

Memo

To: Mike Cormier, P.Eng. – Director, Authorizations Branch, New Brunswick Department of Environment and Local Government

From: Dan Guest, Hammond River Holdings Ltd.

Cc: Paul Vanderlaan, P.Eng. – Director, Environmental Impact Assessment Branch, New Brunswick Department of Environment and Local Government

Date: September 25, 2020

Subject: Monthly Report – Upham East Gypsum Quarry, Surface Water Sampling – August 2020

Our File: File # 18-8346

This monthly report details activities associated with the operation of the Upham East Gypsum Quarry for the month of **August 2020**, in accordance with conditions of the Approval to Operate I-10936.

Introduction

Site preparation activities for the Upham gypsum quarry began with vegetation clearing starting on December 4, 2019. First ground disturbance commenced on December 11, 2019 and hauling of material beginning on December 12, 2019. Developing the storage pads continued for the month of February. Site development activities were paused on March 2, 2020. Maintenance activities on the ponds and ditches as well as the erosion and sediment control structures continued for the months of March and April. Site preparation resumed on May 13, 2020 and continued until the mining lease was obtained. The mining lease was obtained on July 16, 2020; the quarry then moved into the operational stage and gypsum extraction activities began. These activities include drilling, blasting, crushing, and stockpiling of gypsum. Gypsum extraction as well as overburden stripping is ongoing.

As required by the Approval to Operate, surface water sampling of the watercourse that crosses the site and in the Hammond River began immediately. Refer to the December 2019, and January through July 2020 reports for previous water quality results.

Weekly compliance monitoring in August was conducted as per the following:

- Week 1: August 5, 2020;
- Week 2: August 14, 2020;
- Week 3: August 17, 2020;
- Week 4: August 26, 2020; and
- Week 5: August 31, 2020;

The weekly samples on August 26 were collected following a heavy rain event.

Surface Water Sampling - Field Methods

Field parameters were measured using a calibrated multimeter. Field parameters included pH, temperature, specific conductivity, dissolved oxygen, and turbidity. Upon receiving approval of the Environmental Management Plan (EMP) for Operation (Dillon 2020) on June 17, 2020, sampling sites H1 and H2 were removed from the weekly sampling. H1 and H2 are now sampled quarterly rather than

weekly. The approved EMP also removes pH and dissolved oxygen from the weekly monitoring parameters.

Surface water samples were collected from three locations (**Figure 1**). They are as follows:

- PDP-1 was collected at the discharge point from the site, which is located before the confluence with the unnamed tributary to the Hammond River. This is the point of compliance;
- SW3 was the background sample. It was collected within the unnamed tributary approximately 100 m upstream from the PDP-1; and
- SW5 was collected within the unnamed tributary approximately 100m downstream from PDP-1

In addition, surface water samples were collected using laboratory supplied bottles. The bottles were rinsed three times in the watercourse and then submerged below the water surface. The samples were submitted to the Research Productivity Council (RPC) in Fredericton, NB. RPC is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for each of the laboratory analytical methods utilized and have in-house QA/QC programs to govern sample analysis and analytical data quality assurance.

Surface Water Sampling - Compliance Monitoring Results

Results of the surface water compliance monitoring are provided in **Table 1**. Analytical certificates are attached. All results for chloride were below the CCME guideline. The monthly average of grab samples for total suspended solids (TSS) was calculated for each site, presented in **Table 2**. The monthly averages for TSS were all below the site-specific guideline for each site laid out in the Approval to Operate, displayed in **Figure 2**.

A QA/QC program was implemented to evaluate whether the data collected was of suitable quality to characterize the surface water conditions observed. This program required the collection of field duplicates and the calculation of the relative percent difference (RPD). The calculation method and acceptance level of 40% are discussed in CCME (2016). Two duplicate samples were collected during the August water sampling program on August 5 and 17, 2020. The RPD results ranged from 0% to 33% (**Table 3**). Therefore, the data satisfies the quality objectives for the monitoring program.

Environmental Accidents and Malfunctions

During the August 2020 monitoring period there were 5 spills on-site. They occurred on August 5, 12, 24, 25 and 28. The spills were cleaned up and spill reports for all spills were submitted to the NBDELG. For the spills occurring on August 5 and 28, additional information was requested by the NBDELG. The spill on August 5, soil samples were collected and sent to RPC for analysis. Coordinates of the spill, photos of before and after the clean up and disposal forms for the soil all were provided to the NBDELG. The spill on August 28, coordinates of the spill, photos and disposal forms were provided. No further follow up action was requested by NBDELG. All spill reports are attached.

