Memo

HAMMOND RIVER HOLDINGS

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

From: Daniel Guest, Hammond River Holdings Ltd.

Date: January 30, 2024

Subject: Monthly Monitoring Report – Upham East Gypsum Quarry – December 2023

Our File: File # 21-3049

Introduction

This monthly report details activities associated with the Upham East Gypsum Quarry operations for the month of December 2023, in accordance with the Approval to Operate I-10936 conditions. Activities included surface water monitoring, water level monitoring, air quality monitoring, and blasting. For previous monthly activities, refer to the monthly reports provided from December 2019 through November 2023.

Surface Water Sampling

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

- Week 1: December 3, 2023
- Week 2: December 12, 2023
- Week 3: December 19, 2023
- Week 4: December 28, 2023

One additional monitoring event was conducted on December 8, due to heavy rain events, defined as 25 mm of rain or more within 24 hours. The quarterly surface water sampling audit was completed by Dillon staff on December 16, 2023.

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 16, 2023. Quarterly sampling included recording additional field parameters (pH) 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 two samples were collected from one other location in the Hammond River H1 and H2, samples locations displayed in **Figure 1**.

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 holds ISO 17025 from the Standards Council of Canada (SCC) for each of the analytical methods utilized and have in-house quality assurance/ quality control (QA/QC) programs to govern sample analysis and analytical quality assurance.

Compliance Monitoring Results

Surface water compliance monitoring results 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**.

A QA/QC program was implemented to evaluate whether the data collected was of suitable quality to characterize the surface water conditions observed. This program required the collection of field duplicates and the calculation of the relative percent difference (RPD). The calculation method and acceptance level of 40% are discussed in CCME (2016). Two duplicate samples were collected during the December water sampling program. The RPD results could not be calculated due to both of the results being below the laboratory detection limit. Therefore, the data satisfies the quality objectives of the monitoring program.

Groundwater Monitoring

Groundwater samples were collected from the perimeter monitoring wells on December 14, 2023 (**Figure 1**). Results of the previous groundwater sampling programs can be found in the Groundwater Report Upham East Gypsum Quarry (2021 and 2022) as well as, the January, March, and September 2023 Monthly Report.

Water levels were collected from perimeter monitoring wells and three potable wells on December 14 and 15, 2023 (**Figure 1**). 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 of groundwater from the surface was measured using an electronic interface probe. Representative water samples were 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.

Water Level Monitoring

Data loggers were retrieved via Solinst Levelogger Software 4.6.1 the dataloggers were then reset to continue to record the water level every 60 minutes.

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 includes 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 was above the MAC in MW19-01D; manganese, fluoride, Boron and strontium were above the MAC in MW20-02D. Manganese was above the MAC for MW20-02S. Arsenic was above the MAC for MW20-04D and MW20-04S, and Manganese, pH, sulphate, iron and total dissolved solids were above the AO in at least one monitoring well.

Water levels were downloaded on December 14, 2023. The data retrieved from the dataloggers are depicted on a time series plot in **Figure 3**. The dataloggers allow for continuous coverage of water levels in the wells.

Water Level Results

The data for perimeter monitoring wells (**Figure 3**) and potable monitoring wells (**Figures 4, 5, and 6**) 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.

Environmental Accidents and Malfunctions

There were no reported environmental accidents or malfunctions during the December 2023 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 4, 10, 16, 22, and 28 2023. The results are provided in **Table 4**. There were no exceedances of the 120 µg/m^3 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

Three blasts occurred during the December 2023 monitoring period, occurring on December 5, 15, and 22, 2023. 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 public complaints during December, 2023

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 the 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.

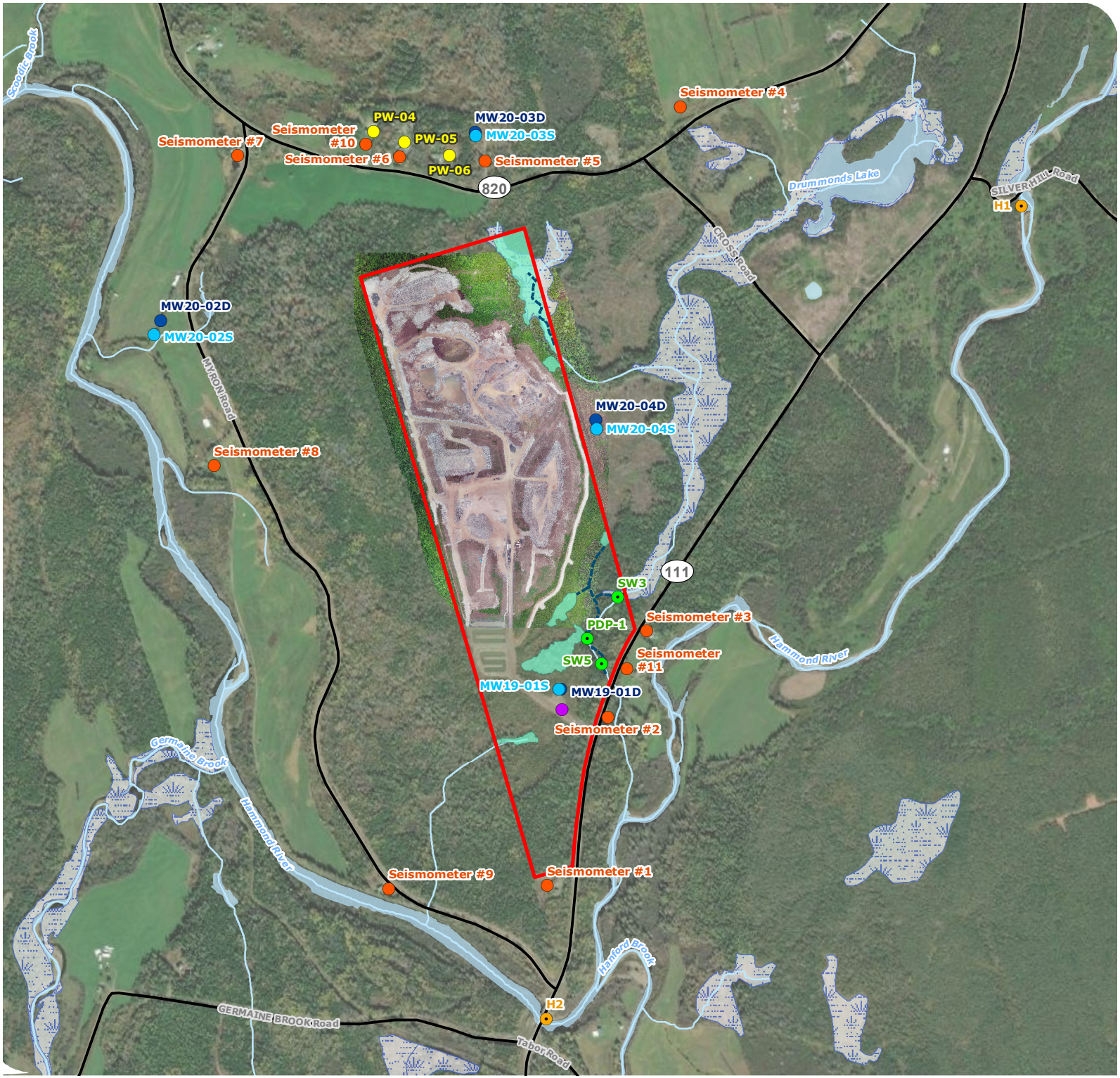
References

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.

Attachment A

Figures



HAMMOND RIVER HOLDINGS

UPHAM EAST GYPSUM QUARRY

MONITORING LOCATIONS

FIGURE 1

- Project Development Area
- Air Quality Monitor
- Blast Monitor Locations

Groundwater Monitoring

- Shallow Perimeter Monitoring Well
- Deep Perimeter Monitoring Well
- Potable Well Data Loggers

Surface Water Sampling Locations

- Weekly Samples
- Quarterly Samples
- Field Delineated Watercourse
- Road
- Watercouse
- Field Delineated Wetlands
- GNB Mapped Wetlands
- Waterbody

Site Imagery is from June 2023

MAP DRAWING INFORMATION:
DATA PROVIDED BY DILLON CONSULTING LIMITED

MAP CREATED BY: GAM
MAP CHECKED BY: JTO
MAP PROJECTION: NAD 1983 CSRS New Brunswick

DILLON CONSULTING

N
W E
S

SCALE 1:14,000

0 105 210 m

PROJECT: 21-3049
STATUS: DRAFT
DATE: 2023-11-01

FILE LOCATION: K:\2021\213049\Product\Client\MonthlyReport\MonitoringLocations_2023.mxd

Figure 2: TSS Monthly Average

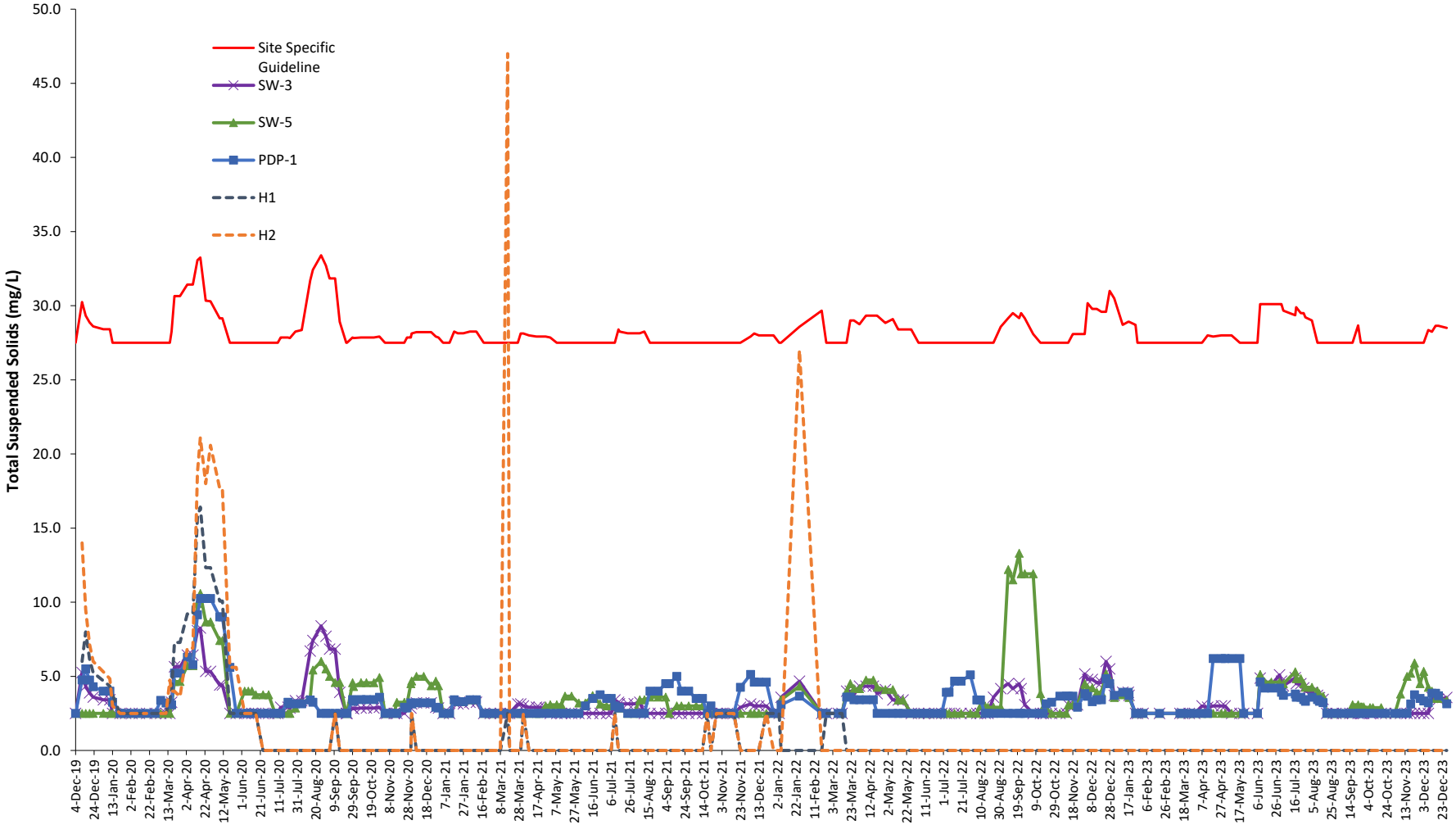


Figure 3: Upham East - Perimeter Monitoring Water Levels

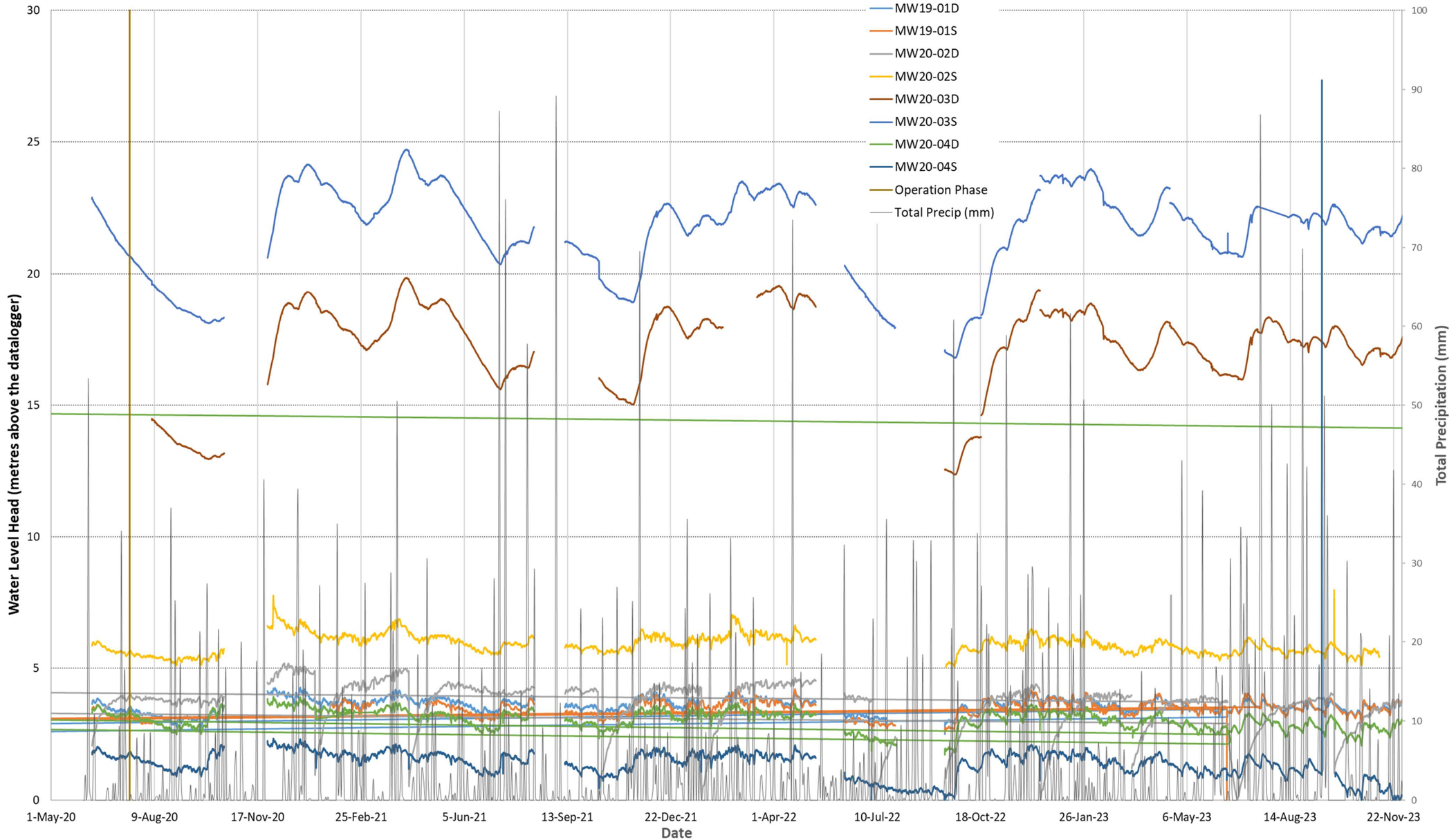


Figure 4: PW-04 Water Levels

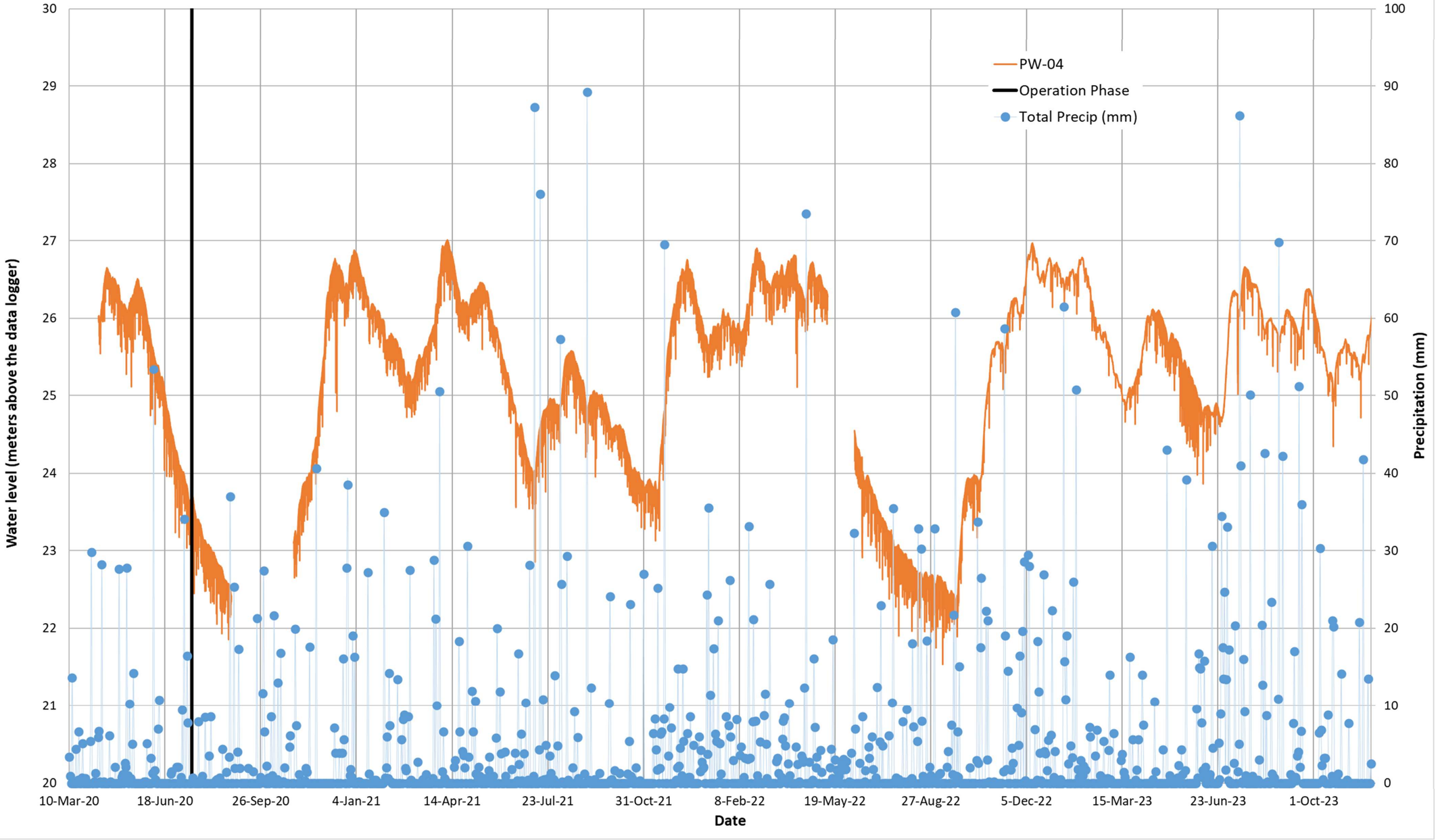


Figure 5: PW-05 Water Levels

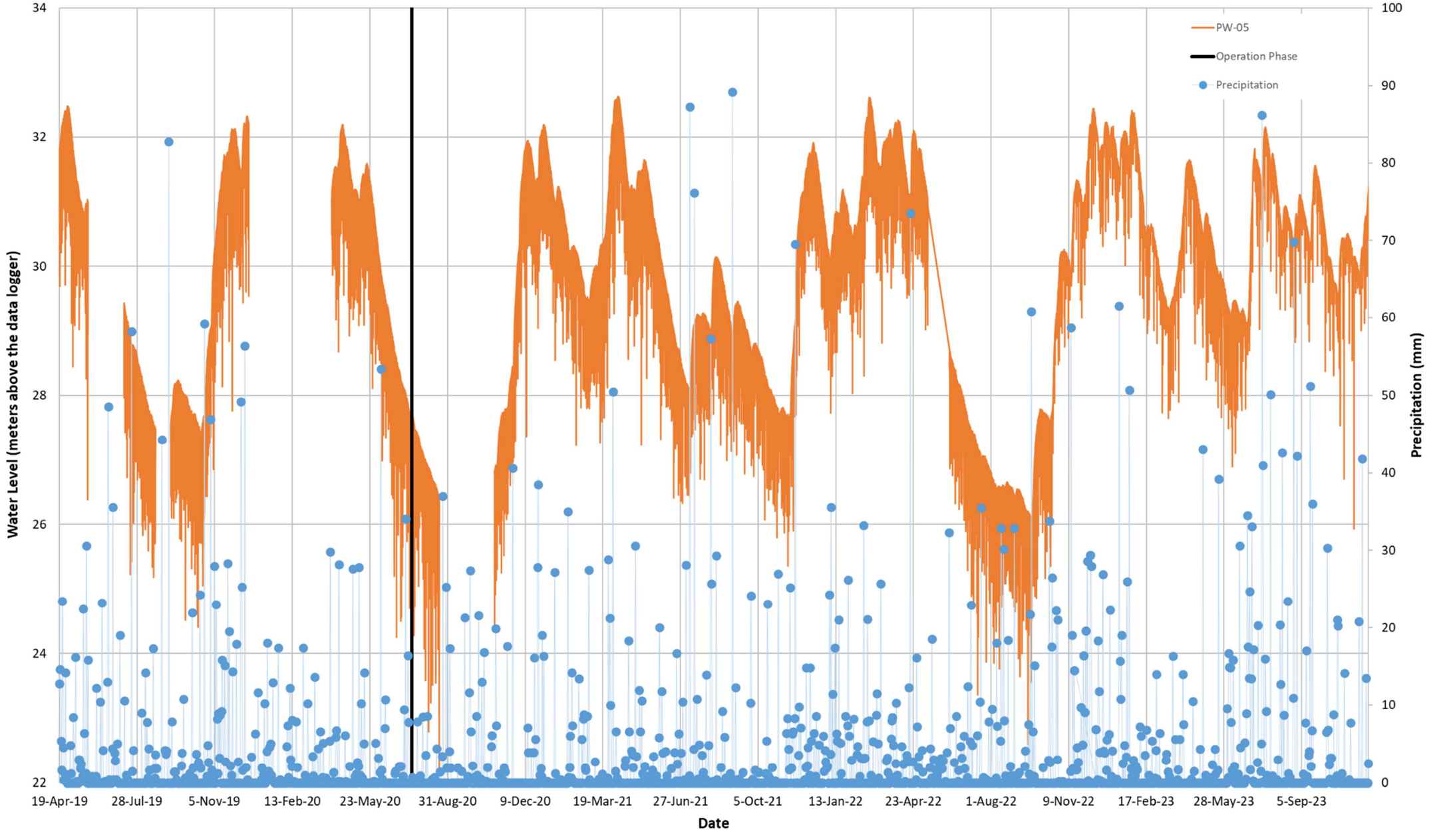
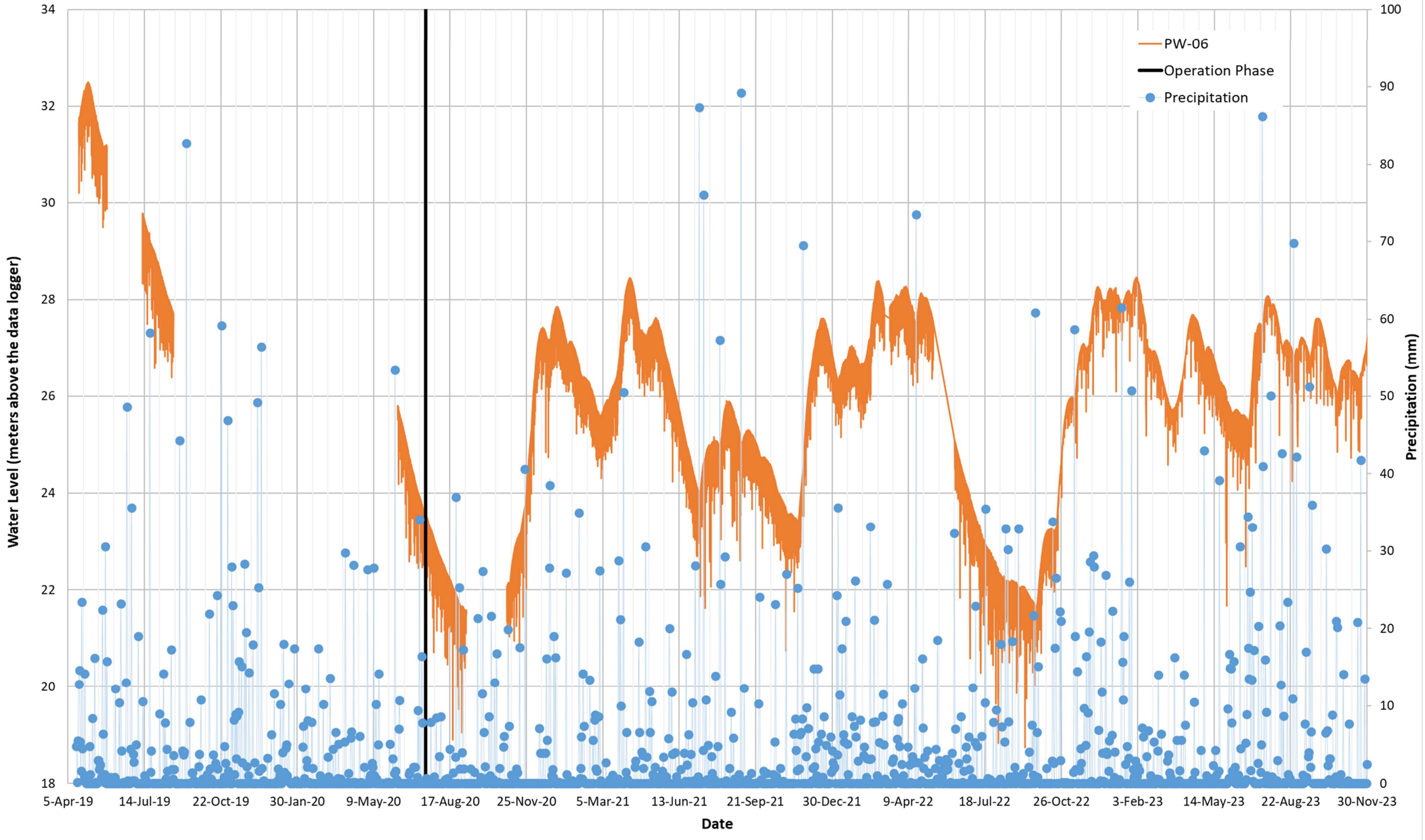


