Mem	NO HAMINIOND RIVER HOLDINGS
То:	Mike Cormier, P.Eng. – Director, Authorizations Branch, New Brunswick Department of Environment and Local Government
From:	Daniel Guest, Hammond River Holdings Ltd.
Cc:	Justin Chase – Environmental Impact Assessment Branch, New Brunswick Department of Environment and Local Government
Date:	January 27, 2023
Subject:	Monthly Monitoring Report – Upham East Gypsum Quarry – December 2022
Our File:	File # 21-3049

## Introduction

This monthly report details activities associated with the operation of the Upham East Gypsum Quarry for the month of December 2022, in accordance with conditions of the Approval to Operate I-10936. Activities included surface water monitoring, groundwater monitoring, air monitoring, and blasting. For previous monthly activities, refer to the monthly reports provided from December 2019 through November 2022.

Weekly compliance surface water monitoring in December was conducted as per the following:

- Week 1: December 1, 2022
- Week 2: December 9, 2022
- Week 3: December 14, 2022
- Week 4: December 24, 2022
- Week 5: December 28, 2022

There were two additional sampling events conducted (December 4 and December 19, 2022) due to heavy rain events, defined as more than 25 mm of rain over a 24-hour period.

## **Surface Water Sampling**

## Field Methods

Field parameters were measured using a calibrated turbidity meter and probe. Field parameters are temperature, conductivity, and turbidity. These parameters were measured at three sampling locations as per the Environmental Management Plan (EMP) for Operation (Dillon 2020). All samples were submitted for lab analysis of total suspended solids (TSS).

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;
- SW5 was collected within the unnamed tributary approximately 100m downstream from PDP-1

Quarterly samples were also collected, as per the EMP (Dillon 2020), on December 14, 2022. Quarterly sampling included recording additional field parameters (pH and dissolved oxygen) and analysis of additional laboratory parameters (alkalinity, calcium, chloride, hardness, magnesium, potassium, sodium, sulphate, total phosphorus and total dissolved solids). In addition to the sites described above, another sample was collected from one other location in the Hammond River (H1). A sample was not collected at H2 on December 14, 2022, as the river conditions at this location were unsafe to sample.

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.

# Compliance Monitoring Results

Results of the surface water compliance monitoring and quarterly sampling are provided in **Table 1**. Analytical certificates are attached. The monthly average of grab samples for 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**.

# Quality Assurance / Quality Control

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). One duplicate sample was collected during the December surface water sampling program and submitted to RPC (SW5 and SW5-Dup on December 14, 2022). The RPD results were below the CCME acceptance criteria, and therefore, the data satisfies the quality objectives for the monitoring program.

# **Groundwater Monitoring**

Groundwater samples were collected from the perimeter monitoring wells on December 14 and 15, 2022. Results of the previous groundwater sampling programs can be found in the *Groundwater Report* – *Upham East Gypsum Quarry* (2021 and 2022).

Water levels were collected from perimeter monitoring wells and three potable wells on December 14 and 15, 2022 (**Figure 3**). The dataloggers allow for continuous coverage of water levels in the wells. Data was retrieved from the dataloggers on a regular basis and depicted as time-series plots.

# Methodology

## Perimeter Monitoring Well Sampling

The depth to groundwater from surface was measured using an electronic interface probe. Representative water samples were being collected from the aquifer via macro purge methodology using dedicated waterra tubing and foot valve from a dedicated reference point at the top of casing (TOC). All samples were submitted to RPC for general chemistry and metals analysis.

## <u>Datalogger Downloads</u>

Data logger was retrieved via Solinst Levelogger Software 4.5, as part of the monthly groundwater monitoring program. The dataloggers were then reset to continue to record the water level every 5 minutes.

## **Monitoring Results**

# Perimeter Monitoring Well Sampling

The results of the groundwater monitoring program are provided in **Table 3**. Analytical certificates are attached. The results were compared to the Health Canada Drinking Water Quality Summary Table (2022), which include a maximum allowable concentration (MAC) guideline that is health based, and an aesthetic objective (AO) that is based on taste, odour, staining of plumbing fixtures, etc., and is not health based.

Manganese and fluoride were above the MAC in MW20-02S; boron, fluoride and strontium were above the MAC for MW20-02D. Arsenic was above the MAC for MW20-04D and MW20-04DS. Manganese, pH, sulphate, iron and total dissolved solids were above the AO in at least one monitoring well.

## Water Level Results

The data from the dataloggers were downloaded on a regular basis. The data for perimeter monitoring wells (**Figure 4**) and potable monitoring wells (**Figures 5**, **6** and **7**) are presented as time series plots. Total precipitation (mm) is also presented within each figure, representing periods of recharge. The overall trend in almost all of the perimeter monitoring wells has remained consistent with seasonal fluctuations. The potable wells all experienced short-term fluctuations, as is expected with normal well use and predictable longer-term fluctuations typical of seasonal variations. Based on the available data as described for the December monitoring period, there does not appear to be a negative impact on water levels in perimeter and potable wells as a result of quarry operations.

# Quality Assurance / Quality Control

A QA/QC program was implemented to evaluate whether the data collected was of suitable quality to characterize the groundwater 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). The RPD was not calculated or calculated parameters. Calculated parameters can be the sum of, the difference of, or the percentage of several different parameters, many of which are reported as measured values (e.g. pH and alkalinity). Therefore, the discussion of variability should pertain to the measured parameters only. RPDs were also not calculated if one or both the results were less than the analytical detection limit, or one or both of the results were within 5x the detection limit.

Duplicate samples were collected from MW20-04D and MW20-04S during the December sampling program. The RPD results ranged from 0 to 23% (**Table 4**). All of the RPD calculations between parent samples and their corresponding field duplicate fell within CCME guidelines, therefore, the data satisfies the quality objectives for the monitoring program.

The analytical results are consistent with baseline samples, as presented in the *Groundwater Report* – *Upham East Gypsum Quarry*, submitted in 2021 and 2022. Therefore, operations at the Upham East Gypsum Quarry do not appear to negatively impact the groundwater, as observed in the perimeter monitoring wells.

# **Environmental Accidents and Malfunctions**

There were no environmental accidents or malfunctions reported during the December 2022 monitoring period.

# Ambient Air Quality Monitoring – Total Suspended Particulate

24-hour air samples are 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 December, there were 5 air quality monitoring events, December 3, 9, 15, 21, and 27, 2022. The results are provided in **Table 5**. There were no exceedances of the 120  $\mu$ g/m<sup>3</sup> 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

Four blasts occurred during the December 2022 monitoring period, occurring on December 2, 8, 13, and 20, 2022. There were no exceedances of the Approval to Operate limits for maximum velocity and sound pressure for the blasting events. Blast reports are attached.

# **Public Complaints**

There were no complaints received during the December 2022 monitoring period.

## Summary

Since extraction activities began in July 2020 at the Upham East Gypsum Quarry, the water chemistry at the discharge point into the unnamed tributary has remained comparable to background, groundwater measured in the perimeter monitoring wells remains comparable to pre-operation conditions, air quality monitoring has remained below guidelines, and decibel levels have remained generally below guidelines.

# References

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.

Dillon (Dillon Consulting Limited). 2021. Groundwater Monitoring Plan. Upham East Gypsum Quarry Project, Upham New Brunswick. Prepared for Hammond River Holdings Limited by Dillon Consulting Limited, Fredericton, New Brunswick. Project 21-3049. June 2021.

Dillon (Dillon Consulting Limited). 2022. Groundwater Monitoring Plan. Upham East Gypsum Quarry Project, Upham New Brunswick. Prepared for Hammond River Holdings Limited by Dillon Consulting Limited, Fredericton, New Brunswick. Project 21-3049. June 2022.

Health Canada. 2020. Guidelines for Canadian Drinking Water Quality Summary Table. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.



# HAMMOND RIVER HOLDINGS LIMITED PROPOSED UPHAM EAST GYPSUM QUARRY

#### SURFACE WATER SAMPLING LOCATIONS FIGURE 1

<ul> <li>PROJECT DEVELOPMENT A</li> <li>WATERBODY</li> <li>WATERCOURSE</li> <li>REGULATED WETLAND</li> <li>30 METRE WETLAND/WATEF</li> <li>PROPOSED SITE FEATURES</li> <li>DITCH</li> <li>TRUCK SCALE (OPTIONAL)</li> <li>SITE AREAS</li> <li>DISCHARGE POINT</li> <li>SECURITY GATE</li> <li>PORTABLE TRAILER/OFFICE</li> <li>ACCESS ROAD</li> <li>STOCKPILE</li> <li>CROSS SECTION</li> <li>QUARRY BERM CONSTRUC AND OVERBURDEN (OFFSE FROM PROPERTY BOUNDAH</li> <li>MATCHING INDICATES MATE ON TOP OF STORAGE PAD</li> </ul>	RCOURSE BUFFER
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QUARRY BERM CONSTRUC           AND OVERBURDEN (OFFSE           FROM PROPERTY BOUNDAI           Image: Strain St	
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![](_page_6_Figure_0.jpeg)

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.

![](_page_7_Picture_0.jpeg)

#### HAMMOND RIVER HOLDINGS UPHAM EAST GYPSUM QUARRY

## GROUNDWATER MONITORING LOCATIONS FIGURE 3

Potable Well Leveloggers 

- Deep
- Shallow
- Upham Outline

SCALE 1:XXX

![](_page_7_Picture_8.jpeg)

MAP DRAWING INFORMATION: DATA PROVIDED BY MNR

MAP CREATED BY: JTO MAP CHECKED BY: GA MAP PROJECTION: NB DOUBLE STEROGRAPHIC

FILE LOCATION: \\DILLON.CA\DILLON\_DFS\LONDON\LONDON CAD\GIS\ VISUAL COMMUNICATIONS DIMXD TEMPLATES\ BEIGE - 11X17 LANDSCAPE - LEGEND RIGHT.MXD

![](_page_7_Picture_12.jpeg)

PROJECT: 18-8346

STATUS: DRAFT DATE: 06/15/2021

![](_page_8_Figure_0.jpeg)

![](_page_9_Figure_0.jpeg)

![](_page_10_Figure_0.jpeg)

![](_page_11_Figure_0.jpeg)

![](_page_12_Picture_0.jpeg)

					Field Results							Laboratory Result	ts				
	Parameter	Ambient Air Temperature <sup>a</sup>	Precipitation 48 hours prior to sample collection <sup>b</sup>	Water Temperat ure	Specific Conductivity	Turbidity	Total Suspended Solids <sup>c</sup>	Alkalinity (as CaCO3)	Calcium	Chloride	Hardness (as CaCO3)	Magnesium	Phosphorus	Potassium	Sodium	Sulphate	Total Dissolved Solids
	Units	°C	mm	°C	mS/cm	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample ID	Date																
SW3	12/1/2022/10:00			4.4	65	14.20	15	-	-	-	-	-	-	-	-	-	-
PDP-1	12/1/2022/10:10			4.0	93	15.10	8	-	-	-	-	-	-	-	-	-	-
SW5	12/1/2022/10:16	2.8	28.7	3.8	107	15.20	11	-	-	-	-	-	-	-	-	-	-
PDP-1 dup	12/1/2022/10:11	1		4.0	93	15.20	7	-	-	-	-	-	-	-	-	-	-
SW3	12/04/2022/14:11			5.4	158	5.75	<5	-	-	-	-	-	-	-	-	-	-
PDP-1	12/04/2022/14:21	1.6	28.6	4.7	272	6.57	<5	-	-	-	-	-	-	-	-	-	-
SW5	12/04/2022/14:26			4.5	261	6.84	<5	-	-	-	-	-	-	-	-	-	-
SW3	12/09/2022/10:06			4.7	384	2.52	<5	-	-	-	-	-	-	-	-	-	-
PDP-1	12/09/2022/10:16	1.6	57.4	3.9	451	3.11	<5	-	-	-	-	-	-	-	-	-	-
SW5	12/09/2022/10:21			3.9	457	2.09	<5	-	-	-	-	-	-	-	-	-	-
SW3	12/14/2022			-0.9	294	0.00	<5	21	69.7	6.4	178	0.93	0.014	0.66	4.15	167	270
PDP-1	12/14/2022			-0.9	319	0.21	<5	21	78.6	8.8	202	1.4	0.015	0.78	5.29	181	304
SW5	12/14/2022	-1	0.0	-0.9	324	0.00	<5	21	77.5	11.7	199	1.44	0.015	0.78	5.39	183	274
SW5-Dup	12/14/2022			-0.9	324	0.00	<5	20	80.8	10.8	208	1.46	0.015	0.75	5.42	181	296
H1	12/14/2022			-1.0	55	0.00	<5	20	11.5	5.2	31.4	0.64	0.009	0.40	3.52	13	50
SW3	12/19/2022/10:36			2.7	190	3.93	<5	-	-	-	-	-	-	-	-	-	-
PDP-1	12/19/2022/10:46			1.6	308	3.15	<5	-	-	-	-	-	-	-	-		-
PDP-1 dup	12/19/2022/10:47	-0.1	30.4	1.6	306	3.73	<5	-	-	-	-				-	-	-
SW5	12/19/2022/10:53			1.1	304	2.26	<5	-	-	-	-	-	-	-	-	-	-
SW3	12/24/2022/10:15			1.8	86	16.80	11	-	-	-	-	-	-	-	-	-	-
PDP-1	12/24/2022/10:25	-2.3	26.9	1.2	129	17.60	11	-	-	-	-	-	-	-	-	-	-
SW5	12/24/2022/10:30			0.5	245	17.40	10	-	-	-	-						-
SW3	12/28/2022/09:18			0.4	334	5.78	<5	-	-	-	-	-	-	-	-	-	-
PDP-1	12/28/2022/09:28	-9.0	1.6	0.2	354	6.49	<5	-	-	-	-	-	-	-	-	-	-
SW5	12/28/2022/09:34	1		0.2	350	6.75	<5	-	-	-	-	-	-	-	-	-	-

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/historica\_data/search\_historic\_data\_e.html

b) Preciptitation 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, not available, or not applicable; FD = field duplicate.

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Data	Site Specific		Ν	Monthly Averag	е	
Dale	Guideline	H1	H2	SW3	PDP-1	SW5
04-Dec-19	27.5	-	-	2.5	2.5	2.5
11-Dec-19	30.3	6.0	14.0	5.3	4.8	2.5
15-Dec-19	29.3	8.0	9.5	4.3	5.5	2.5
19-Dec-19	28.9	6.2	7.2	3.9	4.8	2.5
23-Dec-20	28.6	5.3	6.0	3.6	4.3	2.5
03-Jan-20	28.4	4.7	5.3	3.4	4.0	2.5
10-Jan-20	28.4	4.3	4.8	3.4	4.0	2.5
13-Jan-20	27.5	3.8	3.0	2.5	3.3	2.5
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
03-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
05-Mar-20	27.5	2.5	2.5	2.5	3.4	2.5
11-Mar-20	27.5	2.5	2.5	2.5	3.2	2.5
15-Mar-20	27.5	3.4	4.8	2.5	3.2	2.5
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	5.2	4.6
26-Mar-20	30.6	7.3	3.6	5.6	5.2	4.6
03-Apr-20	31.4	9.2	6.9	6.4	6.3	5.7
09-Apr-20	31.4	9.2	6.9	6.4	5.8	5.7
14-Apr-20	33.1	15.7	18.8	8.1	9.1	9.9
17-Apr-20	33.3	16.4	21.1	8.3	10.3	10.6
23-Apr-20	30.3	12.3	18.0	5.3	10.3	8.7
28-Apr-20	30.3	12.3	20.6	5.3	10.3	8.7
08-May-20	29.1	9.0	15.5	4.1	9.0	6.7
11-May-20	29.1	9.0	15.5	4.1	8.1	6.7
19-May-20	27.5	2.5	5.1	2.5	5.1	2.5
26-May-20	27.5	2.5	5.1	2.5	2.5	2.5
04-Jun-20	27.5	2.5	2.5	2.5	2.5	10.0
08-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
07-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	7.0	2.5
23-Jul-20	27.8	-	-	2.5	2.5	2.5
29-Jul-20	28.3	-	-	6	2.5	5
05-Aug-20	28.4	-	-	3.4	3.1	3.2
14-Aug-20	31.7	-	-	6.7	3.4	3.5

		Та	ble 2			
	Total Su	uspended So	lids - Monthly	Average		
		Linham Fast (	Gynsum Proie	rt of age		
		Unham No	Ny Brunswick			
		Drainat N				
		Projectiv	10.21-3049			
	Site Specific		Λ	Anthly Average	۵	
Date	Guideline	H1	H2	SW3	PDP-1	SW5
17-Aug-20	32.4	-	-	7.4	3.3	5.4
26-Aug-20	33.4	-	-	8.4	2.5	6.0
31-Aug-20	32.7	-	-	7.7	2.5	5.5
04-Sep-20	31.8	-	-	6.8	2.5	5.0
10-Sep-20	31.8	2.5	2.5	6.8	2.5	4.6
15-Sep-20	28.9	-	-	3.9	2.5	4.6
22-Sep-20	27.5	-	-	2.5	2.5	2.5
23-Sep-20	27.5	-	-	2.5	2.5	2.5
29-Sep-20	27.9	-	-	2.9	3.4	4.6
30-Sep-20	27.8	-	-	2.8	3.3	4.3
08-Oct-20	27.9	-	-	2.5	2.5	2.5
14-Oct-20	27.9	-	-	2.5	2.5	2.5
22-Oct-20	27.9	-	-	2.5	2.5	2.5
28-Oct-20	27.9	-	-	2.5	2.5	2.5
03-Nov-20	27.5	-	-	2.5	2.5	2.5
05-Nov-20	27.5	-	-	2.5	2.5	2.5
13-Nov-20	27.5	-	-	2.5	2.5	2.5
16-Nov-20	27.5	-	-	2.5	2.5	7.0
24-Nov-20	27.5	-	-	2.5	5.0	2.5
27-Nov-20	27.9	-	-	5	2.5	2.5
01-Dec-20	27.9	-	-	2.9	3.2	4.5
02-Dec-20	28.1	2.5	2.5	3.1	3.1	4.7
07-Dec-20	28.2	-	-	3.2	3.2	5.0
15-Dec-20	28.2	-	-	3.2	3.2	5.0
23-Dec-20	28.2	-	-	3.2	3.2	4.4
28-Dec-20	27.9	-	-	2.9	2.9	4.7
31-Dec-20	27.9	-	-	2.9	2.9	4.4
05-Jan-21	27.5	-	-	2.5	2.5	2.5
12-Jan-21	27.5	-	-	2.5	2.5	2.5
17-Jan-21	28.3	-	-	3.3	3.4	3.4
21-Jan-21	28.1	-	-	3.1	3.3	3.3
27-Jan-21	28.1	-	-	3.1	3.3	3.3
03-Feb-21	28.3	-	-	3.3	3.4	3.4
10-Feb-21	28.3	-	-	3.3	3.4	3.4
18-Feb-21	27.5	-	-	2.5	2.5	2.5
25-Feb-21	27.5	-	-	2.5	2.5	2.5
02-Mar-21	27.5	-	-	2.5	2.5	2.5
08-Mar-21	27.5	-	-	2.5	2.5	2.5
16-Mar-21	27.5	-	-	2.5	2.5	2.5
18-Mar-21	27.5	2.5	-	2.5	-	2.5
26-Mar-21	27.5	-	47.0	-	2.5	-
27-Mar-21	28.1	-	-	3.1	2.5	2.5
30-Mar-21	28.1	-	-	3.1	2.5	2.5
02-Apr-21	28.0	-	-	3.0	2.5	2.5

		Та	ble 2			
	Total	Suspended So	lids - Monthly	Average		
	Total	Unham Fast (	Gynsum Proio	rt		
				ι		
		Upnam, Ne				
		Project N	10.21-3049			
Date	Site Specific		N	Monthly Averag	е	
	Guideline	H1	H2	SW3	PDP-1	SW5
08-Apr-21	27.9	-	-	2.9	2.5	2.5
16-Apr-21	27.9	-	-	2.9	2.5	2.5
19-Apr-21	27.9	-	-	2.9	2.5	2.5
26-Apr-21	27.9	-	-	2.9	2.5	3.0
01-May-21	27.5	-	-	2.5	2.5	3.1
08-May-21	27.5	-	-	2.5	2.5	3.1
13-May-21	27.5	-	-	2.5	2.5	3.1
17-May-21	27.5	-	-	2.5	2.5	3.7
24-May-21	27.5	-	-	2.5	2.5	3.7
01-Jun-21	27.5	-	-	2.5	2.5	3.2
08-Jun-21	27.5	-	-	2.5	3.0	3.2
16-Jun-21	27.5	-	-	2.5	3.5	3.7
24-Jun-21	27.5	-	-	2.5	3.8	3.1
01-Jul-21	27.5	-	-	2.5	3.5	3.0
06-Jul-21	27.5	-	-	2.5	3.5	3.0
10-Jul-21	28.4	-	-	3.4	3.0	3.0
14-Jul-21	28.3	-	-	3.3	2.9	2.9
15-Jul-21	28.1	-	-	3.1	2.9	2.9
24-Jul-21	28.1	-	-	3.1	2.5	2.5
31-Jul-21	28.1	-	-	3.1	2.5	2.5
6-Aug-21	28.3	-	-	3.3	2.5	2.5
11-Aug-21	27.5	-	-	2.5	2.5	2.5
17-Aug-21	27.5	-	-	2.5	4.0	10.0
26-Aug-21	27.5	-	-	2.5	4.0	2.5
3-Sep-21	27.5	-	-	2.5	4.5	5.0
7-Sep-21	27.5	-	-	2.5	4.5	2.5
15-Sep-21	27.5	-	-	2.5	5.0	5.0
20-Sep-21	27.5	-	-	2.5	4.0	5.0
28-Sep-21	27.5	-	-	2.5	4.0	2.5
6-Oct-21	27.5	-	-	2.5	3.5	2.5
13-Oct-21	27.5	2.5	2.5	2.5	3.5	2.5
18-Oct-21	27.5	-	-	2.5	3.0	2.5
22-Oct-21	27.5	-	-	2.5	2.5	2.5
28-Oct-21	27.5	-	-	2.5	2.5	2.5
01-Nov-21	27.5	-	-	2.5	2.5	2.5
03-Nov-21	27.5	-	-	2.5	2.5	2.5
09-Nov-21	27.5	-	-	2.5	2.5	2.5
16-Nov-21	27.5		-	2.5	2.5	2.5
23-Nov-21	27.9	-	-	2.9	4.3	2.5
4-Dec-21	28.1	-	-	3.1	5.1	2.5
8-Dec-21	28.0		-	3.0	4.6	2.5
13-Dec-21	28.0	-	-	3.0	4.6	2.5
21-Dec-21	28.0	-	-	3.0	4.6	2.5
29-Dec-21	27.5	-	-	2.5	2.5	2.5