Ambient Air Quality Monitoring – Total Suspended Particulate

A 24-hour air sample is collected every 6 days in accordance with the National Air Pollution Surveillance (NAPS) schedule. The air quality monitor used to conduct the monitoring is a BGI PQ100 air sampler, a high-volume sampler for total suspended particulate matter. In August there were 5 air quality monitoring events, August 4, 9, 15, 21 and 27; the results are provided in **Table 4**. None of the air samples collected in August exceed the 120 µg/m³ maximum permissible ground level concentration of total suspended particulate that is specified in Schedule B of the *New Brunswick Air Quality Regulation – Clean Air Act*.

Blasting

In August there were two blasts, the first occurred on August 17, 2020 and the second on August 28, 2020. There were no exceedances of the Approval to Operate limits for maximum velocity and sound pressure. Blast reports are attached.

Public Complaints

Hammond River Holdings did not receive any public complaints during the August 2020 monitoring period.

Summary

The water chemistry at the discharge point into WC3 is comparable to background. Based on the results provided in **Table 1**, the earthworks activities being conducted on site have not had a negative impact on WC3 and subsequently the Hammond River. All air quality monitoring and blast monitoring returned results below the guidelines for each.

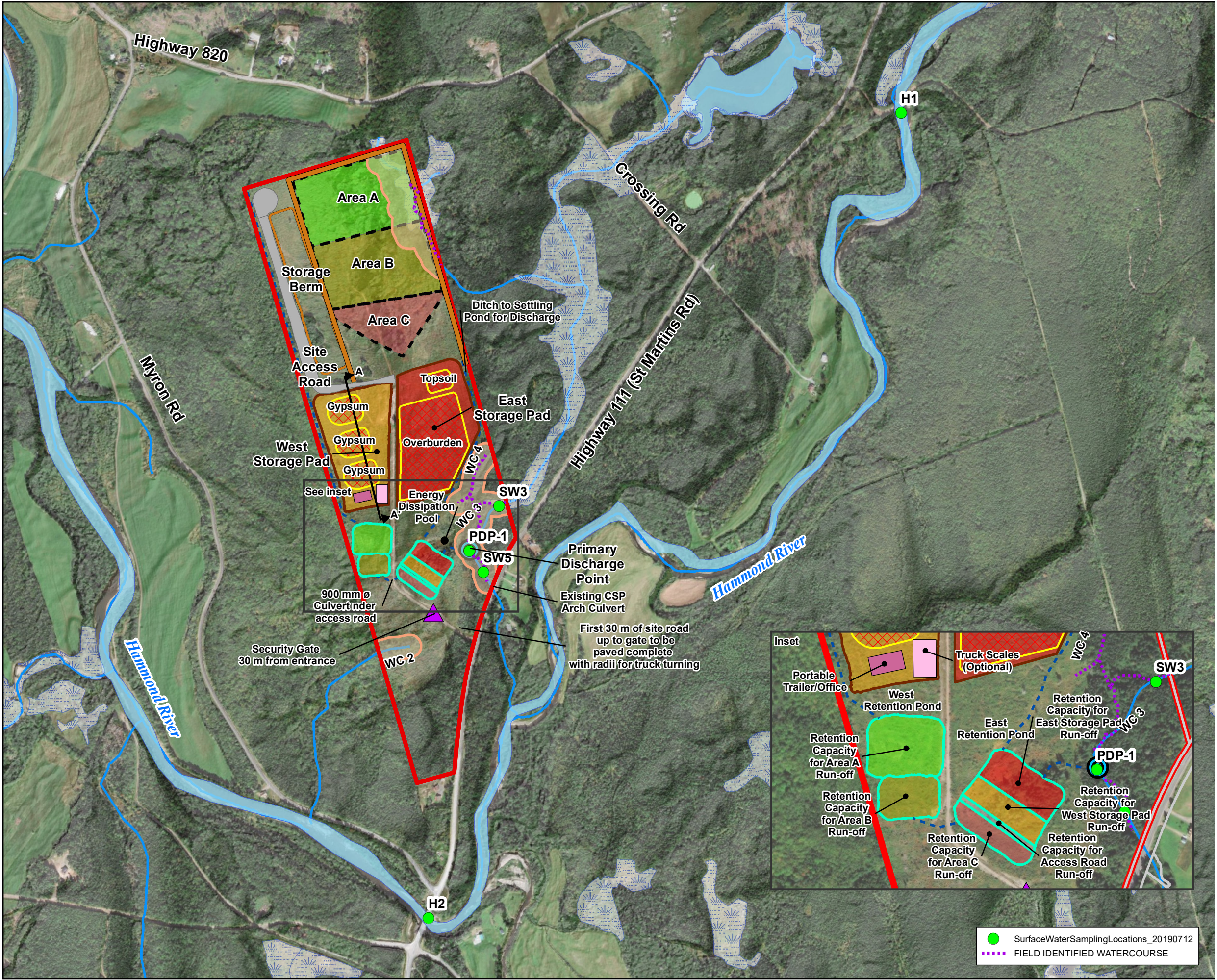
References

Canadian Council of Ministers of the Environment (CCME). 2015. Canadian environmental quality guidelines. Available online at: <http://cegg-rcqe.ccme.ca/en/index.html#void>

Canadian Council of Ministers of the Environment (CCME). 2016. Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment: Volume 1 Guidance Manual. Canadian environmental quality guidelines. ISBN 978-1-77202-026-7.