Figure 6: PW-06 Water Levels



Attachment B

Tables

Table 1
Surface Water Monitoring
Upham East Gypsum Project
Upham, New Brunswick
Project No. 21-3049

Parameter		Ambient Air Temperature[a]	Precipitation 48 hours prior to sample collection[b]	Water Temperature	Specific Conductivity	Turbidity	Total Suspended Solids[c]
Units		°C	mm	°C	mS/cm	NTU	mg/L
Sample ID	Date						
SW3	12-3-23 9:42	1.2	10.3	3.7	174	3.45	<5
PDP-1	12-3-23 9:55			2.8	313	3.37	<5
SW5	12-3-23 10:00			2.9	327	3.23	<5
SW3	12-8-23 11:20	-4.2	0	1.9	456	3.70	<5
PDP-1	12-8-23 11:30			0.1	459	4.73	<5
SW5	12-8-23 11:35			0.1	527	3.46	<5
SW3	12-12-23 12:05	0.3	77.7	5.1	153	7.93	<5
PDP-1	12-12-23 12:11			4.0	516	7.91	7
PDP-1 Dup	12-12-23 12:14			4.1	518	7.93	7
SW5	12-12-23 12:22			3.8	562	9.22	<5
SW3	12-19-23 10:41	7.2	17.4	7.3	104	11.40	10
PDP-1	12-19-23 10:50			6.6	335	11.60	<5
SW5	12-19-23 10:55			6.6	415	11.44	<5
SW3	12-28-23 10:38	4.9	12.9	3.7	358	3.52	<5
PDP-1	12-28-23 10:48			2.9	388	4.55	<5
SW5	12-28-23 10:54			2.6	391	3.83	<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/historical_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

Table 2
Total Suspended Solids - Monthly Average
Upham East Gypsum Project
Upham, New Brunswick
Project No. 21-3049

Date	Site Specific Guideline	Monthly Average				
		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

Table 2
Total Suspended Solids - Monthly Average
Upham East Gypsum Project
Upham, New Brunswick
Project No. 21-3049

Date	Site Specific Guideline	Monthly Average				
		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

Table 2
Total Suspended Solids - Monthly Average
Upham East Gypsum Project
Upham, New Brunswick
Project No. 21-3049

Date	Site Specific Guideline	Monthly Average				
		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

Table 2
Total Suspended Solids - Monthly Average
Upham East Gypsum Project
Upham, New Brunswick
Project No. 21-3049

Date	Site Specific Guideline	Monthly Average				
		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

Table 2
Total Suspended Solids - Monthly Average
Upham East Gypsum Project
Upham, New Brunswick
Project No. 21-3049

Date	Site Specific Guideline	Monthly Average				
		H1	H2	SW3	PDP-1	SW5
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	-	-	3.1	2.5	11.9
06-Oct-22	27.5	-	-	2.5	2.5	11.9
14-Oct-22	27.5	-	-	2.5	2.5	3.8
17-Oct-22	27.5	-	-	2.5	2.5	2.9
20-Oct-22	27.5	-	-	2.5	3.1	2.9
26-Oct-22	27.5	-	-	2.5	3.3	2.5
4-Nov-22	27.5	-	-	2.5	5.0	2.5
11-Nov-22	27.5	-	-	2.5	2.5	2.5
13-Nov-22	28.1	-	-	3.1	2.5	3.1
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
2-Jan-23	28.7	-	-	3.7	3.7	3.6
11-Jan-23	28.9	-	-	3.9	3.9	3.8
17-Jan-23	28.9	-	-	3.9	3.9	3.8
18-Jan-23	28.7	-	-	3.7	3.7	3.6
25-Jan-23	27.5	-	-	2.5	2.5	2.5
27-Jan-23	27.5	-	-	2.5	2.5	2.5
2-Feb-23	27.5	-	-	2.5	2.5	2.5
20-Feb-23	27.5	-	-	2.5	2.5	2.5
14-Mar-23	27.5	2.5	-	2.5	2.5	2.5
17-Mar-23	27.5	-	-	2.5	2.5	2.5
24-Mar-23	27.5	-	-	2.5	2.5	2.5
30-Mar-23	27.5	-	-	2.5	2.5	2.5
7-Apr-23	28.0	-	-	3.0	2.5	2.5
13-Apr-23	27.9	-	-	2.9	2.5	2.5
19-Apr-23	28.0	-	-	3.0	6.2	2.5
28-Apr-23	28.0	-	-	3.0	6.2	2.5
2-May-23	28.0	-	-	3.0	6.2	2.5
9-May-23	27.5	-	-	2.5	6.2	2.5
18-May-23	27.5	-	-	2.5	6.2	2.5
22-May-23	27.5	-	-	2.5	2.5	2.5
6-Jun-23	30.1	-	-	2.5	2.5	2.5
9-Jun-23	30.1	-	-	12.0	11	13.0
14-Jun-23	30.1	-	-	2.5	2.5	2.5
21-Jun-23	30.1	-	-	2.5	2.5	2.5
30-Jun-23	30.1	-	-	6.0	2.5	2.5
2-Jul-23	29.7	-	-	4.7	3.9	4.3

Table 2
Total Suspended Solids - Monthly Average
Upham East Gypsum Project
Upham, New Brunswick
Project No. 21-3049

Date	Site Specific Guideline	Monthly Average				
		H1	H2	SW3	PDP-1	SW5
4-Jul-23	29.4	-	-	4.4	3.7	4.5
17-Jul-23	29.9	-	-	4.9	3.8	5.3
18-Jul-23	29.5	-	-	4.5	3.6	4.8
23-Jul-23	29.5	-	-	4.5	3.6	4.8
26-Jul-23	29.2	-	-	4.2	3.4	4.5
28-Jul-23	29.0	-	-	4.0	3.3	4.3
4-Aug-23	27.5	-	-	2.5	2.5	2.5
10-Aug-23	27.5	-	-	2.5	2.5	2.5
12-Aug-23	27.5	-	-	2.5	2.5	2.5
16-Aug-23	27.5	-	-	2.5	2.5	2.5
20-Aug-23	27.5	-	-	2.5	2.5	2.5
27-Aug-23	27.5	-	-	2.5	2.5	2.5
30-Aug-23	27.5	-	-	2.5	2.5	2.5
6-Sep-23	27.5	-	-	2.5	2.5	2.5
14-Sep-23	27.5	-	-	2.5	2.5	2.5
17-Sep-23	28.7	-	-	2.5	2.5	6.0
20-Sep-23	27.5	-	-	2.5	2.5	2.5
26-Sep-23	27.5	2.5	2.5	2.5	2.5	2.5
27-Sep-23	27.5	-	-	2.5	2.5	2.5
29-Sep-23	27.5	-	-	2.5	2.5	2.5
6-Oct-23	27.5	-	-	2.5	2.5	2.5
9-Oct-23	27.5	-	-	2.5	2.5	2.5
18-Oct-23	27.5	-	-	2.5	2.5	2.5
23-Oct-23	27.5	-	-	2.5	2.5	2.5
02-Nov-23	27.5	-	-	2.5	2.5	2.5
08-Nov-23	27.5	-	-	2.5	2.5	3.7
15-Nov-23	27.5	-	-	2.5	2.5	4.3
19-Nov-23	27.5	-	-	2.5	3.1	5.1
23-Nov-23	27.5	-	-	2.5	3.8	3.4
29-Nov-23	27.5	-	-	2.5	3.5	4.6
03-Dec-23	28.4	-	-	2.5	3.3	4.3
08-Dec-23	28.2	-	-	2.5	3.2	4.0
12-Dec-23	28.6	-	-	3.6	3.9	3.5
16-Dec-23	28.6	27.0	2.5	3.6	3.9	3.5
19-Dec-23	28.5	-	-	3.4	3.7	3.4
28-Dec-23	28.1	-	-	3.6	3.1	2.5

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 East Gypsum Project
Upham, New Brunswick
Project No. 21-3049

Parameter	Units	GCDWQ 2022[1]		MW19-01S		MW19-01D		MW20-02S	MW20-02D	MW20-03S	MW20-03D	MW20-04S	MW20-04D
		MAC	AO	14-Dec-23	14-Dec-23 (FD)	14-Dec-23	14-Dec-23 (FD)	14-Dec-23	14-Dec-23	14-Dec-23	14-Dec-23	14-Dec-23	14-Dec-23
General Chemistry													
Sodium	mg/L	-	200	20.8	20.3	21.6	20.9	14.2	101.0	6.19	9.98	5.46	4.23
Potassium	mg/L	-	-	1.35	1.26	2.35	2.25	2.0	5.1	1.02	0.94	1.16	1.21
Calcium	mg/L	-	-	51.6	51.5	131.0	134.0	567.0	624.0	39.7	3.61	43.5	42.0
Magnesium	mg/L	-	-	15.2	15.1	5.07	5.14	11.1	28.3	3.67	0.86	1.39	1.43
Iron	mg/L	-	0.3	0.06	0.06	0.05	0.05	32.0	8.7	0.69	1.19	0.03	0.06
Manganese	mg/L	0.12	0.02	0.012	0.011	**0.177**	**0.179**	**0.823**	**0.543**	0.019	0.020	0.010	0.008
Copper	mg/L	2	1	0.004	0.004	< 0.001	< 0.001	0.010	0.009	< 0.001	< 0.001	0.003	0.005
Zinc	mg/L	-	5	0.012	0.012	< 0.001	< 0.001	< 0.005	0.006	< 0.001	< 0.001	0.002	0.003
Ammonia (as N)	mg/L	-	-	< 0.05	< 0.05	0.23	0.22	< 0.05	0.27	< 0.05	0.08	< 0.05	< 0.05
pH	units	-	7.0 - 10.5	6.2	6.1	7.6	7.6	6.5	8.4	8.0	9.8	8.0	7.9
Alkalinity (as CaCO3)	mg/L	-	-	42	42	160	150	23	51	100	23	120	110
Chloride	mg/L	-	250	90.4	90.5	145	128	12.7	120	11.3	12.4	3.1	3.4
Flouride	mg/L	1.5	-	0.30	0.29	0.24	0.24	0.99	**3.9**	0.13	< 0.05	0.41	0.39
Sulphate	mg/L	-	500	81	74	62	59	1500	1800	5	2	12	13
Nitrate (as nitrate - nitrogen)	mg/L	10	-	0.67	0.68	< 0.05	< 0.05	< 0.25	< 0.25	0.60	< 0.05	0.10	0.67
o-Phosphate (as P)	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.01	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
r-Silica (as SiO2)	mg/L	-	-	14.1	14.0	16.7	17.0	6.3	0.9	11.1	< 0.1	15.9	14.0
Total Organic Carbon	mg/L	-	-	0.8	0.5	< 0.5	< 0.5	0.8	1.7	< 0.5	0.5	< 0.5	< 0.5
Turbidity[2]	NTU	-	-	0.9	1.1	0.4	0.6	129	47.4	1.3	10.0	0.6	1.5
Solids - Total Suspended	mg/L	-	-	< 5	< 5	< 5	< 5	41	21	< 5	< 5	8	< 5
Conductivity	µS/cm	-	-	532	533	837	850	2210	2840	257	88	255	254
Calculated Parameters													
Bicarbonate as CaCO3	mg/L	-	-	42.0	42.0	159.0	149.0	23.0	49.7	99.0	12.5	119.	109.
Carbonate as CaCO3	mg/L	-	-	0.006	0.005	0.597	0.559	0.007	1.17	0.931	7.41	1.12	0.815
Hydroxide as CaCO3	mg/L	-	-	0.001	0.001	0.020	0.020	0.002	0.126	0.050	3.15	0.050	0.040
Cation sum	meq/L	-	-	4.77	4.73	7.98	8.10	31.6	38.5	2.62	0.779	2.55	2.43
Anion sum	meq/L	-	-	5.12	4.98	8.58	7.84	32.0	41.9	2.46	0.851	2.74	2.61
% difference	%	-	-	-3.59	-2.56	-3.61	1.66	-0.67	-4.21	2.99	-4.42	-3.55	-3.57
Theoretical Conductivity	µS/cm	-	-	533	523	819	786	2850	3530	241	84	248	240
Hardness (as CaCO3)	mg/L	-	-	191	191	348	356	1460	1670	114	12.6	114	111
Total Dissolved Solids (calculat	mg/L	-	500	303	295	482	458	2160	2720	142	45	156	149
Saturation pH (@ 5C)	-	-	-	8.3	8.3	7.4	7.4	7.7	7.4	8.0	9.9	7.9	7.9
Langelier Index (@ 5C)	-	-	-	-2.11	-2.21	0.23	0.21	-1.24	1.01	0.00	-0.08	0.11	-0.04

Table 3
General Chemistry and Trace Metals - Perimeter Monitoring Wells
Upham East Gypsum Project
Upham, New Brunswick
Project No. 21-3049

Parameter	Units	GCDWQ 2022[1]		MW19-01S		MW19-01D		MW20-02S	MW20-02D	MW20-03S	MW20-03D	MW20-04S	MW20-04D
		MAC	AO	14-Dec-23	14-Dec-23 (FD)	14-Dec-23	14-Dec-23 (FD)	14-Dec-23	14-Dec-23	14-Dec-23	14-Dec-23	14-Dec-23	14-Dec-23
Trace Metals													
Aluminum	µg/L	-	-	39	3	2	3	< 5	7	20	1	7	24
Antimony	µg/L	6	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.5	< 0.5	< 0.1	< 0.1	< 0.1	0.3
Arsenic	µg/L	10	-	< 1	< 1	< 1	< 1	< 5	< 5	1	< 1	**12**	**20**
Barium	µg/L	1,000	-	152	182	188	182	< 5	< 5	213	2	113	129
Beryllium	µg/L	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.5	< 0.5	< 0.1	< 0.1	< 0.1	< 0.1
Bismuth	µg/L	-	-	< 1	< 1	< 1	< 1	< 5	< 5	< 1	< 1	< 1	< 1
Boron	µg/L	5,000	-	22	515	498	515	1160	**47800**	13	10	138	79
Cadmium	µg/L	7	-	0.11	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01
Calcium	µg/L	-	-	51600	134000	131000	134000	567000	624000	39700	3610	43500	42000
Chromium	µg/L	50	-	< 1	< 1	< 1	< 1	< 5	< 5	< 1	< 1	< 1	< 1
Cobalt	µg/L	-	-	0.2	< 0.1	< 0.1	< 0.1	< 0.5	< 0.5	0.1	< 0.1	< 0.1	0.2
Copper	µg/L	2,000	1,000	4	< 1	< 1	< 1	10	9	< 1	< 1	3	5
Iron	µg/L	-	300	60	50	50	50	32000	8700	690	1190	30	60
Lead	µg/L	5	-	0.5	< 0.1	< 0.1	< 0.1	< 0.5	< 0.5	< 0.1	< 0.1	< 0.1	0.2
Lithium	µg/L	-	-	12.4	20.8	21.2	20.8	12.2	169.0	5.6	4.0	8.1	8.0
Magnesium	µg/L	-	-	15200	5140	5070	5140	11100	28300	3670	860	1390	1430
Manganese	µg/L	120	20	12	**179**	**177**	**179**	**823**	**543**	19	20	10	8
Mercury	µg/L	1	-	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Molybdenum	µg/L	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.5	4.1	0.2	0.7	1.4	2.4
Nickel	µg/L	-	-	3	< 1	< 1	< 1	< 5	< 5	< 1	< 1	< 1	< 1
Potassium	µg/L	-	-	1350	2250	2350	2250	2000	5100	1020	940	1160	1210
Rubidium	µg/L	-	-	1.7	3.5	3.7	3.5	< 0.5	5.6	0.4	0.4	1.1	1.0
Selenium	µg/L	50	-	< 1	< 1	< 1	< 1	< 5	< 5	< 1	< 1	< 1	< 1
Silver	µg/L	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.5	< 0.5	< 0.1	< 0.1	< 0.1	< 0.1
Sodium	µg/L	-	200,000	20800	20900	21600	20900	14200	101000	6190	9980	5460	4230
Strontium	µg/L	7,000	-	193	2530	2650	2530	4280	**11600**	278	28	423	504
Tellurium	µg/L	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.5	< 0.5	< 0.1	< 0.1	< 0.1	< 0.1
Thallium	µg/L	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.5	< 0.5	< 0.1	< 0.1	< 0.1	< 0.1
Tin	µg/L	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.5	< 0.5	< 0.1	< 0.1	< 0.1	< 0.1
Uranium	µg/L	20	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.5	< 0.5	0.9	< 0.1	3.5	4.4
Vanadium	µg/L	-	-	< 1	< 1	< 1	< 1	< 5	< 5	2	< 1	< 1	3
Zinc	µg/L	-	5,000	12	< 1	< 1	< 1	< 5	6	< 1	< 1	2	3

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.

Underline - 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
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^3)	(mm Hg)	(°C)	(g)	(g)	(µg)	(µg/m3)	($µg/m^3$)
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	16.46	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[a]	22.82[a]	753[a]	12.3[a]	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
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[b]	21.08	17.42	21.08	750	8.8	14.840	14.850	10100	19.96	120
2021-05-12[b]	-	17.49	25.19	748	7.1	14.822	14.830	7800	12.90	120
2021-05-18[b]	19.21	17.53	20.35	757	9.8	14.830	14.838	8700	17.81	120

Table 4
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^3)	(mm Hg)	(°C)	(g)	(g)	(µg)	(µg/m3)	($µg/m^3$)
2021-05-27[c]	-	-	-	-	-	-	-	-	-	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[d]	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
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	751	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	756	3.9	14.834	14.838	3800	6.16	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	-6.8	14.840	14.849	9800	15.53	120
2021-12-09	24 hours	19.23	27.69	755	-15.9	14.823	14.824	1000	1.50	120
2021-12-15	24 hours	18.55	26.72	760	-4.7	14.626	14.841	215300	**335.73**[e]	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	26.25	750	-3.6	14.842	14.850	7700	12.22	120
2022-01-04	24 hours	18.89	27.20	755	-11.2	14.843	14.853	10300	15.78	120
2022-01-10	24 hours	19.19	27.63	749	-17.2	14.825	14.831	6600	9.95	120
2022-01-16	24 hours	18.70	26.08	755	-19.9	14.842	14.865	23300	37.23	120
2022-01-22	24 hours	19.18	25.97	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	-1.7	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[c]	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

Table 4
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^3)	(mm Hg)	(°C)	(g)	(g)	(µg)	(µg/m3)	(µg/m^3)
2022-03-14	24 hours	18.11	26.08	756	0.2	14.814	14.818	4300	6.87	120
2022-03-20	24 hours	17.53	25.24	741	3.9	14.830	14.833	3800	6.27	120
2022-03-26	24 hours	17.51	25.22	735	2.0	14.839	14.847	7500	12.39	120
2022-04-01	24 hours	17.34	24.98	735	4.4	14.847	14.852	5200	8.67	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	25.47	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	14800	24.26	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	14.857	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
2022-05-31	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	16.92	24.36	752	18.3	14.825	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	16.93	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	14.829	14.829	400	0.68	120
2022-07-12	24 hours	16.59	24.29	750	17.7	14.826	14.836	9200	15.78	120
2022-07-18	24 hours	16.57	23.85	746	22.1	14.821	14.840	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	14.832	1000	1.73	120
2022-08-05	24 hours	16.66	24	755	23.9	14.8283	14.8427	14400	25.00	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	14.8771	17000	29.02	120
2022-08-23	24 hours	16.89	24.33	749	17.2	14.8649	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	14.8454	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	14.8668	9500	15.37	120
2022-10-10	24 hours	17.92	25.8	755	2.7	14.8456	14.8551	9500	15.34	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
2022-10-28	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
2022-11-09	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
2022-11-21	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
2022-12-03	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
2022-12-15	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
2022-12-27	24 hours	18.5	26.05	752	-8.1	14.8281	14.838	9900	15.83	120
2023-01-02	24 hours	18.14	26.12	749	-2.5	14.8257	14.8346	8900	14.1973	120

Table 4
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^3)	(mm Hg)	(°C)	(g)	(g)	(µg)	(µg/m3)	($µg/m^3$)
2023-01-08	24 hours	18.65	26.85	752	-9.2	14.8261	14.8401	14000	21.7256	120
2023-01-14	24 hours	18	25.05	745	-2.3	14.8136	14.8289	15300	25.4491	120
2023-01-20	24 hours	18.1	26.05	743	-4.2	14.8156	14.8251	9500	15.1951	120
2023-01-26	25 hours	17.76	25.57	740	-0.2	14.8216	14.8254	3800	6.1922	120
2023-02-01	26 hours	17.93	25.83	742	-17	14.8256	14.8318	6200	10.0013	120
2023-02-07	27 hours	18.05	26.86	756	-7.5	14.8227	14.8464	23700	36.7647	120
2023-02-13	28 hours	18.2	26.05	744	-5.3	14.8097	14.8137	4000	6.3980	120
2023-02-19	29 hours	18.43	26.53	757	-4	14.8066	14.8448	38200	59.9950	120
2022-02-25	30 hours	19.29	27.77	757	-15.8	14.8061	14.8096	3500	5.2515	120
2022-03-03	31 hours	18.29	26.33	745	-5.8	14.8121	14.8128	700	1.1077	120
2022-03-09	32 hours	18.15	26.13	750	-2.4	14.8113	14.8218	10500	16.7432	120
2022-03-15	33 hours	17.75	25.56	736	-1.1	14.8158	14.8232	7400	12.0631	120
2022-03-21	34 hours	18.14	26.12	755	-0.1	14.8191	14.821	1900	3.0309	120
2023-03-27	35 hours	17.97	25.87	750	0	14.8189	14.8275	8600	13.8513	120
2023-04-02	24 hours	16.7	26.05	739	0.9	14.8275	14.8327	5200	8.3173	120
2023-04-08	24 hours	18.27	26.34	756	-1.8	14.8468	14.8785	31700	50.1455	120
2023-04-14	24 hours	17.34	24.97	747	9.4	14.8419	14.8581	16200	27.0324	120
2023-04-20	24 hours	17.61	25.36	751	6.3	14.8514	14.8526	1200	1.9716	120
2023-04-26	24 hours	17.73	25.54	757	6.6	14.8493	14.8509	1600	2.6103	120
2023-05-02	24 hours	17.23	24.81	743	9.2	14.8552	14.8613	6100	10.2445	120
2023-05-08	24 hours	17.32	24.94	741	7.5	14.8542	14.8562	2000	3.3414	120
2023-05-14	24 hours	17.48	25.16	750	8.2	14.8438	14.8484	4600	7.6179	120
2023-05-20	24 hours	17.13	24.67	747	12.7	14.8406	14.8449	4300	7.2625	120
2023-05-26	24 hours	17.64	25.4	754	6.7	14.8725	14.8796	7100	11.6470	120
2023-06-01	24 hours	16.67	24	751	22.9	14.8674	14.8721	4700	8.1597	120
2023-06-07	24 hours	17.05	24.55	738	10.4	14.8511	14.8617	10600	17.9905	120
2023-06-13	24 hours	16.48	23.74	746	23.7	14.8591	14.8636	4500	7.8981	120
2023-06-19	24 hours	17.31	24.92	752	17.6	14.8597	14.8645	4800	8.0257	120
2023-06-25	24 hours	16.59	23.85	747	21.9	14.8469	14.8647	17800	31.0971	120
2023-07-01	24 hours	16.87	24.29	756	20.1	14.8862	14.8999	13700	23.5008	120
2023-07-07	24 hours	16.53	23.81	749	23.9	14.8988	14.9014	2600	4.5499	120
2023-07-13	24 hours	16.58	23.07	751	23.9	14.8734	14.877	3600	6.5020	120
2023-07-19	24 hours	16.67	24	751	21.8	14.8770	14.8823	5300	9.2014	120
2023-07-25	24 hours	16.79	24.18	753	21	14.8780	14.8801	2100	3.6187	120
2023-07-31	24 hours	16.92	24.36	748	17	14.8673	14.8698	2500	4.2761	120
2023-08-06	24 hours	16.76	24.14	748	19.5	14.8652	14.8662	1000	1.726	120
2023-08-12	24 hours	16.87	24.29	748	17.5	14.852	14.877	25000	42.8846	120
2023-08-18	24 hours	16.73	24.09	748	19.5	14.845	14.873	28000	48.4295	120
2023-08-24	24 hours	17.06	24.56	753	16.6	14.828	14.862	34000	57.6819	120
2023-08-30	24 hours	16.75	24.12	744	17.8	14.832	14.854	22000	38.0044	120
2023-09-05	24 hours	16.77	24.14	748	19.4	14.823	14.855	32000	55.2334	120
2023-09-11	24 hours	16.85	24.26	753	19.8	14.85	14.884	34000	58.3952	120
2023-09-17	24 hours	16.81	24.21	742	16.3	14.877	14.899	22000	37.8631	120
2023-09-23	24 hours	17.5	25.19	753	10.9	14.877	14.891	14000	23.1573	120
2023-09-29	24 hours	17.57	25.29	758	9.7	14.858	14.882	24000	39.5413	120
2023-10-05	24 hours	17.51	25.21	754	11	14.8370	14.85	13000	21.4862	120
2023-10-11	24 hours	17.35	24.98	749	9.4	14.8520	14.861	9000	15.0120	120
2023-10-17	24 hours	17.53	25.24	747	5.7	14.8630	14.886	23000	37.9688	120
2023-10-23	24 hours	17.67	25.45	749	4.2	14.8490	14.866	17000	27.8324	120
2023-10-29	24 hours	17.88	25.25	753	2.5	14.86	14.87	10000	16.5017	120

Table 4
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^3)	(mm Hg)	(°C)	(g)	(g)	(µg)	(µg/m3)	($µg/m^3$)
2023-11-04	24 hours	17.56	25.29	753	7.7	14.8380	14.844	6000	9.8853	120
2023-11-10	24 hours	17.88	25.24	747	0.2	14.8470	14.859	12000	19.8098	120
2023-11-16	24 hours	17.96	25.96	753	1.3	14.8340	14.845	11000	17.6554	120
2023-11-22	24 hours	18.28	26.32	753	-3.6	14.8280	14.846	18000	28.4954	120
2023-11-28	24 hours	17.95	25.85	738	-4.2	14.8160	14.836	20000	32.2373	120
2023-12-04	24 hours	18.02	25.94	744	-2.9	14.8190	14.828	9000	14.4564	120
2023-12-10	24 hours	17.94	25.84	753	1.3	14.8080	14.838	30000	48.3746	120
2023-12-16	24 hours	18.48	26.61	759	-4.4	14.8130	14.863	50000	78.2914	120
2023-12-22	24 hours	18.5	26.62	759	-6.1	14.8320	14.847	15000	23.4786	120
2023-12-28	24 hours	18.1	26.05	743	3.2	14.836	14.849	13000	20.7933	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.

