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: July 28, 2023

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

Our File: File # 21-3049

Introduction

This monthly report details activities associated with the Upham East Gypsum Quarry operations for the month of June 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 May 2023.

Surface Water Sampling

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

- Week 1: June 2 and June 6, 2023
- Week 2: June 14, 2023
- Week 3: June 21, 2023
- Week 4: June 28, 2023

Two additional monitoring events were conducted on June 18 and 30, 2023 due to heavy rain events, defined as 25 mm of rain or more within 24 hours.

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 June 13 and 14, 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 locations in the Hammond River H1 and H2.

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

Compliance Monitoring Results

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). One duplicate sample was collected during the May 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 for the monitoring program.

Water Level Monitoring

Water levels were downloaded on June 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. Data was retrieved from the dataloggers on a regular basis and depicted as time-series plots.

Methodology

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. Following consistency within water level monitoring the interval of recording was decreased to a 60 minute interval from the previous 5 minute interval.

Water Level Results

The data for perimeter monitoring wells (**Figure 4**) and potable monitoring wells (**Figures 5, 6** and **7**) are presented as time series plots. Total precipitation (mm) is also presented within each figure, representing periods of recharge. The overall trend in almost all of the perimeter monitoring wells has remained consistent with seasonal fluctuations. The potable wells all experienced short-term fluctuations, as is expected with normal well use and predictable longer-term fluctuations typical of seasonal variations. Based on the available data as described for the May 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 June 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 June, there were 5 air quality monitoring events, June 1, 7, 13, 19, and 25, 2023. The results are provided in **Table 3**. 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

Four blasts occurred during the June 2023 monitoring period, occurring on June 2, 6, 9, 15, 22, and 27 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 the June 2023 monitoring period.

Summary

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

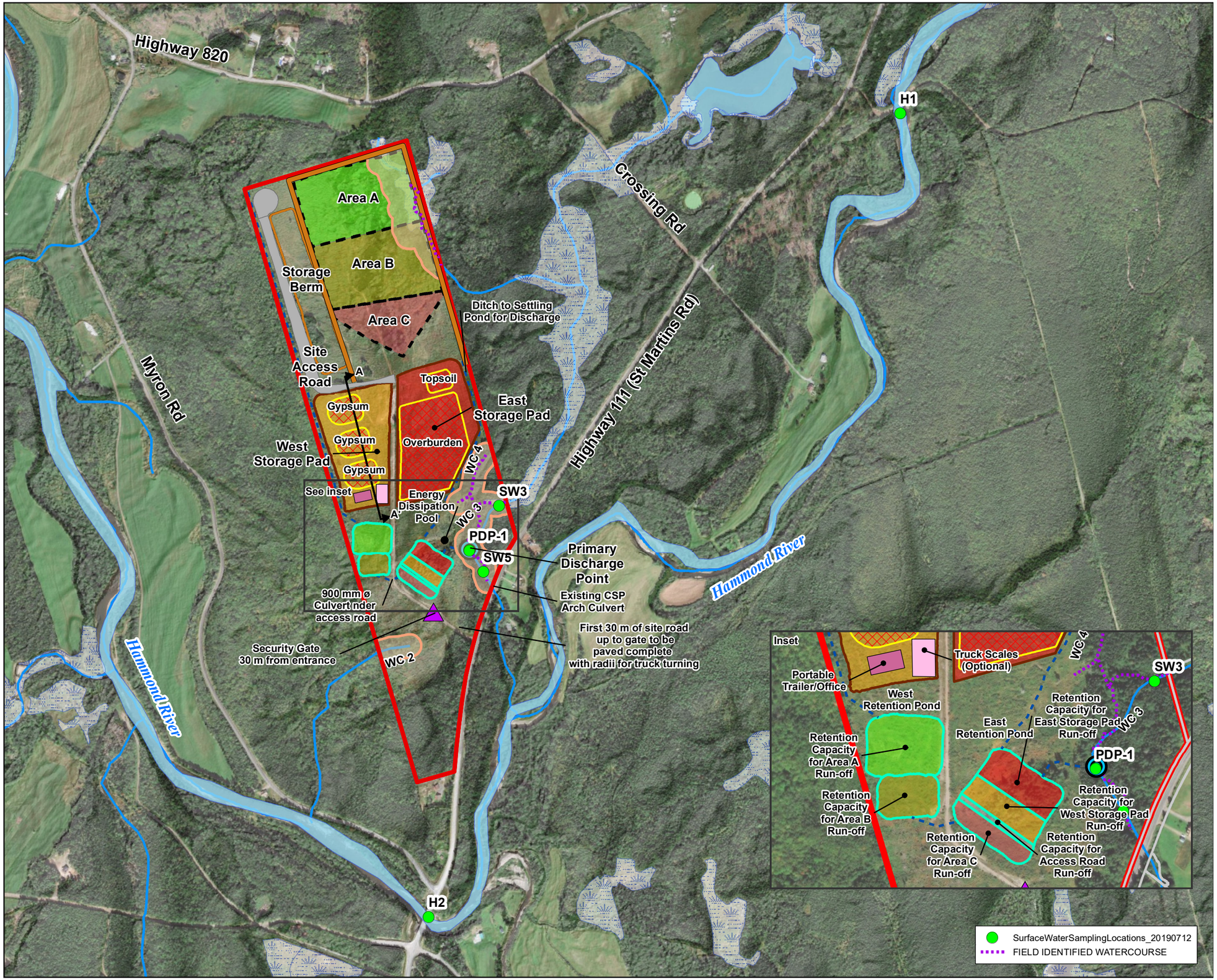
References

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

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

Attachment A

Figures



HAMMOND RIVER HOLDINGS LIMITED
PROPOSED UPHAM EAST GYPSUM QUARRY

SURFACE WATER SAMPLING LOCATIONS
FIGURE 1

- PROPERTY BOUNDARY
- PROJECT DEVELOPMENT AREA
- WATERBODY
- WATERCOURSE
- REGULATED WETLAND
- 30 METRE WETLAND/WATERCOURSE BUFFER

PROPOSED SITE FEATURES

- DITCH
- TRUCK SCALE (OPTIONAL)
- SITE AREAS
- DISCHARGE POINT
- SECURITY GATE
- PORTABLE TRAILER/OFFICE
- ACCESS ROAD
- STORAGE PAD
- STOCKPILE
- RETENTION POND
- CROSS SECTION
- QUARRY BERM CONSTRUCTED FROM TOPSOIL AND OVERBURDEN (OFFSET MINIMUM 7m FROM PROPERTY BOUNDARY)
- HATCHING INDICATES MATERIAL STOCKPILE AREA ON TOP OF STORAGE PAD

0 50 100 200 m

SCALE 1:8,500

N W E S

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

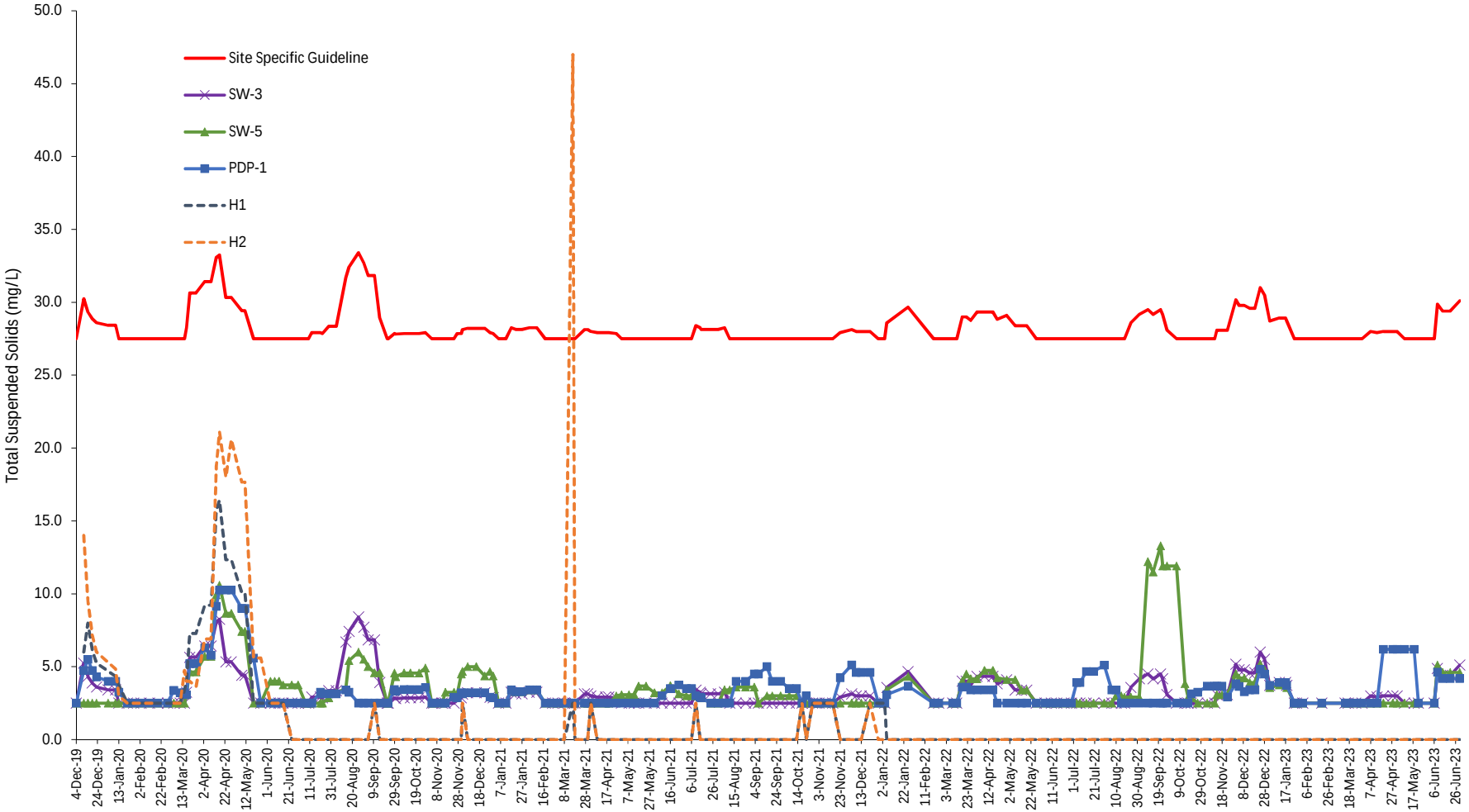
MAP CREATED BY: JH
MAP REVISED BY: JO
MAP CHECKED BY: GA
MAP PROJECTION: NAD_1983_CSRS_NEW_BRUNSWICK_STEREOGRAPHIC

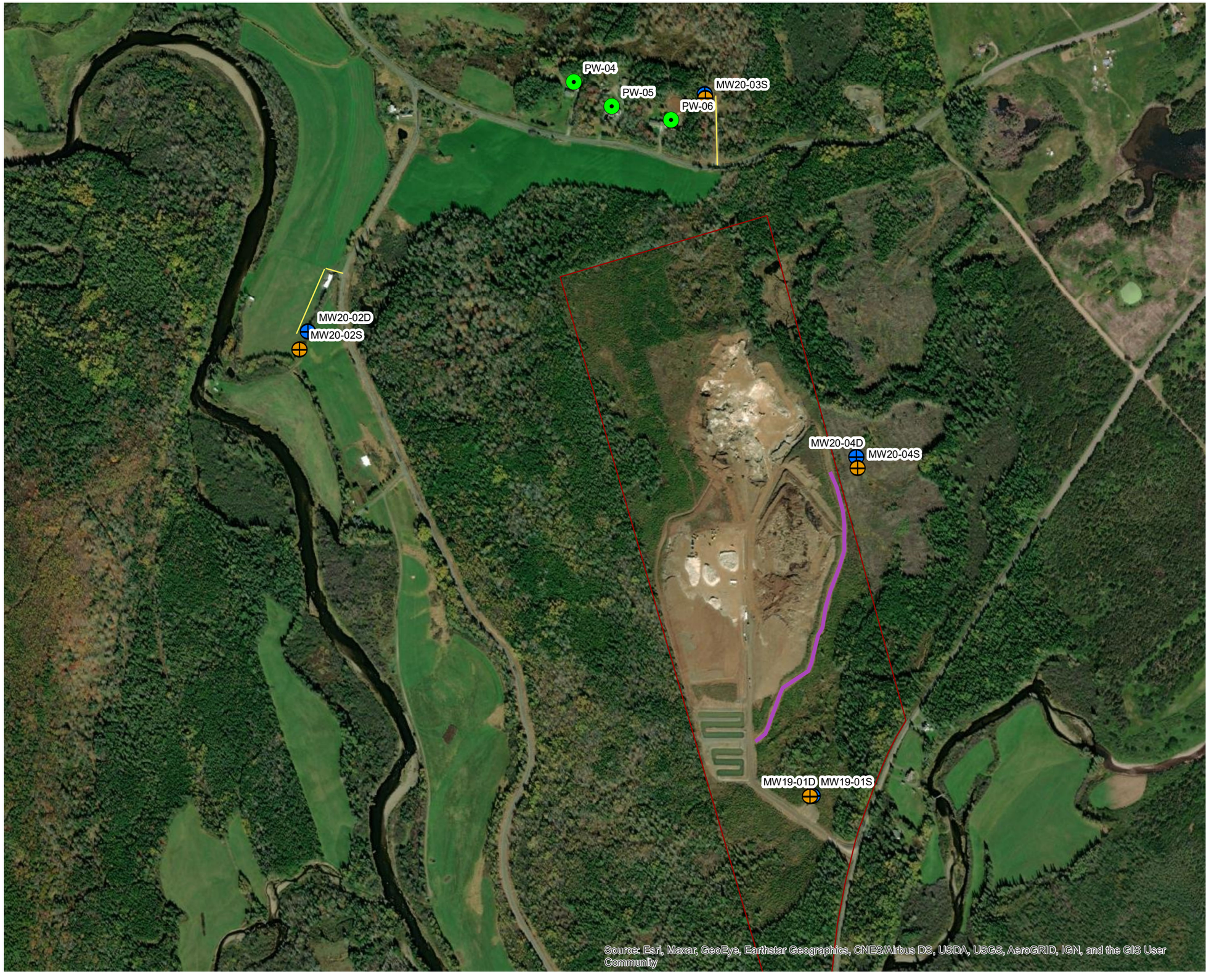
FILE LOCATION: \\DILLON.CA\DILLON_DFS\FREDERICTON\FREDERICTON CAD\CAD\GIS\188346 UPHAM GYPSUM QUARRY\MXD

DILLON CONSULTING

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

Figure 2: TSS Monthly Average





HAMMOND RIVER HOLDINGS
UPHAM EAST GYPSUM QUARRY

GROUNDWATER MONITORING LOCATIONS
FIGURE 3

- Potable Well Leveloggers
- Deep
- Shallow
- Upham Outline

SCALE 1:XXX

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNR

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

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

DILLON CONSULTING

PROJECT: 18-8346
STATUS: DRAFT
DATE: 06/15/2021

Figure 4: Upham East - Perimeter Monitoring Water Levels

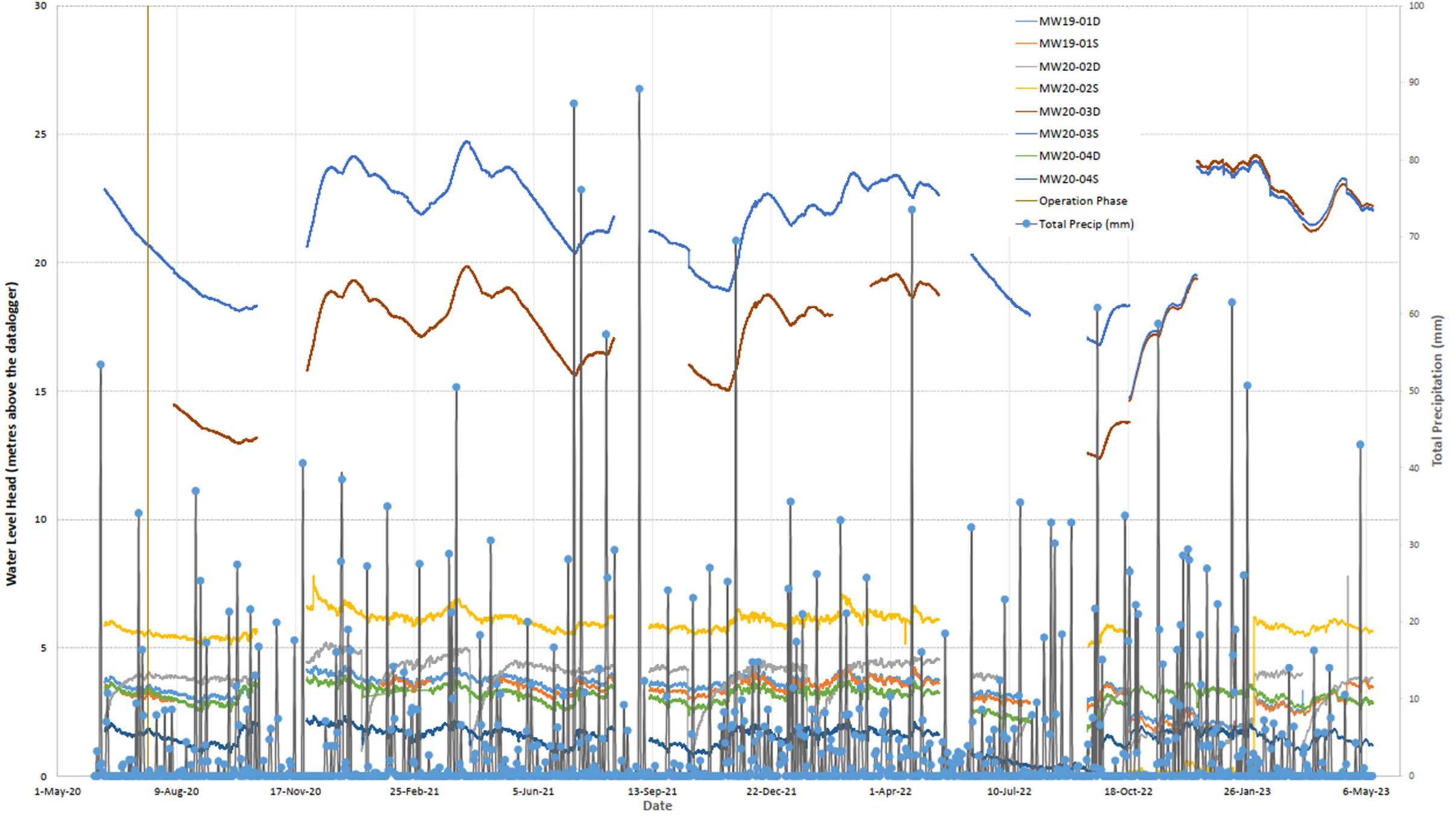


Figure 5: PW-04 Water Levels

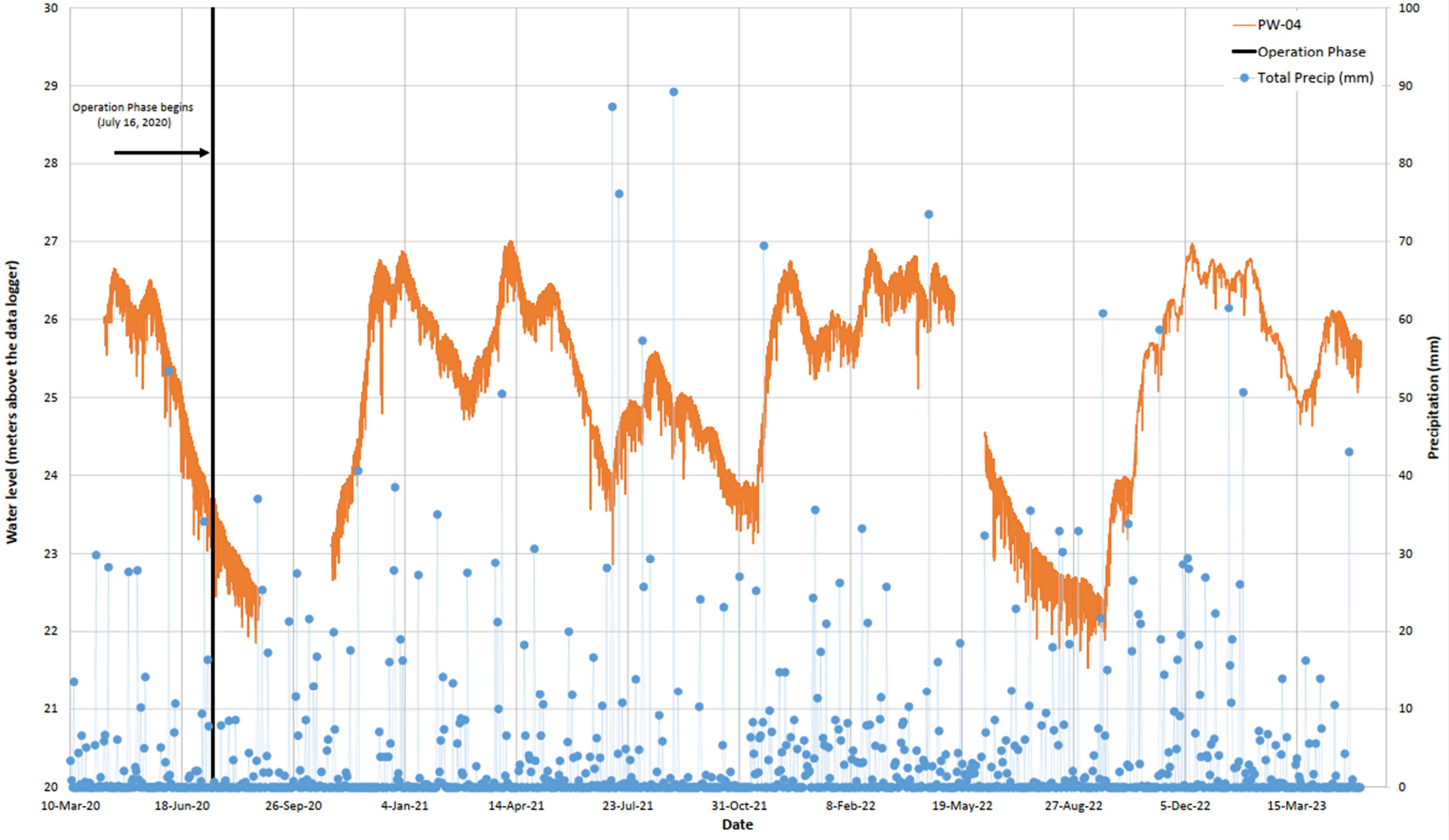


Figure 6: PW-06 Water Levels

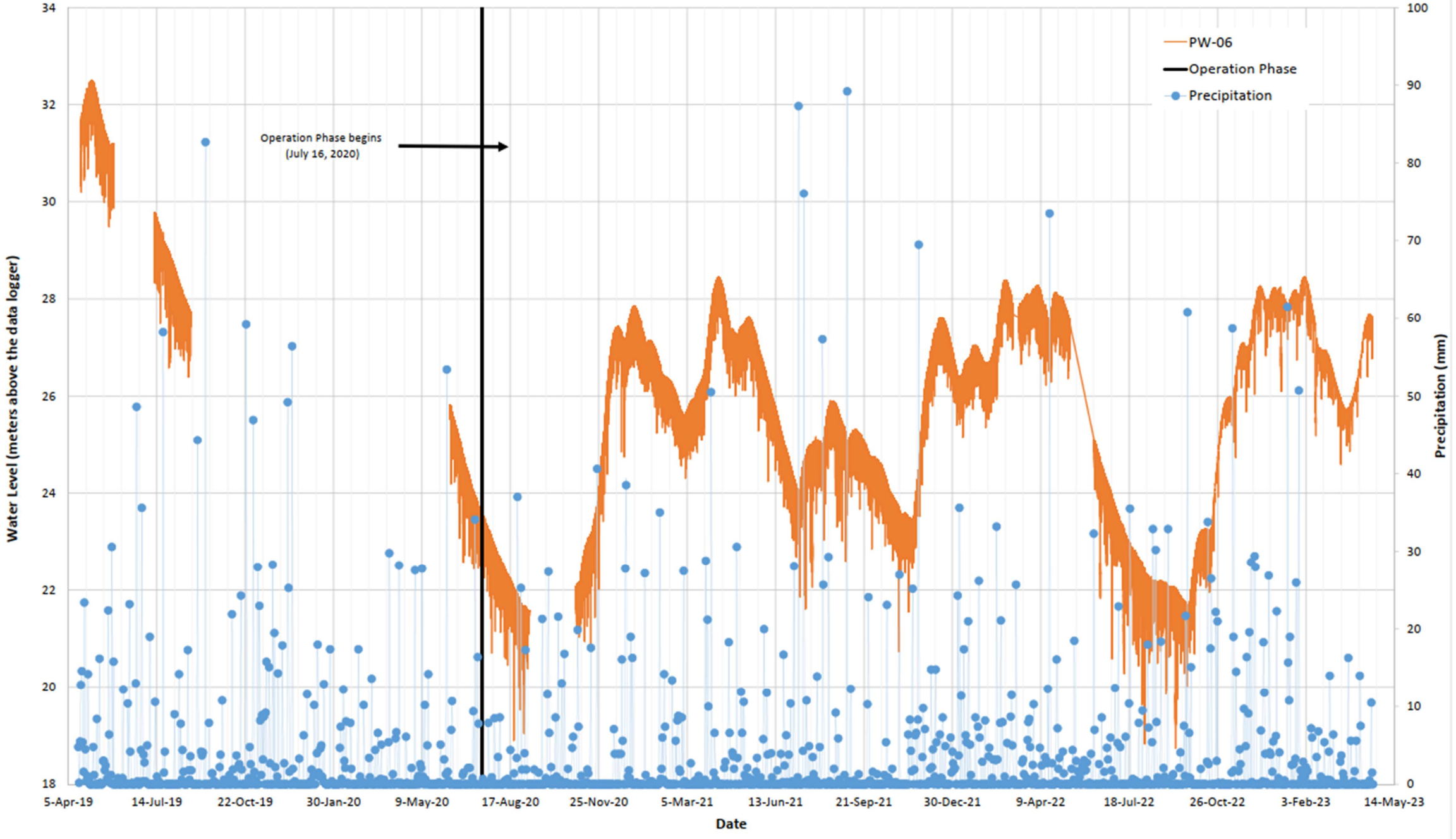
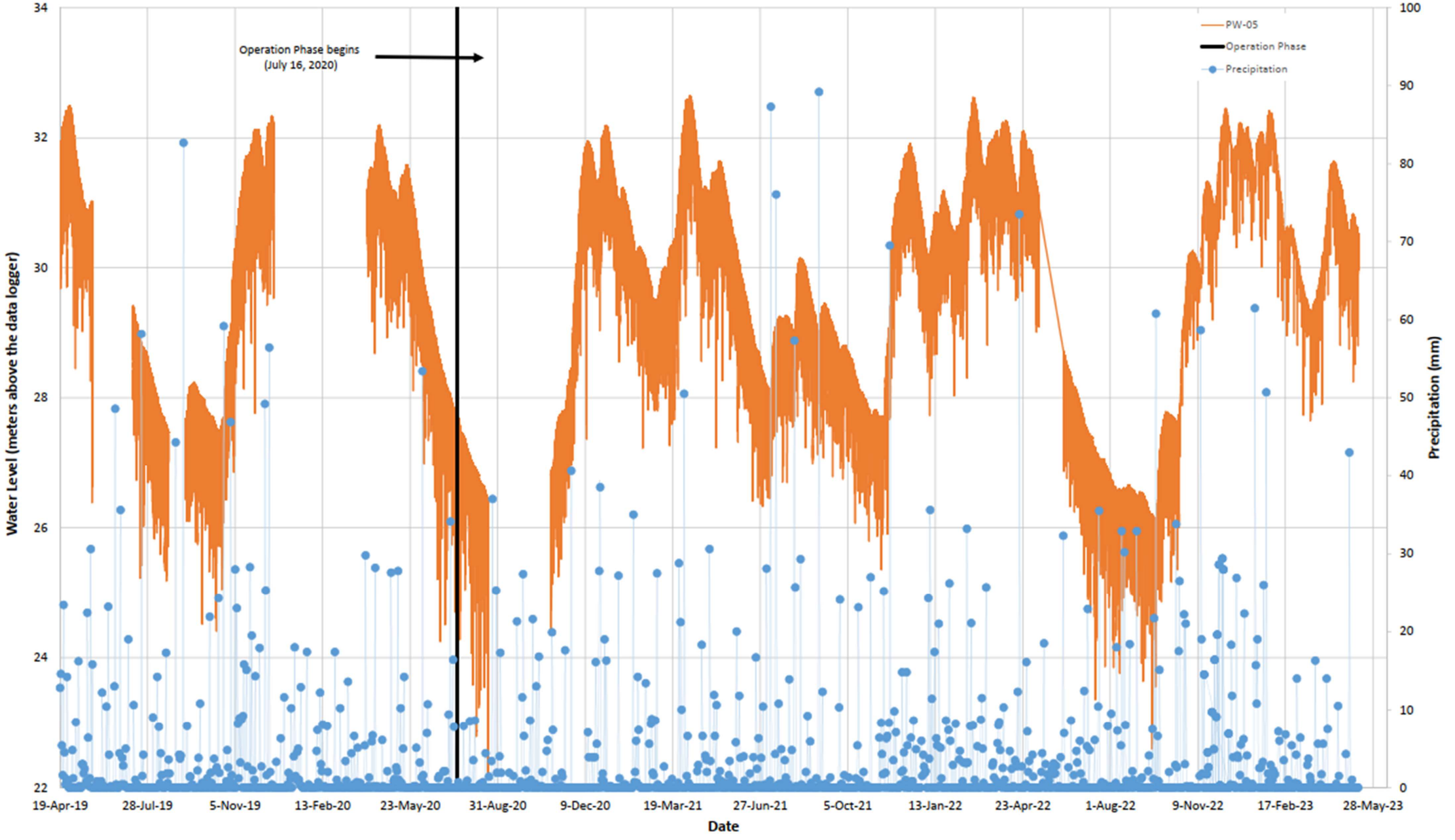


Figure 7: PW-05 Water Levels



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
SW3	6/2/2023/9:25	17.4	9.6	16.7	757	0.94	--
PDP-1	6/2/2023/9:34			15.9	1197	4.98	--
SW5	6/2/2023/9:40			15.9	1223	1.36	--
SW3	6/6/2023/11:46	10.6	29.7	10.3	223	3.87	<5
PDP-1	6/6/2023/11:55			9.8	444	3.20	<5
SW5	6/6/2023/12:05			9.9	496	3.02	<5
SW3	6/9/2023/11:46	13	18.1	10.3	223	3.87	12.0
PDP-1	6/9/2023/11:55			9.8	444	3.20	11
SW5	6/9/2023/12:05			9.9	496	3.02	13.0
SW3	6-14-23 10:02	16.3	0.7	17.2	804	0.07	<5
PDP-1	6-14-23 10:12			17.1	849	0.49	<5
PDP-1 D	6-14-23 10:13			17.0	846	0.52	<5
SW5	6-14-23 10:18			16.9	848	0.15	<5
SW3	6-18-23 15:00	13.7	30.6	15.5	355	3.68	--
PDP-1	6-18-23 15:10			15.1	420	6.33	--
SW5	6-18-23 15:15			15.2	429	6.60	--
SW3	6-21-23 12:10	23.4	0.0	16.4	780	2.50	<5
PDP-1	6-21-23 12:21			16.0	756	1.73	<5
SW5	21-Jun-23			15.9	726	1.93	<5
SW3	6-28-23 10:15	18.9	42.0	16.6	336	5.02	--
PDP-1	6-28-23 10:20			17.1	356	5.91	--
PDP-1 D	6-28-23 10:23			16.6	350	5.65	--
SW5	6-28-23 10:30			16.6	444	5.22	--
SW3	6-30-23 9:43	19.7	31.0	18.7	308	3.08	6
PDP-1	6-30-23 9:52			18.6	736	3.14	<5
SW5	6-30-23 9:57			18.2	786	2.62	<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
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

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
2-Jun-23		-	-			
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
18-Jun-23		-	-			
21-Jun-23	30.1	-	-	2.5	2.5	2.5
28-Jun-23		-	-			
30-Jun-23	30.1	-	-	6.0	2.5	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-Jun-23	14-Jun-23	14-Jun-23	14-Jun-23 (FD)	14-Jun-23	14-Jun-23	14-Jun-23	14-Jun-23	14-Jun-23
General Chemistry												
Sodium	mg/L	-	200	26.2	18.6	11	10.9	88.4	5.39	10.6	5.41	4.32
Potassium	mg/L	-	-	1.57	2.16	1.8	1.8	4.6	0.96	0.97	1.16	1.18
Calcium	mg/L	-	-	91.6	119	561	559	639	40.8	3.93	43.4	40.8
Magnesium	mg/L	-	-	25.9	4.57	11.2	10.8	26.6	3.64	1.06	1.51	1.34
Iron	mg/L	-	0.3	<0.02	<0.02	14.7	17.4	<0.1	<0.02	<0.02	<0.02	<0.02
Manganese	mg/L	0.12	0.02	0.012	**0.161**	**0.753**	**0.731**	**0.448**	<0.001	<0.001	0.011	0.005
Copper	mg/L	2	1	0.005	<0.001	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	0.003
Zinc	mg/L	-	5	0.018	0.004	<0.005	<0.005	<0.005	0.001	0.004	0.005	0.004
Ammonia (as N)	mg/L	-	-	<0.05	0.23	<0.05	<0.05	0.27	<0.05	0.05	<0.05	<0.05
pH	units	-	7.0 - 10.5	6.4	7.9	6.8	5.6	8.3	8.0	9.2	8.0	8.0
Alkalinity (as CaCO3)	mg/L	-	-	44	140	36	39	55	115	21	124	110
Chloride	mg/L	-	250	215	145	4.9	6.0	99.3	7.7	12.7	2.6	3.0
Flouride	mg/L	1.5	-	0.15	0.12	0.58	0.57	**2.7**	0.13	0.08	0.37	0.37
Sulphate	mg/L	-	500	63	40	1,420	1,380	1,630	4	2	11	12
Nitrate + Nitrite (as N)	mg/L	10	-	1.04	<0.05	<0.25	<0.25	<0.25	1.07	<0.05	0.14	0.64
o-Phosphate (as P)	mg/L	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
r-Silica (as SiO2)	mg/L	-	-	12.7	15.5	6.9	7	1.6	9.7	<0.1	15	13.7
Total Organic Carbon	mg/L	-	-	0.6	0.9	0.8	0.7	1.5	0.7	0.8	0.9	<0.5
Turbidity[2]	NTU	-	-	0.6	0.3	112	104	22.3	0.3	2.4	1.6	2.4
Solids - Total Suspended	mg/L	-	-	12	<5	40	39	19	<5	12	<5	12
Conductivity	µS/cm	-	-	900	770	2,190	2,200	2,810	251	88	243	240
Calculated Parameters												
Bicarbonate as CaCO3	mg/L	-	-	44	139	36	39	53.9	114	17.6	123	109
Carbonate as CaCO3	mg/L	-	-	0.01	1.04	0.021	0.001	1.01	1.07	2.62	1.15	1.02
Hydroxide as CaCO3	mg/L	-	-	0.001	0.04	0.003	0	0.1	0.05	0.792	0.05	0.05
Cation sum	meq/L	-	-	7.88	7.2	30.3	30.3	38.1	2.59	0.773	2.56	2.36
Anion sum	meq/L	-	-	8.33	7.72	30.4	29.7	37.8	2.67	0.82	2.79	2.58
% difference	%	-	-	-2.76	-3.48	-0.27	0.98	0.31	-1.52	-2.95	-4.38	-4.31
Theoretical Conductivity	µS/cm	-	-	849	748	2760	2,710	3,350	247	85	250	234
Hardness (as CaCO3)	mg/L	-	-	335	316	1,450	1,440	1,700	117	14.2	115	107
Total Dissolved Solids (calculated)	mg/L	-	500	467	431	2,050	2,020	2,520	147	44	156	146
Saturation pH (@ 5C)	-	-	-	8.1	7.5	7.6	7.5	7.3	7.9	9.7	7.9	7.9
Langelier Index (@ 5C)	-	-	-	-1.68	0.44	-0.75	-1.92	0.96	0.07	-0.5	0.13	0.05

Trace Metals												
Aluminum	µg/L	-	-	5	2	<5	<5	<5	<1	<1	2	2
Antimony	µg/L	6	-	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	0.3
Arsenic	µg/L	10	-	<1	<1	<5	<5	<5	1	<1	**12**	**20**
Barium	µg/L	2,000	-	281	237	<5	<5	<5	203	3	114	124
Beryllium	µg/L	-	-	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1
Bismuth	µg/L	-	-	<1	<1	<5	<5	<5	<1	<1	<1	<1
Boron	µg/L	5,000	-	19	496	979	985	**38,200**	28	17	148	92
Cadmium	µg/L	7	-	0.19	<0.01	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01
Calcium	µg/L	-	-	91,600	119,000	561,000	559,000	639,000	40,800	3,930	43,400	40,800
Chromium	µg/L	50	-	<1	<1	<5	<5	<5	<1	<1	<1	<1
Cobalt	µg/L	-	-	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1
Copper	µg/L	2,000	1,000	5	<1	<5	<5	<5	<1	<1	<1	3
Iron	µg/L	-	300	<20	<20	14,700	17,400	<100	<20	<20	<20	<20
Lead	µg/L	5	-	1.2	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1
Lithium	µg/L	-	-	15.5	20.1	12.3	12	155	6.3	4.2	8.2	7.8
Magnesium	µg/L	-	-	25,900	4,570	11,200	10,800	26,600	3,640	1,060	1,510	1,340
Manganese	µg/L	120	20	12	**161**	**753**	**731**	**448**	<1	<1	11	5
Mercury	µg/L	1	-	<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	0.6	1.2	4.1	0.4	2.3	1.7	2.7
Nickel	µg/L	-	-	3	<1	<5	<5	<5	<1	<1	<1	1
Potassium	µg/L	-	-	1,570	2,160	1,800	1,800	4,600	960	970	1,160	1,180
Rubidium	µg/L	-	-	1.8	3.5	<0.5	<0.5	5.3	0.4	0.4	1.1	1
Selenium	µg/L	50	-	<1	<1	<5	< 5	<5	<1	<1	<1	<1
Silver	µg/L	-	-	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1
Sodium	µg/L	-	200,000	26,200	18,600	11,000	10,900	88,400	5,390	10,600	5,410	4,320
Strontium	µg/L	7,000	-	356	2,440	4,550	4,560	**11,900**	312	35	440	518
Tellurium	µg/L	-	-	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1
Thallium	µg/L	-	-	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1
Tin	µg/L	-	-	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1
Uranium	µg/L	20	-	<0.1	<0.1	<0.5	<0.5	<0.5	0.9	<0.1	3.5	4.4
Vanadium	µg/L	-	-	<1	<1	<5	<5	<5	1	<1	<1	2
Zinc	µg/L	-	5,000	18	4	<5	<5	<5	1	4	5	4

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; MPN/100mL = most probable number per 100 millilitres

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

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)
2021-03-07	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
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

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)
2021-12-15	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
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

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)
2022-08-29	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
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

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)
2023-05-08	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

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: 485614-IAS
Report Date: 15-Jun-23
Date Received: 08-Jun-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:			485614-1	485614-2	485614-3
Client Sample ID:			SW3	SW5	PDP-1
Date Sampled:			6-Jun-23	6-Jun-23	6-Jun-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
Interim Director
Inorganic Analytical Chemistry

Brannen Burhoe
Supervisor
Inorganic Analytical Services

Report ID: 485614-IAS
Report Date: 15-Jun-23
Date Received: 08-Jun-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

Methods

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

Report ID: 486699-IAS
Report Date: 22-Jun-23
Date Received: 16-Jun-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:			486699-1	486699-2	486699-3	486699-4
Client Sample ID:			SW3	SW5	PDP-1	SW5 Duplicate
Date Sampled:			14-Jun-23	14-Jun-23	14-Jun-23	14-Jun-23
Analytes	**Units**	**RL**				
Solids - Total Suspended	mg/L	5	< 5	< 5	< 5	< 5

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

RL = Reporting Limit

Matthew Norman
Senior Chemist
Inorganic Analytical Chemistry

Brannen Burhoe
Supervisor
Inorganic Analytical Services

Report ID: 486699-IAS
Report Date: 22-Jun-23
Date Received: 16-Jun-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

Methods

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

Report ID: 487581-IAS
Report Date: 27-Jun-23
Date Received: 23-Jun-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:			487581-1	487581-2	487581-3
Client Sample ID:			SW3	SW5	PDP-1
Date Sampled:			21-Jun-23	21-Jun-23	21-Jun-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: 487581-IAS
Report Date: 27-Jun-23
Date Received: 23-Jun-23

CERTIFICATE OF ANALYSIS

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

rpc
921 College Hill Rd
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Tel: 506.452.1212
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www.rpc.ca

Methods

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

Report ID: 488540-IAS
Report Date: 10-Jul-23
Date Received: 30-Jun-23

CERTIFICATE OF ANALYSIS

for
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www.rpc.ca

Attention: Distribution Contacts Dillon Reporting
Project #: 17-5121
Location: Upham

Analysis of Water

RPC Sample ID:			488540-1	488540-2	488540-3	488540-4
Client Sample ID:			SW3	SW5	PDP-1	PDP-1 Duplicate
Date Sampled:			9-Jun-23	6-Jun-23	6-Jun-23	6-Jun-23
Analytes	**Units**	**RL**				
Solids - Total Suspended	mg/L	5	12	13	11	11

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: 488540-IAS
Report Date: 10-Jul-23
Date Received: 30-Jun-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: 488994-IAS
Report Date: 12-Jul-23
Date Received: 05-Jul-23