		Та	ble 2			
	Total S	uspended Sol	lids - Monthly	v Average		
		Upham Fast (	Gypsum Proie	ect		
		Linham Ne	Ny Brunswick			
		Drojoct N				
		FIOJECT	10.21-3049			
	Site Specific			Monthly Averag	e	
Date	Guideline	H1	H2	SW3	PDP-1	SW5
4-Jan-22	27.5	-	-	2.5	2.5	2.5
6-Jan-22	28.6	-	-	9.0	6.0	8.0
26-Jan-22	29.7	2.5	2.5	-	-	-
19-Feb-22	27.5	-	-	2.5	2.5	2.5
24-Feb-22	27.5	-	-	2.5	2.5	2.5
9-Mar-22	27.5	-	-	2.5	2.5	2.5
13-Mar-22	27.5	-	-	2.5	2.5	2.5
18-Mar-22	29.0	-	-	4.0	4.0	3.6
22-Mar-22	29.0	-	-	4.0	4.5	3.6
26-Mar-22	28.8	-	-	3.8	4.2	3.4
1-Apr-22	29.3	-	-	4.3	3.4	4.2
8-Apr-22	29.3	-	-	4.3	3.4	4.8
16-Apr-22	29.3	-	-	4.3	3.4	4.8
20-Apr-22	28.8	-	-	3.8	2.5	4.3
29-Apr-22	29.1	-	-	4.1	2.5	4.1
7-May-22	28.4	-	-	2.5	2.5	2.5
13-May-22	28.4	-	-	2.5	2.5	2.5
18-May-22	28.4	-	-	2.5	2.5	2.5
27-May-22	27.5	-	-	2.5	2.5	2.5
4-Jun-22	27.5	-	-	2.5	2.5	2.5
10-Jun-22	27.5	-	-	2.5	2.5	2.5
15-Jun-22	27.5	-	-	2.5	2.5	2.5
22-Jun-22	27.5	-	-	2.5	2.5	2.5
29-Jun-22	27.5	-	-	2.5	2.5	2.5
04-Jul-22	27.5	2.5	2.5	2.5	2.5	3.9
7-Jul-22	27.5	-	-	2.5	2.5	3.9
13-Jul-22	27.5	-	-	2.5	2.5	4.7
20-Jul-22	27.5	-	-	2.5	2.5	4.7
30-Jul-22	27.5	-	-	2.5	2.5	5.1
6-Aug-22	27.5	-	-	2.5	3.4	2.5
10-Aug-22	27.5	-	-	2.5	3.4	3.0
15-Aug-22	27.5	-	-	2.5	2.5	3.0
18-Aug-22	27.5	-	-	2.5	2.5	2.9
24-Aug-22	28.6	-	-	3.6	2.5	2.9
1-Sep-22	29.2	-	-	4.2	2.5	2.9
9-Sep-22	29.5	-	-	4.5	2.5	12.2
14-Sep-22	29.2	2.5	2.5	4.2	2.5	11.5
21-Sep-22	29.5	-	-	4.5	2.5	13.3
23-Sep-22	29.2	-	-	4.2	2.5	11.9
27-Sep-22	28.1	-	-	3. l	2.5	11.9
06-001-22	27.5	-	-	2.5	2.5	11.9
14-UCI-22	27.5	-	-	2.5	2.5	<u>3.8</u>
17-UCI-22	27.5	-	-	2.5	2.5	2.9
20-001-22	27.5	-	-	2.5	<u>3.1</u> っっ	2.9
20-UCI-22	27.5	-	-	2.5	3.3	2.5
4-INOV-22	27.5	-	-	2.5	5.U	2.5 2.5
11-INUV-22 12 Nov 22	27.3	-	-	2.3 2.1	2.3	2.0
13-1100-22	2ŏ. I	-	-	3. I	2.5	3.1

	Table 2											
	Total	Suspended So	lids - Monthly	Average								
	Upham East Gypsum Project											
	Upham, New Brunswick											
	Project No. 21-3049											
110j001110. 21-3047												
Site Specific Monthly Average												
Date	Date Guideline H1 H2 SW3 PDP-1 SW5											
	Guideline H1 H2 SW3 PDP-1 SW5											
18-Nov-22	28.1 3.1 2.5 3.1											
23-Nov-22	28.1	-	-	3.1	2.5	3.1						
1-Dec-22	30.2	-	-	5.2	3.8	4.5						
4-Dec-22	29.8	-	-	4.8	3.6	4.2						
9-Dec-22	29.8	2.5	-	4.8	3.3	4.2						
14-Dec-22	29.6	-	-	4.6	3.4	3.9						
19-Dec-22	29.6	-	-	4.6	3.4	3.9						
24-Dec-22	31.0	-	-	6.0	4.8	5.2						
28-Dec-22	30.5	-	-	5.5	4.5	4.8						

Notes:

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

	Table 3										
General Chemistry and Trace Metals - Perimeter Monitoring Wells											
					Upham Eas	t Gypsum Project					
	Upham, New Brunswick										
					Project	No. 21-3049					
Deremeter	Unite	GCDW	Q 2022 <sup>1</sup>	MW19-01S	MW19-01D	MW20-02S	MW20-02D	MW20-03S	MW20-03D	MW20-04S	MW20-04D
Parameter	UTILS	MAC	AO	15-Dec-22	15-Dec-22	14-Dec-22	14-Dec-22	14-Dec-22	14-Dec-22	14-Dec-22	14-Dec-22
General Chemistry											
Sodium	mg/L	-	200	8.63	15.6	14.3	145	5.20	10.4	5.04	4.27
Potassium	mg/L	-	-	0.96	1.57	1.7	5.4	0.98	0.96	1.1	1.11
Calcium	mg/L	-	-	32.5	62.3	567	621.	41.9	3.48	40.4	40.7
Magnesium	mg/L	-	-	9.09	2.68	11	34.3	3.51	0.73	1.26	1.33
Iron	mg/L	-	0.3	0.06	0.03	27	7.2	0.30	<u>1.80</u>	0.04	0.03
Manganese	mg/L	0.12	0.02	0.009	<u>0.091</u>	0.745	0.427	0.017	0.034	0.006	0.007
Copper	mg/L	2	1	0.003	< 0.001	0.007	< 0.005	< 0.001	< 0.001	0.002	0.002
Zinc	mg/L	-	5	0.012	0.003	< 0.005	< 0.005	0.001	< 0.001	0.002	0.002
Ammonia (as N)	mg/L	-	-	< 0.05	0.20	< 0.05	0.31	< 0.05	0.09	< 0.05	< 0.05
pН	units	-	7.0 - 10.5	<u>6.3</u>	7.9	7.6	8.4	8.0	10.1	8	8
Alkalinity (as CaCO3)	mg/L	-	-	44	130	110	55	109	25	110	110
Chloride	mg/L	-	250	40.5	30.7	11.5	180	12.4	8.2	2.6	2.6
Flouride	mg/L	1.5	-	0.21	0.35	2.2	3.5	0.07	0.07	0.33	0.35
Sulphate	mg/L	-	500	46	42	<u>1,390</u>	1,640	3	2	10	11
Nitrate (as nitrate - nitrogen)	mg/L	10	-	0.75	< 0.05	< 0.05	< 0.05	1.03	< 0.05	0.51	0.84
o-Phosphate (as P)	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
r-Silica (as SiO2)	mg/L	-	-	13.2	15.2	13.1	1.2	11.1	< 0.1	13.9	13.7
Total Organic Carbon	mg/L	-	-	0.7	< 0.5	0.8	2.7	0.5	0.6	< 0.5	< 0.5
Turbidity <sup>2</sup>	NTU	-	-	1.6	0.5	188	45.2	6.0	25.8	5.1	1.3
Solids - Total Suspended	mg/L	-	-	< 5	< 5	123	38	10	18	< 5	< 5
Conductivity	µS/cm	-	-	310	431	2,270	3,020	257	97	222	235
Calculated Parameters											
Bicarbonate as CaCO3	mg/L	-	-	44.0	129	110	53.6	108	8.6	109	109
Carbonate as CaCO3	mg/L	-	-	0.008	0.963	0.41	1.27	1.01	10.2	1.02	1.02
Hydroxide as CaCO3	mg/L	-	-	0.001	0.040	0.02	0.126	0.050	6.29	0.05	0.05
Cation sum	meq/L	-	-	2.77	4.07	31.3	40.7	2.65	0.815	2.37	2.36
Anion sum	meq/L	-	-	3.03	4.34	31.5	40.3	2.66	0.773	2.52	2.56
% difference	%	-	-	-4.46	-3.22	-0.19	0.44	-0.30	2.64	-2.99	-4.13
Theoretical Conductivity	µS/cm	-	-	315	413	2790	3530	252	76	230	232
Hardness (as CaCO3)	mg/L	-	-	119	167	1460	1690	119	11.7	106	107
Total Dissolved Solids (calcula	mg/L	-	500	181	250	2,100	2,670	149	43	144	146
Saturation pH (@ 5C)	-	-	-	8.5	7.7	7.1	7.4	7.9	10.1	8	8
Langelier Index (@ 5C)	-	-	-	-2.16	0.17	0.54	1.04	0.05	0.04	0.05	0.05

Table 3													
General Chemistry and Trace Metals - Perimeter Monitoring Wells													
					Upham Eas	t Gypsum Project							
					Upham, N	New Brunswick							
					Project	No. 21-3049							
	<u>.</u>												
Parameter	Units	GCDW	2 2022'	MW19-01S	MW19-01D	MW20-02S	MW20-02D	MW20-03S	MW20-03D	MW20-04S	MW20-04D		
		MAC	AO	15-Dec-22	15-Dec-22	14-Dec-22	14-Dec-22	14-Dec-22	14-Dec-22	14-Dec-22	14-Dec-22		
Trace Metals													
Aluminum	μg/L	-	-	31	4	80	6	30	1	30	9		
Antimony	µg/L	6	-	< 0.1	< 0.1	< 0.5	< 0.5	< 0.1	< 0.1	0.1	0.3		
Arsenic	µg/L	10	-	< 1	< 1	< 5	< 5	1	< 1	20	19		
Barium	µg/L	1,000	-	115	146	6	< 5	264	2	119	127		
Beryllium	µg/L	-	-	< 0.1	< 0.1	< 0.5	< 0.5	< 0.1	< 0.1	< 0.1	< 0.1		
Bismuth	µg/L	-	-	< 1	< 1	< 5	< 5	< 1	< 1	< 1	< 1		
Boron	µg/L	5,000	-	21	472	844	51,600	11	8	103	95		
Cadmium	µg/L	7	-	0.08	< 0.01	0.20	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01		
Calcium	µg/L	-	-	32,500	62,300	567,000	621,000	41900	3480	40400	40700		
Chromium	μg/L	50	-	< 1	< 1	< 5	< 5	< 1	< 1	< 1	< 1		
Cobalt	µg/L	-	-	< 0.1	< 0.1	0.7	< 0.5	< 0.1	< 0.1	< 0.1	0.1		
Copper	µg/L	2,000	1,000	3	< 1	7	< 5	< 1	< 1	2	2		
Iron	µg/L	-	300	60	30	<u>27,000</u>	<u>7,200</u>	300	<u>1800</u>	40	30		
Lead	µg/L	5	-	0.6	< 0.1	< 0.5	1.7	0.1	< 0.1	< 0.1	< 0.1		
Lithium	μg/L	-	-	10.6	16.2	11.9	210.	5.8	3.2	7.6	8.2		
Magnesium	µg/L	-	-	9,090	2,680	11,000	34,300	3510	730	1260	1330		
Manganese	µg/L	120	20	9	<u>91</u>	745	<u>427</u>	17	<u>34</u>	6	7		
Mercury	μg/L	1	-	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025		
Molybdenum	μg/L	-	-	< 0.1	0.1	< 0.5	6.0	0.2	0.2	2.3	2.9		
Nickel	µg/L	-	-	1	< 1	< 5	< 5	< 1	< 1	< 1	< 1		
Potassium	µg/L	-	-	960	1,570	1700	5400	980	960	1100	1110		
Rubidium	μg/L	-	-	1.3	2.7	< 0.5	6.4	0.4	0.4	1	1		
Selenium	μg/L	50	-	< 1	< 1	< 5	< 5	< 1	< 1	< 1	< 1		
Silver	µg/L	-	-	< 0.1	< 0.1	< 0.5	< 0.5	< 0.1	< 0.1	< 0.1	< 0.1		
Sodium	μg/L	-	200,000	8,630	15,600	14,300	145,000	5,200	10400	5040	4270		
Strontium	μg/L	7,000	-	123	1,320	4,360	10,800	254	25	383	477		
Tellurium	μg/L	-	-	< 0.1	< 0.1	< 0.5	< 0.5	< 0.1	< 0.1	< 0.1	< 0.1		
Thallium	μg/L	-	-	< 0.1	< 0.1	< 0.5	< 0.5	< 0.1	< 0.1	< 0.1	< 0.1		
Tin	μg/L	-	-	< 0.1	< 0.1	< 0.5	< 0.5	< 0.1	< 0.1	< 0.1	< 0.1		
Uranium	µg/L	20	-	< 0.1	< 0.1	2.5	< 0.5	0.8	< 0.1	3.5	4.5		
Vanadium	μg/L	-	-	< 1	< 1	< 5	< 5	1	< 1	2	2		
Zinc	µg/L	-	5,000	12	3	< 5	< 5	1	< 1	2	2		
Notes:					-								

1. Health Canada. 2022. Guidelines for Canadian Drinking Water Quality Summary Table. Prepared in collaboration with the Federal-Provincial-Territorial Committee on Drinking Water of the Federal-Provincial-Territorial Committee on Health and the Environment.

2. Guideline dependant on treatment of individual filters.

<u>Underline</u> - indicates value is above the AO. Bolded - indicates value is above the MAC.

' - ' denotes no guideline, not analyzed, or not applicable

MAC = maximum allowabale concentration; AO = aestheic objective; mg/L = milligrams per litre; µS/cm = microsiemens per centimetre.

# Table 4 QA/QC General Chemistry and Trace Metals - Perimeter Monitoring Wells Upham East Gypsum Project Upham, New Brunswick Project No. 21-3049

Parameter	Units	Laboratory	Original Sample	Field Duplicate Sample	RPD (%)	Original Sample	Field Duplicate Sample	RPD (%)
Turuneter	onits	Detection Limit	14-Dec-22	14-Dec-22	N D (70)	14-Dec-22	14-Dec-22	Ki D (70)
General Chemistry								
Sodium	mg/L	0.05	4.27	4.37	2	5.04	5.24	4
Potassium	mg/L	0.02	1.11	1.14	3	1.1	1.12	2
Calcium	mg/L	0.05	40.7	40.9	0	40.4	37.4	7
Magnesium	mg/L	0.01	1.33	1.35	2	1.26	1.29	2
Iron	mg/L	0.02	0.03	0.02	NA	0.04	0.04	NA
Manganese	mg/L	0.001	0.007	0.007	0	0.006	0.006	0
Copper	mg/L	0.001	0.002	0.002	NA	0.002	0.004	NA
Zinc	mg/L	0.001	0.002	0.002	NA	0.002	0.002	NA
Ammonia (as N)	mg/L	0.05	< 0.05	< 0.05	NA	< 0.05	< 0.05	NA
pH	units	-	8	7.9	1	8	8.0	0
Alkalinity (as CaCO3)	mg/L	2	110	110	0	110	100	9
Chloride	mg/L	0.5	2.6	2.7	4	2.6	2.7	4
Flouride	mg/L	0.05	0.35	0.37	6	0.33	0.34	3
Sulphate	mg/L	1	11	11	0	10	11	10
Nitrate + Nitrite (as N)	mg/L	0.05	0.84	0.87	4	0.51	0.55	8
o-Phosphate (as P)	mg/L	0.01	< 0.01	< 0.01	NA	< 0.01	< 0.01	NA
r-Silica (as SiO2)	mg/L	0.1	13.7	13.9	1	13.9	13.9	0
Total Organic Carbon	mg/L	0.5	< 0.5	< 0.5	NA	< 0.5	< 0.5	NA
Turbidity <sup>2</sup>	NTU	0.1	1.3	1.0	23	5.1	5.6	10
Solids - Total Suspended	ma/L	5	< 5	< 5	NA	< 5	< 5	NA
Conductivity	uS/cm	1	235	235	0	222	221	0
Trace Metals					÷			
Aluminum	ua/l	1	9	8	11	30	31	3
Antimony	µg/L	0.1	0.3	0.3	NΔ	0.1	01	NΔ
Δrsenic	µg/L µg/l	1	19	19	0	20	21	5
Barium	µ9/L	1	127	126	1	119	122	3
Benyllium	µ9/L	0.1	< 0.1	< 0.1	NA	< 0.1	< 0.1	NA
Bismuth	µg/L	1	< 1	< 1	NΔ	< 1	<1	NΔ
Boron	µg/L µg/l	1	95	99	4	103	104	1
Cadmium	µ9/L	0.01	< 0.01	< 0.01	NΔ	< 0.01	< 0.01	ΝΔ
Calcium	µ9/L	50	40700	40900	0	40400	37400	7
Chromium	µg/L	1	< 1	- 1	NΔ	- 1	< 1	NΔ
Cobalt	µg/L	0.1	0.1	01	NΔ	< 0.1	< 0.1	NΔ
Copper	µ9/L	1	2	2	NΔ	2	4	NΔ
Iron	µ9/L	20	30	20	NΔ	40	40	NΔ
Lead	µg/L µg/l	0.1	< 0.1	< 0.1	NA	< 0.1	< 0.1	NA
Lithium	µg/L µg/l	0.1	8	83	1	7.6	7.5	1
Magnesium	µg/L µg/l	10	1330	1350	1	1260	1290	2
Manganese	µ9/2	1	7	7	0	6	6	0
Mercury	ug/l	0.025	< 0.025	< 0.025	NA	< 0.025	< 0.025	NA
Molybdenum	ug/L	0.1	2.9	2.9	0	2.3	2.4	4
Nickel	µg/L µg/l	1	< 1	<1	NA	≤ 1	<1	NA
Potassium	µ9/2	20	1110	1140	3	1100	1120	2
Rubidium	µ9/2	0.1	1	10	0	1	11	10
Selenium	µg/L µg/l	1	< 1	<1	NA	<1	<1	NA
Silver	H9/ L	0.1	< 0.1	< 0.1	NA	< 0.1	< 0.1	NA
Sodium	ug/l	50	4270	4370	2	5040	5240	4
Strontium	H3/ L	1	477	478	0	383	388	1
Tellurium	10/I	0.1	< 0.1	< 0.1	NA	< 0.1	< 0.1	NA
Thallium	Ha\r Ha\r	0.1	< 0.1	< 0.1	NA	< 0.1	< 0.1	NA
Tin	H3/ L	0.1	< 0.1	< 0.1	NA	< 0.1	< 0.1	NA
Uranium	H9/ L	0.1	45	45	0	35	35	0
Vanadium	10/I	1	2	2	NA	2	2	0
Zinc	μg/L	1	2	2	NA	2	2	0

Notes:

Bolded - indicates the RPD is above the 40% threshold criteria (CCME, 2016).

NA = RPD could not be calculated because either one or both results were below the detection limit, one or both of the results were within 5x the detection limit, or the result is a caluclated value.

RPD = relative percent difference; mg/L = milligrams per litre; µS/cm = microsiemens per centimetre; - = not applicable.

				Upl L	Table 5 Air Quality Reporting ham East Gypsum Qua Jpham, New Brunswic Proeict No. 21-3049	ırry k				
T 101 1		Flow Rate	Air Volume	Pressure	Temperature	Initial Filter	Final Filter	TSP Mass	TSP	Site Guideline
Test Start	Duration	(I/min)	(m <sup>3</sup> )	(mm Ha)	(°C)	(a)	(a)	(nu)	(ug/m3)	(µq/m <sup>3</sup> )
2020-07-22	24 hours	16 70	24.05	752	20.3	14 842	14 865	23000	39.85	120
2020-07-28	24 hours	16.76	23.70	747	24.4	14.826	14.828	1700	2 99	120
2020-08-04	24 hours	16.66	23.99	753	22.8	14.826	14.830	3100	5.38	120
2020-08-09	24 hours	16.74	24.10	752	21.2	14.842	14.844	2200	3.80	120
2020-08-15	24 hours	16.88	24.30	754	19.8	14.824	14.836	11600	19.89	120
2020-08-21	24 hours	16.87	24.30	749	17.9	14.839	14.842	2100	3.60	120
2020-08-27	24 hours	17.06	24.57	743	12.4	14.823	14.845	21700	36.80	120
2020-09-02	24 hours	16.75	24.12	747	18.8	14.842	14.861	19700	34.03	120
2020-09-08	24 hours	17.02	24.51	759	19.1	14.859	14.871	12100	20.57	120
2020-09-14	24 hours	17.62	25.37	756	8.0	14.828	14.837	9300	15.27	120
2020-09-20	24 hours	18.03	25.97	764	4.8	14.835	14.852	17100	27.44	120
2020-09-26	24 hours	17.10	24.62	753	15.3	14.856	14.859	3300	5.59	120
2020-10-02	24 hours	14.43	25.10	753	9.6	14.972	14.959	-12800	-21.25	120
2020-10-08	24 hours	17.69	25.48	748	3.8	14.861	14.889	28800	47.10	120
2020-10-14	24 hours	17.56	25.29	753	7.8	14.883	14.891	8300	13.68	120
2020-10-20	19:31	17.63	20.66	760	9.1	14.875	14.858	-17100	-34.49	120
2020-10-23	21:55	17.34	22.82	750	10.1	14.859	14.865	5600	11.20	120
2020-10-26	21:02	17.71	22.35	752	4.8	14.854	14.864	10100	21.52	120
2020-11-01	24 hours	17.19	24.75	732	5.9	14.873	14.880	7300	12.29	120
2020-11-07	24 hours	17.84	25.68	759	5.9	14.869	14.872	3100	5.03	120
2020-11-13	24 hours	17.79	25.62	748	1.9	14.860	14.861	600	0.98	120
2020-11-19	24 hours	17.63	25.22	756	7.3	14.848	14.850	2200	3.64	120
2020-11-25	24 hours	17.83	25.68	756	4.4	14.850	14.856	6700	10.87	120
2020-12-01	24 hours	17.48	25.18	748	7.0	14.843	14.861	18300	30.28	120
2020-12-07	24 hours	17.88	25.75	740	-2.1	14.834	14.836	1900	3.07	120
2020-12-13	24 hours	17.98	25.90	746	-1.3	14.831	14.839	8300	13.35	120
2020-12-19	24 hours	18.37	26.45	756	-3.6	14.837	14.843	5700	8.98	120
2020-12-25	24 hours	17.34 <sup>a</sup>	22.82 <sup>a</sup>	753 <sup>a</sup>	12.3 <sup>a</sup>	14.840	14.850	10000	18.26	120
2020-12-31	24 hours	18.58	26.76	759	-5.8	14.845	14.850	4800	7.47	120
2021-01-06	24 hours	18.00	24.73	744	-2.7	14.836	14.852	16300	27.46	120
2021-01-12	24 hours	16.70	24.74	749	-6.7	14.854	14.872	18200	30.65	120
2021-01-18	24 hours	17.52	25.52	737	-0.8	14.868	14.877	8600	14.04	120
2021-01-24	24 hours	16.70	24.03	737	-8.0	14.823	14.827	4200	7.28	120
2021-01-30	24 hours	16.70	24.03	750	-11.2	14.829	14.833	3600	6.24	120

	Table 5 Air Quality Reporting Upham East Gypsum Quarry Upham, New Brunswick Proejct No. 21-3049											
Test Start	Duration	Flow Rate	Air Volume	Pressure	Temperature	Initial Filter Weight	Final Filter Weight	TSP Mass	TSP	Site Guideline		
		(L/min)	(m <sup>3</sup> )	(mm Hg)	(°C)	(g)	(g)	(µg)	(µg/m3)	(µg/m <sup>3</sup> )		
2021-02-05	24 hours	17.90	25.80	744	-0.9	14.850	14.866	15800	25.52	120		
2021-02-11	24 hours	16.70	24.05	750	-12.6	14.829	14.834	5300	9.18	120		
2021-02-17	24 hours	16.70	24.05	755	-9.9	14.818	14.821	2800	4.85	120		
2021-02-23	24 hours	17.70	25.49	737	-0.6	14.891	14.897	6000	9.81	120		
2021-03-01	24 hours	17.87	25.74	741	-1.6	14.858	14.866	7700	12.46	120		
2021-03-07	24 hours	16.70	24.05	753	-8.9	14.840	14.851	11800	20.44	120		
2021-03-13	24 hours	17.92	25.81	743	-1.3	14.828	14.835	6900	11.14	120		
2021-03-19	24 hours	16.70	24.05	750	-5.3	14.819	14.823	4600	7.97	120		
2021-03-25	24 hours	17.52	24.23	754	8.9	14.820	14.826	6100	10.49	120		
2021-03-31	24 hours	16.70	24.05	756	6.8	14.823	14.831	8600	14.90	120		
2021-04-06	24 hours	16.70	24.05	746	4.1	14.822	14.835	13400	23.22	120		
2021-04-12	24 hours	17.64	25.55	749	5.2	14.812	14.817	5100	8.32	120		
2021-04-18	24 hours	16.70	24.05	742	2.6	14.815	14.825	10000	17.33	120		
2021-04-24	24 hours	17.27	24.05	743	8.8	14.815	14.826	10400	18.02	120		
2021-04-30	24 hours	17.24	24.82	735	6.4	14.814	14.921	107000	11.75	120		
2021-05-06 <sup>D</sup>	21.08	17.42	21.08	750	8.8	14.840	14.850	10100	19.96	120		
2021-05-12 <sup>b</sup>	-	17.49	25.19	748	7.1	14.822	14.830	7800	12.90	120		
2021-05-18 <sup>b</sup>	19.21	17.53	20.35	757	9.8	14.830	14.838	8700	17.81	120		
2021-05-27 <sup>c</sup>	-	-		-				-	-	120		
2021-05-31	24 hours	16.70	24.05	753	14.2	14.829	14.835	5800	10.05	120		
2021-06-04	33.46	16.79	34.02	746	18.1	14.831	14.839	7900	9.68	120		
2021-06-10	24 hours	17.42	25.09	754	10.4	14.840	14.844	4300	7.14	120		
2021-06-16	24 hours	17.48	25.18	743	5.6	14.849	14.854	5600	9.27	120		
2021-06-22 <sup>d</sup>	24 hours	17.23	24.82	744	9.7	14.870	14.879	9100	15.28	120		
2021-06-24	24 hours	17.94	25.83	762	5.4	14.846	14.847	1200	1.94	120		
2021-06-30	24 hours	17.01	24.29	746	14.4	14.885	14.889	4200	7.20	120		
2021-07-06	24 hours	17.30	24.91	746	9.3	14.866	14.868	1700	2.84	120		
2021-07-12	24 hours	17.60	24.05	759	9.5	14.848	14.851	3000	5.20	120		
2021-07-18	24 hours	16.70	24.05	753	11.8	14.847	14.852	5200	9.01	120		
2021-07-24	24 hours	17.51	25.21	753	8.8	14.831	14.838	6900	11.40	120		
2021-07-30	24 hours	17.43	25.10	742	5.6	14.830	14.840	10000	16.60	120		
2021-08-05	24 hours	17.47	25.15	755	10.0	14.821	14.835	13900	23.03	120		
2021-08-10	24 hours	17.21	24.78	753	13.5	14.822	14.830	8100	13.62	120		
2021-08-11	24 hours	17.18	23.42	752	13.6	14.878	14.890	12000	21.35	120		
2021-08-17	24 hours	17.43	24.05	756	11.2	14.825	14.836	10200	17.67	120		
2021-08-23	24 hours	17.19	24.75	750	12.4	14.844	14.859	14500	24.41	120		