Attachment C

Analytical Certificates

Report ID: 508394-IAS
Report Date: 21-Dec-23
Date Received: 14-Dec-23

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

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

Analysis of Water

RPC Sample ID:			508394-1	508394-2	508394-3	508394-4
Client Sample ID:			SW3	SW5	PDP-1	PDP-1 duplicate
Date Sampled:			12-Dec-23	12-Dec-23	12-Dec-23	12-Dec-23
Analytes	**Units**	**RL**				
Solids - Total Suspended	mg/L	5	< 5	7	7	< 5

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

RL = Reporting Limit

Matthew Norman
Senior Chemist
Inorganic Analytical Chemistry

Brannen Burhoe
Supervisor
Inorganic Analytical Services

Report ID: 508394-IAS
Report Date: 21-Dec-23
Date Received: 14-Dec-23

CERTIFICATE OF ANALYSIS

for
Hammond River Holdings Limited
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Methods

Analyte	RPC SOP #	Method Reference	Method Principle
Solids - Total Suspended	IAS-M05	APHA 2540 D	Filtration, Gravimetry

Report ID: 508833-IAS
Report Date: 27-Dec-23
Date Received: 20-Dec-23

CERTIFICATE OF ANALYSIS

for
Hammond River Holdings Limited
30 Jervis Lane
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Tel: 506.452.1212
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www.rpc.ca

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

Analysis of Water

RPC Sample ID:			508833-1	508833-2	508833-3
Client Sample ID:			SW3	SW5	PDP-1
Date Sampled:			19-Dec-23	19-Dec-23	19-Dec-23
Analytes	**Units**	**RL**			
Solids - Total Suspended	mg/L	5	10	< 5	< 5

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

RL = Reporting Limit

Brannen Burhoe
Supervisor
Inorganic Analytical Services

Lisa Ferrish
Supervisor
Inorganic Analytical Services

Report ID: 508833-IAS
Report Date: 27-Dec-23
Date Received: 20-Dec-23

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Methods

Analyte	RPC SOP #	Method Reference	Method Principle
Solids - Total Suspended	IAS-M05	APHA 2540 D	Filtration, Gravimetry

Report ID: 509025-IAS
Report Date: 05-Jan-24
Date Received: 21-Dec-23

CERTIFICATE OF ANALYSIS

for
Dillon Consulting Ltd
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Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Nick MacGillivray
Project #: 21-3049-1002
Location: Upham Quarry

Analysis of Water

RPC Sample ID:			509025-01	509025-02	509025-03
Client Sample ID:			MW19-01D	MW19-01S	MW20-02D
Date Sampled:			14-Dec-23	14-Dec-23	14-Dec-23
Analytes	**Units**	**RL**			
Sodium	mg/L	0.05	21.6	20.8	101.
Potassium	mg/L	0.02	2.35	1.35	5.1
Calcium	mg/L	0.05	131.	51.6	624.
Magnesium	mg/L	0.01	5.07	15.2	28.3
Iron	mg/L	0.02	0.05	0.06	8.7
Manganese	mg/L	0.001	0.177	0.012	0.543
Copper	mg/L	0.001	< 0.001	0.004	0.009
Zinc	mg/L	0.001	< 0.001	0.012	0.006
Ammonia (as N)	mg/L	0.05	0.23	< 0.05	0.27
pH	units	-	7.6	6.2	8.4
Alkalinity (as $CaCO_3$)	mg/L	2	160	42	51
Chloride	mg/L	0.5	145	90.4	120
Fluoride	mg/L	0.05	0.24	0.30	3.9
Sulfate	mg/L	1	62	81	1800
Nitrate + Nitrite (as N)	mg/L	0.05	< 0.05	0.67	< 0.25
o-Phosphate (as P)	mg/L	0.01	< 0.01	< 0.01	< 0.01
r-Silica (as SiO_2)	mg/L	0.1	16.7	14.1	0.9
Carbon - Total Organic	mg/L	0.5	< 0.5	0.8	1.7
Turbidity	NTU	0.1	0.4	0.9	47.4
Solids - Total Suspended	mg/L	5	< 5	< 5	21
Conductivity	µS/cm	1	837	532	2840
Calculated Parameters					
Bicarbonate (as $CaCO_3$)	mg/L	-	159.	42.0	49.7
Carbonate (as $CaCO_3$)	mg/L	-	0.597	0.006	1.17
Hydroxide (as $CaCO_3$)	mg/L	-	0.020	0.001	0.126
Cation Sum	meq/L	-	7.98	4.77	38.5
Anion Sum	meq/L	-	8.58	5.12	41.9
Percent Difference	%	-	-3.61	-3.59	-4.21
Theoretical Conductivity	µS/cm	-	819	533	3530
Hardness (as $CaCO_3$)	mg/L	0.2	348	191	1670
Ion Sum	mg/L	-	482	303	2720
Saturation pH (5°C)	units	-	7.4	8.3	7.4
Langelier Index (5°C)	-	-	0.23	-2.11	1.01

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.

Matthew Norman
Senior Chemist
Inorganic Analytical Chemistry

Brannen Burhoe
Supervisor
Inorganic Analytical Services

Report ID: 509025-IAS
Report Date: 05-Jan-24
Date Received: 21-Dec-23

CERTIFICATE OF ANALYSIS

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Attention: Nick MacGillivray
Project #: 21-3049-1002
Location: Upham Quarry

Analysis of Water

RPC Sample ID:			509025-04	509025-05	509025-06
Client Sample ID:			MW20-02S	MW20-03D	MW20-03S
Date Sampled:			14-Dec-23	14-Dec-23	14-Dec-23
Analytes	**Units**	**RL**			
Sodium	mg/L	0.05	14.2	9.98	6.19
Potassium	mg/L	0.02	2.0	0.94	1.02
Calcium	mg/L	0.05	567.	3.61	39.7
Magnesium	mg/L	0.01	11.1	0.86	3.67
Iron	mg/L	0.02	32.0	1.19	0.69
Manganese	mg/L	0.001	0.823	0.020	0.019
Copper	mg/L	0.001	0.010	< 0.001	< 0.001
Zinc	mg/L	0.001	< 0.005	< 0.001	< 0.001
Ammonia (as N)	mg/L	0.05	< 0.05	0.08	< 0.05
pH	units	-	6.5	9.8	8.0
Alkalinity (as $CaCO_3$)	mg/L	2	23	23	100
Chloride	mg/L	0.5	12.7	12.4	11.3
Fluoride	mg/L	0.05	0.99	< 0.05	0.13
Sulfate	mg/L	1	1500	2	5
Nitrate + Nitrite (as N)	mg/L	0.05	< 0.25	< 0.05	0.60
o-Phosphate (as P)	mg/L	0.01	0.03	< 0.01	< 0.01
r-Silica (as SiO_2)	mg/L	0.1	6.3	< 0.1	11.1
Carbon - Total Organic	mg/L	0.5	0.8	0.5	< 0.5
Turbidity	NTU	0.1	129	10.0	1.3
Solids - Total Suspended	mg/L	5	41	< 5	< 5
Conductivity	µS/cm	1	2210	88	257
Calculated Parameters					
Bicarbonate (as $CaCO_3$)	mg/L	-	23.0	12.5	99.0
Carbonate (as $CaCO_3$)	mg/L	-	0.007	7.41	0.931
Hydroxide (as $CaCO_3$)	mg/L	-	0.002	3.15	0.050
Cation Sum	meq/L	-	31.6	0.779	2.62
Anion Sum	meq/L	-	32.0	0.851	2.46
Percent Difference	%	-	-0.67	-4.42	2.99
Theoretical Conductivity	µS/cm	-	2850	84	241
Hardness (as $CaCO_3$)	mg/L	0.2	1460	12.6	114
Ion Sum	mg/L	-	2160	45	142
Saturation pH (5°C)	units	-	7.7	9.9	8.0
Langelier Index (5°C)	-	-	-1.24	-0.08	0.00

Report ID: 509025-IAS
Report Date: 05-Jan-24
Date Received: 21-Dec-23

CERTIFICATE OF ANALYSIS

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www.rpc.ca

Attention: Nick MacGillivray
Project #: 21-3049-1002
Location: Upham Quarry

Analysis of Water

RPC Sample ID:			509025-07	509025-08	509025-09
Client Sample ID:			MW20-04D	MW20-04S	MW100-D
Date Sampled:			14-Dec-23	14-Dec-23	14-Dec-23
Analytes	**Units**	**RL**			
Sodium	mg/L	0.05	4.23	5.46	20.9
Potassium	mg/L	0.02	1.21	1.16	2.25
Calcium	mg/L	0.05	42.0	43.5	134
Magnesium	mg/L	0.01	1.43	1.39	5.14
Iron	mg/L	0.02	0.06	0.03	0.05
Manganese	mg/L	0.001	0.008	0.010	0.179
Copper	mg/L	0.001	0.005	0.003	< 0.001
Zinc	mg/L	0.001	0.003	0.002	< 0.001
Ammonia (as N)	mg/L	0.05	< 0.05	< 0.05	0.22
pH	units	-	7.9	8.0	7.6
Alkalinity (as $CaCO_3$)	mg/L	2	110	120	150
Chloride	mg/L	0.5	3.4	3.1	128
Fluoride	mg/L	0.05	0.39	0.41	0.24
Sulfate	mg/L	1	13	12	59
Nitrate + Nitrite (as N)	mg/L	0.05	0.67	0.10	< 0.05
o-Phosphate (as P)	mg/L	0.01	< 0.01	< 0.01	< 0.01
r-Silica (as SiO_2)	mg/L	0.1	14.0	15.9	17.0
Carbon - Total Organic	mg/L	0.5	< 0.5	< 0.5	< 0.5
Turbidity	NTU	0.1	1.5	0.6	0.6
Solids - Total Suspended	mg/L	5	< 5	8	< 5
Conductivity	µS/cm	1	254	255	850
Calculated Parameters					
Bicarbonate (as $CaCO_3$)	mg/L	-	109.	119.	149.
Carbonate (as $CaCO_3$)	mg/L	-	0.815	1.12	0.559
Hydroxide (as $CaCO_3$)	mg/L	-	0.040	0.050	0.020
Cation Sum	meq/L	-	2.43	2.55	8.10
Anion Sum	meq/L	-	2.61	2.74	7.84
Percent Difference	%	-	-3.57	-3.55	1.66
Theoretical Conductivity	µS/cm	-	240	248	786
Hardness (as $CaCO_3$)	mg/L	0.2	111	114	356
Ion Sum	mg/L	-	149	156	458
Saturation pH (5°C)	units	-	7.9	7.9	7.4
Langelier Index (5°C)	-	-	-0.04	0.11	0.21

Report ID: 509025-IAS
Report Date: 05-Jan-24
Date Received: 21-Dec-23

CERTIFICATE OF ANALYSIS

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

Attention: Nick MacGillivray
Project #: 21-3049-1002
Location: Upham Quarry

Analysis of Water

RPC Sample ID:			509025-10
Client Sample ID:			MW100-S
Date Sampled:			14-Dec-23
Analytes	**Units**	**RL**	
Sodium	mg/L	0.05	20.3
Potassium	mg/L	0.02	1.26
Calcium	mg/L	0.05	51.5
Magnesium	mg/L	0.01	15.1
Iron	mg/L	0.02	0.06
Manganese	mg/L	0.001	0.011
Copper	mg/L	0.001	0.004
Zinc	mg/L	0.001	0.012
Ammonia (as N)	mg/L	0.05	< 0.05
pH	units	-	6.1
Alkalinity (as $CaCO_3$)	mg/L	2	42
Chloride	mg/L	0.5	90.5
Fluoride	mg/L	0.05	0.29
Sulfate	mg/L	1	74
Nitrate + Nitrite (as N)	mg/L	0.05	0.68
o-Phosphate (as P)	mg/L	0.01	< 0.01
r-Silica (as SiO_2)	mg/L	0.1	14.0
Carbon - Total Organic	mg/L	0.5	0.5
Turbidity	NTU	0.1	1.1
Solids - Total Suspended	mg/L	5	< 5
Conductivity	µS/cm	1	533
Calculated Parameters			
Bicarbonate (as $CaCO_3$)	mg/L	-	42.0
Carbonate (as $CaCO_3$)	mg/L	-	0.005
Hydroxide (as $CaCO_3$)	mg/L	-	0.001
Cation Sum	meq/L	-	4.73
Anion Sum	meq/L	-	4.98
Percent Difference	%	-	-2.56
Theoretical Conductivity	µS/cm	-	523
Hardness (as $CaCO_3$)	mg/L	0.2	191
Ion Sum	mg/L	-	295
Saturation pH (5°C)	units	-	8.3
Langelier Index (5°C)	-	-	-2.21

Report ID: 509025-IAS
Report Date: 05-Jan-24
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Attention: Nick MacGillivray
Project #: 21-3049-1002
Location: Upham Quarry

Analysis of Metals in Water

RPC Sample ID:			509025-01	509025-02	509025-03
Client Sample ID:			MW19-01D	MW19-01S	MW20-02D
Date Sampled:			14-Dec-23	14-Dec-23	14-Dec-23
Analytes	**Units**	**RL**			
Aluminum	µg/L	1	2	39	7
Antimony	µg/L	0.1	< 0.1	< 0.1	< 0.5
Arsenic	µg/L	1	< 1	< 1	< 5
Barium	µg/L	1	188	152	< 5
Beryllium	µg/L	0.1	< 0.1	< 0.1	< 0.5
Bismuth	µg/L	1	< 1	< 1	< 5
Boron	µg/L	1	498	22	47800
Cadmium	µg/L	0.01	< 0.01	0.11	< 0.05
Calcium	µg/L	50	131000	51600	624000
Chromium	µg/L	1	< 1	< 1	< 5
Cobalt	µg/L	0.1	< 0.1	0.2	< 0.5
Copper	µg/L	1	< 1	4	9
Iron	µg/L	20	50	60	8700
Lead	µg/L	0.1	< 0.1	0.5	< 0.5
Lithium	µg/L	0.1	21.2	12.4	169.
Magnesium	µg/L	10	5070	15200	28300
Manganese	µg/L	1	177	12	543
Mercury	µg/L	0.025	< 0.025	< 0.025	< 0.025
Molybdenum	µg/L	0.1	< 0.1	< 0.1	4.1
Nickel	µg/L	1	< 1	3	< 5
Potassium	µg/L	20	2350	1350	5100
Rubidium	µg/L	0.1	3.7	1.7	5.6
Selenium	µg/L	1	< 1	< 1	< 5
Silver	µg/L	0.1	< 0.1	< 0.1	< 0.5
Sodium	µg/L	50	21600	20800	101000
Strontium	µg/L	1	2650	193	11600
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	< 0.5
Vanadium	µg/L	1	< 1	< 1	< 5
Zinc	µg/L	1	< 1	12	6

Report ID: 509025-IAS
Report Date: 05-Jan-24
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Attention: Nick MacGillivray
Project #: 21-3049-1002
Location: Upham Quarry

Analysis of Metals in Water

RPC Sample ID:			509025-04	509025-05	509025-06
Client Sample ID:			MW20-02S	MW20-03D	MW20-03S
Date Sampled:			14-Dec-23	14-Dec-23	14-Dec-23
Analytes	**Units**	**RL**			
Aluminum	µg/L	1	< 5	1	20
Antimony	µg/L	0.1	< 0.5	< 0.1	< 0.1
Arsenic	µg/L	1	< 5	< 1	1
Barium	µg/L	1	< 5	2	213
Beryllium	µg/L	0.1	< 0.5	< 0.1	< 0.1
Bismuth	µg/L	1	< 5	< 1	< 1
Boron	µg/L	1	1160	10	13
Cadmium	µg/L	0.01	< 0.05	< 0.01	< 0.01
Calcium	µg/L	50	567000	3610	39700
Chromium	µg/L	1	< 5	< 1	< 1
Cobalt	µg/L	0.1	< 0.5	< 0.1	0.1
Copper	µg/L	1	10	< 1	< 1
Iron	µg/L	20	32000	1190	690
Lead	µg/L	0.1	< 0.5	< 0.1	< 0.1
Lithium	µg/L	0.1	12.2	4.0	5.6
Magnesium	µg/L	10	11100	860	3670
Manganese	µg/L	1	823	20	19
Mercury	µg/L	0.025	< 0.025	< 0.025	< 0.025
Molybdenum	µg/L	0.1	< 0.5	0.7	0.2
Nickel	µg/L	1	< 5	< 1	< 1
Potassium	µg/L	20	2000	940	1020
Rubidium	µg/L	0.1	< 0.5	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	14200	9980	6190
Strontium	µg/L	1	4280	28	278
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	< 0.1	0.9
Vanadium	µg/L	1	< 5	< 1	2
Zinc	µg/L	1	< 5	< 1	< 1

Report ID: 509025-IAS
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Attention: Nick MacGillivray
Project #: 21-3049-1002
Location: Upham Quarry

Analysis of Metals in Water

RPC Sample ID:			509025-07	509025-08	509025-09
Client Sample ID:			MW20-04D	MW20-04S	MW100-D
Date Sampled:			14-Dec-23	14-Dec-23	14-Dec-23
Analytes	**Units**	**RL**			
Aluminum	µg/L	1	24	7	3
Antimony	µg/L	0.1	0.3	< 0.1	< 0.1
Arsenic	µg/L	1	20	12	< 1
Barium	µg/L	1	129	113	182
Beryllium	µg/L	0.1	< 0.1	< 0.1	< 0.1
Bismuth	µg/L	1	< 1	< 1	< 1
Boron	µg/L	1	79	138	515
Cadmium	µg/L	0.01	< 0.01	< 0.01	< 0.01
Calcium	µg/L	50	42000	43500	134000
Chromium	µg/L	1	< 1	< 1	< 1
Cobalt	µg/L	0.1	0.2	< 0.1	< 0.1
Copper	µg/L	1	5	3	< 1
Iron	µg/L	20	60	30	50
Lead	µg/L	0.1	0.2	< 0.1	< 0.1
Lithium	µg/L	0.1	8.0	8.1	20.8
Magnesium	µg/L	10	1430	1390	5140
Manganese	µg/L	1	8	10	179
Mercury	µg/L	0.025	< 0.025	< 0.025	< 0.025
Molybdenum	µg/L	0.1	2.4	1.4	< 0.1
Nickel	µg/L	1	< 1	< 1	< 1
Potassium	µg/L	20	1210	1160	2250
Rubidium	µg/L	0.1	1.0	1.1	3.5
Selenium	µg/L	1	< 1	< 1	< 1
Silver	µg/L	0.1	< 0.1	< 0.1	< 0.1
Sodium	µg/L	50	4230	5460	20900
Strontium	µg/L	1	504	423	2530
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	4.4	3.5	< 0.1
Vanadium	µg/L	1	3	< 1	< 1
Zinc	µg/L	1	3	2	< 1

Report ID: 509025-IAS
Report Date: 05-Jan-24
Date Received: 21-Dec-23

CERTIFICATE OF ANALYSIS

for

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www.rpc.ca

Attention: Nick MacGillivray
Project #: 21-3049-1002
Location: Upham Quarry

Analysis of Metals in Water

RPC Sample ID:			509025-10
Client Sample ID:			MW100-S
Date Sampled:			14-Dec-23
Analytes	**Units**	**RL**	
Aluminum	µg/L	1	29
Antimony	µg/L	0.1	< 0.1
Arsenic	µg/L	1	< 1
Barium	µg/L	1	146
Beryllium	µg/L	0.1	< 0.1
Bismuth	µg/L	1	< 1
Boron	µg/L	1	24
Cadmium	µg/L	0.01	0.11
Calcium	µg/L	50	51500
Chromium	µg/L	1	< 1
Cobalt	µg/L	0.1	0.1
Copper	µg/L	1	4
Iron	µg/L	20	60
Lead	µg/L	0.1	0.5
Lithium	µg/L	0.1	12.3
Magnesium	µg/L	10	15100
Manganese	µg/L	1	11
Mercury	µg/L	0.025	< 0.025
Molybdenum	µg/L	0.1	< 0.1
Nickel	µg/L	1	3
Potassium	µg/L	20	1260
Rubidium	µg/L	0.1	1.6
Selenium	µg/L	1	< 1
Silver	µg/L	0.1	< 0.1
Sodium	µg/L	50	20300
Strontium	µg/L	1	183
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	< 0.1
Vanadium	µg/L	1	< 1
Zinc	µg/L	1	12

Report ID: 509025-IAS
Report Date: 05-Jan-24
Date Received: 21-Dec-23

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Methods

Analyte	RPC SOP #	Method Reference	Method Principle
Ammonia	IAS-M47	APHA 4500-NH_3 G	Phenate Colourimetry
pH	IAS-M03	APHA 4500-H^+ B	pH Electrode - Electrometric
Alkalinity (as $CaCO_3$)	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_4 E	Turbidimetry
Nitrate + Nitrite (as N)	IAS-M48	APHA 4500-NO_3 H	Hydrazine Red., Derivitization, Colourimetry
o-Phosphate (as P)	IAS-M50	APHA 4500-P F	Molybdate/Ascorbic Acid Colourimetry
r-Silica (as SiO_2)	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

Report ID: 509029-IAS
Report Date: 05-Jan-24
Date Received: 21-Dec-23

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Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Nick MacGillivray
Project #: 21-3049-1002
Location: Upham Quarry

Analysis of Water

RPC Sample ID:			509029-1	509029-2	509029-3	509029-4	509029-5	509029-6
Client Sample ID:			SW3	SW5	PDP-1	H1	H2	H2O
Date Sampled:			16-Dec-23	16-Dec-23	16-Dec-23	16-Dec-23	16-Dec-23	16-Dec-23
Analytes	**Units**	**RL**						
Alkalinity (as $CaCO_3$)	mg/L	2	16	19	18	17	13	17
Chloride	mg/L	0.5	7.2	24.1	23.5	5.1	5.2	5.2
Sulfate	mg/L	1	140	300	290	12	15	15
Phosphorus - Total	mg/L	0.002	0.026	0.025	0.023	0.015	0.044	0.023
Solids - Total Dissolved	mg/L	5	248	458	450	56	48	58
Solids - Total Suspended	mg/L	5	< 5	< 5	< 5	< 5	27	< 5
Hardness (as $CaCO_3$)	mg/L	0.2	155.	299.	296.	27.3	27.6	27.2

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

RL = Reporting Limit

Matthew Norman
Senior Chemist
Inorganic Analytical Chemistry

Brannen Burhoe
Supervisor
Inorganic Analytical Services

Report ID: 509029-IAS
Report Date: 05-Jan-24
Date Received: 21-Dec-23

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Attention: Nick MacGillivray
Project #: 21-3049-1002
Location: Upham Quarry

Analysis of Metals in Water

RPC Sample ID:			509029-1	509029-2	509029-3	509029-4	509029-5	509029-6
Client Sample ID:			SW3	SW5	PDP-1	H1	H2	H2O
Date Sampled:			16-Dec-23	16-Dec-23	16-Dec-23	16-Dec-23	16-Dec-23	16-Dec-23
Analytes	**Units**	**RL**						
Calcium	µg/L	50	60600	115000	114000	10000	10000	9970
Magnesium	µg/L	10	860	2880	2800	560	630	570
Potassium	µg/L	20	900	1160	1070	490	510	470
Sodium	µg/L	50	3900	9520	9350	3110	3210	3210

Report ID: 509029-IAS
Report Date: 05-Jan-24
Date Received: 21-Dec-23

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Methods

Analyte	RPC SOP #	Method Reference	Method Principle
Alkalinity (as $CaCO_3$)	IAS-M43	EPA 310.2	Methyl Orange Colourimetry
Chloride	IAS-M44	APHA 4500-CL E	Ferricyanide Colourimetry
Sulfate	IAS-M45	APHA 4500-SO_4 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: 509408-IAS
Report Date: 04-Jan-24
Date Received: 02-Jan-24

CERTIFICATE OF ANALYSIS

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

Analysis of Water

RPC Sample ID:			509408-1	509408-2	509408-3
Client Sample ID:			SW3	SW5	PDP-1
Date Sampled:			28-Dec-23	28-Dec-23	28-Dec-23
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

Matthew Norman
Senior Chemist
Inorganic Analytical Chemistry

Brannen Burhoe
Supervisor
Inorganic Analytical Services

Report ID: 509408-IAS
Report Date: 04-Jan-24
Date Received: 02-Jan-24

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Methods

Analyte	RPC SOP #	Method Reference	Method Principle
Solids - Total Suspended	IAS-M05	APHA 2540 D	Filtration, Gravimetry

Report ID: 507319-IAS
Report Date: 08-Dec-23
Date Received: 05-Dec-23

CERTIFICATE OF ANALYSIS

for
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Tel: 506.452.1212
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Attention: Daniel Guest
Project #: 17-5121
Location: Upham

Analysis of Water

RPC Sample ID:			507319-1	507319-2	507319-3
Client Sample ID:			SW3	SW5	PDP-1
Date Sampled:			3-Dec-23	3-Dec-23	3-Dec-23
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 Burhoe
Supervisor
Inorganic Analytical Services

Report ID: 507319-IAS
Report Date: 08-Dec-23
Date Received: 05-Dec-23

CERTIFICATE OF ANALYSIS

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Methods

Analyte	RPC SOP #	Method Reference	Method Principle
Solids - Total Suspended	IAS-M05	APHA 2540 D	Filtration, Gravimetry

Report ID: 507909-IAS
Report Date: 14-Dec-23
Date Received: 11-Dec-23

CERTIFICATE OF ANALYSIS

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Fax: 506.452.0594
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Attention: Daniel Guest
Project #: 17-5121
Location: Upham

Analysis of Water

RPC Sample ID:			507909-1	507909-2	507909-3
Client Sample ID:			SW3	SW5	PDP-1
Date Sampled:			8-Dec-23	8-Dec-23	8-Dec-23
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

Matthew Norman
Senior Chemist
Inorganic Analytical Chemistry

Brannen Burhoe
Supervisor
Inorganic Analytical Services

Report ID: 507909-IAS
Report Date: 14-Dec-23
Date Received: 11-Dec-23

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Methods

Analyte	RPC SOP #	Method Reference	Method Principle
Solids - Total Suspended	IAS-M05	APHA 2540 D	Filtration, Gravimetry

Attachment D

Blast Reports

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CANADA BEST MANAGED COMPANIES
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December 6, 2023

Project No.: 234601.00

Mr. Daniel Guest
Hammond River Holdings
Via email: Guest.Daniel@AtlanticWallboard.com

Re: Blast Vibration Monitoring – Blast No. 2023-38 – 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 Ltd. at 14:03 on December 5, 2023. For the monitoring we positioned eleven (11) digital seismographs in the area. The location of each monitoring point is noted in the following table.