Dillon (Dillon Consulting Limited). 2020 Environmental Management Plan (EMP) for Operation. Upham East Gypsum Quarry Project, Upham New Brunswick. Prepared for Hammond River Holdings Limited by Dillon Consulting Limited, Fredericton, New Brunswick. Project 18-8346. June 2020.

New Brunswick Regulation 97-133, (1997). Clean Air Act, O.C 97-923.



HAMMOND RIVER HOLDINGS LIMITED
PROPOSED UPHAM EAST GYPSUM QUARRY

SURFACE WATER SAMPLING LOCATIONS
FIGURE 1

- PROPERTY BOUNDARY
 - PROJECT DEVELOPMENT AREA
 - WATERBODY
 - WATERCOURSE
 - REGULATED WETLAND
 - 30 METRE WETLAND/WATERCOURSE BUFFER
- PROPOSED SITE FEATURES**
- DITCH
 - TRUCK SCALE (OPTIONAL)
 - SITE AREAS
 - DISCHARGE POINT
 - SECURITY GATE
 - PORTABLE TRAILER/OFFICE
 - ACCESS ROAD
 - STOCKPILE
 - CROSS SECTION
 - QUARRY BERM CONSTRUCTED FROM TOPSOIL AND OVERBURDEN (OFFSET MINIMUM 7m FROM PROPERTY BOUNDARY)
 - HATCHING INDICATES MATERIAL STOCKPILE AREA ON TOP OF STORAGE PAD

0 50 100 200 m
SCALE 1:8,500

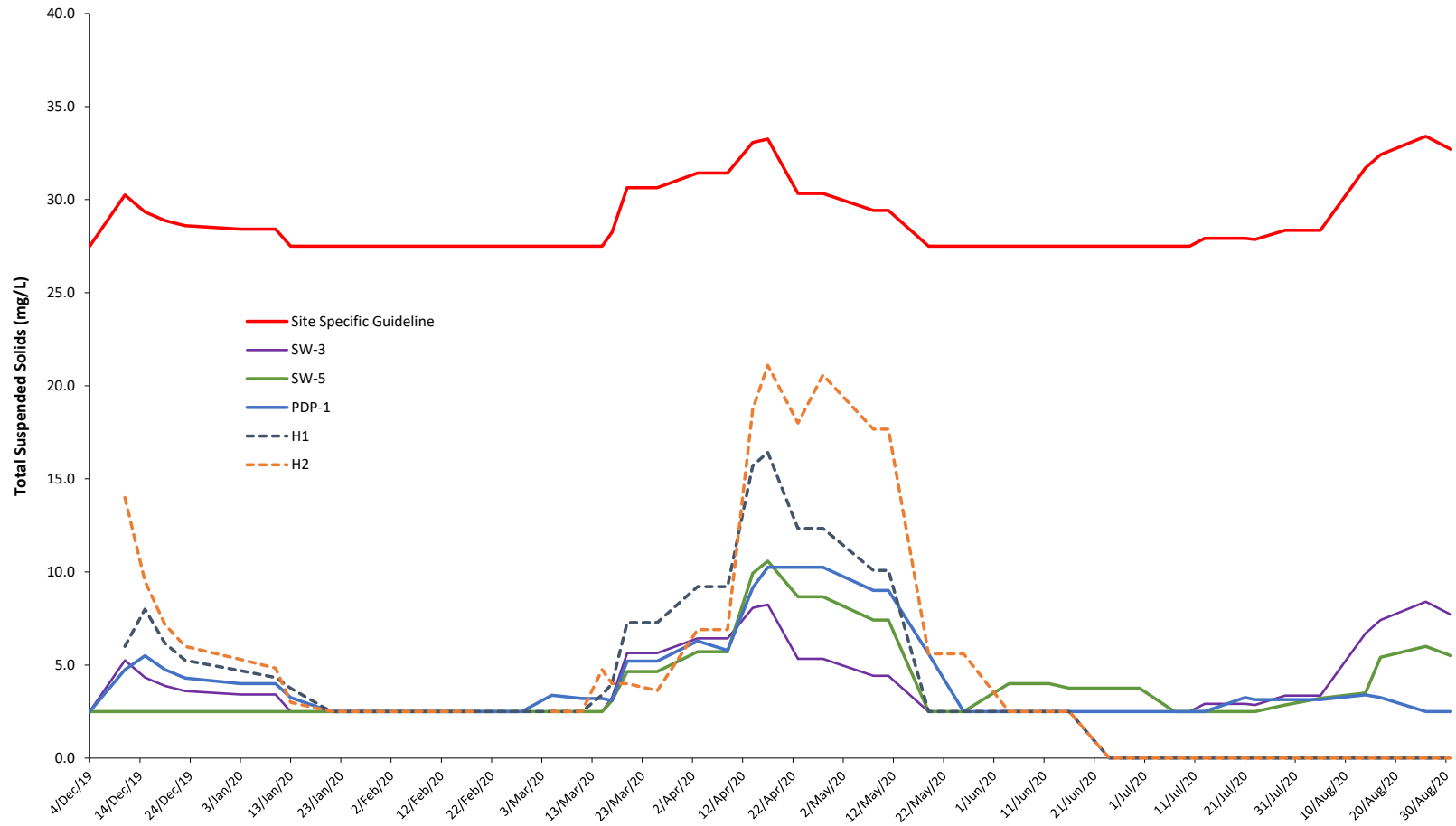
MAP DRAWING INFORMATION:
DATA PROVIDED BY DILLON CONSULTING LIMITED, CANVEC
SERVICE LAYER CREDITS: ESRI, HERE, GARMIN, INTERMAP, INCREMENT
P CORP, GEBCO, USGS, FAO, NPS, NRCAN, GEBCO, IGN, KADASTER NL,
ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISS
TOPO, OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
MAP CREATED BY: JH
MAP REVISED BY: JO
MAP CHECKED BY: GA
MAP PROJECTION: NAD_1983_CSRS_NEW_BRUNSWICK_STEREOGRAPHIC