CERTIFICATE OF ANALYSIS

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

Analysis of Water

RPC Sample ID:			488994-1	488994-2	488994-3
Client Sample ID:			SW-3	SW-5	PDP-1
Date Sampled:			30-Jun-23	30-Jun-23	30-Jun-23
Analytes	**Units**	**RL**			
Solids - Total Suspended	mg/L	5	6	< 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: 488994-IAS
Report Date: 12-Jul-23
Date Received: 05-Jul-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: 486568-IAS
Report Date: 27-Jun-23
Date Received: 15-Jun-23

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Attention: Distribution Contacts Dillon Reporting
Project #: 21-3049-1002
Location: Upham

Analysis of Water

RPC Sample ID:			486568-1	486568-2	486568-3
Client Sample ID:			MW19-01S	MW19-01D	MW20-02S
Date Sampled:			14-Jun-23	14-Jun-23	14-Jun-23
Analytes	**Units**	**RL**			
Sodium	mg/L	0.05	26.2	18.6	11.0
Potassium	mg/L	0.02	1.57	2.16	1.8
Calcium	mg/L	0.05	91.6	119.	561.
Magnesium	mg/L	0.01	25.9	4.57	11.2
Iron	mg/L	0.02	< 0.02	< 0.02	14.7
Manganese	mg/L	0.001	0.012	0.161	0.753
Copper	mg/L	0.001	0.005	< 0.001	< 0.005
Zinc	mg/L	0.001	0.018	0.004	< 0.005
Ammonia (as N)	mg/L	0.05	< 0.05	0.23	< 0.05
pH	units	-	6.4	7.9	6.8
Alkalinity (as $CaCO_3$)	mg/L	2	44	140	36
Chloride	mg/L	0.5	215	145	4.9
Fluoride	mg/L	0.05	0.15	0.12	0.58
Sulfate	mg/L	1	63	40	1420
Nitrate + Nitrite (as N)	mg/L	0.05	1.04	< 0.05	< 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	12.7	15.5	6.9
Carbon - Total Organic	mg/L	0.5	0.6	0.9	0.8
Turbidity	NTU	0.1	0.6	0.3	112
Solids - Total Suspended	mg/L	5	12	< 5	40
Conductivity	µS/cm	1	900	770	2190
Calculated Parameters					
Bicarbonate (as $CaCO_3$)	mg/L	-	44.0	139.	36.0
Carbonate (as $CaCO_3$)	mg/L	-	0.010	1.04	0.021
Hydroxide (as $CaCO_3$)	mg/L	-	0.001	0.040	0.003
Cation Sum	meq/L	-	7.88	7.20	30.3
Anion Sum	meq/L	-	8.33	7.72	30.4
Percent Difference	%	-	-2.76	-3.48	-0.27
Theoretical Conductivity	µS/cm	-	849	748	2760
Hardness (as $CaCO_3$)	mg/L	0.2	335	316	1450
Ion Sum	mg/L	-	467	431	2050
Saturation pH (5°C)	units	-	8.1	7.5	7.6
Langelier Index (5°C)	-	-	-1.68	0.44	-0.75

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: 486568-IAS
Report Date: 27-Jun-23
Date Received: 15-Jun-23

CERTIFICATE OF ANALYSIS

for
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Attention: Distribution Contacts Dillon Reporting
Project #: 21-3049-1002
Location: Upham

Analysis of Water

RPC Sample ID:			486568-4	486568-5	486568-6
Client Sample ID:			MW20-02D	MW20-03S	MW20-03D
Date Sampled:			14-Jun-23	14-Jun-23	14-Jun-23
Analytes	**Units**	**RL**			
Sodium	mg/L	0.05	88.4	5.39	10.6
Potassium	mg/L	0.02	4.6	0.96	0.97
Calcium	mg/L	0.05	639.	40.8	3.93
Magnesium	mg/L	0.01	26.6	3.64	1.06
Iron	mg/L	0.02	< 0.1	< 0.02	< 0.02
Manganese	mg/L	0.001	0.448	< 0.001	< 0.001
Copper	mg/L	0.001	< 0.005	< 0.001	< 0.001
Zinc	mg/L	0.001	< 0.005	0.001	0.004
Ammonia (as N)	mg/L	0.05	0.27	< 0.05	0.05
pH	units	-	8.3	8.0	9.2
Alkalinity (as $CaCO_3$)	mg/L	2	55	115	21
Chloride	mg/L	0.5	99.3	7.7	12.7
Fluoride	mg/L	0.05	2.7	0.13	0.08
Sulfate	mg/L	1	1630	4	2
Nitrate + Nitrite (as N)	mg/L	0.05	< 0.25	1.07	< 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	1.6	9.7	< 0.1
Carbon - Total Organic	mg/L	0.5	1.5	0.7	0.8
Turbidity	NTU	0.1	22.3	0.3	2.4
Solids - Total Suspended	mg/L	5	19	< 5	12
Conductivity	µS/cm	1	2810	251	88
Calculated Parameters					
Bicarbonate (as $CaCO_3$)	mg/L	-	53.9	114.	17.6
Carbonate (as $CaCO_3$)	mg/L	-	1.01	1.07	2.62
Hydroxide (as $CaCO_3$)	mg/L	-	0.100	0.050	0.792
Cation Sum	meq/L	-	38.1	2.59	0.773
Anion Sum	meq/L	-	37.8	2.67	0.820
Percent Difference	%	-	0.31	-1.52	-2.95
Theoretical Conductivity	µS/cm	-	3350	247	85
Hardness (as $CaCO_3$)	mg/L	0.2	1700	117	14.2
Ion Sum	mg/L	-	2520	147	44
Saturation pH (5°C)	units	-	7.3	7.9	9.7
Langelier Index (5°C)	-	-	0.96	0.07	-0.50

Report ID: 486568-IAS
Report Date: 27-Jun-23
Date Received: 15-Jun-23

CERTIFICATE OF ANALYSIS

for
Hammond River Holdings Limited
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Tel: 506.452.1212
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Attention: Distribution Contacts Dillon Reporting
Project #: 21-3049-1002
Location: Upham

Analysis of Water

RPC Sample ID:			486568-7	486568-8	486568-9
Client Sample ID:			MW20-04S	MW20-04D	MW18-02S
Date Sampled:			14-Jun-23	14-Jun-23	14-Jun-23
Analytes	**Units**	**RL**			
Sodium	mg/L	0.05	5.41	4.32	10.9
Potassium	mg/L	0.02	1.16	1.18	1.8
Calcium	mg/L	0.05	43.4	40.8	559.
Magnesium	mg/L	0.01	1.51	1.34	10.8
Iron	mg/L	0.02	< 0.02	< 0.02	17.4
Manganese	mg/L	0.001	0.011	0.005	0.731
Copper	mg/L	0.001	< 0.001	0.003	< 0.005
Zinc	mg/L	0.001	0.005	0.004	< 0.005
Ammonia (as N)	mg/L	0.05	< 0.05	< 0.05	< 0.05
pH	units	-	8.0	8.0	5.6
Alkalinity (as $CaCO_3$)	mg/L	2	124	110	39
Chloride	mg/L	0.5	2.6	3.0	6.0
Fluoride	mg/L	0.05	0.37	0.37	0.57
Sulfate	mg/L	1	11	12	1380
Nitrate + Nitrite (as N)	mg/L	0.05	0.14	0.64	< 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	15.0	13.7	7.0
Carbon - Total Organic	mg/L	0.5	0.9	< 0.5	0.7
Turbidity	NTU	0.1	1.6	2.4	104
Solids - Total Suspended	mg/L	5	< 5	12	39
Conductivity	µS/cm	1	243	240	2200
Calculated Parameters					
Bicarbonate (as $CaCO_3$)	mg/L	-	123.	109.	39.0
Carbonate (as $CaCO_3$)	mg/L	-	1.15	1.02	0.001
Hydroxide (as $CaCO_3$)	mg/L	-	0.050	0.050	0.000
Cation Sum	meq/L	-	2.56	2.36	30.3
Anion Sum	meq/L	-	2.79	2.58	29.7
Percent Difference	%	-	-4.38	-4.31	0.98
Theoretical Conductivity	µS/cm	-	250	234	2710
Hardness (as $CaCO_3$)	mg/L	0.2	115	107	1440
Ion Sum	mg/L	-	156	146	2020
Saturation pH (5°C)	units	-	7.9	7.9	7.5
Langelier Index (5°C)	-	-	0.13	0.05	-1.92

Report ID: 486568-IAS
Report Date: 27-Jun-23
Date Received: 15-Jun-23

CERTIFICATE OF ANALYSIS

for
Hammond River Holdings Limited
30 Jervis Lane
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Tel: 506.452.1212
Fax: 506.452.0594
www.rpc.ca

Attention: Distribution Contacts Dillon Reporting
Project #: 21-3049-1002
Location: Upham

Analysis of Metals in Water

RPC Sample ID:			486568-1	486568-2	486568-3
Client Sample ID:			MW19-01S	MW19-01D	MW20-02S
Date Sampled:			14-Jun-23	14-Jun-23	14-Jun-23
Analytes	**Units**	**RL**			
Aluminum	µg/L	1	5	2	< 5
Antimony	µg/L	0.1	< 0.1	< 0.1	< 0.5
Arsenic	µg/L	1	< 1	< 1	< 5
Barium	µg/L	1	281	237	< 5
Beryllium	µg/L	0.1	< 0.1	< 0.1	< 0.5
Bismuth	µg/L	1	< 1	< 1	< 5
Boron	µg/L	1	19	496	979
Cadmium	µg/L	0.01	0.19	< 0.01	< 0.05
Calcium	µg/L	50	91600	119000	561000
Chromium	µg/L	1	< 1	< 1	< 5
Cobalt	µg/L	0.1	< 0.1	< 0.1	< 0.5
Copper	µg/L	1	5	< 1	< 5
Iron	µg/L	20	< 20	< 20	14700
Lead	µg/L	0.1	1.2	< 0.1	< 0.5
Lithium	µg/L	0.1	15.5	20.1	12.3
Magnesium	µg/L	10	25900	4570	11200
Manganese	µg/L	1	12	161	753
Mercury	µg/L	0.025	< 0.025	< 0.025	< 0.025
Molybdenum	µg/L	0.1	0.1	0.1	0.6
Nickel	µg/L	1	3	< 1	< 5
Potassium	µg/L	20	1570	2160	1800
Rubidium	µg/L	0.1	1.8	3.5	< 0.5
Selenium	µg/L	1	< 1	< 1	< 5
Silver	µg/L	0.1	< 0.1	< 0.1	< 0.5
Sodium	µg/L	50	26200	18600	11000
Strontium	µg/L	1	356	2440	4550
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	18	4	< 5

Report ID: 486568-IAS
Report Date: 27-Jun-23
Date Received: 15-Jun-23

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www.rpc.ca

Attention: Distribution Contacts Dillon Reporting
Project #: 21-3049-1002
Location: Upham

Analysis of Metals in Water

RPC Sample ID:			486568-4	486568-5	486568-6
Client Sample ID:			MW20-02D	MW20-03S	MW20-03D
Date Sampled:			14-Jun-23	14-Jun-23	14-Jun-23
Analytes	**Units**	**RL**			
Aluminum	µg/L	1	< 5	< 1	< 1
Antimony	µg/L	0.1	< 0.5	< 0.1	< 0.1
Arsenic	µg/L	1	< 5	1	< 1
Barium	µg/L	1	< 5	203	3
Beryllium	µg/L	0.1	< 0.5	< 0.1	< 0.1
Bismuth	µg/L	1	< 5	< 1	< 1
Boron	µg/L	1	38200	28	17
Cadmium	µg/L	0.01	< 0.05	< 0.01	< 0.01
Calcium	µg/L	50	639000	40800	3930
Chromium	µg/L	1	< 5	< 1	< 1
Cobalt	µg/L	0.1	< 0.5	< 0.1	< 0.1
Copper	µg/L	1	< 5	< 1	< 1
Iron	µg/L	20	< 100	< 20	< 20
Lead	µg/L	0.1	< 0.5	< 0.1	< 0.1
Lithium	µg/L	0.1	155.	6.3	4.2
Magnesium	µg/L	10	26600	3640	1060
Manganese	µg/L	1	448	< 1	< 1
Mercury	µg/L	0.025	< 0.025	< 0.025	< 0.025
Molybdenum	µg/L	0.1	4.1	0.4	2.3
Nickel	µg/L	1	< 5	< 1	< 1
Potassium	µg/L	20	4600	960	970
Rubidium	µg/L	0.1	5.3	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	88400	5390	10600
Strontium	µg/L	1	11900	312	35
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	0.9	< 0.1
Vanadium	µg/L	1	< 5	1	< 1
Zinc	µg/L	1	< 5	1	4

Report ID: 486568-IAS
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Attention: Distribution Contacts Dillon Reporting
Project #: 21-3049-1002
Location: Upham

Analysis of Metals in Water

RPC Sample ID:			486568-7	486568-8	486568-9
Client Sample ID:			MW20-04S	MW20-04D	MW18-02S
Date Sampled:			14-Jun-23	14-Jun-23	14-Jun-23
Analytes	**Units**	**RL**			
Aluminum	µg/L	1	2	2	< 5
Antimony	µg/L	0.1	< 0.1	0.3	< 0.5
Arsenic	µg/L	1	12	20	< 5
Barium	µg/L	1	114	124	< 5
Beryllium	µg/L	0.1	< 0.1	< 0.1	< 0.5
Bismuth	µg/L	1	< 1	< 1	< 5
Boron	µg/L	1	148	92	985
Cadmium	µg/L	0.01	< 0.01	< 0.01	< 0.05
Calcium	µg/L	50	43400	40800	559000
Chromium	µg/L	1	< 1	< 1	< 5
Cobalt	µg/L	0.1	< 0.1	< 0.1	< 0.5
Copper	µg/L	1	< 1	3	< 5
Iron	µg/L	20	< 20	< 20	17400
Lead	µg/L	0.1	< 0.1	< 0.1	< 0.5
Lithium	µg/L	0.1	8.2	7.8	12.0
Magnesium	µg/L	10	1510	1340	10800
Manganese	µg/L	1	11	5	731
Mercury	µg/L	0.025	< 0.025	< 0.025	< 0.025
Molybdenum	µg/L	0.1	1.7	2.7	1.2
Nickel	µg/L	1	< 1	1	< 5
Potassium	µg/L	20	1160	1180	1800
Rubidium	µg/L	0.1	1.1	1.0	< 0.5
Selenium	µg/L	1	< 1	< 1	< 5
Silver	µg/L	0.1	< 0.1	< 0.1	< 0.5
Sodium	µg/L	50	5410	4320	10900
Strontium	µg/L	1	440	518	4560
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	3.5	4.4	< 0.5
Vanadium	µg/L	1	< 1	2	< 5
Zinc	µg/L	1	5	4	< 5

Report ID: 486568-IAS
Report Date: 27-Jun-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

Attachment D

Blast Reports

CBCL
Solutions today | Tomorrow IN mind
575 Crown Street, Saint John, NB E2L 5E9
506-635-7565 | CBCL.ca | info@CBCL.ca

June 16, 2023

Project No.: 234601.00

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

Re: Blast Vibration Monitoring – Blast No. 2023-19 – 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 14:26 on June 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. 2023-19 – June 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)	14:26	1,310 m S	< 0.5 mm/s	<120	Units were not triggered
2. Civic No. 4126 Route 111 (PW-10)		887 m S	< 0.5 mm/s	<120	
3. Civic No. 4150 Route 111 (PW-13)		726 m SE	0.83 mm/s @ 57 Hz	114	-
4. Civic No. 2447 Route 820 (PW-07)		848 m NE	1.50 mm/s @ 24 Hz	108	-
5. PW-03 - Cottage Route 820		642 m N	0.89 mm/s @ 16 Hz	114	-
6. Civic No. 2341 Route 820 (PW-05)		659 m NW	1.02 mm/s @ 14 Hz	112	-
7. Civic No. 50 Myron Road (PW-15)		940 m NW	< 0.5 mm/s	<120	Unit was not triggered
8. Civic No. 86 Myron Road (PW-16)		799 m W	0.70 mm/s @ 28 Hz	117	-
9. Civic No. 220 Myron Road (PW-01)		1,360 m S	< 0.5 mm/s	<120	Unit was not triggered
10. Civic No. 2337 Route 820 (PW-04)		717 m NW	0.51 mm/s @ 47 Hz	110	-
11. Civic No. 4140 Route 111 (PW-12)		803 m S	0.70 mm/s @ 64 Hz	112	-
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

Attachment A

Blast Record

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 15, 2023
Project No.:	234601.00	**Time of Blast:**	14:26
Inspector:	S. Carroll	**Blast No.:**	2023-19
Client:	Hammond River Holdings		

IDENTIFICATION:

Blasting Contractor:	Gulf Operators Ltd.		
Blaster's Certification No.:	1318	**Blaster's Name:**	Daniel Blanchard
Blast Location:	N 45º28'59.8" W 65º37'57.7" (see attached sketch)		
Type of Rock:	Anhydrate/Gypsum	**Est. Vol. or Tonnage:**	11,629 tonnes
Weather at time of Blast:	Cloudy	**Air Temp.:**	16ºC
Est. Wind Speed :	≈ 10 km/h	**Wind Direction:**	W
Cloud Cover:	Yes – ≈80%	**Precipitation:**	Yes - light

BLAST DESIGN:

Total No. Holes:	105	**Hole Diameter:**	4.5"
Average Depth:	5.6 m – 7.1 m	**Spacing:**	10'x10' & 11'x10'
No. Holes per Delay:	4	**Collar Length:**	7 ft
Delay between Holes:	17 & 25 ms	**Delay between Rows:**	34 & 42 ms
Initiation Method:	Non-Electric		
Weight of Explosives per Delay:	Max.: 192 kg		
Type and weight of Explosives for Blast:	4,358 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:**	June 15, 2023
Project No.:	234601.00	**Time of Blast:**	14:26
Inspector:	S. Carroll	**Blast No.:**	2023-19
Client:	Hammond River Holdings		

BLAST MONITORING

Distance to the Nearest Structure:	642 m
Direction to the Nearest Structure:	North
Structure Type:	Cottage
Scaled Distance Factor: (distance / sq. rt. of max. wt. per delay):	46.3

SAFETY:

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

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

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 15, 2023
Project No.:	234601.00	**Time of Blast:**	14:26
Inspector:	S. Carroll	**Blast No.:**	2023-19
Client:	Hammond River Holdings		

Data Collection – Seismometer #1

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5489
Calibration Date:	May 5, 2023
Location of seismograph:	Civic Number 4079 Route 111 (PW-09)
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 #2

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5673
Calibration Date:	April 25, 2023
Location of seismograph:	Civic Number 4126 Route 111 (PW-10)
Distance and Direction from Blast:	887 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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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 15, 2023
Project No.:	234601.00	**Time of Blast:**	14:26
Inspector:	S. Carroll	**Blast No.:**	2023-19
Client:	Hammond River Holdings		

Data Collection – Seismometer #3

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5372
Calibration Date:	February 28, 2023
Location of seismograph:	Civic Number 4150 Route 111 (PW-13)
Distance and Direction from Blast:	726 m Southeast
Transverse Particle Velocity:	0.64 mm/s @ 57 Hz
Vertical Particle Velocity:	0.64 mm/s @ 64 Hz
Longitudinal Particle Velocity:	0.83 mm/s @ 57 Hz
Peak Particle Velocity:	0.83 mm/s @ 57 Hz
Maximum Airblast:	114 dB(L)

Data Collection – Seismometer #4

Make, Model and Serial # of unit:	Instantel Minimate, Serial #18193
Calibration Date:	May 12, 2023
Location of seismograph:	Civic Number 2447 Route 820 (PW-07)
Distance and Direction from Blast:	848 m Northeast
Transverse Particle Velocity:	0.84 mm/s @ 17 Hz
Vertical Particle Velocity:	0.37 mm/s @ 20 Hz
Longitudinal Particle Velocity:	1.50 mm/s @ 24 Hz
Peak Particle Velocity:	1.50 mm/s @ 24 Hz
Maximum Airblast:	108 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 15, 2023
Project No.:	234601.00	**Time of Blast:**	14:26
Inspector:	S. Carroll	**Blast No.:**	2023-19
Client:	Hammond River Holdings		

Data Collection – Seismometer #5

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5487
Calibration Date:	January 16, 2023
Location of seismograph:	Cottage - PW-03 - Route 820
Distance and Direction from Blast:	642 m North
Transverse Particle Velocity:	0.64 mm/s @ 9 Hz
Vertical Particle Velocity:	0.32 mm/s @ 32 Hz
Longitudinal Particle Velocity:	0.89 mm/s @ 16 Hz
Peak Particle Velocity:	0.89 mm/s @ 16 Hz
Maximum Airblast:	114 dB(L)

Data Collection – Seismometer #6

Make, Model and Serial # of unit:	Instantel Minimate, Serial #18187
Calibration Date:	May 12, 2023
Location of seismograph:	Civic Number 2341 Route 820 (PW-05)
Distance and Direction from Blast:	659 m Northwest
Transverse Particle Velocity:	1.00 mm/s @ 47 Hz
Vertical Particle Velocity:	0.50 mm/s @ 19 Hz
Longitudinal Particle Velocity:	1.02 mm/s @ 14 Hz
Peak Particle Velocity:	1.02 mm/s @ 14 Hz
Maximum Airblast:	112 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 15, 2023
Project No.:	234601.00	**Time of Blast:**	14:26
Inspector:	S. Carroll	**Blast No.:**	2023-19
Client:	Hammond River Holdings		

Data Collection – Seismometer #7

Make, Model and Serial # of unit:	Instantel Micromate, Serial #20203
Calibration Date:	May 30, 2023
Location of seismograph:	Civic Number 50 Myron Road (PW-15)
Distance and Direction from Blast:	940 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 #20205
Calibration Date:	May 30, 2023
Location of seismograph:	Civic Number 86 Myron Road (PW-16)
Distance and Direction from Blast:	799 m West
Transverse Particle Velocity:	0.58 mm/s @ 22 Hz
Vertical Particle Velocity:	0.36 mm/s @ 43 Hz
Longitudinal Particle Velocity:	0.70 mm/s @ 28 Hz
Peak Particle Velocity:	0.70 mm/s @ 28 Hz
Maximum Airblast:	117 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 15, 2023
Project No.:	234601.00	**Time of Blast:**	14:26
Inspector:	S. Carroll	**Blast No.:**	2023-19
Client:	Hammond River Holdings		

Data Collection – Seismometer #9

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5632
Calibration Date:	November 16, 2022
Location of seismograph:	Civic Number 220 Myron Road (PW-01)
Distance and Direction from Blast:	1,360 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 #5635
Calibration Date:	March 8, 2023
Location of seismograph:	Civic Number 2337 Route 820 (PW-04)
Distance and Direction from Blast:	717 m Northwest
Transverse Particle Velocity:	0.45 mm/s @ 51 Hz
Vertical Particle Velocity:	0.51 mm/s @ 47 Hz
Longitudinal Particle Velocity:	0.51 mm/s @ 51 Hz
Peak Particle Velocity:	0.51 mm/s @ 47 Hz
Maximum Airblast:	110 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 15, 2023
Project No.:	234601.00	**Time of Blast:**	14:26
Inspector:	S. Carroll	**Blast No.:**	2023-19
Client:	Hammond River Holdings		

Data Collection – Seismometer #11

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5676
Calibration Date:	March 8, 2023
Location of seismograph:	Civic Number 4140 Route 111 (PW-12)
Distance and Direction from Blast:	803 m South
Transverse Particle Velocity:	0.64 mm/s @ 51 Hz
Vertical Particle Velocity:	0.51 mm/s @ 64 Hz
Longitudinal Particle Velocity:	0.70 mm/s @ 64 Hz
Peak Particle Velocity:	0.70 mm/s @ 64 Hz
Maximum Airblast:	112 dB(L)

Attachment B

Blast and Seismograph Location Plan

Blast and Seismograph Location Plan
Blast No: 2023-19
Upham East Gypsum Quarry
Upham, NB

Date: June 15, 2023
Project No.: 234601.00

Attachment C

Blast Event Reports

Event Report

Date/Time Vert at 14:26:29 June 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: June 15, 2023 16:26:23 (V10.72.1)

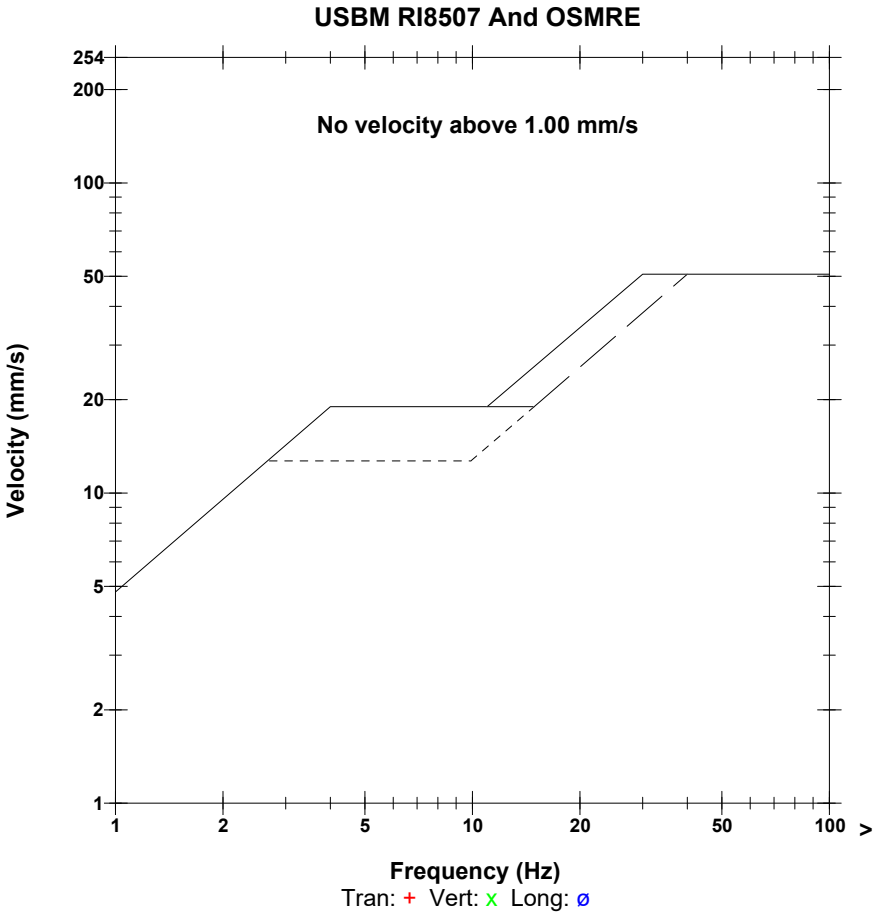
Extended Notes

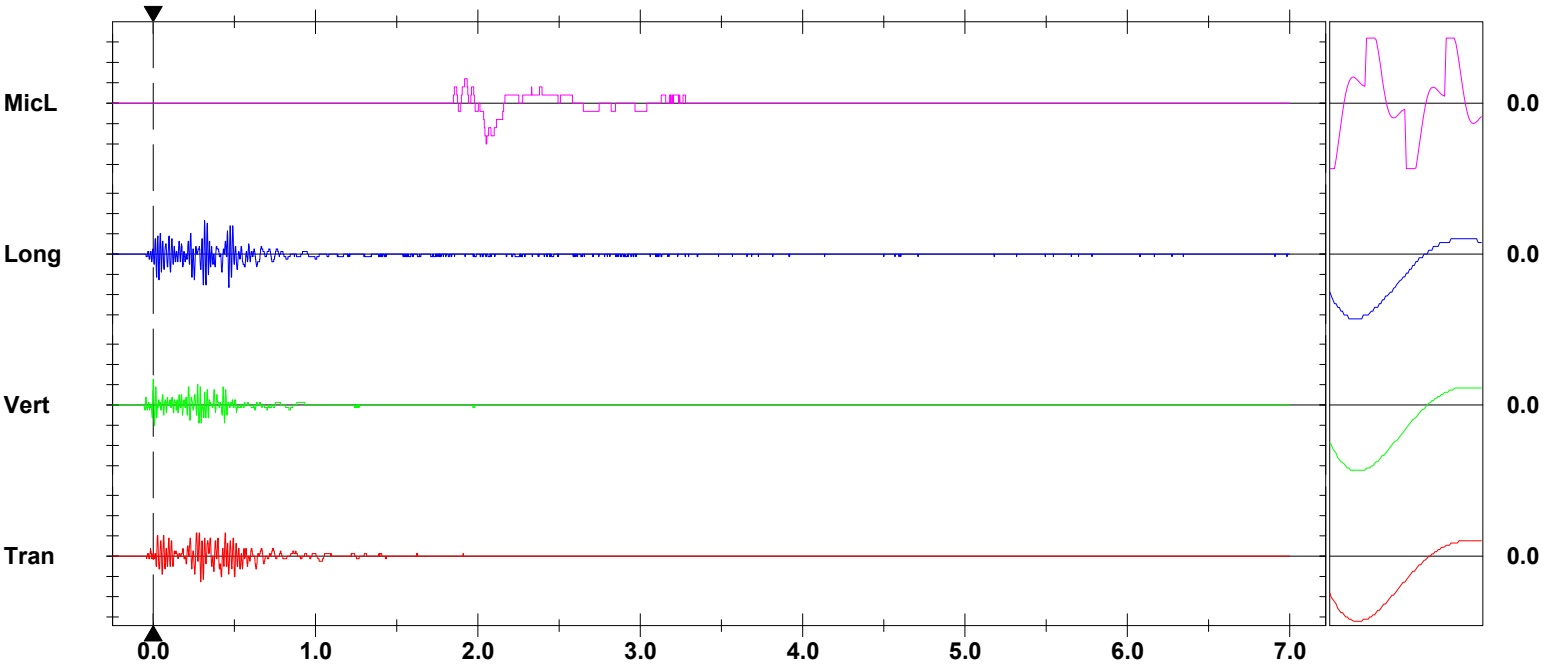
Microphone Linear Weighting
PSPL 114.0 dB(L) 10.000 pa.(L) at 2.051 sec
ZC Freq 3.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 293 mv)

	Tran	Vert	Long	
PPV	0.635	0.635	0.826	mm/s
PPV	47.06	47.06	49.33	dB
ZC Freq	57	64	57	Hz
Time (Rel. to Trig)	0.294	0.001	0.317	sec
Peak Acceleration	0.027	0.027	0.033	g
Peak Displacement	0.003	0.001	0.002	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.7	8.0	8.0	Hz
Overswing Ratio	3.7	3.5	3.5	

Peak Vector Sum 0.968 mm/s at 0.317 sec

Serial Number 5372 V 2.61 MiniMate
Battery Level 6.0 Volts
Unit Calibration February 28, 2023 by Instantel
File Name G372K2ID.G50
Post Event Notes
Location: Civic Number 4150 Route 111 (PW-13)
Blast No.: 2023-19
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 =

Event Report

Date/Time Long at 14:26:28 June 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/factory.MMB

Notes
Location:
Client:
User Name:
General:

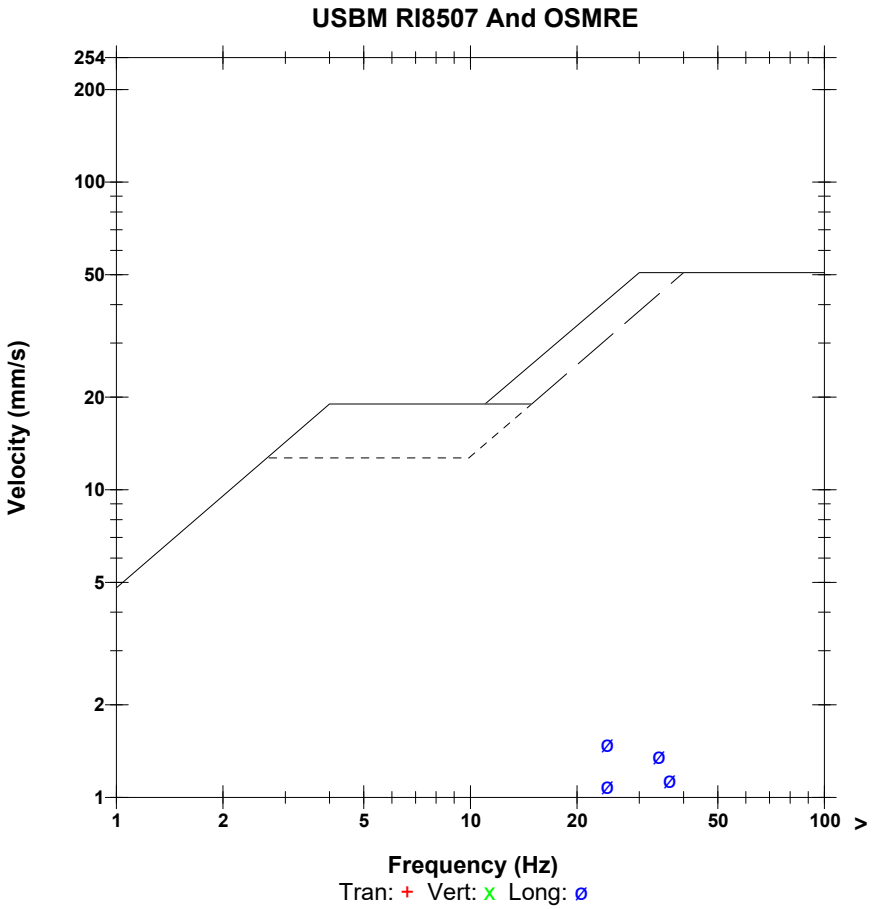
Serial Number UM18193 V 10-90GC Micromate ISEE
Battery Level 3.6 Volts
Unit Calibration May 12, 2023 by Instantel
File Name UM18193_20230615142628.IDFW

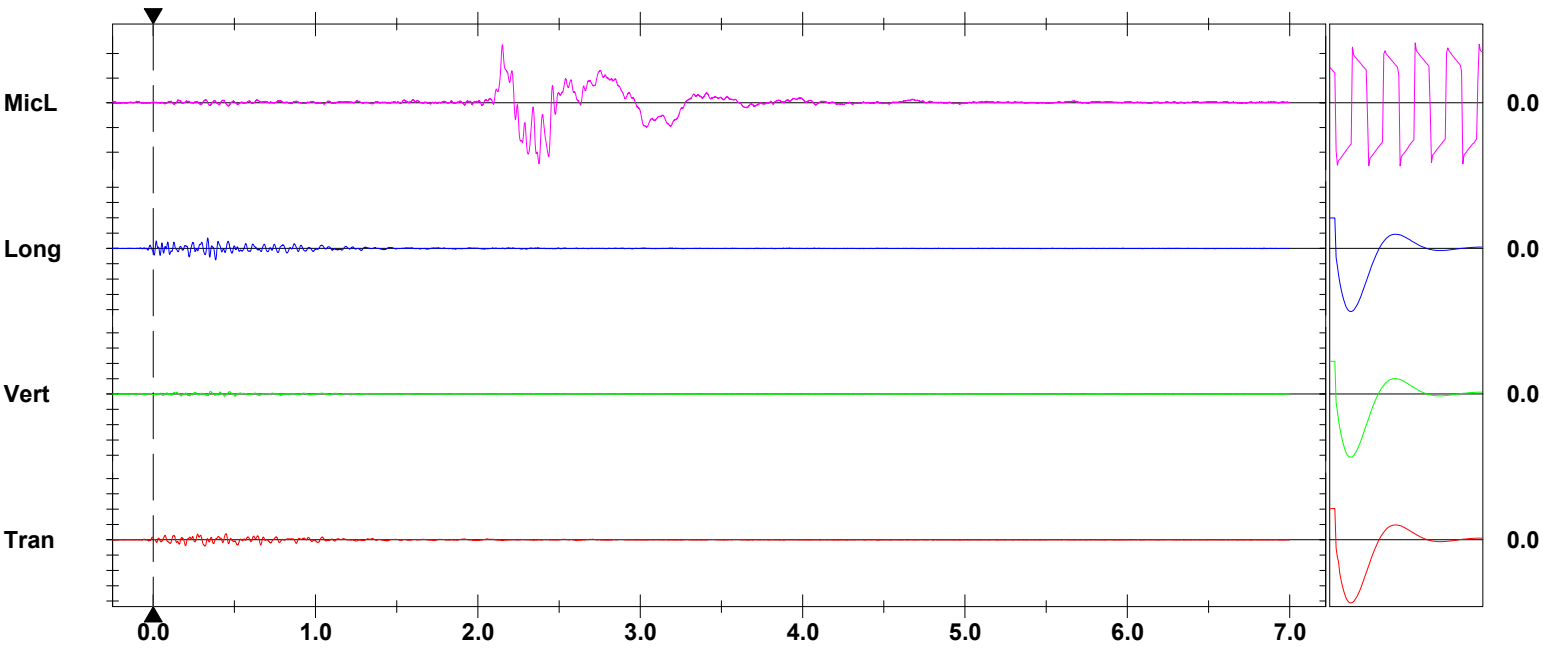
Post Event Notes
Location: Civic Number 2447 Route 820 (PW-07)
Blast No.: 2023-19
Project No: 234601.00

Microphone Linear Weighting
PSPL 107.8 dB(L) 4.934 pa.(L) at 2.376 sec
ZC Freq 2.2 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 1443 mv)

	Tran	Vert	Long	
PPV	0.835	0.370	1.498	mm/s
PPV	49.44	42.37	54.51	dB
ZC Freq	17	20	24	Hz
Time (Rel. to Trig)	0.320	0.354	0.385	sec
Peak Acceleration	0.023	0.010	0.033	g
Peak Displacement	0.008	0.003	0.009	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.5	7.3	Hz
Overswing Ratio	4.3	4.1	4.4	

Peak Vector Sum 1.509 mm/s at 0.385 sec





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

Event Report

Date/Time Long at 14:26:35 June 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: June 15, 2023 16:32:59 (V10.72.1)

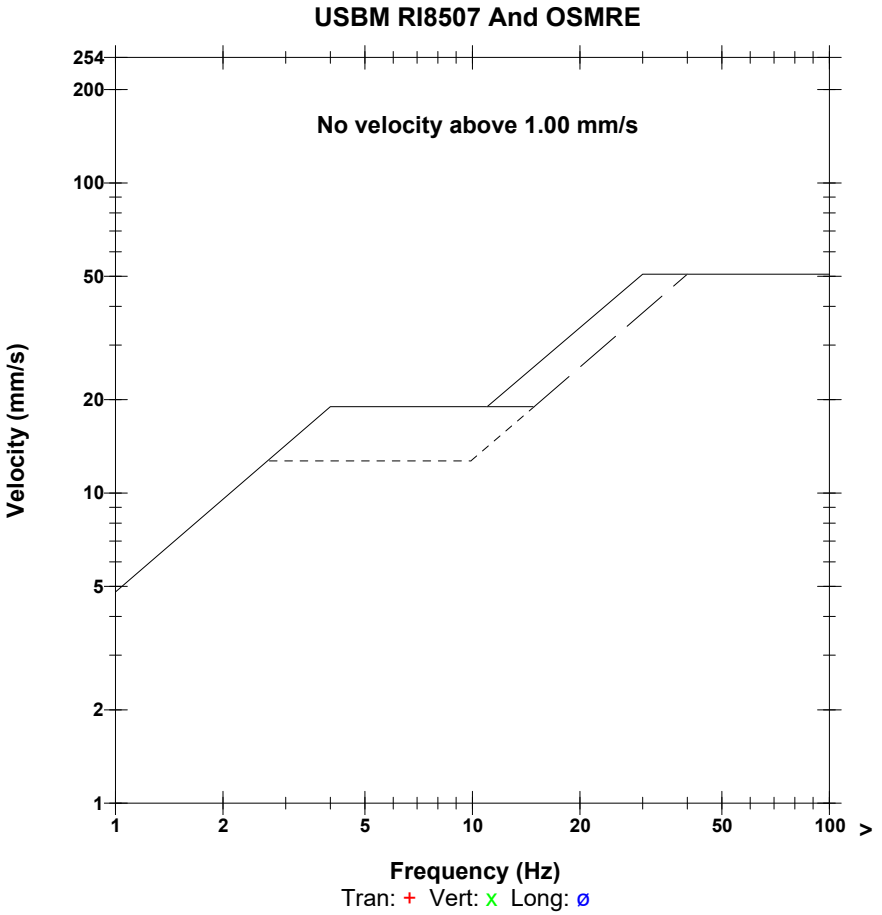
Extended Notes

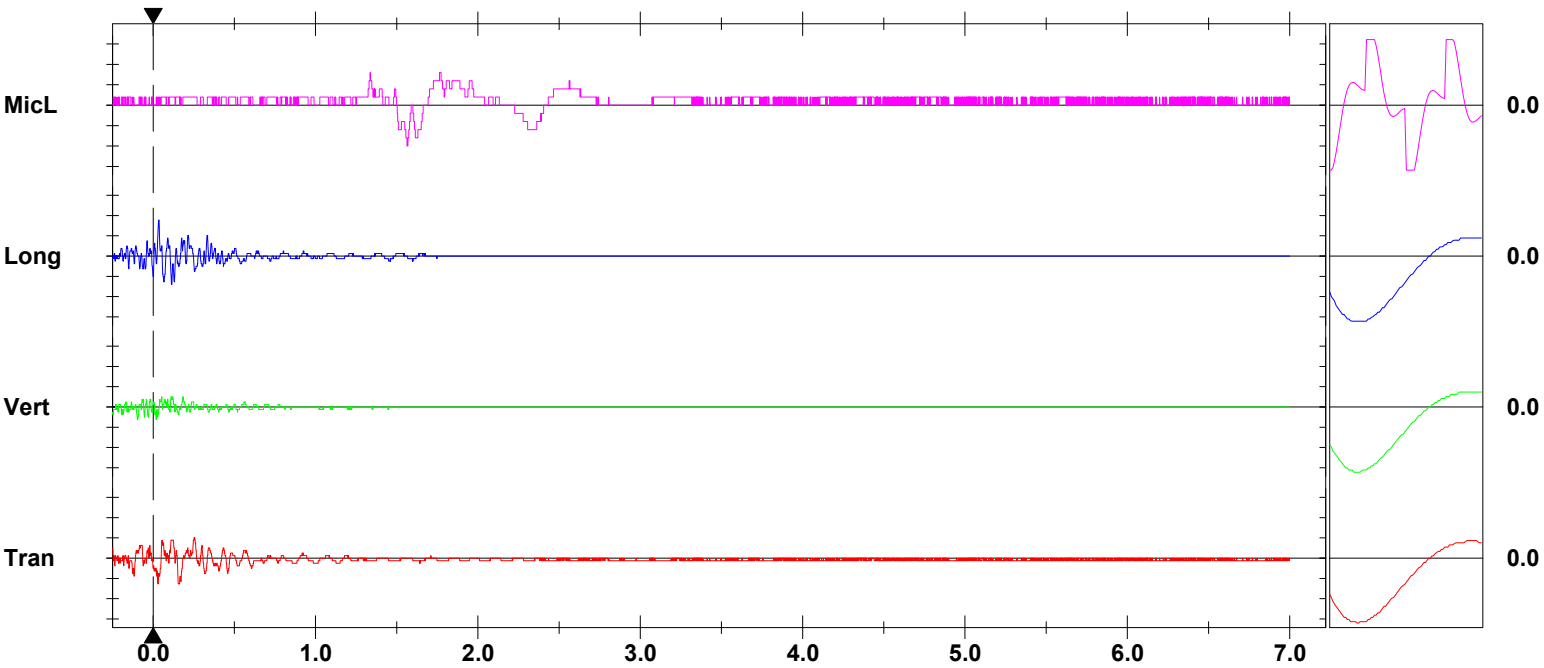
Microphone Linear Weighting
PSPL 114.0 dB(L) 10.000 pa.(L) at 1.564 sec
ZC Freq 6.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 287 mv)