Blast No. 2023-38 – December 5, 2023

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)	14:03	1,300 m S	< 0.5 mm/s	<120	Units were not triggered
2. Civic No. 4126 Route 111 (PW-10)		860 m S	< 0.5 mm/s	<120	
3. Civic No. 4150 Route 111 (PW-13)		722 m SE	0.69 mm/s @ 57 Hz	101	-
4. Civic No. 2447 Route 820 (PW-07)		945 m NE	< 0.5 mm/s	<120	Units were not triggered
5. PW-03 - Cottage Route 820		690 m N	< 0.5 mm/s	<120	
6. Civic No. 2341 Route 820 (PW-05)		690 m N	< 0.5 mm/s	<120	
7. Civic No. 50 Myron Road (PW-15)		950 m NW	< 0.5 mm/s	<120	
8. Civic No. 86 Myron Road (PW-16)		830 m W	1.09 mm/s @ 15 Hz	104	-
9. Civic No. 220 Myron Road (PW-01)		1,320 m S	< 0.5 mm/s	<120	Units were not triggered
10. Civic No. 2337 Route 820 (PW-04)		785 m NW	< 0.5 mm/s	<120	
11. Civic No. 4140 Route 111 (PW-12)		790 m SE	0.71 mm/s @ 64 Hz	107	-
maximum limits as per Approval to Operate			**12.5 mm/s**	**128 dB**	

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

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

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

Project No: 234601.00

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Attachment A

Blast Record

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 5, 2023
Project No.:	234601.00	**Time of Blast:**	14:03
Inspector:	C. Buckley	**Blast No.:**	2023-38
Client:	Hammond River Holdings		

IDENTIFICATION:

Blasting Contractor:	Gulf Operators Ltd.		
Blaster's Certification No.:	1318	**Blaster's Name:**	Daniel Blanchard
Blast Location:	N 45º28.867' W 65º37.987" (see attached sketch)		
Type of Rock:	Anhydrate/Gypsum	**Est. Vol. or Tonnage:**	16,466 tonnes
Weather at time of Blast:	Clear	**Air Temp.:**	-4ºC
Est. Wind Speed :	≈ 5 km/h	**Wind Direction:**	E
Cloud Cover:	No	**Precipitation:**	No

BLAST DESIGN:

Total No. Holes:	104	**Hole Diameter:**	4.5"
Average Depth:	5.0 m – 5.9 m	**Spacing:**	12 ft x 12 ft
No. Holes per Delay:	2	**Collar Length:**	7 ft
Delay between Holes:	25 ms	**Delay between Rows:**	42, 67 & 84 ms
Initiation Method:	Non-Electric		
Weight of Explosives per Delay:	Max.: 56 kg		
Type and weight of Explosives for Blast:	3,500 kg – Titan XL-1000		

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

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 5, 2023
Project No.:	234601.00	**Time of Blast:**	14:03
Inspector:	C. Buckley	**Blast No.:**	2023-38
Client:	Hammond River Holdings		

BLAST MONITORING

Distance to the Nearest Structure:	690 m
Direction to the Nearest Structure:	North
Structure Type:	House
Scaled Distance Factor: (distance / sq. rt. of max. wt. per delay):	92.2

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.

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CANADA BEST MANAGED COMPANIES
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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 5, 2023
Project No.:	234601.00	**Time of Blast:**	14:03
Inspector:	C. Buckley	**Blast No.:**	2023-38
Client:	Hammond River Holdings		

Data Collection – Seismometer #1

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5487
Calibration Date:	January 16, 2023
Location of seismograph:	Civic Number 4079 Route 111 (PW-09)
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

Data Collection – Seismometer #2

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5372
Calibration Date:	February 28, 2023
Location of seismograph:	Civic Number 4126 Route 111 (PW-10)
Distance and Direction from Blast:	860 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

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CANADA BEST MANAGED COMPANIES
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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 5, 2023
Project No.:	234601.00	**Time of Blast:**	14:03
Inspector:	C. Buckley	**Blast No.:**	2023-38
Client:	Hammond River Holdings		

Data Collection – Seismometer #3

Make, Model and Serial # of unit:	Instantel Micromate, Serial #21832
Calibration Date:	July 10, 2023
Location of seismograph:	Civic Number 4150 Route 111 (PW-13)
Distance and Direction from Blast:	722 m Southeast
Transverse Particle Velocity:	0.54 mm/s @ 51 Hz
Vertical Particle Velocity:	0.69 mm/s @ 57 Hz
Longitudinal Particle Velocity:	0.61 mm/s @ 47 Hz
Peak Particle Velocity:	0.69 mm/s @ 57 Hz
Maximum Airblast:	101 dB(L)

Data Collection – Seismometer #4

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5489
Calibration Date:	May 5, 2023
Location of seismograph:	Civic Number 2447 Route 820 (PW-07)
Distance and Direction from Blast:	945 m Northeast
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

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CANADA BEST MANAGED COMPANIES
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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 5, 2023
Project No.:	234601.00	**Time of Blast:**	14:03
Inspector:	C. Buckley	**Blast No.:**	2023-38
Client:	Hammond River Holdings		

Data Collection – Seismometer #5

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5673
Calibration Date:	April 25, 2023
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

Data Collection – Seismometer #6

Make, Model and Serial # of unit:	Instantel Micromate, Serial #18193
Calibration Date:	May 12, 2023
Location of seismograph:	Civic Number 2341 Route 820 (PW-05)
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

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 5, 2023
Project No.:	234601.00	**Time of Blast:**	14:03
Inspector:	C. Buckley	**Blast No.:**	2023-38
Client:	Hammond River Holdings		

Data Collection – Seismometer #7

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5676
Calibration Date:	March 8, 2023
Location of seismograph:	Civic Number 50 Myron Road (PW-15)
Distance and Direction from Blast:	950 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

Data Collection – Seismometer #8

Make, Model and Serial # of unit:	Instantel Micromate, Serial #18187
Calibration Date:	May 12, 2023
Location of seismograph:	Civic Number 86 Myron Road (PW-16)
Distance and Direction from Blast:	830 m West
Transverse Particle Velocity:	1.09 mm/s @ 15 Hz
Vertical Particle Velocity:	0.55 mm/s @ 39 Hz
Longitudinal Particle Velocity:	0.99 mm/s @ 18 Hz
Peak Particle Velocity:	1.09 mm/s @ 15 Hz
Maximum Airblast:	104 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 5, 2023
Project No.:	234601.00	**Time of Blast:**	14:03
Inspector:	C. Buckley	**Blast No.:**	2023-38
Client:	Hammond River Holdings		

Data Collection – Seismometer #9

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5371
Calibration Date:	August 3, 2023
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

Data Collection – Seismometer #10

Make, Model and Serial # of unit:	Instantel Minimate, Serial #21348
Calibration Date:	July 25, 2023
Location of seismograph:	Civic Number 2337 Route 820 (PW-04)
Distance and Direction from Blast:	785 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

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 5, 2023
Project No.:	234601.00	**Time of Blast:**	14:03
Inspector:	C. Buckley	**Blast No.:**	2023-38
Client:	Hammond River Holdings		

Data Collection – Seismometer #11

Make, Model and Serial # of unit:	Instantel Micromate, Serial #21696
Calibration Date:	July 10, 2023
Location of seismograph:	Civic Number 4140 Route 111 (PW-12)
Distance and Direction from Blast:	790 m South
Transverse Particle Velocity:	0.39 mm/s @ 47 Hz
Vertical Particle Velocity:	0.71 mm/s @ 64 Hz
Longitudinal Particle Velocity:	0.55 mm/s @ 47 Hz
Peak Particle Velocity:	0.71 mm/s @ 64 Hz
Maximum Airblast:	107 dB(L)

Attachment B

Blast and Seismograph Location Plan

Blast and Seismograph Location Plan
Blast No: 2023-38
Upham East Gypsum Quarry, Upham, NB

Date: December 5, 2023
Project No.: 234601.00

Attachment C

Blast Event Reports

Event Report

Date/Time Vert at 14:03:17 December 5, 2023
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/BAYSIDE.MMB

Notes
Location
Client
Company
General Notes

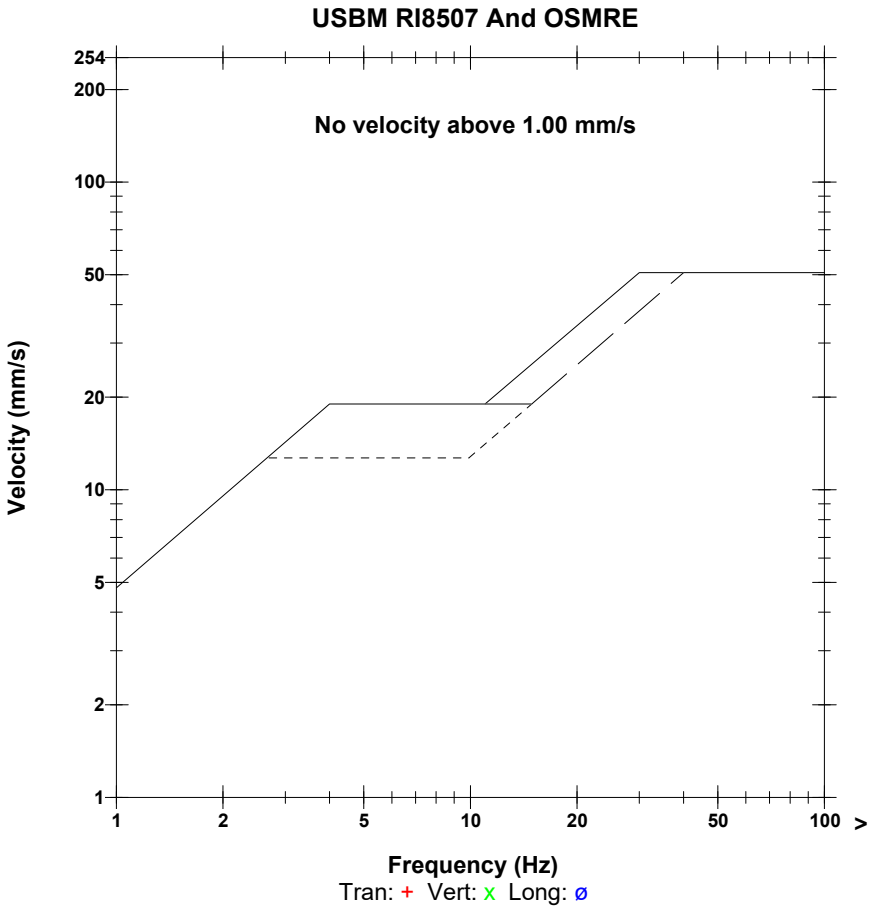
Serial Number UM21832 V 10-90GC Micromate ISEE
Battery Level 3.4 Volts
Unit Calibration July 10, 2023 by Instantel
File Name UM21832_20231205140317.IDFW

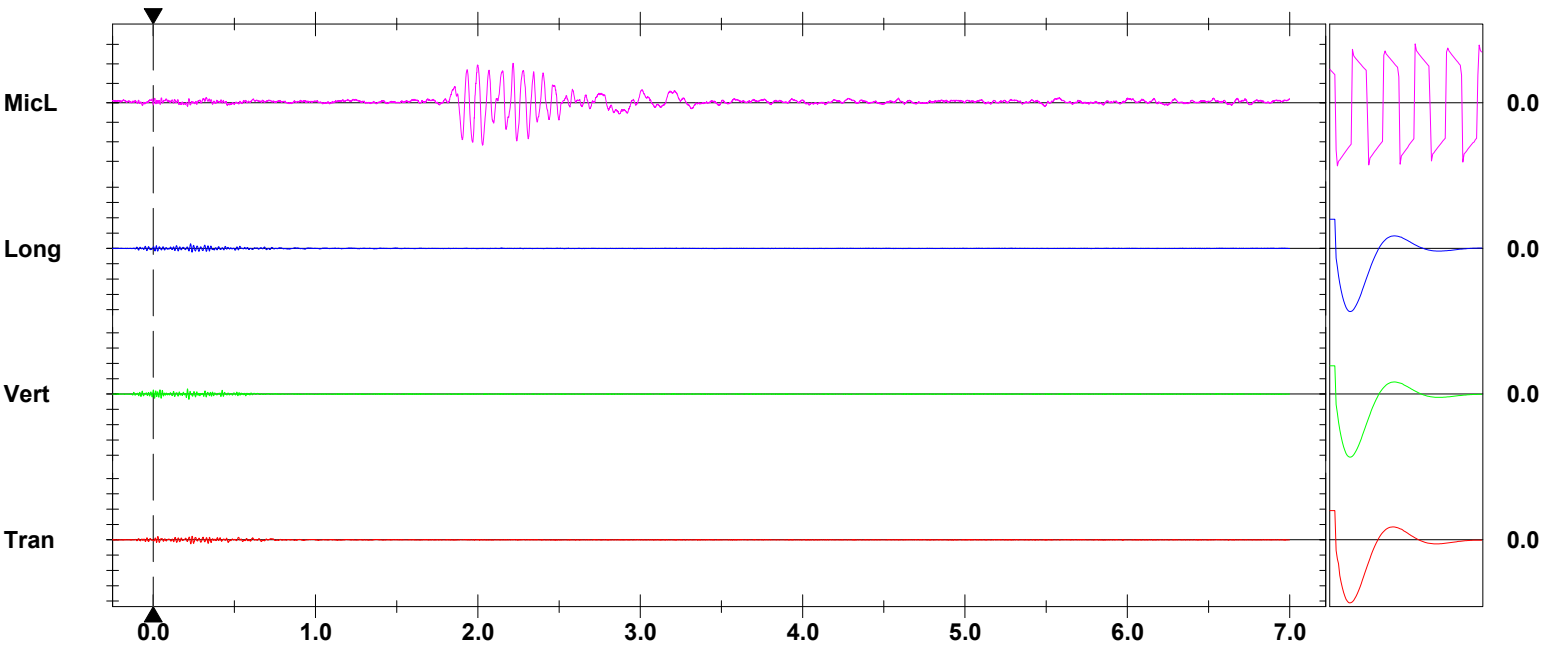
Post Event Notes
Location: 4150 Route 111 (PW-13)
Blast No.: 2023-38
Project No: 234601.00

Microphone Linear Weighting
PSPL 100.7 dB(L) 2.172 pa.(L) at 2.028 sec
ZC Freq 14 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 1760 mv)

	Tran	Vert	Long	
PPV	0.536	0.694	0.607	mm/s
PPV	45.58	47.82	46.66	dB
ZC Freq	51	57	47	Hz
Time (Rel. to Trig)	0.231	0.220	0.229	sec
Peak Acceleration	0.031	0.029	0.030	g
Peak Displacement	0.002	0.002	0.002	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.3	7.3	Hz
Overswing Ratio	4.9	5.3	5.0	

Peak Vector Sum 0.828 mm/s at 0.220 sec





Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 1.000 pa.(L)/div Sensor Check
Trigger =

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Event Report

Date/Time Vert at 14:03:19 December 5, 2023
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/BAYSIDE.MMB

Notes
Location:
Client:
User Name:
General:

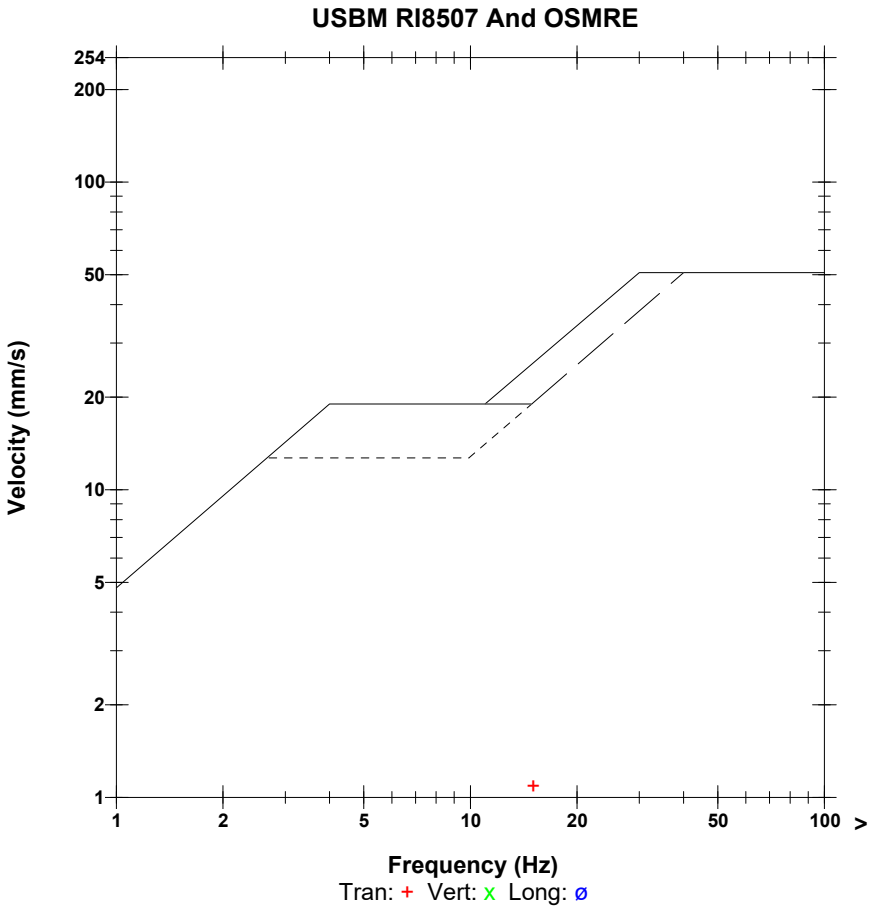
Serial Number UM18187 V 10-90GC Micromate ISEE
Battery Level 3.8 Volts
Unit Calibration May 12, 2023 by Instantel
File Name UM18187_20231205140319.IDFW

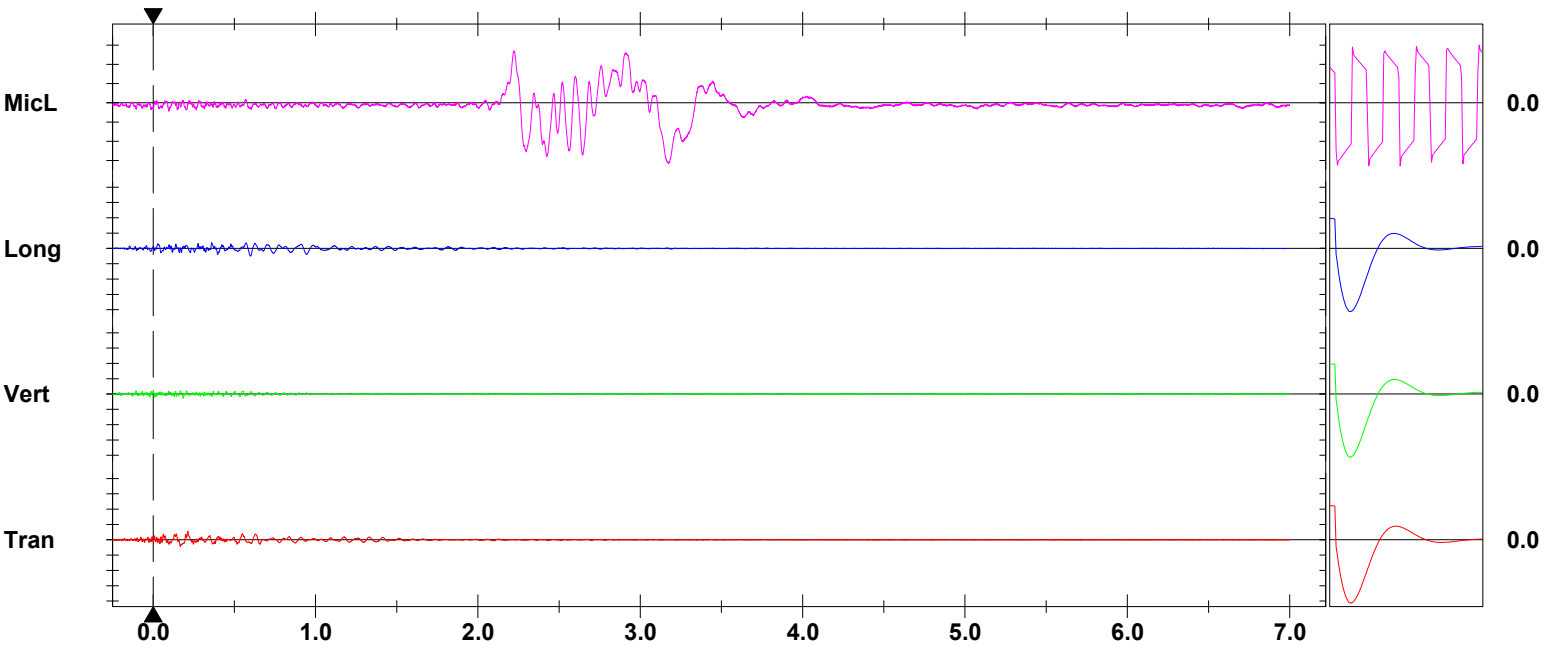
Post Event Notes
Location: 86 Myron Road (PW-16)
Blast No.: 2023-38
Project No: 234601.00

Microphone Linear Weighting
PSPL 104.0 dB(L) 3.165 pa.(L) at 3.175 sec
ZC Freq 2.1 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 1752 mv)

	Tran	Vert	Long	
PPV	1.088	0.552	0.985	mm/s
PPV	51.73	45.83	50.87	dB
ZC Freq	15	39	18	Hz
Time (Rel. to Trig)	0.213	0.186	0.600	sec
Peak Acceleration	0.041	0.032	0.030	g
Peak Displacement	0.009	0.002	0.009	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.5	7.5	Hz
Overswing Ratio	4.7	4.3	4.2	

Peak Vector Sum 1.113 mm/s at 0.601 sec





Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 1.000 pa.(L)/div Sensor Check
Trigger =

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Event Report

Date/Time Vert at 14:03:17 December 5, 2023
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/BAYSIDE.MMB

Notes
Location
Client
Company
General Notes

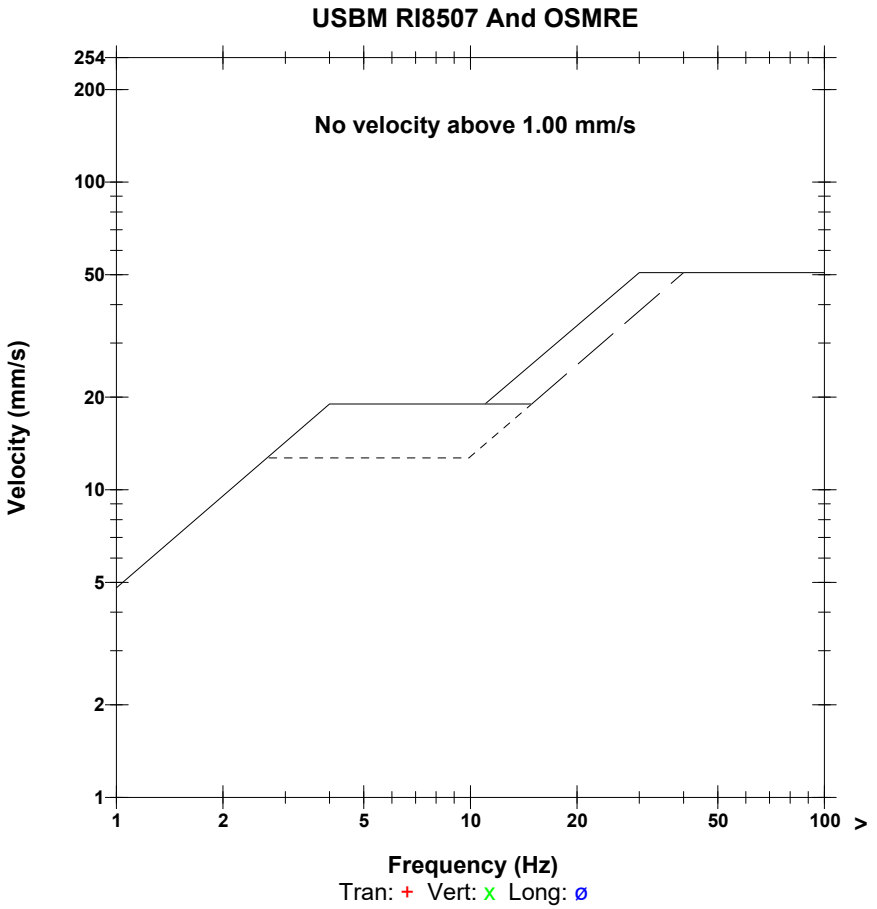
Serial Number UM21696 V 10-90GC Micromate ISEE
Battery Level 3.6 Volts
Unit Calibration July 10, 2023 by Instantel
File Name UM21696_20231205140317.IDFW

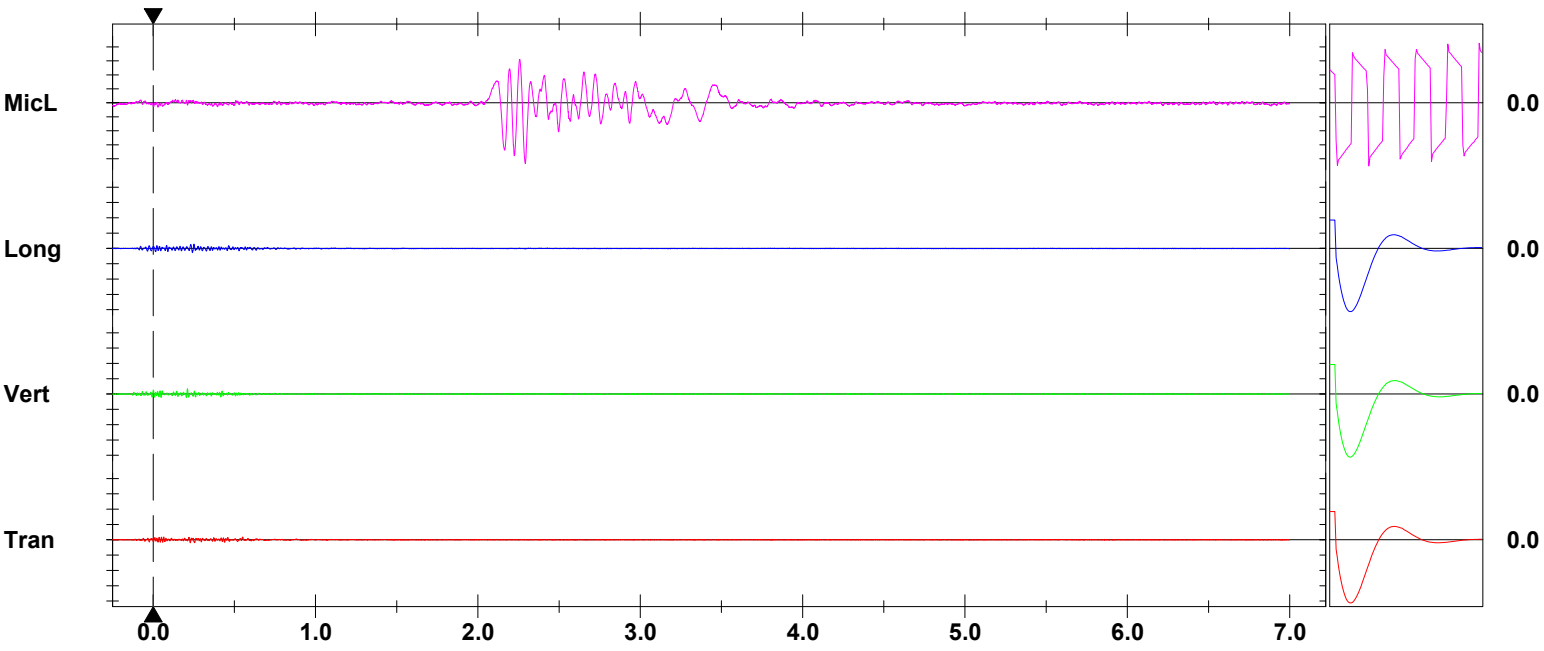
Post Event Notes
Location: 4140 Route 111 (PW-12)
Blast No.: 2023-38
Project No: 234601.00

Microphone Linear Weighting
PSPL 106.7 dB(L) 4.344 pa.(L) at 2.291 sec
ZC Freq 13 Hz
Channel Test Passed (Freq = 19.7 Hz Amp = 1676 mv)

	Tran	Vert	Long	
PPV	0.386	0.709	0.552	mm/s
PPV	42.74	48.02	45.83	dB
ZC Freq	47	64	47	Hz
Time (Rel. to Trig)	0.254	0.211	0.242	sec
Peak Acceleration	0.030	0.037	0.035	g
Peak Displacement	0.001	0.002	0.002	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.5	7.5	Hz
Overswing Ratio	4.7	4.7	4.6	

Peak Vector Sum 0.729 mm/s at 0.211 sec





Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 1.000 pa.(L)/div Sensor Check
Trigger =

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December 16, 2023

Project No.: 234601.00

Mr. Daniel Guest
Hammond River Holdings
Via email: Guest.Daniel@AtlanticWallboard.com

Re: Blast Vibration Monitoring – Blast No. 2023-39 – 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 Ltd. at 13:02 on December 15, 2023. For the monitoring we positioned eleven (11) digital seismographs in the area. The location of each monitoring point is noted in the following table.