FILE LOCATION: \\DILLON.CA\\DILLON_DFS\\FREDERICTON\\
FREDERICTON CAD\\CAD\\GIS\\188346 UPHAM GYPSUM QUARRY\\MXD



PROJECT: 18-8346
STATUS: DRAFT
DATE: 2020/01/06

Figure 2: TSS Monthly Average



Notes:

The detection limit for TSS is 5 mg/L; for results <5 mg/L, half the detection limit was used.

Monthly average is calculated based on results from the previous 30 days.

Site specific guideline is 25 mg/L above the monthly average.

Table 1
Surface Water Monitoring
Upham East Gypsum Project
Upham, New Brunswick
Project No. 18-8346

Parameter	Ambient Air Temperature ^a	Precipitation on 48 hours prior to sample collection ^b	Field Parameters					General Chemistry												
			pH	Water Temperature	Specific Conductivity	Dissolved Oxygen	Turbidity	Alkalinity (as CaCO ₃)	Calcium	Chloride	Hardness	Magnesium	Potassium	Sodium	Sulphate	Total Dissolved Solids	Total Suspended Solids ^c			
Units	°C	mm	-	°C	mS/cm	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L				
CCME PAL ^d			6.5 - 9.0	-	-	-	-	-	-	640 (short term) 120 (long term)	-	-	-	-	-	-				
Sample ID	Date																			
SW3	5-Aug-20	21.00	8.60		22.32	0.841		0.90	59	261	7.7	663	2.77	1.06	7.16	550	878	<5		
SW5	5-Aug-20				21.52	0.860		0.50	7	264	3.9	696	8.96	1.64	5.05	650	969	5		
PDP-1	5-Aug-20			No Discharge					No Discharge											
SW15 (FD)	5-Aug-20				21.52	0.860		0.50	7	267	3.9	696	8.87	1.57	5.03	660	966	7		
SW3	14-Aug-20	28.40	1.10		22.58	0.788		1.80	60	247	8.1	629	2.70	1.24	7.08	520	861	20		
SW5	14-Aug-20				22.06	0.868		1.10	6	260	3.9	690	9.86	1.69	5.09	660	992	<5		
PDP-1	14-Aug-20			No Discharge					No Discharge											
SW3	17-Aug-20				18.30	0.330		2.9	50	223	8.0	567	2.60	1.55	6.99	490	810	11		
SW13 (FD)	17-Aug-20	20.00	4.40		18.30	0.330		2.4	50	238	8.1	606	2.56	1.40	6.80	490	814	8		
SW5	17-Aug-20				18.30	0.960		0.5	6	241	4.0	643	9.98	1.72	5.14	630	952	15		
PDP-1	17-Aug-20			No Discharge					No Discharge											
SW3	26-Aug-20			No Sample, Water too Low					No Sample, Water too Low											
SW5	26-Aug-20	17.20	40.40		17.37	0.63		0.50	6	171	3.8	462	8.43	1.21	5.22	400	664	<5		
PDP-1	26-Aug-20			No Discharge					No Discharge											
SW3	31-Aug-20			16.00	27.20		14.85	0.698		1.5	60	217	7.5	552	2.56	17-Aug-20	6.25	460	758	<5
SW5	31-Aug-20						15.73	0.524		1.0	20	146	5.0	387	5.42	1.19	5.56	320	548	<5
PDP-1	31-Aug-20	No Discharge					No Discharge													