	Tran	Vert	Long	
PPV	0.635	0.318	0.889	mm/s
PPV	47.06	41.03	49.98	dB
ZC Freq	9.0	32	16	Hz
Time (Rel. to Trig)	0.031	-0.095	0.034	sec
Peak Acceleration	0.013	0.013	0.020	g
Peak Displacement	0.008	0.001	0.006	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.7	7.7	7.7	Hz
Overswing Ratio	3.4	4.2	3.7	

Peak Vector Sum 1.000 mm/s at 0.037 sec

Serial Number 5487 V 2.61 MiniMate
Battery Level 6.3 Volts
Unit Calibration January 16, 2023 by Instantel
File Name G487K2ID.GB0
Post Event Notes
Location: Cottage - Route 820 (PW-03)
Blast No.: 2023-19
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 =

Event Report

Date/Time Long at 14:26:30 June 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/factory.MMB

Notes
Location:
Client:
User Name:
General:

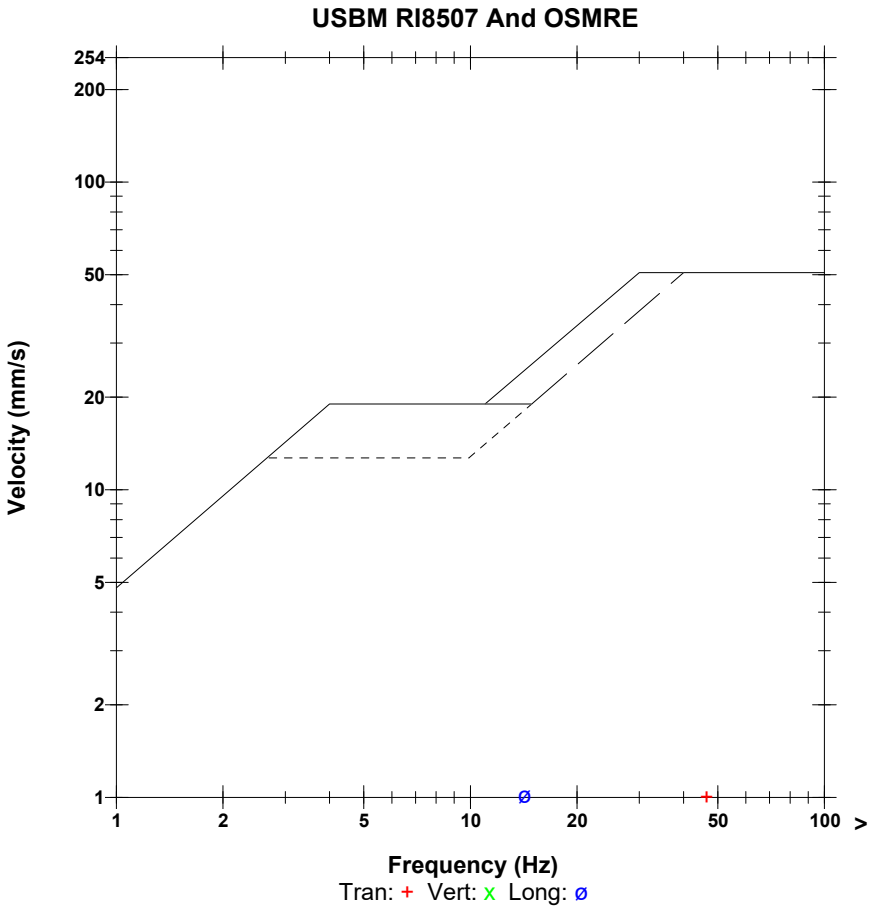
Serial Number UM18187 V 10-90GC Micromate ISEE
Battery Level 3.8 Volts
Unit Calibration May 12, 2023 by Instantel
File Name UM18187_20230615142630.IDFW

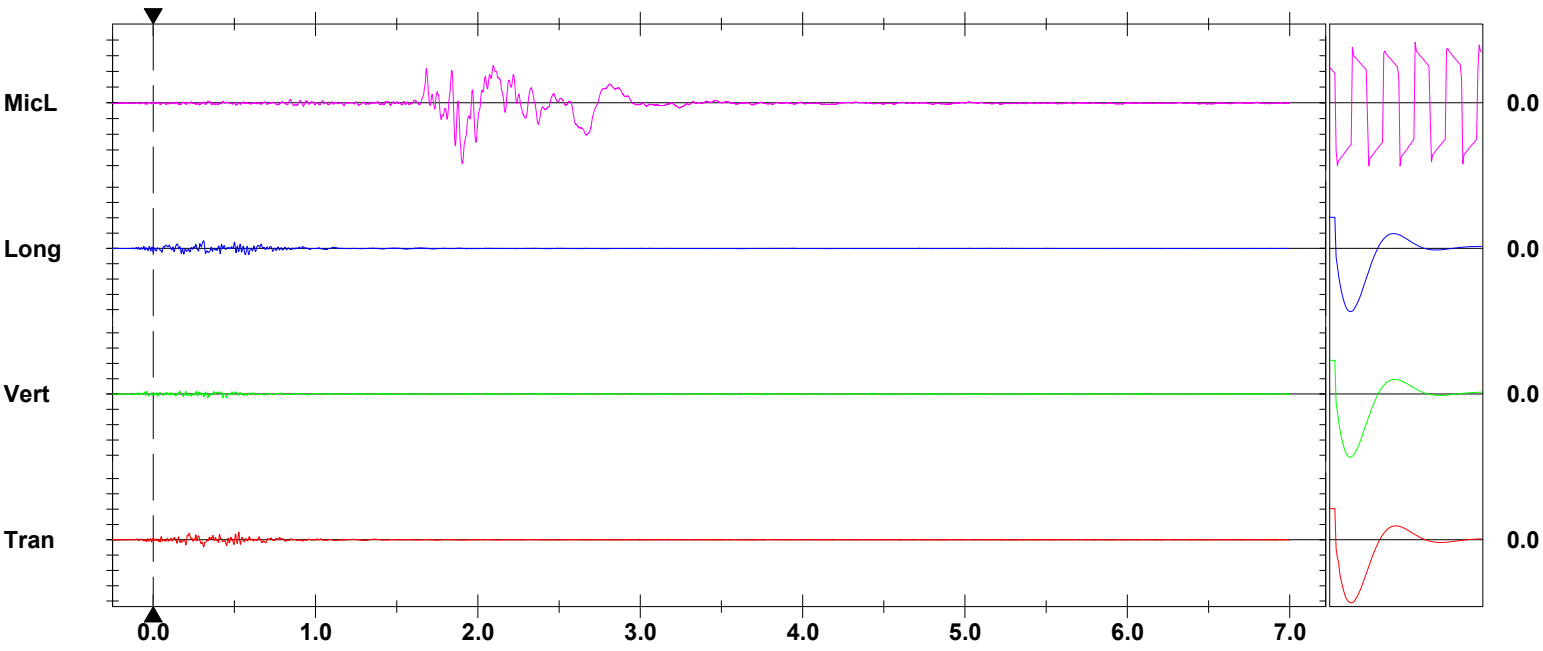
Post Event Notes
Location: Civic Number 2341 Route 820 (PW-05)
Blast No.: 2023-19
Project No: 234601.00

Microphone Linear Weighting
PSPL 111.8 dB(L) 7.742 pa.(L) at 1.905 sec
ZC Freq 6.2 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 1456 mv)

	Tran	Vert	Long	
PPV	1.001	0.504	1.017	mm/s
PPV	51.01	45.06	51.14	dB
ZC Freq	47	19	14	Hz
Time (Rel. to Trig)	0.526	0.336	0.311	sec
Peak Acceleration	0.040	0.021	0.034	g
Peak Displacement	0.009	0.004	0.010	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.5	7.5	Hz
Overswing Ratio	4.6	4.3	4.3	

Peak Vector Sum 1.392 mm/s at 0.311 sec





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

Event Report

Date/Time Long at 14:26:29 June 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/factory.MMB

Notes
Location:
Client:
User Name:
General:

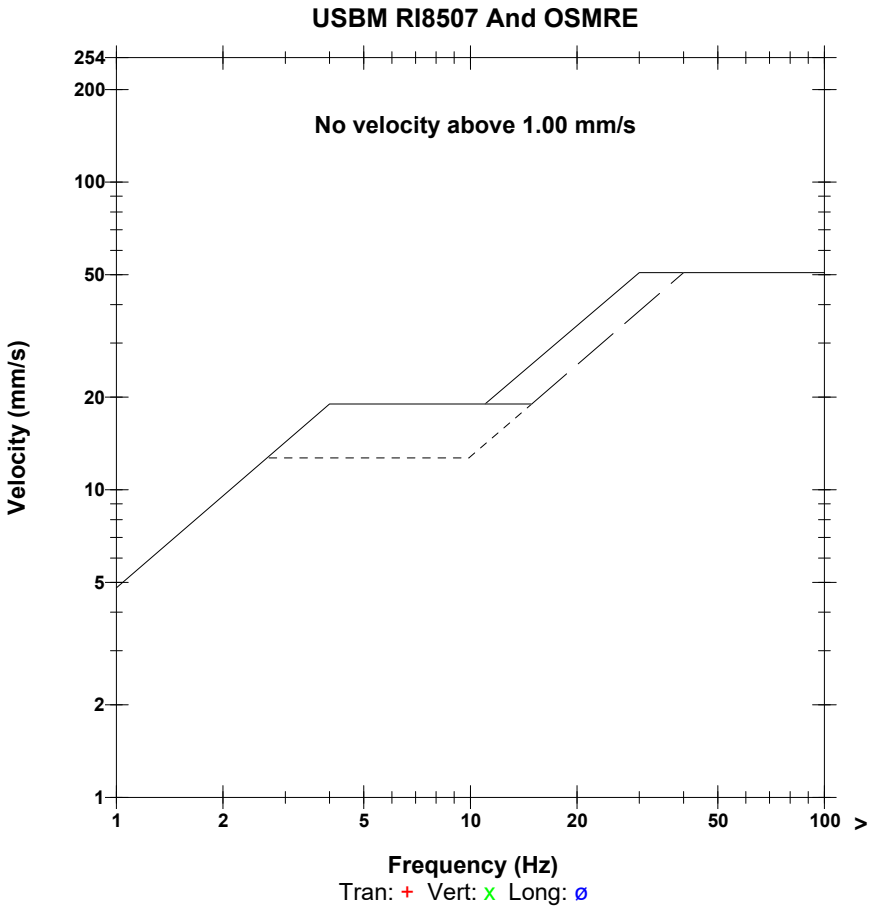
Serial Number UM20205 V 10-90GC Micromate ISEE
Battery Level 3.8 Volts
Unit Calibration May 30, 2023 by Instantel
File Name UM20205_20230615142629.IDFW

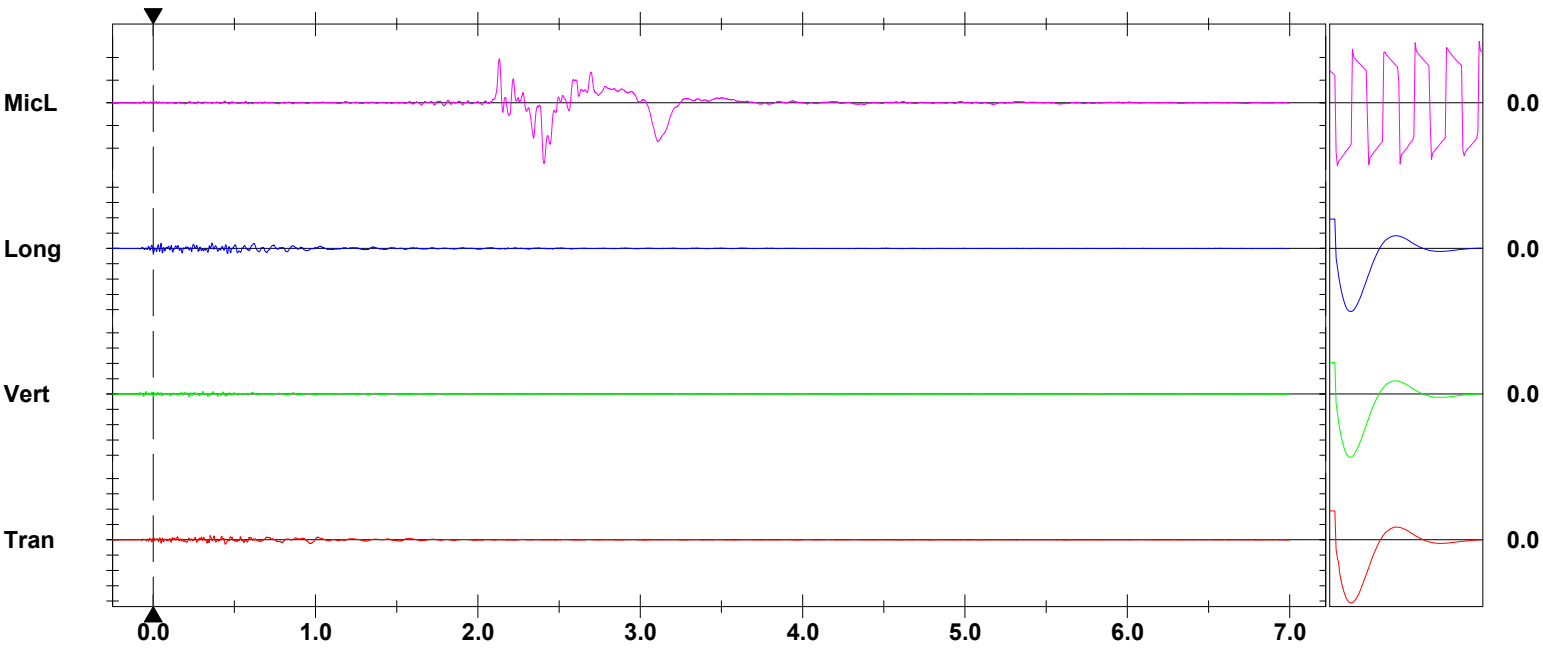
Post Event Notes
Location: Civic Number 86 Myron Road (PW-16)
Blast No.: 2023-19
Project No: 234601.00

Microphone Linear Weighting
PSPL 116.5 dB(L) 13.41 pa.(L) at 2.407 sec
ZC Freq 2.5 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 1508 mv)

	Tran	Vert	Long	
PPV	0.575	0.355	0.701	mm/s
PPV	46.20	42.00	47.92	dB
ZC Freq	22	43	28	Hz
Time (Rel. to Trig)	0.442	0.306	0.363	sec
Peak Acceleration	0.031	0.015	0.026	g
Peak Displacement	0.008	0.002	0.007	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.1	7.3	7.3	Hz
Overswing Ratio	5.0	4.8	5.0	

Peak Vector Sum 0.817 mm/s at 0.049 sec





Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.000 mm/s/div Mic: 5.000 pa.(L)/div Sensor Check
Trigger =

Event Report

Date/Time Long at 14:26:23 June 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: June 15, 2023 16:44:44 (V10.72.1)

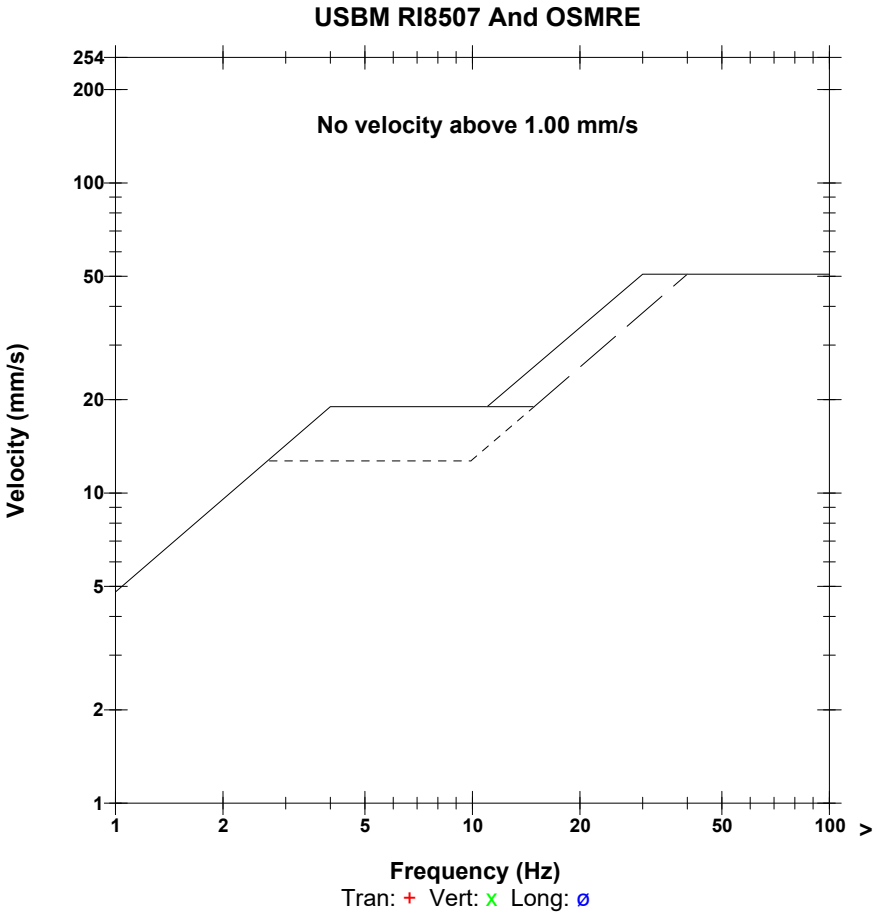
Extended Notes

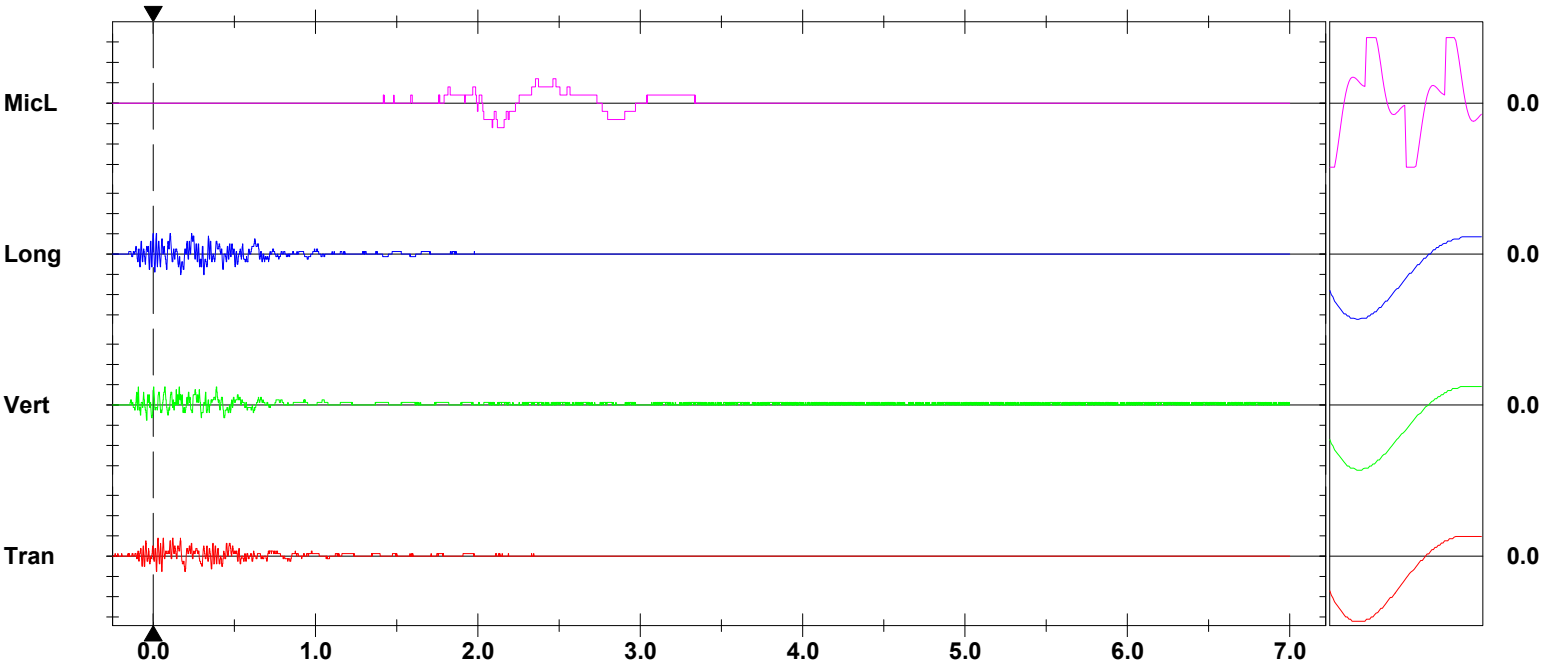
Microphone Linear Weighting
PSPL 109.5 dB(L) 6.000 pa.(L) at 2.089 sec
ZC Freq 2.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 298 mv)

	Tran	Vert	Long	
PPV	0.445	0.445	0.508	mm/s
PPV	43.96	43.96	45.12	dB
ZC Freq	51	47	51	Hz
Time (Rel. to Trig)	0.030	0.004	0.001	sec
Peak Acceleration	0.020	0.020	0.020	g
Peak Displacement	0.002	0.003	0.004	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.1	7.8	7.7	Hz
Overswing Ratio	3.2	3.7	3.8	

Peak Vector Sum 0.667 mm/s at 0.171 sec

Serial Number 5635 V 2.61 MiniMate
Battery Level 6.1 Volts
Unit Calibration March 8, 2023 by Instantel
File Name G635K2ID.FZ0
Post Event Notes
Location: Civic Number 2336 Route 820 (PW-04)
Blast No.: 2023-19
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 =

Event Report

Date/Time Vert at 14:25:45 June 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: June 15, 2023 16:47:41 (V10.72.1)

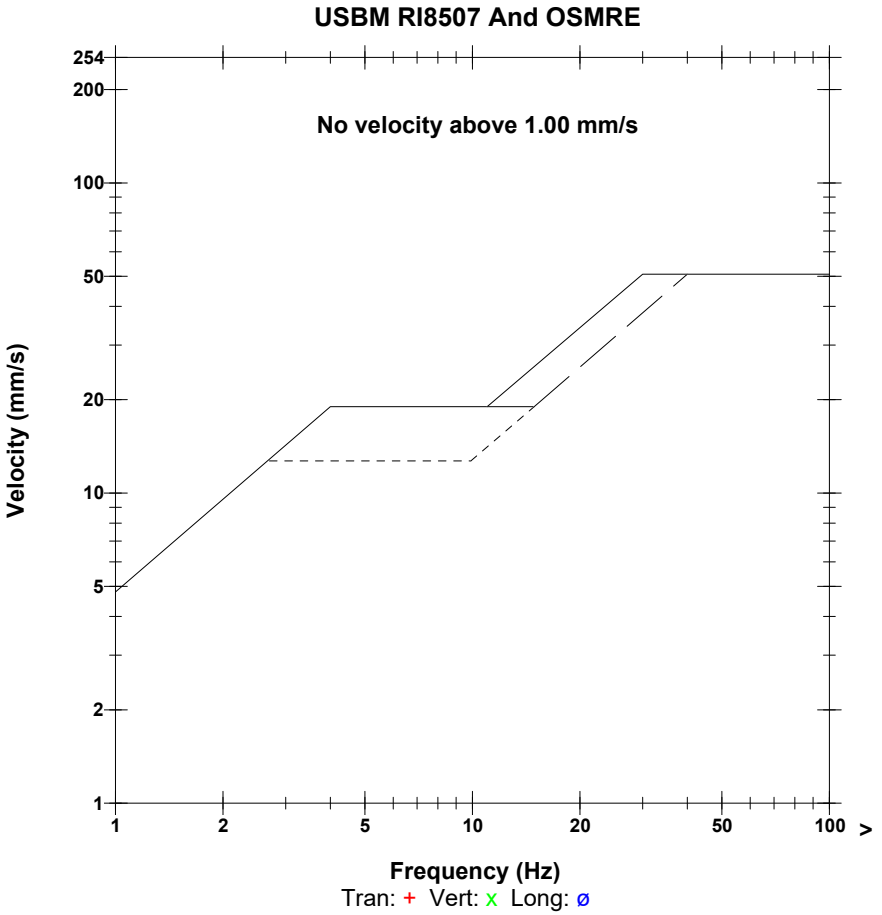
Extended Notes

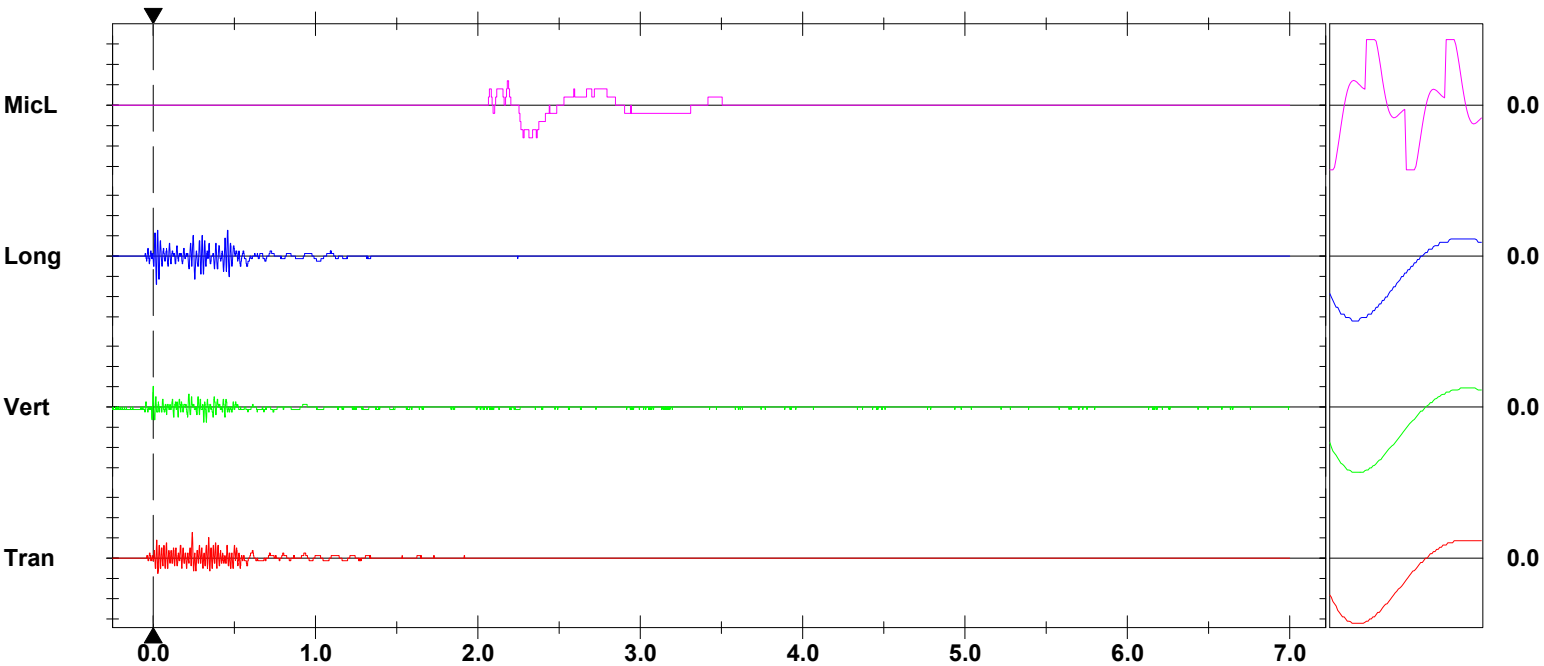
Microphone Linear Weighting
PSPL 112.0 dB(L) 8.000 pa.(L) at 2.278 sec
ZC Freq 3.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 302 mv)

	Tran	Vert	Long	
PPV	0.635	0.508	0.699	mm/s
PPV	47.06	45.12	47.88	dB
ZC Freq	51	64	64	Hz
Time (Rel. to Trig)	0.242	0.001	0.020	sec
Peak Acceleration	0.020	0.020	0.027	g
Peak Displacement	0.002	0.001	0.002	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.0	8.1	8.3	Hz
Overswing Ratio	3.8	3.6	4.0	

Peak Vector Sum 0.778 mm/s at 0.021 sec

Serial Number 5676 V 2.61 MiniMate
Battery Level 6.1 Volts
Unit Calibration March 8, 2023 by Instantel
File Name G676K2ID.EX0
Post Event Notes
Location: Civic Number 4140 Route 111 (PW-12)
Blast No.: 2023-19
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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June 23, 2023

Project No.: 234601.00

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

Re: Blast Vibration Monitoring – Blast No. 2023-20 – 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 15:42 on June 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. 2023-20 – June 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)	15:42	1,380 m S	< 0.5 mm/s	<120	Units were not triggered
2. Civic No. 4126 Route 111 (PW-10)		996 m S	< 0.5 mm/s	<120	
3. Civic No. 4150 Route 111 (PW-13)		865 m SE	< 0.5 mm/s	<120	
4. Civic No. 2447 Route 820 (PW-07)		928 m NE	1.08 mm/s @ 32 Hz	109	-
5. PW-03 - Cottage Route 820		594 m N	1.97 mm/s @ 85 Hz	112	-
6. Civic No. 2341 Route 820 (PW-05)		545 m N	4.75 mm/s @ 64 Hz	112	-
7. Civic No. 50 Myron Road (PW-15)		770 m NW	1.91 mm/s @ 51 Hz	112	-
8. Civic No. 86 Myron Road (PW-16)		634 m W	0.89 mm/s @ 43 Hz	110	-
9. Civic No. 220 Myron Road (PW-01)		1,370 m S	< 0.5 mm/s	<120	Unit was not triggered
10. Civic No. 2337 Route 820 (PW-04)		587 m N	2.16 mm/s @ 64 Hz	112	-
11. Civic No. 4140 Route 111 (PW-12)		927 m SE	< 0.5 mm/s	<120	Unit was not triggered
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

Attachment A

Blast Record

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 22, 2023
Project No.:	234601.00	**Time of Blast:**	15:42
Inspector:	S. Carroll	**Blast No.:**	2023-20
Client:	Hammond River Holdings		

IDENTIFICATION:

Blasting Contractor:	Gulf Operators Ltd.		
Blaster's Certification No.:	1318	**Blaster's Name:**	Daniel Blanchard
Blast Location:	N 45º28'54.3" W 65º38'04.4" (see attached sketch)		
Type of Rock:	Anhydrate/Gypsum	**Est. Vol. or Tonnage:**	19,176 tonnes
Weather at time of Blast:	Sunny	**Air Temp.:**	25ºC
Est. Wind Speed :	≈ 15 km/h	**Wind Direction:**	NE
Cloud Cover:	No	**Precipitation:**	No

BLAST DESIGN:

Total No. Holes:	153	**Hole Diameter:**	4.5"
Average Depth:	5.3 m – 6.6 m	**Spacing:**	11 ft x11 ft
No. Holes per Delay:	3	**Collar Length:**	7 ft
Delay between Holes:	25 ms	**Delay between Rows:**	42 & 67 ms
Initiation Method:	Non-Electric		
Weight of Explosives per Delay:	Max.: 150 kg		
Type and weight of Explosives for Blast:	7,250 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:**	June 22, 2023
Project No.:	234601.00	**Time of Blast:**	15:42
Inspector:	S. Carroll	**Blast No.:**	2023-20
Client:	Hammond River Holdings		

BLAST MONITORING

Distance to the Nearest Structure:	545 m
Direction to the Nearest Structure:	North
Structure Type:	House
Scaled Distance Factor: (distance / sq. rt. of max. wt. per delay):	44.5

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:**	June 22, 2023
Project No.:	234601.00	**Time of Blast:**	15:42
Inspector:	S. Carroll	**Blast No.:**	2023-20
Client:	Hammond River Holdings		

Data Collection – Seismometer #1

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5489
Calibration Date:	May 5, 2023
Location of seismograph:	Civic Number 4079 Route 111 (PW-09)
Distance and Direction from Blast:	1,380 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 #5371
Calibration Date:	July 27, 2022
Location of seismograph:	Civic Number 4126 Route 111 (PW-10)
Distance and Direction from Blast:	996 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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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 22, 2023
Project No.:	234601.00	**Time of Blast:**	15:42
Inspector:	S. Carroll	**Blast No.:**	2023-20
Client:	Hammond River Holdings		

Data Collection – Seismometer #3

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5489
Calibration Date:	May 5, 2023
Location of seismograph:	Civic Number 4150 Route 111 (PW-13)
Distance and Direction from Blast:	865 m Southeast
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Data Collection – Seismometer #4

Make, Model and Serial # of unit:	Instantel Micromate, Serial #20206
Calibration Date:	June 9, 2023
Location of seismograph:	Civic Number 2447 Route 820 (PW-07)
Distance and Direction from Blast:	928 m Northeast
Transverse Particle Velocity:	1.00 mm/s @ 34 Hz
Vertical Particle Velocity:	0.26 mm/s @ 39 Hz
Longitudinal Particle Velocity:	1.08 mm/s @ 32 Hz
Peak Particle Velocity:	1.08 mm/s @ 32 Hz
Maximum Airblast:	109 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 22, 2023
Project No.:	234601.00	**Time of Blast:**	15:42
Inspector:	S. Carroll	**Blast No.:**	2023-20
Client:	Hammond River Holdings		

Data Collection – Seismometer #5

Make, Model and Serial # of unit:	Instantel Minimate, Serial #18193
Calibration Date:	May 12, 2023
Location of seismograph:	Cottage - PW-03 - Route 820
Distance and Direction from Blast:	594 m North
Transverse Particle Velocity:	1.70 mm/s @ 37 Hz
Vertical Particle Velocity:	1.36 mm/s @ 85 Hz
Longitudinal Particle Velocity:	1.97 mm/s @ 85 Hz
Peak Particle Velocity:	1.97 mm/s @ 85 Hz
Maximum Airblast:	112 dB(L)

Data Collection – Seismometer #6

Make, Model and Serial # of unit:	Instantel Minimate, Serial #18187
Calibration Date:	May 12, 2023
Location of seismograph:	Civic Number 2341 Route 820 (PW-05)
Distance and Direction from Blast:	545 m North
Transverse Particle Velocity:	2.77 mm/s @ 73 Hz
Vertical Particle Velocity:	2.85 mm/s @ 64 Hz
Longitudinal Particle Velocity:	4.75 mm/s @ 64 Hz
Peak Particle Velocity:	4.75 mm/s @ 64 Hz
Maximum Airblast:	112 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 22, 2023
Project No.:	234601.00	**Time of Blast:**	15:42
Inspector:	S. Carroll	**Blast No.:**	2023-20
Client:	Hammond River Holdings		

Data Collection – Seismometer #7

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5372
Calibration Date:	February 28, 2023
Location of seismograph:	Civic Number 50 Myron Road (PW-15)
Distance and Direction from Blast:	770 m Northwest
Transverse Particle Velocity:	1.91 mm/s @ 57 Hz
Vertical Particle Velocity:	1.46 mm/s @ 85 Hz
Longitudinal Particle Velocity:	1.46 mm/s @ 51 Hz
Peak Particle Velocity:	1.91 mm/s @ 51 Hz
Maximum Airblast:	112 dB(L)

Data Collection – Seismometer #8

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5632
Calibration Date:	November 16, 2022
Location of seismograph:	Civic Number 86 Myron Road (PW-16)
Distance and Direction from Blast:	634 m West
Transverse Particle Velocity:	0.76 mm/s @ 39 Hz
Vertical Particle Velocity:	0.57 mm/s @ 32 Hz
Longitudinal Particle Velocity:	0.89 mm/s @ 43 Hz
Peak Particle Velocity:	0.89 mm/s @ 43 Hz
Maximum Airblast:	110 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 22, 2023
Project No.:	234601.00	**Time of Blast:**	15:42
Inspector:	S. Carroll	**Blast No.:**	2023-20
Client:	Hammond River Holdings		

Data Collection – Seismometer #9

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5673
Calibration Date:	April 25, 2023
Location of seismograph:	Civic Number 220 Myron Road (PW-01)
Distance and Direction from Blast:	1,370 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 #5635
Calibration Date:	March 8, 2023
Location of seismograph:	Civic Number 2337 Route 820 (PW-04)
Distance and Direction from Blast:	587 m North
Transverse Particle Velocity:	2.16 mm/s @ 64 Hz
Vertical Particle Velocity:	1.59 mm/s @ 73 Hz
Longitudinal Particle Velocity:	2.16 mm/s @ 73 Hz
Peak Particle Velocity:	2.16 mm/s @ 64 Hz
Maximum Airblast:	112 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 22, 2023
Project No.:	234601.00	**Time of Blast:**	15:42
Inspector:	S. Carroll	**Blast No.:**	2023-20
Client:	Hammond River Holdings		

Data Collection – Seismometer #11

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5676
Calibration Date:	March 8, 2023
Location of seismograph:	Civic Number 4140 Route 111 (PW-12)
Distance and Direction from Blast:	927 m Southeast
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Attachment B

Blast and Seismograph Location Plan

Blast and Seismograph Location Plan
Blast No: 2023-20
Upham East Gypsum Quarry
Upham, NB

Date: June 22, 2023
Project No.: 234601.00

Attachment C

Blast Event Reports

Event Report

Date/Time	Long at 15:42:15 June 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/factory.MMB

Notes
Location:
Client:
User Name:
General:

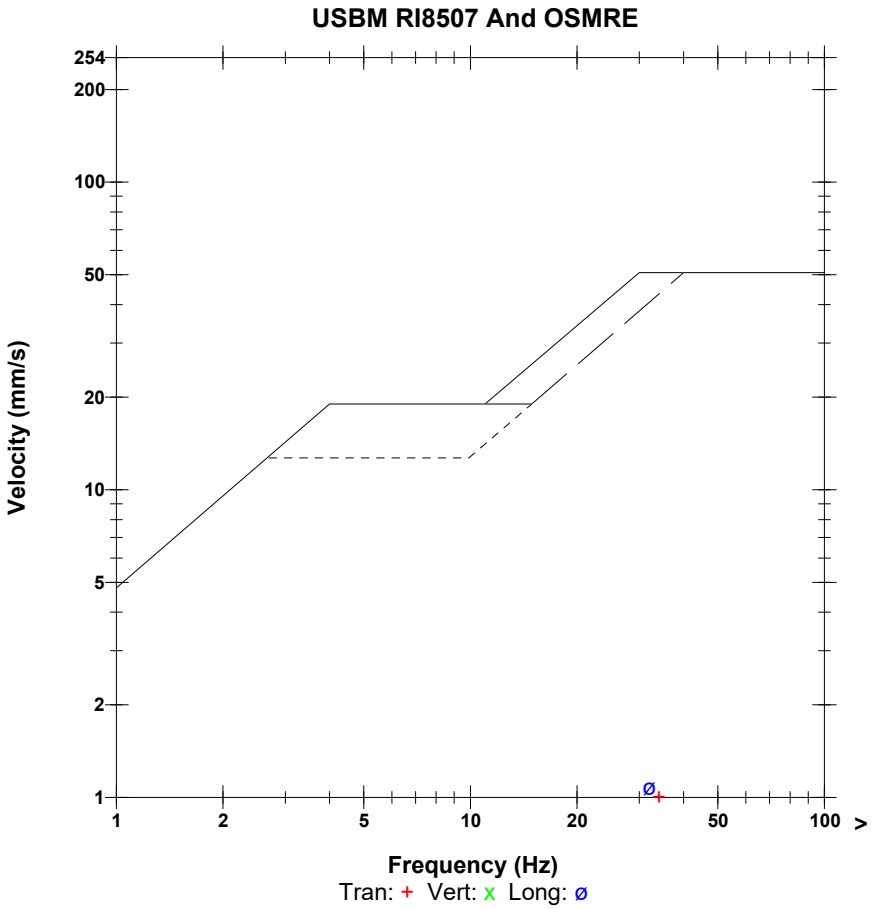
Serial Number	UM20206 V 10-90GC Micromate ISEE
Battery Level	3.8 Volts
Unit Calibration	June 9, 2023 by Instantel
File Name	UM20206_20230622154215.IDFW