Blast No. 2023-39 – December 15, 2023

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)	13:02	1,320 m S	< 0.5 mm/s	<120	Unit was not triggered
2. Civic No. 4126 Route 111 (PW-10)		955 m S	2.41 mm/s @ 64 Hz	106	-
3. Civic No. 4150 Route 111 (PW-13)		820 m SE	0.77 mm/s @ 57 Hz	108	-
4. Civic No. 2447 Route 820 (PW-07)		1,020 m NE	0.51 mm/s @ 27 Hz	112	-
5. PW-03 - Cottage Route 820		670 m N	1.08 mm/s @ 34 Hz	110	-
6. Civic No. 2341 Route 820 (PW-05)		640 m N	2.35 mm/s @ 51 Hz	112	-
7. Civic No. 50 Myron Road (PW-15)		830 m NW	1.59 mm/s @ 64 Hz	112	-
8. Civic No. 86 Myron Road (PW-16)		680 m W	1.25 mm/s @ 9 Hz	110	-
9. Civic No. 220 Myron Road (PW-01)		1,310 m S	< 0.5 mm/s	<120	Unit was not triggered
10. Civic No. 2337 Route 820 (PW-04)		710 m NW	0.83 mm/s @ 10 Hz	114	-
11. Civic No. 4140 Route 111 (PW-12)		885 m S	1.91 mm/s @ 57 Hz	100	-
maximum limits as per Approval to Operate			**12.5 mm/s**	**128 dB**	

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

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

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

Project No: 234601.00

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Attachment A

Blast Record

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 15, 2023
Project No.:	234601.00	**Time of Blast:**	13:02
Inspector:	M. McLeod	**Blast No.:**	2023-39
Client:	Hammond River Holdings		

IDENTIFICATION:

Blasting Contractor:	Gulf Operators Ltd.		
Blaster's Certification No.:	1318	**Blaster's Name:**	Daniel Blanchard
Blast Location:	N 45º28.887' W 65º38.115" (see attached sketch)		
Type of Rock:	Anhydrate/Gypsum	**Est. Vol. or Tonnage:**	10,723 tonnes
Weather at time of Blast:	Clear	**Air Temp.:**	5ºC
Est. Wind Speed :	≈ 10 km/h	**Wind Direction:**	NE
Cloud Cover:	No	**Precipitation:**	No

BLAST DESIGN:

Total No. Holes:	84	**Hole Diameter:**	4.5"
Average Depth:	5.0 m – 6.2 m	**Spacing:**	10 ft x 10 ft
No. Holes per Delay:	2	**Collar Length:**	7 ft
Delay between Holes:	25 ms	**Delay between Rows:**	42 ms
Initiation Method:	Non-Electric		
Weight of Explosives per Delay:	Max.: 112 kg		
Type and weight of Explosives for Blast:	26,685 kg – Titan XL-1000		

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

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 15, 2023
Project No.:	234601.00	**Time of Blast:**	13:02
Inspector:	M. McLeod	**Blast No.:**	2023-39
Client:	Hammond River Holdings		

BLAST MONITORING

Distance to the Nearest Structure:	640 m
Direction to the Nearest Structure:	North
Structure Type:	House
Scaled Distance Factor: (distance / sq. rt. of max. wt. per delay):	60.5

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.

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 15, 2023
Project No.:	234601.00	**Time of Blast:**	13:02
Inspector:	M. McLeod	**Blast No.:**	2023-39
Client:	Hammond River Holdings		

Data Collection – Seismometer #1

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5632
Calibration Date:	November 24, 2023
Location of seismograph:	Civic Number 4079 Route 111 (PW-09)
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

Data Collection – Seismometer #2

Make, Model and Serial # of unit:	Instantel Minimate, Serial #21348
Calibration Date:	July 25, 2023
Location of seismograph:	Civic Number 4126 Route 111 (PW-10)
Distance and Direction from Blast:	955 m South
Transverse Particle Velocity:	1.14 mm/s @ 51 Hz
Vertical Particle Velocity:	2.41 mm/s @ 64 Hz
Longitudinal Particle Velocity:	0.63 mm/s @ 57 Hz
Peak Particle Velocity:	2.41 mm/s @ 64 Hz
Maximum Airblast:	106 dB(L)

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 15, 2023
Project No.:	234601.00	**Time of Blast:**	13:02
Inspector:	M. McLeod	**Blast No.:**	2023-39
Client:	Hammond River Holdings		

Data Collection – Seismometer #3

Make, Model and Serial # of unit:	Instantel Micromate, Serial #18187
Calibration Date:	May 12, 2023
Location of seismograph:	Civic Number 4150 Route 111 (PW-13)
Distance and Direction from Blast:	820 m Southeast
Transverse Particle Velocity:	0.36 mm/s @ 57 Hz
Vertical Particle Velocity:	0.77 mm/s @ 57 Hz
Longitudinal Particle Velocity:	0.51 mm/s @ 64 Hz
Peak Particle Velocity:	0.77 mm/s @ 57 Hz
Maximum Airblast:	108 dB(L)

Data Collection – Seismometer #4

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5673
Calibration Date:	April 25, 2023
Location of seismograph:	Civic Number 2447 Route 820 (PW-07)
Distance and Direction from Blast:	1,020 m Northeast
Transverse Particle Velocity:	0.51 mm/s @ 27 Hz
Vertical Particle Velocity:	0.32 mm/s @ 13 Hz
Longitudinal Particle Velocity:	0.38 mm/s @ 37 Hz
Peak Particle Velocity:	0.51 mm/s @ 27 Hz
Maximum Airblast:	112 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 15, 2023
Project No.:	234601.00	**Time of Blast:**	13:02
Inspector:	M. McLeod	**Blast No.:**	2023-39
Client:	Hammond River Holdings		

Data Collection – Seismometer #5

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5676
Calibration Date:	March 8, 2023
Location of seismograph:	Cottage - PW-03 - Route 820
Distance and Direction from Blast:	670 m North
Transverse Particle Velocity:	0.76 mm/s @ 39 Hz
Vertical Particle Velocity:	0.95 mm/s @ 57 Hz
Longitudinal Particle Velocity:	1.08 mm/s @ 34 Hz
Peak Particle Velocity:	1.08 mm/s @ 34 Hz
Maximum Airblast:	110 dB(L)

Data Collection – Seismometer #6

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5371
Calibration Date:	August 3, 2023
Location of seismograph:	Civic Number 2341 Route 820 (PW-05)
Distance and Direction from Blast:	640 m North
Transverse Particle Velocity:	1.21 mm/s @ 47 Hz
Vertical Particle Velocity:	2.35 mm/s @ 51 Hz
Longitudinal Particle Velocity:	1.65 mm/s @ 43 Hz
Peak Particle Velocity:	2.35 mm/s @ 51 Hz
Maximum Airblast:	112 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 15, 2023
Project No.:	234601.00	**Time of Blast:**	13:02
Inspector:	M. McLeod	**Blast No.:**	2023-39
Client:	Hammond River Holdings		

Data Collection – Seismometer #7

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5489
Calibration Date:	May 5, 2023
Location of seismograph:	Civic Number 50 Myron Road (PW-15)
Distance and Direction from Blast:	830 m Northwest
Transverse Particle Velocity:	0.89 mm/s @ 51 Hz
Vertical Particle Velocity:	1.59 mm/s @ 64 Hz
Longitudinal Particle Velocity:	1.40 mm/s @ 43 Hz
Peak Particle Velocity:	1.59 mm/s @ 64 Hz
Maximum Airblast:	112 dB(L)

Data Collection – Seismometer #8

Make, Model and Serial # of unit:	Instantel Micromate, Serial #18193
Calibration Date:	May 12, 2023
Location of seismograph:	Civic Number 86 Myron Road (PW-16)
Distance and Direction from Blast:	680 m West
Transverse Particle Velocity:	1.07 mm/s @ 15 Hz
Vertical Particle Velocity:	1.03 mm/s @ 30 Hz
Longitudinal Particle Velocity:	1.25 mm/s @ 9 Hz
Peak Particle Velocity:	1.25 mm/s @ 9 Hz
Maximum Airblast:	110 dB(L)

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 15, 2023
Project No.:	234601.00	**Time of Blast:**	13:02
Inspector:	M. McLeod	**Blast No.:**	2023-39
Client:	Hammond River Holdings		

Data Collection – Seismometer #9

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5635
Calibration Date:	March 8, 2023
Location of seismograph:	Civic Number 220 Myron Road (PW-01)
Distance and Direction from Blast:	1,310 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

Data Collection – Seismometer #10

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5372
Calibration Date:	February 28, 2023
Location of seismograph:	Civic Number 2337 Route 820 (PW-04)
Distance and Direction from Blast:	710 m Northwest
Transverse Particle Velocity:	0.76 mm/s @ 43 Hz
Vertical Particle Velocity:	0.51 mm/s @ 47 Hz
Longitudinal Particle Velocity:	0.83 mm/s @ 10 Hz
Peak Particle Velocity:	0.83 mm/s @ 10 Hz
Maximum Airblast:	114 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 15, 2023
Project No.:	234601.00	**Time of Blast:**	13:02
Inspector:	M. McLeod	**Blast No.:**	2023-39
Client:	Hammond River Holdings		

Data Collection – Seismometer #11

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5487
Calibration Date:	January 16, 2023
Location of seismograph:	Civic Number 4140 Route 111 (PW-12)
Distance and Direction from Blast:	885 m South
Transverse Particle Velocity:	1.27 mm/s @ 64 Hz
Vertical Particle Velocity:	1.14 mm/s @ 57 Hz
Longitudinal Particle Velocity:	1.91 mm/s @ 57 Hz
Peak Particle Velocity:	1.91 mm/s @ 57 Hz
Maximum Airblast:	100 dB(L)

Attachment B

Blast and Seismograph Location Plan

Blast and Seismograph Loction Plan
Blast No: 2023-39
Upham East Gypsum Quarry, Upham, NB

Date: December 15, 2023
Project No.: 234601.00

Attachment C

Blast Event Reports

Event Report

Date/Time	Vert at 12:58:17 December 15, 2023
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
Job Number:	1

Serial Number	BE21348 V 10.72-1.1 Minimate Blaster
Battery Level	6.2 Volts
Unit Calibration	July 25, 2023 by Instantel
File Name	W348KBVA.P50

Notes
Location:
Client:
User Name:
General:

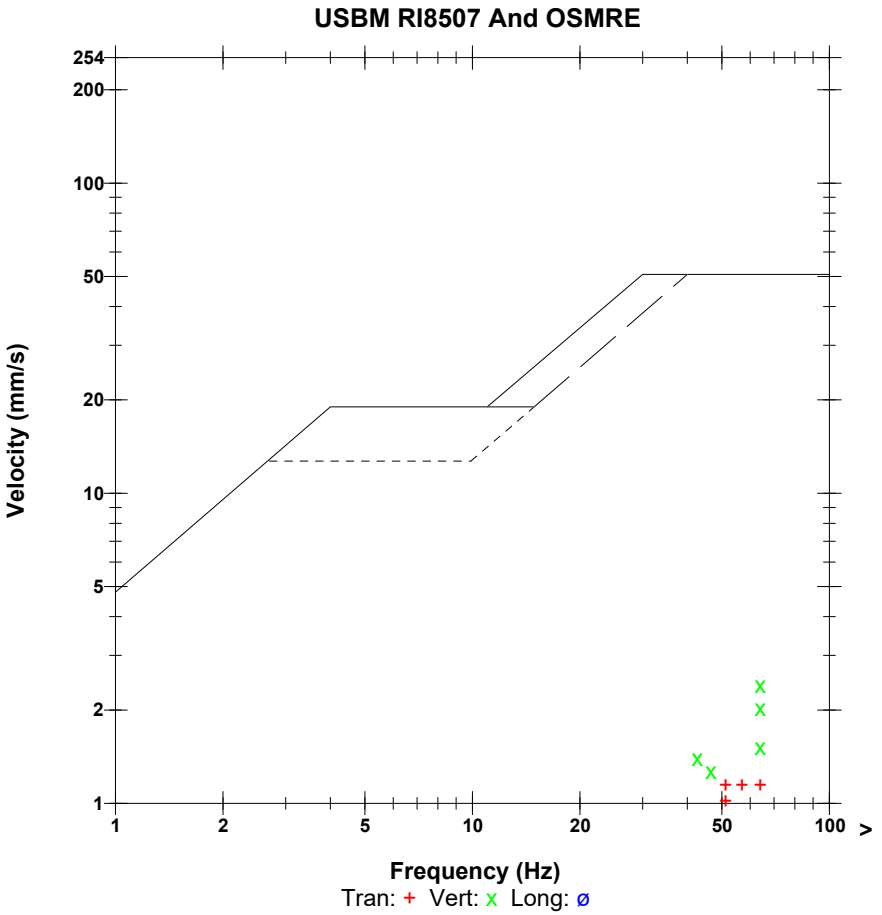
Post Event Notes
Location: 4126 Route 111 (PW-10)
Blast No.: 2023-39
Project No: 234601.00

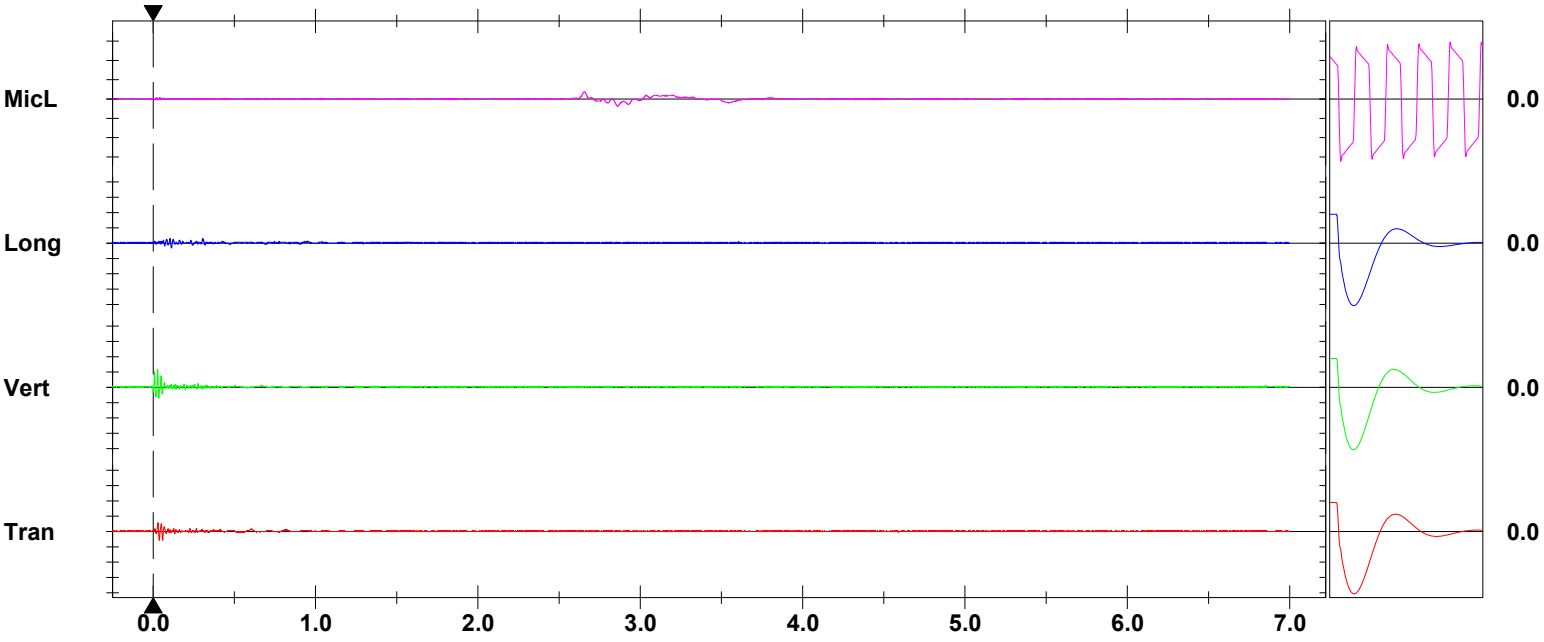
Extended Notes

Microphone	Linear Weighting
PSPL	105.5 dB(L) 3.750 pa.(L) at 2.652 sec
ZC Freq	6.0 Hz
Channel Test	Passed (Freq = 19.7 Hz Amp = 667 mv)

	Tran	Vert	Long	
PPV	1.143	2.413	0.635	mm/s
PPV	52.16	58.65	47.06	dB
ZC Freq	51	64	57	Hz
Time (Rel. to Trig)	0.029	0.028	0.104	sec
Peak Acceleration	0.053	0.093	0.027	g
Peak Displacement	0.003	0.006	0.003	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.7	7.3	Hz
Overswing Ratio	3.6	3.5	4.3	

Peak Vector Sum 2.618 mm/s at 0.028 sec





Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 10.000 pa.(L)/div Sensor Check
Trigger =

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Event Report

Date/Time Vert at 13:02:53 December 15, 2023
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/BAYSIDE.MMB

Notes
Location:
Client:
User Name:
General:

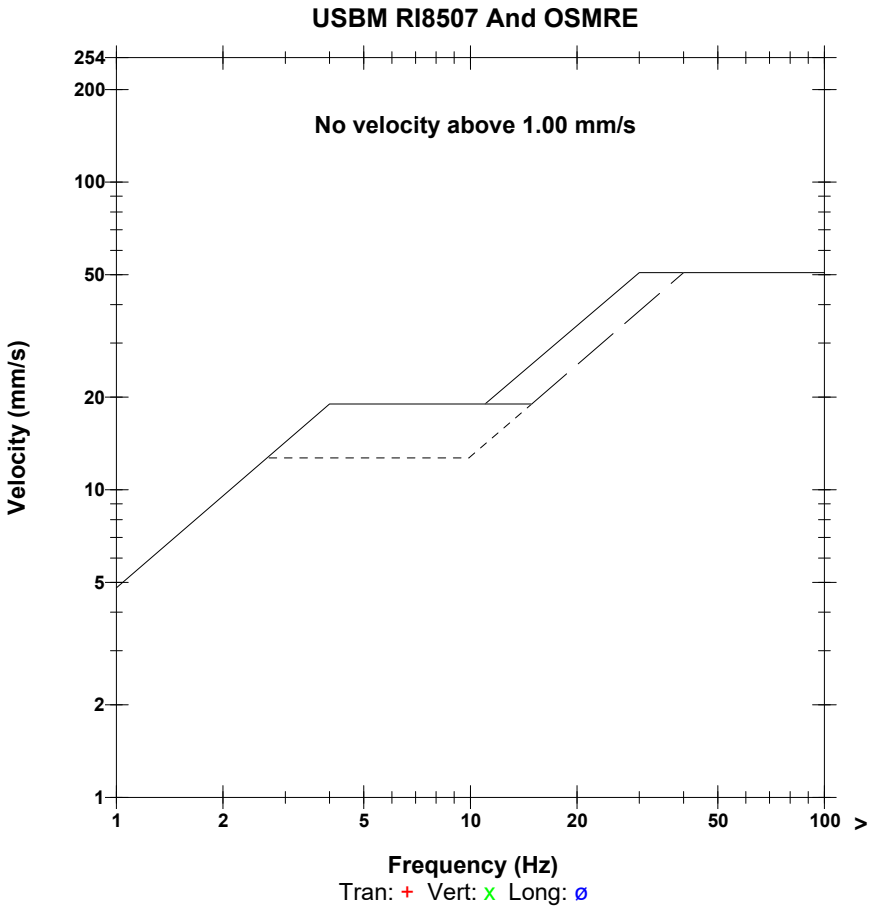
Serial Number UM18187 V 10-90GC Micromate ISEE
Battery Level 3.8 Volts
Unit Calibration May 12, 2023 by Instantel
File Name UM18187_20231215130253.IDFW

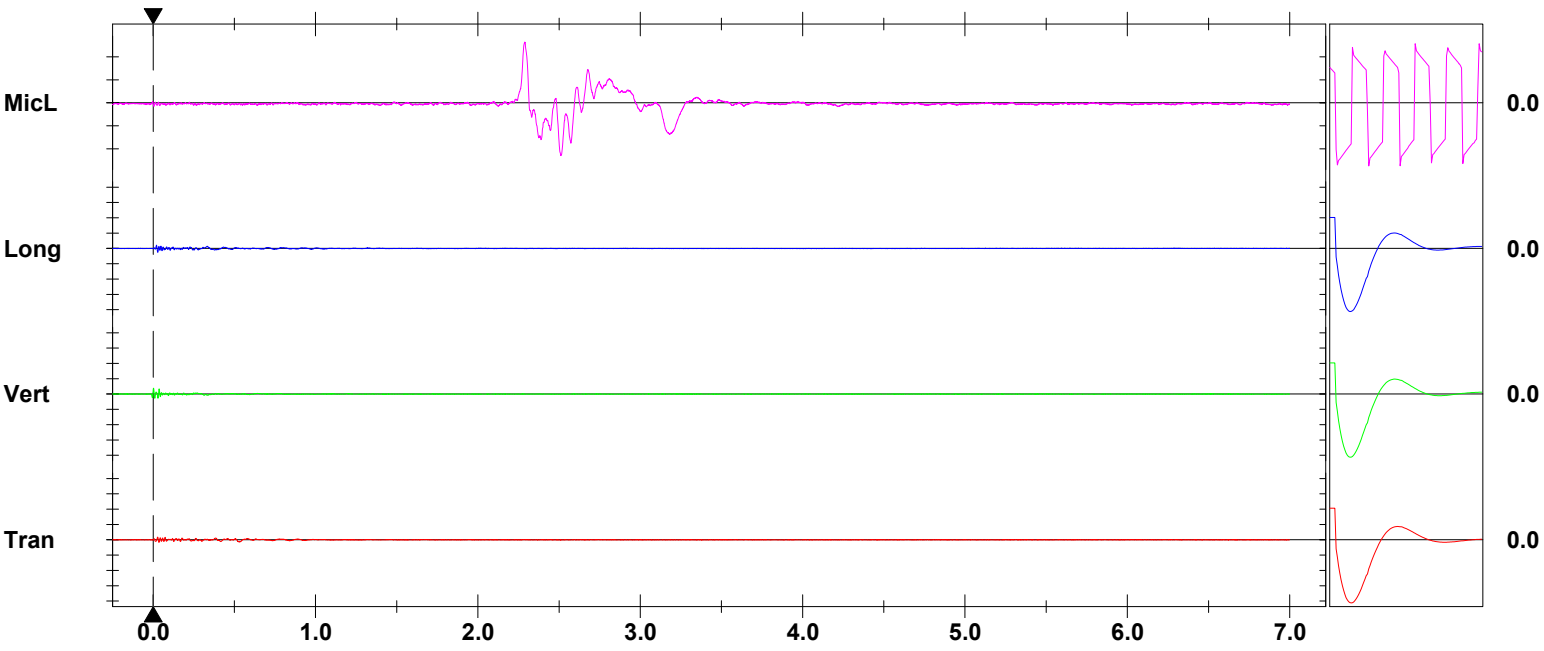
Post Event Notes
Location: 4150 Route 111 (PW-13)
Blast No.: 2023-39
Project No: 234601.00

Microphone Linear Weighting
PSPL 108.4 dB(L) 5.291 pa.(L) at 2.287 sec
ZC Freq 5.4 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 1522 mv)

	Tran	Vert	Long	
PPV	0.355	0.772	0.512	mm/s
PPV	42.00	48.76	45.19	dB
ZC Freq	57	57	64	Hz
Time (Rel. to Trig)	0.027	0.002	0.028	sec
Peak Acceleration	0.023	0.031	0.020	g
Peak Displacement	0.003	0.002	0.004	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.1	7.5	7.5	Hz
Overswing Ratio	4.8	4.2	4.1	

Peak Vector Sum 0.796 mm/s at 0.029 sec





Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 2.000 pa.(L)/div Sensor Check
Trigger =