a) Temperature based on data from the climate station at the Saint John airport. Temperature is the value recorded at 12:00pm on the day of sampling. Data available at: https://climate.weather.gc.ca/historical_data/search_historic_data_e.html

b) Precipitation based on data from the climate station at the Saint John airport. Data available at: https://climate.weather.gc.ca/historical_data/search_historic_data_e.html

c) Site specific guideline, TSS cannot exceed 25 mg/L above the background monthly average.

d) Canadian Council of Ministers of Environment (CCME) for the Protection of Aquatic Life.

SW3 is the background sample for Watercourse 3.

"-" denotes no guideline, not analyzed, or not applicable; FD = field duplicate.

75 bold/shaded value denotes concentration exceeds CCME criteria or TSS background.

Table 2
Total Suspended Solids - Monthly Average
Upham East Gypsum Project
Upham, New Brunswick
Project No. 18-8346

Date	Site Specific Guideline	Monthly Average				
		H1	H2	SW3	SW5	PDP-1
4-Dec-19	27.5	-	-	2.5	2.5	2.5
11/Dec/19	30.3	6.0	14.0	5.3	2.5	4.8
15/Dec/19	29.3	8.0	9.5	4.3	2.5	5.5
19/Dec/19	28.9	6.2	7.2	3.9	2.5	4.8
23/Dec/20	28.6	5.3	6.0	3.6	2.5	4.3
3/Jan/20	28.4	4.7	5.3	3.4	2.5	4.0
10/Jan/20	28.4	4.3	4.8	3.4	2.5	4.0
13/Jan/20	27.5	3.8	3.0	2.5	2.5	3.3
21/Jan/20	27.5	2.5	2.5	2.5	2.5	2.5
27/Jan/20	27.5	2.5	2.5	2.5	2.5	2.5
3/Feb/20	27.5	2.5	2.5	2.5	2.5	2.5
11/Feb/20	27.5	2.5	2.5	2.5	2.5	2.5
19/Feb/20	27.5	2.5	2.5	2.5	2.5	2.5
28/Feb/20	27.5	2.5	0.0	2.5	2.5	2.5
5/Mar/20	27.5	2.5	2.5	2.5	2.5	3.4
11/Mar/20	27.5	2.5	2.5	2.5	2.5	3.2
15/Mar/20	27.5	3.4	4.8	2.5	2.5	3.2
17/Mar/20	28.3	4.0	4.0	3.3	3.1	3.1
20/Mar/20	30.6	7.3	4.0	5.6	4.6	5.2
26/Mar/20	30.6	7.3	3.6	5.6	4.6	5.2
3/Apr/20	31.4	9.2	6.9	6.4	5.7	6.3
9/Apr/20	31.4	9.2	6.9	6.4	5.7	5.8
14/Apr/20	33.1	15.7	18.8	8.1	9.9	9.1
17/Apr/20	33.3	16.4	21.1	8.3	10.6	10.3
23/Apr/20	30.3	12.3	18.0	5.3	8.7	10.3
28/Apr/20	30.3	12.3	20.6	5.3	8.7	10.3
8/May/20	29.1	9.0	15.5	4.1	6.7	8.1
11/May/20	29.1	9.0	15.5	4.1	6.7	8.1
19/May/20	27.5	2.5	5.1	2.5	2.5	5.1
26/May/20	27.5	2.5	5.1	2.5	2.5	2.5
4/Jun/20	27.5	2.5	2.5	2.5	10.0	2.5
8/Jun/20	27.5	2.5	2.5	2.5	2.5	2.5
12/Jun/20	27.5	2.5	2.5	2.5	2.5	2.5
16/Jun/20	27.5	2.5	2.5	2.5	2.5	2.5
24/Jun/20	27.5			2.5	2.5	2.5
30/Jun/20	27.5			2.5	2.5	2.5
7/Jul/20	27.5			2.5	2.5	2.5
10/Jul/20	27.5			2.5	2.5	2.5
13/Jul/20	27.9			5.0	2.5	2.5
21/Jul/20	27.9			2.5	2.5	7.0
23/Jul/20	27.8			2.5	2.5	2.5
29/Jul/20	28.25			6	5	2.5
5/Aug/20	28.4			2.5	5	2.5
14/Aug/20	31.7			20	2.5	2.5
17/Aug/20	32.4			11	15	2.5
26/Aug/20	33.4			2.5	2.5	2.5
31/Aug/20	32.7			2.5	2.5	2.5

Notes:

Dashed line indicates monthly average could not be calculated.