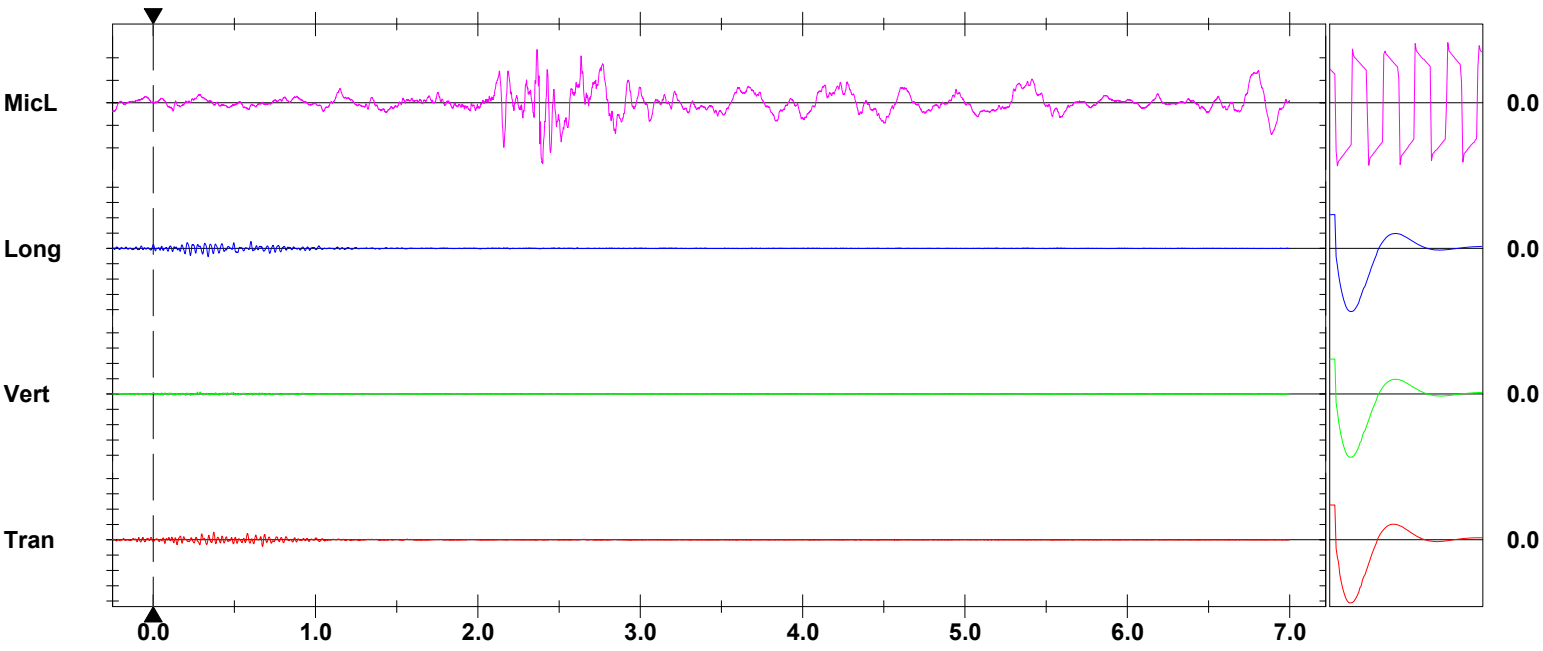
Post Event Notes
Location: Civic Number 2447 Route 820 (PW-07)
Blast No.: 2023-20
Project No: 234601.00

Microphone	Linear Weighting
PSPL	108.6 dB(L) 5.399 pa.(L) at 2.398 sec
ZC Freq	12 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 1253 mv)

	Tran	Vert	Long	
PPV	1.001	0.260	1.080	mm/s
PPV	51.01	39.30	51.67	dB
ZC Freq	34	39	32	Hz
Time (Rel. to Trig)	0.374	0.289	0.338	sec
Peak Acceleration	0.042	0.012	0.028	g
Peak Displacement	0.005	0.001	0.005	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.7	7.5	7.3	Hz
Overswing Ratio	4.0	4.3	4.2	

Peak Vector Sum 1.138 mm/s at 0.372 sec





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

Event Report

Date/Time Long at 15:42:11 June 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/factory.MMB

Notes
Location:
Client:
User Name:
General:

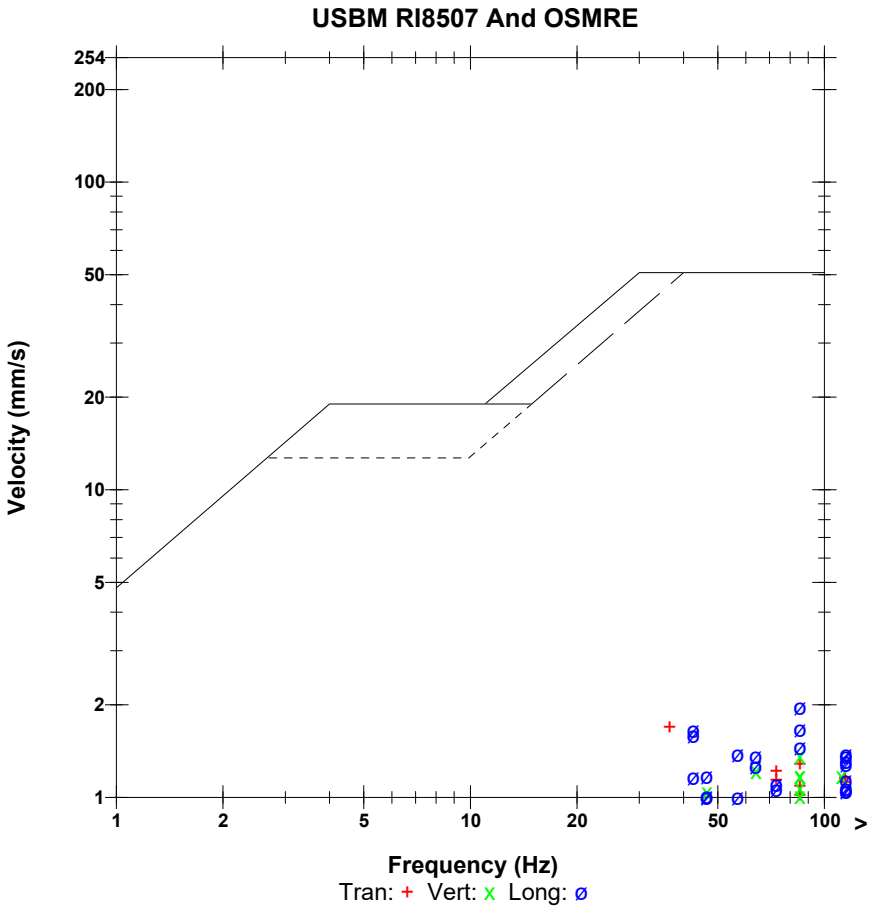
Serial Number UM18193 V 10-90GC Micromate ISEE
Battery Level 3.6 Volts
Unit Calibration May 12, 2023 by Instantel
File Name UM18193_20230622154211.IDFW

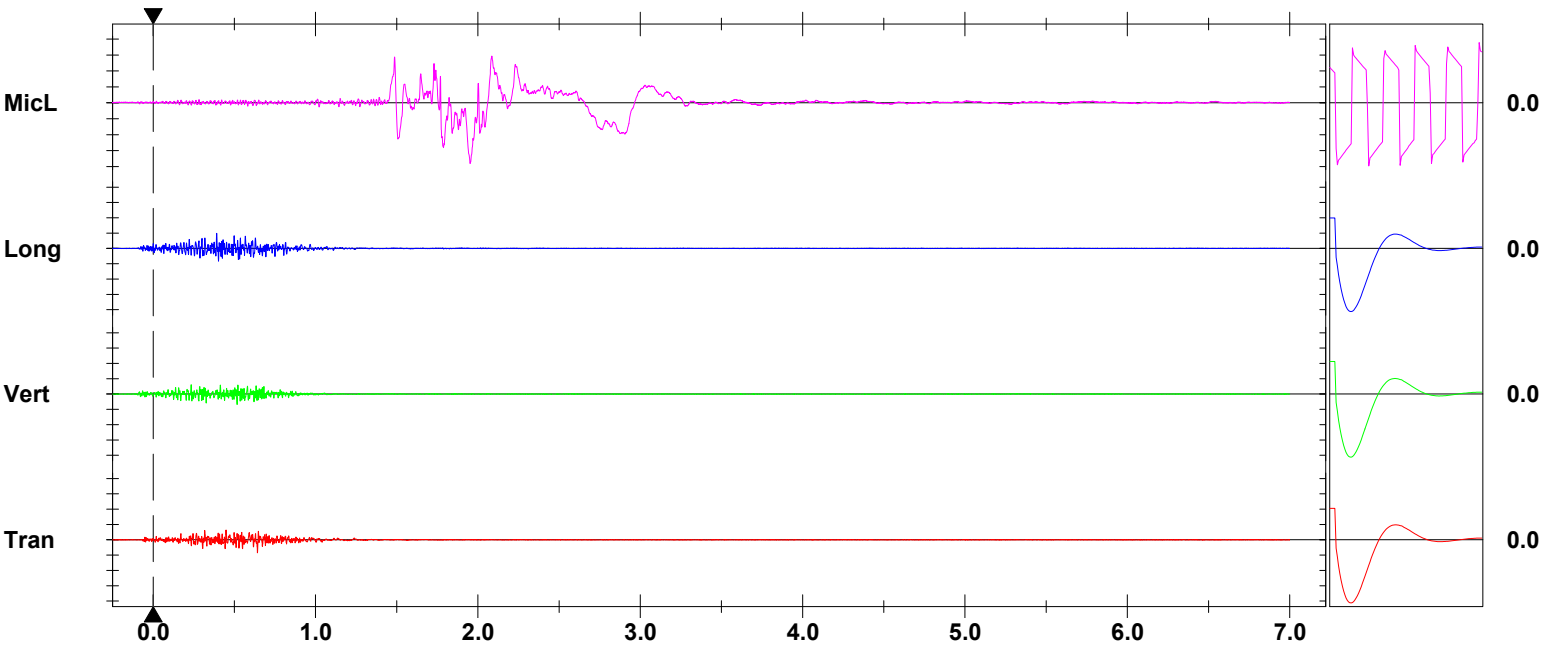
Post Event Notes
Location: Cottage - Route 820 (PW-03)
Blast No.: 2023-20
Project No: 234601.00

Microphone Linear Weighting
PSPL 111.6 dB(L) 7.618 pa.(L) at 1.952 sec
ZC Freq 2.9 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 1302 mv)

	Tran	Vert	Long	
PPV	1.695	1.364	1.970	mm/s
PPV	55.58	53.69	56.89	dB
ZC Freq	37	85	85	Hz
Time (Rel. to Trig)	0.642	0.517	0.392	sec
Peak Acceleration	0.137	0.118	0.097	g
Peak Displacement	0.005	0.003	0.005	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.5	7.3	Hz
Overswing Ratio	4.2	4.1	4.4	

Peak Vector Sum 1.995 mm/s at 0.392 sec





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

Event Report

Date/Time	Vert at 15:42:14 June 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/factory.MMB

Notes
Location:
Client:
User Name:
General:

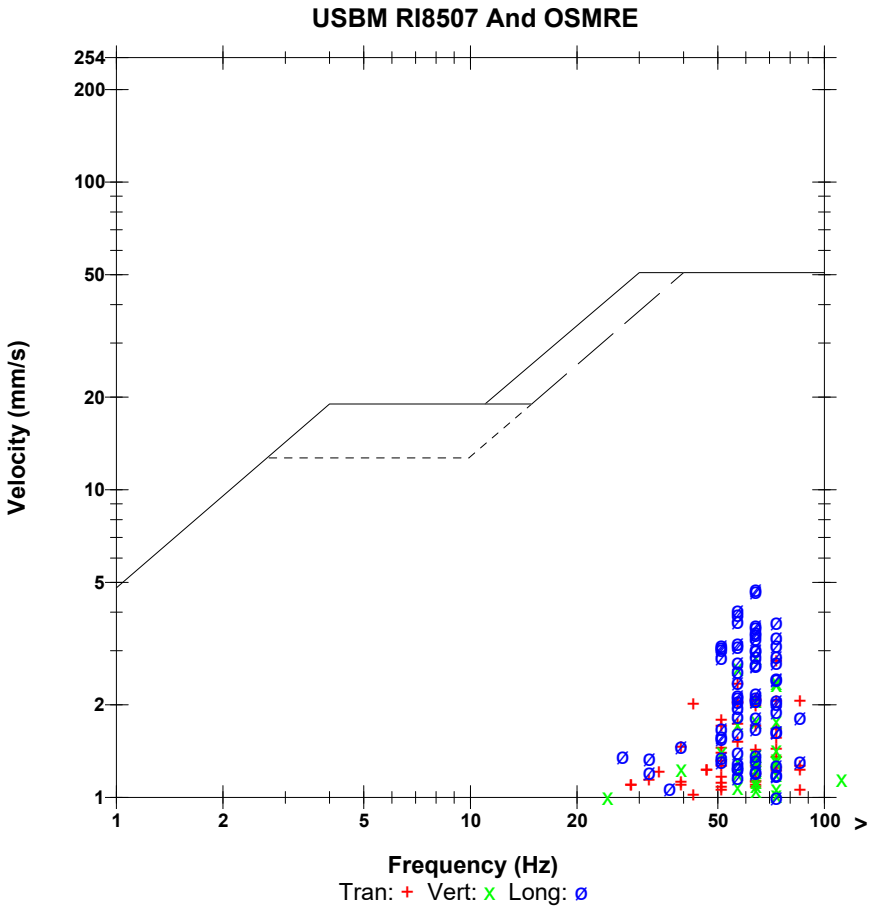
Serial Number	UM18187 V 10-90GC Micromate ISEE
Battery Level	3.8 Volts
Unit Calibration	May 12, 2023 by Instantel
File Name	UM18187_20230622154214.IDFW

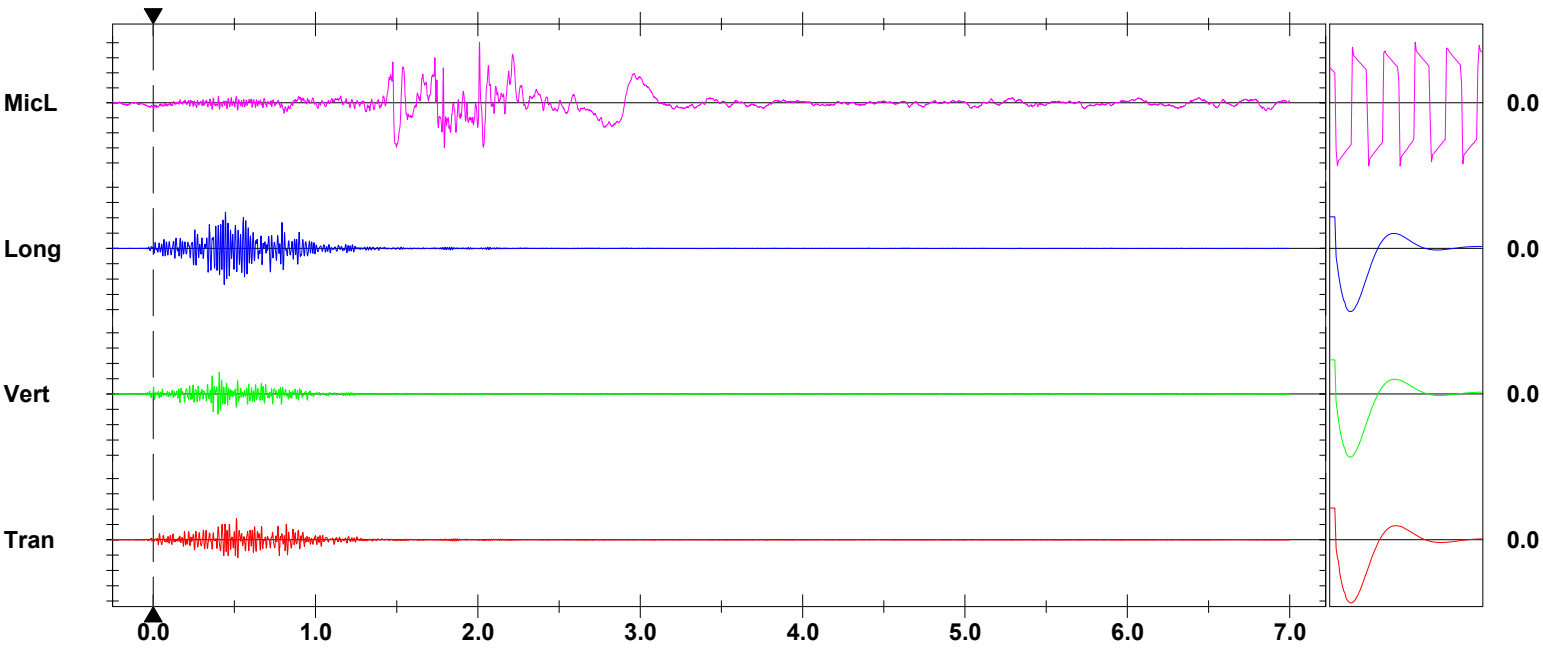
Post Event Notes
Location: Civic Number 2341 Route 820 (PW-05)
Blast No.: 2023-20
Project No: 234601.00

Microphone	Linear Weighting
PSPL	112.1 dB(L) 8.099 pa.(L) at 2.010 sec
ZC Freq	39 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 1331 mv)

	Tran	Vert	Long	
PPV	2.767	2.853	4.753	mm/s
PPV	59.84	60.11	64.54	dB
ZC Freq	73	64	64	Hz
Time (Rel. to Trig)	0.513	0.407	0.444	sec
Peak Acceleration	0.210	0.182	0.199	g
Peak Displacement	0.007	0.007	0.012	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.5	7.5	Hz
Overswing Ratio	4.5	4.3	4.2	

Peak Vector Sum 4.940 mm/s at 0.444 sec





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

Event Report

Date/Time Vert at 15:42:19 June 22, 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: June 22, 2023 17:43:07 (V10.72.1)

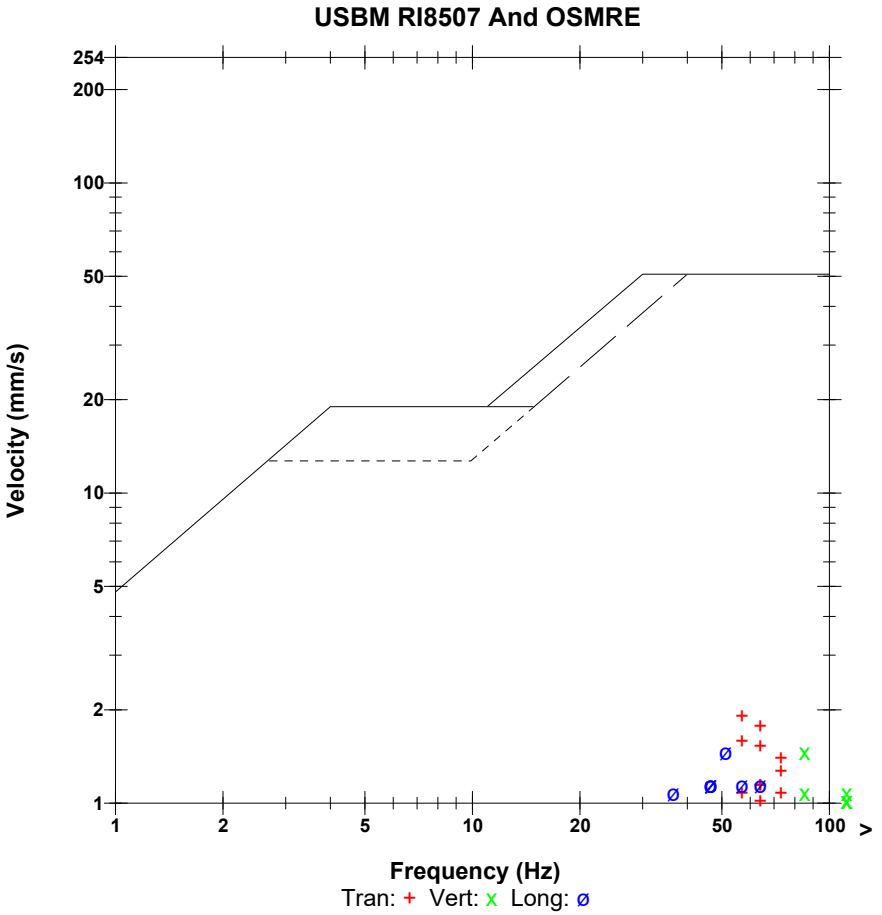
Extended Notes

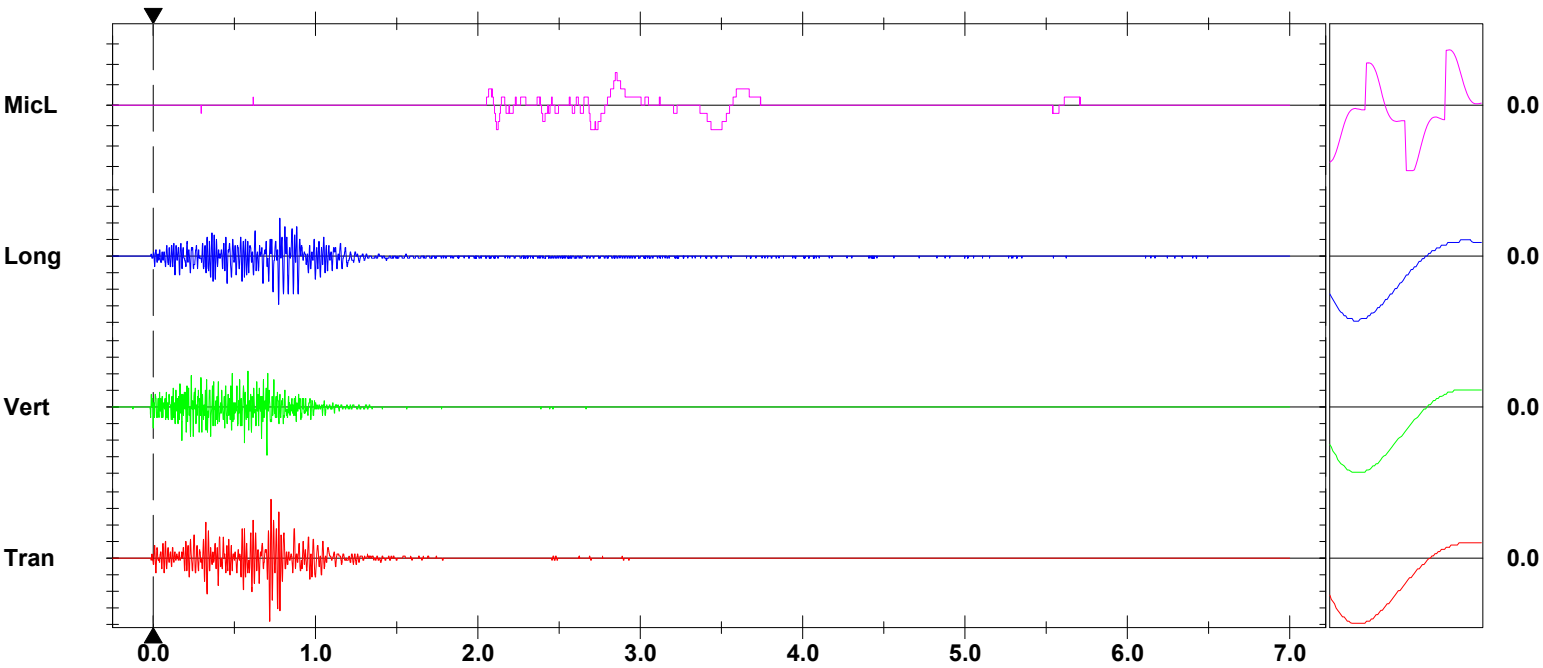
Microphone Linear Weighting
PSPL 112.0 dB(L) 8.000 pa.(L) at 2.848 sec
ZC Freq 2.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 449 mv)

	Tran	Vert	Long	
PPV	1.905	1.461	1.461	mm/s
PPV	56.60	54.29	54.29	dB
ZC Freq	57	85	51	Hz
Time (Rel. to Trig)	0.719	0.701	0.773	sec
Peak Acceleration	0.073	0.080	0.046	g
Peak Displacement	0.005	0.003	0.004	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.7	8.0	8.0	Hz
Overswing Ratio	3.7	3.5	3.7	

Peak Vector Sum 2.000 mm/s at 0.774 sec

Serial Number 5372 V 2.61 MiniMate
Battery Level 6.4 Volts
Unit Calibration February 28, 2023 by Instantel
File Name G372K2VF.MJ0
Post Event Notes
Location: Civic Number 50 Myron Road (PW-15)
Blast No.: 2023-20
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 =

Event Report

Date/Time Long at 15:41:08 June 22, 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: June 22, 2023 17:45:57 (V10.72.1)

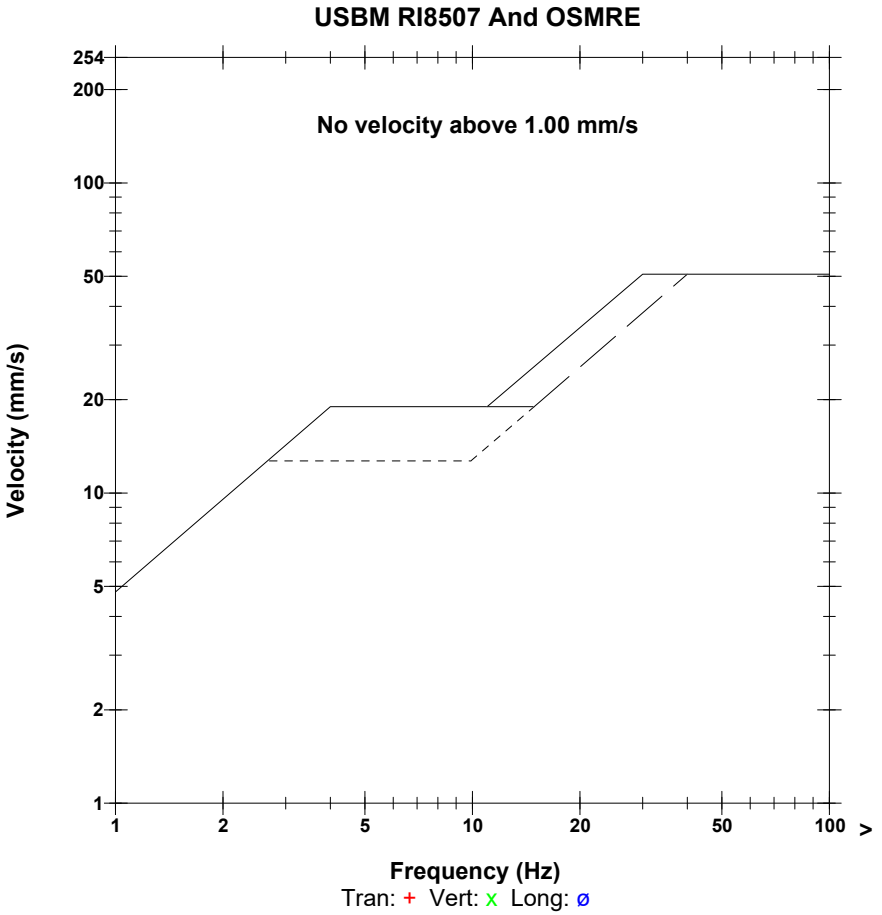
Extended Notes

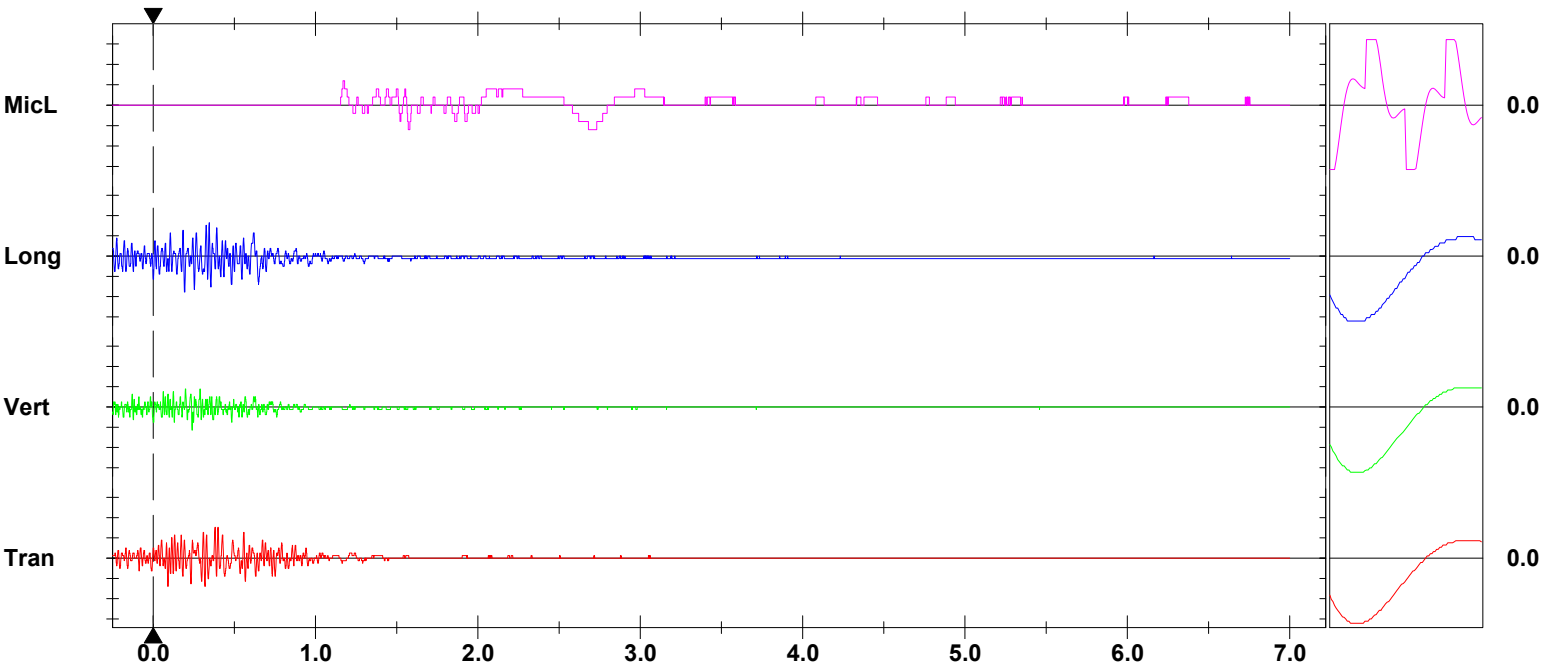
Microphone Linear Weighting
PSPL 109.5 dB(L) 6.000 pa.(L) at 1.170 sec
ZC Freq 10 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 299 mv)

	Tran	Vert	Long	
PPV	0.762	0.572	0.889	mm/s
PPV	48.64	46.14	49.98	dB
ZC Freq	39	32	43	Hz
Time (Rel. to Trig)	0.382	0.240	0.193	sec
Peak Acceleration	0.027	0.020	0.027	g
Peak Displacement	0.003	0.002	0.004	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.1	8.2	8.2	Hz
Overswing Ratio	3.8	3.3	3.7	

Peak Vector Sum 1.000 mm/s at 0.193 sec

Serial Number 5632 V 2.61 MiniMate
Battery Level 6.3 Volts
Unit Calibration November 16, 2022 by Instantel
File Name G632K2VF.KK0
Post Event Notes
Location: Civic Number 86 Myron Road (PW-16)
Blast No.: 2023-20
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 =

Event Report

Date/Time Vert at 15:42:15 June 22, 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: June 22, 2023 17:50:56 (V10.72.1)

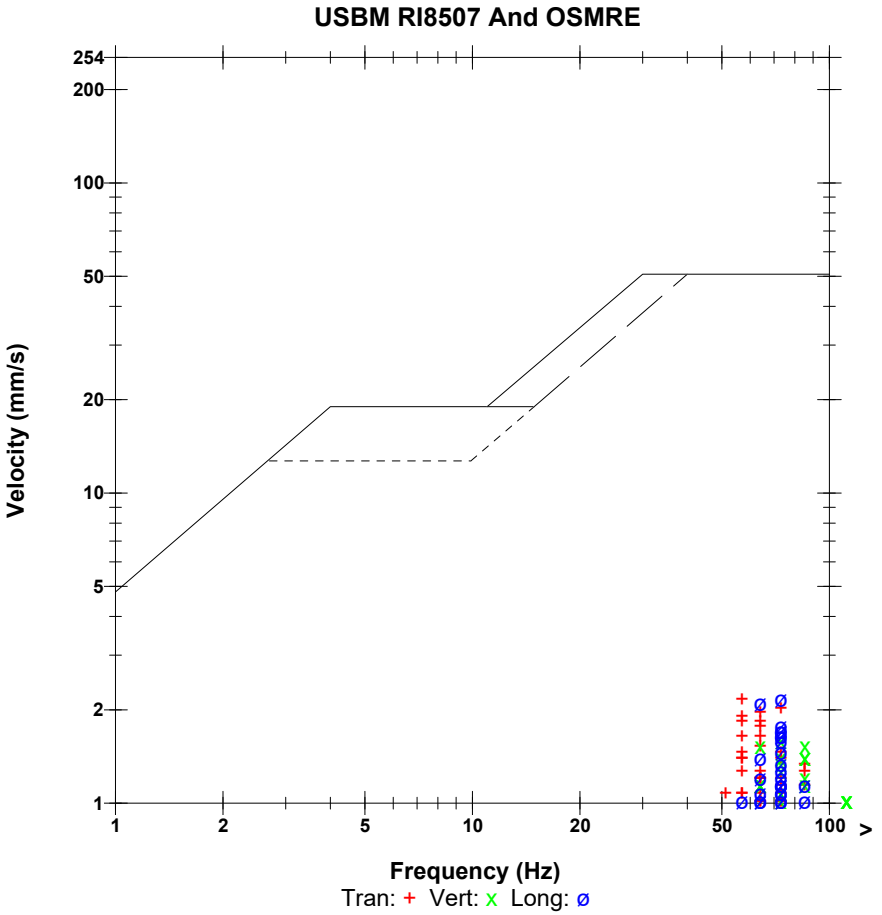
Extended Notes

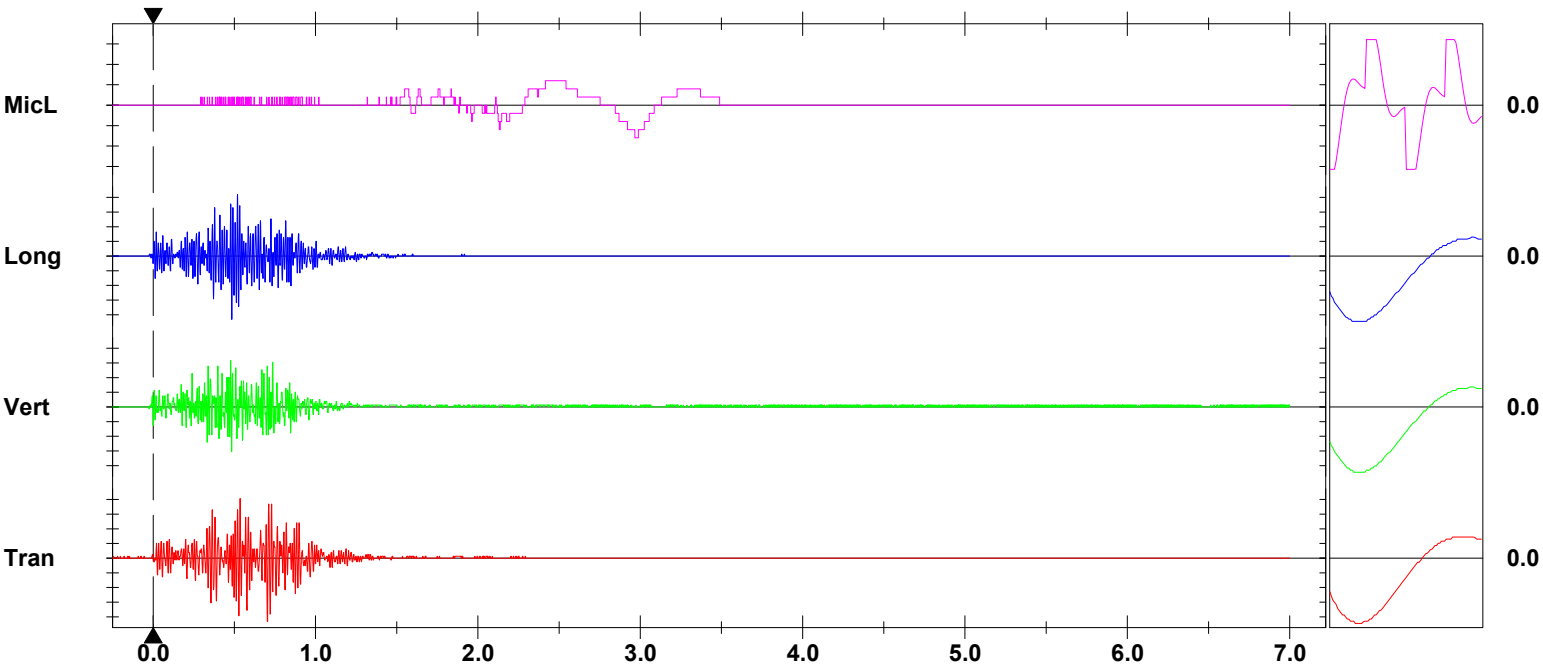
Microphone Linear Weighting
PSPL 112.0 dB(L) 8.000 pa.(L) at 2.968 sec
ZC Freq 2.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 300 mv)

	Tran	Vert	Long	
PPV	2.159	1.588	2.159	mm/s
PPV	57.69	55.01	57.69	dB
ZC Freq	64	73	73	Hz
Time (Rel. to Trig)	0.704	0.479	0.485	sec
Peak Acceleration	0.086	0.093	0.099	g
Peak Displacement	0.006	0.004	0.005	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.3	7.8	7.7	Hz
Overswing Ratio	3.1	3.2	3.6	

Peak Vector Sum 2.667 mm/s at 0.521 sec

Serial Number 5635 V 2.61 MiniMate
Battery Level 6.0 Volts
Unit Calibration March 8, 2023 by Instantel
File Name G635K2VF.MF0
Post Event Notes
Location: Civic Number 2337 Route 820 (PW-04)
Blast No.: 2023-20
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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June 28, 2023

Project No.: 234601.00

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

Re: Blast Vibration Monitoring – Blast No. 2023-21 – 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 13:58 on June 27, 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. 2023-21 – June 27, 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)	13:58	1,340 m S	< 0.5 mm/s	<120	Unit was not triggered
2. Civic No. 4126 Route 111 (PW-10)		906 m S	0.51 mm/s @ 64 Hz	99	-
3. Civic No. 4150 Route 111 (PW-13)		734 m SE	0.58 mm/s @ 73 Hz	101	-
4. Civic No. 2447 Route 820 (PW-07)		893 m NE	0.76 mm/s @ 39 Hz	112	-
5. PW-03 - Cottage Route 820		652 m N	< 0.5 mm/s	<120	Unit was not triggered
6. Civic No. 2341 Route 820 (PW-05)		670 m NW	0.74 mm/s @ 51 Hz	111	-
7. Civic No. 50 Myron Road (PW-15)		914 m NW	< 0.5 mm/s	<120	Units were not triggered
8. Civic No. 86 Myron Road (PW-16)		854 m W	< 0.5 mm/s	<120	
9. Civic No. 220 Myron Road (PW-01)		1,360 m S	< 0.5 mm/s	<120	
10. Civic No. 2337 Route 820 (PW-04)		761 m NW	< 0.5 mm/s	<120	
11. Civic No. 4140 Route 111 (PW-12)		828 m S	0.89 mm/s @ 47 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

Attachment A

Blast Record

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 27, 2023
Project No.:	234601.00	**Time of Blast:**	13:58
Inspector:	J. Yuzda	**Blast No.:**	2023-21
Client:	Hammond River Holdings		

IDENTIFICATION:

Blasting Contractor:	Gulf Operators Ltd.		
Blaster's Certification No.:	1318	**Blaster's Name:**	Daniel Blanchard
Blast Location:	N 45º28'54.3" W 65º38'04.4" (see attached sketch)		
Type of Rock:	Anhydrate/Gypsum	**Est. Vol. or Tonnage:**	9,087 tonnes
Weather at time of Blast:	Rain	**Air Temp.:**	20ºC
Est. Wind Speed :	≈ 15 km/h	**Wind Direction:**	NW
Cloud Cover:	Yes – overcast	**Precipitation:**	Yes

BLAST DESIGN:

Total No. Holes:	70	**Hole Diameter:**	4.5"
Average Depth:	5.6 m – 6.2 m	**Spacing:**	11 ft x11 ft
No. Holes per Delay:	3	**Collar Length:**	7 ft
Delay between Holes:	25 ms	**Delay between Rows:**	34, 42 & 67 ms
Initiation Method:	Non-Electric		
Weight of Explosives per Delay:	Max.: 154 kg		
Type and weight of Explosives for Blast:	3,190 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:**	June 27, 2023
Project No.:	234601.00	**Time of Blast:**	13:58
Inspector:	J. Yuzda	**Blast No.:**	2023-21
Client:	Hammond River Holdings		

BLAST MONITORING

Distance to the Nearest Structure:	652 m
Direction to the Nearest Structure:	North
Structure Type:	Cottage
Scaled Distance Factor: (distance / sq. rt. of max. wt. per delay):	52.5

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:**	June 27, 2023
Project No.:	234601.00	**Time of Blast:**	13:58
Inspector:	J. Yuzda	**Blast No.:**	2023-21
Client:	Hammond River Holdings		

