<5
Total Phosphorous as P	mg/L	Fact Sheet	0.002	0.030	0.012

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to NS-FWAL(mg/L)

Certified By:



Guideline Violation

AGAT WORK ORDER: 10X438935

PROJECT NO: GRQ

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SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2018956	GRQ-3	NS - FWAL(ug/L)	Standard Water Analysis + Metals (Total)	Fluoride	0.12	0.4
2018956	GRQ-3	NS - FWAL(ug/L)	Standard Water Analysis + Metals (Total)	Total Aluminum	5.0	1050
2018956	GRQ-3	NS - FWAL(ug/L)	Standard Water Analysis + Metals (Total)	Total Cadmium	0.017	0.102
2018956	GRQ-3	NS - FWAL(ug/L)	Standard Water Analysis + Metals (Total)	Total Iron	300	936
2018956	GRQ-3	NS - FWAL(ug/L)	Standard Water Analysis + Metals (Total)	Total Lead	1	2.2
2018956	GRQ-3	NS - FWAL(ug/L)	Standard Water Analysis + Metals (Total)	pH	6.5-9	3.9
2018959	GRQ-4	NS - FWAL(ug/L)	Standard Water Analysis + Metals (Total)	Total Aluminum	5.0	272
2018959	GRQ-4	NS - FWAL(ug/L)	Standard Water Analysis + Metals (Total)	Total Iron	300	415
2018959	GRQ-4	NS - FWAL(ug/L)	Standard Water Analysis + Metals (Total)	pH	6.5-9	4.2

Quality Assurance

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

AGAT WORK ORDER: 10X438935

PROJECT NO: GRQ

ATTENTION TO: CHYANN KIRBY

Water Analysis															
RPT Date: Oct 06, 2010			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Standard Water Analysis + Metals (Total)

pH	1	2017954	7.4	7.4	0.0%	< 0.5	100%	80%	120%		80%	120%		80%	120%
Reactive Silica as SiO2	1	2014611	13.4	13.3	0.7%	< 1	99%	80%	120%		80%	120%	102%	80%	120%
Chloride	1	2021445	8	7	13.3%	< 0.1	102%	80%	120%		80%	120%	106%	80%	120%
Fluoride	1	2021445	< 0.1	< 0.1	0.0%	< 0.1	94%	80%	120%		80%	120%	94%	80%	120%
Sulphate	1	2021445	14	15	6.9%	< 2	108%	80%	120%		80%	120%	105%	80%	120%
Alkalinity	1	2017954	18	17	5.7%	< 5	101%	80%	120%		80%	120%	95%	80%	120%
True Color	1	2016154	30	28	6.9%	< 5	90%	80%	120%		80%	120%		80%	120%
Turbidity	1	2016154	7.6	7.5	1.3%	< 0.1	87%	80%	120%		80%	120%		80%	120%
Electrical Conductivity	1	2017954	93	93	0.0%	< 1	98%	80%	120%		80%	120%		80%	120%
Nitrate as N	1	2021445	2.63	2.67	1.5%	< 0.05	110%	80%	120%		80%	120%	102%	80%	120%
Nitrite as N	1	2021445	< 0.05	< 0.05	0.0%	< 0.05	118%	80%	120%		80%	120%	105%	80%	120%
Ammonia as N	1	2023292	<0.05	<0.05	0.0%	< 0.05	98%	80%	120%		80%	120%	97%	80%	120%
Ortho-Phosphate as P	1	2016250	<0.01	<0.01	0.0%	< 0.01	97%	80%	120%		80%	120%	104%	80%	120%
Total Sodium	92920	2018917	6.0	6.3	4.9%	< 0.1	102%	90%	110%	92%	90%	110%	113%	80%	120%
Total Potassium	92920	2018917	1.4	1.3	7.4%	< 0.1	105%	90%	110%	103%	90%	110%	89%	80%	1020
Total Calcium	92920	2018917	481	427	11.9%	< 0.1	104%	90%	110%	103%	90%	110%	90%	80%	120%
Total Magnesium	92920	2018917	15.7	16.6	5.6%	< 0.1	100%	90%	110%	99%	90%	110%	117%	80%	120%
Total Aluminum	92920	2018917	206	212	2.9%	< 10	100%	90%	110%	100%	90%	110%	106%	80%	120%
Total Antimony	92920	2018917	< 2	< 2	0.0%	< 2	97%	90%	110%	104%	90%	110%	109%	80%	120%
Total Arsenic	92920	2018917	14	14	0.0%	< 2	97%	90%	110%	97%	90%	110%	113%	80%	120%
Total Barium	92920	2018917	13	11	16.7%	< 5	97%	90%	110%	100%	90%	110%	106%	80%	120%
Total Beryllium	92920	2018917	< 2	< 2	0.0%	< 2	103%	90%	110%	102%	90%	110%	110%	80%	120%
Total Bismuth	92920	2018917	< 2	< 2	0.0%	< 2	102%	90%	110%	87%	80%	120%	84%	80%	120%
Total Boron	92920	2018917	79	77	2.6%	< 5	102%	90%	110%	94%	90%	110%	120%	80%	120%
Total Cadmium	92920	2018917	< 0.3	< 0.3	0.0%	< 0.3	98%	90%	110%	100%	90%	110%	101%	80%	120%
Total Chromium	92920	2018917	< 2	< 2	0.0%	< 2	105%	90%	110%	104%	90%	110%	80%	80%	120%
Total Cobalt	92920	2018917	< 1	< 1	0.0%	< 1	105%	90%	110%	103%	90%	110%	91%	80%	120%
Total Copper	92920	2018917	3	3	0.0%	< 2	108%	90%	110%	106%	90%	110%	107%	80%	120%
Total Iron	92920	2018917	2270	2000	12.6%	< 50	106%	90%	110%	105%	90%	110%	89%	80%	120%
Total Lead	92920	2018917	< 0.5	< 0.5	0.0%	< 0.5	102%	90%	110%	100%	90%	110%	86%	80%	120%
Total Manganese	92920	2018917	105	91	14.3%	< 2	105%	90%	110%	104%	90%	110%	80%	80%	120%
Total Molybdenum	92920	2018917	5	5	0.0%	< 2	99%	90%	110%	92%	90%	110%	86%	80%	120%
Total Nickel	92920	2018917	< 2	< 2	0.0%	< 2	107%	90%	110%	106%	90%	110%	90%	80%	120%
Total Selenium	92920	2018917	< 2	< 2	0.0%	< 2	99%	90%	110%	99%	90%	110%	111%	80%	120%
Total Silver	92920	2018917	< 0.5	< 0.5	0.0%	< 0.5	98%	90%	110%	105%	90%	110%	98%	80%	120%
Total Strontium	92920	2018917	7750	7650	1.3%	< 5	98%	90%	110%	98%	90%	110%	96%	80%	120%
Total Thallium	92920	2018917	< 0.1	< 0.1	0.0%	< 0.1	101%	90%	110%	100%	90%	110%	90%	80%	120%
Total Tin	92920	2018917	< 2	< 2	0.0%	< 2	96%	90%	110%	100%	90%	110%	115%	80%	120%
Total Titanium	92920	2018917	20	21	4.9%	< 2	103%	90%	110%	100%	90%	110%	106%	80%	120%