	Table 5 Air Quality Reporting Upham East Gypsum Quarry Upham, New Brunswick Proejct No. 21-3049												
Test Start	Duration	Flow Rate	Air Volume	Pressure	Temperature	Initial Filter Weight	Final Filter Weight	TSP Mass	TSP	Site Guideline			
		(L/min)	(m <sup>3</sup> )	(mm Hg)	(°C)	(g)	(g)	(µg)	(µg/m3)	(µg/m³)			
2021-08-29	24 hours	17.49	25.18	755	9.8	14.824	14.830	6100	10.09	120			
2021-09-04	24 hours	16.70	24.05	745	3.1	14.822	14.832	10600	18.36	120			
2021-09-09	24 hours	17.15	24.70	747	11.9	14.818	14.824	5600	9.45	120			
2021-09-16	24 hours	18.05	24.05	759	2.7	14.844	14.859	15700	27.20	120			
2021-09-22	24 hours	18.68	25.46	757	7.4	14.821	14.832	11700	19.15	120			
2021-09-28	24 hours	17.45	25.13	746	7.2	14.821	14.830	9100	15.09	120			
2021-10-04	24 hours	18.30	26.35	755	-2.6	14.820	14.824	3700	5.85	120			
2021-10-10	24 hours	17.98	25.89	757	2.7	14.818	14.823	5000	8.05	120			
2021-10-16	24 hours	17.16	24.70	747	12.1	14.815	14.822	6600	11.13	120			
2021-10-22	24 hours	17.10	24.63	747	13.2	14.816	14.820	3200	5.41	120			
2021-10-28	24 hours	17.61	25.36	749	5.8	14.837	14.838	1200	1.97	120			
2021-11-03	24 hours	18.17	26.17	754	-1.1	14.825	14.835	10000	15.92	120			
2021-11-09	24 hours	17.76	25.58	/51	3.6	14.821	14.836	14400	23.46	120			
2021-11-15	24 hours	17.67	25.45	739	0.8	14.831	14.837	5700	9.33	120			
2021-11-21	24 hours	17.06	25.72	/56	3.9	14.834	14.838	3800	0.10	120			
2021-11-27	24 hours	17.98	25.90	737	-4.7	14.839	14.846	7400	11.90	120			
2021-12-03	24 hours	18.26	26.29	742	-0.8	14.840	14.849	9800	15.53	120			
2021-12-09	24 HOUIS	19.23	27.09	755	-15.9	14.823	14.824	1000	UC.1	120			
2021-12-15	24 hours	18.55	26.72	760	-4.7	14.626	14.841	215300	335./3	120			
2021-12-17	24 hours	17.98	25.89	748	-0.6	14.819	14.829	9600	15.45	120			
2021-12-23	24 hours	18.90	27.22	747	-14.2	14.835	14.839	3800	5.82	120			
2021-12-29	24 HOURS	18.23	20.20	750	-3.0	14.842	14.850	10200	12.22	120			
2022-01-04	24 Hours	10.07	27.20	733	-17.2	14.825	14.000	6600	0.05	120			
2022-01-10	24 hours	18.70	26.08	755	-17.2	14.842	14.865	23300	37.23	120			
2022-01-22	24 hours	10.70	25.00	752	-15.5	14.829	14.851	21300	34.17	120			
2022-01-28	24 hours	18.59	26.78	753	-7.8	14 833	14 861	28600	44 50	120			
2022-02-03	24 hours	18.24	26.26	755	-17	14 894	14 940	45300	71.88	120			
2022-02-09	24 hours	18.11	26.07	748	-2.5	14.856	14.858	2100	3.36	120			
2022-02-15	24 hours	19.70	28.37	762	-19.5	14.843	14.844	1700	2.50	120			
2022-02-21 <sup>C</sup>	9.5 hours	-	-	-	-	-	-	-	-	120			
2022-02-23	24 hours	18.41	26.51	749	-6.4	14.837	14,844	7100	11.16	120			
2022-03-01	24 hours	18.43	26.28	751	-5.9	14.827	14.831	3300	5.23	120			
2022-03-08	24 hours	18.37	26.45	748	-6.2	14 834	14 834	500	0.79	120			
2022-03-14	24 hours	18 11	26.08	756	0.2	14 814	14 818	4300	6.87	120			

Art Using Reporting Uption: New formatic Provide the 210094         Art Volume         Pressure (nm)         Intel Filter Weight         Find Filter Weight         Intel Filter Weight         I						Table 5					
Instant, env oppand with any synthesis and any synthy synthy synthy synthesis and any synthesis and any synthesis a					Lin	Air Quality Reporting					
Test Start         Duration         Inov Rate         Ar Volume         Pressure         Temperature         Initial Filter         Start Multiple         Star					Up	nam East Gypsum Qua	arry				
Test Start         Flow Rate         Air Volume         Pressure         Initial Filter Weight         Tipel All ther Weight         Tipel All ther WeightWeight         Tipel All ther Weight					L. L	Proeict No. 21-3049	ĸ				
Test Start         Duration         Flow Rate         Air Volume         Pressure         Temperature         Initial Filter Weight         TSP Mass         TSP         Site Caldelin           2022203.26         24 hours         17.51         25.22         735         2.0         14.839         14.843         3800         6.67         120           202203.26         24 hours         17.51         25.22         735         2.0         14.839         14.847         7500         12.39         120           202204-01         24 hours         17.77         25.59         753         4.4         14.847         14.862         500         0.33         120           202204-13         24 hours         17.69         25.47         746         3.4         14.840         14.847         14.860         0.0         0.33         120           202204-25         24 hours         17.69         25.47         746         3.4         14.841         14.845         14.800         24.26         120           202204-50         24 hours         17.82         25.67         755         4.4         14.821         14.845         14.840         14.872         1300         22.37         120           202205-51						1100j01100.21 0047					
Test Start         Duration         Involutine         Pressure         Weight			Flow Data	Air Valumaa	Dressure	Tomporature	Initial Filter	Final Filter		TCD	Cito Cuidalina
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Test Start	Duration	FIOW Rate	Air volume	Pressure	remperature	Weight	Weight	I SP IVIASS	13P	Site Guideline
2022 03-0         24 hours         17.53         25.24         741         3.9         14.839         14.833         3800         6.27         120           2022 04-01         24 hours         17.34         24.98         735         2.0         14.839         14.847         17.84         2500         8.67         120           2022 04-01         24 hours         17.77         25.59         753         4.4         14.849         14.849         200         0.33         120           2022 04-01         24 hours         17.69         25.53         752         6.6         14.855         14.849         200         0.33         120           2022 04-19         24 hours         17.65         25.47         764         3.4         14.843         14.845         14.845         14.845         14.845         14.845         14.845         14.845         14.845         14.845         14.845         14.845         14.820         <			(L/min)	(m <sup>3</sup> )	(mm Hg)	(°C)	(g)	(g)	(µg)	(µg/m3)	(µg/m³)
2022.03-26         24 hours         17.51         25.22         735         2.0         14.847         7500         12.39         120           2022.04.07         24 hours         17.77         25.59         753         4.4         14.847         14.847         5200         0.33         120           2022.04.07         24 hours         17.79         25.53         752         6.6         14.855         14.856         600         0.98         120           2022.04.19         24 hours         17.69         25.47         746         3.4         14.840         14.812         31700         24.26         120           2022.04.25         24 hours         17.65         25.47         754         3.7         14.825         14.840         14.840         2700         36.80         120           2022.05.07         24 hours         17.76         24.57         754         16.3         14.821         14.849         13300         22.37         120           2022.05.19         24 hours         17.76         24.57         754         16.3         14.829         13300         22.37         120           2022.05.19         24 hours         17.44         25.11         760 <td< td=""><td>2022-03-20</td><td>24 hours</td><td>17.53</td><td>25.24</td><td>741</td><td>3.9</td><td>14.830</td><td>14.833</td><td>3800</td><td>6.27</td><td>120</td></td<>	2022-03-20	24 hours	17.53	25.24	741	3.9	14.830	14.833	3800	6.27	120
2022-04-01         24 hours         17.34         24.98         735         4.4         14.847         14.852         5200         8.67         120           2022-04-13         24 hours         17.79         25.59         753         4.4         14.847         14.848         600         0.98         120           2022-04-13         24 hours         17.69         25.57         752         6.6         14.855         14.856         600         0.98         120           2022-04-13         24 hours         17.65         25.47         746         3.4         14.841         14.846         14.800         24.26         120           2022-05-12         24 hours         17.82         25.67         755         4.4         14.821         14.848         24.90         15.58         120           2022-05-13         24 hours         17.06         24.57         754         16.3         14.821         14.857         36.200         61.59         120           2022-05-13         24 hours         17.44         25.11         760         12.4         14.828         14.829         700         1.16         120           2022-05-13         24 hours         17.49         25.14 <t< td=""><td>2022-03-26</td><td>24 hours</td><td>17.51</td><td>25.22</td><td>735</td><td>2.0</td><td>14.839</td><td>14.847</td><td>7500</td><td>12.39</td><td>120</td></t<>	2022-03-26	24 hours	17.51	25.22	735	2.0	14.839	14.847	7500	12.39	120
2022-04-07         24 hours         17.77         25.59         753         4.4         14.848         14.849         200         0.33         120           2022-04-13         24 hours         17.59         25.53         752         6.6         14.855         14.856         600         0.98         120           2022-04-19         24 hours         17.69         25.42         757         7.8         14.831         14.845         14800         24.26         120           2022-05-01         24 hours         17.84         25.70         755         4.4         14.823         14.845         14.800         24.26         120           2022-05-07         24 hours         17.84         25.70         755         4.4         14.823         14.832         9600         15.58         120           2022-05-13         24 hours         17.06         24.77         754         10.3         14.821         14.829         13300         22.37         120           2022-05-52         24 hours         17.46         25.11         761         8.8         14.820         13300         22.37         120           2022-06-12         24 hours         17.46         25.14         751 <td< td=""><td>2022-04-01</td><td>24 hours</td><td>17.34</td><td>24.98</td><td>735</td><td>4.4</td><td>14.847</td><td>14.852</td><td>5200</td><td>8.67</td><td>120</td></td<>	2022-04-01	24 hours	17.34	24.98	735	4.4	14.847	14.852	5200	8.67	120
2022-04-13         24 hours         17.59         25.53         752         6.6         14.855         14.856         600         0.98         120           2022-04-19         24 hours         17.65         25.47         746         3.4         14.845         14.860         24.26         120           2022-04-25         24 hours         17.85         25.67         75         7.8         14.825         14.848         2200         36.80         120           2022-05-07         24 hours         17.82         25.67         754         16.3         14.821         14.832         9600         15.58         120           2022-05-19         24 hours         17.06         24.57         754         16.3         14.821         14.857         36200         61.39         120           2022-05-19         24 hours         17.44         25.11         760         12.4         14.828         14.829         1700         1.16         120           2022-05-25         24 hours         17.39         25.04         752         18.3         14.826         14.831         900         1.49         120           2022-06-12         24 hours         16.92         24.30         752	2022-04-07	24 hours	17.77	25.59	753	4.4	14.848	14.849	200	0.33	120
2022-04-19         24 hours         17.69         25.47         746         3.4         14.840         14.872         31700         51.86         120           2022-04-25         24 hours         17.65         25.42         757         7.8         14.831         14.845         14.800         24.26         120           2022-05-01         24 hours         17.82         25.67         755         4.4         14.823         14.842         9600         15.58         120           2022-05-13         24 hours         17.06         24.57         754         1.4         14.823         14.827         36200         61.39         120           2022-05-19         24 hours         17.70         24.77         749         12.0         14.816         14.829         700         1.16         120           2022-05-31         24 hours         17.44         25.14         751         8.8         14.850         14.813         14.826         13800         22.96         120           2022-06-12         24 hours         16.82         24.36         752         18.3         14.826         14.833         7200         12.32         120           2022-06-12         24 hours         16.81	2022-04-13	24 hours	17.59	25.53	752	6.6	14.855	14.856	600	0.98	120
2022-04-25         24 hours         17.65         25.42         757         7.8         14.831         14.845         14800         24.26         120           2022-05-01         24 hours         17.84         25.70         754         3.7         14.823         14.832         9600         15.58         120           2022-05-13         24 hours         17.06         24.57         754         16.3         14.821         14.827         36.200         61.39         120           2022-05-13         24 hours         17.20         24.77         749         12.0         14.816         14.829         1300         22.37         120           2022-05-25         24 hours         17.44         25.11         760         12.4         14.828         14.829         700         1.16         120           2022-06-06         24 hours         17.39         25.04         753         10.5         14.813         14.826         13800         22.96         120           2022-06-18         24 hours         16.93         24.36         752         18.3         14.825         14.833         1200         12.32         120           2022-06-24         24 hours         16.95         24.41	2022-04-19	24 hours	17.69	25.47	746	3.4	14.840	14.872	31700	51.86	120
2022-05-01         24 hours         17.84         25.70         754         3.7         14.825         14.848         22700         36.80         120           2022-05-07         24 hours         17.82         25.67         755         4.4         14.823         14.832         9600         15.58         120           2022-05-13         24 hours         17.06         24.57         754         16.3         14.821         14.827         36200         61.39         120           2022-05-19         24 hours         17.40         24.77         749         12.0         14.816         14.829         1300         22.37         120           2022-05-25         24 hours         17.46         25.14         751         8.8         14.850         14.851         900         1.49         120           2022-06-12         24 hours         17.39         25.04         753         10.5         14.813         14.826         14.830         22.96         120         120           2022-06-18         24 hours         16.93         24.38         751         17.4         14.826         14.839         1200         12.32         120           2022-06-24         24 hours         16.95	2022-04-25	24 hours	17.65	25.42	757	7.8	14.831	14.845	14800	24.26	120
2022-05-07         24 hours         17.82         25.67         755         4.4         14.823         14.821         14.823         9600         15.58         120           2022-05-13         24 hours         17.06         24.77         749         12.0         14.816         14.827         33200         61.39         120           2022-05-15         24 hours         17.44         25.11         760         12.4         14.828         14.829         700         1.16         120           2022-05-31         24 hours         17.44         25.14         751         8.8         14.850         14.813         14.824         13800         22.96         120           2022-06-06         24 hours         16.92         24.36         752         18.3         14.851         14.833         7200         12.32         120           2022-06-18         24 hours         16.81         24.21         739         15.2         14.843         14.848         5600         9.64         120           2022-06-24         24 hours         16.69         24.41         752         18.0         14.828         14.833         12900         2.02         120           2022-06-24         24 hours	2022-05-01	24 hours	17.84	25.70	754	3.7	14.825	14.848	22700	36.80	120
2022-05-13         24 hours         17.06         24.57         754         16.3         14.821         14.857         36200         61.39         120           2022-05-19         24 hours         17.20         24.77         749         12.0         14.816         14.829         13300         22.37         120           2022-05-25         24 hours         17.44         25.11         760         12.4         14.828         14.829         700         1.16         120           2022-05-65         24 hours         17.46         25.14         753         10.5         14.813         14.820         13800         22.96         120           2022-06-66         24 hours         16.92         24.36         752         18.3         14.825         14.833         7200         12.32         120           2022-06-12         24 hours         16.92         24.36         751         17.4         14.828         14.838         30300         51.78         120           2022-06-30         24 hours         16.95         24.41         750         17.7         14.826         14.839         12000         26.202         120           2022-07-12         24 hours         16.57         23.85	2022-05-07	24 hours	17.82	25.67	755	4.4	14.823	14.832	9600	15.58	120
2022-05-19         24 hours         17.20         24.77         749         12.0         14.816         14.829         13300         22.37         120           2022-05-25         24 hours         17.44         25.11         760         12.4         14.828         14.829         700         1.16         120           2022-05-31         24 hours         17.46         25.14         751         8.8         14.850         14.851         900         1.49         120           2022-06-06         24 hours         16.92         24.36         752         18.3         14.825         14.833         7200         12.32         120           2022-06-12         24 hours         16.61         24.21         739         15.2         14.843         14.848         5600         9.64         120           2022-06-30         24 hours         16.93         24.41         752         18.0         14.826         14.839         12900         22.02         120           2022-07-06         24 hours         16.95         24.41         752         18.0         14.826         14.839         12900         22.02         120           2022-07-16         24 hours         16.57         23.85	2022-05-13	24 hours	17.06	24.57	754	16.3	14.821	14.857	36200	61.39	120
2022.05-25         24 hours         17.44         25.11         760         1.24         14.828         14.829         700         1.16         120           2022.05-31         24 hours         17.46         25.14         751         8.8         14.850         14.851         900         1.49         120           2022.06-06         24 hours         16.92         24.36         752         18.3         14.825         14.833         7200         12.32         120           2022.06-12         24 hours         16.92         24.36         751         17.4         14.828         14.858         30300         51.78         120           2022.06-24         24 hours         16.95         24.41         752         18.0         14.828         14.858         30300         51.78         120           2022.06-30         24 hours         16.95         24.41         752         18.0         14.826         14.839         12900         22.02         120           2022.07-16         24 hours         16.57         23.85         746         22.1         14.829         14.829         400         0.68         120           2022.07-24         24 hours         16.73         24.10	2022-05-19	24 hours	17.20	24.77	749	12.0	14.816	14.829	13300	22.37	120
2022-05-31         24 hours         17.46         25.14         751         8.8         14.850         14.851         900         1.49         120           2022-06-06         24 hours         17.39         25.04         753         10.5         14.813         14.826         13800         22.96         120           2022-06-12         24 hours         16.81         24.21         739         15.2         14.843         14.848         5600         9.64         120           2022-06-30         24 hours         16.93         24.38         751         17.4         14.828         14.858         30300         51.78         120           2022-06-30         24 hours         16.95         24.41         752         18.0         14.826         14.839         1200         2.02         120           2022-06-30         24 hours         16.57         23.85         747         13.0         14.829         14.836         9200         12.02         120           2022-07-12         24 hours         16.57         23.85         746         22.1         14.821         14.840         18500         32.32         120           2022-07-30         24 hours         16.67         23.85	2022-05-25	24 hours	17.44	25.11	760	12.4	14.828	14.829	700	1.16	120
2022-06-06         24 hours         17.39         25.04         753         10.5         14.813         14.826         13800         22.96         120           2022-06-12         24 hours         16.92         24.36         752         18.3         14.825         14.833         7200         12.32         120           2022-06-18         24 hours         16.93         24.38         751         17.4         14.843         14.848         5600         9.64         120           2022-06-24         24 hours         16.95         24.41         752         18.0         14.826         14.839         1200         22.02         120           2022-06-24         24 hours         16.95         24.41         752         18.0         14.826         14.839         1200         22.02         120           2022-07-06         24 hours         16.59         24.29         750         17.7         14.826         14.836         9200         15.78         120           2022-07-12         24 hours         16.57         23.85         746         22.1         14.821         14.840         18500         32.32         120           2022-07-30         24 hours         16.73         24.10	2022-05-31	24 hours	17.46	25.14	751	8.8	14.850	14.851	900	1.49	120
2022-06-1224 hours16.9224.3675218.314.82514.833720012.321202022-06-1824 hours16.8124.2173915.214.84314.84856009.641202022-06-2424 hours16.9324.3875117.414.82814.8583030051.781202022-06-3024 hours16.9524.4175218.014.82614.8391290022.021202022-07-0624 hours17.1024.6374713.014.82914.8294000.681202022-07-1224 hours16.5723.8574622.114.82114.8401850032.321202022-07-1824 hours16.7024.0574924.414.86114.86215002.601202022-07-3024 hours16.7024.0574924.414.86114.86215002.601202022-08-1524 hours16.7324.1074920.414.83114.83210001.731202022-08-1724 hours16.7624.1375019.914.82314.83214.83210001.731202022-08-1724 hours16.7624.1174916.514.860114.8771170029.021202022-08-1724 hours16.7624.4174916.514.860114.8771170029.021202022-08-17<	2022-06-06	24 hours	17.39	25.04	753	10.5	14.813	14.826	13800	22.96	120
2022-06-18         24 hours         16.81         24.21         739         15.2         14.843         14.848         5600         9.64         120           2022-06-24         24 hours         16.93         24.38         751         17.4         14.828         14.858         30300         51.78         120           2022-06-30         24 hours         16.95         24.41         752         18.0         14.826         14.839         12900         22.02         120           2022-07-06         24 hours         17.10         24.63         747         13.0         14.826         14.839         9200         15.78         120           2022-07-12         24 hours         16.57         23.85         746         22.1         14.826         14.830         18500         32.32         120           2022-07-24         24 hours         16.70         24.05         749         24.4         14.861         14.862         1500         2.60         120           2022-07-30         24 hours         16.73         24.10         749         20.4         14.831         14.842         1400         25.00         120           2022-08-17         24 hours         16.66         24	2022-06-12	24 hours	16.92	24.36	752	18.3	14.825	14.833	7200	12.32	120
2022-06-2424 hours16.9324.3875117.414.82814.8583030051.781202022-06-3024 hours16.9524.4175218.014.82914.8391290022.021202022-07-0624 hours17.1024.6374713.014.82914.8294000.681202022-07-1224 hours16.5924.2975017.714.82614.836920015.781202022-07-1824 hours16.5723.8574622.114.82114.8401850032.321202022-07-3024 hours16.7024.0574924.414.86114.86215002.601202022-07-3024 hours16.662475523.914.823314.84271440025.001202022-08-0524 hours16.662475523.914.823314.84271440025.001202022-08-1124 hours16.7624.1375019.914.82114.835837006.391202022-08-1724 hours16.7624.4174916.514.860114.87711700029.021202022-08-1724 hours16.7624.4374916.514.860114.87711700029.021202022-08-2324 hours16.7024.0575317.314.870614.8111050018.191202022-08-29 <td< td=""><td>2022-06-18</td><td>24 hours</td><td>16.81</td><td>24.21</td><td>739</td><td>15.2</td><td>14.843</td><td>14.848</td><td>5600</td><td>9.64</td><td>120</td></td<>	2022-06-18	24 hours	16.81	24.21	739	15.2	14.843	14.848	5600	9.64	120
2022-06-3024 hours16.9524.4175218.014.82614.8391290022.021202022-07-0624 hours17.1024.6374713.014.82914.8294000.681202022-07-1224 hours16.5924.2975017.714.82614.836920015.781202022-07-1824 hours16.5723.8574622.114.82114.8401850032.321202022-07-2424 hours16.7024.0574924.414.86114.86215002.601202022-07-3024 hours16.662475523.914.828314.84271440025.001202022-08-0524 hours16.662475523.914.828314.84271440025.001202022-08-1124 hours16.7624.1375019.914.828114.84271440025.001202022-08-1724 hours16.9524.4174916.514.860114.87111700029.021202022-08-1724 hours16.8924.3374917.214.864914.8726770013.191202022-08-2324 hours16.724.0575317.314.870614.88111050018.191202022-08-2424 hours17.1124.6475516.214.863514.865314.865318003.04120	2022-06-24	24 hours	16.93	24.38	751	17.4	14.828	14.858	30300	51.78	120
2022-07-0624 hours17.1024.6374713.014.82914.8294000.681202022-07-1224 hours16.5924.2975017.714.82614.836920015.781202022-07-1824 hours16.5723.8574622.114.82114.8401850032.321202022-07-2424 hours16.7024.0574924.414.86114.86215002.601202022-07-3024 hours16.7324.1074920.414.83114.83210001.731202022-08-0524 hours16.662475523.914.828314.84271440025.001202022-08-1124 hours16.7624.1375019.914.82114.835837006.391202022-08-1724 hours16.7924.4174916.514.860114.87111700029.021202022-08-2324 hours16.8924.3374917.214.864914.8716770013.191202022-08-2924 hours16.724.0575317.314.870614.88111050018.191202022-09-0424 hours17.1124.6475516.214.863514.865318003.041202022-09-1624 hours17.3224.9574910.314.861414.8654400015.291202022-09-16	2022-06-30	24 hours	16.95	24.41	752	18.0	14.826	14.839	12900	22.02	120
2022-07-1224 hours16.5924.2975017.714.82614.836920015.781202022-07-1824 hours16.5723.8574622.114.82114.8401850032.321202022-07-2424 hours16.7024.0574924.414.86114.86215002.601202022-07-3024 hours16.7324.1074920.414.83114.83210001.731202022-08-0524 hours16.662475523.914.828314.84271440025.001202022-08-1124 hours16.7624.1375019.914.832114.835837006.391202022-08-1724 hours16.9524.4174916.514.860114.87711700029.021202022-08-2324 hours16.8924.3374917.214.864914.8716770013.191202022-08-2924 hours16.724.0575317.314.870614.88111050018.191202022-09-0424 hours17.1124.6475516.214.863514.865318003.041202022-09-1624 hours17.3224.9574910.314.861414.865440006.681202022-09-2224 hours16.9324.3874113.614.860314.882414.8544900015.29120 <td< td=""><td>2022-07-06</td><td>24 hours</td><td>17.10</td><td>24.63</td><td>747</td><td>13.0</td><td>14.829</td><td>14.829</td><td>400</td><td>0.68</td><td>120</td></td<>	2022-07-06	24 hours	17.10	24.63	747	13.0	14.829	14.829	400	0.68	120
2022-07-1824 hours16.5723.8574622.114.82114.8401850032.321202022-07-2424 hours16.7024.0574924.414.86114.86215002.601202022-07-3024 hours16.7324.1074920.414.83114.83210001.731202022-08-0524 hours16.662475523.914.828314.84271440025.001202022-08-1124 hours16.7624.1375019.914.832114.835837006.391202022-08-1724 hours16.9524.4174916.514.860114.87711700029.021202022-08-2324 hours16.8924.3374917.214.864914.8111050018.191202022-09-2924 hours16.724.0575317.314.870614.88111050018.191202022-09-0424 hours17.1124.6475516.214.863514.865318003.041202022-09-1024 hours17.3224.9575517.614.845440006.681202022-09-1624 hours17.3224.9575517.614.863414.8544900015.291202022-09-2224 hours16.9324.3874113.614.860314.85252190037.431202022-09-2824 hours<	2022-07-12	24 hours	16.59	24.29	/50	1/./	14.826	14.836	9200	15.78	120
2022-07-2424 hours16.7024.0574924.414.86114.86215002.601202022-07-3024 hours16.7324.1074920.414.83114.83210001.731202022-08-0524 hours16.662475523.914.828314.84271440025.001202022-08-1124 hours16.7624.1375019.914.828314.827140025.001202022-08-1724 hours16.9524.4174916.514.860114.87711700029.021202022-08-2324 hours16.8924.3374917.214.864914.8726770013.191202022-08-2924 hours16.724.0575317.314.870614.88111050018.191202022-09-0424 hours17.1124.6475516.214.863514.865318003.041202022-09-1624 hours17.3224.9575517.614.863514.8653180015.291202022-09-1624 hours17.3224.9574910.314.861414.864440006.681202022-09-2224 hours16.9324.3874113.614.860314.8295920015.551202022-09-2824 hours17.1224.6575013.914.850314.8595920015.551202022-09-28 </td <td>2022-07-18</td> <td>24 hours</td> <td>16.57</td> <td>23.85</td> <td>/46</td> <td>22.1</td> <td>14.821</td> <td>14.840</td> <td>18500</td> <td>32.32</td> <td>120</td>	2022-07-18	24 hours	16.57	23.85	/46	22.1	14.821	14.840	18500	32.32	120
2022-07-3024 hours16.7324.1074920.414.83114.83210001.731202022-08-0524 hours16.662475523.914.828314.84271440025.001202022-08-1124 hours16.7624.1375019.914.822114.832114.835837006.391202022-08-1724 hours16.9524.4174916.514.80114.8371170029.021202022-08-2324 hours16.8924.3374917.214.864914.8726770013.191202022-08-2924 hours16.724.0575317.314.870614.88111050018.191202022-09-0424 hours17.1124.6475516.214.863514.865318003.041202022-09-1624 hours17.3224.9575517.614.845414.8544900015.291202022-09-1624 hours17.3224.9574910.314.861414.864440006.681202022-09-2224 hours16.9324.3874113.614.860314.8255920037.431202022-09-2824 hours17.1224.6575013.914.850314.8595920015.551202022-09-2824 hours17.8925.767574.314.857314.8668950015.37120 <td>2022-07-24</td> <td>24 hours</td> <td>16.70</td> <td>24.05</td> <td>749</td> <td>24.4</td> <td>14.861</td> <td>14.862</td> <td>1500</td> <td>2.60</td> <td>120</td>	2022-07-24	24 hours	16.70	24.05	749	24.4	14.861	14.862	1500	2.60	120
2022-08-0524 hours16.662475523.914.828314.84271440025.001202022-08-1124 hours16.7624.1375019.914.832114.835837006.391202022-08-1724 hours16.9524.4174916.514.860114.87711700029.021202022-08-2324 hours16.8924.3374917.214.864914.8716770013.191202022-08-2924 hours16.724.0575317.314.870614.88111050018.191202022-09-0424 hours17.1124.6475516.214.863514.865318003.041202022-09-1024 hours17.3224.9575517.614.845414.8544900015.291202022-09-1624 hours17.3224.9574910.314.861414.865440006.681202022-09-2224 hours16.9324.3874113.614.860314.88222190037.431202022-09-2824 hours17.1224.6575013.914.850314.8595920015.551202022-09-2824 hours17.8925.767574.314.857314.8668950015.37120	2022-07-30	24 hours	16.73	24.10	749	20.4	14.831	14.832	1000	1.73	120
2022-08-11         24 hours         16.76         24.13         750         19.9         14.8321         14.8358         3700         6.39         120           2022-08-17         24 hours         16.95         24.41         749         16.5         14.8601         14.8711         17000         29.02         120           2022-08-23         24 hours         16.89         24.33         749         17.2         14.8601         14.8716         7700         13.19         120           2022-08-29         24 hours         16.7         24.05         753         17.3         14.8706         14.8811         10500         18.19         120           2022-09-04         24 hours         17.11         24.64         755         16.2         14.8635         14.8653         1800         3.04         120           2022-09-10         24 hours         17.32         24.52         755         17.6         14.8454         14.8544         9000         15.29         120           2022-09-16         24 hours         17.32         24.95         749         10.3         14.8614         14.8544         9000         15.29         120           2022-09-22         24 hours         17.32         2	2022-08-05	24 hours	16.66	24	755	23.9	14.8283	14.8427	14400	25.00	120
2022-08-17         24 hours         16.95         24.41         749         16.5         14.8001         14.8771         17000         29.02         120           2022-08-23         24 hours         16.89         24.33         749         17.2         14.8601         14.8771         17000         29.02         120           2022-08-23         24 hours         16.7         24.05         753         17.3         14.8601         14.811         10500         18.19         120           2022-08-29         24 hours         17.11         24.64         755         16.2         14.8635         14.8653         1800         3.04         120           2022-09-04         24 hours         17.03         24.52         755         17.6         14.8454         14.8544         9000         15.29         120           2022-09-16         24 hours         17.32         24.95         749         10.3         14.8614         14.8654         4000         6.68         120           2022-09-16         24 hours         17.32         24.95         749         10.3         14.8614         14.8654         4000         6.68         120           2022-09-22         24 hours         16.93         24	2022-08-11	24 hours	16.70	24.13	750	19.9	14.8321	14.8358	3700	0.39	120
2022-08-29         24 hours         16.89         24.33         749         17.2         14.8049         14.8726         7700         13.19         120           2022-08-29         24 hours         16.7         24.05         753         17.3         14.8706         14.8811         10500         18.19         120           2022-09-04         24 hours         17.11         24.64         755         16.2         14.8635         14.8653         1800         3.04         120           2022-09-10         24 hours         17.03         24.52         755         17.6         14.8635         14.8544         9000         15.29         120           2022-09-16         24 hours         17.32         24.95         749         10.3         14.8614         14.8544         4000         6.68         120           2022-09-22         24 hours         16.93         24.38         741         13.6         14.8603         14.8822         21900         37.43         120           2022-09-28         24 hours         17.12         24.65         750         13.9         14.8503         14.8595         9200         15.55         120           2022-09-28         24 hours         17.89         2	2022-08-17	24 hours	16.95	24.41	749	10.5	14.8601	14.8771	7700	29.02	120
2022-08-29         24 hours         16.7         24.03         755         17.5         14.8706         14.8611         10500         18.19         120           2022-09-04         24 hours         17.11         24.64         755         16.2         14.8635         14.8653         1800         3.04         120           2022-09-10         24 hours         17.03         24.52         755         17.6         14.8644         14.8544         9000         15.29         120           2022-09-16         24 hours         17.32         24.95         749         10.3         14.8614         14.8654         4000         6.68         120           2022-09-22         24 hours         16.93         24.38         741         13.6         14.8603         14.8822         21900         37.43         120           2022-09-28         24 hours         17.12         24.65         750         13.9         14.803         14.8595         9200         15.55         120           2022-09-28         24 hours         17.89         25.76         757         4.3         14.8573         14.8688         9500         15.37         120	2022-06-23	24 Hours	16.69	24.33	749	17.2	14.0049	14.0720	10500	13.19	120
2022-09-04         24 hours         17.11         24.04         755         16.2         14.8035         14.8035         1600         5.04         120           2022-09-10         24 hours         17.03         24.52         755         17.6         14.8035         14.8035         1600         5.04         120           2022-09-10         24 hours         17.03         24.52         755         17.6         14.8454         14.8544         9000         15.29         120           2022-09-16         24 hours         17.32         24.95         749         10.3         14.8614         14.8654         4000         6.68         120           2022-09-22         24 hours         16.93         24.38         741         13.6         14.8603         14.8822         21900         37.43         120           2022-09-28         24 hours         17.12         24.65         750         13.9         14.8503         14.8595         9200         15.55         120           2022-10-04         24 hours         17.89         25.76         757         4.3         14.8573         14.8688         9500         15.37         120	2022-06-29	24 Hours	10.7	24.05	753	17.3	14.0700	14.0011	1000	10.19	120
2022-09-16         24 hours         17.32         24.95         749         10.3         14.8434         14.8544         9000         15.27         120           2022-09-16         24 hours         17.32         24.95         749         10.3         14.8614         14.8544         4000         6.68         120           2022-09-22         24 hours         16.93         24.38         741         13.6         14.8603         14.822         21900         37.43         120           2022-09-28         24 hours         17.12         24.65         750         13.9         14.8503         14.8595         9200         15.55         120           2022-10-04         24 hours         17.89         25.76         757         4.3         14.8573         14.8668         9500         15.37         120	2022-09-04	24 Hours	17.11	24.04	755	17.6	14.6035	14.0033	0000	15 20	120
2022-09-10         24 hours         17.32         24.33         747         10.3         14.8014         14.8034         4000         0.68         120           2022-09-22         24 hours         16.93         24.38         741         13.6         14.8034         14.8822         21900         37.43         120           2022-09-28         24 hours         17.12         24.65         750         13.9         14.8503         14.8525         9200         15.55         120           2022-09-28         24 hours         17.89         25.76         757         4.3         14.8573         14.8668         9500         15.37         120	2022-07-10	24 hours	17.03	24.52	733	10.2	14.0454	14.0344	4000	6.40	120
2022-07-22         24 hours         17.3         24.30         741         13.0         14.803         14.802         2190         37.43         120           2022-09-28         24 hours         17.12         24.65         750         13.9         14.8503         14.8595         9200         15.55         120           2022-10-04         24 hours         17.89         25.76         757         4.3         14.8573         14.8668         9500         15.37         120	2022-09-10	24 Hours	17.32	24.93	749	13.6	14.8014	14.0034	21000	27.43	120
2022-07-20         24 hours         17.12         24.03         730         13.7         14.003         14.073         9200         13.33         120           2022-10-04         24 hours         17.89         25.76         757         4.3         14.8573         14.8668         9500         15.37         120	2022-09-22	24 hours	17.12	24.50	741	13.0	14.0003	14.0022	21700	15 55	120
2022-10-04 24 10013 17.07 20.70 701 4.07 14.070 14.0000 7000 10.07 120	2022-09-20	24 hours	17.12	24.03	757	13.7	14.0505	14.0575	9200	15.33	120
2022-10-10 24 hours 17.92 25.8 755 2.7 14.8456 14.8551 9500 15.34 120	2022-10-04	24 hours	17.07	25.70	755	2.7	14.8456	14.8551	9500	15.37	120
2022 10-16 2 Hours 17.04 24.54 749 14.8 14.8455 14.8589 13400 22.75 120	2022-10-16	24 hours	17.04	24.54	749	14.8	14 8455	14 8589	13400	22.75	120
2022-10-22 24 hours 17.75 25.56 758 6.6 14.859 14.8611 2100 3.42 120	2022-10-10	24 hours	17.5	25.56	758	6.6	14 859	14 8611	2100	3.42	120
2022-10-28 24 hours 18 17 26 17 762 1.6 14 8436 14 8609 17300 27.54 120	2022-10-28	24 hours	18 17	26.17	762	1.6	14 8436	14 8609	17300	27.54	120
2022-11-03 24 hours 17.95 25.85 758 3.8 14.8588 14.8684 9600 15.47 120	2022-11-03	24 hours	17.95	25.85	758	3.8	14.8588	14.8684	9600	15.47	120
2022-11-09 24 hours 18.24 26.27 762 0.7 14.8484 14.857 8600 13.64 120	2022-11-09	24 hours	18.24	26.27	762	0.7	14.8484	14.857	8600	13.64	120
2022-11-15 24 hours 18.38 26.42 759 -2 14.8242 14.8295 5300 8.36 120	2022-11-15	24 hours	18.38	26.42	759	-2	14.8242	14.8295	5300	8.36	120
2022-11-21 24 hours 18.51 26.66 752 -7.2 14.8173 14.8216 4300 6.72 120	2022-11-21	24 hours	18.51	26.66	752	-7.2	14.8173	14.8216	4300	6.72	120
2022-11-27 24 hours 17.89 25.66 743 0.1 14.8212 14.8304 9200 14.94 120	2022-11-27	24 hours	17.89	25.66	743	0.1	14.8212	14.8304	9200	14.94	120
2022-12-03 24 hours 18.02 25.95 756 1.9 14.8070 14.8185 11500 18.46 120	2022-12-03	24 hours	18.02	25.95	756	1.9	14.8070	14.8185	11500	18.46	120
2022-12-09 24 hours 18.36 26.16 753 -1.5 14.8096 14.8232 13600 21.66 120	2022-12-09	24 hours	18.36	26.16	753	-1.5	14.8096	14.8232	13600	21.66	120
2022-12-15 24 hours 18.25 26.36 752 -3.2 14.8244 14.8284 4000 6.32 120	2022-12-15	24 hours	18.25	26.36	752	-3.2	14.8244	14.8284	4000	6.32	120
2022-12-21 24 hours 18.65 26.86 763 -5.4 14.8111 14.8211 10000 15.51 120	2022-12-21	24 hours	18.65	26.86	763	-5.4	14.8111	14.8211	10000	15.51	120
2022-12-27 24 hours 18.5 26.05 752 -8.1 14.8281 14.838 9900 15.83 120	2022-12-27	24 hours	18.5	26.05	752	-8.1	14.8281	14.838	9900	15.83	120