Site specific guideline is 25 mg/L above the monthly average.

Monthly average is calculated based on results from the previous 30 days.

The background sample is SW3.

Samples above the site specific guideline are **bolded in red**.

<p align="center"> Table 3 Surface Water Monitoring - QA/QC Results Upham East Gypsum Project Upham, New Brunswick Project No. 18-8346 </p>

Parameter		General Chemistry									
		Alkalinity (as CaCO ₃)	Calcium	Chloride	Hardness	Magnesium	Potassium	Sodium	Sulphate	Total Dissolved Solids	Total Suspended Solids
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample ID	Date										
SW5	5-Aug-20	7	264	3.9	696	8.96	1.64	5.05	650	969	5
SW15	5-Aug-20	7	267	3.9	696	8.87	1.57	5.03	660	966	7
RPD value		0%	1%	0%	0%	1%	4%	0%	2%	0%	33%
SW5	17-Aug-20	50	223	8.0	567	2.60	1.55	6.99	490	810	11
SW15	17-Aug-20	50	238	8.1	606	2.56	1.40	6.80	490	814	8
RPD value		0%	7%	1%	7%	2%	10%	3%	0%	0%	32%
RPD calculations and acceptance criteria based on CCME (2016).											
' - ' denotes RPD could not be calculated because one or more parameters was below detection limit. 75 bold/shaded value denotes RPD above criteria of 40%.											

Table 4 Air Quality Reporting Upham East Gypsum Quarry											
Test Start	Time	Duration	Flow Rate (L/min)	Air Volume (m ³)	Pressure (mm Hg)	Temperature (°C)	Initial Filter Weight (g)	Final Filter Weight (g)	TSP Mass (µg)	TSP (µg/m ³)	Site Guideline (µg/m3)
8/4/2020	13:55	24 hours	16.66	23.99	753	22.8	14.8264	14.8295	3100	5.3842	120
8/9/2020	23:59	24 hours	16.74	24.1	752	21.2	14.8422	14.8444	2200	3.8036	120
8/15/2020	23:59	24 hours	16.88	24.3	754	19.8	14.8243	14.8359	11600	19.8903	120
8/21/2020	23:59	24 hours	16.87	24.3	749	17.9	14.8394	14.8415	2100	3.6008	120
8/27/2020	23:59	24 hours	17.06	24.57	743	12.4	14.8233	14.845	21700	36.7996	120

Report ID: 363118-IAS
Report Date: 21-Aug-20
Date Received: 10-Aug-20

CERTIFICATE OF ANALYSIS

for
Dillon Consulting Ltd
274 Sydney Street, Suite 200
Saint John, NB E2L 0A8



921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Jonathan Oliver

Project #: 17-5121

Location: Upham

Analysis of Water

RPC Sample ID:			363118-1	363118-2	363118-3	363118-4
Client Sample ID:			SW-3	SW-5	SW-15	PDP-1
Date Sampled:			5-Aug-20	5-Aug-20	5-Aug-20	5-Aug-20
Analytes	Units	RL				
Alkalinity (as CaCO ₃)	mg/L	2	59	7	7	8
Chloride	mg/L	0.5	7.7	3.9	3.9	4.1
Sulfate	mg/L	1	550	650	660	650
Solids - Total Dissolved	mg/L	5	878	969	966	960
Solids - Total Suspended	mg/L	5	< 5	5	7	< 5
Hardness (as CaCO ₃)	mg/L	0.2	663.	696.	703.	696.

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit

Peter Crowhurst, B.Sc., C.Chem.
Director
Inorganic Analytical Chemistry

Brannen Burhoe
Supervisor
Inorganic Analytical Services

WATER CHEMISTRY

Report ID: 363118-IAS
Report Date: 21-Aug-20
Date Received: 10-Aug-20

CERTIFICATE OF ANALYSIS

for
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Attention: Jonathan Oliver

Project #: 17-5121

Location: Upham

Analysis of Metals in Water

RPC Sample ID:			363118-1	363118-2	363118-3	363118-4
Client Sample ID:			SW-3	SW-5	SW-15	PDP-1
Date Sampled:			5-Aug-20	5-Aug-20	5-Aug-20	5-Aug-20
Analytes	Units	RL				
Calcium	mg/L	0.05	261.	264.	267.	264.
Magnesium	mg/L	0.01	2.77	8.96	8.87	8.91
Potassium	mg/L	0.02	1.06	1.64	1.57	1.58
Sodium	mg/L	0.05	7.16	5.05	5.03	5.12