Quality Assurance

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

AGAT WORK ORDER: 10X438935

PROJECT NO: GRQ

ATTENTION TO: CHYANN KIRBY

Water Analysis (Continued)

RPT Date: Oct 06, 2010			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits		
								Lower	Upper		Lower	Upper		Lower	Upper	
Total Uranium	92920	2018917	0.5	0.5	0.0%	< 0.1	102%	90%	110%	98%	90%	110%	84%	80%	120%	
Total Vanadium	92920	2018917	< 2	< 2	0.0%	< 2	105%	90%	110%	98%	90%	110%	91%	80%	120%	
Total Zinc	92920	2018917	< 5	< 5	0.0%	< 5	103%	90%	110%	103%	90%	110%	104%	80%	120%	
Mercury	1	2016154	< 0.00005	< 0.00005	0.0%	< 0.00005	103%	80%	120%		80%	120%	96%	80%	120%	
Water Analysis - Various Inorganics																
Total Suspended Solids	1	2020180	<5	<5	0.0%	< 5	100%	80%	120%		80%	120%	102%	80%	120%	
Total Phosphorous as P	1		0.055	0.051	7.5%	< 0.002	90%	80%	120%	95%	80%	120%	94%	80%	120%	

Certified By:



Method Summary

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

AGAT WORK ORDER: 10X438935

PROJECT NO: GRQ

ATTENTION TO: CHYANN KIRBY

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
pH	INOR-121-6001	SM 4500 H+B	PC-TITRATE
Reactive Silica as SiO ₂	INORG-121-6028	SM 4110 B	COLORIMETER
Chloride	INORG-121-6005	SM 4110 B	IC
Fluoride	INORG-121-6005	SM 4110 B	IC
Sulphate	INORG-121-6005	SM 4110 B	IC
Alkalinity	INORG-121-6001	SM 2320 B	PC-TITRATE
True Color	INORG-121-6014	EPA 110.2	NEPHELOMETER
Turbidity	INORG-121-6022	SM 2130 B	NEPHELOMETER
Electrical Conductivity	INOR-121-6001	SM 2510 B	PC-TITRATE
Nitrate + Nitrite as N	INORG-121-6005	SM 4110 B	IC
Nitrate as N	INORG-121-6005	SM 4110 B	IC
Nitrite as N	INORG-121-6005	SM 4110 B	IC
Ammonia as N	INORG-121-6003	SM 4500-NH ₃ G	COLORIMETER
Total Organic Carbon	INORG-121-6026	SM 5310 B	TOC ANALYZER
Ortho-Phosphate as P	INORG-121-6005	SM 4110 B	COLORIMETER
Total Sodium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Potassium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Calcium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Magnesium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Bicarb. Alkalinity (as CaCO ₃)	INORG-121-6001	SM 2320 B	PC-TITRATE
Carb. Alkalinity (as CaCO ₃)	INORG-121-6001	SM 2320 B	PC-TITRATE
Hydroxide	INORG-121-6001	SM 2320 B	PC-TITRATE
Calculated TDS			
Hardness			
Langelier Index (@20C)			CALCULATION
Langelier Index (@ 4C)			CALCULATION
Saturation pH (@ 20C)			CALCULATION
Saturation pH (@ 4C)			CALCULATION
Anion Sum			
Cation sum			
% Difference/ Ion Balance (NS)			
Total Aluminum	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Antimony	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Arsenic	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Barium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Beryllium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Bismuth	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Boron	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Cadmium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS

Method Summary

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

AGAT WORK ORDER: 10X438935

PROJECT NO: GRQ

ATTENTION TO: CHYANN KIRBY

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total Chromium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Cobalt	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Copper	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Iron	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Lead	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Manganese	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Molybdenum	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Nickel	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Selenium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Silver	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Strontium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Thallium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Tin	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Titanium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Uranium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Vanadium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Zinc	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Mercury	INOR-121-6100 & INOR-121-6107	SM 3112 B	CVAAS
Total Suspended Solids	INOR-121-6024, 6025	SM 2540C, D	GRAVIMETRIC
Total Phosphorous as P	INORG-121-6009	SM 365.2	COLORIMETER