Notes

24 hour sample collected by BGI PQ-100 air sampler every sixth day for the duration of the quarry operation each year.

a) Values were not recorded; temperature and pressure calculated based on Environment Canada data recorded at the Saint John airport weather station. Flow rate and Air Volume were approximated based on a previous day's recording with similar temperature and pressure.

b) Battery was low in machine, full run was not completed.c) Run was not completed. Battery was replaced.

d) 24 hour air sample recorded at 2349 Route 820, Upham, NB.

e) Result was above the maximum allowable limit due to operator error. The sample was recollected on December 17, 2021.

Report ID:467182-IASReport Date:14-Dec-22Date Received:02-Dec-22

### **CERTIFICATE OF ANALYSIS**

for Hammond River Holdings Limited 30 Jervis Lane Saint John, NB E2J 0A9

![](_page_25_Picture_3.jpeg)

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

Attention: Daniel Guest

Project #: 17-5121

Location: Upham Analysis of Water

RPC Sample ID:			467182-1	467182-2	467182-3	467182-4
Client Sample ID:			SW3	SW5	PDP-1	PDP-1
						Duplicate
Date Sampled:			1-Dec-22	1-Dec-22	1-Dec-22	1-Dec-22
Analytes	Units	RL				
Solids - Total Suspended	mg/L	5	15	11	8	7

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 Bute

Brannen Burhoe Supervisor Inorganic Analytical Services

Report ID:467182-IASReport Date:14-Dec-22Date Received:02-Dec-22

## **CERTIFICATE OF ANALYSIS**

for Hammond River Holdings Limited 30 Jervis Lane Saint John, NB E2J 0A9

![](_page_26_Picture_3.jpeg)

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

#### Methods

<u>Analyte</u>

RPC SOP #

Method Reference

Solids - Total Suspended IAS-M05

APHA 2540 D

Filtration, Gravimetry

Method Principle

Report ID:467502-IASReport Date:14-Dec-22Date Received:06-Dec-22

### **CERTIFICATE OF ANALYSIS**

for Hammond River Holdings Limited 30 Jervis Lane Saint John, NB E2J 0A9

![](_page_27_Picture_3.jpeg)

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

Attention: Daniel Guest	
Project #: 17-5121	
Location: Upham	

#### Analysis of Water

RPC Sample ID:			467502-1	467502-2	467502-3
Client Sample ID:			SW3	SW5	PDP-1
Date Sampled:			4-Dec-22	4-Dec-22	4-Dec-22
Analytes	Units	RL			
Solids - Total Suspended	mg/L	5	< 5	< 5	< 5

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 Bute

Brannen Burhoe Supervisor Inorganic Analytical Services

Report ID:467502-IASReport Date:14-Dec-22Date Received:06-Dec-22

## **CERTIFICATE OF ANALYSIS**

for Hammond River Holdings Limited 30 Jervis Lane Saint John, NB E2J 0A9

![](_page_28_Picture_3.jpeg)

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

#### Methods

<u>Analyte</u>

RPC SOP #

Method Reference

Solids - Total Suspended IAS-M05

APHA 2540 D

Filtration, Gravimetry

Method Principle

Report ID:468105-IASReport Date:21-Dec-22Date Received:12-Dec-22

### **CERTIFICATE OF ANALYSIS**

for Hammond River Holdings Limited 30 Jervis Lane Saint John, NB E2J 0A9

![](_page_29_Picture_3.jpeg)

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

Attention:	Daniel Guest
Project #:	17-5121
Location:	Upham

#### Analysis of Water

RPC Sample ID:			468105-1	468105-2	468105-3
Client Sample ID:			SW3	SW5	PDP-1
Date Sampled:		9-Dec-22	9-Dec-22	9-Dec-22	
Analytes	Units	RL			
Solids - Total Suspended	mg/L	5	< 5	< 5	< 5

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 Bute

Brannen Burhoe Supervisor Inorganic Analytical Services

Report ID:468105-IASReport Date:21-Dec-22Date Received:12-Dec-22

## **CERTIFICATE OF ANALYSIS**

for Hammond River Holdings Limited 30 Jervis Lane Saint John, NB E2J 0A9

![](_page_30_Picture_3.jpeg)

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

#### Methods

<u>Analyte</u>

RPC SOP #

Method Reference

APHA 2540 D

Filtration, Gravimetry

Method Principle

Solids - Total Suspended IAS-M05

05

WATER METHODS Page 2 of 2 Report ID:468892-IASReport Date:30-Dec-22Date Received:19-Dec-22

## **CERTIFICATE OF ANALYSIS**

for Hammond River Holdings Limited 30 Jervis Lane Saint John, NB E2J 0A9

![](_page_31_Picture_3.jpeg)

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

Attention: Daniel Guest

Project #: Not Available

Location: Upham

#### Analysis of Water

RPC Sample ID:			468892-1	468892-2	468892-3	468892-4	468892-5
Client Sample ID:			SW-3	SW-5	PDP-1	H1	SW-7
Date Sampled:	14-Dec-22	14-Dec-22	14-Dec-22	14-Dec-22	14-Dec-22		
Analytes	Units	RL					
Alkalinity (as CaCO <sub>3</sub> )	mg/L	2	21	21	21	20	20
Chloride	mg/L	0.5	6.4	11.7	8.8	5.2	10.8
Sulfate	mg/L	1	167	183	181	13	181
Phosphorus - Total	mg/L	0.002	0.014	0.015	0.015	0.009	0.015
Solids - Total Dissolved	mg/L	5	270	274	304	50	296
Solids - Total Suspended	mg/L	5	< 5	< 5	< 5	< 5	< 5
Hardness (as CaCO <sub>3</sub> )	mg/L	0.2	178.	199.	202.	31.4	208.