WATER METALS

Report ID: 363118-IAS
Report Date: 21-Aug-20
Date Received: 10-Aug-20

CERTIFICATE OF ANALYSIS

for
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Methods

<u>Analyte</u>	<u>RPC SOP #</u>	<u>Method Reference</u>	<u>Method Principle</u>
Alkalinity (as CaCO ₃)	4.M43	EPA 310.2	Methyl Orange Colourimetry
Chloride	4.M44	APHA 4500-CL E	Ferricyanide Colourimetry
Sulfate	4.M45	APHA 4500-SO ₄ E	Turbidimetry
Solids - Total Suspended	4.M05	APHA 2540 D	Filtration, Gravimetry
Solids - Total Dissolved	-	APHA 2540 G	Evaporation, Gravimetry
Trace Metals	4.M01/4.M29	EPA 200.8/EPA 200.7	ICP-MS/ICP-ES

WATER METHODS

Report ID: 364931-IAS
Report Date: 03-Sep-20
Date Received: 21-Aug-20

CERTIFICATE OF ANALYSIS

for
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274 Sydney Street, Suite 200
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www.rpc.ca

Attention: Jonathan Oliver

Project #: 17-5121

Location: Upham

Analysis of Water

RPC Sample ID:			364931-1	364931-2	364931-3
Client Sample ID:			SW-3	SW-5	PDP-1
Date Sampled:			14-Aug-20	14-Aug-20	14-Aug-20
Analytes	Units	RL			
Alkalinity (as CaCO ₃)	mg/L	2	60	6	6
Chloride	mg/L	0.5	8.1	3.9	3.9
Sulfate	mg/L	1	520	660	680
Solids - Total Dissolved	mg/L	5	861	992	1010
Solids - Total Suspended	mg/L	5	20	< 5	< 5
Hardness (as CaCO ₃)	mg/L	0.2	629.	690.	703.

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit

Peter Crowhurst, B.Sc., C.Chem.
Director
Inorganic Analytical Chemistry

Brannen Burhoe
Supervisor
Inorganic Analytical Services

Report ID: 364931-IAS
Report Date: 03-Sep-20
Date Received: 21-Aug-20

CERTIFICATE OF ANALYSIS

for
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Attention: Jonathan Oliver

Project #: 17-5121

Location: Upham

Analysis of Metals in Water

RPC Sample ID:			364931-1	364931-2	364931-3
Client Sample ID:			SW-3	SW-5	PDP-1
Date Sampled:			14-Aug-20	14-Aug-20	14-Aug-20
Analytes	Units	RL			
Calcium	mg/L	0.05	247.	260.	265.
Magnesium	mg/L	0.01	2.70	9.86	10.3
Potassium	mg/L	0.02	1.24	1.69	1.75
Sodium	mg/L	0.05	7.08	5.09	5.19

Report ID: 364931-IAS
Report Date: 03-Sep-20
Date Received: 21-Aug-20

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Methods

<u>Analyte</u>	<u>RPC SOP #</u>	<u>Method Reference</u>	<u>Method Principle</u>
Alkalinity (as CaCO ₃)	4.M43	EPA 310.2	Methyl Orange Colourimetry
Chloride	4.M44	APHA 4500-CL E	Ferricyanide Colourimetry
Sulfate	4.M45	APHA 4500-SO ₄ E	Turbidimetry
Solids - Total Suspended	4.M05	APHA 2540 D	Filtration, Gravimetry
Solids - Total Dissolved	-	APHA 2540 G	Evaporation, Gravimetry
Trace Metals	4.M01/4.M29	EPA 200.8/EPA 200.7	ICP-MS/ICP-ES

Report ID: 364923-IAS
Report Date: 03-Sep-20
Date Received: 21-Aug-20

CERTIFICATE OF ANALYSIS

for
Dillon Consulting Ltd
274 Sydney Street, Suite 200
Saint John, NB E2L 0A8



921 College Hill Rd
Fredericton NB
Canada E3B 6Z9
Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Jonathan Oliver

Project #: 17-5121

Location: Upham

Analysis of Water

RPC Sample ID:			364923-1	364923-2	364923-3	364923-4
Client Sample ID:			SW-3	SW-5	PDP-1	SW-13
Date Sampled:			17-Aug-20	17-Aug-20	17-Aug-20	17-Aug-20
Analytes	Units	RL				
Alkalinity (as CaCO ₃)	mg/L	2	50	6	8	50
Chloride	mg/L	0.5	8.0	4.0	4.3	8.1
Sulfate	mg/L	1	490	630	650	490
Turbidity	NTU	0.1	2.9	0.5	0.7	2.4
Solids - Total Dissolved	mg/L	5	810	952	957	814
Solids - Total Suspended	mg/L	5	11	15	< 5	8
Hardness (as CaCO ₃)	mg/L	0.2	567.	643.	658.	606.