Format © 1995-2015 Xmark Corporation

Event Report

Date/Time Tran at 13:01:24 December 15, 2023
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

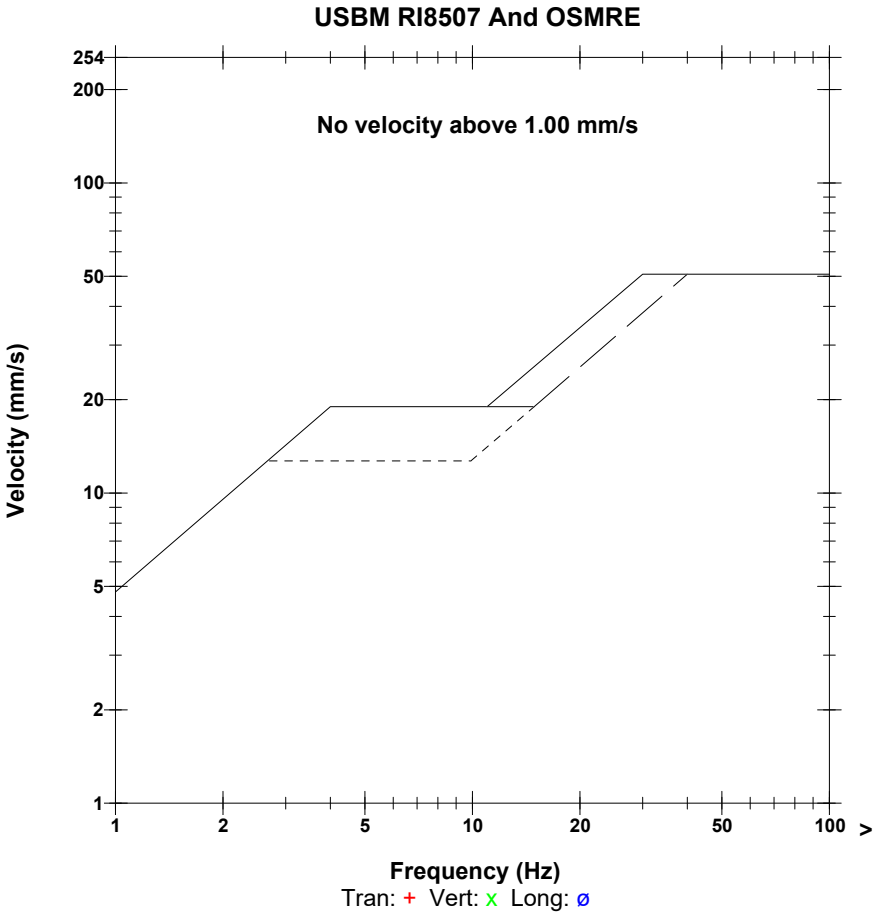
Notes
Location:
Client: UUUUUUUUUUUUUU
User Name: UU
Converted: December 15, 2023 15:59:49 (V10.72.1)

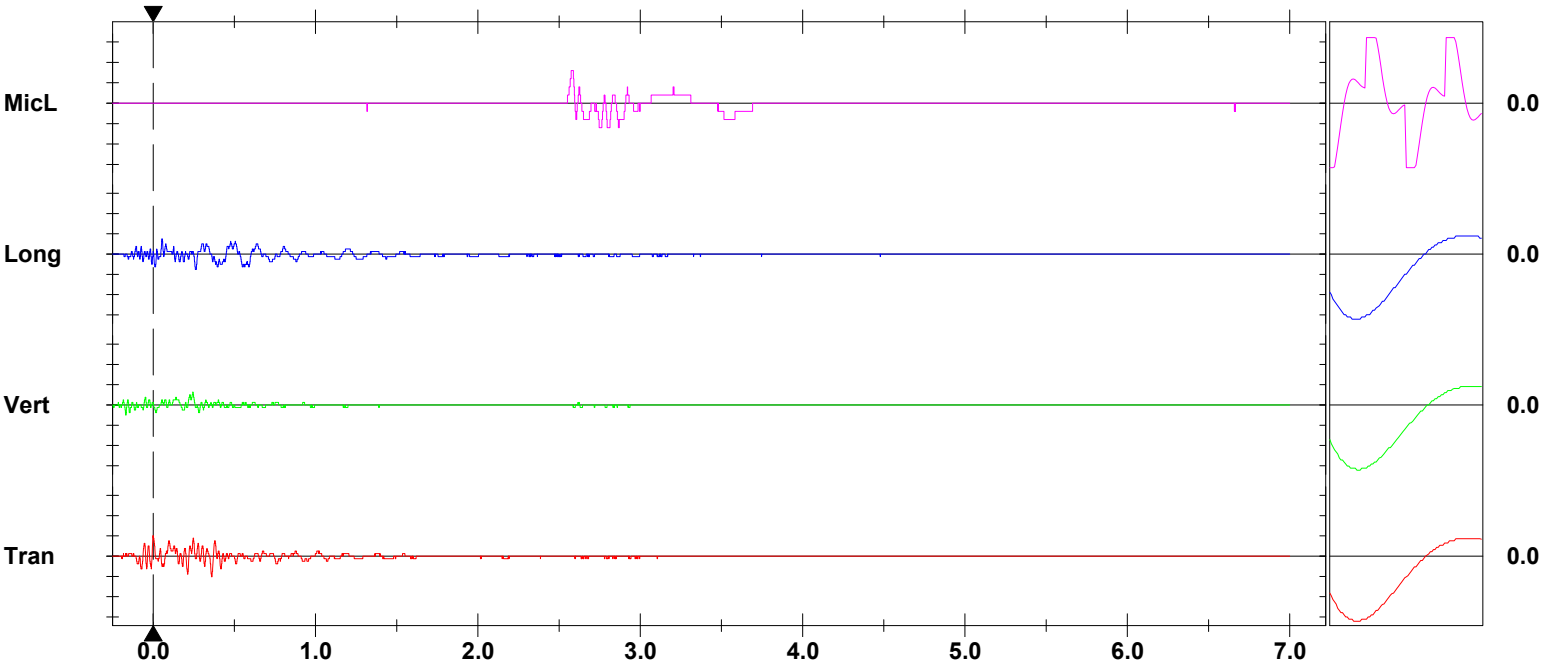
Microphone Linear Weighting
PSPL 112.0 dB(L) 8.000 pa.(L) at 2.575 sec
ZC Freq 11 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 308 mv)

	Tran	Vert	Long	
PPV	0.508	0.318	0.381	mm/s
PPV	45.12	41.03	42.62	dB
ZC Freq	27	13	37	Hz
Time (Rel. to Trig)	0.000	0.245	0.056	sec
Peak Acceleration	0.013	0.007	0.013	g
Peak Displacement	0.003	0.002	0.007	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.1	7.8	8.1	Hz
Overswing Ratio	3.8	3.7	3.7	

Peak Vector Sum 0.556 mm/s at 0.247 sec

Serial Number 5673 V 2.61 MiniMate
Battery Level 5.9 Volts
Unit Calibration April 25, 2023 by Instantel
File Name G673KBX5.IC0
Post Event Notes
Location: 2447 Route 820 (PW-07)
Blast No.: 2023-39
Project No: 234601.00





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

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Event Report

Date/Time Vert at 13:02:25 December 13, 2023
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: JOB # 0000
Client:
User Name:
Converted: December 15, 2023 15:57:11 (V10.72.1)

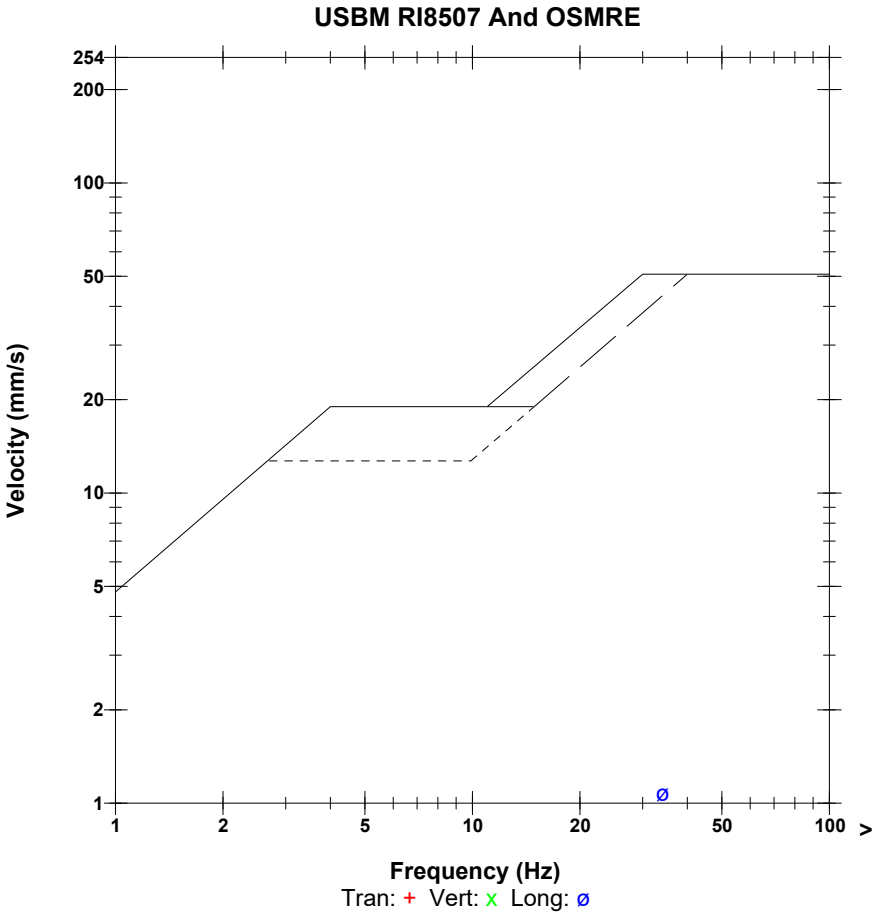
Extended Notes

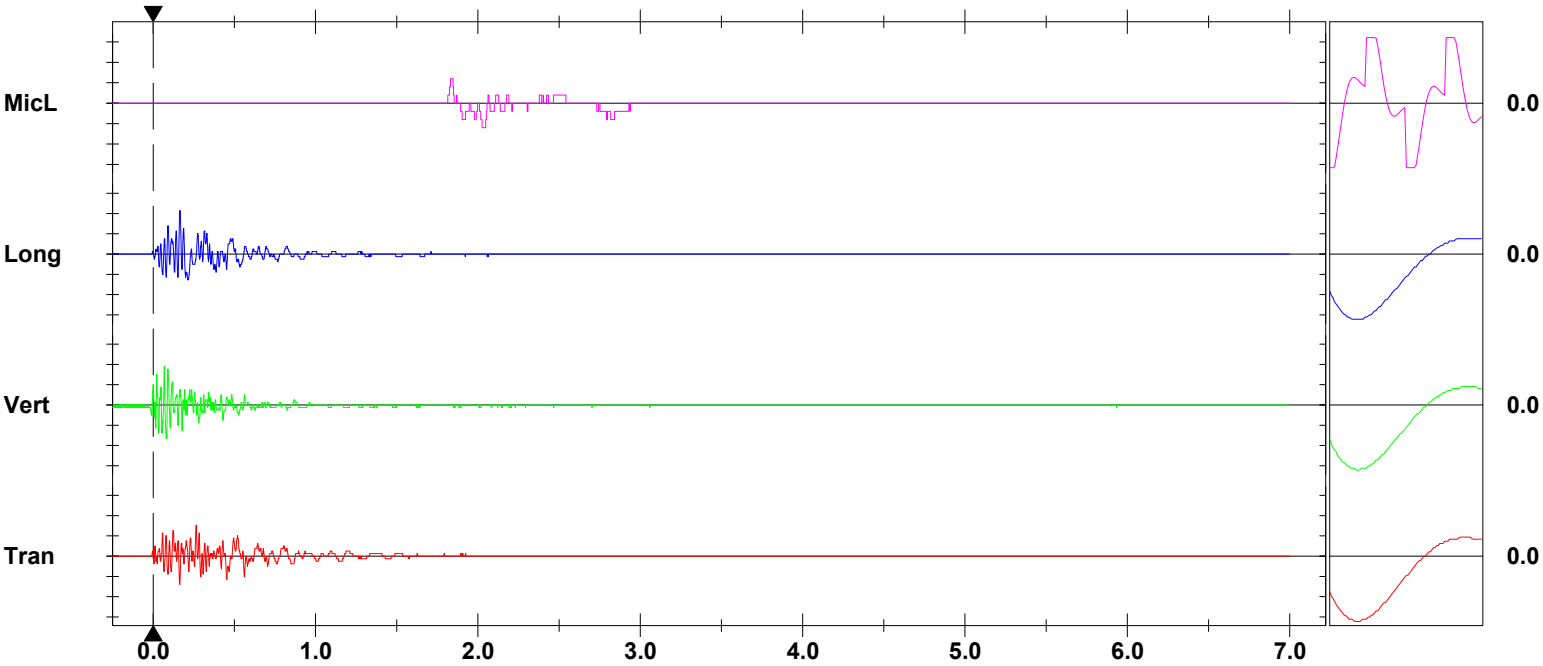
Microphone Linear Weighting
PSPL 109.5 dB(L) 6.000 pa.(L) at 1.832 sec
ZC Freq 12 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 302 mv)

	Tran	Vert	Long	
PPV	0.762	0.953	1.080	mm/s
PPV	48.64	50.58	51.66	dB
ZC Freq	39	57	34	Hz
Time (Rel. to Trig)	0.265	0.069	0.166	sec
Peak Acceleration	0.020	0.040	0.020	g
Peak Displacement	0.005	0.004	0.008	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.1	8.0	7.7	Hz
Overswing Ratio	3.6	3.7	4.1	

Peak Vector Sum 1.302 mm/s at 0.166 sec

Serial Number 5676 V 2.61 MiniMate
Battery Level 6.4 Volts
Unit Calibration March 8, 2023 by Instantel
File Name G676KBTG.810
Post Event Notes
Location: Cottage off Route 820 (PW-03)
Blast No.: 2023-39
Project No: 234601.00





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

Format © 1995-2015 Xmark Corporation

Event Report

Date/Time Vert at 13:03:38 December 15, 2023
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:
User Name:
Converted: December 15, 2023 16:02:10 (V10.72.1)

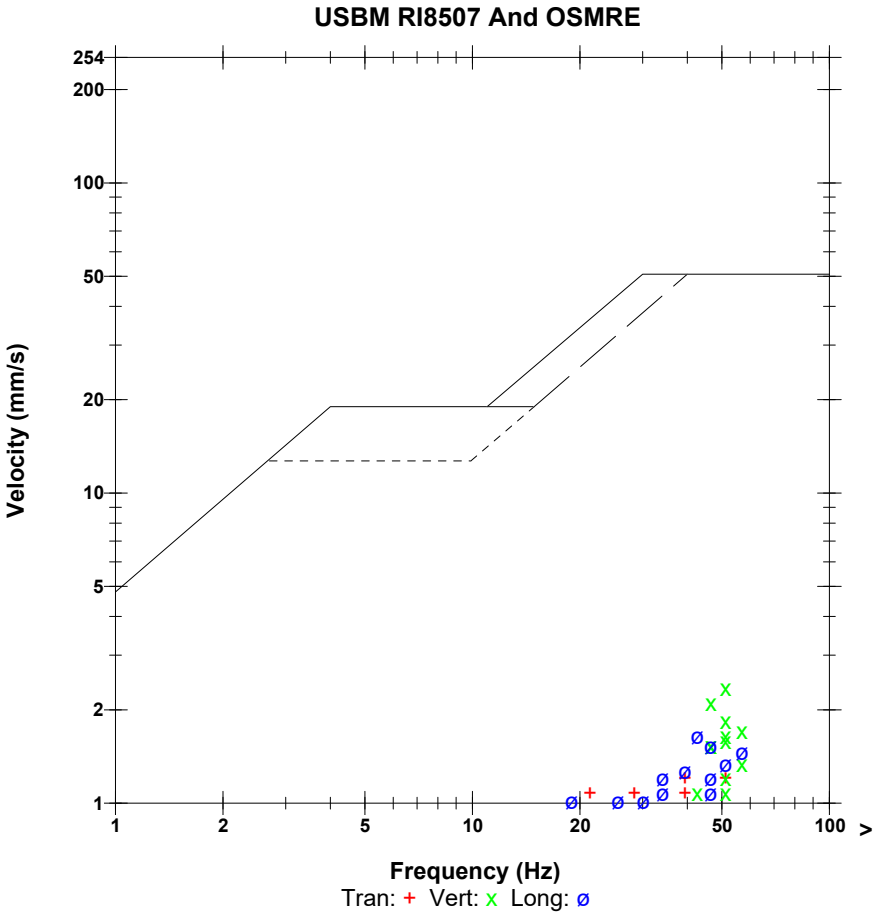
Extended Notes

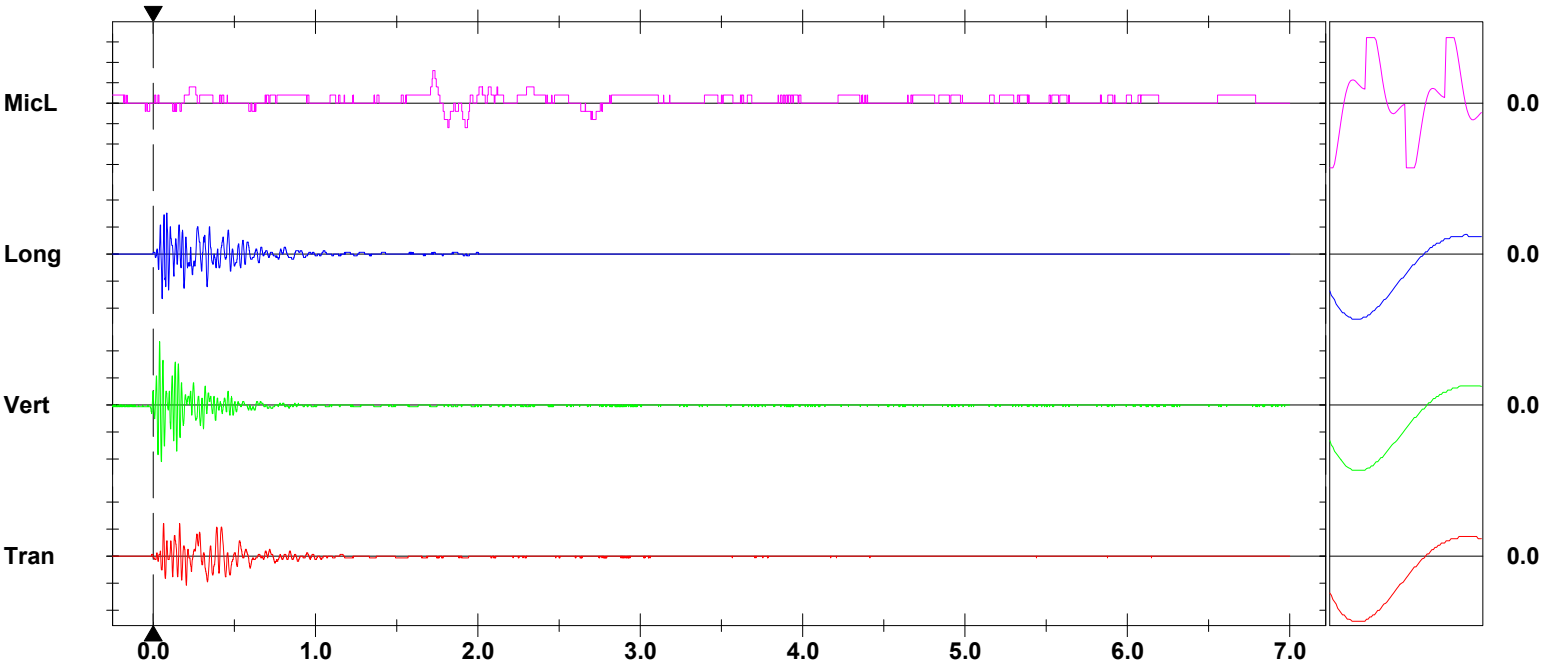
Microphone Linear Weighting
PSPL 112.0 dB(L) 8.000 pa.(L) at 1.723 sec
ZC Freq 2.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 305 mv)

	Tran	Vert	Long	
PPV	1.207	2.350	1.651	mm/s
PPV	52.63	58.42	55.35	dB
ZC Freq	47	51	43	Hz
Time (Rel. to Trig)	0.064	0.041	0.057	sec
Peak Acceleration	0.033	0.066	0.080	g
Peak Displacement	0.011	0.007	0.008	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.1	8.0	8.2	Hz
Overswing Ratio	3.5	3.6	3.5	

Peak Vector Sum 2.365 mm/s at 0.041 sec

Serial Number 5371 V 2.61 MiniMate
Battery Level 6.5 Volts
Unit Calibration August 3, 2023 by Instantel
File Name G371KBX5.M20
Post Event Notes
Location: 2341 Route 820 (PW-05)
Blast No.: 2023-39
Project No: 234601.00





Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 1.000 mm/s/div Mic: 5.000 pa.(L)/div Sensor Check
Trigger =

Format © 1995-2015 Xmark Corporation

Event Report

Date/Time	Vert at 13:02:48 December 15, 2023
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

Serial Number	5489 V 2.61 MiniMate
Battery Level	6.0 Volts
Unit Calibration	May 5, 2023 by Instantel
File Name	G489KBX5.KO0

Post Event Notes
Location: 50 Myron Road (PW-15)
Blast No.: 2023-39
Project No: 234601.00

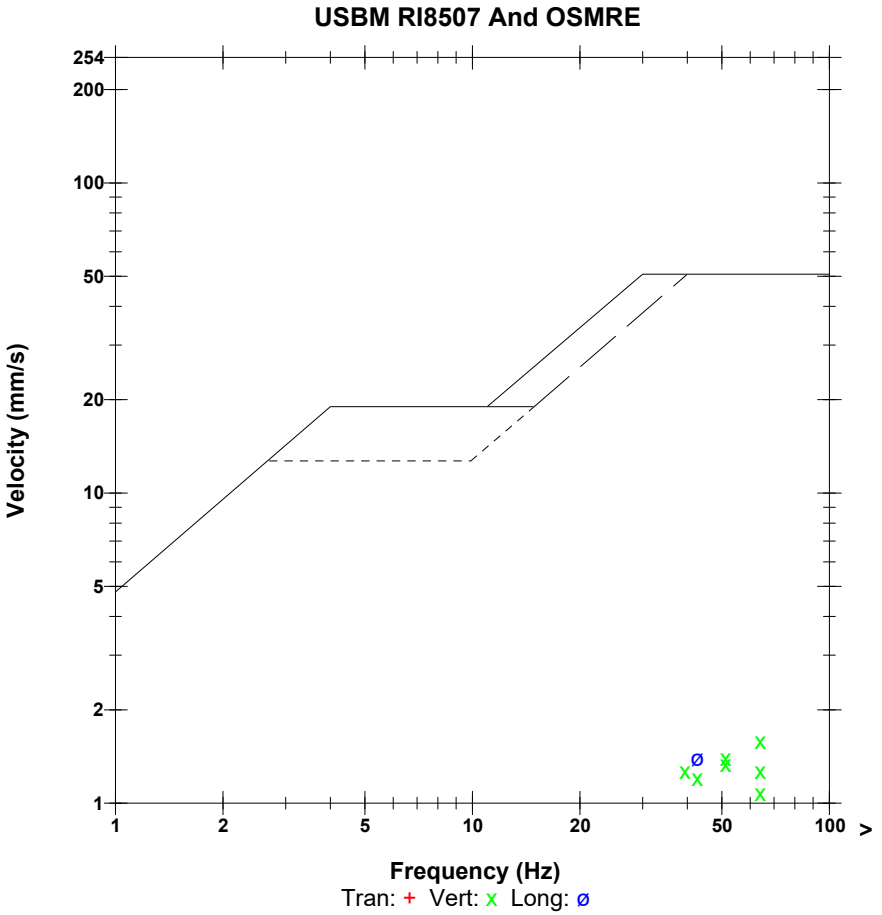
Notes
Location:
Client:
User Name:
Converted: December 15, 2023 16:08:50 (V10.72.1)

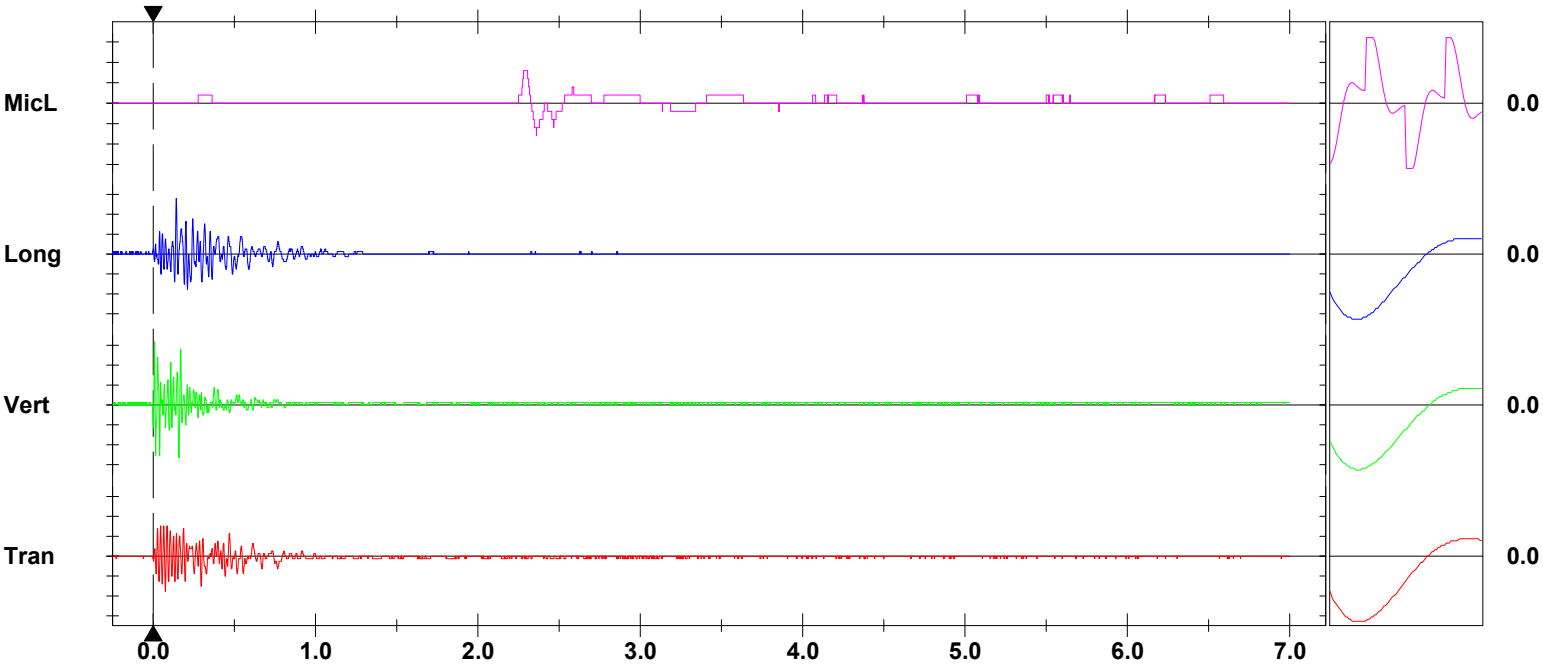
Extended Notes

Microphone	Linear Weighting
PSPL	112.0 dB(L) 8.000 pa.(L) at 2.281 sec
ZC Freq	7.0 Hz
Channel Test	Passed (Freq = 20.0 Hz Amp = 284 mv)