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

RL = Reporting Limit

math m

Matthew Norman Senior Chemist Inorganic Analytical Chemistry Brannen Burba

Brannen Burhoe Supervisor Inorganic Analytical Services

Report ID:468892-IASReport Date:30-Dec-22Date Received:19-Dec-22

## **CERTIFICATE OF ANALYSIS**

for Hammond River Holdings Limited 30 Jervis Lane Saint John, NB E2J 0A9

![](_page_32_Picture_3.jpeg)

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

Attention: Daniel Guest

Project #: Not Available

Location: Upham

#### Analysis of Metals in Water

RPC Sample ID:			468892-1	468892-2	468892-3	468892-4	468892-5
Client Sample ID:			SW-3	SW-5	PDP-1	H1	SW-7
Date Sampled:			14-Dec-22	14-Dec-22	14-Dec-22	14-Dec-22	14-Dec-22
Analytes	Units	RL					
Calcium	mg/L	0.05	69.7	77.5	78.6	11.5	80.8
Magnesium	mg/L	0.01	0.93	1.44	1.40	0.64	1.46
Potassium	mg/L	0.02	0.66	0.78	0.78	0.40	0.75
Sodium	mg/L	0.05	4.15	5.39	5.29	3.52	5.42

Report ID:468892-IASReport Date:30-Dec-22Date Received:19-Dec-22

## **CERTIFICATE OF ANALYSIS**

for Hammond River Holdings Limited 30 Jervis Lane Saint John, NB E2J 0A9

# rpc

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

#### Methods

Analyte	RPC SOP #	Method Reference	Method Principle
Alkalinity (as CaCO <sub>3</sub> )	IAS-M43	EPA 310.2	Methyl Orange Colourimetry
Chloride	IAS-M44	APHA 4500-CL E	Ferricyanide Colourimetry
Sulfate	IAS-M45	APHA 4500-SO <sub>4</sub> E	Turbidimetry
Phosphorus - Total	IAS-M17	APHA 4500-P E	Digestion, Manual Colourimetry
Solids - Total Suspended	IAS-M05	APHA 2540 D	Filtration, Gravimetry
Solids - Total Dissolved	-	APHA 2540 G	Evaporation, Gravimetry
Trace Metals	IAS-M01/IAS-M29	EPA 200.8/EPA 200.7	ICP-MS/ICP-ES

Report ID:469062-IASReport Date:30-Dec-22Date Received:20-Dec-22

### **CERTIFICATE OF ANALYSIS**

for Hammond River Holdings Limited 30 Jervis Lane Saint John, NB E2J 0A9

![](_page_34_Picture_3.jpeg)

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

Attention: Daniel Guest

Project #: 17-5121

Location: Upham Analysis of Water

RPC Sample ID:	469062-1	469062-2	469062-3	469062-4		
Client Sample ID:	SW3	SW5	PDP-1	PDP-1 Duplicate		
Date Sampled:			19-Dec-22	19-Dec-22	19-Dec-22	19-Dec-22
Analytes	Units	RL				
Solids - Total Suspended	mg/L	5	< 5	< 5	< 5	< 5

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

math m

Matthew Norman Senior Chemist Inorganic Analytical Chemistry

Report ID:469062-IASReport Date:30-Dec-22Date Received:20-Dec-22

## **CERTIFICATE OF ANALYSIS**

for Hammond River Holdings Limited 30 Jervis Lane Saint John, NB E2J 0A9

![](_page_35_Picture_3.jpeg)

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

#### Methods

<u>Analyte</u>

RPC SOP #

Method Reference

Solids - Total Suspended IAS-M05

APHA 2540 D

Filtration, Gravimetry

Method Principle
Report ID:469594-IASReport Date:06-Jan-23Date Received:29-Dec-22

#### **CERTIFICATE OF ANALYSIS**

for Hammond River Holdings Limited 30 Jervis Lane Saint John, NB E2J 0A9



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

Attention:	Daniel Guest
Project #:	17-5121
Location:	Upham

#### Analysis of Water

RPC Sample ID:			469594-1	469594-2	469594-3
Client Sample ID:			SW3	SW5	PDP-1
Date Sampled:			24-Dec-22	24-Dec-22	24-Dec-22
Analytes	Units	RL			
Solids - Total Suspended	mg/L	5	11	10	11

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

RL = Reporting Limit

math m

Matthew Norman Senior Chemist Inorganic Analytical Chemistry

Brannen Bute

Brannen Burhoe Supervisor Inorganic Analytical Services

WATER CHEMISTRY Page 1 of 2 Report ID:469594-IASReport Date:06-Jan-23Date Received:29-Dec-22

## **CERTIFICATE OF ANALYSIS**

for Hammond River Holdings Limited 30 Jervis Lane Saint John, NB E2J 0A9



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

#### Methods

<u>Analyte</u>

RPC SOP #

Method Reference

Method Principle

Solids - Total Suspended IAS-M05

APHA 2540 D

Filtration, Gravimetry

Report ID:469598-IASReport Date:06-Jan-23Date Received:29-Dec-22

#### **CERTIFICATE OF ANALYSIS**

for Hammond River Holdings Limited 30 Jervis Lane Saint John, NB E2J 0A9



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

Attention: Daniel Guest **Project #: 17-5121** Location: Upham

## Analysis of Water

RPC Sample ID:			469598-1	469598-2	469598-3
Client Sample ID:			SW3	SW5	PDP-1
Date Sampled:			28-Dec-22	28-Dec-22	28-Dec-22
Analytes	Units	RL			
Solids - Total Suspended	mg/L	5	< 5	< 5	< 5

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

RL = Reporting Limit

math m

Matthew Norman Senior Chemist Inorganic Analytical Chemistry

Brannen Bute

Brannen Burhoe Supervisor Inorganic Analytical Services

WATER CHEMISTRY Page 1 of 2 Report ID:469598-IASReport Date:06-Jan-23Date Received:29-Dec-22

## **CERTIFICATE OF ANALYSIS**

for Hammond River Holdings Limited 30 Jervis Lane Saint John, NB E2J 0A9



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

#### Methods

<u>Analyte</u>

RPC SOP #

Method Reference

Method Principle

Solids - Total Suspended IAS-M05

APHA 2540 D

Filtration, Gravimetry

for Dillon Consulting Ltd 1149 Smythe Street, Suite 200 Fredericton, NB E3B 3H4



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

Attention: Jonathan Oliver

Project #: 21-3049-1002

# Location: Upham Analysis of Water

RPC Sample ID:			468895-01	468895-02	468895-03
Client Sample ID:			MW19-01S	MW19-01D	MW20-02S
Date Sampled:			15-Dec-22	15-Dec-22	14-Dec-22
Analytes	Units	RL			
Sodium	mg/L	0.05	8.63	15.6	14.3
Potassium	mg/L	0.02	0.96	1.57	1.7
Calcium	mg/L	0.05	32.5	62.3	567.
Magnesium	mg/L	0.01	9.09	2.68	11.0
Iron	mg/L	0.02	0.06	0.03	27.0
Manganese	mg/L	0.001	0.009	0.091	0.745
Copper	mg/L	0.001	0.003	< 0.001	0.007
Zinc	mg/L	0.001	0.012	0.003	< 0.005
Ammonia (as N)	mg/L	0.05	< 0.05	0.20	< 0.05
рН	units	-	6.3	7.9	7.6
Alkalinity (as $CaCO_3$ )	mg/L	2	44	130	110
Chloride	mg/L	0.5	40.5	30.7	11.5
Fluoride	mg/L	0.05	0.21	0.35	2.2
Sulfate	mg/L	1	46	42	1390
Nitrate + Nitrite (as N)	mg/L	0.05	0.75	< 0.05	< 0.05
o-Phosphate (as P)	mg/L	0.01	< 0.01	< 0.01	< 0.01
r-Silica (as SiO <sub>2</sub> )	mg/L	0.1	13.2	15.2	13.1
Carbon - Total Organic	mg/L	0.5	0.7	< 0.5	0.8
Turbidity	NTU	0.1	1.6	0.5	188
Solids - Total Suspended	mg/L	5	< 5	< 5	123
Conductivity	μS/cm	1	310	431	2270
Calculated Parameters					
Bicarbonate (as $CaCO_3$ )	mg/L	-	44.0	129.	110.
Carbonate (as $CaCO_3$ )	mg/L	-	0.008	0.963	0.410
Hydroxide (as CaCO <sub>3</sub> )	mg/L	-	0.001	0.040	0.020
Cation Sum	meq/L	-	2.77	4.07	31.3
Anion Sum	meq/L	-	3.03	4.34	31.5
Percent Difference	%	-	-4.46	-3.22	-0.19
Theoretical Conductivity	µS/cm	-	315	413	2790
Hardness (as CaCO <sub>3</sub> )	mg/L	0.2	119	167	1460
Ion Sum	mg/L	-	181	250	2100
Saturation pH (5°C)	units	-	8.5	7.7	7.1
Langelier Index (5°C)	-	-	-2.16	0.17	0.54

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

RL = Reporting Limit; Organic Carbon and ion chemistries for turbid samples are determined on filtered aliquots.

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

WATER CHEMISTRY Page 1 of 9

matt m

Matthew Norman Senior Chemist Inorganic Analytical Chemistry

for Dillon Consulting Ltd 1149 Smythe Street, Suite 200 Fredericton, NB E3B 3H4



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

Attention: Jonathan Oliver Project #: 21-3049-1002

## Location: Upham

Analysis of Water					
RPC Sample ID:			468895-04	468895-05	468895-06
Client Sample ID:			MW20-02D	MW20-03S	MW20-03D
Date Sampled:	11.16		14-Dec-22	14-Dec-22	14-Dec-22
Analytes	Units	RL	4.45	5.00	40.4
Sodium	mg/L	0.05	145.	5.20	10.4
Potassium	mg/L	0.02	5.4	0.98	0.96
Calcium	mg/L	0.05	621.	41.9	3.48
Magnesium	mg/L	0.01	34.3	3.51	0.73
Iron	mg/L	0.02	7.2	0.30	1.80
Manganese	mg/L	0.001	0.427	0.017	0.034
Copper	mg/L	0.001	< 0.005	< 0.001	< 0.001
Zinc	mg/L	0.001	< 0.005	0.001	< 0.001
Ammonia (as N)	mg/L	0.05	0.31	< 0.05	0.09
рН	units	-	8.4	8.0	10.1
Alkalinity (as CaCO <sub>3</sub> )	mg/L	2	55	109	25
Chloride	mg/L	0.5	180	12.4	8.2
Fluoride	mg/L	0.05	3.5	0.07	0.07
Sulfate	mg/L	1	1640	3	2
Nitrate + Nitrite (as N)	mg/L	0.05	< 0.05	1.03	< 0.05
o-Phosphate (as P)	mg/L	0.01	< 0.01	< 0.01	< 0.01
r-Silica (as SiO <sub>2</sub> )	mg/L	0.1	1.2	11.1	< 0.1
Carbon - Total Organic	mg/L	0.5	2.7	0.5	0.6
Turbidity	NTU	0.1	45.2	6.0	25.8
Solids - Total Suspended	mg/L	5	38	10	18
Conductivity	µS/cm	1	3020	257	97
Calculated Parameters					
Bicarbonate (as CaCO <sub>3</sub> )	mg/L	-	53.6	108.	8.6
Carbonate (as CaCO <sub>3</sub> )	mg/L	-	1.27	1.01	10.2
Hydroxide (as CaCO <sub>3</sub> )	mg/L	-	0.126	0.050	6.29
Cation Sum	meq/L	-	40.7	2.65	0.815
Anion Sum	meq/L	-	40.3	2.66	0.773
Percent Difference	%	-	0.44	-0.30	2.64
Theoretical Conductivity	μS/cm	-	3530	252	76
Hardness (as CaCO <sub>3</sub> )	mg/L	0.2	1690	119	11.7
Ion Sum	mg/L	-	2670	149	43
Saturation pH (5°C)	units	-	7.4	7.9	10.1
Langelier Index (5°C)	-	-	1.04	0.05	0.04

Report ID: 468895-IAS Report Date: 30-Dec-22 Date Received: 19-Dec-22

#### **CERTIFICATE OF ANALYSIS**

for Dillon Consulting Ltd 1149 Smythe Street, Suite 200 Fredericton, NB E3B 3H4



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

Attention: Jonathan Oliver )2

Project	: #:	21	-30	)49-	1	00
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#### Location: Upham Analysis of Water

RPC Sample ID:			468895-07	468895-08	468895-09
Client Sample ID:			MW20-04S	MW20-04D	MW20-40D
Date Sampled:			14-Dec-22	14-Dec-22	14-Dec-22
Analytes	Units	RL			
Sodium	mg/L	0.05	5.04	4.27	4.37
Potassium	mg/L	0.02	1.10	1.11	1.14
Calcium	mg/L	0.05	40.4	40.7	40.9
Magnesium	mg/L	0.01	1.26	1.33	1.35
Iron	mg/L	0.02	0.04	0.03	0.02
Manganese	mg/L	0.001	0.006	0.007	0.007
Copper	mg/L	0.001	0.002	0.002	0.002
Zinc	mg/L	0.001	0.002	0.002	0.002
Ammonia (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
рН	units	-	8.0	8.0	7.9
Alkalinity (as $CaCO_3$ )	mg/L	2	110	110	110
Chloride	mg/L	0.5	2.6	2.6	2.7
Fluoride	mg/L	0.05	0.33	0.35	0.37
Sulfate	mg/L	1	10	11	11
Nitrate + Nitrite (as N)	mg/L	0.05	0.51	0.84	0.87
o-Phosphate (as P)	mg/L	0.01	< 0.01	< 0.01	< 0.01
r-Silica (as SiO <sub>2</sub> )	mg/L	0.1	13.9	13.7	13.9
Carbon - Total Organic	mg/L	0.5	< 0.5	< 0.5	< 0.5
Turbidity	NTU	0.1	5.1	1.3	1.0
Solids - Total Suspended	mg/L	5	< 5	< 5	< 5
Conductivity	μS/cm	1	222	235	235
Calculated Parameters					
Bicarbonate (as CaCO <sub>3</sub> )	mg/L	-	109.	109.	109.
Carbonate (as CaCO <sub>3</sub> )	mg/L	-	1.02	1.02	0.815
Hydroxide (as CaCO <sub>3</sub> )	mg/L	-	0.050	0.050	0.040
Cation Sum	meq/L	-	2.37	2.36	2.37
Anion Sum	meq/L	-	2.52	2.56	2.57
Percent Difference	%	-	-2.99	-4.13	-3.89
Theoretical Conductivity	μS/cm	-	230	232	234
Hardness (as CaCO <sub>3</sub> )	mg/L	0.2	106	107	108
Ion Sum	mg/L	-	144	146	146
Saturation pH (5°C)	units	-	8.0	8.0	7.9
Langelier Index (5°C)	-	-	0.05	0.05	-0.05

for Dillon Consulting Ltd 1149 Smythe Street, Suite 200 Fredericton, NB E3B 3H4 rpc

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

Attention: Jonathan Oliver			
Project #: 21-3049-1002			
Location: Upham			
Analysis of Water			
RPC Sample ID:			468895-10
Client Sample ID:			MW20-40S
Date Sampled:			14-Dec-22
Analytes	Units	RL	
Sodium	mg/L	0.05	5.24
Potassium	mg/L	0.02	1.12
Calcium	mg/L	0.05	37.4
Magnesium	mg/L	0.01	1.29
Iron	mg/L	0.02	0.04
Manganese	mg/L	0.001	0.006
Copper	mg/L	0.001	0.004
Zinc	mg/L	0.001	0.002
Ammonia (as N)	mg/L	0.05	< 0.05
рН	units	-	8.0
Alkalinity (as CaCO <sub>3</sub> )	mg/L	2	100
Chloride	mg/L	0.5	2.7
Fluoride	mg/L	0.05	0.34
Sulfate	mg/L	1	11
Nitrate + Nitrite (as N)	mg/L	0.05	0.55
o-Phosphate (as P)	mg/L	0.01	< 0.01
r-Silica (as SiO <sub>2</sub> )	mg/L	0.1	13.9
Carbon - Total Organic	mg/L	0.5	< 0.5
Turbidity	NTU	0.1	5.6
Solids - Total Suspended	mg/L	5	< 5
Conductivity	μS/cm	1	221
Calculated Parameters			
Bicarbonate (as CaCO <sub>3</sub> )	mg/L	-	99.0
Carbonate (as $CaCO_3$ )	mg/L	-	0.931
Hydroxide (as CaCO <sub>3</sub> )	mg/L	-	0.050
Cation Sum	meq/L	-	2.23
Anion Sum	meq/L	-	2.34
Percent Difference	%	-	-2.43
Theoretical Conductivity	μS/cm	-	218
Hardness (as CaCO <sub>3</sub> )	mg/L	0.2	98.7
Ion Sum	mg/L	- 1	136
Saturation pH (5°C)	units	-	8.0
Langelier Index (5°C)	-	-	-0.02

for Dillon Consulting Ltd 1149 Smythe Street, Suite 200 Fredericton, NB E3B 3H4



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

Attention: Jonathan Oliver

Project #: 21-3049-1002 Location: Upham

# Analysis of Metals in Water

RPC Sample ID:			468895-01	468895-02	468895-03
Client Sample ID:			MW19-01S	MW19-01D	MW20-02S
Date Sampled:			15-Dec-22	15-Dec-22	14-Dec-22
Analytes	Units	RL			
Aluminum	µg/L	1	31	4	80
Antimony	μg/L	0.1	< 0.1	< 0.1	< 0.5
Arsenic	μg/L	1	< 1	< 1	< 5
Barium	μg/L	1	115	146	6
Beryllium	μg/L	0.1	< 0.1	< 0.1	< 0.5
Bismuth	µg/L	1	< 1	< 1	< 5
Boron	µg/L	1	21	472	844
Cadmium	µg/L	0.01	0.08	< 0.01	0.20
Calcium	µg/L	50	32500	62300	567000
Chromium	µg/L	1	< 1	< 1	< 5
Cobalt	μg/L	0.1	< 0.1	< 0.1	0.7
Copper	μg/L	1	3	< 1	7
Iron	µg/L	20	60	30	27000
Lead	µg/L	0.1	0.6	< 0.1	< 0.5
Lithium	µg/L	0.1	10.6	16.2	11.9
Magnesium	μg/L	10	9090	2680	11000
Manganese	µg/L	1	9	91	745
Mercury	µg/L	0.025	< 0.025	< 0.025	< 0.025
Molybdenum	µg/L	0.1	< 0.1	0.1	< 0.5
Nickel	µg/L	1	1	< 1	< 5
Potassium	μg/L	20	960	1570	1700
Rubidium	µg/L	0.1	1.3	2.7	< 0.5
Selenium	µg/L	1	< 1	< 1	< 5
Silver	µg/L	0.1	< 0.1	< 0.1	< 0.5
Sodium	µg/L	50	8630	15600	14300
Strontium	µg/L	1	123	1320	4360
Tellurium	μg/L	0.1	< 0.1	< 0.1	< 0.5
Thallium	μg/L	0.1	< 0.1	< 0.1	< 0.5
Tin	μg/L	0.1	< 0.1	< 0.1	< 0.5
Uranium	µg/L	0.1	< 0.1	< 0.1	2.5
Vanadium	µg/L	1	< 1	< 1	< 5
Zinc	μg/L	1	12	3	< 5

for Dillon Consulting Ltd 1149 Smythe Street, Suite 200 Fredericton, NB E3B 3H4



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

Attention: Jonathan Oliver

# Project #: 21-3049-1002

Location: Upham Analysis of Metals in Water

RPC Sample ID:			468895-04	468895-05	468895-06
Client Sample ID:			MW20-02D	MW20-03S	MW20-03D
Date Sampled:			14-Dec-22	14-Dec-22	14-Dec-22
Analytes	Units	RL			
Aluminum	µg/L	1	6	30	1
Antimony	µg/L	0.1	< 0.5	< 0.1	< 0.1
Arsenic	µg/L	1	< 5	1	< 1
Barium	µg/L	1	< 5	264	2
Beryllium	µg/L	0.1	< 0.5	< 0.1	< 0.1
Bismuth	µg/L	1	< 5	< 1	< 1
Boron	µg/L	1	51600	11	8
Cadmium	µg/L	0.01	< 0.05	< 0.01	< 0.01
Calcium	µg/L	50	621000	41900	3480
Chromium	µg/L	1	< 5	< 1	< 1
Cobalt	µg/L	0.1	< 0.5	< 0.1	< 0.1
Copper	µg/L	1	< 5	< 1	< 1
Iron	µg/L	20	7200	300	1800
Lead	µg/L	0.1	1.7	0.1	< 0.1
Lithium	µg/L	0.1	210.	5.8	3.2
Magnesium	µg/L	10	34300	3510	730
Manganese	µg/L	1	427	17	34
Mercury	µg/L	0.025	< 0.025	< 0.025	< 0.025
Molybdenum	µg/L	0.1	6.0	0.2	0.2
Nickel	µg/L	1	< 5	< 1	< 1
Potassium	µg/L	20	5400	980	960
Rubidium	µg/L	0.1	6.4	0.4	0.4
Selenium	µg/L	1	< 5	< 1	< 1
Silver	µg/L	0.1	< 0.5	< 0.1	< 0.1
Sodium	µg/L	50	145000	5200	10400
Strontium	µg/L	1	10800	254	25
Tellurium	µg/L	0.1	< 0.5	< 0.1	< 0.1
Thallium	µg/L	0.1	< 0.5	< 0.1	< 0.1
Tin	μg/L	0.1	< 0.5	< 0.1	< 0.1
Uranium	μg/L	0.1	< 0.5	0.8	< 0.1
Vanadium	μg/L	1	< 5	1	< 1
Zinc	µg/L	1	< 5	1	< 1

for Dillon Consulting Ltd 1149 Smythe Street, Suite 200 Fredericton, NB E3B 3H4



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

Attention: Jonathan Oliver

# Project #: 21-3049-1002

Location: Upham Analysis of Metals in Water

RPC Sample ID:			468895-07	468895-08	468895-09
Client Sample ID:			MW20-04S	MW20-04D	MW20-40D
Date Sampled:			14-Dec-22	14-Dec-22	14-Dec-22
Analytes	Units	RL			
Aluminum	μg/L	1	30	9	8
Antimony	μg/L	0.1	0.1	0.3	0.3
Arsenic	μg/L	1	20	19	19
Barium	μg/L	1	119	127	126
Beryllium	μg/L	0.1	< 0.1	< 0.1	< 0.1
Bismuth	μg/L	1	< 1	< 1	< 1
Boron	µg/L	1	103	95	99
Cadmium	μg/L	0.01	< 0.01	< 0.01	< 0.01
Calcium	µg/L	50	40400	40700	40900
Chromium	µg/L	1	< 1	< 1	< 1
Cobalt	μg/L	0.1	< 0.1	0.1	0.1
Copper	μg/L	1	2	2	2
Iron	µg/L	20	40	30	20
Lead	μg/L	0.1	< 0.1	< 0.1	< 0.1
Lithium	µg/L	0.1	7.6	8.2	8.3
Magnesium	μg/L	10	1260	1330	1350
Manganese	μg/L	1	6	7	7
Mercury	µg/L	0.025	< 0.025	< 0.025	< 0.025
Molybdenum	μg/L	0.1	2.3	2.9	2.9
Nickel	μg/L	1	< 1	< 1	< 1
Potassium	μg/L	20	1100	1110	1140
Rubidium	μg/L	0.1	1.0	1.0	1.0
Selenium	μg/L	1	< 1	< 1	< 1
Silver	μg/L	0.1	< 0.1	< 0.1	< 0.1
Sodium	μg/L	50	5040	4270	4370
Strontium	μg/L	1	383	477	478
Tellurium	μg/L	0.1	< 0.1	< 0.1	< 0.1
Thallium	µg/L	0.1	< 0.1	< 0.1	< 0.1
Tin	µg/L	0.1	< 0.1	< 0.1	< 0.1
Uranium	μg/L	0.1	3.5	4.5	4.5
Vanadium	μg/L	1	2	2	2
Zinc	µg/L	1	2	2	2

for

Dillon Consulting Ltd 1149 Smythe Street, Suite 200 Fredericton, NB E3B 3H4 rpc

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

Attention: Jonathan Oliver			
Project #: 21-3049-1002			
Location: Upham			
Analysis of Metals in Water			
RPC Sample ID:			468895-10
Client Sample ID:			MW20-40S
Date Sampled:			14-Dec-22
Analytes	Units	RL	
Aluminum	µg/L	1	31
Antimony	µg/L	0.1	0.1
Arsenic	μg/L	1	21
Barium	μg/L	1	122
Beryllium	μg/L	0.1	< 0.1
Bismuth	μg/L	1	< 1
Boron	μg/L	1	104
Cadmium	μg/L	0.01	< 0.01
Calcium	μg/L	50	37400
Chromium	µg/L	1	< 1
Cobalt	µg/L	0.1	< 0.1
Copper	µg/L	1	4
Iron	µg/L	20	40
Lead	µg/L	0.1	< 0.1
Lithium	µg/L	0.1	7.5
Magnesium	µg/L	10	1290
Manganese	µg/L	1	6
Mercury	µg/L	0.025	< 0.025
Molybdenum	µg/L	0.1	2.4
Nickel	µg/L	1	< 1
Potassium	μg/L	20	1120
Rubidium	μg/L	0.1	1.1
Selenium	μg/L	1	< 1
Silver	μg/L	0.1	< 0.1
Sodium	μg/L	50	5240
Strontium	μg/L	1	388
Tellurium	μg/L	0.1	< 0.1
Thallium	µg/L	0.1	< 0.1
Tin	µg/L	0.1	< 0.1
Uranium	µg/L	0.1	3.5
Vanadium	µg/L	1	2
Zinc	µg/L	1	2

Report ID:468895-IASReport Date:30-Dec-22Date Received:19-Dec-22

### **CERTIFICATE OF ANALYSIS**

for Dillon Consulting Ltd 1149 Smythe Street, Suite 200 Fredericton, NB E3B 3H4



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

#### Methods

<u>Analyte</u>	RPC SOP #	Method Reference	Method Principle
Ammonia	IAS-M47	APHA 4500-NH <sub>3</sub> G	Phenate Colourimetry
рН	IAS-M03	APHA 4500-H <sup>+</sup> B	pH Electrode - Electrometric
Alkalinity (as CaCO <sub>3</sub> )	IAS-M43	EPA 310.2	Methyl Orange Colourimetry
Chloride	IAS-M44	APHA 4500-CL E	Ferricyanide Colourimetry
Fluoride	IAS-M30	APHA 4500-F- D	SPADNS Colourimetry
Sulfate	IAS-M45	APHA 4500-SO <sub>4</sub> E	Turbidimetry
Nitrate + Nitrite (as N)	IAS-M48	APHA 4500-NO <sub>3</sub> H	Hydrazine Red., Derivitization, Colourimetry
o-Phosphate (as P)	IAS-M50	APHA 4500-P F	Molybdate/Ascorbic Acid Colourimetry
r-Silica (as SiO <sub>2</sub> )	IAS-M46	APHA 4500-SI F	Heteropoly Blue Colourimetry
Carbon - Total Organic	IAS-M57	APHA 5310 B	Combustion/NDIR
Turbidity	IAS-M06	APHA 2130 B	Nephelometry
Conductivity	IAS-M04	APHA 2510 B	Conductivity Meter - Electrode
Solids - Total Suspended	IAS-M05	APHA 2540 D	Filtration, Gravimetry
Trace Metals	IAS-M01/IAS-M29	EPA 200.8/EPA 200.7	ICP-MS/ICP-ES
Mercury	IAS-M52	EPA 245.1	Cold Vapor AAS





December 4, 2022

Project No.: 22S001.00

Mr. Daniel Guest Hammond River Holdings Via email: <u>Guest.Daniel@AtlanticWallboard.com</u>

## Re: Blast Vibration Monitoring - Blast No. 2022-44 - Upham East Gypsum Quarry, Upham, N.B.

Following are the results of the vibration monitoring carried out on behalf of Hammond River Holdings for the blast detonated by Gulf Operators at 14:04 on December 2, 2022. For the monitoring we positioned eleven (11) digital seismographs in the area.