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit

Peter Crowhurst, B.Sc., C.Chem.
Director
Inorganic Analytical Chemistry

Brannen Burhoe
Supervisor
Inorganic Analytical Services

Report ID: 364923-IAS
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Attention: Jonathan Oliver

Project #: 17-5121

Location: Upham

Analysis of Metals in Water

RPC Sample ID:			364923-1	364923-2	364923-3	364923-4
Client Sample ID:			SW-3	SW-5	PDP-1	SW-13
Date Sampled:			17-Aug-20	17-Aug-20	17-Aug-20	17-Aug-20
Analytes	Units	RL				
Calcium	mg/L	0.05	223.	241.	246.	238.
Magnesium	mg/L	0.01	2.60	9.98	10.6	2.56
Potassium	mg/L	0.02	1.55	1.72	1.77	1.40
Sodium	mg/L	0.05	6.99	5.14	5.23	6.80

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Methods

<u>Analyte</u>	<u>RPC SOP #</u>	<u>Method Reference</u>	<u>Method Principle</u>
Alkalinity (as CaCO ₃)	4.M43	EPA 310.2	Methyl Orange Colourimetry
Chloride	4.M44	APHA 4500-CL E	Ferricyanide Colourimetry
Sulfate	4.M45	APHA 4500-SO ₄ E	Turbidimetry
Turbidity	4.M06	APHA 2130 B	Nephelometry
Solids - Total Suspended	4.M05	APHA 2540 D	Filtration, Gravimetry
Solids - Total Dissolved	-	APHA 2540 G	Evaporation, Gravimetry
Trace Metals	4.M01/4.M29	EPA 200.8/EPA 200.7	ICP-MS/ICP-ES

Report ID: 366332-IAS
Report Date: 17-Sep-20
Date Received: 02-Sep-20

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Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Jonathan Oliver

Project #: 17-5121

Location: Upham

Analysis of Water

RPC Sample ID:			366332-1	366332-2	366332-3	366332-4
Client Sample ID:			SW-3	SW-5	SW-5	PDP-1
Date Sampled:			31-Aug-20	31-Aug-20	26-Aug-20	26-Aug-20
Analytes	Units	RL				
Alkalinity (as CaCO ₃)	mg/L	2	60	20	6	7
Chloride	mg/L	0.5	7.5	5.0	3.8	3.7
Sulfate	mg/L	1	460	320	400	380
Solids - Total Dissolved	mg/L	5	758	548	664	646
Solids - Total Suspended	mg/L	5	< 5	< 5	< 5	< 5
Hardness (as CaCO ₃)	mg/L	0.2	552.	387.	462.	452.

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit

Peter Crowhurst, B.Sc., C.Chem.
Director
Inorganic Analytical Chemistry

Brannen Burhoe
Supervisor
Inorganic Analytical Services

Report ID: 366332-IAS
Report Date: 17-Sep-20
Date Received: 02-Sep-20

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Attention: Jonathan Oliver

Project #: 17-5121

Location: Upham

Analysis of Metals in Water

RPC Sample ID:			366332-1	366332-2	366332-3	366332-4
Client Sample ID:			SW-3	SW-5	SW-5	PDP-1
Date Sampled:			31-Aug-20	31-Aug-20	26-Aug-20	26-Aug-20
Analytes	Units	RL				
Calcium	mg/L	0.05	217.	146.	171.	167.
Magnesium	mg/L	0.01	2.56	5.42	8.43	8.50
Potassium	mg/L	0.02	1.45	1.19	1.21	1.19
Sodium	mg/L	0.05	6.25	5.56	5.22	5.19

Report ID: 366332-IAS
Report Date: 17-Sep-20
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Methods

<u>Analyte</u>	<u>RPC SOP #</u>	<u>Method Reference</u>	<u>Method Principle</u>
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Chloride	4.M44	APHA 4500-CL E	Ferricyanide Colourimetry
Sulfate	4.M45	APHA 4500-SO ₄ E	Turbidimetry
Solids - Total Suspended	4.M05	APHA 2540 D	Filtration, Gravimetry
Solids - Total Dissolved	-	APHA 2540 G	Evaporation, Gravimetry
Trace Metals	4.M01/4.M29	EPA 200.8/EPA 200.7	ICP-MS/ICP-ES