	Tran	Vert	Long	
PPV	0.889	1.588	1.397	mm/s
PPV	49.98	55.01	53.90	dB
ZC Freq	51	64	43	Hz
Time (Rel. to Trig)	0.076	0.009	0.144	sec
Peak Acceleration	0.027	0.066	0.033	g
Peak Displacement	0.003	0.004	0.005	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.8	7.7	8.0	Hz
Overswing Ratio	3.8	4.0	4.1	

Peak Vector Sum 1.603 mm/s at 0.009 sec





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

Format © 1995-2015 Xmark Corporation

Event Report

Date/Time Vert at 13:02:51 December 15, 2023
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/Bayside.mmb

Notes
Location:
Client:
User Name:
General:

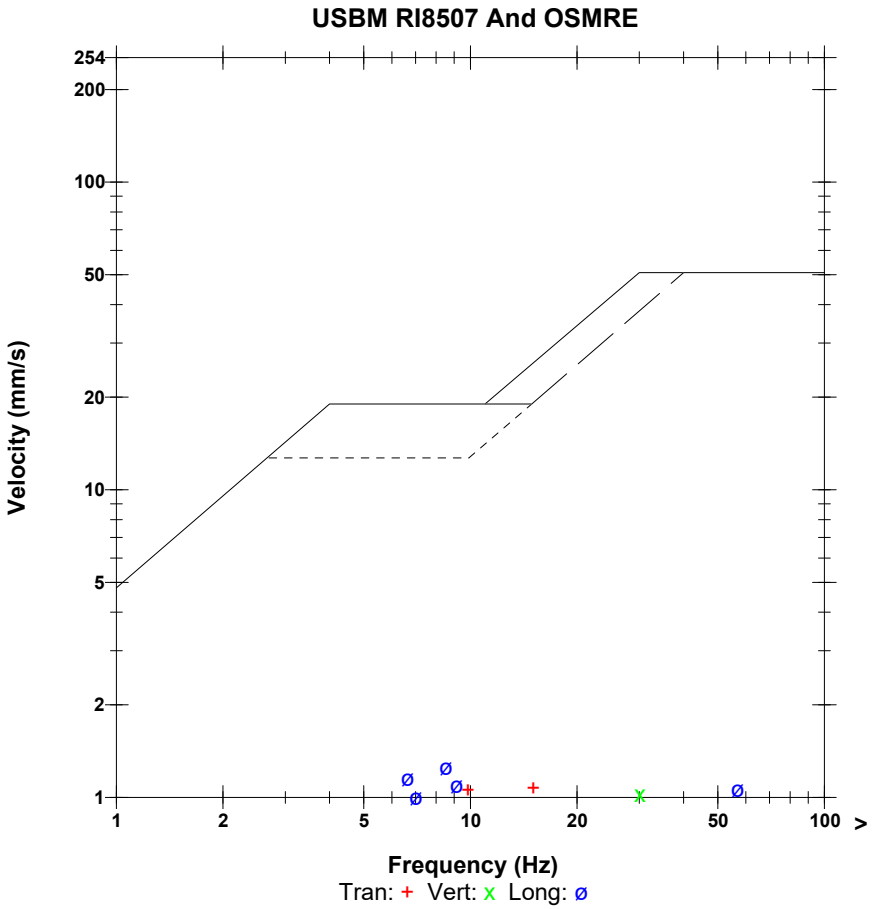
Serial Number UM18193 V 10-90GC Micromate ISEE
Battery Level 3.6 Volts
Unit Calibration May 12, 2023 by Instantel
File Name UM18193_20231215130251.IDFW

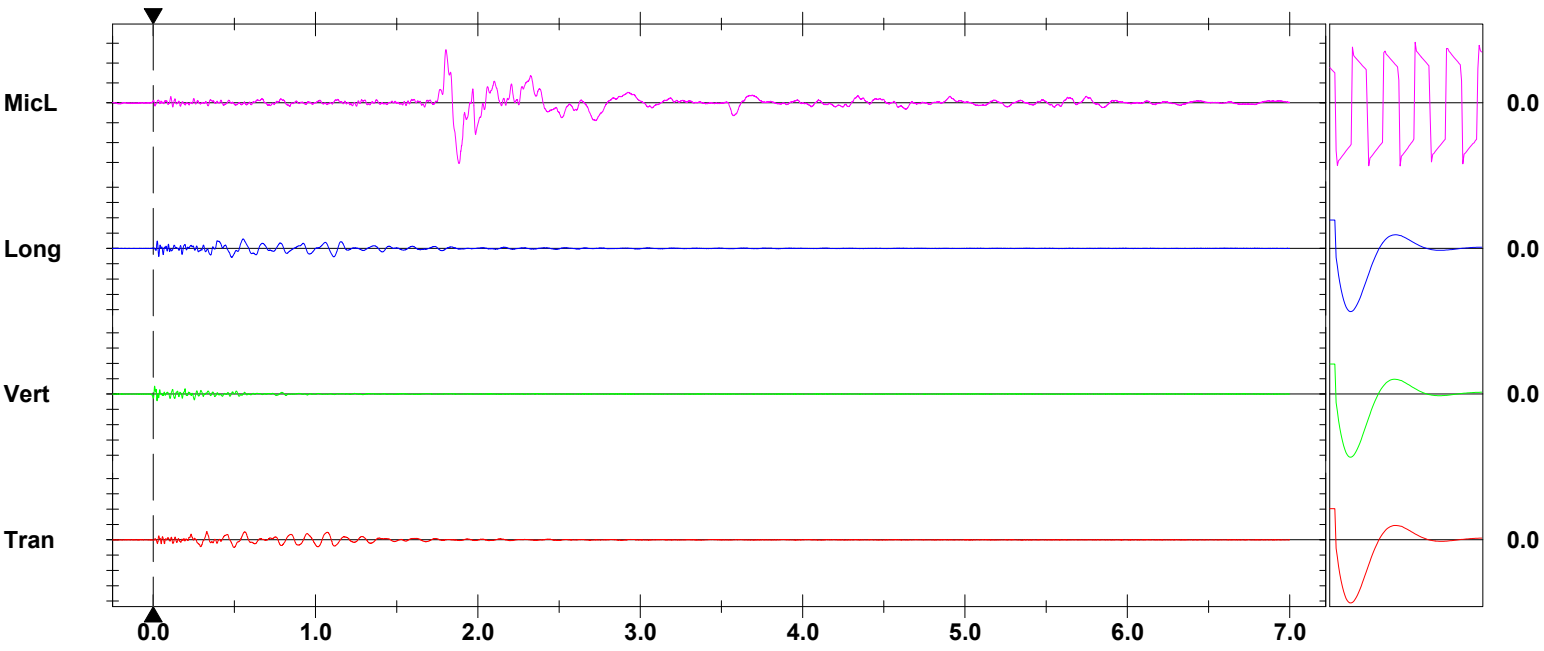
Post Event Notes
Location: 86 Myron Road (PW-16)
Blast No.: 2023-39
Project No: 234601.00

Microphone Linear Weighting
PSPL 109.7 dB(L) 6.113 pa.(L) at 1.884 sec
ZC Freq 4.7 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 1625 mv)

	Tran	Vert	Long	
PPV	1.072	1.025	1.253	mm/s
PPV	51.60	51.21	52.96	dB
ZC Freq	15	30	8.5	Hz
Time (Rel. to Trig)	0.329	0.009	0.553	sec
Peak Acceleration	0.038	0.039	0.036	g
Peak Displacement	0.018	0.005	0.022	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.5	7.3	Hz
Overswing Ratio	4.4	4.3	4.6	

Peak Vector Sum 1.529 mm/s at 0.555 sec





Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 2.000 pa.(L)/div Sensor Check
Trigger =

Format © 1995-2015 Xmark Corporation

Event Report

Date/Time Tran at 13:01:44 December 15, 2023
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:
User Name:
Converted: December 15, 2023 16:06:50 (V10.72.1)

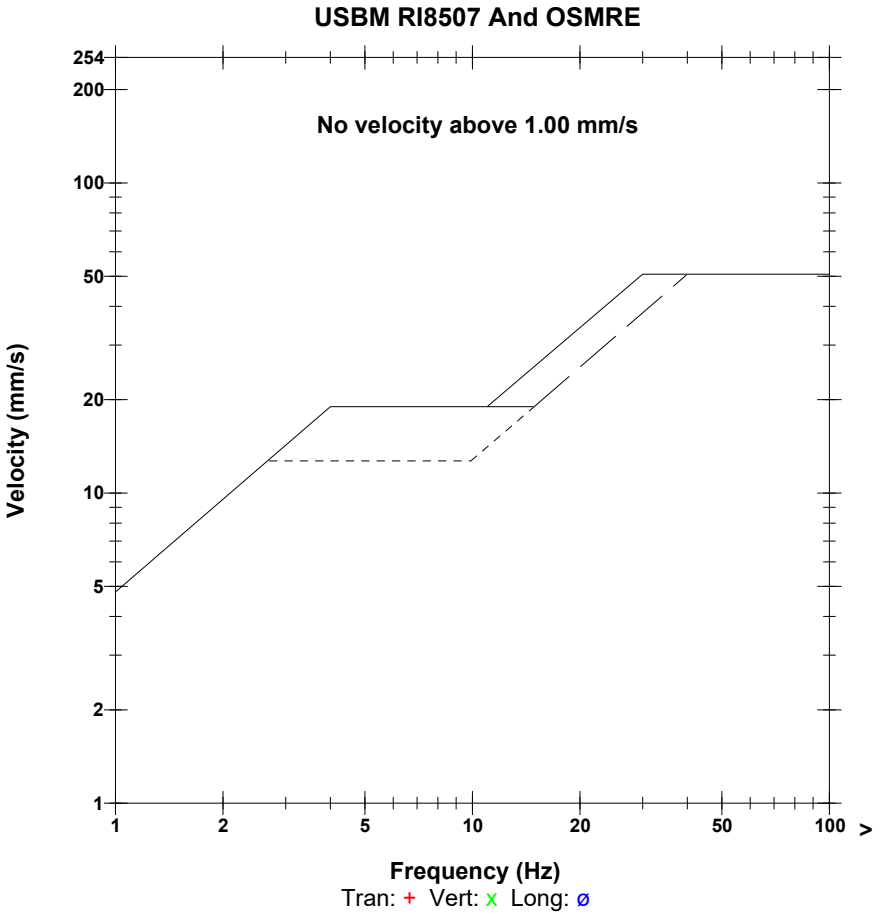
Extended Notes

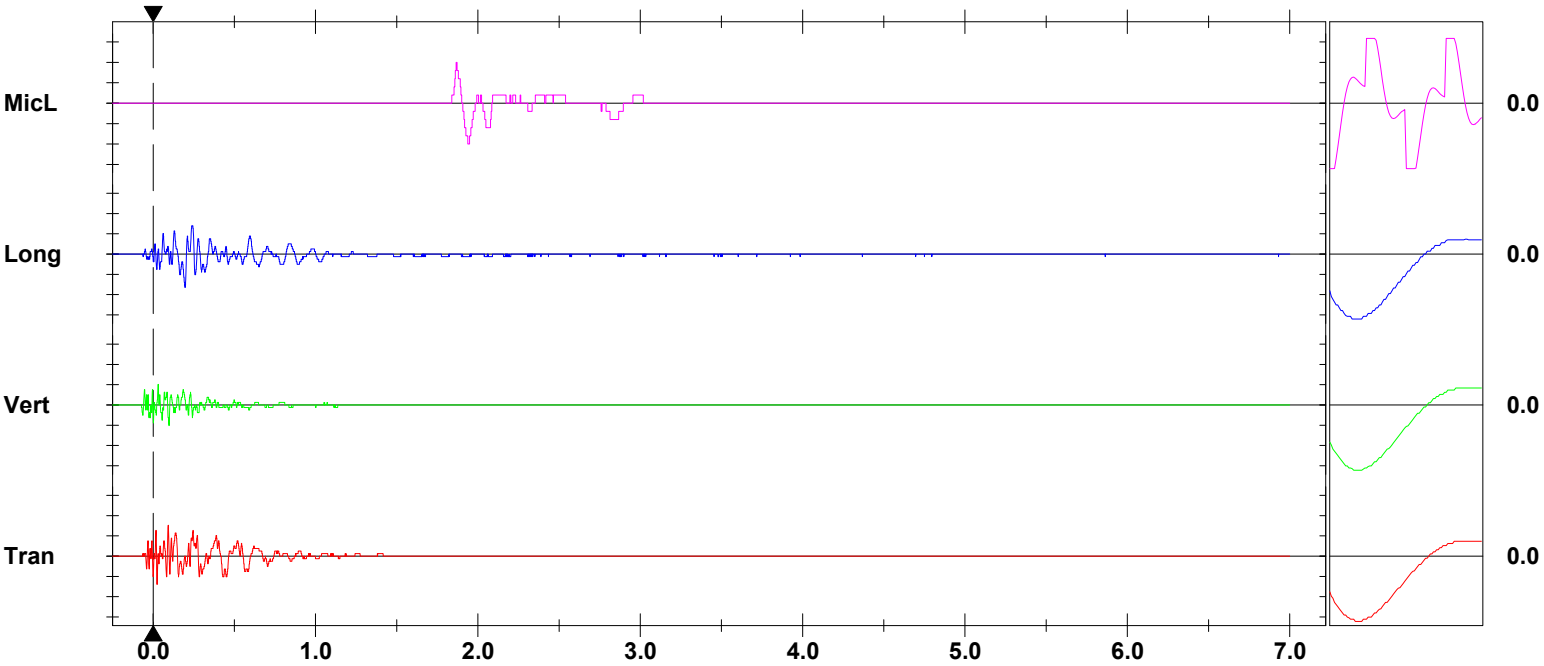
Microphone Linear Weighting
PSPL 114.0 dB(L) 10.000 pa.(L) at 1.867 sec
ZC Freq 8.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 300 mv)

	Tran	Vert	Long	
PPV	0.762	0.508	0.826	mm/s
PPV	48.64	45.12	49.33	dB
ZC Freq	43	47	10	Hz
Time (Rel. to Trig)	0.093	0.032	0.196	sec
Peak Acceleration	0.033	0.027	0.020	g
Peak Displacement	0.009	0.002	0.010	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.8	8.0	8.1	Hz
Overswing Ratio	3.8	3.5	3.8	

Peak Vector Sum 0.937 mm/s at 0.244 sec

Serial Number 5372 V 2.61 MiniMate
Battery Level 6.0 Volts
Unit Calibration February 28, 2023 by Instantel
File Name G372KBX5.IW0
Post Event Notes
Location: 2337 Route 820 (PW-04)
Blast No.: 2023-39
Project No: 234601.00





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

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Event Report

Date/Time Long at 13:02:55 December 15, 2023
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:
User Name:
Converted: December 15, 2023 16:11:55 (V10.72.1)

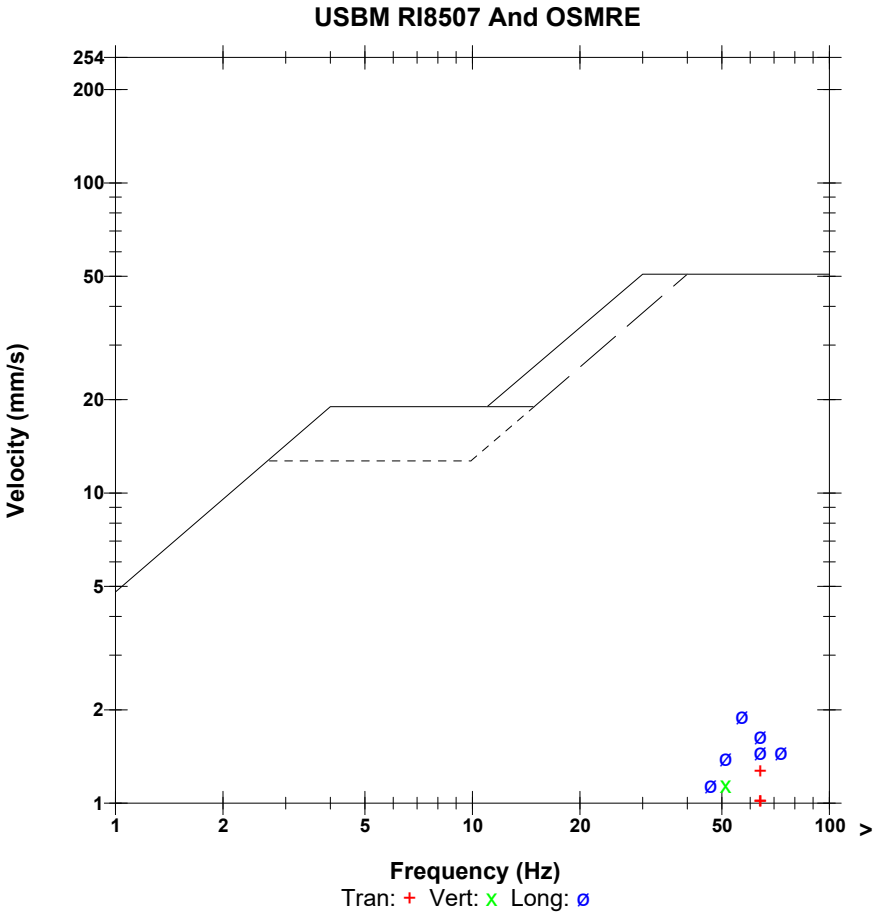
Extended Notes

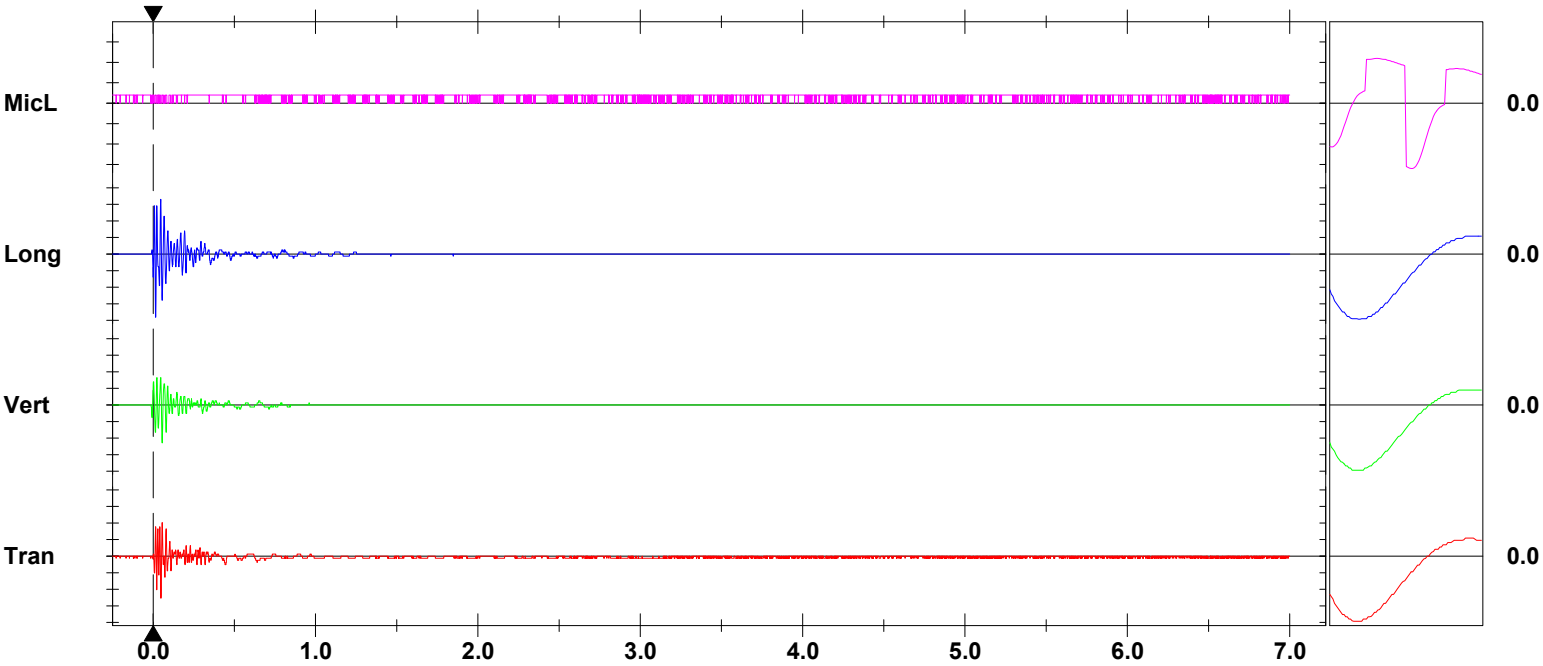
Microphone Linear Weighting
PSPL 100.0 dB(L) 2.000 pa.(L) at 0.004 sec
ZC Freq 73 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 294 mv)

	Tran	Vert	Long	
PPV	1.270	1.143	1.905	mm/s
PPV	53.08	52.16	56.60	dB
ZC Freq	64	57	57	Hz
Time (Rel. to Trig)	0.049	0.056	0.016	sec
Peak Acceleration	0.053	0.040	0.073	g
Peak Displacement	0.003	0.003	0.005	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.8	7.7	7.6	Hz
Overswing Ratio	3.3	4.0	4.0	

Peak Vector Sum 2.223 mm/s at 0.016 sec

Serial Number 5487 V 2.61 MiniMate
Battery Level 6.4 Volts
Unit Calibration January 16, 2023 by Instantel
File Name G487KBX5.KV0
Post Event Notes
Location: 4140 Route 111 (PW-12)
Blast No.: 2023-39
Project No: 234601.00





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

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CANADA BEST MANAGED COMPANIES
Platinum member

December 27, 2023

Project No.: 234601.00

Mr. Daniel Guest
Hammond River Holdings
Via email: Guest.Daniel@AtlanticWallboard.com

Re: Blast Vibration Monitoring – Blast No. 2023-40 – 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 Ltd. at 13:20 on December 22, 2023. For the monitoring we positioned eleven (11) digital seismographs in the area. The location of each monitoring point is noted in the following table.

Blast No. 2023-40 – December 22, 2023

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)	13:20	1,270 m S	< 0.5 mm/s	<120	Unit was not triggered
2. Civic No. 4126 Route 111 (PW-10)		834 m SSE	0.67 mm/s @ 21 Hz	89	-
3. Civic No. 4150 Route 111 (PW-13)		667 m SSE	< 0.5 mm/s	<120	Unit was not triggered
4. Civic No. 2447 Route 820 (PW-07)		951 m NNE	< 0.5 mm/s	<120	Unit was not triggered
5. PW-03 - Cottage Route 820		668 m NNW	< 0.5 mm/s	<120	Unit was not triggered
6. Civic No. 2341 Route 820 (PW-05)		740 m NNW	< 0.5 mm/s	<120	Unit was not triggered
7. Civic No. 50 Myron Road (PW-15)		1000 m NW	< 0.5 mm/s	<120	Unit was not triggered
8. Civic No. 86 Myron Road (PW-16)		852 m W	0.536 mm/s @ 11 Hz	104	-
9. Civic No. 220 Myron Road (PW-01)		1,300 m SSW	< 0.5 mm/s	<120	Unit was not triggered
10. Civic No. 2337 Route 820 (PW-04)		823 m NNW	< 0.5 mm/s	<120	Unit was not triggered
11. Civic No. 4140 Route 111 (PW-12)		747 m SSE	1.04 mm/s @ 43 Hz	104	-
maximum limits as per Approval to Operate			**12.5 mm/s**	**128 dB**	

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

Kris LeClair, P.Eng.
Senior Geotechnical Engineer

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

Project No: 234601.00

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Attachment A

Blast Record

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 22, 2023
Project No.:	234601.00	**Time of Blast:**	13:20
Inspector:	H. Floyd	**Blast No.:**	2023-40
Client:	Hammond River Holdings		

IDENTIFICATION:

Blasting Contractor:	Gulf Operators Ltd.		
Blaster's Certification No.:	1318	**Blaster's Name:**	Daniel Blanchard
Blast Location:	N 45º28.849', W 65º37.962" (see attached sketch)		
Type of Rock:	Anhydrate/Gypsum	**Est. Vol. or Tonnage:**	7,697 tonnes
Weather at time of Blast:	Clear / Sun	**Air Temp.:**	-7ºC
Est. Wind Speed :	≈ 16 km/h	**Wind Direction:**	NW
Cloud Cover:	No	**Precipitation:**	No

BLAST DESIGN:

Total No. Holes:	47	**Hole Diameter:**	4.5"
Average Depth:	16.4 ft – 20.3 ft	**Spacing:**	12 ft x 12 ft
No. Holes per Delay:	5	**Collar Length:**	7 ft
Delay between Holes:	25 ms	**Delay between Rows:**	42 ms
Initiation Method:	Non-Electric		
Weight of Explosives per Delay:	Max.: 110 kg		
Type and weight of Explosives for Blast:	1,201.5 kg – Titan XL-1000		

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

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 22, 2023
Project No.:	234601.00	**Time of Blast:**	13:20
Inspector:	H. Floyd	**Blast No.:**	2023-40
Client:	Hammond River Holdings		

BLAST MONITORING

Distance to the Nearest Structure:	747 m
Direction to the Nearest Structure:	SSE
Structure Type:	House
Scaled Distance Factor: (distance / sq. rt. of max. wt. per delay):	71.2

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: Kris LeClair, P.Eng.