The location of each monitoring point is noted in the following table.

Seismograph Location	Time	Approx. dist. from shot to seismograph (m)	Maximum Velocity (mm/s)	Sound Pressure (dB(L))	Remarks
1. Civic No. 4079 Route 111 (PW-09)		1,350 m S	< 0.5 mm/s	<120	Unit was not triggered
2. Civic No. 4126 Route 111 (PW-10)		960 m S	0.68 mm/s @ 57 Hz	111	-
3. Civic No. 4150 Route 111 (PW-13)		915 m SE	< 0.5 mm/s	<120	Units were not
4. Civic No. 2447 Route 820 (PW-07)		985 m NE	< 0.5 mm/s	<120	triggered
5. PW-03 - Cottage Route 820		625 m N	0.70 mm/s @ 27 Hz	112	-
6. Civic No. 2341 Route 820 (PW-05)	14:04	610 m N	1.73 mm/s @ 47 Hz	109	-
7. Civic No. 50 Myron Road (PW-15)		800 m NW	1.27 mm/s @ 47 Hz	106	-
8. Civic No. 86 Myron Road (PW-16)		700 m W	NA	NA	Unit malfunction
9. Civic No. 220 Myron Road (PW-01)		1,355 m S	< 0.5 mm/s	<120	Unit was not triggered
10. Civic No. 4140 Route 111 (PW-12)		915 m SE	0.84 mm/s @ 64 Hz	113	-
11. Civic No. 2337 Route 820 (PW-04)		670 m N	0.62 mm/s @ 51 Hz	106	-
maximum limits as per App	roval to	Operate	12.5 mm/s	128 dB	

#### Blast No. 2022-44 - December 2, 2022

*Mr. Daniel Guest – Hammond River Holdings December 4, 2022 Project No.: 22S001.00 – Blast No.: 2022-44* 

The monitors did not detect any vibrations that exceeded the maximum allowable peak particle velocity of 12.5 mm/s (1.25 cm/s) or the maximum air overpressure of 128 dB(L) as established in the Approval to Operate (I-10936).

We trust this information is sufficient at this time. If you have any questions, please do not hesitate to contact us.

Best regards, CBCL Limited

K that S

Robert Y. Cyr, M.A.Sc., P.Eng. *Senior Technical Specialist* 

Attachments: Blast Record Blast and Seismograph Location Plan Blast Event Reports

Project No: 22S001.00

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Attachment A

Blast Record





# **BLAST RECORD**

<b>Project Name:</b>	Upham Gypsum Quarry	Date of Blast:	December 2, 2022
Project No.:	22S001.00	<b>Time of Blast:</b>	14:04
Inspector:	C. Buckley	Blast No.:	2022-44
Client:	Hammond River Holdings		

## **IDENTIFICATION:**

<b>Blasting Contractor:</b>	Gulf Operators		
Blaster's Certification No.:	1318	Blaster's Name:	Daniel Blanchard
Blast Location:	N 45°28.899' W 65°38.101' (see attached sketch)		
Type of Rock:	Anhydrate/Gypsum	Est. Vol. or Tonnage:	16,017 tonnes
Weather at time of Blast:	Overcast	Air Temp.:	0°C
Est. Wind Speed :	≈10 km/h	Wind Direction:	SW
Cloud Cover:	Yes - overcast	Precipitation:	No

# **BLAST DESIGN:**

<b>Total No. Holes:</b>	143	Hole Diameter:	4.5"
Average Depth:	5.4 m to 7.0 m	Spacing:	10 ft x 10 ft
No. Holes per Delay:	3	Collar Length:	7 ft
Delay between Holes:	25 ms	Delay between Rows:	42, 59 & 84 ms
Initiation Method: Weight of Explosives	Non-Electric		
per Delay:	Max.: 101 kg		
Type and weight of Explosives for Blast:	6,495 kg – Titan X	L-1000	

Sketch of shot location, hole layout, timing sequence, free face etc. if available.





# **BLAST RECORD**

<b>Project Name:</b>	Upham Gypsum Quarry	Date of Blast:	December 2, 2022
Project No.:	22S001.00	Time of Blast:	14:04
Inspector:	C. Buckley	Blast No.:	2022-44
Client:	Hammond River Holdings		

## **BLAST MONITORING**

Distance to the Nearest Structure:	610 m
Direction to the Nearest Structure:	Ν
Structure Type:	House
Scaled Distance Factor: (distance / sq. rt. of max. wt. per delay):	60.7

## SAFETY:

Type of Warning Signal Used:	Siren
Blasting Mats Used (yes or no ):	No
Airblast Measurement ( yes or no ):	Yes
Vibration Measurement ( yes or no ):	Yes
Warning Signs Posted ( yes or no ):	Yes
Accesses Guarded ( yes or no ):	Yes
Flyrock Damage ( yes or no ):	No
If Yes, Describe:	
Misfire ( yes or no ):	No

Reviewed By: Robert Y. Cyr, M.A.Sc., P.Eng.





# **BLAST RECORD**

Project Name:	Upham Gypsum Quarry	Date of Blast:	December 2, 2022
Project No.:	22S001.00	Time of Blast:	14:04
Inspector:	C. Buckley	Blast No.:	2022-44
Client:	Hammond River Holdings		

## **Data Collection – Seismometer #1**

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #21348
Calibration Date:	July 23, 2022
Location of seismograph:	Civic Number 4079 Route 111 (PW-09)
Distance and Direction from Blast:	1,350 m South
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Make, Model and Serial # of unit:
Calibration Date:
Location of seismograph:
Distance and Direction from Blast:
Transverse Particle Velocity:
Vertical Particle Velocity:
Longitudinal Particle Velocity:
Peak Particle Velocity:
Maximum Airblast:



Platinum member

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# **BLAST RECORD**

Project Name:	Upham Gypsum Quarry	Date of Blast:	December 2, 2022
Project No.:	22S001.00	Time of Blast:	14:04
Inspector:	C. Buckley	Blast No.:	2022-44
Client:	Hammond River Holdings	_	

## Data Collection – Seismometer #3

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #18187
Calibration Date:	May 5, 2022
Location of seismograph:	Civic Number 4150 Route 111 (PW-13)
Distance and Direction from Blast:	915 m Southeast
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Make, Model and Serial # of unit:
Calibration Date:
Location of seismograph:
Distance and Direction from Blast:
Transverse Particle Velocity:
Vertical Particle Velocity:
Longitudinal Particle Velocity:
Peak Particle Velocity:
Maximum Airblast:

Instantel Mini Mate, Serial #5372
February 18, 2022
Civic Number 2447 Route 820 (PW-07)
985 m Northeast
<0.5 mm/s – Unit was not triggered
<0.5 mm/s – Unit was not triggered
<0.5 mm/s – Unit was not triggered
N/A
<120 dB(L) – Unit was not triggered





# **BLAST RECORD**

Project Name:	Upham Gypsum Quarry	Date of Blast:	December 2, 2022
Project No.:	22S001.00	Time of Blast:	14:04
Inspector:	C. Buckley	Blast No.:	2022-44
Client:	Hammond River Holdings		

## **Data Collection – Seismometer #5**

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5487
Calibration Date:	February 18, 2022
Location of seismograph:	Cottage - PW-03 - Route 820
Distance and Direction from Blast:	625 m North
Transverse Particle Velocity:	0.57 mm/s @ 32 Hz
Vertical Particle Velocity:	0.51 mm/s @ 47 Hz
Longitudinal Particle Velocity:	0.70 mm/s @ 27 Hz
Peak Particle Velocity:	0.70 mm/s @ 27 Hz
Maximum Airblast:	112 dB(L)

Make, Model and Serial # of unit:
Calibration Date:
Location of seismograph:
Distance and Direction from Blast:
Transverse Particle Velocity:
Vertical Particle Velocity:
Longitudinal Particle Velocity:
Peak Particle Velocity:
Maximum Airblast:

Instantel Mini Mate, Serial #20203
May 31, 2022
Civic Number 2341 Route 820 (PW-05)
610 m North
1.32 mm/s @ 39 Hz
1.73 mm/s @ 47 Hz
1.68 mm/s @ 57 Hz
1.73 mm/s @ 47 Hz
109 dB(L)





# **BLAST RECORD**

Project Name:	Upham Gypsum Quarry	Date of Blast:	December 2, 2022
Project No.:	228001.00	Time of Blast:	14:04
Inspector:	C. Buckley	Blast No.:	2022-44
Client:	Hammond River Holdings	_	

## **Data Collection – Seismometer #7**

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5371
Calibration Date:	July 27, 2022
Location of seismograph:	Civic Number 50 Myron Road (PW-15)
Distance and Direction from Blast:	800 m Northwest
Transverse Particle Velocity:	1.27 mm/s @ 47 Hz
Vertical Particle Velocity:	0.95 mm/s @ 64 Hz
Longitudinal Particle Velocity:	1.14 mm/s @ 43 Hz
Peak Particle Velocity:	1.27 mm/s @ 47 Hz
Maximum Airblast:	106 dB(L)

Make, Model and Serial # of unit:
Calibration Date:
Location of seismograph:
Distance and Direction from Blast:
Transverse Particle Velocity:
Vertical Particle Velocity:
Longitudinal Particle Velocity:
Peak Particle Velocity:
Maximum Airblast:

Instantel Mini Mate, Serial #5489
April 25, 2022
Civic Number 86 Myron Road (PW-16)
700 m West
N/A – Unit malfunction
N/A – Unit malfunction
N/A – Unit malfunction
N/A
N/A – Unit malfunction





# **BLAST RECORD**

Project Name:	Upham Gypsum Quarry	Date of Blast:	December 2, 2022
Project No.:	22S001.00	Time of Blast:	14:04
Inspector:	C. Buckley	Blast No.:	2022-44
Client:	Hammond River Holdings	_	

## Data Collection – Seismometer #9

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #20205
Calibration Date:	May 31, 2022
Location of seismograph:	Civic Number 220 Myron Road (PW-01)
Distance and Direction from Blast:	1,355 m South
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Make, Model and Serial # of unit:	
Calibration Date:	
Location of seismograph:	
Distance and Direction from Blast:	
Transverse Particle Velocity:	
Vertical Particle Velocity:	
Longitudinal Particle Velocity:	
Peak Particle Velocity:	
Maximum Airblast:	





# **BLAST RECORD**

Project Name:	Upham Gypsum Quarry	Date of Blast:	December 2, 2022
Project No.:	228001.00	Time of Blast:	14:04
Inspector:	C. Buckley	Blast No.:	2022-44
Client:	Hammond River Holdings	_	

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #20206
Calibration Date:	May 31, 2022
Location of seismograph:	Civic Number 2337 Route 820 (PW-04)
Distance and Direction from Blast:	670 m North
Transverse Particle Velocity:	0.46 mm/s @ 47 Hz
Vertical Particle Velocity:	0.36 mm/s @ 26 Hz
Longitudinal Particle Velocity:	0.62 mm/s @ 51 Hz
Peak Particle Velocity:	0.62 mm/s @ 51 Hz
Maximum Airblast:	106 dB(L)

Attachment B

Blast and Seismograph Location Plan

Blast and Seismograph Location Plan Blast No: 2022-44 Upham East Gypsum Quarry Upham, NB





Date: December 2, 2022 Project No.: 22S001.00

# Attachment C

Blast Event Reports



Serial Number

**Post Event Notes** 

3.8 Volts

Unit Calibration April 11, 2022 by Instantel

Location: Civic Number 4126 Route 111 (PW-10)

Battery Level

File Name

UM18193 V 10-90GC Micromate ISEE

UM18193\_20221202140430.IDFW

Date/Time Vert at 14:04:30 December 2, 2022 Trigger Source Geo: 0.500 mm/s, Mic: 123.0 dB(L) Range Geo: 254.0 mm/s Record Time 7.0 sec at 1024 sps Operator/Setup: Operator/CARVER.MMB

#### Notes

Location: Client:						Blast No.: Project No	2022-44 o: 22S001.0	0		. ,				
User Name: General:						-								
Misseshawa	lineen Meinhti					054	1	USBN	I RI8507	And OS	MRE		1	
PSPL	111.1 dB(L) 7	.184 pa.(L) a	at 2.577	sec		254 200—								
ZC Freq Channel Test	15 Hz t Passed (Freq	= 20.5 Hz A	mp = 160	69 mv)				No ve	ocity ab	ove 1.00	mm/s			
	Tran	Vert	Long			100							+	
PPV PPV	0.402 43.08	0.678 47.62	0.567 46.08	mm/s dB		+							+	
ZC Freq Time (Rel. to	34 Tria) 0.487	57 0.021	51 0.351	Hz sec		50—					<u> </u>	/		
Peak Acceler	ration 0.026	0.026	0.035	g	()	+				/			-	
Sensor Chec	k Passed	Passed P	assed		s/mu	20—					/		_	
Frequency Overswing	7.3 <b>Ratio</b> 4.3	7.5 4.3	7.3 4.5	Hz	ity (r									
Peak Vector	<b>Sum</b> 0.836 mm	/s at 0.368 s	ec		eloc	10—			/				_	
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Time Scale: 0.50 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 2.000 pa.(L)/div Trigger = -\_ \_ -

Sensor Check



 Date/Time
 Long at 14:04:30 December 2, 2022

 Trigger Source
 Geo: 0.492 mm/s, Mic: 119.6 dB(L)

 Range
 Geo: 127.0 mm/s

 Record Time
 7.0 sec at 1024 sps

#### Notes

MicL

Long

Vert

Tran

Location: Client: User Name: Converted: December 2, 2022 16:05:42 (V10.72.1)

#### **Extended Notes**

Microphone	Linear Weighting
PSPL	112.0 dB(L) 8.000 pa.(L) at 1.948 sec
ZC Freq	3.0 Hz
<b>Channel Test</b>	Passed (Freq = 20.0 Hz Amp = 286 mv)

	Tran	Vert	Long	
PPV	0.572	0.508	0.699	mm/s
PPV	46.14	45.12	47.88	dB
ZC Freq	32	47	27	Hz
Time (Rel. to Trig)	0.425	0.248	0.295	sec
Peak Acceleration	0.020	0.027	0.027	g
Peak Displacement	0.003	0.001	0.004	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.8	7.7	7.8	Hz
Overswing Ratio	3.4	4.2	3.8	

Peak Vector Sum 0.889 mm/s at 0.424 sec

Serial Number5487 V 2.61 MiniMateBattery Level6.2 VoltsUnit CalibrationFebruary 18, 2022 by InstantelFile NameG487JSH8.FI0Post Event NotesLocation: Cottage - Route 820 (PW-03)Blast No.: 2022-44Project No: 22S001.00

#### **USBM RI8507 And OSMRE**



Time Scale: 0.50 sec/div Amplitude Scale: Geo: 0.500 mm/s/div Mic: 5.000 pa.(L)/div Trigger =

2.0

Printed: December 4, 2022 (V 10.74)

0.0

1.0

Sensor Check



Battery Level

**Post Event Notes** 

File Name

Serial Number UM20203 V 10-90GC Micromate ISEE

UM20203\_20221202140431.IDFW

3.6 Volts

Unit Calibration May 31, 2022 by Instantel

Location: Civic Number 2341 Route 820 (PW-05)

Date/Time Vert at 14:04:31 December 2, 2022 Trigger Source Geo: 0.500 mm/s, Mic: 120.0 dB(L) Range Geo: 254.0 mm/s Record Time 7.0 sec at 1024 sps Operator/Setup: Operator/GAYTON.MMB

#### Notes

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MicL	+	han afrene filmen er		H W WM	$\int $	~								0.0
			۱۰۰۱ ۸۰۰۸	M. ~	$\wedge$			İ		1	I	-	NNN	
	•	1 I	, I		I	1	.	I	Tran:	+ Vert: x	Long: ø	I		
						1	2		° F	requenc	20 y (Hz)		50	100 >
						2				++++		+ ؇ +¶ + + + +	×8 ₩ ₩ ₩ Ø Ø Ø Ø Ø Ø Ø Ø Ø Ø Ø Ø Ø Ø Ø Ø	+
						5								- - -
Peak Veo	ctor Sum 1	.976 mm/s a	t 0.322 sec		Veloc	10				/				
Freque Overs	ency wing Ratio	6.9 4.8	7.5 7.5 4.7 4.4	i 5 Hz I	ity (mr	20—				/				+
Peak Acc Peak Dis	celeration placement	0.074 0.007	0.087 0.097 0.005 0.006	g mm	n/s)	+						/		+
PPV ZC Freq	l to Tria)	53.44 39 0.781	55.78 55.46 47 57 0.323 0.460	dB / Hz		50								- -
PPV		<b>Tran</b> 1.324	Vert Long	) mm/s		100								
Channel	5.2 H Test Passe	z z z (Freq = 1	9.7 Hz Amp =	1618 mv)		200—								-
ZC Freq	one Linea	r Weighting	$E_{\rm DO}(L)$ at $2.1^{\circ}$	77		254				++++			+ + + + + + + + + + + + + + + + + + + +	+
Micropho PSPL ZC Freq									SBM I	218507 /	M20 hav	PF		
General: Micropho PSPL ZC Freq	ie:													

Trigger = -

\_ \_

-

Sensor Check

Time Scale: 0.50 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 2.000 pa.(L)/div



Velocity (mm/s)

 Date/Time
 Vert at 14:04:31 December 2, 2022

 Trigger Source
 Geo: 0.492 mm/s, Mic: 119.6 dB(L)

 Range
 Geo: 127.0 mm/s

 Record Time
 7.0 sec at 1024 sps

#### Notes

Location:	
Client:	QU
User Name:	WR
Converted:	December 2, 2022 16:07:56 (V10.72.1)

MicrophoneLinear WeightingPSPL106.0 dB(L)4.000 pa.(L) at 2.646 secZC Freq7.0 HzChannel TestPassed (Freq = 20.0 Hz Amp = 303 mv )

 Tran
 Vert
 Long

 PPV
 1.270
 0.953
 1.143
 mm/s

	1.270	0.000	1.110	
PPV	53.08	50.58	52.16	dB
ZC Freq	47	64	43	Hz
Time (Rel. to Trig)	0.620	0.587	0.573	sec
Peak Acceleration	0.040	0.040	0.033	g
Peak Displacement	0.004	0.002	0.004	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.1	8.0	8.2	Hz
Overswing Ratio	3.4	3.6	3.3	

Peak Vector Sum 1.445 mm/s at 0.586 sec

Serial Number5371 V 2.61 MiniMateBattery Level6.1 VoltsUnit CalibrationJuly 27, 2022 by InstantelFile NameG371JSH8.FJ0Post Event NotesLocation: Civic Number 50 Myron Road (PW-15)Blast No.: 2022-44Project No: 22S001.00

**USBM RI8507 And OSMRE** 254 -----200-100-50 20 10 5 2 +øø 10 20 50 100 > ż Frequency (Hz) Tran: + Vert: x Long: ø



Trigger = >



Serial Number

**Post Event Notes** 

3.8 Volts Unit Calibration May 31, 2022 by Instantel

Location: Civic Number 4140 Route 111 (PW-12)

Battery Level

File Name

UM20204 V 10-90GC Micromate ISEE

UM20204\_20221202140431.IDFW

Date/Time Vert at 14:04:31 December 2, 2022 Trigger Source Geo: 0.500 mm/s, Mic: 120.0 dB(L) Range Geo: 254.0 mm/s Record Time 7.0 sec at 1024 sps Operator/Setup: Operator/GAYTON.MMB

#### Notes

Location: Client: User Name: General:					Blast No. Project N	:: 2022-44 lo: 22S001.	.00		ONDE		
Microphone PSPL ZC Freq Channel Te	e Linear W 112.6 dE 12 Hz est Passed	Veighting 3(L)  8.502 pa.(I (Freq = 20.5 Hz	_) at 2.624 s : Amp = 165{	ec 5 mv )	254 200—			elocity above 1.00	) mm/s	++++++	-
PPV PPV ZC Freq Time (Rel. t Peak Accel Peak Displa Sensor Che Frequenc Overswir Peak Vecto	to Trig) leration acement eck Pa cy ng Ratio or Sum 0 87	Tran         Vert           0.835         0.567           49.44         46.08           64         73           0.091         0.255           0.058         0.039           0.002         0.002           assed         Passed           7.3         7.5           4.3         4.4           7         mm/s at 0.09	Long 0.686 47.72 57 0.295 0.043 0.002 Passed 7.5 4.3 1 sec	mm/s dB Hz sec g mm (s/um/s) Hz	100						
reak vecto	<b>50 1</b> 0.07	7 mm/s at 0.09	1 360	Vel		2	+	-+ + + +   10	++ 20		- - 0 >
	•						Tra	Frequency (Hz) an: + Vert: x Long	Ø		
MicL	 						_				0.0
Long	••••••••••••••••••••••••••••••••••••••										0.0
Vert											0.0
Tran	0.0	1.0	2.0		4.0		5.0		7.0		0.0

Time Scale: 0.50 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 2.000 pa.(L)/div Trigger = --\_ \_

Sensor Check



Serial Number

**Post Event Notes** 

3.8 Volts Unit Calibration May 31, 2022 by Instantel

Location: Civic Number 2337 Route 820 (PW-04)

Battery Level

File Name

UM20206 V 10-90GC Micromate ISEE

UM20206\_20221202140431.IDFW

Date/Time Long at 14:04:31 December 2, 2022 Trigger Source Geo: 0.500 mm/s, Mic: 120.0 dB(L) Range Geo: 254.0 mm/s Record Time 7.0 sec at 1024 sps Operator/Setup: Operator/GAYTON.MMB

#### Notes

Location: Client: User Name		Blast No.: 2022-44 Project No: 22S001.00	
General:		USBM RI8507 An	d OSMRE
Microphone PSPL ZC Freq Channel Tes	Linear Weighting 106.0 dB(L) 4.003 pa.(L) at 2.055 sec 5.6 Hz st Passed (Freq = 20.5 Hz Amp = 1644 mv)	254	1.00 mm/s
PPV PPV ZC Freq Time (Rel. to Peak Accele Peak Displac Sensor Cheo Frequency Overswing Peak Vector	Tran       Vert       Long         0.457       0.355       0.623       mm/s         44.20       42.00       46.89       dB         47       26       51       Hz         o Trig)       0.044       0.241       0.084       sec         eration       0.026       0.016       0.026       g         cement       0.003       0.002       0.003       mm       for the sec         y       7.5       7.3       7.5       Hz       the sec       the se	100 50 20 10	
		$ \begin{array}{c}                                     $	+ + + + + + + + + + + + + + + + + + +
	▼	Tran: + Vert: x L	ong: ø
MicL		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	0.0
Long			0.0
Vert			0.0
Tran			0.0
	0.0 1.0 2.0 3.0	4.0 5.0 6.0	7.0

Time Scale: 0.50 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 1.000 pa.(L)/div Trigger = -\_ \_ -

Sensor Check





December 9, 2022

Project No.: 22S001.00

Mr. Daniel Guest Hammond River Holdings Via email: <u>Guest.Daniel@AtlanticWallboard.com</u>

## Re: Blast Vibration Monitoring - Blast No. 2022-45 - Upham East Gypsum Quarry, Upham, N.B.

Following are the results of the vibration monitoring carried out on behalf of Hammond River Holdings for the blast detonated by Gulf Operators at 14:02 on December 9, 2022. For the monitoring we positioned eleven (11) digital seismographs in the area.