Data Collection – Seismometer #1

Make, Model and Serial # of unit:	Instantel Micromate, Serial #20204
Calibration Date:	June 12, 2023
Location of seismograph:	Civic Number 4079 Route 111 (PW-09)
Distance and Direction from Blast:	1,340 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 23, 2022
Location of seismograph:	Civic Number 4126 Route 111 (PW-10)
Distance and Direction from Blast:	906 m South
Transverse Particle Velocity:	0.38 mm/s @ 64 Hz
Vertical Particle Velocity:	0.51 mm/s @ 64 Hz
Longitudinal Particle Velocity:	0.38 mm/s @ 51 Hz
Peak Particle Velocity:	0.51 mm/s @ 64 Hz
Maximum Airblast:	99 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 27, 2023
Project No.:	234601.00	**Time of Blast:**	13:58
Inspector:	J. Yuzda	**Blast No.:**	2023-21
Client:	Hammond River Holdings		

Data Collection – Seismometer #3

Make, Model and Serial # of unit:	Instantel Micromate, Serial #20206
Calibration Date:	June 9, 2023
Location of seismograph:	Civic Number 4150 Route 111 (PW-13)
Distance and Direction from Blast:	734 m Southeast
Transverse Particle Velocity:	0.29 mm/s @ 51 Hz
Vertical Particle Velocity:	0.58 mm/s @ 73 Hz
Longitudinal Particle Velocity:	0.54 mm/s @ 51 Hz
Peak Particle Velocity:	0.58 mm/s @ 73 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:	893 m Northeast
Transverse Particle Velocity:	0.64 mm/s @ 43 Hz
Vertical Particle Velocity:	0.32 mm/s @ 57 Hz
Longitudinal Particle Velocity:	0.76 mm/s @ 39 Hz
Peak Particle Velocity:	0.76 mm/s @ 39 Hz
Maximum Airblast:	112 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 27, 2023
Project No.:	234601.00	**Time of Blast:**	13:58
Inspector:	J. Yuzda	**Blast No.:**	2023-21
Client:	Hammond River Holdings		

Data Collection – Seismometer #5

Make, Model and Serial # of unit:	Instantel Micromate, Serial #20205
Calibration Date:	May 30, 2023
Location of seismograph:	Cottage - PW-03 - Route 820
Distance and Direction from Blast:	652 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:	670 m Northwest
Transverse Particle Velocity:	0.57 mm/s @ 73 Hz
Vertical Particle Velocity:	0.74 mm/s @ 51 Hz
Longitudinal Particle Velocity:	0.65 mm/s @ 39 Hz
Peak Particle Velocity:	0.74 mm/s @ 51 Hz
Maximum Airblast:	111 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 27, 2023
Project No.:	234601.00	**Time of Blast:**	13:58
Inspector:	J. Yuzda	**Blast No.:**	2023-21
Client:	Hammond River Holdings		

Data Collection – Seismometer #7

Make, Model and Serial # of unit:	Instantel Micromate, Serial #18187
Calibration Date:	May 12, 2023
Location of seismograph:	Civic Number 50 Myron Road (PW-15)
Distance and Direction from Blast:	914 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 Minimate, Serial #5635
Calibration Date:	March 8, 2023
Location of seismograph:	Civic Number 86 Myron Road (PW-16)
Distance and Direction from Blast:	854 m West
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:**	June 27, 2023
Project No.:	234601.00	**Time of Blast:**	13:58
Inspector:	J. Yuzda	**Blast No.:**	2023-21
Client:	Hammond River Holdings		

Data Collection – Seismometer #9

Make, Model and Serial # of unit:	Instantel Minimate, Serial #21349
Calibration Date:	July 20, 2022
Location of seismograph:	Civic Number 220 Myron Road (PW-01)
Distance and Direction from Blast:	1,360 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 Micromate, Serial #20203
Calibration Date:	May 30, 2023
Location of seismograph:	Civic Number 2337 Route 820 (PW-04)
Distance and Direction from Blast:	761 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:**	June 27, 2023
Project No.:	234601.00	**Time of Blast:**	13:58
Inspector:	J. Yuzda	**Blast No.:**	2023-21
Client:	Hammond River Holdings		

Data Collection – Seismometer #11

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5676
Calibration Date:	March 8, 2023
Location of seismograph:	Civic Number 4140 Route 111 (PW-12)
Distance and Direction from Blast:	828 m South
Transverse Particle Velocity:	0.89 mm/s @ 47 Hz
Vertical Particle Velocity:	0.64 mm/s @ 51 Hz
Longitudinal Particle Velocity:	0.76 mm/s @ 57 Hz
Peak Particle Velocity:	0.89 mm/s @ 47 Hz
Maximum Airblast:	100 dB(L)

Attachment B

Blast and Seismograph Location Plan

Blast and Seismograph Location Plan
Blast No: 2023-21
Upham East Gypsum Quarry, Upham, NB

Date: June 28, 2023
Project No.: 234601.00

Attachment C

Blast Event Reports

Event Report

Date/Time Vert at 13:57:37 June 27, 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

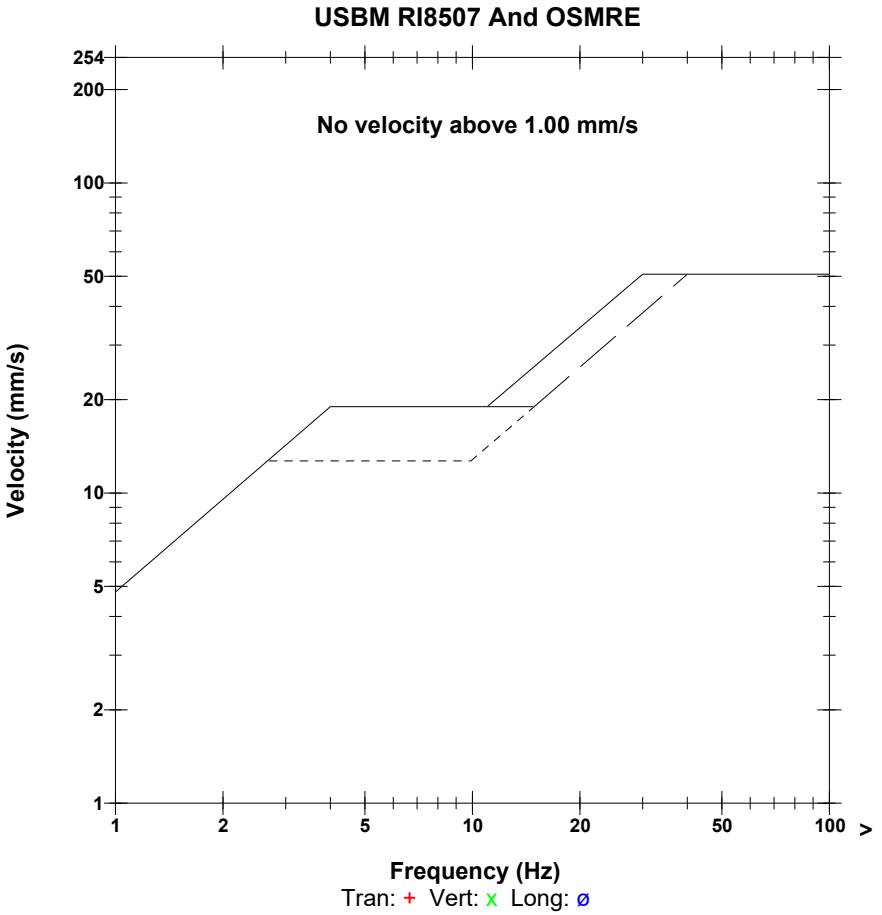
Notes

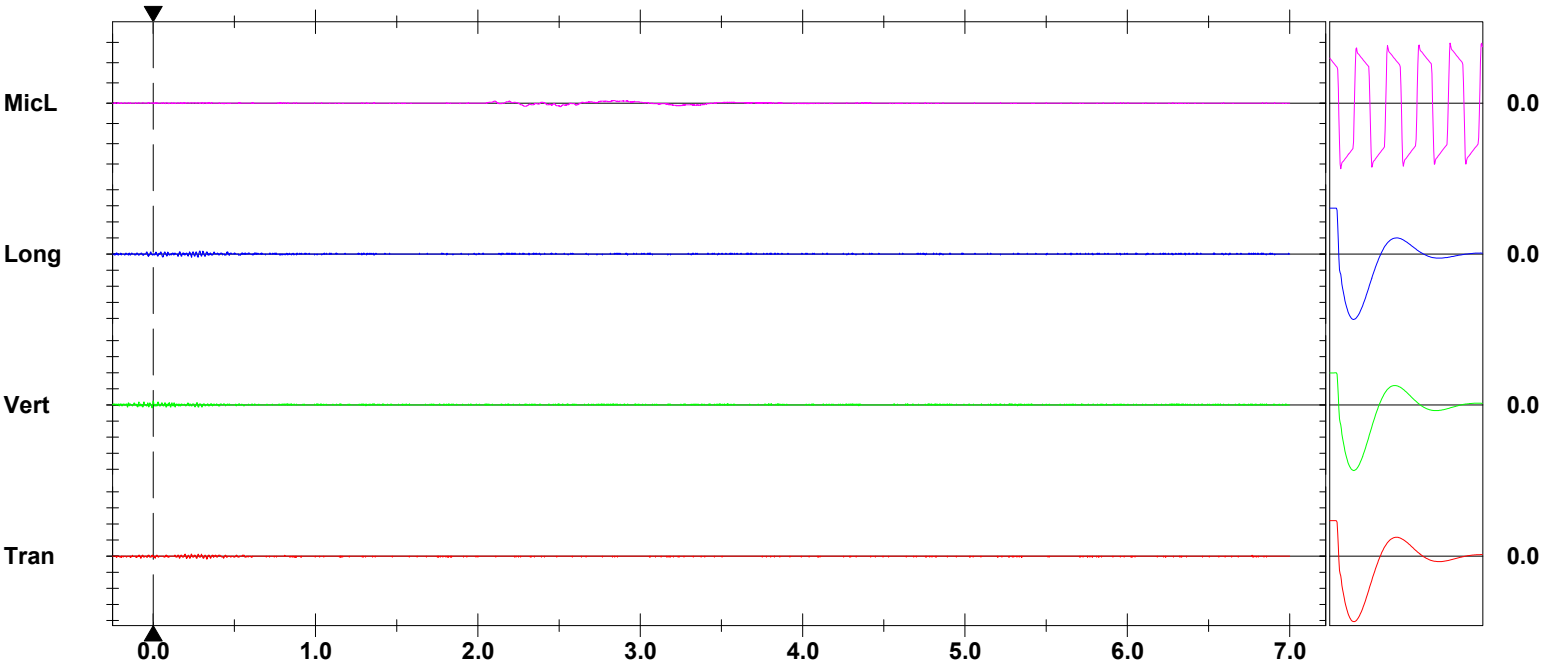
Serial Number BE21348 V 10.72-1.1 Minimate Blaster
Battery Level 6.1 Volts
Unit Calibration July 21, 2022 by Instantel
File Name W348K32P.G10
Post Event Notes
Location: Civic Number 4126 Route 111 (PW-10)
Blast No.: 2023-21
Project No: 234601.00

Microphone Linear Weighting
PSPL 98.8 dB(L) 1.750 pa.(L) at 2.504 sec
ZC Freq 5.4 Hz
Channel Test Passed (Freq = 19.7 Hz Amp = 549 mv)

	Tran	Vert	Long	
PPV	0.381	0.508	0.381	mm/s
PPV	42.62	45.12	42.62	dB
ZC Freq	64	64	51	Hz
Time (Rel. to Trig)	0.330	0.000	0.059	sec
Peak Acceleration	0.013	0.027	0.027	g
Peak Displacement	0.001	0.001	0.001	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.6	7.4	Hz
Overswing Ratio	3.5	3.4	4.1	

Peak Vector Sum 0.524 mm/s at 0.277 sec





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

Event Report

Date/Time Long at 13:58:23 June 27, 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/factory.MMB

Notes
Location:
Client:
User Name:
General:

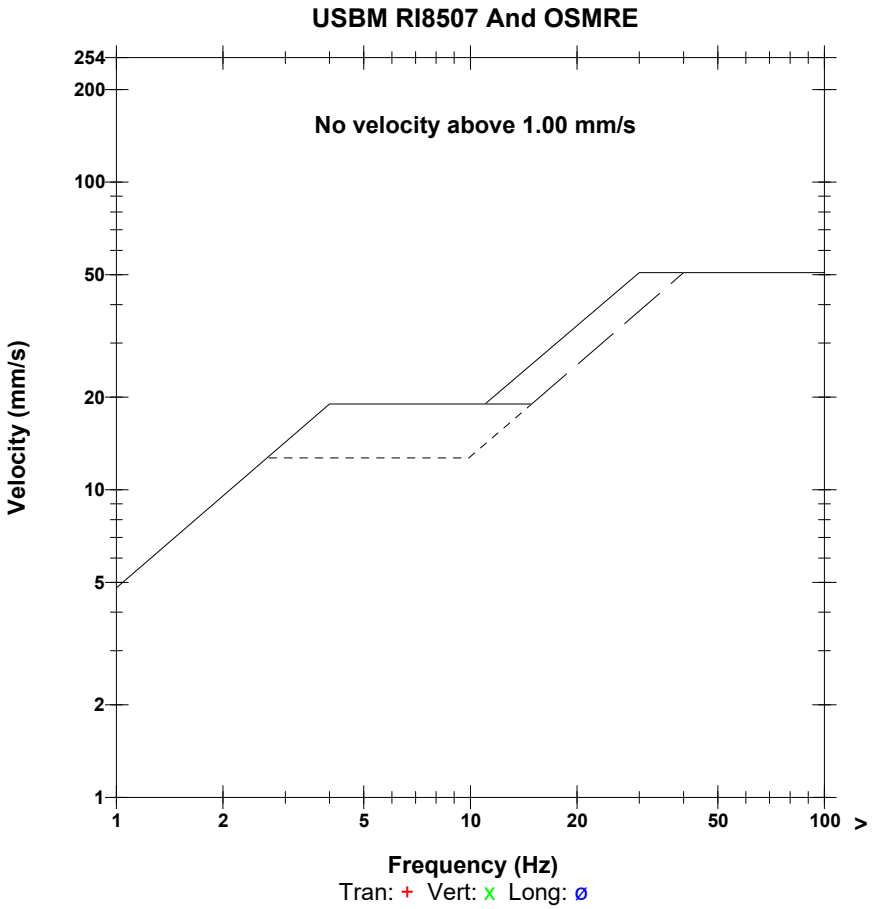
Serial Number UM20206 V 10-90GC Micromate ISEE
Battery Level 3.8 Volts
Unit Calibration June 9, 2023 by Instantel
File Name UM20206_20230627135823.IDFW

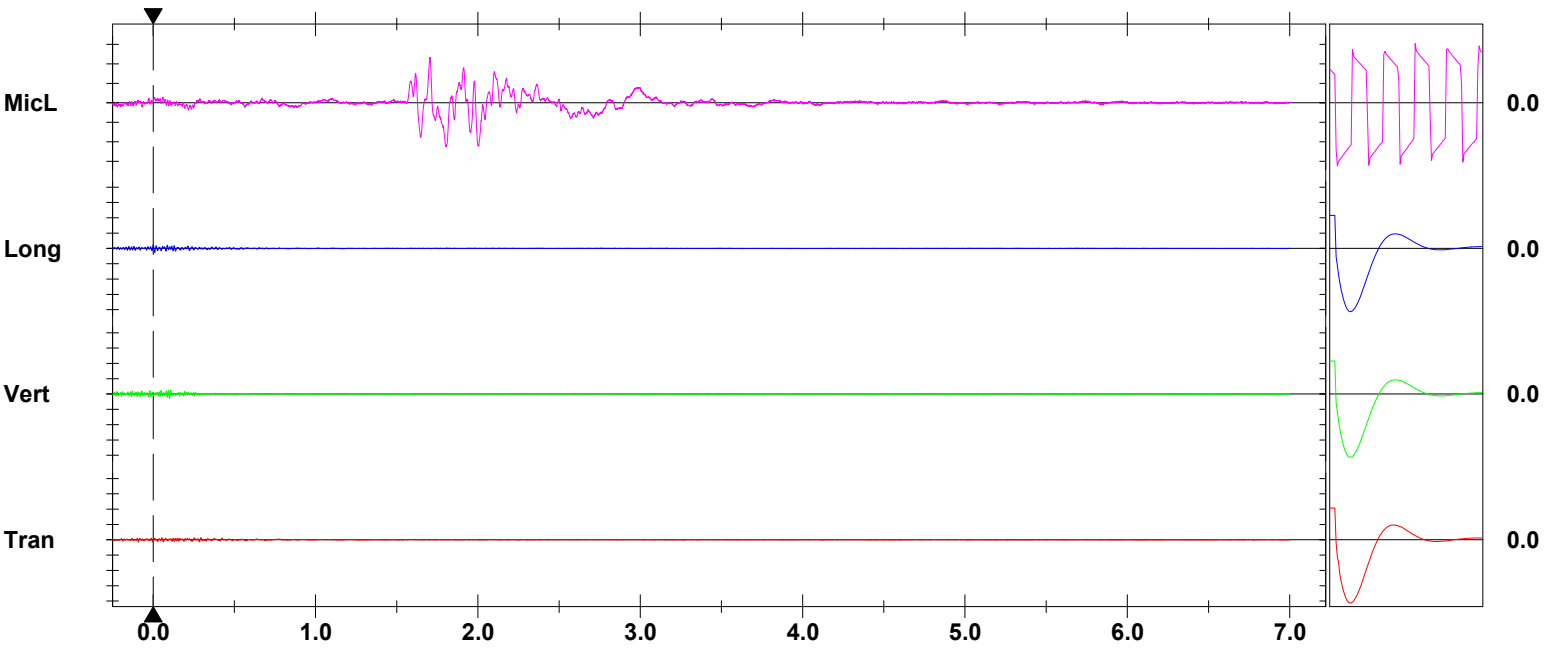
Post Event Notes
Location: Civic Number 4150 Route 111 (PW-13)
Blast No.: 2023-21
Project No: 234601.00

Microphone Linear Weighting
PSPL 101.4 dB(L) 2.343 pa.(L) at 1.704 sec
ZC Freq 10 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 1396 mv)

	Tran	Vert	Long	
PPV	0.292	0.575	0.536	mm/s
PPV	40.30	46.20	45.58	dB
ZC Freq	51	73	51	Hz
Time (Rel. to Trig)	0.054	0.101	0.009	sec
Peak Acceleration	0.018	0.027	0.028	g
Peak Displacement	0.001	0.001	0.002	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.3	7.5	Hz
Overswing Ratio	4.3	4.5	4.3	

Peak Vector Sum 0.615 mm/s at 0.101 sec





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

Event Report

Date/Time Long at 13:58:13 June 27, 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: June 27, 2023 15:35:19 (V10.72.1)

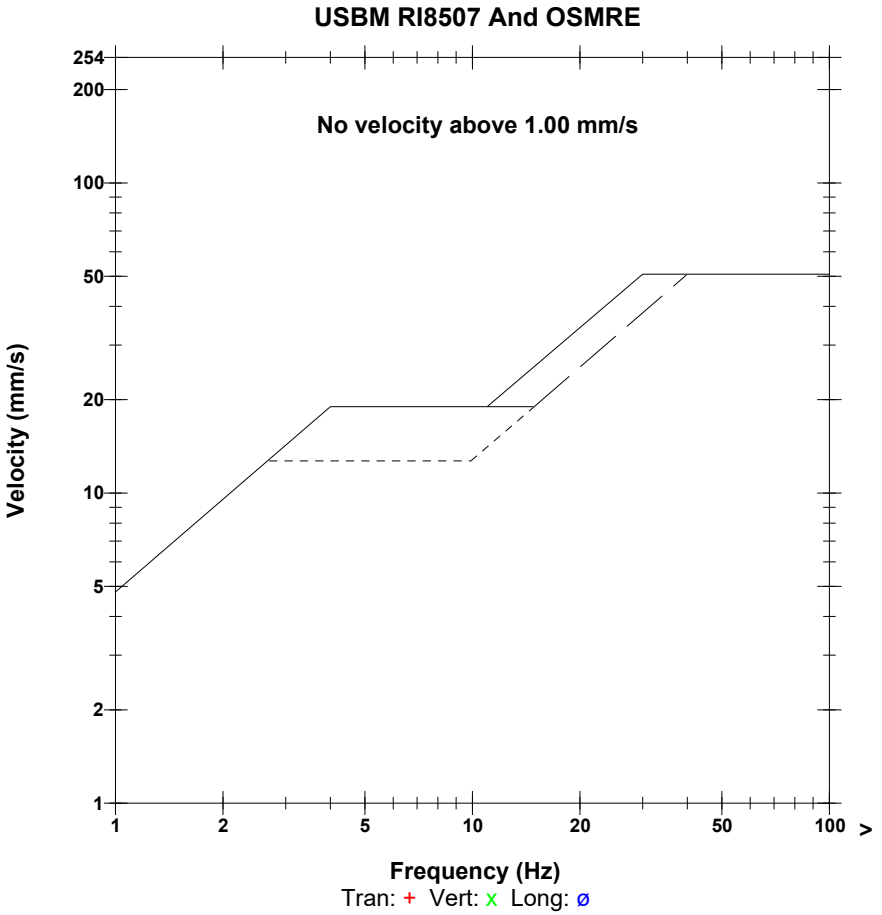
Extended Notes

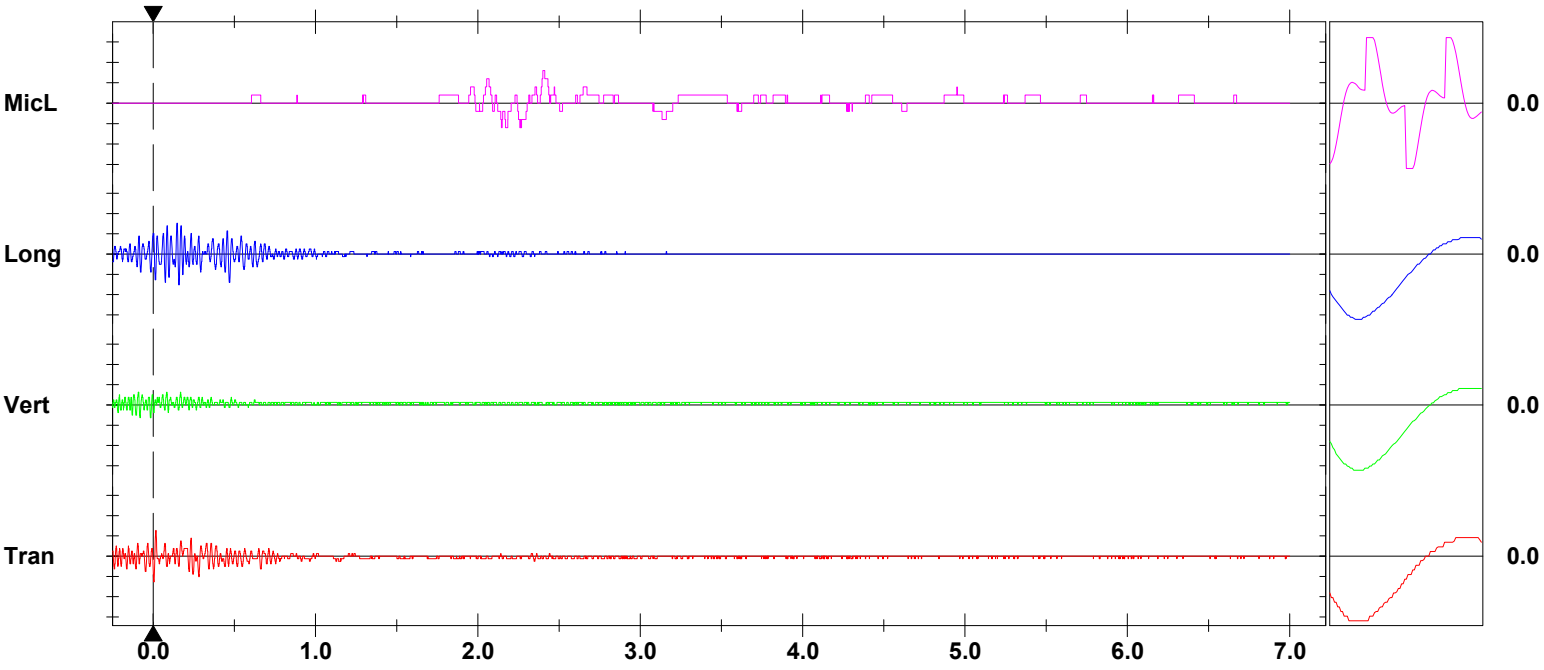
Microphone Linear Weighting
PSPL 112.0 dB(L) 8.000 pa.(L) at 2.400 sec
ZC Freq 9.1 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 284 mv)

	Tran	Vert	Long	
PPV	0.635	0.318	0.762	mm/s
PPV	47.06	41.03	48.64	dB
ZC Freq	43	57	39	Hz
Time (Rel. to Trig)	0.006	-0.014	0.147	sec
Peak Acceleration	0.020	0.013	0.027	g
Peak Displacement	0.003	0.001	0.003	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.8	7.7	7.7	Hz
Overswing Ratio	3.6	4.0	4.0	

Peak Vector Sum 0.857 mm/s at 0.016 sec

Serial Number 5489 V 2.61 MiniMate
Battery Level 6.5 Volts
Unit Calibration May 5, 2023 by Instantel
File Name G489K34K.510
Post Event Notes
Location: Civic Number 2447 Route 820 (PW-07)
Blast No.: 2023-21
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 =

Event Report

Date/Time Vert at 13:58:19 June 27, 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/factory.MMB

Notes
Location:
Client:
User Name:
General:

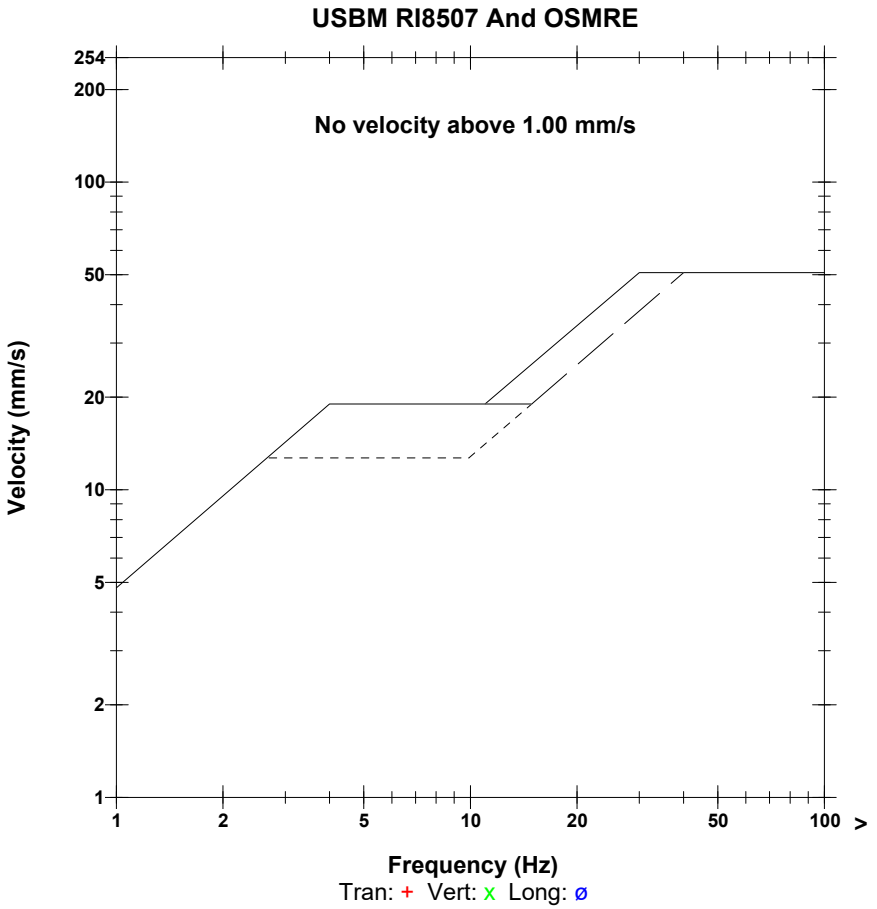
Serial Number UM18193 V 10-90GC Micromate ISEE
Battery Level 3.6 Volts
Unit Calibration May 12, 2023 by Instantel
File Name UM18193_20230627135819.IDFW

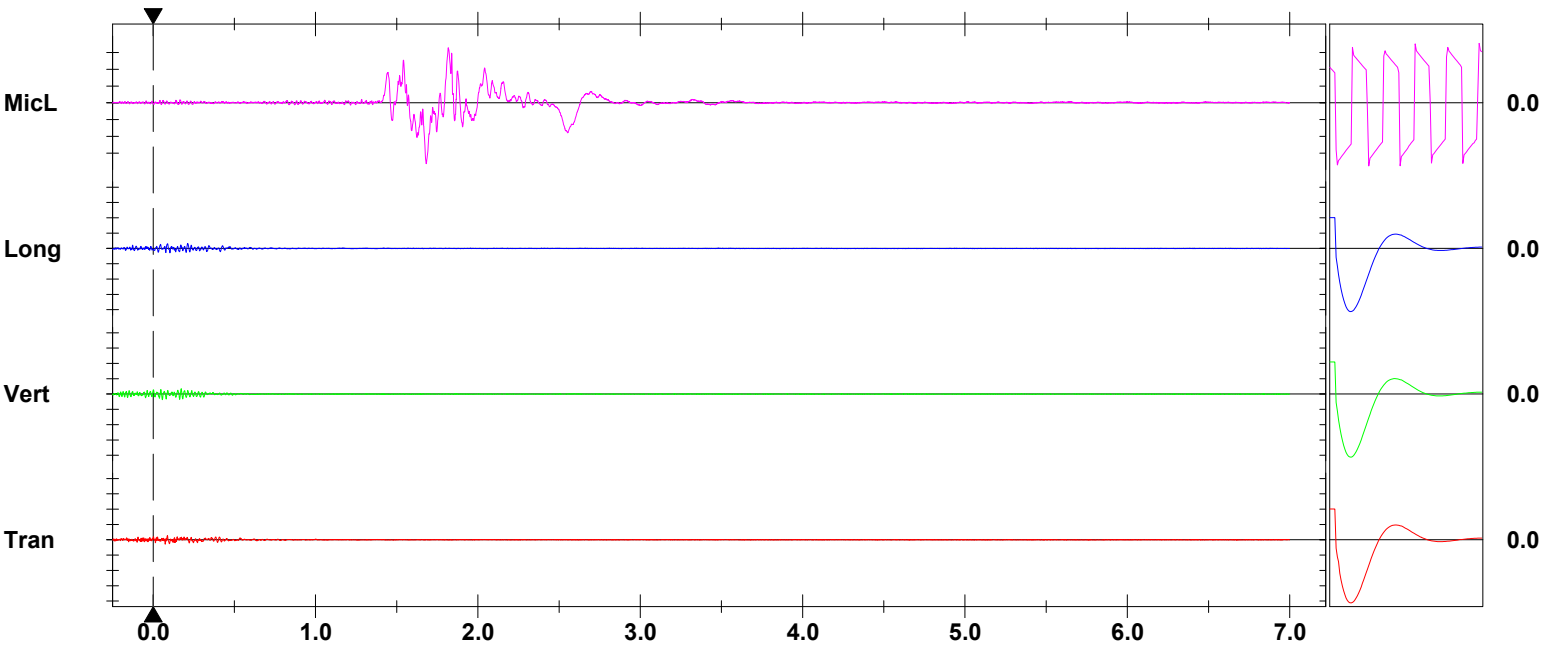
Post Event Notes
Location: Civic Number 2341 Route 820 (PW-05)
Blast No.: 2023-21
Project No: 234601.00

Microphone Linear Weighting
PSPL 111.2 dB(L) 7.246 pa.(L) at 1.682 sec
ZC Freq 2.7 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 1400 mv)

	Tran	Vert	Long	
PPV	0.567	0.741	0.654	mm/s
PPV	46.08	48.40	47.31	dB
ZC Freq	73	51	39	Hz
Time (Rel. to Trig)	0.074	0.057	0.212	sec
Peak Acceleration	0.043	0.039	0.025	g
Peak Displacement	0.002	0.002	0.003	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.5	7.3	Hz
Overswing Ratio	4.3	4.1	4.4	

Peak Vector Sum 0.892 mm/s at 0.088 sec





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

Event Report

Date/Time Tran at 13:58:17 June 27, 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: June 27, 2023 15:33:08 (V10.72.1)

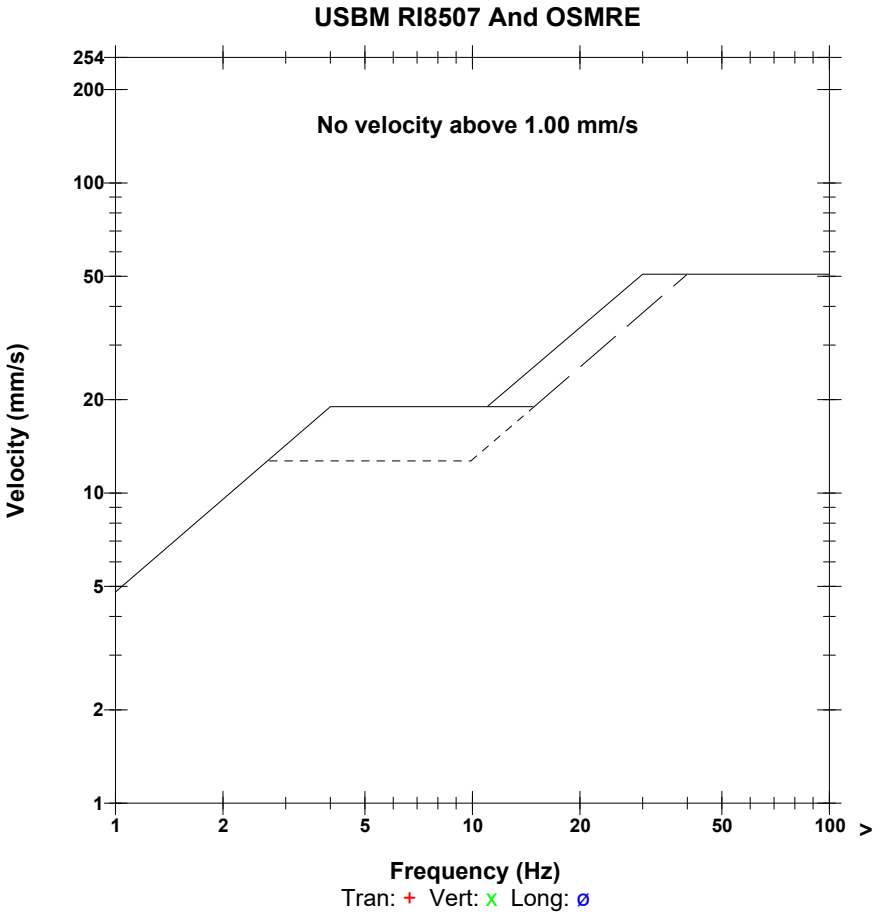
Extended Notes

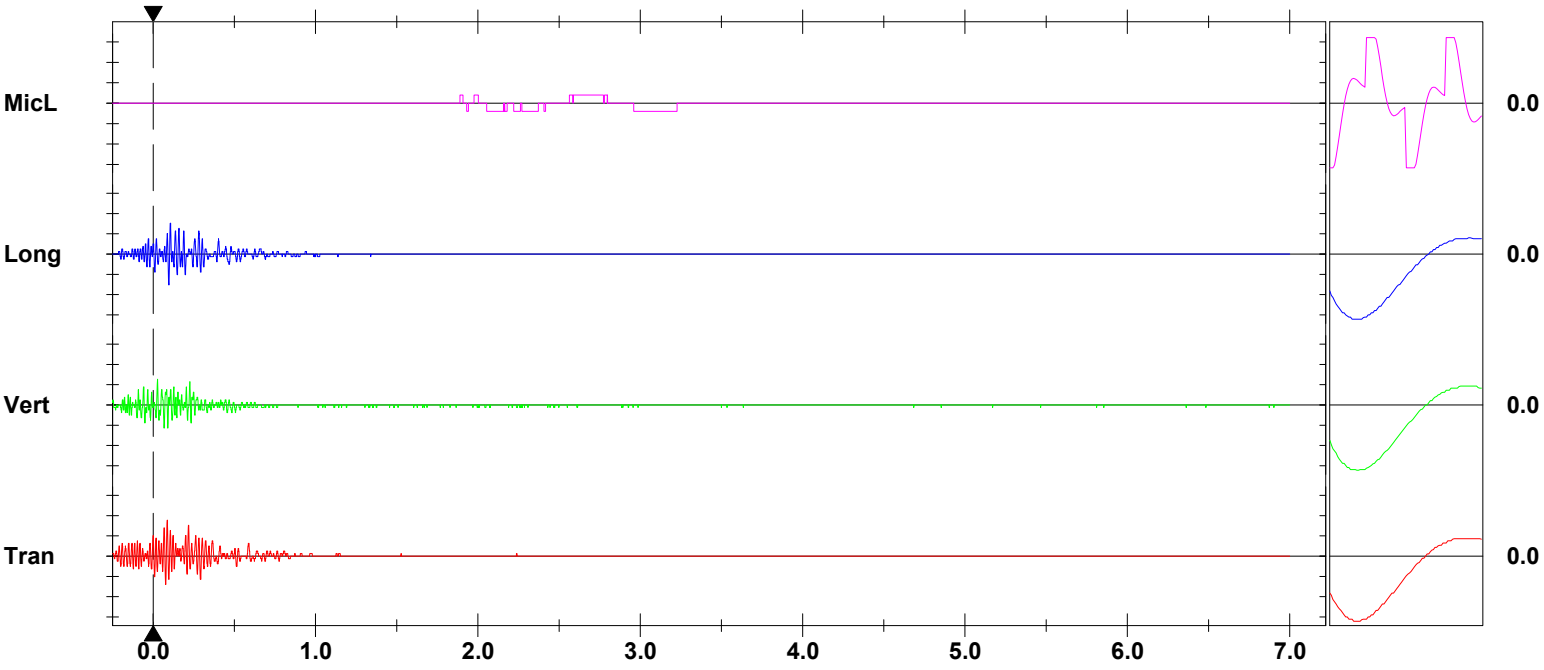
Microphone Linear Weighting
PSPL 100.0 dB(L) 2.000 pa.(L) at 1.891 sec
ZC Freq 27 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 302 mv)

	Tran	Vert	Long	
PPV	0.889	0.635	0.762	mm/s
PPV	49.98	47.06	48.64	dB
ZC Freq	47	51	57	Hz
Time (Rel. to Trig)	0.087	0.028	0.097	sec
Peak Acceleration	0.027	0.020	0.027	g
Peak Displacement	0.003	0.002	0.002	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.1	8.0	7.8	Hz
Overswing Ratio	3.8	3.6	3.9	

Peak Vector Sum 1.048 mm/s at 0.106 sec

Serial Number 5676 V 2.61 MiniMate
Battery Level 6.1 Volts
Unit Calibration March 8, 2023 by Instantel
File Name G676K34K.550
Post Event Notes
Location: Civic Number 4140 Route 111 (PW-12)
Blast No.: 2023-21
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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June 5, 2023

Project No.: 234601.00

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

Re: Blast Vibration Monitoring – Blast No. 2023-16 – 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 14:25 on June 2, 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. 2023-16 – June 2, 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)	14:25	1,270 m S	< 0.5 mm/s	<120	Units were not triggered
2. Civic No. 4126 Route 111 (PW-10)		851 m S	< 0.5 mm/s	<120	
3. Civic No. 4150 Route 111 (PW-13)		691 m SE	1.65 mm/s @ 73 Hz	112	-
4. Civic No. 2447 Route 820 (PW-07)		875 m NE	2.03 mm/s @ 27 Hz	97	-
5. PW-03 - Cottage Route 820		677 m N	< 1.0 mm/s	<120	Unit was not triggered
6. Civic No. 2341 Route 820 (PW-05)		691 m NW	0.96 mm/s @ 13 Hz	103	-
7. Civic No. 50 Myron Road (PW-15)		967 m NW	< 0.5 mm/s	<120	Unit was not triggered
8. Civic No. 86 Myron Road (PW-16)		797 m W	1.03 mm/s @ 13 Hz	109	-
9. Civic No. 220 Myron Road (PW-01)		1,320 m SW	< 0.5 mm/s	<120	Units were not triggered
10. Civic No. 2337 Route 820 (PW-04)		750 m NW	< 0.5 mm/s	<120	
11. Civic No. 4140 Route 111 (PW-12)		767 m S	< 1.0 mm/s	<120	
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

Attachment A

Blast Record

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 2, 2023
Project No.:	234601.00	**Time of Blast:**	14:25
Inspector:	S. Carroll	**Blast No.:**	2023-16
Client:	Hammond River Holdings		

IDENTIFICATION:

Blasting Contractor:	Gulf Operators Ltd.		
Blaster's Certification No.:	1318	**Blaster's Name:**	Daniel Blanchard
Blast Location:	N 45º28'52.08" W 65º37'58.04" (see attached sketch)		
Type of Rock:	Anhydrate/Gypsum	**Est. Vol. or Tonnage:**	16,925 tonnes
Weather at time of Blast:	Sunny with clouds	**Air Temp.:**	15ºC
Est. Wind Speed :	≈ 20 km/h	**Wind Direction:**	S
Cloud Cover:	Yes - ≈ 50%	**Precipitation:**	No

BLAST DESIGN:

Total No. Holes:	153	**Hole Diameter:**	4.5"
Average Depth:	5.4 m – 7.2 m	**Spacing:**	10 ft x 10 ft
No. Holes per Delay:	3	**Collar Length:**	7 ft
Delay between Holes:	25 ms	**Delay between Rows:**	42, 59, 67 & 84 ms
Initiation Method:	Non-Electric		
Weight of Explosives per Delay:	Max.: 113 kg		
Type and weight of Explosives for Blast:	6,242 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:**	June 2, 2023
Project No.:	234601.00	**Time of Blast:**	14:25
Inspector:	S. Carroll	**Blast No.:**	2023-16
Client:	Hammond River Holdings		

BLAST MONITORING

Distance to the Nearest Structure:	677 m
Direction to the Nearest Structure:	N
Structure Type:	Cottage
Scaled Distance Factor: (distance / sq. rt. of max. wt. per delay):	63.7