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 22, 2023
Project No.:	234601.00	**Time of Blast:**	13:20
Inspector:	H. Floyd	**Blast No.:**	2023-40
Client:	Hammond River Holdings		

Data Collection – Seismometer #1

Make, Model and Serial # of unit:	Instantel Minimate, Serial # 5673
Calibration Date:	April. 25/23
Location of seismograph:	Civic Number 4079 Route 111 (PW-09)
Distance and Direction from Blast:	1270 m, 176°
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

Data Collection – Seismometer #2

Make, Model and Serial # of unit:	Instantel Micromate, Serial # UM20203
Calibration Date:	May. 30/23
Location of seismograph:	Civic Number 4126 Route 111 (PW-10)
Distance and Direction from Blast:	834 m, 166°
Transverse Particle Velocity:	0.670 mm/s @ 21 Hz
Vertical Particle Velocity:	0.473 mm/s @ 57 Hz
Longitudinal Particle Velocity:	0.323 mm/s @ 28 Hz
Peak Particle Velocity:	0.670 mm/s @ 21Hz
Maximum Airblast:	88.68 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 22, 2023
Project No.:	234601.00	**Time of Blast:**	13:20
Inspector:	H. Floyd	**Blast No.:**	2023-40
Client:	Hammond River Holdings		

Data Collection – Seismometer #3

Make, Model and Serial # of unit:	Instantel Micromate, Serial # UM18193
Calibration Date:	May. 12/23
Location of seismograph:	Civic Number 4150 Route 111 (PW-13)
Distance and Direction from Blast:	667 m, 152°
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

Data Collection – Seismometer #4

Make, Model and Serial # of unit:	Instantel Minimate, Serial # 21348
Calibration Date:	July. 25/23
Location of seismograph:	Civic Number 2447 Route 820 (PW-07)
Distance and Direction from Blast:	951 m, 30°
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

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 22, 2023
Project No.:	234601.00	**Time of Blast:**	13:20
Inspector:	H. Floyd	**Blast No.:**	2023-40
Client:	Hammond River Holdings		

Data Collection – Seismometer #5

Make, Model and Serial # of unit:	Instantel Micromate, Serial # UM18187
Calibration Date:	May. 12/23
Location of seismograph:	PW-03 - Route 820
Distance and Direction from Blast:	668 m, 352°
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

Data Collection – Seismometer #6

Make, Model and Serial # of unit:	Instantel Micromate, Serial # UM20205
Calibration Date:	May. 30/23
Location of seismograph:	Civic Number 2341 Route 820 (PW-05)
Distance and Direction from Blast:	740 m, 334°
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

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 22, 2023
Project No.:	234601.00	**Time of Blast:**	13:20
Inspector:	H. Floyd	**Blast No.:**	2023-40
Client:	Hammond River Holdings		

Data Collection – Seismometer #7

Make, Model and Serial # of unit:	Instantel Minimate, Serial # 5371
Calibration Date:	August.03/23
Location of seismograph:	Civic Number 50 Myron Road (PW-15)
Distance and Direction from Blast:	1000 m, 314°
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

Data Collection – Seismometer #8

Make, Model and Serial # of unit:	Instante Micromate, Serial # UM20206
Calibration Date:	June. 09/23
Location of seismograph:	Civic Number 86 Myron Road (PW-16)
Distance and Direction from Blast:	852 m
Transverse Particle Velocity:	0.536 mm/s @ 11 Hz
Vertical Particle Velocity:	0.142 mm/s @ 20 Hz
Longitudinal Particle Velocity:	0.323 mm/s @ 16 Hz
Peak Particle Velocity:	0.536 mm/s @ 11 Hz
Maximum Airblast:	104.0 dB(L)

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 22, 2023
Project No.:	234601.00	**Time of Blast:**	13:20
Inspector:	H. Floyd	**Blast No.:**	2023-40
Client:	Hammond River Holdings		

Data Collection – Seismometer #9

Make, Model and Serial # of unit:	Instantel Minimate, Serial # 5487
Calibration Date:	January. 16/23
Location of seismograph:	Civic Number 220 Myron Road (PW-01)
Distance and Direction from Blast:	1300 m, 197°
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

Data Collection – Seismometer #10

Make, Model and Serial # of unit:	Instantel Minimate, Serial # 5372
Calibration Date:	February. 28/23
Location of seismograph:	Civic No. 2337 Route 820 (PW-04)
Distance and Direction from Blast:	823 m, 331°
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

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	December 22, 2023
Project No.:	234601.00	**Time of Blast:**	13:20
Inspector:	H. Floyd	**Blast No.:**	2023-40
Client:	Hammond River Holdings		

Data Collection – Seismometer #11

Make, Model and Serial # of unit:	Instantel Micromate, Serial # UM20204
Calibration Date:	June. 12/23
Location of seismograph:	Civic No. 4140 Route 111 (PW-12)
Distance and Direction from Blast:	747 m, 157°
Transverse Particle Velocity:	0.347 mm/s @ 30 Hz
Vertical Particle Velocity:	1.040 mm/s @ 43 Hz
Longitudinal Particle Velocity:	0.181 mm/s @ 37 Hz
Peak Particle Velocity:	1.040 mm/s @ 43 Hz
Maximum Airblast:	104.4 dB(L)

Attachment B

Blast and Seismograph Location Plan

Blast and Seismograph Loction Plan
Blast No: 2023- 40
Upham East Gypsum Quarry, upnam, NB

Date: December 22 2023
Project No.: 234601.00

Attachment C

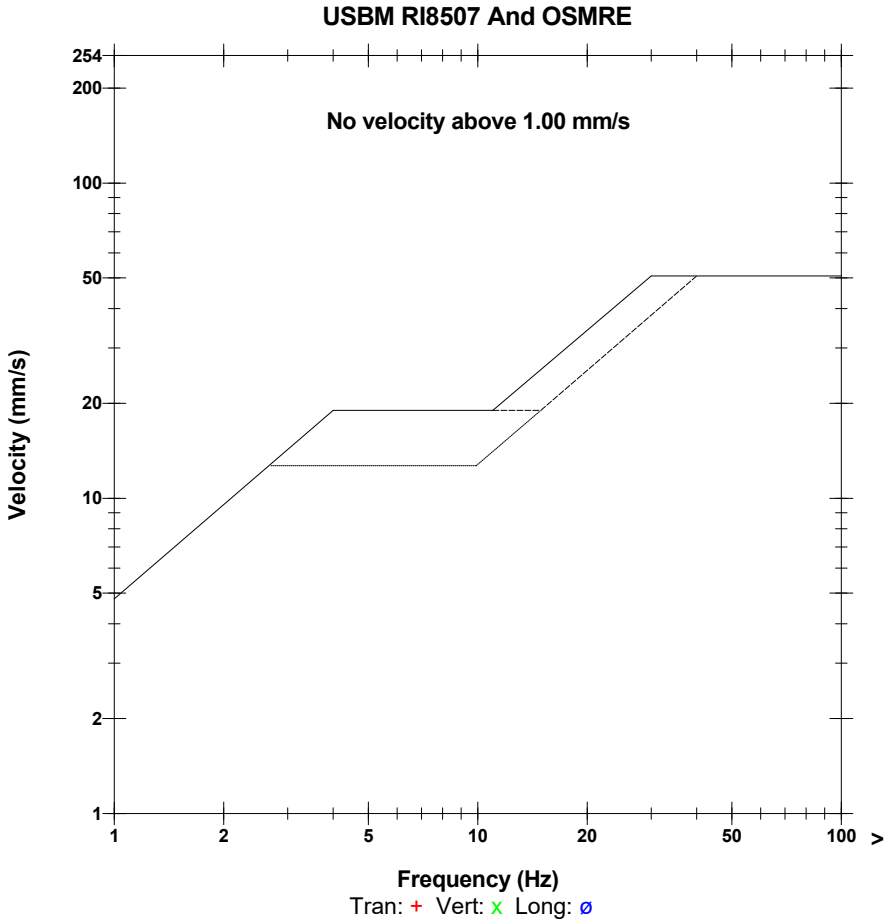
Blast Event Reports

Event Report

Date/Time	Vert at 13:20:06 December 22, 2023
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

Serial Number	UM20203 V 10-90GC Micromate ISEE
Battery Level	3.8 Volts
Unit Calibration	May 30, 2023 by Instantel
File Name	__TEMP.EVT

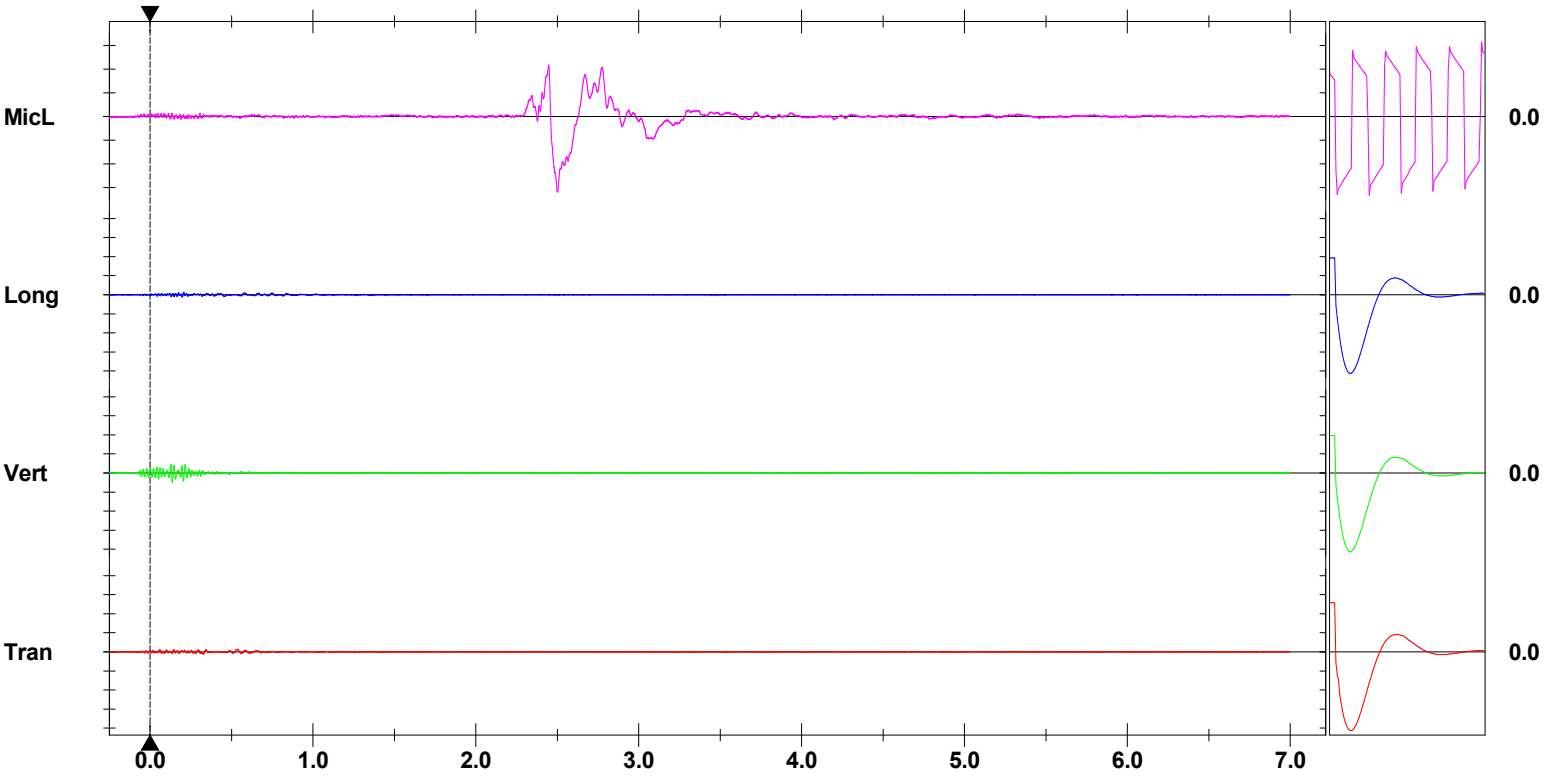
Notes



Microphone	Linear Weighting
PSPL	110.1 dB(L) 6.392 pa.(L) at 2.500 sec
ZC Freq	3.0 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 1715 mv)

	Tran	Vert	Long	
PPV	0.268	0.993	0.260	mm/s
ZC Freq	18	51	51	Hz
Time (Rel. to Trig)	0.328	0.137	0.207	sec
Peak Acceleration	0.011	0.049	0.016	g
Peak Displacement	0.002	0.003	0.002	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.3	7.5	Hz
Overswing Ratio	4.5	5.0	4.7	

Peak Vector Sum 1.004 mm/s at 0.137 sec



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

Trigger = ▶----------◀

Sensor Check

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Event Report

Date/Time Vert at 13:20:06 December 22, 2023
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

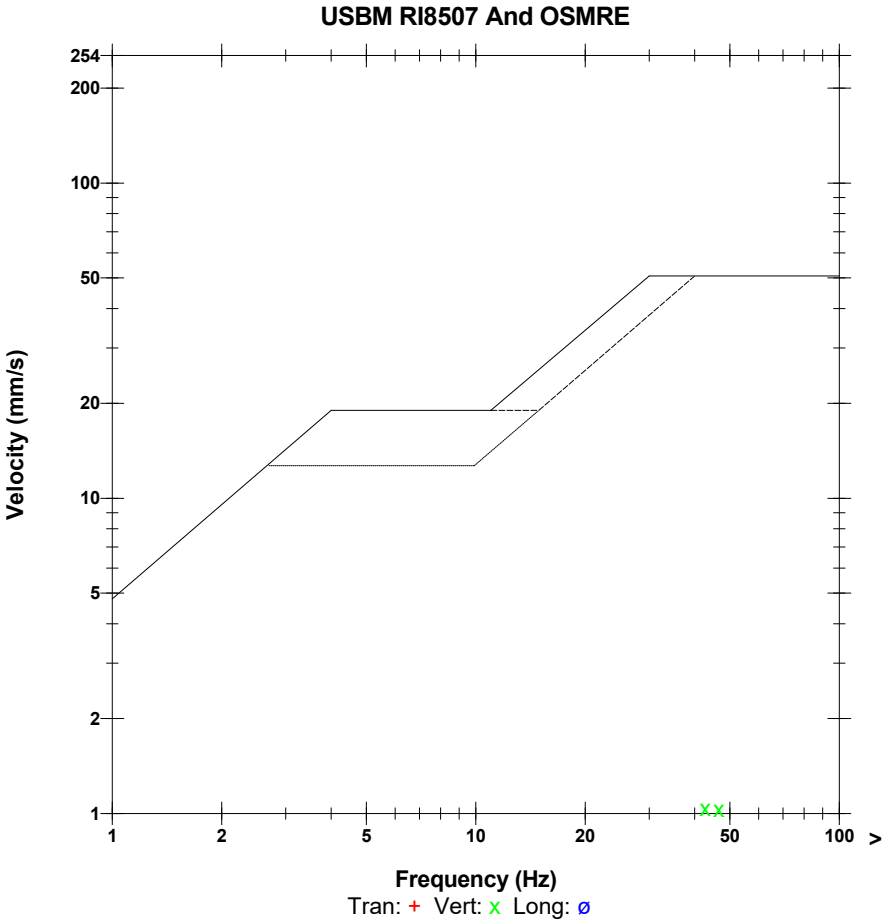
Serial Number UM20204 V 10-90GC Micromate ISEE
Battery Level 3.8 Volts
Unit Calibration June 12, 2023 by Instantel
File Name __TEMP.EVT

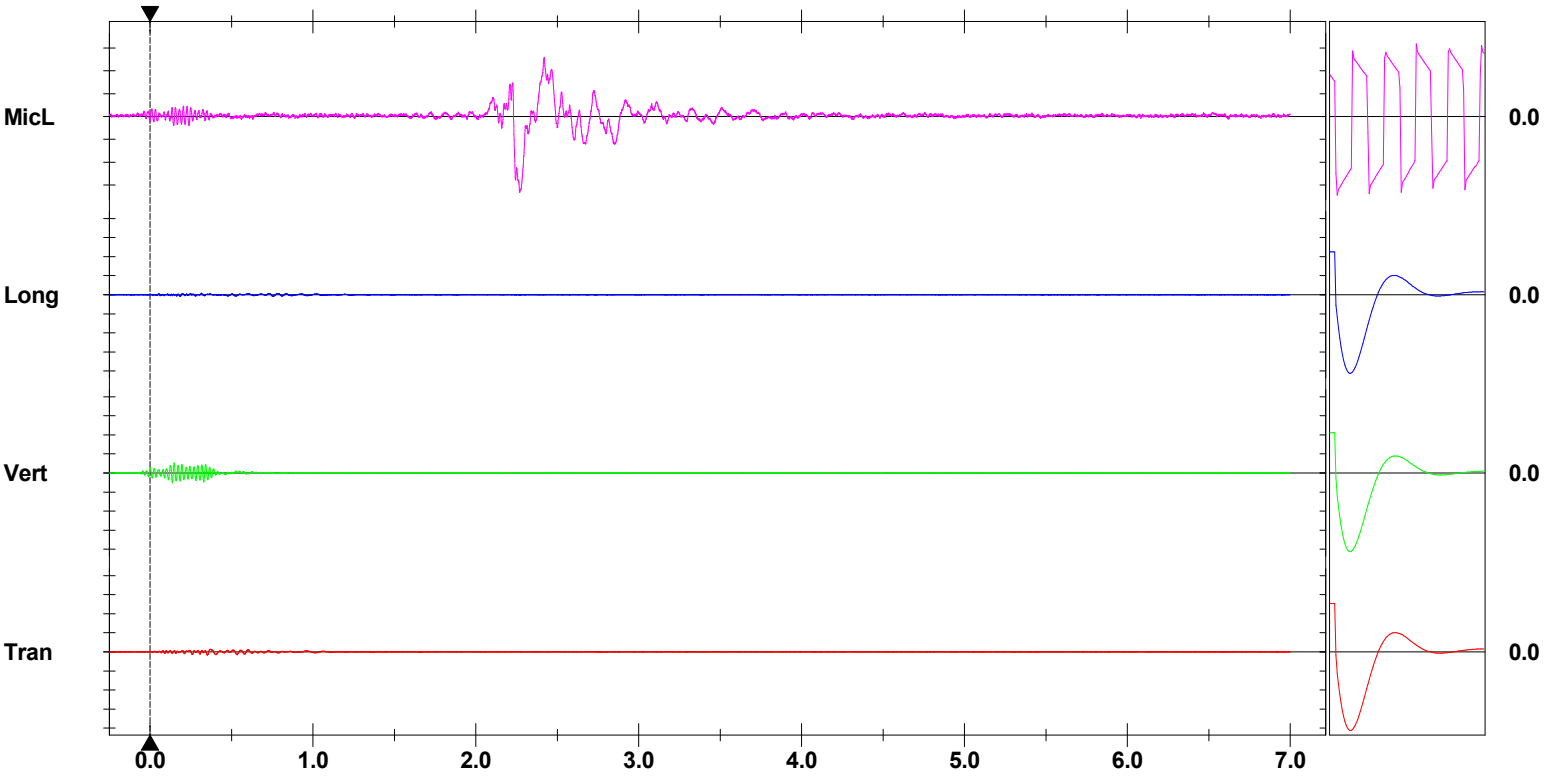
Notes

Microphone Linear Weighting
PSPL 104.4 dB(L) 3.320 pa.(L) at 2.269 sec
ZC Freq 4.8 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 1737 mv)

	Tran	Vert	Long	
PPV	0.347	1.040	0.181	mm/s
ZC Freq	30	43	37	Hz
Time (Rel. to Trig)	0.352	0.147	0.314	sec
Peak Acceleration	0.011	0.047	0.007	g
Peak Displacement	0.003	0.004	0.001	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.5	7.7	Hz
Overswing Ratio	4.1	4.6	4.1	

Peak Vector Sum 1.051 mm/s at 0.148 sec





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

Sensor Check

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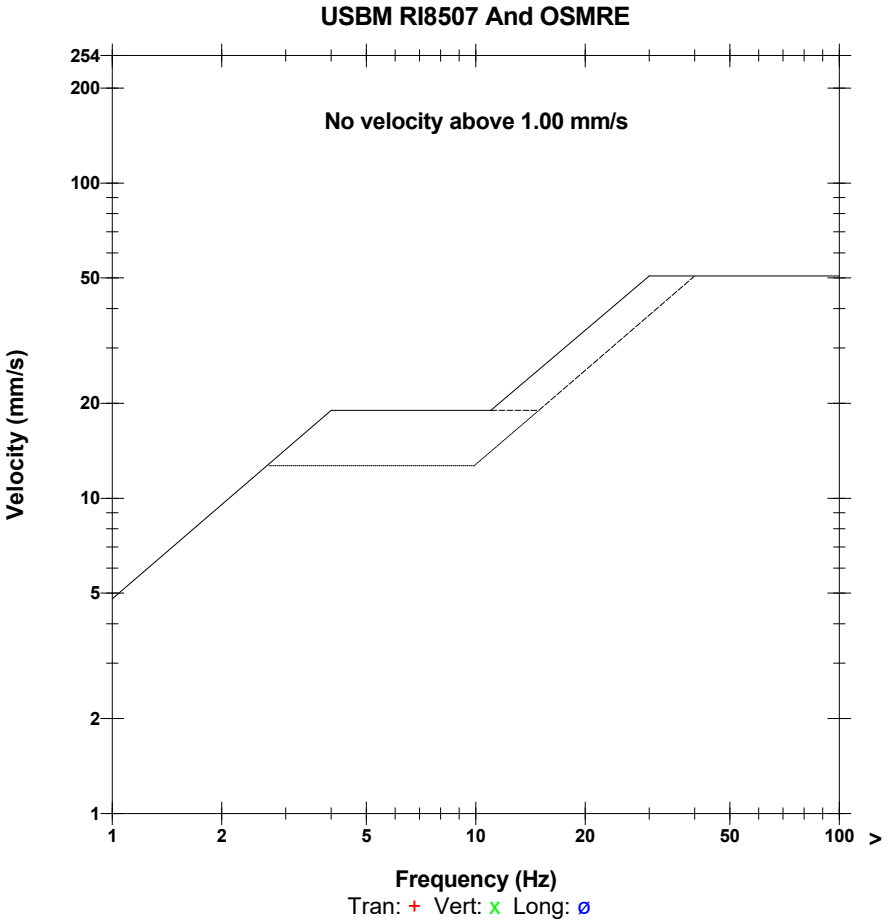
Event Report

Date/Time	Tran at 13:20:05 December 22, 2023
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

Serial Number	UM20206 V 10-90GC Micromate ISEE
Battery Level	3.8 Volts
Unit Calibration	June 9, 2023 by Instantel
File Name	__TEMP.EVT

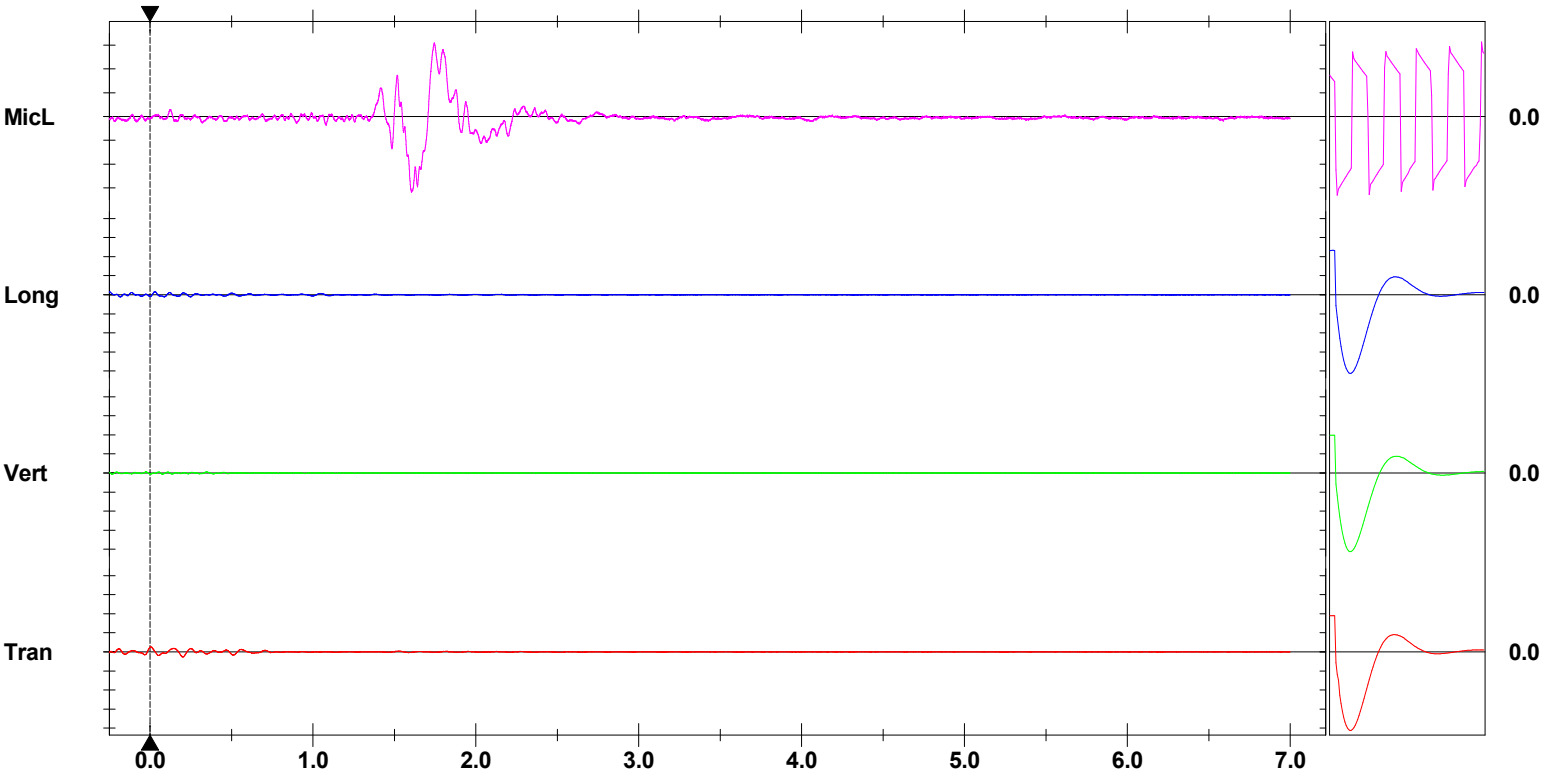
Notes



Microphone	Linear Weighting
PSPL	104.0 dB(L) 3.181 pa.(L) at 1.604 sec
ZC Freq	3.2 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 1725 mv)

	Tran	Vert	Long	
PPV	0.536	0.142	0.323	mm/s
ZC Freq	11	20	16	Hz
Time (Rel. to Trig)	0.002	-0.234	0.027	sec
Peak Acceleration	0.009	0.005	0.005	g
Peak Displacement	0.008	0.001	0.004	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.3	7.5	Hz
Overswing Ratio	4.5	4.7	4.4	

Peak Vector Sum 0.580 mm/s at 0.003 sec



Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 1.000 pa.(L)/div

Trigger = ▶----------◀

Sensor Check

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