The location of each monitoring point is noted in the following table.

Seismograph Location	Time	Approx. dist. from shot to seismograph (m)	Maximum Velocity (mm/s)	Sound Pressure (dB(L))	Remarks	
1. Civic No. 4079 Route 111 (PW-09)		1,000 m S	< 0.5 mm/s	<120	Unit was not triggered	
2. Civic No. 4126 Route 111 (PW-10)		900 m S	0.50 mm/s @ 51 Hz	104	-	
3. Civic No. 4150 Route 111 (PW-13)		830 m SE	< 0.5 mm/s	<120		
4. Civic No. 2447 Route 820 (PW-07)		990 m NE	< 0.5 mm/s	<120	Units were not triggered	
5. PW-03 - Cottage Route 820		680 m N	< 0.5 mm/s	<120		
6. Civic No. 2341 Route 820 (PW-05)	14:02	670 m N	0.62 mm/s @ 34 Hz	109	-	
7. Civic No. 50 Myron Road (PW-15)		885 m NW	< 0.5 mm/s	<120	Unit was not triggered	
8. Civic No. 86 Myron Road (PW-16)		730 m W	1.93 mm/s @ 24 Hz	110	-	
9. Civic No. 220 Myron Road (PW-01)		1,300 m S	< 0.5 mm/s	<120	Unit was not triggered	
10. Civic No. 4140 Route 111 (PW-12)		840 m SE	0.86 mm/s @ 64 Hz	108	-	
11. Civic No. 2337 Route 820 (PW-04)		740 m N	< 0.5 mm/s	<120	Unit was not triggered	
maximum limits as per Approval to Operate			12.5 mm/s	128 dB		

### Blast No. 2022-45 - December 8, 2022

*Mr. Daniel Guest – Hammond River Holdings December 9, 2022 Project No.: 225001.00 – Blast No.: 2022-45* 

The monitors did not detect any vibrations that exceeded the maximum allowable peak particle velocity of 12.5 mm/s (1.25 cm/s) or the maximum air overpressure of 128 dB(L) as established in the Approval to Operate (I-10936).

We trust this information is sufficient at this time. If you have any questions, please do not hesitate to contact us.

Best regards, **CBCL Limited** 

K that S

Robert Y. Cyr, M.A.Sc., P.Eng. *Senior Technical Specialist* 

Attachments: Blast Record Blast and Seismograph Location Plan Blast Event Reports

Project No: 22S001.00

This document was prepared for the party indicated herein. The material and information in the document reflects CBCL Limited's opinion and best judgment based on the information available at the time of preparation. Any use of this document or reliance on its content by third parties is the responsibility of the third party. CBCL Limited accepts no responsibility for any damages suffered as a result of third party use of this document.

Attachment A

Blast Record




### **BLAST RECORD**

Project Name:	Upham Gypsum Quarry	Date of Blast:	December 8, 2022
Project No.:	22S001.00	Time of Blast:	14:02
Inspector:	C. Buckley	Blast No.:	2022-45
Client:	Hammond River Holdings		

### **IDENTIFICATION:**

<b>Blasting Contractor:</b>	sting Contractor:		Gulf Operators	
Blaster's Certification No.:	1318	Blaster's Name:	Daniel Blanchard	
Blast Location:	N 45°28.867' W 65°38.	070' (see attached sketch)		
Type of Rock:	Anhydrate/Gypsum	Est. Vol. or Tonnage:	9,508 tonnes	
Weather at time of Blast:	Overcast with light rain	Air Temp.:	8°C	
Est. Wind Speed :	≈20 km/h	Wind Direction:	N	
Cloud Cover:	Yes - overcast	Precipitation:	Light	

### **BLAST DESIGN:**

<b>Total No. Holes:</b>	84	Hole Diameter:	4.5"
Average Depth:	5.4 m to 6.4 m	Spacing:	10 ft x 10 ft
No. Holes per Delay:	3	Collar Length:	7 ft
Delay between Holes:	25 ms	Delay between Rows:	42 & 84 ms
Initiation Method: Weight of Explosives	Non-Electric		
per Delay:	Max.: 110 kg		
Type and weight of Explosives for Blast:	3,303 kg – Titan XL-1000		

Sketch of shot location, hole layout, timing sequence, free face etc. if available.





# **BLAST RECORD**

<b>Project Name:</b>	Upham Gypsum Quarry	Date of Blast:	December 8, 2022
Project No.:	22S001.00	Time of Blast:	14:02
Inspector:	C. Buckley	Blast No.:	2022-45
Client:	Hammond River Holdings		

#### **BLAST MONITORING**

Distance to the Nearest Structure:	670 m
Direction to the Nearest Structure:	Ν
Structure Type:	House
Scaled Distance Factor: (distance / sq. rt. of max. wt. per delay):	63.9

### SAFETY:

Type of Warning Signal Used:	Siren	
Blasting Mats Used (yes or no ):	No	
Airblast Measurement ( yes or no ):	Yes	
Vibration Measurement ( yes or no ):	Yes	
Warning Signs Posted ( yes or no ):	Yes	
Accesses Guarded ( yes or no ):	Yes	
Flyrock Damage ( yes or no ):	No	
If Yes, Describe:		
Misfire ( yes or no ):	No	

Reviewed By: Robert Y. Cyr, M.A.Sc., P.Eng.





# **BLAST RECORD**

<b>Project Name:</b>	Upham Gypsum Quarry	Date of Blast:	December 8, 2022
Project No.:	22S001.00	<b>Time of Blast:</b>	14:02
Inspector:	C. Buckley	Blast No.:	2022-45
Client:	Hammond River Holdings		

### **Data Collection – Seismometer #1**

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #20203
Calibration Date:	May 31, 2022
Location of seismograph:	Civic Number 4079 Route 111 (PW-09)
Distance and Direction from Blast:	1,000 m South
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Make, Model and Serial # of unit:
Calibration Date:
Location of seismograph:
Distance and Direction from Blast:
Transverse Particle Velocity:
Vertical Particle Velocity:
Longitudinal Particle Velocity:
Peak Particle Velocity:
Maximum Airblast:





# **BLAST RECORD**

<b>Project Name:</b>	Upham Gypsum Quarry	Date of Blast:	December 8, 2022
Project No.:	22S001.00	Time of Blast:	14:02
Inspector:	C. Buckley	Blast No.:	2022-45
Client:	Hammond River Holdings		

#### Data Collection – Seismometer #3

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #20205
Calibration Date:	May 31, 2022
Location of seismograph:	Civic Number 4150 Route 111 (PW-13)
Distance and Direction from Blast:	830 m Southeast
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Make, Model and Serial # of unit:
Calibration Date:
Location of seismograph:
Distance and Direction from Blast:
Transverse Particle Velocity:
Vertical Particle Velocity:
Longitudinal Particle Velocity:
Peak Particle Velocity:
Maximum Airblast:

Instantel Mini Mate, Serial #5487
February 18, 2022
Civic Number 2447 Route 820 (PW-07)
990 m Northeast
<0.5 mm/s – Unit was not triggered
<0.5 mm/s – Unit was not triggered
<0.5 mm/s – Unit was not triggered
N/A
<120 dB(L) – Unit was not triggered





# **BLAST RECORD**

Project Name:	Upham Gypsum Quarry	Date of Blast:	December 8, 2022
Project No.:	228001.00	<b>Time of Blast:</b>	14:02
Inspector:	C. Buckley	Blast No.:	2022-45
Client:	Hammond River Holdings	_	

#### **Data Collection – Seismometer #5**

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5632
Calibration Date:	November 16, 2022
Location of seismograph:	Cottage - PW-03 - Route 820
Distance and Direction from Blast:	680 m North
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Make, Model and Serial # of unit:
Calibration Date:
Location of seismograph:
Distance and Direction from Blast:
Transverse Particle Velocity:
Vertical Particle Velocity:
Longitudinal Particle Velocity:
Peak Particle Velocity:
Maximum Airblast:

Instantel Mini Mate, Serial #18193
April 11, 2022
Civic Number 2341 Route 820 (PW-05)
670 m North
0.61 mm/s @ 34 Hz
0.62 mm/s @ 39 Hz
0.62 mm/s @ 34 Hz
0.62 mm/s @ 34 Hz
109 dB(L)





# **BLAST RECORD**

Project Name:	Upham Gypsum Quarry	Date of Blast:	December 8, 2022
Project No.:	228001.00	<b>Time of Blast:</b>	14:02
Inspector:	C. Buckley	Blast No.:	2022-45
Client:	Hammond River Holdings	_	

### **Data Collection – Seismometer #7**

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #21348
Calibration Date:	July 23, 2022
Location of seismograph:	Civic Number 50 Myron Road (PW-15)
Distance and Direction from Blast:	885 m Northwest
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Make, Model and Serial # of unit:
Calibration Date:
Location of seismograph:
Distance and Direction from Blast:
Transverse Particle Velocity:
Vertical Particle Velocity:
Longitudinal Particle Velocity:
Peak Particle Velocity:
Maximum Airblast:

Instantel Mini Mate, Serial #18187
May 5, 2022
Civic Number 86 Myron Road (PW-16)
730 m West
1.93 mm/s @ 24 Hz
0.81 mm/s @ 30 Hz
0.99 mm/s @ 16 Hz
1.93 mm/s @ 24 Hz
110 dB(L)





# **BLAST RECORD**

Project Name:	Upham Gypsum Quarry	Date of Blast:	December 8, 2022
Project No.:	22S001.00	Time of Blast:	14:02
Inspector:	C. Buckley	Blast No.:	2022-45
Client:	Hammond River Holdings	_	

#### Data Collection – Seismometer #9

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5371
Calibration Date:	July 27, 2022
Location of seismograph:	Civic Number 220 Myron Road (PW-01)
Distance and Direction from Blast:	1,300 m South
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Make, Model and Serial # of unit:
Calibration Date:
Location of seismograph:
Distance and Direction from Blast:
Transverse Particle Velocity:
Vertical Particle Velocity:
Longitudinal Particle Velocity:
Peak Particle Velocity:
Maximum Airblast:

Instantel Mini Mate, Serial #20206
May 31, 2022
Civic Number 4140 Route 111 (PW-12)
840 m Southeast
0.86 mm/s @ 64 Hz
0.49 mm/s @ 64 Hz
0.58 mm/s @ 39 Hz
0.86 mm/s @ 64 Hz
108 dB(L)
· · · · ·





# **BLAST RECORD**

Project Name:	Upham Gypsum Quarry	Date of Blast:	December 8, 2022
Project No.:	22S001.00	Time of Blast:	14:02
Inspector:	C. Buckley	Blast No.:	2022-45
Client:	Hammond River Holdings		

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #21349
Calibration Date:	July 23, 2022
Location of seismograph:	Civic Number 2337 Route 820 (PW-04)
Distance and Direction from Blast:	740 m North
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Attachment B

Blast and Seismograph Location Plan

Blast and Seismograph Location Plan Blast No: 2022-45 Upham East Gypsum Quarry Upham, NB





Date: December 8, 2022 Project No.: 22S001.00

# Attachment C

Blast Event Reports



Serial Number

**Post Event Notes** 

3.7 Volts

Unit Calibration May 31, 2022 by Instantel

Location: Civic Number 4126 Route 111 (PW-10)

Battery Level

File Name

UM20204 V 10-90GC Micromate ISEE

UM20204\_20221208140200.IDFW

Date/Time Tran at 14:02:00 December 8, 2022 Trigger Source Geo: 0.500 mm/s, Mic: 120.0 dB(L) Range Geo: 254.0 mm/s Record Time 7.0 sec at 1024 sps Operator/Setup: Operator/GAYTON.MMB

#### Notes

Location: Client: User Name:		Blas Pro	st No.: 2022-45 jject No: 22S001.00
General:			USBM RI8507 And OSMRE
Microphone PSPL ZC Freq Channel Tes	Linear Weighting 103.6 dB(L) 3.010 pa.(L) at 2.515 sec 8.7 Hz st Passed (Freq = 20.5 Hz Amp = 1598 mv)	254 200	
PPV PPV ZC Freq Time (Rel. to Peak Accele Peak Displac Sensor Cheo Frequency Overswing Peak Vector	Tran         Vert         Long           0.497         0.457         0.268         mm/s           44.92         44.20         39.56         dB           51         47         47         Hz           o Trig)         0.000         -0.015         0.073         sec           eration         0.025         0.018         0.012         g           cement         0.002         0.002         0.001         mm           ck         Passed         Passed         Passed           y         7.5         7.5         7.7         Hz           g Ratio         4.2         4.3         4.1	100 	
		1 <del>+</del> 1	2 5 10 20 50 100 > Frequency (Hz) Tran: + Vert: × Long: Ø
MicL			0.0
Long			0.0
Vert			0.0
Tran			0.0
	0.0 1.0 2.0 3	3.0	4.0 5.0 6.0 7.0

Time Scale: 0.50 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 1.000 pa.(L)/div Trigger = -\_ \_ -

Sensor Check



Serial Number

**Post Event Notes** 

Blast No.: 2022-45

3.8 Volts Unit Calibration April 11, 2022 by Instantel

Location: Civic Number 2341 Route 820 (PW-05)

Battery Level

File Name

UM18193 V 10-90GC Micromate ISEE

UM18193\_20221208140158.IDFW

Date/Time Long at 14:01:58 December 8, 2022 Trigger Source Geo: 0.500 mm/s, Mic: 123.0 dB(L) Range Geo: 254.0 mm/s Record Time 7.0 sec at 1024 sps Operator/Setup: Operator/CARVER.MMB

#### Notes

Location:

Client: User Name:			Project No: 22S001.00
General:			USBM RI8507 And OSMRE
Microphone PSPL ZC Freq Channel Test	Linear Weighting 109.0 dB(L) 5.632 pa.(L) at 1.708 sec 3.4 Hz t Passed (Freq = 20.5 Hz Amp = 1617 mv )		254
PPV PPV ZC Freq Time (Rel. to Peak Acceler Peak Displace Sensor Check Frequency Overswing	Tran         Vert         Long           0.607         0.623         0.623         mm/s           46.66         46.89         46.89         dB           34         39         34         Hz           Trig)         0.311         0.016         0.003         sec           ation         0.029         0.021         0.018         g           ement         0.003         0.002         0.004         mm           k         Passed         Passed         Passed           7.3         7.5         7.3         Hz           Ratio         4.4         4.3         4.6	city (mm/s)	
Peak Vector S	Sum 0.742 mm/s at 0.003 sec	Velo	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
	-	I	Tran: + Vert: x Long: ø
MicL			
Long	 		0.0
Vert			0.0
Tran			0.0
0	.0 1.0 2.0 3	3.0	4.0 5.0 6.0 7.0

Time Scale: 0.50 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 2.000 pa.(L)/div Trigger = --\_ \_

Sensor Check



Serial Number

**Post Event Notes** 

3.8 Volts

Location: Civic Number 86 Myron Road (PW-16)

Unit Calibration May 5, 2022 by Instantel

Battery Level

File Name

UM18187 V 10-90GC Micromate ISEE

UM18187\_20221208140200.IDFW

Date/Time Vert at 14:02:00 December 8, 2022 Trigger Source Geo: 0.500 mm/s, Mic: 120.0 dB(L) Range Geo: 254.0 mm/s Record Time 7.0 sec at 1024 sps Operator/Setup: Operator/factory.MMB

#### Notes

Location: Client: User Name: General:						Blast No.: Project No	2022-45 : 22S001.0	0		-10)	
oonora.								USBM	RI8507 An	d OSMRE	
Microphon PSPL ZC Freq Channel To	e Linear Wei 110.2 dB(L 23 Hz est Passed (Fr	ghting .)  6.486 pa.(l <sup></sup> eq = 20.5 Hz	L) at 1.832 : Amp = 16	sec 15 mv)		254 200	+ +		++++		+++++++++++++++++++++++++++++++++++++++
PPV PPV ZC Freq Time (Rel. Peak Acce Peak Displ Sensor Ch Frequen Overswi Peak Vecto	Tr 1.9 56. to Trig) 0.4 leration 0.0 acement 0.0 eck Pass cy 5 ng Ratio 4 or Sum 1.954 r	ran Vert 031 0.812 .72 49.19 24 30 19 0.018 057 0.025 012 0.004 sed Passed 7.3 7.5 4.7 4.4 mm/s at 0.42	Long 0.993 50.94 16 0.574 0.024 0.010 Passed 7.5 4.4 0 sec	mm/s dB Hz sec g mm Hz	Velocity (mm/s)					+ + + + + + + + + + + + + + + + + + +	
F	<b>Y</b> +										
MicL			MM // WWW.	our from	<del></del>						0
Long		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~									0
Vert	·····										0
Tran		A									0
+	0.0	1.0	2.0	3.	0	4.0		5.0	6.0	7.0	

Time Scale: 0.50 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 2.000 pa.(L)/div Trigger = -\_ \_ -

Sensor Check

0.0

0.0

0.0

0.0



Serial Number

**Post Event Notes** 

3.6 Volts Unit Calibration May 31, 2022 by Instantel

Location: Civic Number 4140 Route 111 (PW-12)

Battery Level

File Name

UM20206 V 10-90GC Micromate ISEE

UM20206\_20221208140159.IDFW

Date/Time Tran at 14:01:59 December 8, 2022 Trigger Source Geo: 0.500 mm/s, Mic: 120.0 dB(L) Range Geo: 254.0 mm/s Record Time 7.0 sec at 1024 sps Operator/Setup: Operator/GAYTON.MMB

#### Notes

Location: Client: User Name:		Blast No.: 2 Project No:	022-45 22S001.00		
General:			USBM RI8507 And OSMRE		
Microphone PSPL ZC Freq Channel Test	Linear Weighting 108.1 dB(L) 5.105 pa.(L) at 2.454 sec 8.5 Hz : Passed (Freq = 20.5 Hz Amp = 1599 mv )	254 200	No velocity above 1.00 mm/s	+ + + + + + + + + + + + + + + + + + + +	
PPV PPV ZC Freq Time (Rel. to Peak Acceler Peak Displace Sensor Check Frequency Overswing	Tran         Vert         Long           0.859         0.489         0.575         mm/s           49.68         44.78         46.20         dB           64         64         39         Hz           Trig)         0.025         0.278         0.191         sec           ation         0.060         0.026         0.027         g           ement         0.002         0.002         mm           k         Passed         Passed         Passed           7.7         7.3         7.5         Hz           Ratio         4.4         4.6         4.4	100			
Peak Vector S	Sum 0.879 mm/s at 0.025 sec			+	
		2		-	
		1	2 5 10 20 Frequency (Hz) Tran: + Vert: × Long: Ø	+	>
MicL					0.0
Long					0.0
Vert					0.0
Tran					0.0
0	.0 1.0 2.0	3.0 4.0	5.0 6.0 7	.0	

Time Scale: 0.50 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 2.000 pa.(L)/div Trigger = --\_ \_

Sensor Check





December 13, 2022

Project No.: 22S001.00

Mr. Daniel Guest Hammond River Holdings Via email: <u>Guest.Daniel@AtlanticWallboard.com</u>

#### Re: Blast Vibration Monitoring - Blast No. 2022-46 - Upham East Gypsum Quarry, Upham, N.B.

Following are the results of the vibration monitoring carried out on behalf of Hammond River Holdings for the blast detonated by Gulf Operators at 14:00 on December 13, 2022. For the monitoring we positioned eleven (11) digital seismographs in the area.

The location of each monitoring point is noted in the following table.

Seismograph Location	Time	Approx. dist. from shot to seismograph (m)	Maximum Velocity (mm/s)	Sound Pressure (dB(L))	Remarks
1. Civic No. 4079 Route 111 (PW-09)	14:00	1,280 m S	< 0.5 mm/s	<120	
2. Civic No. 4126 Route 111 (PW-10)		857 m S	< 0.5 mm/s	<120	Units were not
3. Civic No. 4150 Route 111 (PW-13)		701 m SE	< 0.5 mm/s	<120	triggered
4. Civic No. 2447 Route 820 (PW-07)		947 m NE	< 0.5 mm/s	<120	
5. PW-03 - Cottage Route 820		654 m N	0.51 mm/s @ 57 Hz	110	-
6. Civic No. 2341 Route 820 (PW-05)		712 m N	< 0.5 mm/s	<120	Units were not
7. Civic No. 50 Myron Road (PW-15)		958 m NW	< 0.5 mm/s	<120	triggered
8. Civic No. 86 Myron Road (PW-16)		824 m W	0.57 mm/s @ 64 Hz	106	-
9. Civic No. 220 Myron Road (PW-01)		1,320 m S	< 0.5 mm/s	<120	
10. Civic No. 4140 Route 111 (PW-12)		785 m SE	< 0.5 mm/s	<120	Units were not triggered
11. Civic No. 2337 Route 820 (PW-04)		788 m N	< 0.5 mm/s	<120	
maximum limits as per App	12.5 mm/s	128 dB			

#### Blast No. 2022-46 - December 13, 2022

*Mr. Daniel Guest – Hammond River Holdings December 13, 2022 Project No.: 22S001.00 – Blast No.: 2022-46* 

The monitors did not detect any vibrations that exceeded the maximum allowable peak particle velocity of 12.5 mm/s (1.25 cm/s) or the maximum air overpressure of 128 dB(L) as established in the Approval to Operate (I-10936).

We trust this information is sufficient at this time. If you have any questions, please do not hesitate to contact us.

Best regards, CBCL Limited

Kobut S

Robert Y. Cyr, M.A.Sc., P.Eng. *Senior Technical Specialist* 

Attachments: Blast Record Blast and Seismograph Location Plan Blast Event Reports

Project No: 22S001.00

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Attachment A

Blast Record





# **BLAST RECORD**

<b>Project Name:</b>	Upham Gypsum Quarry	Date of Blast:	December 13, 2022
Project No.:	22S001.00	Time of Blast:	14:00
Inspector:	C. Buckley	Blast No.:	2022-46
Client:	Hammond River Holdings		

### **IDENTIFICATION:**

<b>Blasting Contractor:</b>	Gulf Operators						
Blaster's Certification No.:	1318	Blaster's Name:	Daniel Blanchard				
Blast Location:	N 45°28'51.9" W 65°37	ch)					
Type of Rock:	Anhydrate/Gypsum	Est. Vol. or Tonnage:	9,148 tonnes				
Weather at time of Blast:	Sunny with few clouds	Air Temp.:	1°C				
Est. Wind Speed :	≈20 km/h	Wind Direction:	SE				
Cloud Cover:	Yes – few	Precipitation:	No				

### **BLAST DESIGN:**

<b>Total No. Holes:</b>	94	Hole Diameter:	4.5"
Average Depth:	5.1 m to 6.8 m	Spacing:	10 ft x 10 ft
No. Holes per Delay:	3	Collar Length:	7 ft
Delay between Holes:	25 ms	Delay between Rows:	42, 89 & 125 ms
Initiation Method: Weight of Explosives	Non-Electric		
per Delay:	Max.: 105 kg		
Type and weight of Explosives for Blast:	3,605 kg – Titan XI	L-1000	

Sketch of shot location, hole layout, timing sequence, free face etc. if available.





# **BLAST RECORD**

Project Name:	Upham Gypsum Quarry	Date of Blast:	December 13, 2022
Project No.:	22S001.00	Time of Blast:	14:00
Inspector:	C. Buckley	Blast No.:	2022-46
Client:	Hammond River Holdings		

### **BLAST MONITORING**

Distance to the Nearest Structure:	654 m
Direction to the Nearest Structure:	Ν
Structure Type:	House
Scaled Distance Factor: (distance / sq. rt. of max. wt. per delay):	63.8

### SAFETY:

Type of Warning Signal Used:	Siren
Blasting Mats Used (yes or no ):	No
Airblast Measurement ( yes or no ):	Yes
Vibration Measurement ( yes or no ):	Yes
Warning Signs Posted ( yes or no ):	Yes
Accesses Guarded ( yes or no ):	Yes
Flyrock Damage ( yes or no ):	No
If Yes, Describe:	
Misfire ( yes or no ):	No

Reviewed By: Robert Y. Cyr, M.A.Sc., P.Eng.