SAFETY:

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

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

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 2, 2023
Project No.:	234601.00	**Time of Blast:**	14:25
Inspector:	S. Carroll	**Blast No.:**	2023-16
Client:	Hammond River Holdings		

Data Collection – Seismometer #1

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5632
Calibration Date:	November 16, 2022
Location of seismograph:	Civic Number 4079 Route 111 (PW-09)
Distance and Direction from Blast:	1,270 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:	851 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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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 2, 2023
Project No.:	234601.00	**Time of Blast:**	14:25
Inspector:	S. Carroll	**Blast No.:**	2023-16
Client:	Hammond River Holdings		

Data Collection – Seismometer #3

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5676
Calibration Date:	March 8, 2023
Location of seismograph:	Civic Number 4150 Route 111 (PW-13)
Distance and Direction from Blast:	691 m Southeast
Transverse Particle Velocity:	1.59 mm/s @ 47 Hz
Vertical Particle Velocity:	1.65 mm/s @ 73 Hz
Longitudinal Particle Velocity:	0.89 mm/s @ 51 Hz
Peak Particle Velocity:	1.65 mm/s @ 73 Hz
Maximum Airblast:	112 dB(L)

Data Collection – Seismometer #4

Make, Model and Serial # of unit:	Instantel Micromate, Serial #20206
Calibration Date:	May 31, 2022
Location of seismograph:	Civic Number 2447 Route 820 (PW-07)
Distance and Direction from Blast:	875 m Northeast
Transverse Particle Velocity:	2.03 mm/s @ 27 Hz
Vertical Particle Velocity:	0.74 mm/s @ 16 Hz
Longitudinal Particle Velocity:	1.83 mm/s @ 26 Hz
Peak Particle Velocity:	2.03 mm/s @ 27 Hz
Maximum Airblast:	97 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 2, 2023
Project No.:	234601.00	**Time of Blast:**	14:25
Inspector:	S. Carroll	**Blast No.:**	2023-16
Client:	Hammond River Holdings		

Data Collection – Seismometer #5

Make, Model and Serial # of unit:	Instantel Micromate, Serial #18193
Calibration Date:	May 12, 2023
Location of seismograph:	Cottage - PW-03 - Route 820
Distance and Direction from Blast:	677 m North
Transverse Particle Velocity:	<1.0 mm/s – Unit was not triggered
Vertical Particle Velocity:	<1.0 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<1.0 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 #20204
Calibration Date:	May 31, 2022
Location of seismograph:	Civic Number 2341 Route 820 (PW-05)
Distance and Direction from Blast:	691 m Northwest
Transverse Particle Velocity:	0.96 mm/s @ 13 Hz
Vertical Particle Velocity:	0.51 mm/s @ 18 Hz
Longitudinal Particle Velocity:	0.96 mm/s @ 57 Hz
Peak Particle Velocity:	0.96 mm/s @ 13 Hz
Maximum Airblast:	103 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 2, 2023
Project No.:	234601.00	**Time of Blast:**	14:25
Inspector:	S. Carroll	**Blast No.:**	2023-16
Client:	Hammond River Holdings		

Data Collection – Seismometer #7

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5487
Calibration Date:	January 16, 2023
Location of seismograph:	Civic Number 50 Myron Road (PW-15)
Distance and Direction from Blast:	967 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:	797 m West
Transverse Particle Velocity:	1.03 mm/s @ 13 Hz
Vertical Particle Velocity:	0.85 mm/s @ 37 Hz
Longitudinal Particle Velocity:	0.87 mm/s @ 43 Hz
Peak Particle Velocity:	1.03 mm/s @ 13 Hz
Maximum Airblast:	109 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 2, 2023
Project No.:	234601.00	**Time of Blast:**	14:25
Inspector:	S. Carroll	**Blast No.:**	2023-16
Client:	Hammond River Holdings		

Data Collection – Seismometer #9

Make, Model and Serial # of unit:	Instantel Micromate, Serial #21348
Calibration Date:	July 23, 2022
Location of seismograph:	Civic Number 220 Myron Road (PW-01)
Distance and Direction from Blast:	1,320 m Southwest
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 #5673
Calibration Date:	April 25, 2023
Location of seismograph:	Civic Number 2337 Route 820 (PW-04)
Distance and Direction from Blast:	750 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:**	June 2, 2023
Project No.:	234601.00	**Time of Blast:**	14:25
Inspector:	S. Carroll	**Blast No.:**	2023-16
Client:	Hammond River Holdings		

Data Collection – Seismometer #11

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5371
Calibration Date:	July 27, 2022
Location of seismograph:	Civic Number 4140 Route 111 (PW-12)
Distance and Direction from Blast:	767 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

Attachment B

Blast and Seismograph Location Plan

Blast and Seismograph Location Plan
Blast No: 2023-16
Upham East Gypsum Quarry
Upham, NB

Date: June 2, 2023
Project No.: 234601.00

Attachment C

Blast Event Reports

Event Report

Date/Time Tran at 14:25:00 June 2, 2023
Trigger Source Geo: 1.000 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: June 2, 2023 16:23:39 (V10.72.1)

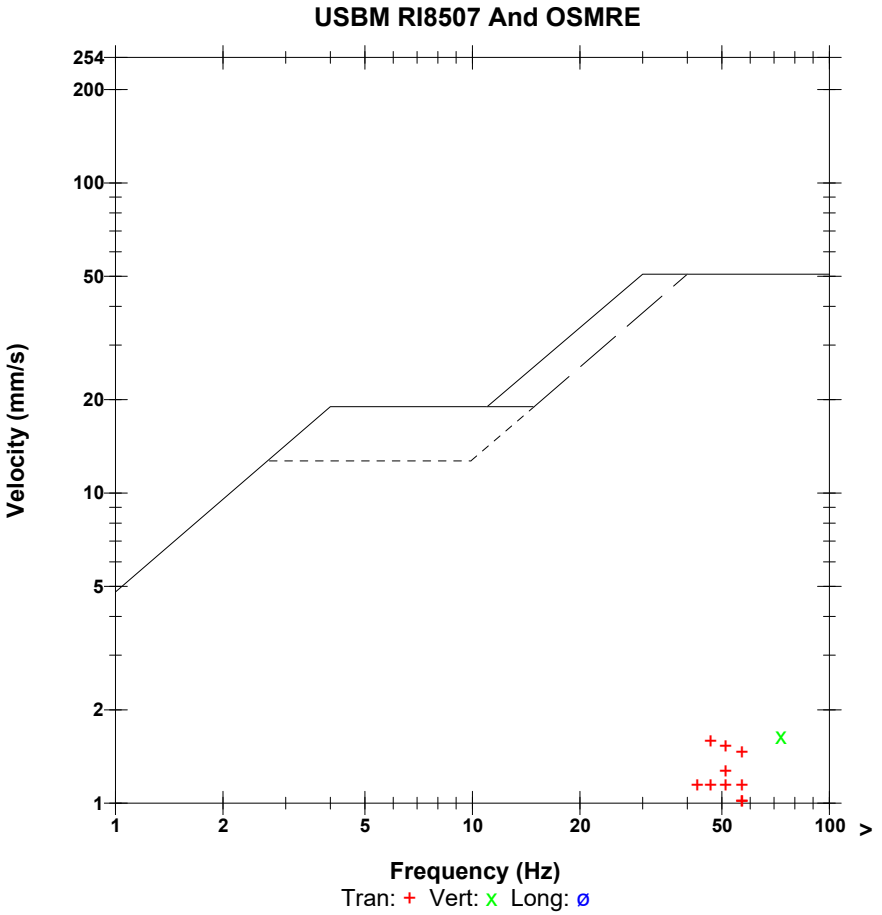
Extended Notes

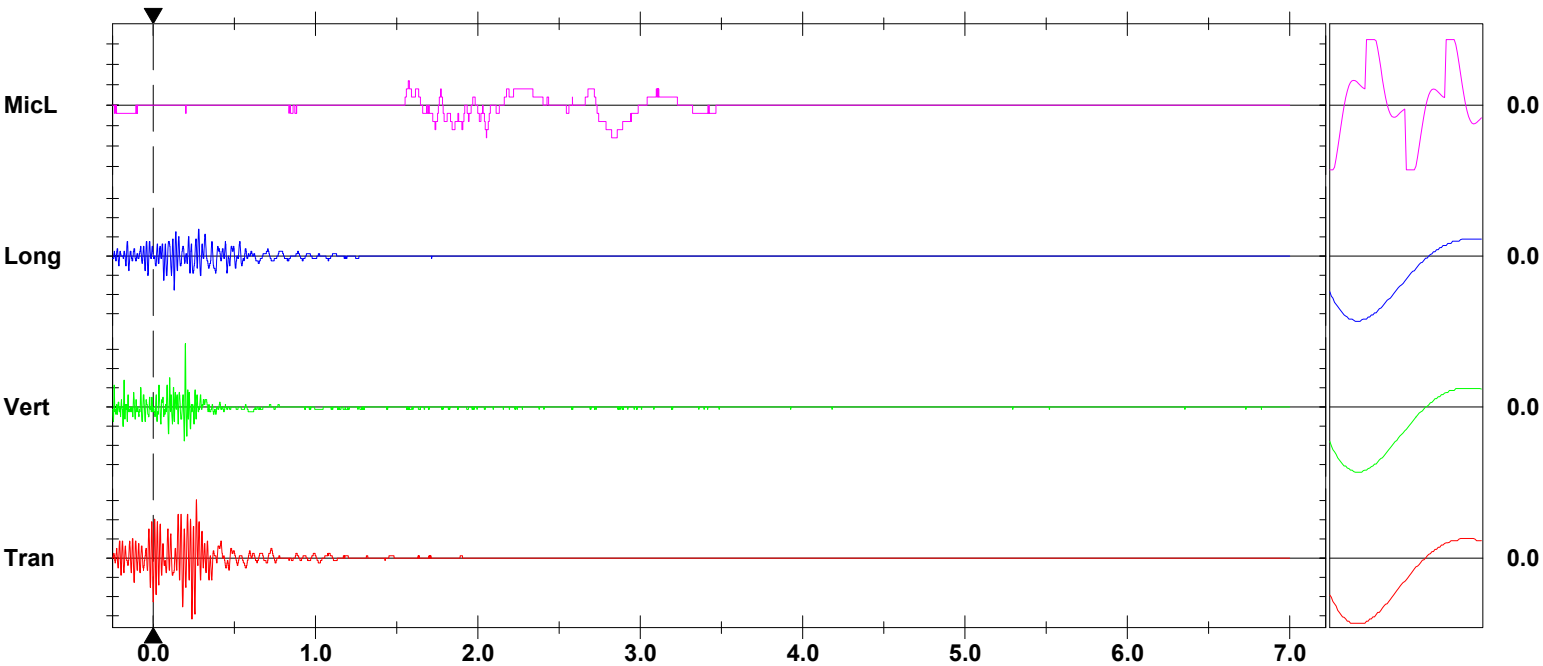
Microphone Linear Weighting
PSPL 112.0 dB(L) 8.000 pa.(L) at 2.053 sec
ZC Freq 11 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 302 mv)

	Tran	Vert	Long	
PPV	1.588	1.651	0.889	mm/s
PPV	55.01	55.35	49.98	dB
ZC Freq	47	73	51	Hz
Time (Rel. to Trig)	0.240	0.199	0.131	sec
Peak Acceleration	0.053	0.066	0.027	g
Peak Displacement	0.005	0.004	0.003	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.1	8.1	7.8	Hz
Overswing Ratio	3.5	3.6	3.9	

Peak Vector Sum 1.746 mm/s at 0.199 sec

Serial Number 5676 V 2.61 MiniMate
Battery Level 5.9 Volts
Unit Calibration March 8, 2023 by Instantel
File Name G676K1UA.PO0
Post Event Notes
Location: Civic Number 4150 Route 111 (PW-13)
Blast No.: 2023-16
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 =

Event Report

Date/Time Tran at 14:25:14 June 2, 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

Notes

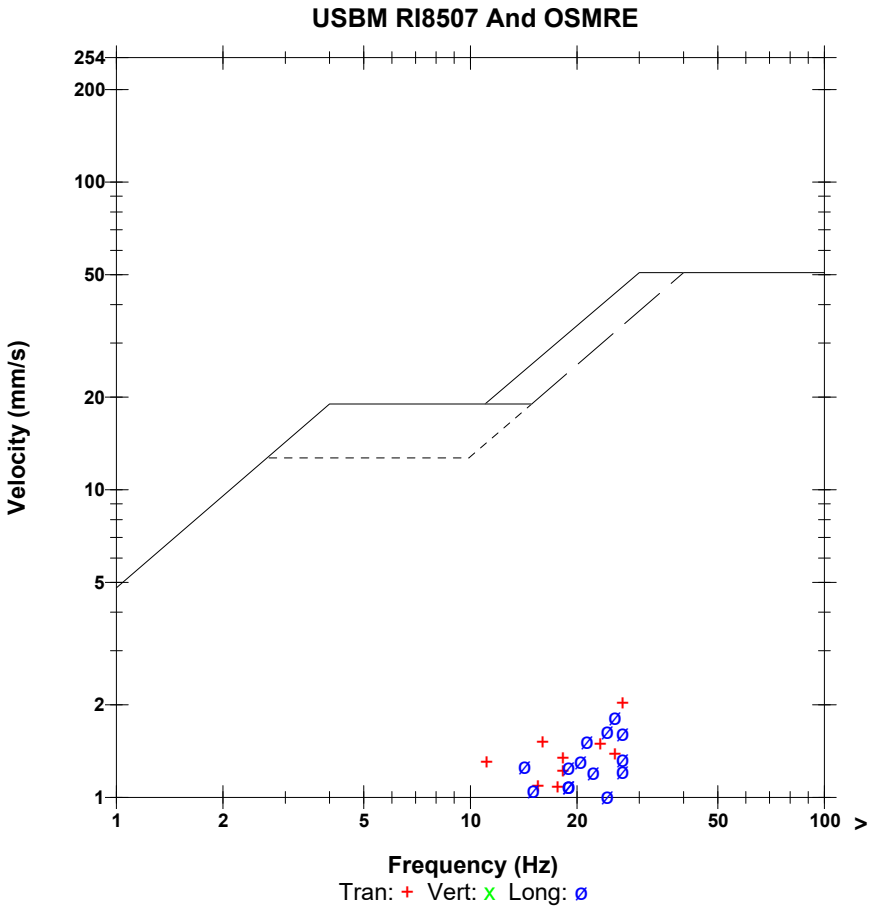
Serial Number UM20206 V 10-90GC Micromate ISEE
Battery Level 3.8 Volts
Unit Calibration May 31, 2022 by Instantel
File Name UM20206_20230602142514.IDFW

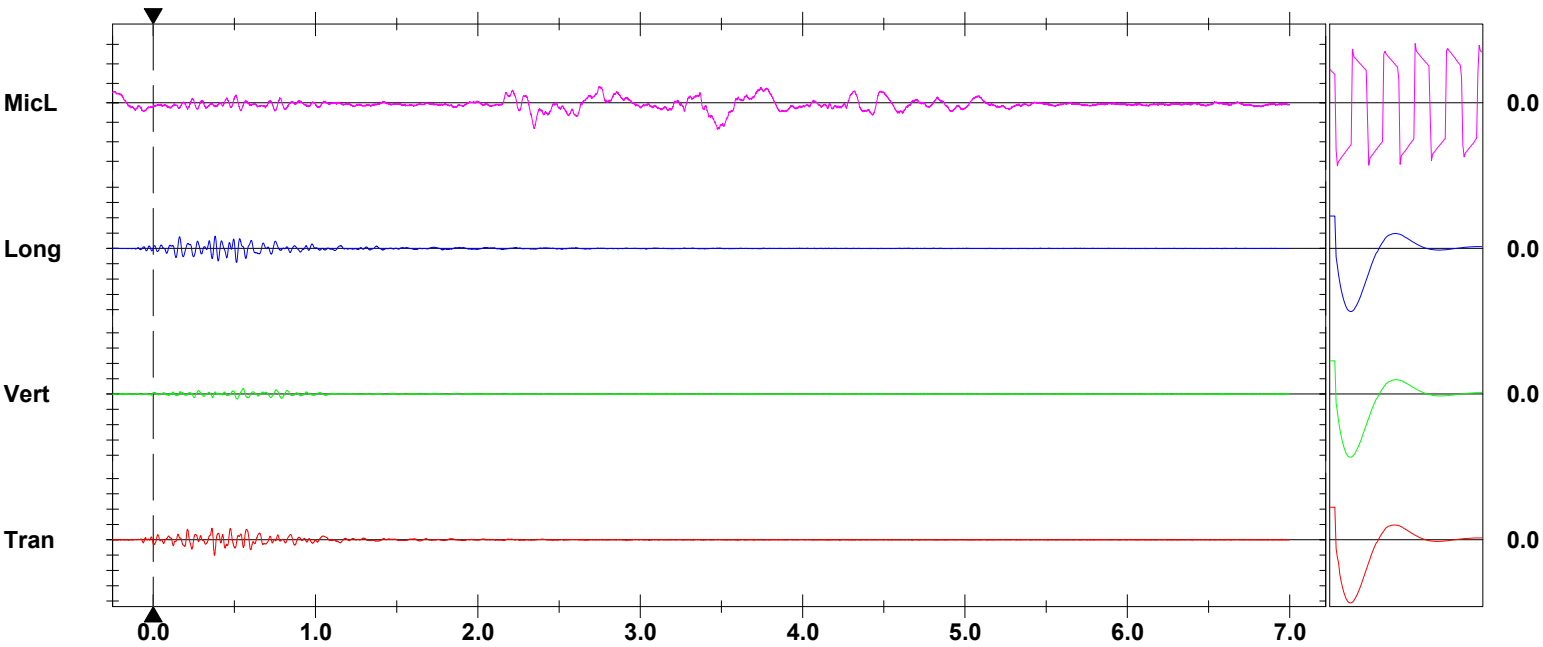
Post Event Notes
Location: Civic Number 2447 Route 820 (PW-07)
Blast No.: 2023-16
Project No: 234601.00

Microphone Linear Weighting
PSPL 96.6 dB(L) 1.350 pa.(L) at 3.474 sec
ZC Freq 2.5 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 1438 mv)

	Tran	Vert	Long	
PPV	2.034	0.741	1.829	mm/s
PPV	57.16	48.40	56.24	dB
ZC Freq	27	16	26	Hz
Time (Rel. to Trig)	0.378	0.553	0.514	sec
Peak Acceleration	0.070	0.014	0.029	g
Peak Displacement	0.013	0.007	0.013	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.3	7.3	Hz
Overswing Ratio	4.3	4.4	4.2	

Peak Vector Sum 2.499 mm/s at 0.379 sec





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

Event Report

Date/Time Long at 14:25:16 June 2, 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

Notes

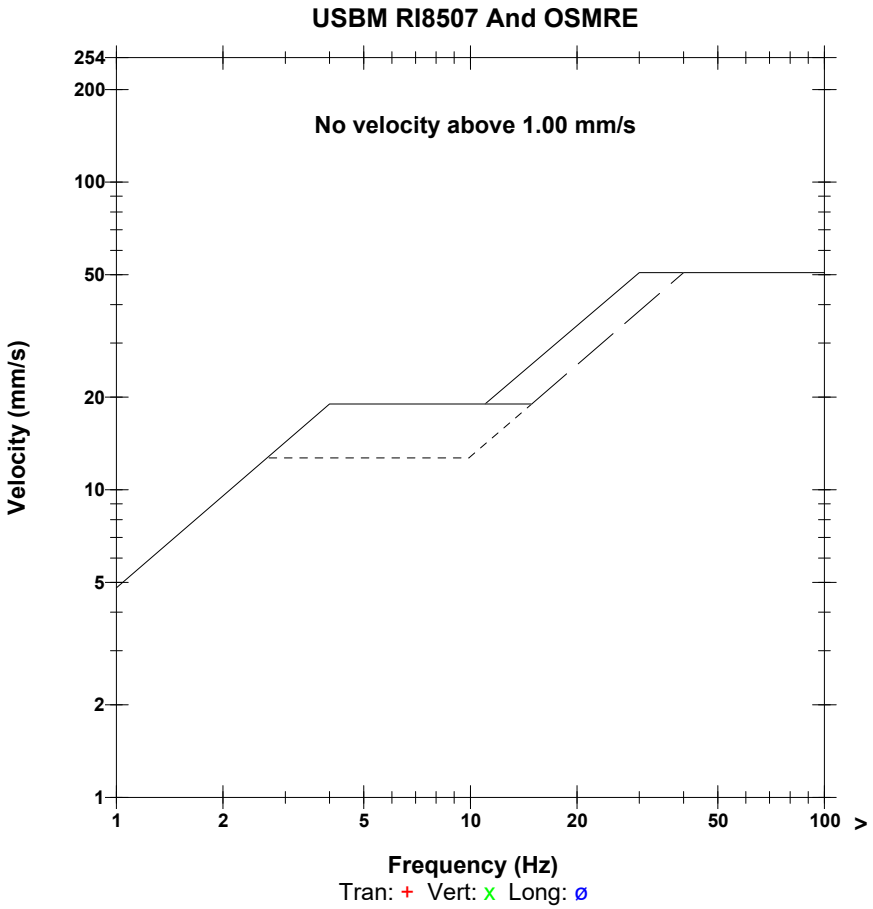
Serial Number UM20204 V 10-90GC Micromate ISEE
Battery Level 3.6 Volts
Unit Calibration May 31, 2022 by Instantel
File Name UM20204_20230602142516.IDFW

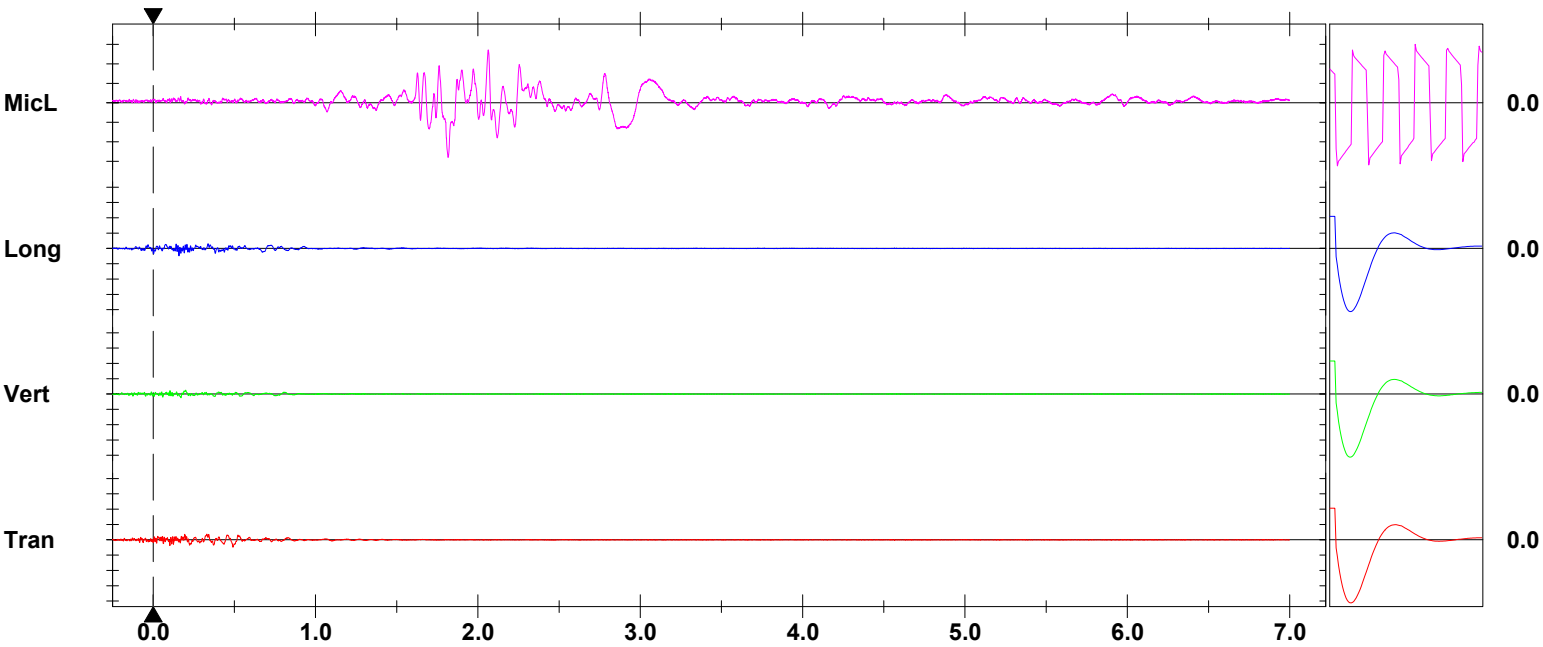
Post Event Notes
Location: Civic Number 2341 Route 820 (PW-05)
Blast No.: 2023-16
Project No: 234601.00

Microphone Linear Weighting
PSPL 102.9 dB(L) 2.808 pa.(L) at 1.816 sec
ZC Freq 5.8 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 1460 mv)

	Tran	Vert	Long	
PPV	0.962	0.512	0.962	mm/s
PPV	50.66	45.19	50.66	dB
ZC Freq	13	18	57	Hz
Time (Rel. to Trig)	0.491	0.200	0.159	sec
Peak Acceleration	0.051	0.030	0.035	g
Peak Displacement	0.009	0.004	0.007	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.5	7.5	Hz
Overswing Ratio	4.2	4.3	4.1	

Peak Vector Sum 0.983 mm/s at 0.491 sec





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

Event Report

Date/Time	Tran at 14:25:17 June 2, 2023
Trigger Source	Geo: 1.000 mm/s, Mic: 120.0 dB(L)
Range	Geo: 254.0 mm/s
Record Time	7.0 sec at 1024 sps
Operator/Setup:	Operator/factory.MMB

Notes
Location:
Client:
User Name:
General:

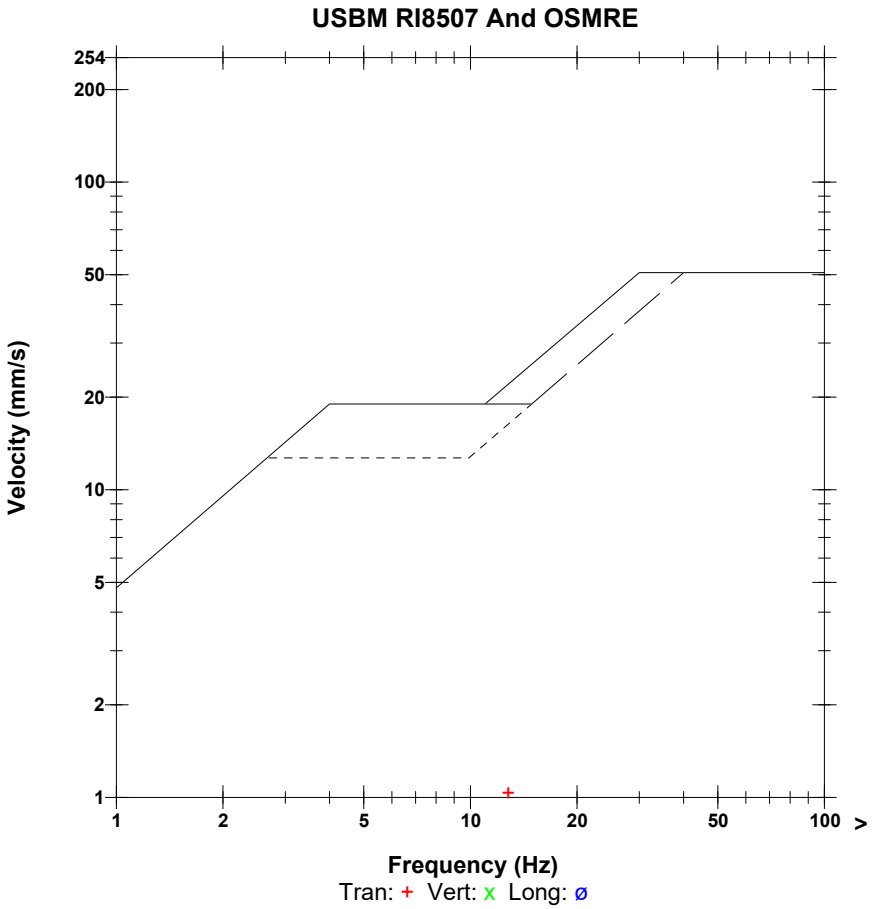
Serial Number	UM18187 V 10-90GC Micromate ISEE
Battery Level	3.8 Volts
Unit Calibration	May 12, 2023 by Instantel
File Name	UM18187_20230602142517.IDFW

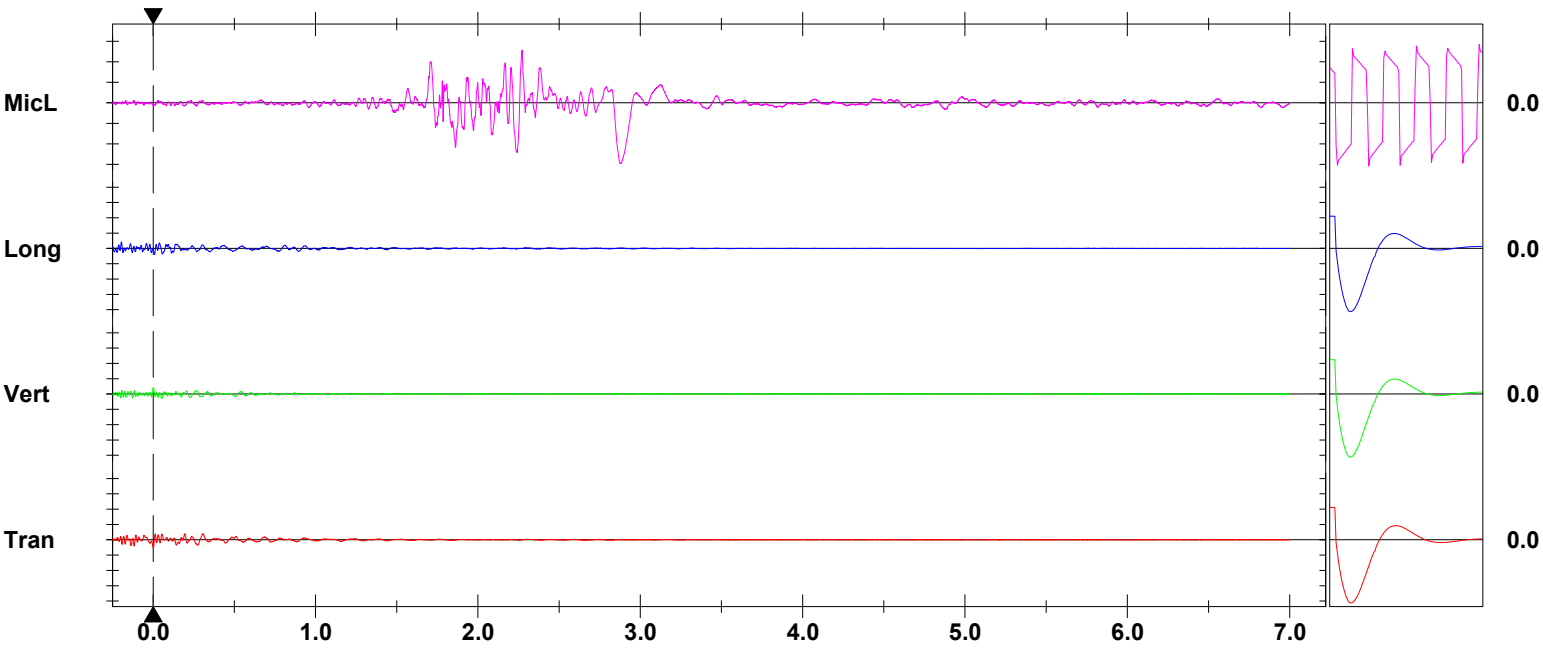
Post Event Notes
Location: Civic Number 86 Myron Road (PW-16)
Blast No.: 2023-16
Project No: 234601.00

Microphone	Linear Weighting
PSPL	109.4 dB(L) 5.927 pa.(L) at 2.876 sec
ZC Freq	4.4 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 1398 mv)

	Tran	Vert	Long	
PPV	1.033	0.851	0.867	mm/s
PPV	51.28	49.60	49.76	dB
ZC Freq	13	37	43	Hz
Time (Rel. to Trig)	0.000	0.000	-0.195	sec
Peak Acceleration	0.045	0.020	0.023	g
Peak Displacement	0.008	0.005	0.007	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.5	7.5	Hz
Overswing Ratio	4.5	4.2	4.2	

Peak Vector Sum 1.348 mm/s at 0.000 sec





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

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June 7, 2023

Project No.: 234601.00

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

Re: Blast Vibration Monitoring – Blast No. 2023-17 – 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 14:28 on June 6, 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. 2023-17 – June 6, 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)	14:28	1,420 m S	< 0.5 mm/s	<120	Units were not triggered
2. Civic No. 4126 Route 111 (PW-10)		1,030 m S	< 0.5 mm/s	<120	
3. Civic No. 4150 Route 111 (PW-13)		901 m SE	< 0.5 mm/s	<120	
4. Civic No. 2447 Route 820 (PW-07)		995 m NE	< 0.5 mm/s	<120	
5. PW-03 - Cottage Route 820		611 m N	0.89 mm/s @ 39 Hz	112	-
6. Civic No. 2341 Route 820 (PW-05)		558 m N	< 0.5 mm/s	<120	Unit was not triggered
7. Civic No. 50 Myron Road (PW-15)		720 m NW	0.94 mm/s @ >100 Hz	111	-
8. Civic No. 86 Myron Road (PW-16)		661 m W	1.02 mm/s @ 32 Hz	112	-
9. Civic No. 220 Myron Road (PW-01)		1,370 m S	< 0.5 mm/s	<120	Units were not triggered
10. Civic No. 2337 Route 820 (PW-04)		628 m NW	< 0.5 mm/s	<120	
11. Civic No. 4140 Route 111 (PW-12)		979 m SE	0.57 mm/s @ 47 Hz	110	-
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

Attachment A

Blast Record

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 6, 2023
Project No.:	234601.00	**Time of Blast:**	14:28
Inspector:	J. Yuzda	**Blast No.:**	2023-17
Client:	Hammond River Holdings		

IDENTIFICATION:

Blasting Contractor:	Gulf Operators Ltd.		
Blaster's Certification No.:	1318	**Blaster's Name:**	Daniel Blanchard
Blast Location:	N 45º28'54.8" W 65º38'9.2" (see attached sketch)		
Type of Rock:	Anhydrate/Gypsum	**Est. Vol. or Tonnage:**	13,141 tonnes
Weather at time of Blast:	Light rain	**Air Temp.:**	10ºC
Est. Wind Speed :	≈ 15 km/h	**Wind Direction:**	S
Cloud Cover:	Yes – overcast	**Precipitation:**	Yes - light

BLAST DESIGN:

Total No. Holes:	127	**Hole Diameter:**	4.5"
Average Depth:	4.8 m – 6.6 m	**Spacing:**	10 ft x 10 ft
No. Holes per Delay:	3	**Collar Length:**	7 ft
Delay between Holes:	25 ms	**Delay between Rows:**	42, 59, 67 & 84 ms
Initiation Method:	Non-Electric		
Weight of Explosives per Delay:	Max.: 132 kg		
Type and weight of Explosives for Blast:	5,139 kg – Titan XL-1000		

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

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 6, 2023
Project No.:	234601.00	**Time of Blast:**	14:28
Inspector:	J. Yuzda	**Blast No.:**	2023-17
Client:	Hammond River Holdings		

BLAST MONITORING

Distance to the Nearest Structure:	558 m
Direction to the Nearest Structure:	N
Structure Type:	House
Scaled Distance Factor: (distance / sq. rt. of max. wt. per delay):	48.6

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:**	June 6, 2023
Project No.:	234601.00	**Time of Blast:**	14:28
Inspector:	J. Yuzda	**Blast No.:**	2023-17
Client:	Hammond River Holdings		

Data Collection – Seismometer #1

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5673
Calibration Date:	April 25, 2023
Location of seismograph:	Civic Number 4079 Route 111 (PW-09)
Distance and Direction from Blast:	1,420 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 Micromate, Serial #18187
Calibration Date:	May 12, 2023
Location of seismograph:	Civic Number 4126 Route 111 (PW-10)
Distance and Direction from Blast:	1,030 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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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 6, 2023
Project No.:	234601.00	**Time of Blast:**	14:28
Inspector:	J. Yuzda	**Blast No.:**	2023-17
Client:	Hammond River Holdings		

Data Collection – Seismometer #3

Make, Model and Serial # of unit:	Instantel Micromate, Serial #20206
Calibration Date:	May 31, 2023
Location of seismograph:	Civic Number 4150 Route 111 (PW-13)
Distance and Direction from Blast:	901 m Southeast
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Data Collection – Seismometer #4

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5635
Calibration Date:	March 8, 2023
Location of seismograph:	Civic Number 2447 Route 820 (PW-07)
Distance and Direction from Blast:	995 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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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 6, 2023
Project No.:	234601.00	**Time of Blast:**	14:28
Inspector:	J. Yuzda	**Blast No.:**	2023-17
Client:	Hammond River Holdings		

Data Collection – Seismometer #5

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5489
Calibration Date:	May 5, 2023
Location of seismograph:	Cottage - PW-03 - Route 820
Distance and Direction from Blast:	611 m North
Transverse Particle Velocity:	0.51 mm/s @ 64 Hz
Vertical Particle Velocity:	0.76 mm/s @ 73 Hz
Longitudinal Particle Velocity:	0.89 mm/s @ 39 Hz
Peak Particle Velocity:	0.89 mm/s @ 39 Hz
Maximum Airblast:	112 dB(L)

Data Collection – Seismometer #6

Make, Model and Serial # of unit:	Instantel Micromate, Serial #20204
Calibration Date:	May 31, 2022
Location of seismograph:	Civic Number 2341 Route 820 (PW-05)
Distance and Direction from Blast:	558 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

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 6, 2023
Project No.:	234601.00	**Time of Blast:**	14:28
Inspector:	J. Yuzda	**Blast No.:**	2023-17
Client:	Hammond River Holdings		

Data Collection – Seismometer #7

Make, Model and Serial # of unit:	Instantel Micromate, Serial #20205
Calibration Date:	May 30, 2023
Location of seismograph:	Civic Number 50 Myron Road (PW-15)
Distance and Direction from Blast:	720 m Northwest
Transverse Particle Velocity:	0.94 mm/s @ >100 Hz
Vertical Particle Velocity:	0.88 mm/s @ 39 Hz
Longitudinal Particle Velocity:	0.64 mm/s @ 30 Hz
Peak Particle Velocity:	0.94 mm/s @ >100 Hz
Maximum Airblast:	111 dB(L)

Data Collection – Seismometer #8

Make, Model and Serial # of unit:	Instantel Minimate, Serial #21348
Calibration Date:	July 23, 2022
Location of seismograph:	Civic Number 86 Myron Road (PW-16)
Distance and Direction from Blast:	661 m West
Transverse Particle Velocity:	1.02 mm/s @ 43 Hz
Vertical Particle Velocity:	0.76 mm/s @ 57 Hz
Longitudinal Particle Velocity:	1.02 mm/s @ 32 Hz
Peak Particle Velocity:	1.02 mm/s @ 32 Hz
Maximum Airblast:	112 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 6, 2023
Project No.:	234601.00	**Time of Blast:**	14:28
Inspector:	J. Yuzda	**Blast No.:**	2023-17
Client:	Hammond River Holdings		

Data Collection – Seismometer #9

Make, Model and Serial # of unit:	Instantel Micromate, Serial #18193
Calibration Date:	May 12, 2023
Location of seismograph:	Civic Number 220 Myron Road (PW-01)
Distance and Direction from Blast:	1,370 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 Micromate, Serial #20203
Calibration Date:	May 30, 2023
Location of seismograph:	Civic Number 2337 Route 820 (PW-04)
Distance and Direction from Blast:	628 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:**	June 6, 2023
Project No.:	234601.00	**Time of Blast:**	14:28
Inspector:	J. Yuzda	**Blast No.:**	2023-17
Client:	Hammond River Holdings		

Data Collection – Seismometer #11

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5371
Calibration Date:	July 27, 2022
Location of seismograph:	Civic Number 4140 Route 111 (PW-12)
Distance and Direction from Blast:	979 m Southeast
Transverse Particle Velocity:	0.57 mm/s @ 47 Hz
Vertical Particle Velocity:	0.45 mm/s @ 64 Hz
Longitudinal Particle Velocity:	0.57 mm/s @ 57 Hz
Peak Particle Velocity:	0.57 mm/s @ 47 Hz
Maximum Airblast:	110 dB(L)

Attachment B

Blast and Seismograph Location Plan

Blast and Seismograph Location Plan
Blast No: 2023-17
Upham East Gypsum Quarry
Upham, NB

Date: June 6, 2023
Project No.: 234601.00

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Attachment C

Blast Event Reports

Event Report

Date/Time Vert at 14:29:16 June 6, 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: June 6, 2023 16:00:24 (V10.72.1)

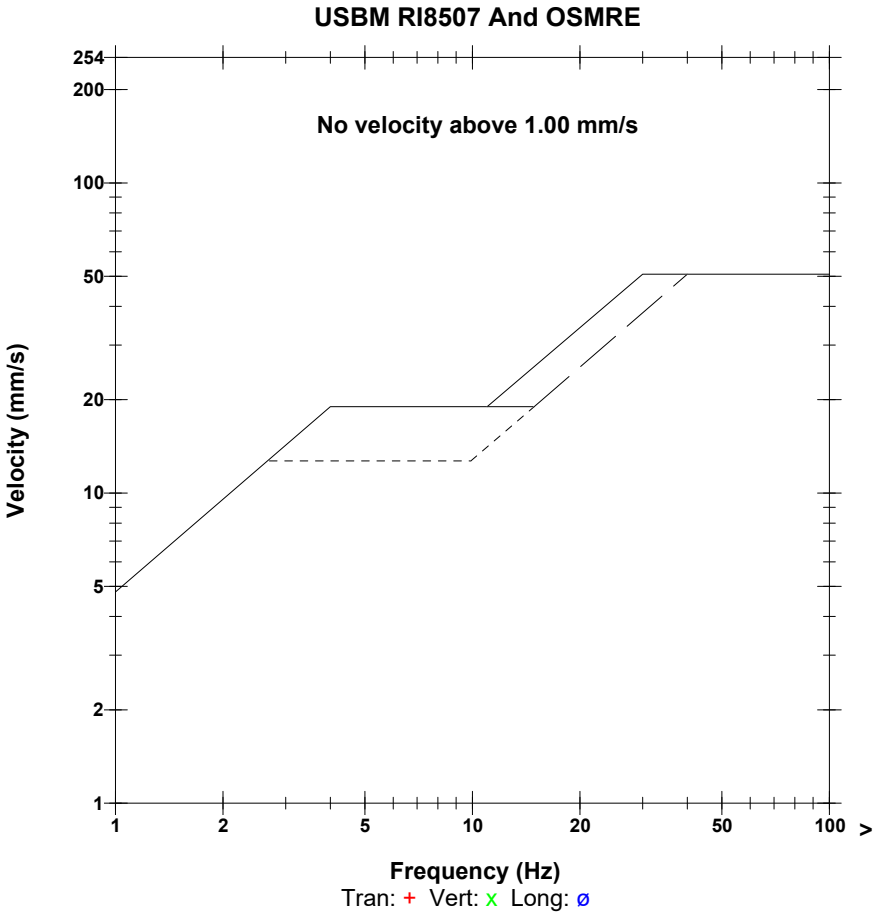
Extended Notes

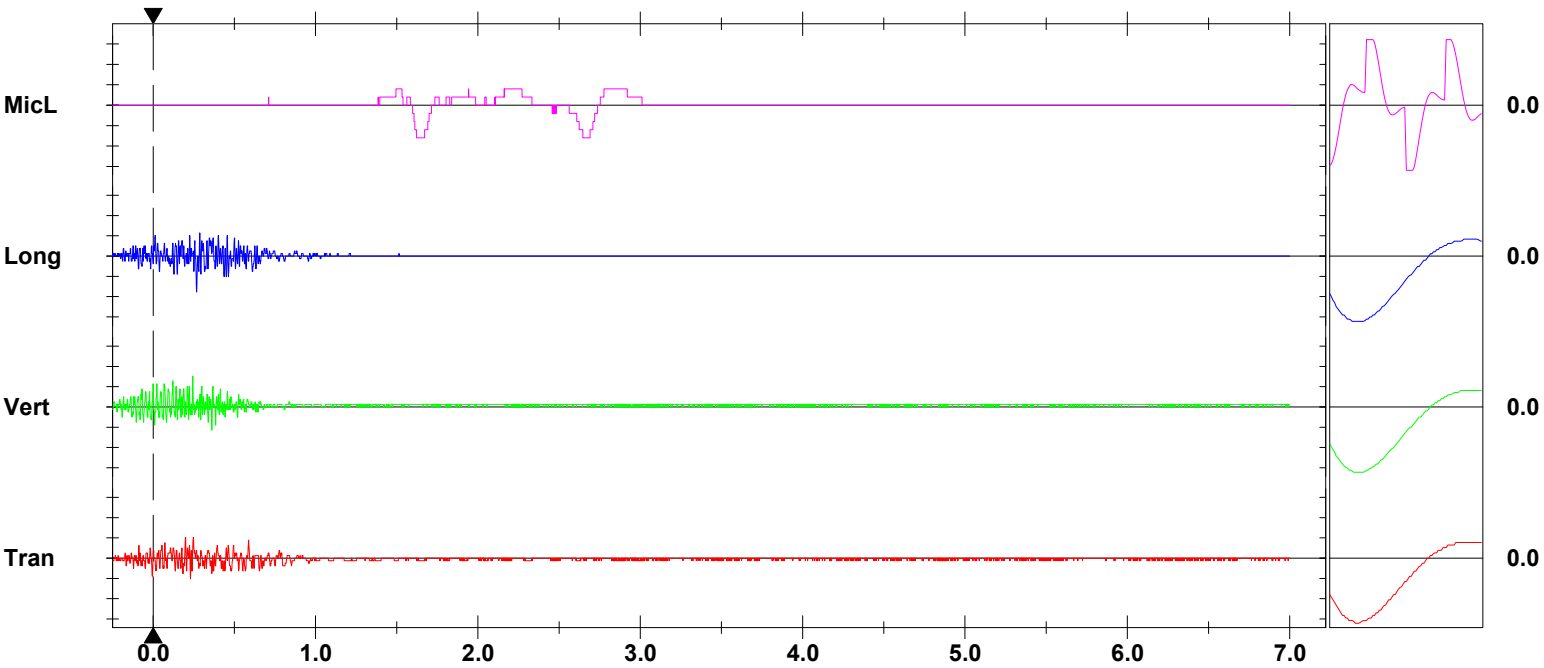
Microphone Linear Weighting
PSPL 112.0 dB(L) 8.000 pa.(L) at 1.622 sec
ZC Freq 4.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 285 mv)

	Tran	Vert	Long	
PPV	0.508	0.762	0.889	mm/s
PPV	45.12	48.64	49.98	dB
ZC Freq	64	73	39	Hz
Time (Rel. to Trig)	0.199	0.245	0.269	sec
Peak Acceleration	0.027	0.033	0.027	g
Peak Displacement	0.002	0.002	0.003	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.8	7.7	7.8	Hz
Overswing Ratio	3.8	4.0	3.9	

Peak Vector Sum 0.905 mm/s at 0.269 sec

Serial Number 5489 V 2.61 MiniMate
Battery Level 6.4 Volts
Unit Calibration May 5, 2023 by Instantel
File Name G489K21P.KS0
Post Event Notes
Location: Cottage - Route 820 (PW-03)
Blast No.: 2023-17
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 =

Event Report

Date/Time Tran at 14:29:13 June 6, 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/factory.MMB

Notes
Location:
Client:
User Name:
General:

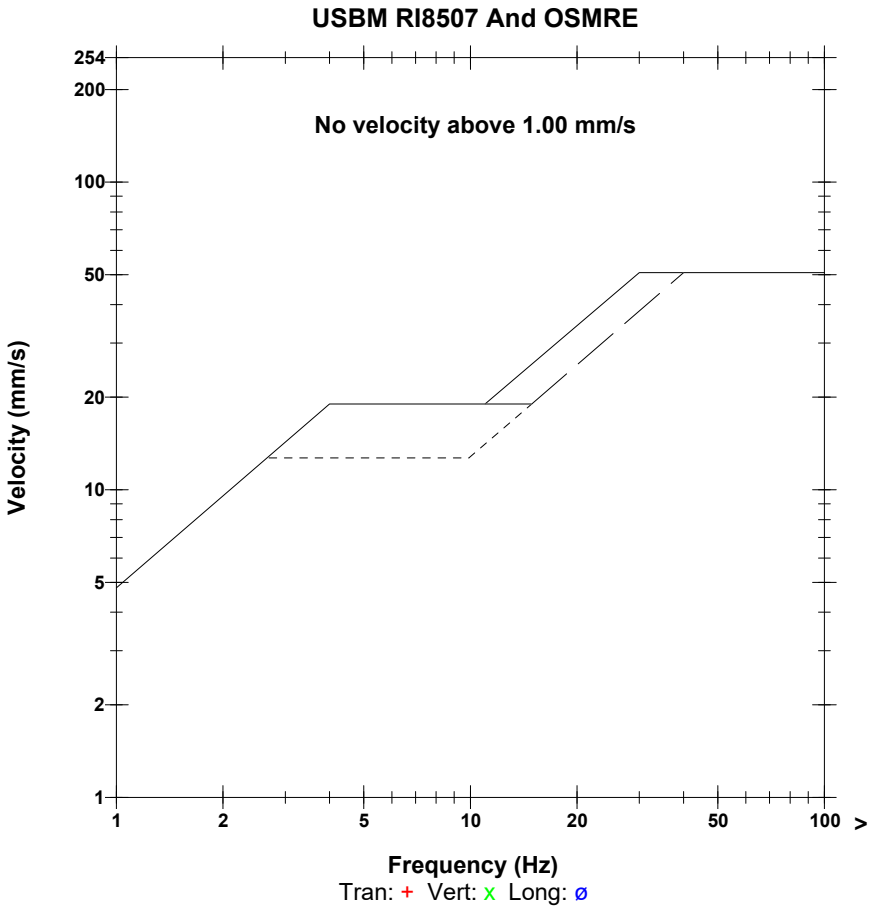
Serial Number UM20205 V 10-90GC Micromate ISEE
Battery Level 3.8 Volts
Unit Calibration May 30, 2023 by Instantel
File Name UM20205_20230606142913.IDFW

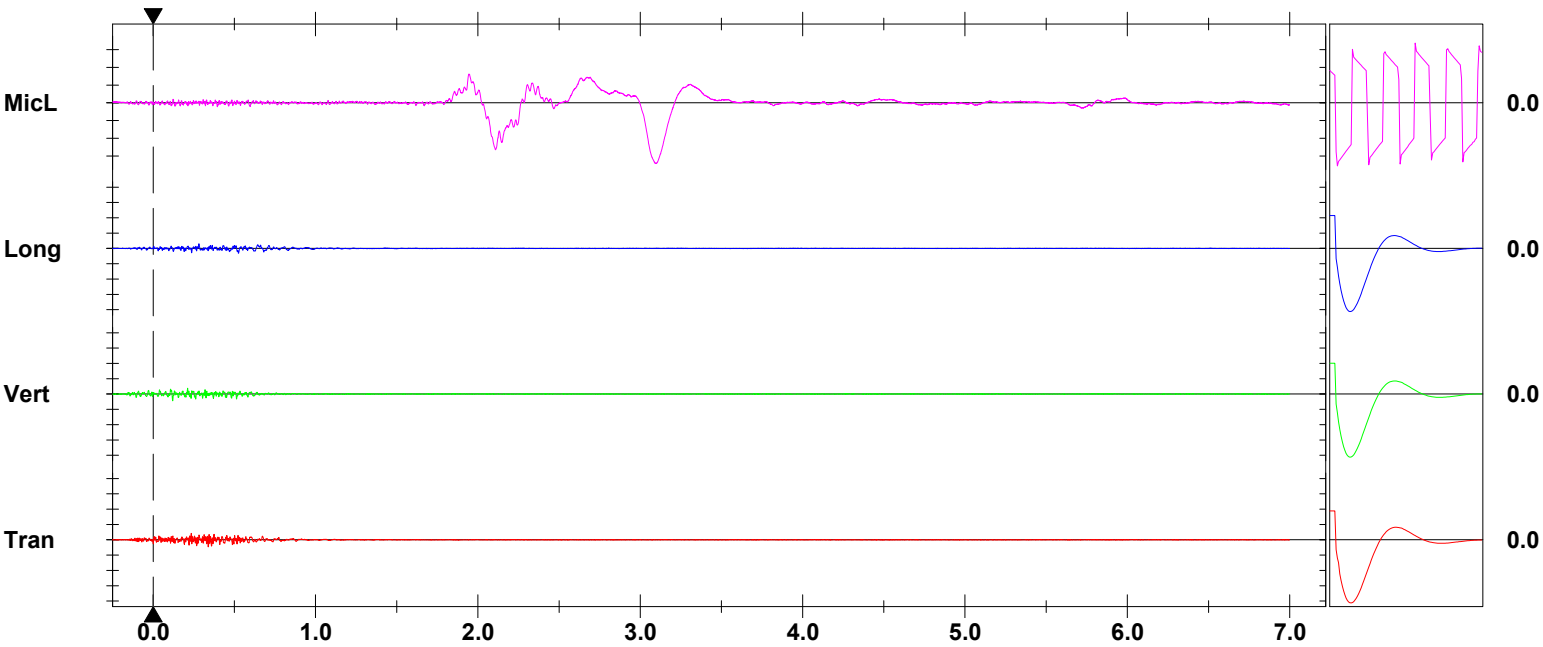
Post Event Notes
Location: Civic Number 50 Myron Road (PW-15)
Blast No.: 2023-17
Project No: 234601.00

Microphone Linear Weighting
PSPL 110.7 dB(L) 6.842 pa.(L) at 3.097 sec
ZC Freq 2.3 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 1489 mv)

	Tran	Vert	Long	
PPV	0.938	0.883	0.638	mm/s
PPV	50.44	49.92	47.10	dB
ZC Freq	>100	39	30	Hz
Time (Rel. to Trig)	0.339	0.120	0.525	sec
Peak Acceleration	0.093	0.046	0.029	g
Peak Displacement	0.003	0.003	0.005	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.1	7.3	7.3	Hz
Overswing Ratio	5.1	4.8	4.9	

Peak Vector Sum 1.018 mm/s at 0.120 sec





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

Event Report

Date/Time Tran at 14:28:42 June 6, 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

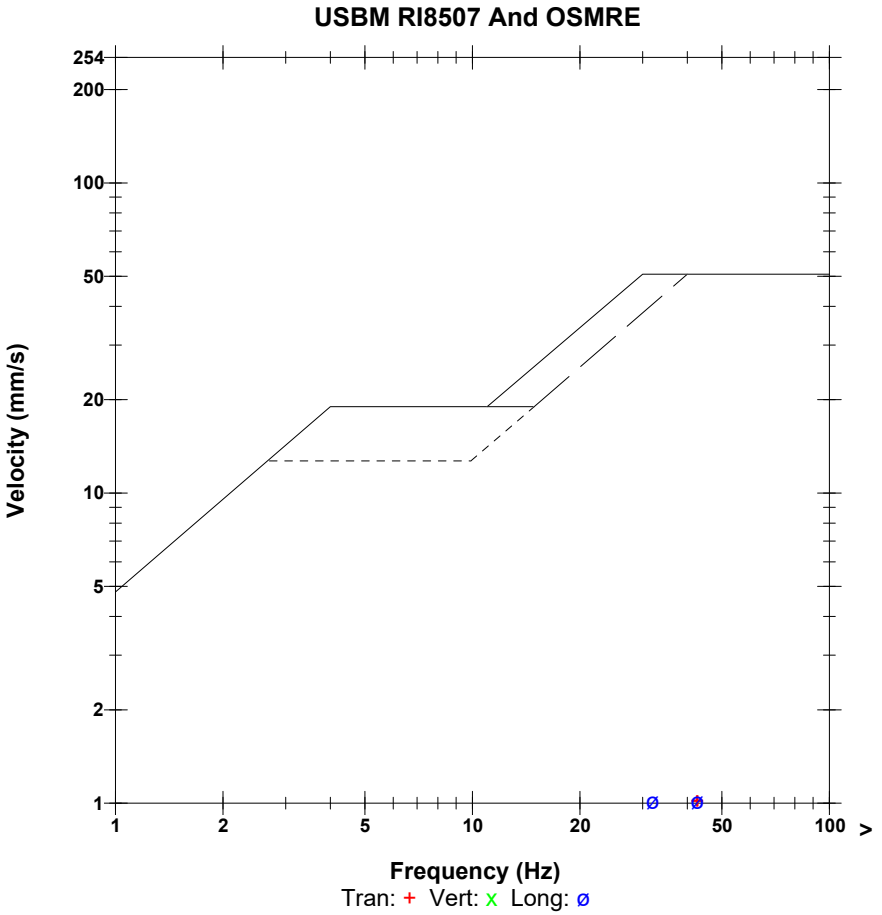
Notes

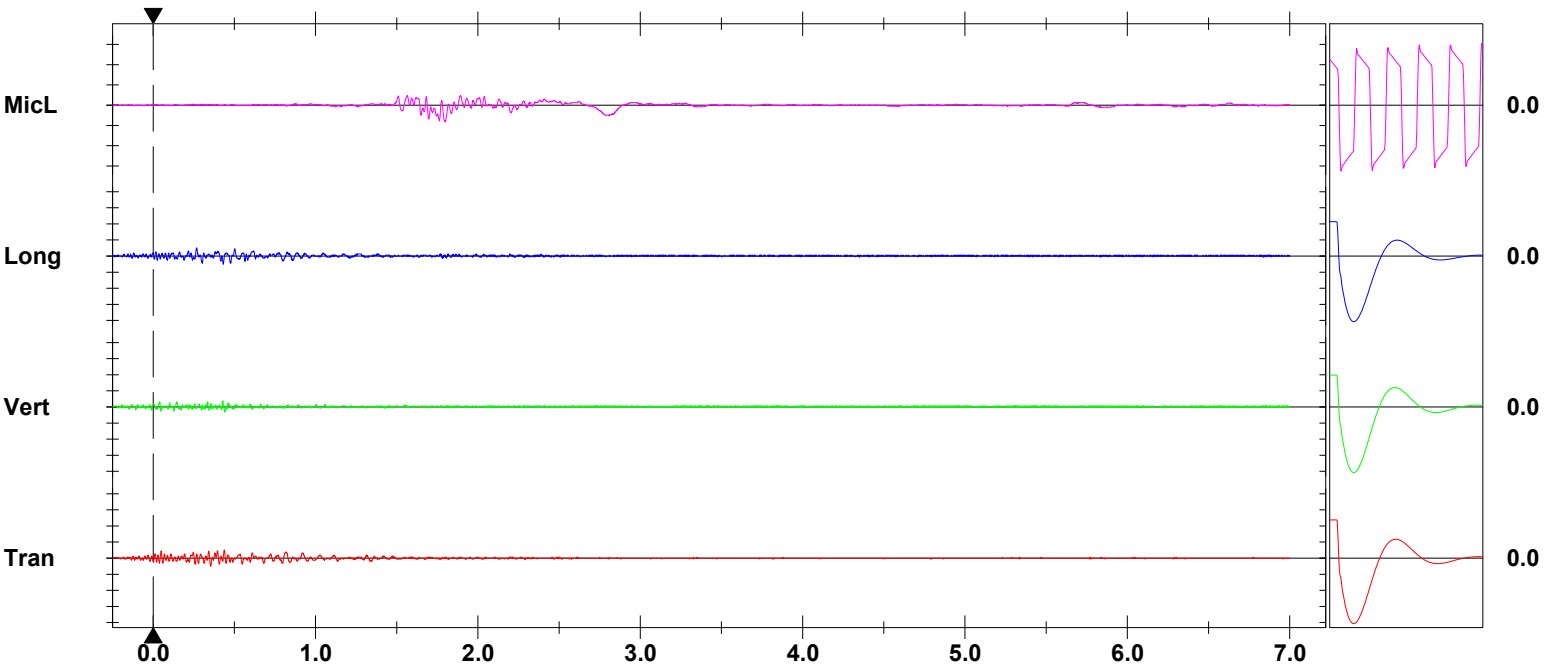
Serial Number BE21348 V 10.72-1.1 Minimate Blaster
Battery Level 6.0 Volts
Unit Calibration July 21, 2022 by Instantel
File Name W348K1ZU.VU0
Post Event Notes
Location: Civic Number 86 Myron Road (PW-16)
Blast No.: 2023-17
Project No: 234601.00

Microphone Linear Weighting
PSPL 112.3 dB(L) 8.250 pa.(L) at 1.799 sec
ZC Freq 15 Hz
Channel Test Passed (Freq = 20.1 Hz Amp = 595 mv)

	Tran	Vert	Long	
PPV	1.016	0.762	1.016	mm/s
PPV	51.14	48.64	51.14	dB
ZC Freq	43	57	32	Hz
Time (Rel. to Trig)	0.354	0.429	0.267	sec
Peak Acceleration	0.027	0.040	0.040	g
Peak Displacement	0.007	0.003	0.007	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.6	7.3	Hz
Overswing Ratio	3.5	3.4	4.1	

Peak Vector Sum 1.143 mm/s at 0.268 sec





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

Event Report

Date/Time Long at 14:28:12 June 6, 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: June 6, 2023 16:09:08 (V10.72.1)

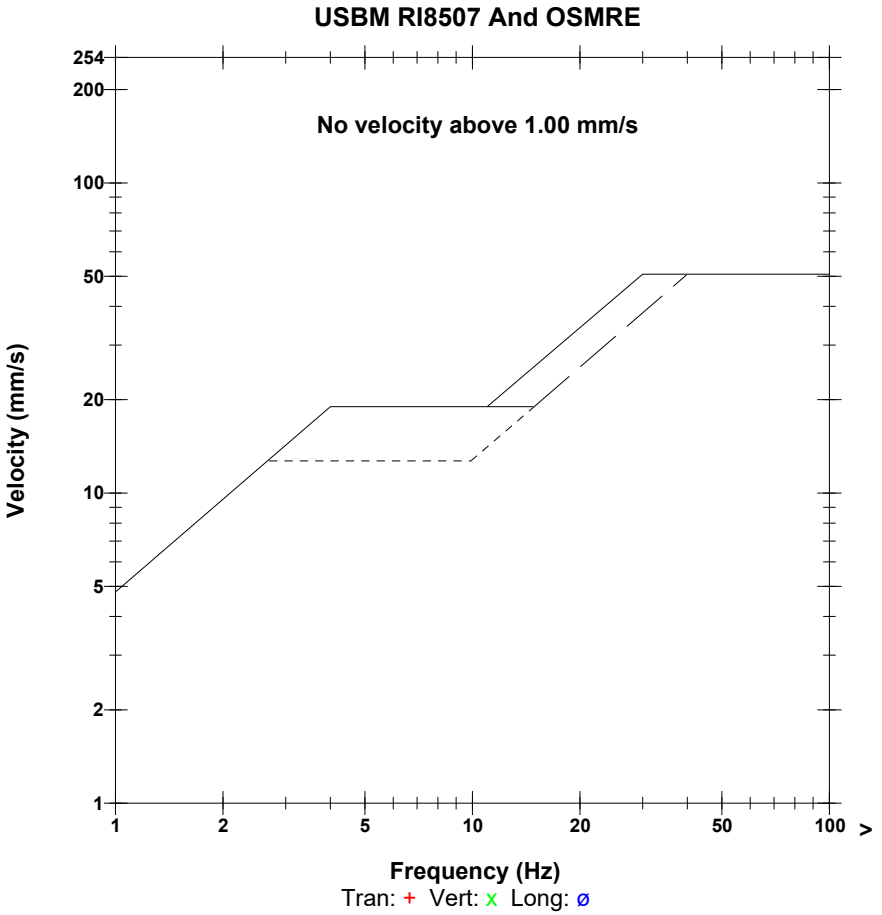
Serial Number 5371 V 2.61 MiniMate
Battery Level 6.3 Volts
Unit Calibration July 27, 2022 by Instantel
File Name G371K21P.J00
Post Event Notes
Location: Civic Number 4140 Route 111 (PW-12)
Blast No.: 2023-17
Project No: 234601.00

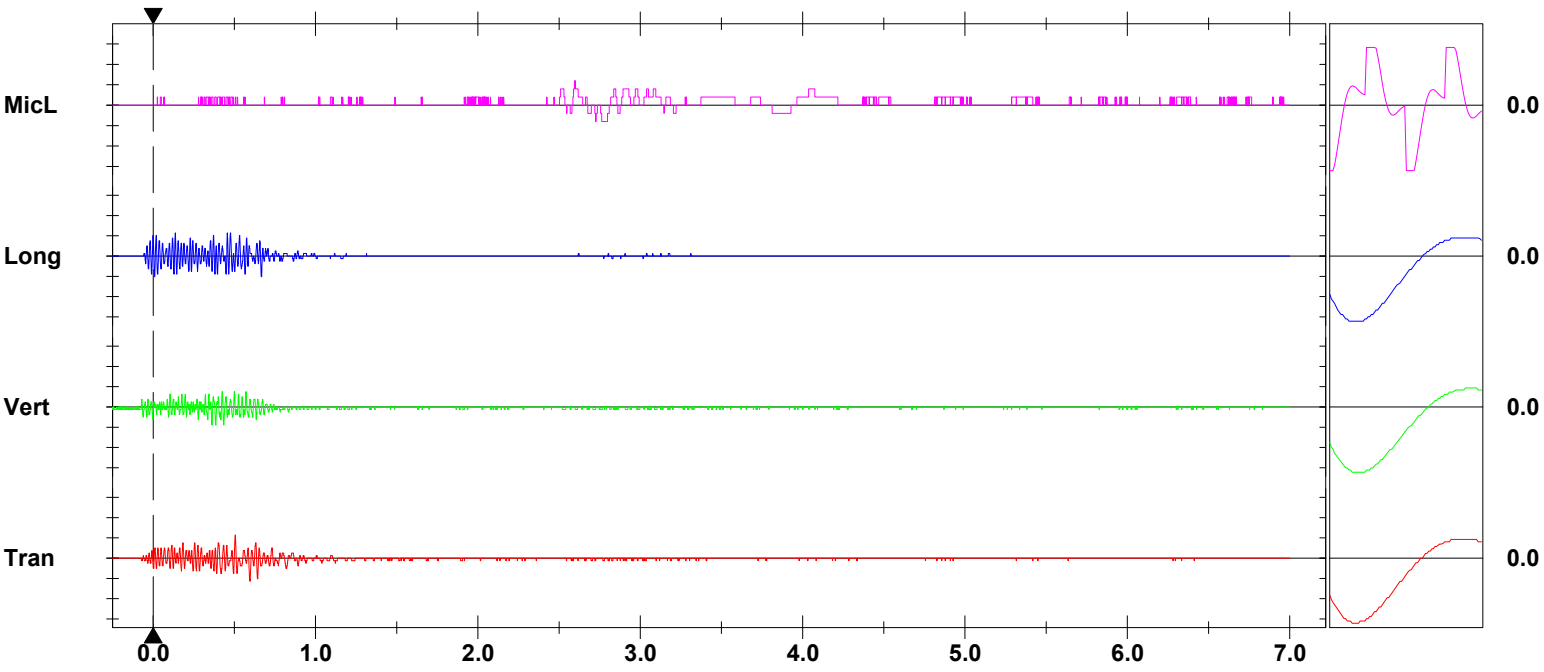
Extended Notes

Microphone Linear Weighting
PSPL 109.5 dB(L) 6.000 pa.(L) at 2.596 sec
ZC Freq 8.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 301 mv)

	Tran	Vert	Long	
PPV	0.572	0.445	0.572	mm/s
PPV	46.14	43.96	46.14	dB
ZC Freq	47	64	57	Hz
Time (Rel. to Trig)	0.506	0.363	0.138	sec
Peak Acceleration	0.013	0.013	0.020	g
Peak Displacement	0.002	0.001	0.002	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.3	7.8	8.3	Hz
Overswing Ratio	3.6	3.6	3.7	

Peak Vector Sum 0.635 mm/s at 0.458 sec





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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June 12, 2023

Project No.: 234601.00

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

Re: Blast Vibration Monitoring – Blast No. 2023-18 – 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 15:52 on June 9, 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. 2023-18 – June 9, 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)	15:52	1,220 m S	< 0.5 mm/s	<120	Unit was not triggered
2. Civic No. 4126 Route 111 (PW-10)		800 m S	1.14 mm/s @ 73 Hz	100	-
3. Civic No. 4150 Route 111 (PW-13)		641 m SE	0.51 mm/s @ 51 Hz	110	-
4. Civic No. 2447 Route 820 (PW-07)		911 m NE	< 0.5 mm/s	<120	Unit was not triggered
5. PW-03 - Cottage Route 820		729 m N	0.51 mm/s @ 20 Hz	112	-
6. Civic No. 2341 Route 820 (PW-05)		743 m NW	0.60 mm/s @ 18 Hz	112	-
7. Civic No. 50 Myron Road (PW-15)		1,010 m NW	< 0.5 mm/s	<120	Units were not triggered
8. Civic No. 86 Myron Road (PW-16)		803 m W	< 0.5 mm/s	<120	
9. Civic No. 220 Myron Road (PW-01)		1,280 m S	0.51 mm/s @ 85 Hz	102	-
10. Civic No. 2337 Route 820 (PW-04)		799 m NW	0.70 mm/s @ 39 Hz	110	-
11. Civic No. 4140 Route 111 (PW-12)		716 m S	1.46 mm/s @ 51 Hz	106	-
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

Attachment A

Blast Record

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 9, 2023
Project No.:	234601.00	**Time of Blast:**	15:52
Inspector:	S. Carroll	**Blast No.:**	2023-18
Client:	Hammond River Holdings		

IDENTIFICATION:

Blasting Contractor:	Gulf Operators Ltd.		
Blaster's Certification No.:	1318	**Blaster's Name:**	Daniel Blanchard
Blast Location:	N 45º28'50.8" W 65º37'57.4" (see attached sketch)		
Type of Rock:	Anhydrate/Gypsum	**Est. Vol. or Tonnage:**	14,667 tonnes
Weather at time of Blast:	Cloudy	**Air Temp.:**	14ºC
Est. Wind Speed :	≈ 10 km/h	**Wind Direction:**	W
Cloud Cover:	Yes – ≈80%	**Precipitation:**	Yes

BLAST DESIGN:

Total No. Holes:	131	**Hole Diameter:**	4.5"
Average Depth:	5.4 m – 8.1 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, 67 & 84 ms
Initiation Method:	Non-Electric		
Weight of Explosives per Delay:	Max.: 68 kg		
Type and weight of Explosives for Blast:	4,278 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:**	June 9, 2023
Project No.:	234601.00	**Time of Blast:**	15:52
Inspector:	S. Carroll	**Blast No.:**	2023-18
Client:	Hammond River Holdings		

BLAST MONITORING

Distance to the Nearest Structure:	641 m
Direction to the Nearest Structure:	SE
Structure Type:	House
Scaled Distance Factor: (distance / sq. rt. of max. wt. per delay):	77.7

SAFETY:

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

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

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 9, 2023
Project No.:	234601.00	**Time of Blast:**	15:52
Inspector:	S. Carroll	**Blast No.:**	2023-18
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:	1,220 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 Micromate, Serial #5635
Calibration Date:	March 8, 2023
Location of seismograph:	Civic Number 4126 Route 111 (PW-10)
Distance and Direction from Blast:	800 m South
Transverse Particle Velocity:	0.45 mm/s @ 51 Hz
Vertical Particle Velocity:	1.14 mm/s @ 73 Hz
Longitudinal Particle Velocity:	0.51 mm/s @ 43 Hz
Peak Particle Velocity:	1.14 mm/s @ 73 Hz
Maximum Airblast:	100 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 9, 2023
Project No.:	234601.00	**Time of Blast:**	15:52
Inspector:	S. Carroll	**Blast No.:**	2023-18
Client:	Hammond River Holdings		

Data Collection – Seismometer #3

Make, Model and Serial # of unit:	Instantel Micromate, Serial #5372
Calibration Date:	February 28, 2023
Location of seismograph:	Civic Number 4150 Route 111 (PW-13)
Distance and Direction from Blast:	641 m Southeast
Transverse Particle Velocity:	0.51 mm/s @ 57 Hz
Vertical Particle Velocity:	0.45 mm/s @ 64 Hz
Longitudinal Particle Velocity:	0.51 mm/s @ 51 Hz
Peak Particle Velocity:	0.51 mm/s @ 51 Hz
Maximum Airblast:	110 dB(L)

Data Collection – Seismometer #4

Make, Model and Serial # of unit:	Instantel Minimate, Serial #18193
Calibration Date:	May 12, 2023
Location of seismograph:	Civic Number 2447 Route 820 (PW-07)
Distance and Direction from Blast:	911 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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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 9, 2023
Project No.:	234601.00	**Time of Blast:**	15:52
Inspector:	S. Carroll	**Blast No.:**	2023-18
Client:	Hammond River Holdings		

Data Collection – Seismometer #5

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5371
Calibration Date:	July 27, 2022
Location of seismograph:	Cottage - PW-03 - Route 820
Distance and Direction from Blast:	729 m North
Transverse Particle Velocity:	0.38 mm/s @ 12 Hz
Vertical Particle Velocity:	0.32 mm/s @ N/A Hz
Longitudinal Particle Velocity:	0.51 mm/s @ 20 Hz
Peak Particle Velocity:	0.51 mm/s @ 20 Hz
Maximum Airblast:	112 dB(L)

Data Collection – Seismometer #6

Make, Model and Serial # of unit:	Instantel Micromate, Serial #20205
Calibration Date:	May 30, 2023
Location of seismograph:	Civic Number 2341 Route 820 (PW-05)
Distance and Direction from Blast:	743 m Northwest
Transverse Particle Velocity:	0.49 mm/s @ 23 Hz
Vertical Particle Velocity:	0.38 mm/s @ 43 Hz
Longitudinal Particle Velocity:	0.60 mm/s @ 18 Hz
Peak Particle Velocity:	0.60 mm/s @ 18 Hz
Maximum Airblast:	112 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 9, 2023
Project No.:	234601.00	**Time of Blast:**	15:52
Inspector:	S. Carroll	**Blast No.:**	2023-18
Client:	Hammond River Holdings		

Data Collection – Seismometer #7

Make, Model and Serial # of unit:	Instantel Micromate, Serial #5676
Calibration Date:	March 8, 2023
Location of seismograph:	Civic Number 50 Myron Road (PW-15)
Distance and Direction from Blast:	1,010 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 Minimate, Serial #20203
Calibration Date:	May 30, 2023
Location of seismograph:	Civic Number 86 Myron Road (PW-16)
Distance and Direction from Blast:	803 m West
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:**	June 9, 2023
Project No.:	234601.00	**Time of Blast:**	15:52
Inspector:	S. Carroll	**Blast No.:**	2023-18
Client:	Hammond River Holdings		

Data Collection – Seismometer #9

Make, Model and Serial # of unit:	Instantel Micromate, Serial #21348
Calibration Date:	July 23, 2022
Location of seismograph:	Civic Number 220 Myron Road (PW-01)
Distance and Direction from Blast:	1,280 m South
Transverse Particle Velocity:	0.38 mm/s @ 85 Hz
Vertical Particle Velocity:	0.25 mm/s @ >100 Hz
Longitudinal Particle Velocity:	0.51 mm/s @ 85 Hz
Peak Particle Velocity:	0.51 mm/s @ 85 Hz
Maximum Airblast:	102 dB(L)

Data Collection – Seismometer #10

Make, Model and Serial # of unit:	Instantel Micromate, Serial #5489
Calibration Date:	May 5, 2023
Location of seismograph:	Civic Number 2337 Route 820 (PW-04)
Distance and Direction from Blast:	799 m Northwest
Transverse Particle Velocity:	0.51 mm/s @ 43 Hz
Vertical Particle Velocity:	0.51 mm/s @ 39 Hz
Longitudinal Particle Velocity:	0.70 mm/s @ 39 Hz
Peak Particle Velocity:	0.70 mm/s @ 39 Hz
Maximum Airblast:	110 dB(L)

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BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	June 9, 2023
Project No.:	234601.00	**Time of Blast:**	15:52
Inspector:	S. Carroll	**Blast No.:**	2023-18
Client:	Hammond River Holdings		

Data Collection – Seismometer #11

Make, Model and Serial # of unit:	Instantel Minimate, Serial #5673
Calibration Date:	April 25, 2023
Location of seismograph:	Civic Number 4140 Route 111 (PW-12)
Distance and Direction from Blast:	716 m South
Transverse Particle Velocity:	0.83 mm/s @ 51 Hz
Vertical Particle Velocity:	1.02 mm/s @ 73 Hz
Longitudinal Particle Velocity:	1.46 mm/s @ 51 Hz
Peak Particle Velocity:	1.46 mm/s @ 51 Hz
Maximum Airblast:	106 dB(L)

Attachment B

Blast and Seismograph Location Plan

Blast and Seismograph Location Plan
Blast No: 2023-18
Upham East Gypsum Quarry
Upham, NB

Date: June 9, 2023
Project No.: 234601.00

Attachment C

Blast Event Reports

Event Report

Date/Time Vert at 15:52:50 June 9, 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: June 9, 2023 17:31:46 (V10.72.1)

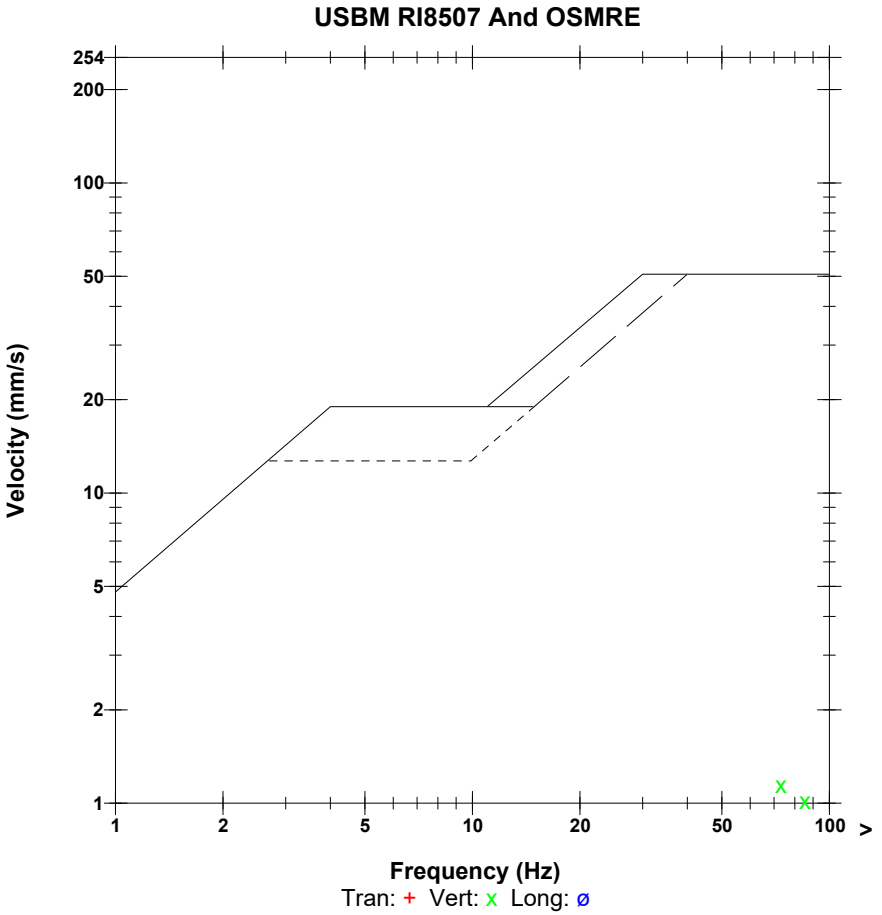
Extended Notes

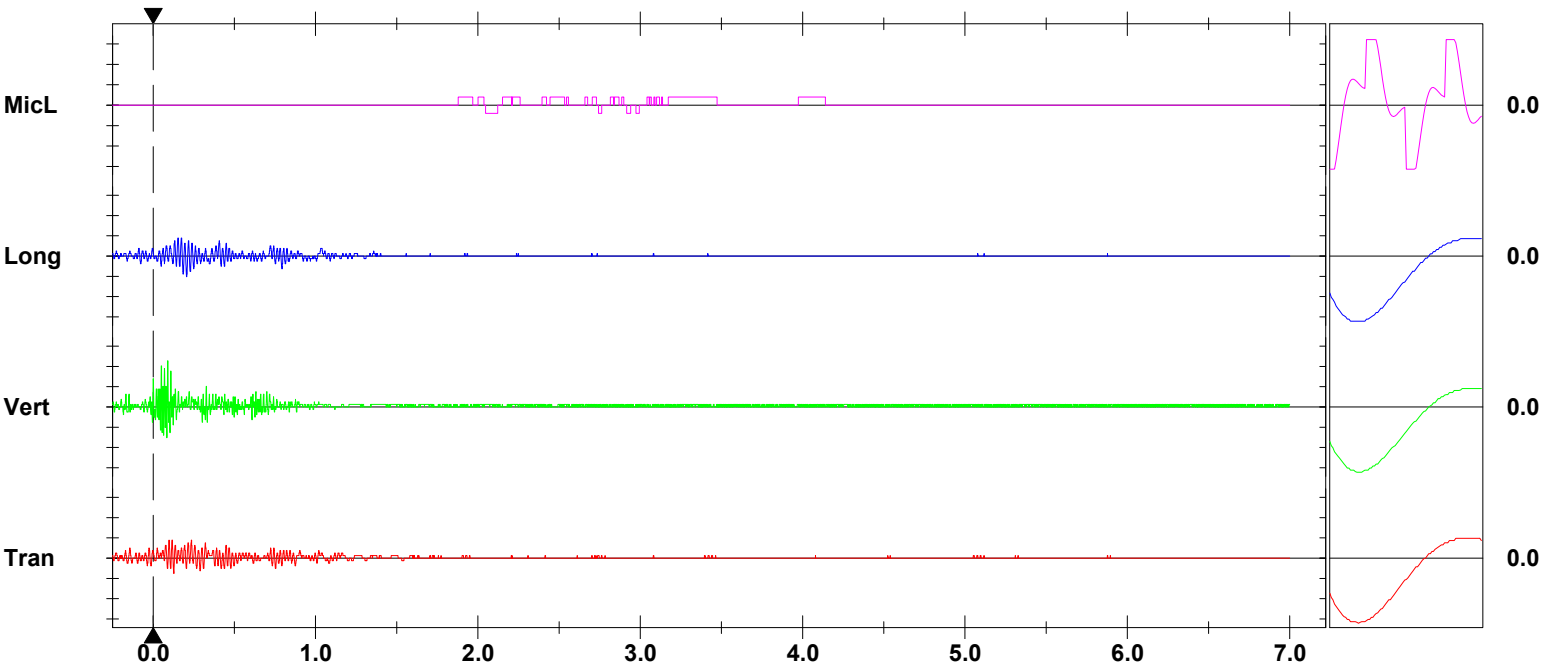
Microphone Linear Weighting
PSPL 100.0 dB(L) 2.000 pa.(L) at 1.880 sec
ZC Freq 6.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 298 mv)