# **BLAST RECORD**

Project Name:	Upham Gypsum Quarry	Date of Blast:	December 13, 2022
Project No.:	22S001.00	Time of Blast:	14:00
Inspector:	C. Buckley	Blast No.:	2022-46
Client:	Hammond River Holdings	_	

### **Data Collection – Seismometer #1**

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5489
Calibration Date:	April 25, 2022
Location of seismograph:	Civic Number 4079 Route 111 (PW-09)
Distance and Direction from Blast:	1,280 m South
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Make, Model and Serial # of unit:
Calibration Date:
Location of seismograph:
Distance and Direction from Blast:
Transverse Particle Velocity:
Vertical Particle Velocity:
Longitudinal Particle Velocity:
Peak Particle Velocity:
Maximum Airblast:

Instantel Mini Mate, Serial #20205
May 31, 2022
Civic Number 4126 Route 111 (PW-10)
857 m South
<0.5 mm/s – Unit was not triggered
<0.5 mm/s – Unit was not triggered
<0.5 mm/s – Unit was not triggered
N/A
<120 dB(L) – Unit was not triggered





# **BLAST RECORD**

<b>Project Name:</b>	Upham Gypsum Quarry	Date of Blast:	December 13, 2022
Project No.:	228001.00	<b>Time of Blast:</b>	14:00
Inspector:	C. Buckley	Blast No.:	2022-46
Client:	Hammond River Holdings		

### Data Collection – Seismometer #3

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #20206
Calibration Date:	May 31, 2022
Location of seismograph:	Civic Number 4150 Route 111 (PW-13)
Distance and Direction from Blast:	701 m Southeast
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Make, Model and Serial # of unit:
Calibration Date:
Location of seismograph:
Distance and Direction from Blast:
Transverse Particle Velocity:
Vertical Particle Velocity:
Longitudinal Particle Velocity:
Peak Particle Velocity:
Maximum Airblast:

Instantel Mini Mate, Serial #5632
November 16, 2022
Civic Number 2447 Route 820 (PW-07)
947 m Northeast
<0.5 mm/s – Unit was not triggered
<0.5 mm/s – Unit was not triggered
<0.5 mm/s – Unit was not triggered
N/A
<120 dB(L) – Unit was not triggered





# **BLAST RECORD**

<b>Project Name:</b>	Upham Gypsum Quarry	Date of Blast:	December 13, 2022
Project No.:	22S001.00	Time of Blast:	14:00
Inspector:	C. Buckley	Blast No.:	2022-46
Client:	Hammond River Holdings	_	

### **Data Collection – Seismometer #5**

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5487
Calibration Date:	February 18, 2022
Location of seismograph:	Cottage - PW-03 - Route 820
Distance and Direction from Blast:	654 m North
Transverse Particle Velocity:	0.32 mm/s @ 64 Hz
Vertical Particle Velocity:	0.38 mm/s @ 57 Hz
Longitudinal Particle Velocity:	0.50 mm/s @ 57 Hz
Peak Particle Velocity:	0.50 mm/s @ 57 Hz
Maximum Airblast:	110 dB(L)

Make, Model and Serial # of unit:
Calibration Date:
Location of seismograph:
Distance and Direction from Blast:
Transverse Particle Velocity:
Vertical Particle Velocity:
Longitudinal Particle Velocity:
Peak Particle Velocity:
Maximum Airblast:

Instantel Mini Mate, Serial #20203
May 31, 2022
Civic Number 2341 Route 820 (PW-05)
712 m North
<0.5 mm/s – Unit was not triggered
<0.5 mm/s – Unit was not triggered
<0.5 mm/s – Unit was not triggered
N/A
<120 dB(L) – Unit was not triggered





# **BLAST RECORD**

<b>Project Name:</b>	Upham Gypsum Quarry	Date of Blast:	December 13, 2022
Project No.:	228001.00	<b>Time of Blast:</b>	14:00
Inspector:	C. Buckley	Blast No.:	2022-46
Client:	Hammond River Holdings		

### **Data Collection – Seismometer #7**

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #18187
Calibration Date:	May 5, 2022
Location of seismograph:	Civic Number 50 Myron Road (PW-15)
Distance and Direction from Blast:	958 m Northwest
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Make, Model and Serial # of unit:
Calibration Date:
Location of seismograph:
Distance and Direction from Blast:
Transverse Particle Velocity:
Vertical Particle Velocity:
Longitudinal Particle Velocity:
Peak Particle Velocity:
Maximum Airblast:

Instantel Mini Mate, Serial #5371
July 27, 2022
Civic Number 86 Myron Road (PW-16)
824 m West
0.51 mm/s @ 73 Hz
0.57 mm/s @ 57 Hz
0.57 mm/s @ 64 Hz
0.57 mm/s @ 64 Hz
106 dB(L)





# **BLAST RECORD**

Project Name:	Upham Gypsum Quarry	Date of Blast:	December 13, 2022
Project No.:	228001.00	Time of Blast:	14:00
Inspector:	C. Buckley	Blast No.:	2022-46
Client:	Hammond River Holdings	_	

#### Data Collection – Seismometer #9

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #20204
Calibration Date:	May 31, 2022
Location of seismograph:	Civic Number 220 Myron Road (PW-01)
Distance and Direction from Blast:	1,320 m South
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Make, Model and Serial # of unit:	Inst
Calibration Date:	Apr
Location of seismograph:	Civ
Distance and Direction from Blast:	785
Transverse Particle Velocity:	<0.
Vertical Particle Velocity:	<0.
Longitudinal Particle Velocity:	<0.
Peak Particle Velocity:	N/A
Maximum Airblast:	<12

Instantel Mini Mate, Serial #5673
April 8, 2022
Civic Number 4140 Route 111 (PW-12)
785 m Southeast
<0.5 mm/s – Unit was not triggered
<0.5 mm/s – Unit was not triggered
<0.5 mm/s – Unit was not triggered
N/A
<120 dB(L) – Unit was not triggered





# **BLAST RECORD**

<b>Project Name:</b>	Upham Gypsum Quarry	Date of Blast:	December 13, 2022
Project No.:	22S001.00	Time of Blast:	14:00
Inspector:	C. Buckley	Blast No.:	2022-46
Client:	Hammond River Holdings	_	

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #18193
Calibration Date:	April 11, 2022
Location of seismograph:	Civic Number 2337 Route 820 (PW-04)
Distance and Direction from Blast:	788 m North
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Attachment B

Blast and Seismograph Location Plan

Blast and Seismograph Location Plan Blast No: 2022-46 Upham East Gypsum Quarry Upham, NB



Date: December 13, 2022 Project No.: 22S001.00



# Attachment C

Blast Event Reports



 Date/Time
 Long at 14:00:41 December 13, 2022

 Trigger Source
 Geo: 0.492 mm/s, Mic: 119.6 dB(L)

 Range
 Geo: 127.0 mm/s

 Record Time
 7.0 sec at 1024 sps

#### Notes

MicL

Long

Vert

Tran

Location: Client: User Name: Converted: December 13, 2022 16:39:16 (V10.72.1)

#### **Extended Notes**

MicrophoneLinear WeightingPSPL109.5 dB(L) 6.000 pa.(L) at 2.362 secZC Freq4.0 HzChannel TestPassed (Freq = 20.0 Hz Amp = 286 mv )

	Tran	Vert	Long	
PPV	0.318	0.381	0.508	mm/s
PPV	41.03	42.62	45.12	dB
ZC Freq	64	57	57	Hz
Time (Rel. to Trig)	0.107	0.104	0.000	sec
Peak Acceleration	0.013	0.013	0.020	g
Peak Displacement	0.001	0.001	0.002	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.0	7.7	8.0	Hz
Overswing Ratio	3.6	4.1	3.8	

Peak Vector Sum 0.524 mm/s at 0.000 sec

Serial Number5487 V 2.61 MiniMateBattery Level5.8 VoltsUnit CalibrationFebruary 18, 2022 by InstantelFile NameG487JT1L.L50Post Event NotesLocation: Cottage - Route 820 (PW-03)Blast No.: 2022-46Project No: 22S001.00

#### USBM RI8507 And OSMRE



Time Scale: 0.50 sec/div Amplitude Scale: Geo: 0.500 mm/s/div Mic: 5.000 pa.(L)/div Trigger =

2.0

Printed: December 13, 2022 (V 10.74)

0.0

1.0

Sensor Check



Velocity (mm/s)

5

Date/Time Vert at 14:01:05 December 13, 2022 Trigger Source Geo: 0.492 mm/s, Mic: 119.6 dB(L) Geo: 127.0 mm/s Range **Record Time** 7.0 sec at 1024 sps

#### Notes

Location:	
Client:	QU
User Name:	WR
Converted:	December 13, 2022 16:43:38 (V10.72.1)

Microphone Linear Weighting 106.0 dB(L) 4.000 pa.(L) at 2.191 sec PSPL ZC Freq 3.0 Hz Channel Test Passed (Freq = 20.0 Hz Amp = 302 mv)

	Tran	Vert	Long	
PPV	0.508	0.572	0.572	mm/s
PPV	45.12	46.14	46.14	dB
ZC Freq	73	57	64	Hz
Time (Rel. to Trig)	0.141	0.001	0.032	sec
Peak Acceleration	0.020	0.020	0.027	g
<b>Peak Displacement</b>	0.008	0.003	0.002	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.0	7.8	8.2	Hz
Overswing Ratio	3.5	3.6	3.8	

Peak Vector Sum 0.714 mm/s at 0.141 sec

Serial Number 5371 V 2.61 MiniMate **Battery Level** 5.9 Volts Unit Calibration July 27, 2022 by Instantel **File Name** G371JT1L.LT0 Post Event Notes Location: Civic Number 86 Myron Road (PW-16) Blast No.: 2022-46 Project No: 22S001.00

# **USBM RI8507 And OSMRE** 254 + + + + + +200-No velocity above 1.00 mm/s 100 50 20 10 2 10 20 50 100 > Frequency (Hz) Tran: + Vert: x Long: ø



Time Scale: 0.50 sec/div Amplitude Scale: Geo: 0.500 mm/s/div Mic: 5.000 pa.(L)/div Trigger = >

Sensor Check

Printed: December 13, 2022 (V 10.74)





December 20, 2022

Project No.: 22S001.00

Mr. Daniel Guest Hammond River Holdings Via email: <u>Guest.Daniel@AtlanticWallboard.com</u>

#### Re: Blast Vibration Monitoring - Blast No. 2022-47 - Upham East Gypsum Quarry, Upham, N.B.

Following are the results of the vibration monitoring carried out on behalf of Hammond River Holdings for the blast detonated by Gulf Operators at 13:59 on December 20, 2022. For the monitoring we positioned eleven (11) digital seismographs in the area.

The location of each monitoring point is noted in the following table.

Seismograph Location	Time	Approx. dist. from shot to seismograph (m)	Maximum Velocity (mm/s)	Sound Pressure (dB(L))	Remarks
1. Civic No. 4079 Route 111 (PW-09)		1,290 m S	< 0.5 mm/s	<120	
2. Civic No. 4126 Route 111 (PW-10)		855 m S	< 0.5 mm/s	<120	
3. Civic No. 4150 Route 111 (PW-13)		695 m SE	< 0.5 mm/s	<120	Units were not triggered
4. Civic No. 2447 Route 820 (PW-07)		940 m NE	< 0.5 mm/s	<120	
5. PW-03 - Cottage Route 820		690 m N	< 0.5 mm/s	<120	
6. Civic No. 2341 Route 820 (PW-05)	13:59	715 m N	0.51 mm/s @ 57 Hz	105	-
7. Civic No. 50 Myron Road (PW-15)		970 m NW	< 0.5 mm/s	<120	
8. Civic No. 86 Myron Road (PW-16)		850 m W	< 0.5 mm/s	<120	Units were not triggered
9. Civic No. 220 Myron Road (PW-01)		1,330 m S	< 0.5 mm/s	<120	
10. Civic No. 4140 Route 111 (PW-12)		790 m SE	0.62 mm/s @ >100 Hz	99	-
11. Civic No. 2337 Route 820 (PW-04)		800 m N	< 0.5 mm/s	<120	Unit was not triggered
maximum limits as per Approval to Operate			12.5 mm/s	128 dB	

#### Blast No. 2022-47 - December 20, 2022

*Mr. Daniel Guest – Hammond River Holdings December 20, 2022 Project No.: 22S001.00 – Blast No.: 2022-47* 

The monitors did not detect any vibrations that exceeded the maximum allowable peak particle velocity of 12.5 mm/s (1.25 cm/s) or the maximum air overpressure of 128 dB(L) as established in the Approval to Operate (I-10936).

We trust this information is sufficient at this time. If you have any questions, please do not hesitate to contact us.

Best regards, CBCL Limited

Kobut S

Robert Y. Cyr, M.A.Sc., P.Eng. *Senior Technical Specialist* 

Attachments: Blast Record Blast and Seismograph Location Plan Blast Event Reports

Project No: 22S001.00

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Attachment A

Blast Record





# **BLAST RECORD**

<b>Project Name:</b>	Upham Gypsum Quarry	Date of Blast:	December 20, 2022
Project No.:	22S001.00	Time of Blast:	13:59
Inspector:	C. Buckley	Blast No.:	2022-47
Client:	Hammond River Holdings		

### **IDENTIFICATION:**

<b>Blasting Contractor:</b>	Gulf Operators		
Blaster's Certification No.:	1318	Blaster's Name:	Daniel Blanchard
Blast Location:	N 45°28.863' W 65°37	.973' (see attached sketch	1)
Type of Rock:	Anhydrate/Gypsum	Est. Vol. or Tonnage:	7,115 tonnes
Weather at time of Blast:	Snowing	Air Temp.:	1°C
Est. Wind Speed :	≈20 km/h	Wind Direction:	N
Cloud Cover:	Yes	Precipitation:	Snow (light)

### **BLAST DESIGN:**

<b>Total No. Holes:</b>	77	Hole Diameter:	4.5"
Average Depth:	4.6 m to 6.0 m	Spacing:	10 ft x 10 ft
No. Holes per Delay:	3	Collar Length:	7 ft
Delay between Holes:	25 ms	Delay between Rows:	42, 59 & 84 ms
Initiation Method: Weight of Explosives	Non-Electric		
per Delay:	Max.: 100 kg		
Type and weight of Explosives for Blast:	2,815 kg – Titan X	L-1000	

Sketch of shot location, hole layout, timing sequence, free face etc. if available.





# **BLAST RECORD**

Project Name:	Upham Gypsum Quarry	Date of Blast:	December 20, 2022
Project No.:	22S001.00	Time of Blast:	13:59
Inspector:	C. Buckley	Blast No.:	2022-47
Client:	Hammond River Holdings		

### **BLAST MONITORING**

Distance to the Nearest Structure:	690 m
Direction to the Nearest Structure:	Ν
Structure Type:	House
Scaled Distance Factor: (distance / sq. rt. of max. wt. per delay):	69.0

### SAFETY:

Type of Warning Signal Used:	Siren
Blasting Mats Used (yes or no ):	No
Airblast Measurement ( yes or no ):	Yes
Vibration Measurement ( yes or no ):	Yes
Warning Signs Posted ( yes or no ):	Yes
Accesses Guarded ( yes or no ):	Yes
Flyrock Damage ( yes or no ):	No
If Yes, Describe:	
Misfire ( yes or no ):	No

Reviewed By: Robert Y. Cyr, M.A.Sc., P.Eng.




## **BLAST RECORD**

Project Name:	Upham Gypsum Quarry	Date of Blast:	December 20, 2022
Project No.:	228001.00	Time of Blast:	13:59
Inspector:	C. Buckley	Blast No.:	2022-47
Client:	Hammond River Holdings		

#### **Data Collection – Seismometer #1**

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5371	
Calibration Date:	July 27, 2022	
Location of seismograph:	Civic Number 4079 Route 111 (PW-09)	
Distance and Direction from Blast:	1,290 m South	
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered	
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered	
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered	
Peak Particle Velocity:	N/A	
Maximum Airblast:	<120 dB(L) – Unit was not triggered	

Make, Model and Serial # of unit:
Calibration Date:
Location of seismograph:
Distance and Direction from Blast:
Transverse Particle Velocity:
Vertical Particle Velocity:
Longitudinal Particle Velocity:
Peak Particle Velocity:
Maximum Airblast:

Instantel Mini Mate, Serial #20206
May 31, 2022
Civic Number 4126 Route 111 (PW-10)
855 m South
<0.5 mm/s – Unit was not triggered
<0.5 mm/s – Unit was not triggered
<0.5 mm/s – Unit was not triggered
N/A
<120 dB(L) – Unit was not triggered





## **BLAST RECORD**

<b>Project Name:</b>	Upham Gypsum Quarry	Date of Blast:	December 20, 2022
Project No.:	22S001.00	<b>Time of Blast:</b>	13:59
Inspector:	C. Buckley	Blast No.:	2022-47
Client:	Hammond River Holdings	_	

#### Data Collection – Seismometer #3

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #20203	
Calibration Date:	May 31, 2022	
Location of seismograph:	Civic Number 4150 Route 111 (PW-13)	
Distance and Direction from Blast:	695 m Southeast	
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered	
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered	
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered	
Peak Particle Velocity:	N/A	
Maximum Airblast:	<120 dB(L) – Unit was not triggered	

Make, Model and Serial # of unit:
Calibration Date:
Location of seismograph:
Distance and Direction from Blast:
Transverse Particle Velocity:
Vertical Particle Velocity:
Longitudinal Particle Velocity:
Peak Particle Velocity:
Maximum Airblast:

Instantel Mini Mate, Serial #20204
May 31, 2022
Civic Number 2447 Route 820 (PW-07)
940 m Northeast
<0.5 mm/s – Unit was not triggered
<0.5 mm/s – Unit was not triggered
<0.5 mm/s – Unit was not triggered
N/A
<120 dB(L) – Unit was not triggered





## **BLAST RECORD**

Project Name:	Upham Gypsum Quarry	Date of Blast:	December 20, 2022
Project No.:	22S001.00	Time of Blast:	13:59
Inspector:	C. Buckley	Blast No.:	2022-47
Client:	Hammond River Holdings	_	

#### **Data Collection – Seismometer #5**

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5487	
Calibration Date:	February 18, 2022	
Location of seismograph:	Cottage - PW-03 - Route 820	
Distance and Direction from Blast:	690 m North	
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered	
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered	
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered	
Peak Particle Velocity:	N/A	
Maximum Airblast:	<120 dB(L) – Unit was not triggered	

Make, Model and Serial # of unit:	
Calibration Date:	
Location of seismograph:	
Distance and Direction from Blast:	
Transverse Particle Velocity:	
Vertical Particle Velocity:	
Longitudinal Particle Velocity:	
Peak Particle Velocity:	
Maximum Airblast:	

Instantel Mini Mate, Serial #21348
July 23, 2022
Civic Number 2341 Route 820 (PW-05)
715 m North
0.51 mm/s @ 57 Hz
0.38 mm/s @ 64 Hz
0.51 mm/s @ 57 Hz
0.51 mm/s @ 57 Hz
105 dB(L)





## **BLAST RECORD**

Project Name:	Upham Gypsum Quarry	Date of Blast:	December 20, 2022
Project No.:	22S001.00	Time of Blast:	13:59
Inspector:	C. Buckley	Blast No.:	2022-47
Client:	Hammond River Holdings	_	

#### **Data Collection – Seismometer #7**

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5673
Calibration Date:	April 8, 2022
Location of seismograph:	Civic Number 50 Myron Road (PW-15)
Distance and Direction from Blast:	970 m Northwest
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Make, Model and Serial # of unit:			
Calibration Date:			
Location of seismograph:			
Distance and Direction from Blast:			
Transverse Particle Velocity:			
Vertical Particle Velocity:			
Longitudinal Particle Velocity:			
Peak Particle Velocity:			
Maximum Airblast:			

Instantel Mini Mate, Serial #20205
May 31, 2022
Civic Number 86 Myron Road (PW-16)
850 m West
<0.5 mm/s – Unit was not triggered
<0.5 mm/s – Unit was not triggered
<0.5 mm/s – Unit was not triggered
N/A
<120 dB(L) – Unit was not triggered





## **BLAST RECORD**

Project Name:	Upham Gypsum Quarry	Date of Blast:	December 20, 2022
Project No.:	22S001.00	Time of Blast:	13:59
Inspector:	C. Buckley	Blast No.:	2022-47
Client:	Hammond River Holdings	_	

#### Data Collection – Seismometer #9

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5489
Calibration Date:	April 25, 2022
Location of seismograph:	Civic Number 220 Myron Road (PW-01)
Distance and Direction from Blast:	1,330 m South
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Make, Model and Serial # of unit:
Calibration Date:
Location of seismograph:
Distance and Direction from Blast:
Transverse Particle Velocity:
Vertical Particle Velocity:
Longitudinal Particle Velocity:
Peak Particle Velocity:
Maximum Airblast:

Instantel Mini Mate, Serial #18193
April 11, 2022
Civic Number 4140 Route 111 (PW-12)
790 m Southeast
0.10 mm/s @ >100 Hz
0.62 mm/s @ >100 Hz
0.12 mm/s @ >100 Hz
0.62 mm/s @ >100 Hz
99 dB(L)





## **BLAST RECORD**

<b>Project Name:</b>	Upham Gypsum Quarry	Date of Blast:	December 20, 2022
Project No.:	22S001.00	<b>Time of Blast:</b>	13:59
Inspector:	C. Buckley	Blast No.:	2022-47
Client:	Hammond River Holdings		

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5632
Calibration Date:	November 16, 2022
Location of seismograph:	Civic Number 2337 Route 820 (PW-04)
Distance and Direction from Blast:	800 m North
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Attachment B

Blast and Seismograph Location Plan

Blast and Seismograph Location Plan Blast No: 2022-47 Upham East Gypsum Quarry Upham, NB





Date: December 20, 2022 Project No.: 22S001.00

# Attachment C

Blast Event Reports



## Event Report

 Date/Time
 Long at 13:59:29 December 20, 2022

 Trigger Source
 Geo: 0.510 mm/s, Mic: 120.0 dB(L)

 Range
 Geo: 254.0 mm/s

 Record Time
 7.0 sec at 1024 sps

Notes

Serial NumberBE21348 V 10.72-1.1 Minimate BlasterBattery Level6.1 VoltsUnit CalibrationJuly 21, 2022 by InstantelFile NameW348JTCP.J50Post Event NotesLocation: Civic Number 2341 Route 820 (PW-05)Blast No.: 2022-47Project No: 22S001.00





Printed: December 20, 2022 (V 10.74)



## **Event Report**

Serial Number

**Post Event Notes** 

Blast No.: 2022-47

3.8 Volts Unit Calibration April 11, 2022 by Instantel

Location: Civic Number 4140 Route 111 (PW-12)

Battery Level

File Name

UM18193 V 10-90GC Micromate ISEE

UM18193\_20221220140359.IDFW

Date/Time Vert at 14:03:59 December 20, 2022 Trigger Source Geo: 0.500 mm/s, Mic: 120.0 dB(L) Range Geo: 254.0 mm/s Record Time 7.0 sec at 1024 sps Operator/Setup: Operator/CARVER.MMB

#### Notes

Location: Client:

Client: User Na	me:	Project No: 22S001.00	
General		USBM RI8507 And O	SMRE
Micropi PSPL ZC Free Channe	hone         Linear Weighting           98.8 dB(L)         1.738 pa.(L) at -0.144 sec           q         3.4 Hz           el Test         Passed (Freq = 20.5 Hz Amp = 1710 mv )	254	++-++++++++++++++++++++++++++++++++
PPV PPV ZC Free Time (F Peak Ad Peak D Sensor Freq Over Peak V	Tran         Vert         Long           0.102         0.615         0.118         mm/s           31.21         46.77         32.45         dB           a         >100         >100         >100         Hz           Rel. to Trig)         0.004         0.004         0.000         sec           cceleration         0.009         0.042         0.010         g           isplacement         0.000         0.001         0.000         mm           Check         Passed         Passed         Passed           uency         7.3         7.5         7.3         Hz           swing Ratio         4.5         4.4         4.6	100	
		10	+ + 20 50 100 >
MicL			0.0
Long			0.0
Vert			0.0
Tran			0.0
	0.0 1.0 2.0	3.0 4.0 5.0 6.0	7.0

Time Scale: 0.50 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 1.000 pa.(L)/div Trigger = --\_ \_

Sensor Check

Printed: December 20, 2022 (V 10.74)