	Tran	Vert	Long	
PPV	0.445	1.143	0.508	mm/s
PPV	43.96	52.16	45.12	dB
ZC Freq	51	73	43	Hz
Time (Rel. to Trig)	0.099	0.091	0.206	sec
Peak Acceleration	0.013	0.053	0.013	g
Peak Displacement	0.002	0.002	0.002	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.1	7.8	7.8	Hz
Overswing Ratio	3.3	3.7	3.8	

Peak Vector Sum 1.159 mm/s at 0.091 sec

Serial Number 5635 V 2.61 MiniMate
Battery Level 6.1 Volts
Unit Calibration March 8, 2023 by Instantel
File Name G635K27D.G20
Post Event Notes
Location: Civic Number 4126 Route 111 (PW-10)
Blast No.: 2023-18
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 =

Event Report

Date/Time Long at 15:52:44 June 9, 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: June 9, 2023 17:34:44 (V10.72.1)

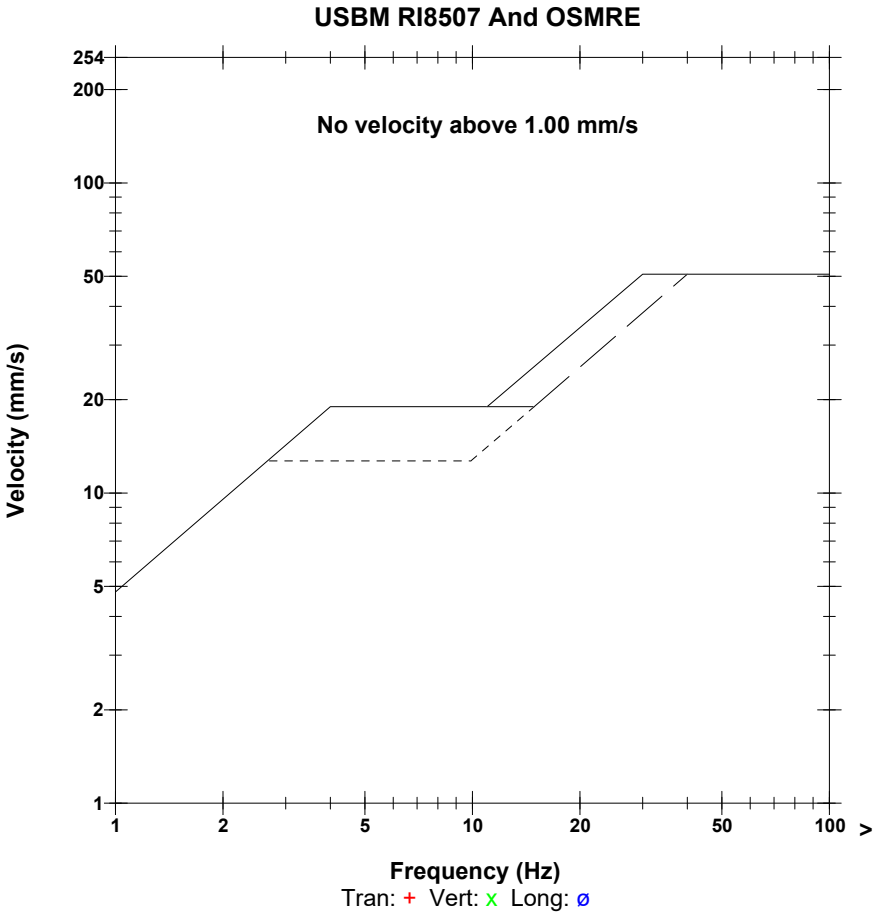
Extended Notes

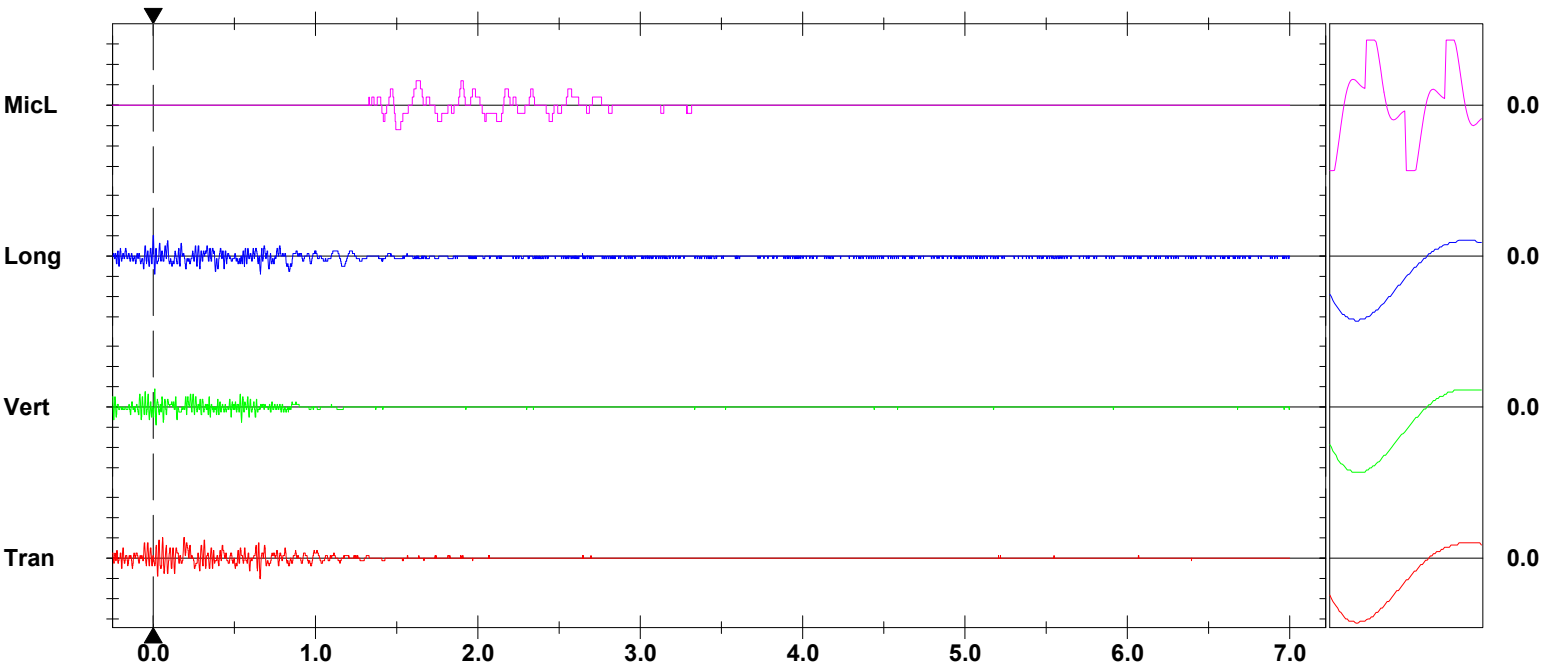
Microphone Linear Weighting
PSPL 109.5 dB(L) 6.000 pa.(L) at 1.495 sec
ZC Freq 6.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 293 mv)

	Tran	Vert	Long	
PPV	0.508	0.445	0.508	mm/s
PPV	45.12	43.96	45.12	dB
ZC Freq	57	64	51	Hz
Time (Rel. to Trig)	0.060	0.010	0.002	sec
Peak Acceleration	0.020	0.020	0.020	g
Peak Displacement	0.002	0.001	0.004	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.8	8.0	8.0	Hz
Overswing Ratio	3.7	3.5	3.6	

Peak Vector Sum 0.651 mm/s at 0.010 sec

Serial Number 5372 V 2.61 MiniMate
Battery Level 6.2 Volts
Unit Calibration February 28, 2023 by Instantel
File Name G372K27D.FW0
Post Event Notes
Location: Civic Number 4150 Route 111 (PW-13)
Blast No.: 2023-18
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 =

Event Report

Date/Time Long at 15:51:52 June 9, 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: June 9, 2023 17:37:43 (V10.72.1)

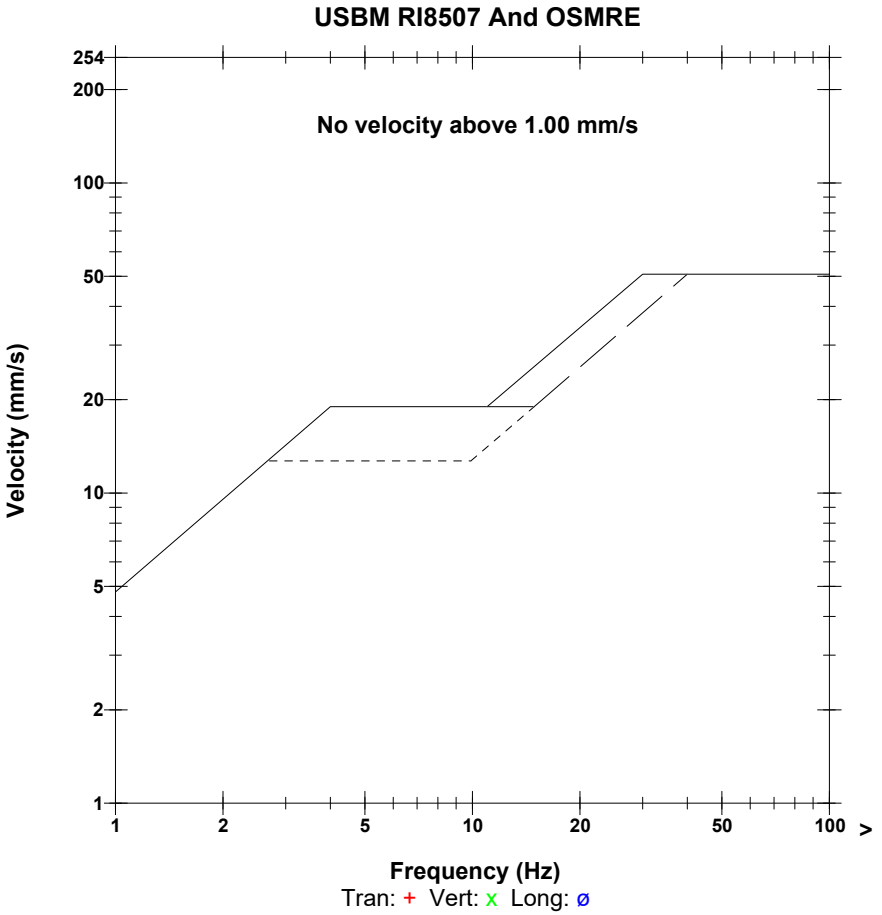
Extended Notes

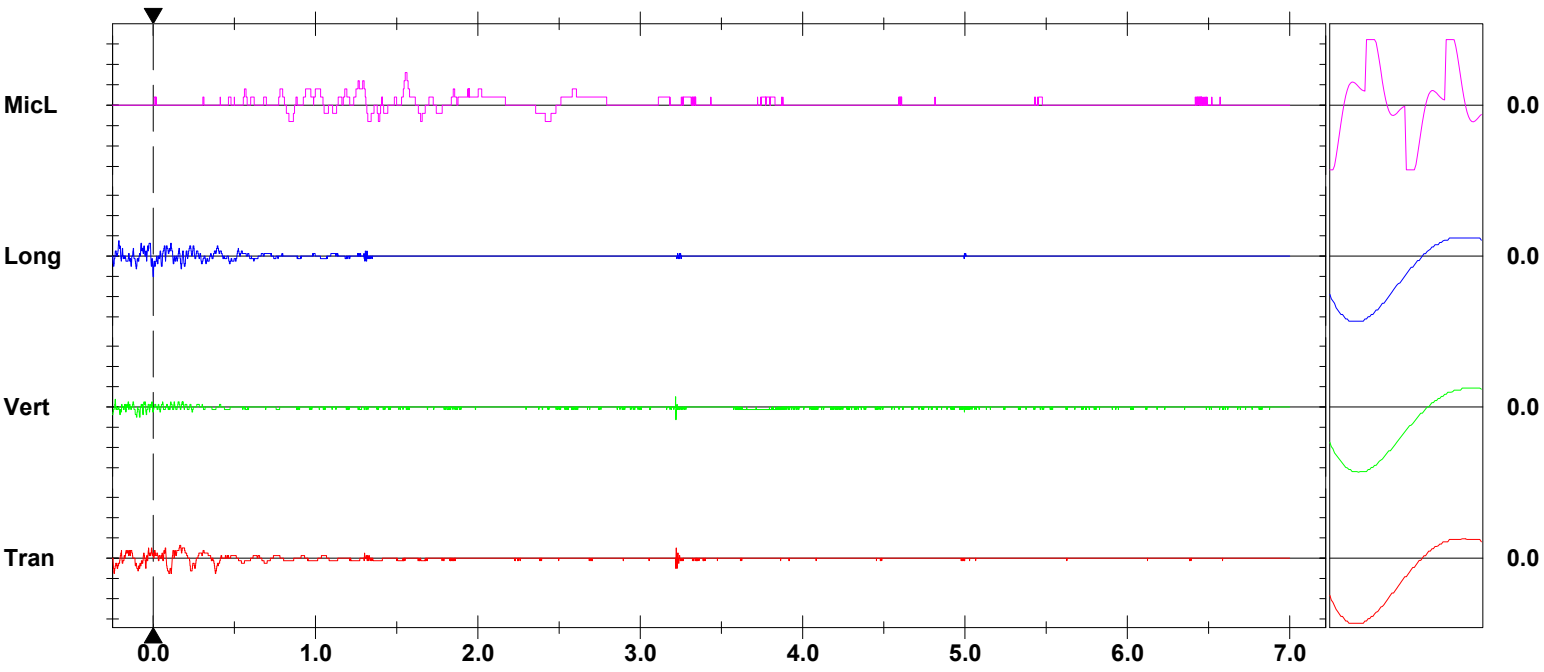
Microphone Linear Weighting
PSPL 112.0 dB(L) 8.000 pa.(L) at 1.554 sec
ZC Freq 6.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 305 mv)

	Tran	Vert	Long	
PPV	0.381	0.318	0.508	mm/s
PPV	42.62	41.03	45.12	dB
ZC Freq	12	N/A	20	Hz
Time (Rel. to Trig)	-0.239	3.221	0.002	sec
Peak Acceleration	0.027	0.040	0.013	g
Peak Displacement	0.005	0.001	0.002	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.3	7.8	8.3	Hz
Overswing Ratio	3.5	3.6	3.7	

Peak Vector Sum 0.540 mm/s at 0.000 sec
N/A: Not Applicable

Serial Number 5371 V 2.61 MiniMate
Battery Level 6.1 Volts
Unit Calibration July 27, 2022 by Instantel
File Name G371K27D.EG0
Post Event Notes
Location: Civic Number Cottage - Route 850 (PW-03)
Blast No.: 2023-18
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 =

Event Report

Date/Time Long at 15:52:47 June 9, 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/factory.MMB

Notes
Location:
Client:
User Name:
General:

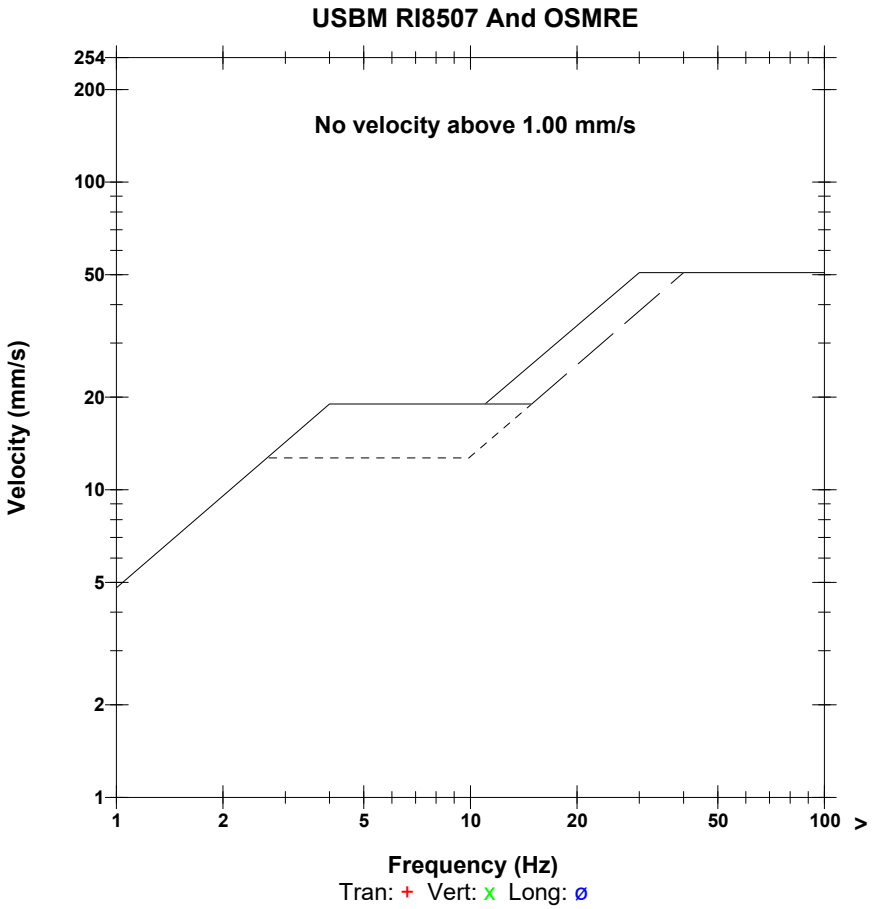
Serial Number UM20205 V 10-90GC Micromate ISEE
Battery Level 3.8 Volts
Unit Calibration May 30, 2023 by Instantel
File Name UM20205_20230609155247.IDFW

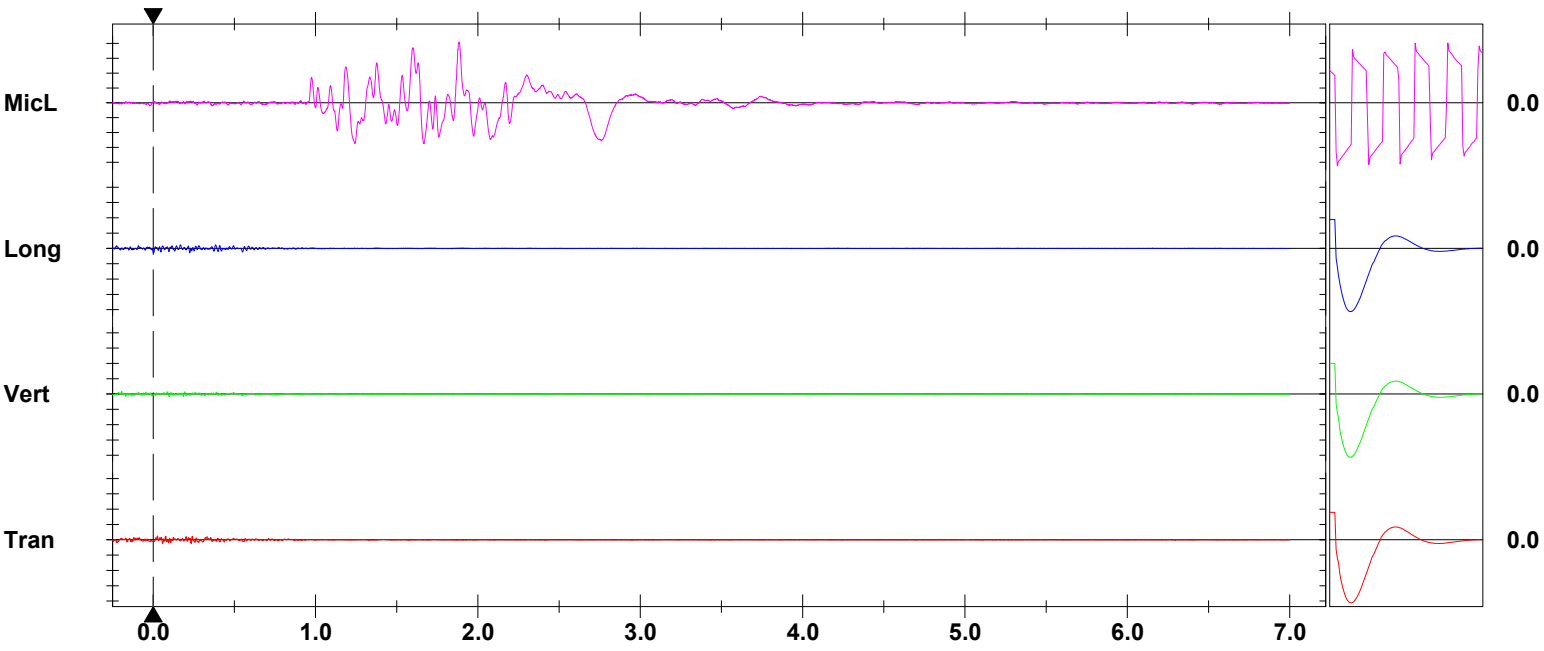
Post Event Notes
Location: Civic Number 2341 Route 820 (PW-05)
Blast No.: 2023-18
Project No: 234601.00

Microphone Linear Weighting
PSPL 112.2 dB(L) 8.192 pa.(L) at 1.885 sec
ZC Freq 5.4 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 1537 mv)

	Tran	Vert	Long	
PPV	0.489	0.378	0.599	mm/s
PPV	44.78	42.56	46.55	dB
ZC Freq	23	43	18	Hz
Time (Rel. to Trig)	0.026	0.099	0.002	sec
Peak Acceleration	0.039	0.015	0.024	g
Peak Displacement	0.003	0.002	0.003	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.1	7.3	7.1	Hz
Overswing Ratio	4.9	4.9	5.0	

Peak Vector Sum 0.628 mm/s at 0.096 sec





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

Event Report

Date/Time Long at 15:51:53 June 9, 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

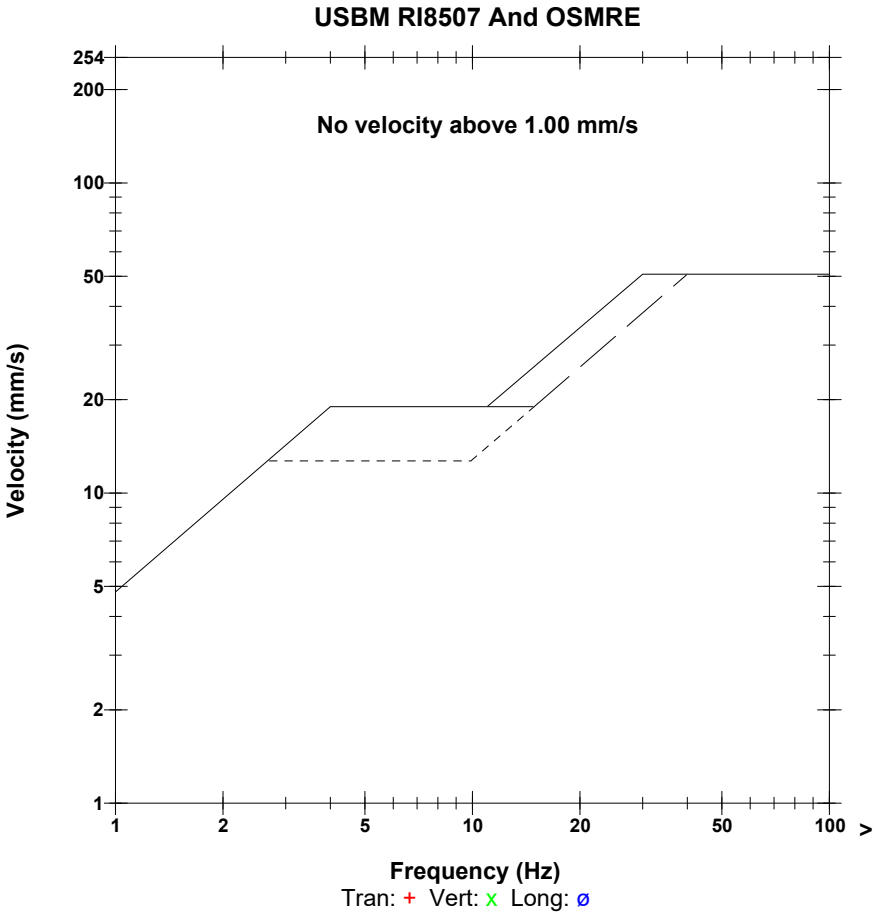
Notes

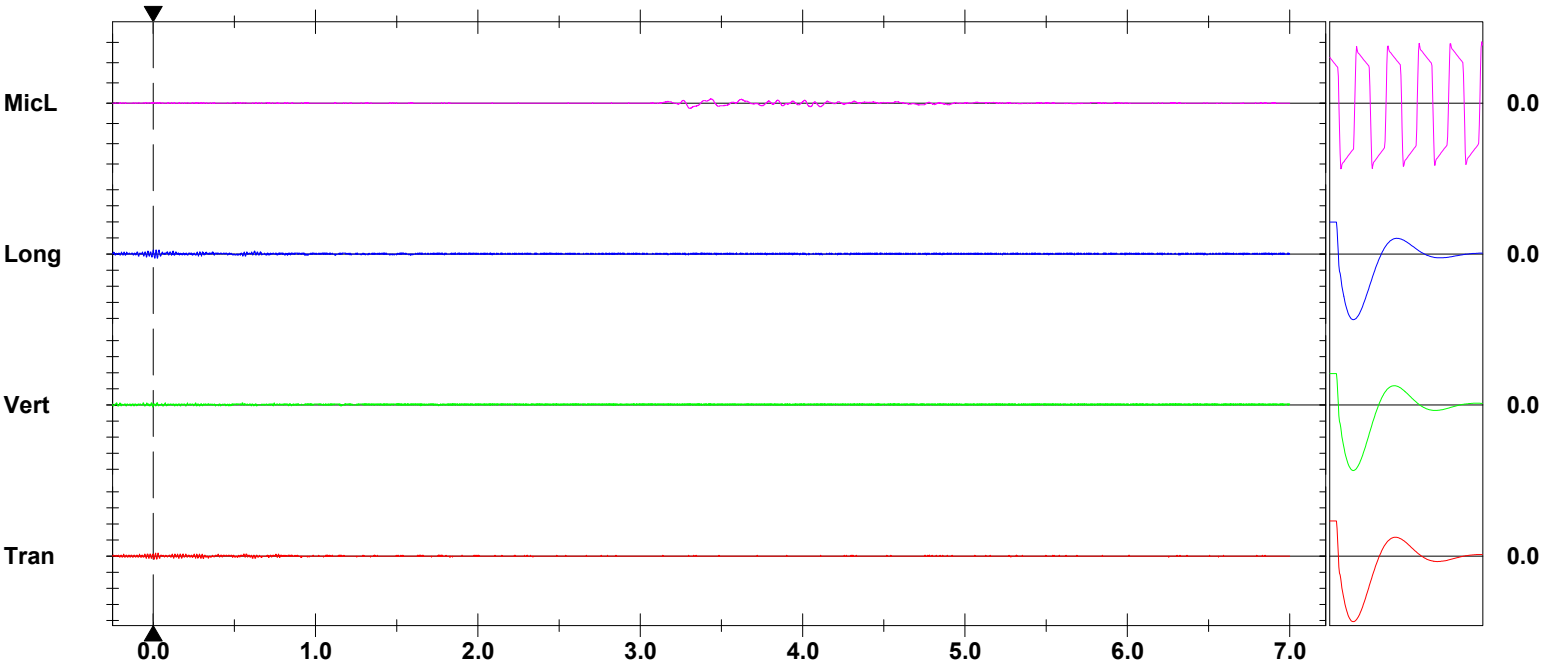
Serial Number BE21348 V 10.72-1.1 Minimate Blaster
Battery Level 5.9 Volts
Unit Calibration July 21, 2022 by Instantel
File Name W348K25I.QH0
Post Event Notes
Location: Civic Number 220 Myron Road (PW-01)
Blast No.: 2023-18
Project No: 234601.00

Microphone Linear Weighting
PSPL 101.9 dB(L) 2.500 pa.(L) at 3.300 sec
ZC Freq 6.0 Hz
Channel Test Passed (Freq = 20.1 Hz Amp = 603 mv)

	Tran	Vert	Long	
PPV	0.381	0.254	0.508	mm/s
PPV	42.62	39.10	45.12	dB
ZC Freq	85	>100	85	Hz
Time (Rel. to Trig)	0.005	-0.228	0.000	sec
Peak Acceleration	0.027	0.027	0.027	g
Peak Displacement	0.001	0.001	0.001	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.6	7.7	7.3	Hz
Overswing Ratio	3.5	3.4	4.2	

Peak Vector Sum 0.568 mm/s at 0.000 sec





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

Event Report

Date/Time Long at 15:52:48 June 9, 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: June 9, 2023 17:47:07 (V10.72.1)

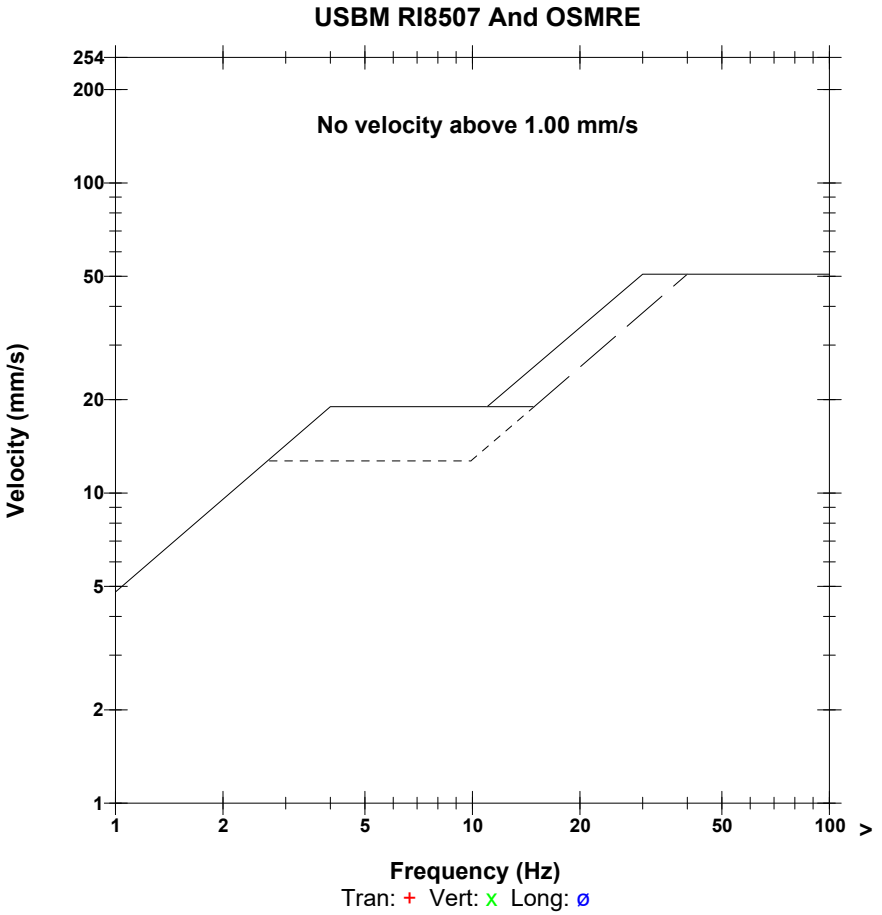
Extended Notes

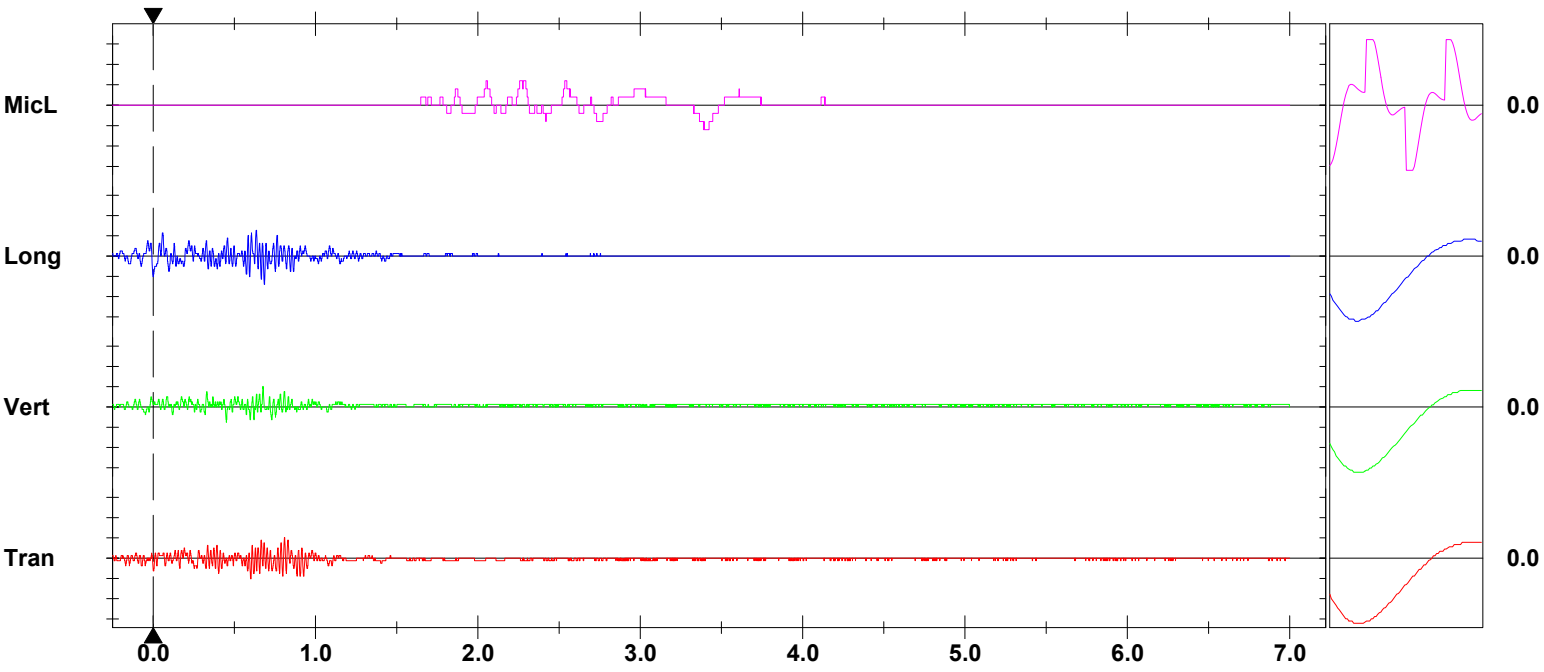
Microphone Linear Weighting
PSPL 109.5 dB(L) 6.000 pa.(L) at 2.051 sec
ZC Freq 6.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 284 mv)

	Tran	Vert	Long	
PPV	0.508	0.508	0.699	mm/s
PPV	45.12	45.12	47.88	dB
ZC Freq	43	39	39	Hz
Time (Rel. to Trig)	0.601	0.678	0.686	sec
Peak Acceleration	0.020	0.013	0.020	g
Peak Displacement	0.002	0.002	0.004	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.6	7.7	7.8	Hz
Overswing Ratio	4.0	4.0	3.9	

Peak Vector Sum 0.794 mm/s at 0.686 sec

Serial Number 5489 V 2.61 MiniMate
Battery Level 6.1 Volts
Unit Calibration May 5, 2023 by Instantel
File Name G489K27D.G00
Post Event Notes
Location: Civic Number 2337 Route 820 (PW-04)
Blast No.: 2023-18
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 =

Event Report

Date/Time Vert at 15:52:01 June 9, 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: June 9, 2023 17:49:55 (V10.72.1)

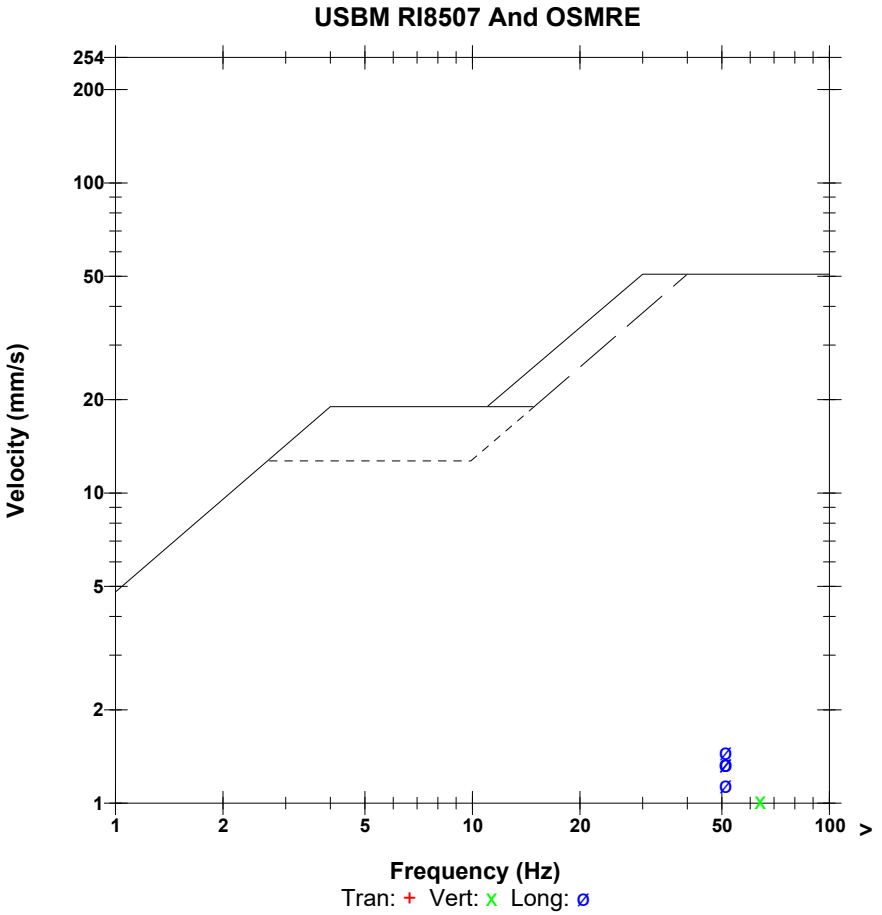
Extended Notes

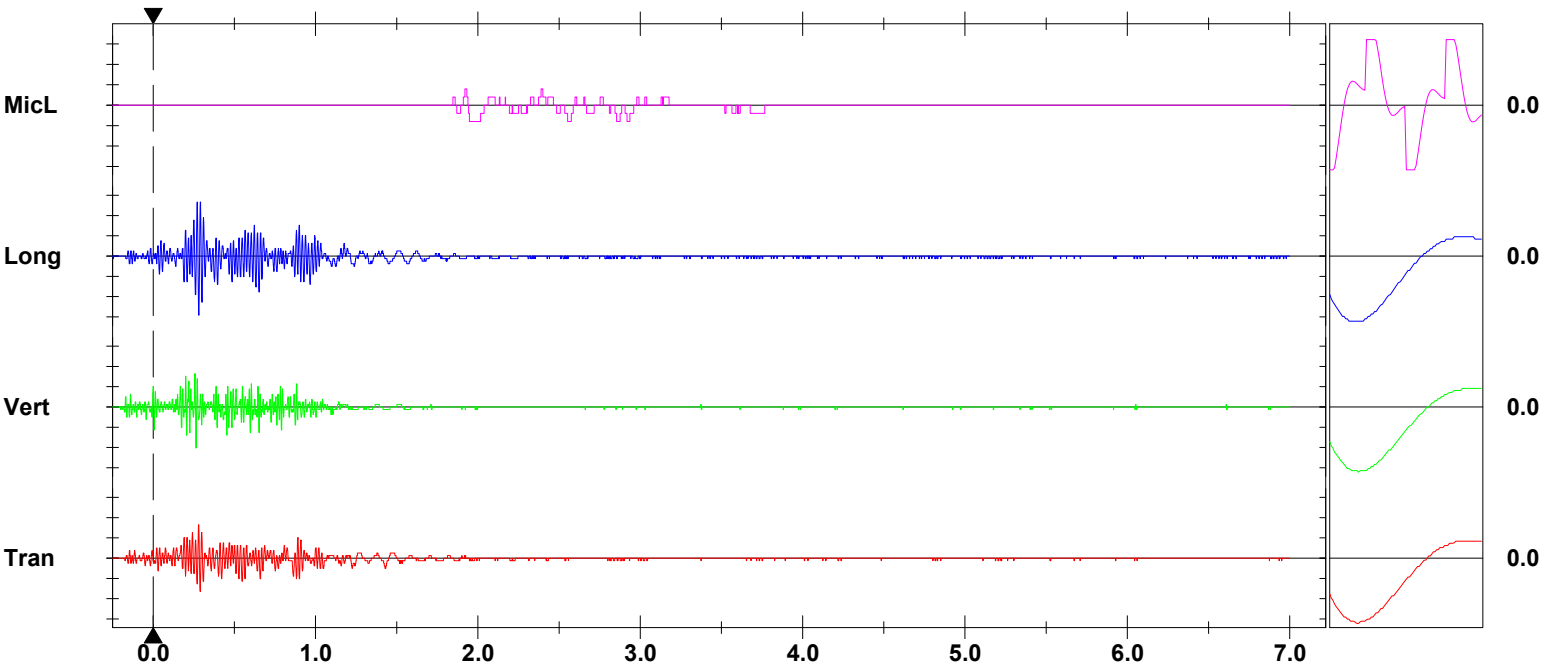
Microphone Linear Weighting
PSPL 106.0 dB(L) 4.000 pa.(L) at 1.921 sec
ZC Freq 17 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 307 mv)

	Tran	Vert	Long	
PPV	0.826	1.016	1.461	mm/s
PPV	49.33	51.14	54.29	dB
ZC Freq	51	73	51	Hz
Time (Rel. to Trig)	0.280	0.265	0.281	sec
Peak Acceleration	0.033	0.046	0.046	g
Peak Displacement	0.003	0.002	0.005	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.0	7.8	8.3	Hz
Overswing Ratio	3.9	3.7	3.5	

Peak Vector Sum 1.715 mm/s at 0.281 sec

Serial Number 5673 V 2.61 MiniMate
Battery Level 6.2 Volts
Unit Calibration April 25, 2023 by Instantel
File Name G673K27D.EP0
Post Event Notes
Location: Civic Number 4140 Route 111 (PW-12)
Blast No.: 2023-18
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 =