Memo

HAMMOND RIVER HOLDINGS

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

From: Dan Guest, Hammond River Holdings Ltd.

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

Date: April 29, 2021

Subject: Monthly Report – Upham East Gypsum Quarry, Surface Water Sampling – March 2021

Our File: File # 18-8346

Introduction

This monthly report details activities associated with the operation of the Upham East Gypsum Quarry for the month of March 2021, in accordance with conditions of the Approval to Operate I-10936. As required by the approval to operate, surface water sampling of the watercourse that crosses the site and in the Hammond River began immediately. Refer to the December 2019, January through December 2020, and January through February 2021 reports for previous water quality results.

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

- Week 1: March 2, 2021
- Week 2: March 8, 2021
- Week 3: March 18, 2021
- Week 4: March 27, 2021
- Week 5: March 30, 2021

The March 27 and March 30 sample events coincided with heavy precipitation events, defined as more than 25 mm of rain over a 24-hour period. Quarterly samples were collected on March 16, 2021; two sites were frozen during this sampling event. The two remaining quarterly samples were collected on March 26. Additionally, sites were frozen during the March 2, March 8, and March 18 sampling events. Field parameters were not measured and samples were not collected for these events.

Surface Water Sampling – Field Methods

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

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

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

Quarterly samples were collected, as per the EMP (Dillon 2020), on March 16 and 26, 2021. Quarterly sampling included recording additional field parameters (pH and dissolved oxygen) and analysis of additional laboratory parameters (alkalinity, calcium, chloride, hardness, magnesium, potassium, sodium, sulphate, total phosphorus and total dissolved solids). In addition to the sites described above, samples were collected from two 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

Results of the surface water compliance monitoring 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, with one exception. The downstream site in the Hammond River (H2) reported a TSS concentration of 47 mg/L on March 26, 2021. However, the TSS concentration reported from PDP-1 on the same day was <5 mg/L. Therefore, the elevated TSS result observed at H2 can be attributed to natural factors, including spring melt and heavy precipitation.

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

Environmental Accidents and Malfunctions

No spills occurred during the March 2021 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 January there were 5 air quality monitoring events, March 1, 7, 13, 19, 25, and 31; the results are provided in Table 4. None of the air samples collected in March exceed 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

In March there were two blasts, March 4 and March 24, 2021. There were no exceedances of Approval to Operate limits for maximum velocity and sound pressure. Blast reports are attached.

Public Complaints

Hammond River Holdings received 5 public complaints during the March 2021 monitoring period. Two complaints related to truck traffic at night and the other three related to noise coming from the site at night. All complaints were responded to by an HRH representative with 24 hours of receiving the complaint.

During a critical time when frost comes out of the ground HRH attempted to mitigate damage to the haul route by hauling at night when temperatures were below zero. To mitigate noise issues for the community HRH asked that drivers not use Jake brakes and not to travel in convoys; hauling was also reduced from 5 days a week to 4 nights a week. Despite these efforts, the above complaints were still received. Given the warming temperatures and the complaints received, HRH further reduced truck weights and shifted back to hauling during regular daytime hours.

Summary

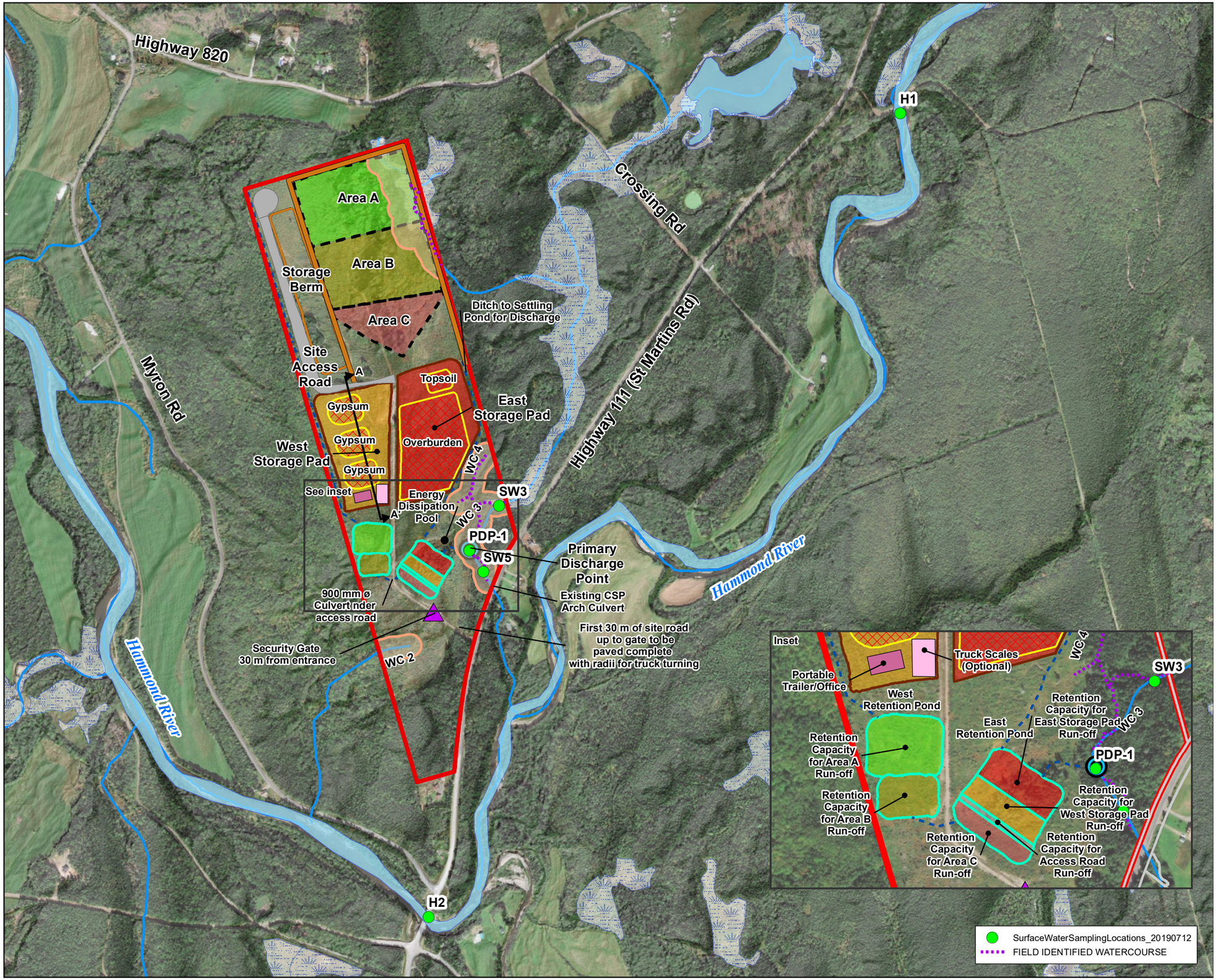
The water chemistry at the discharge point into WC3 is comparable to background. Based on the results provided in Table 1, the gypsum extraction activities being conducted on site have not had a negative impact on WC3 and subsequently the Hammond River. All air quality monitoring and blast monitoring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

References

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

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

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



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

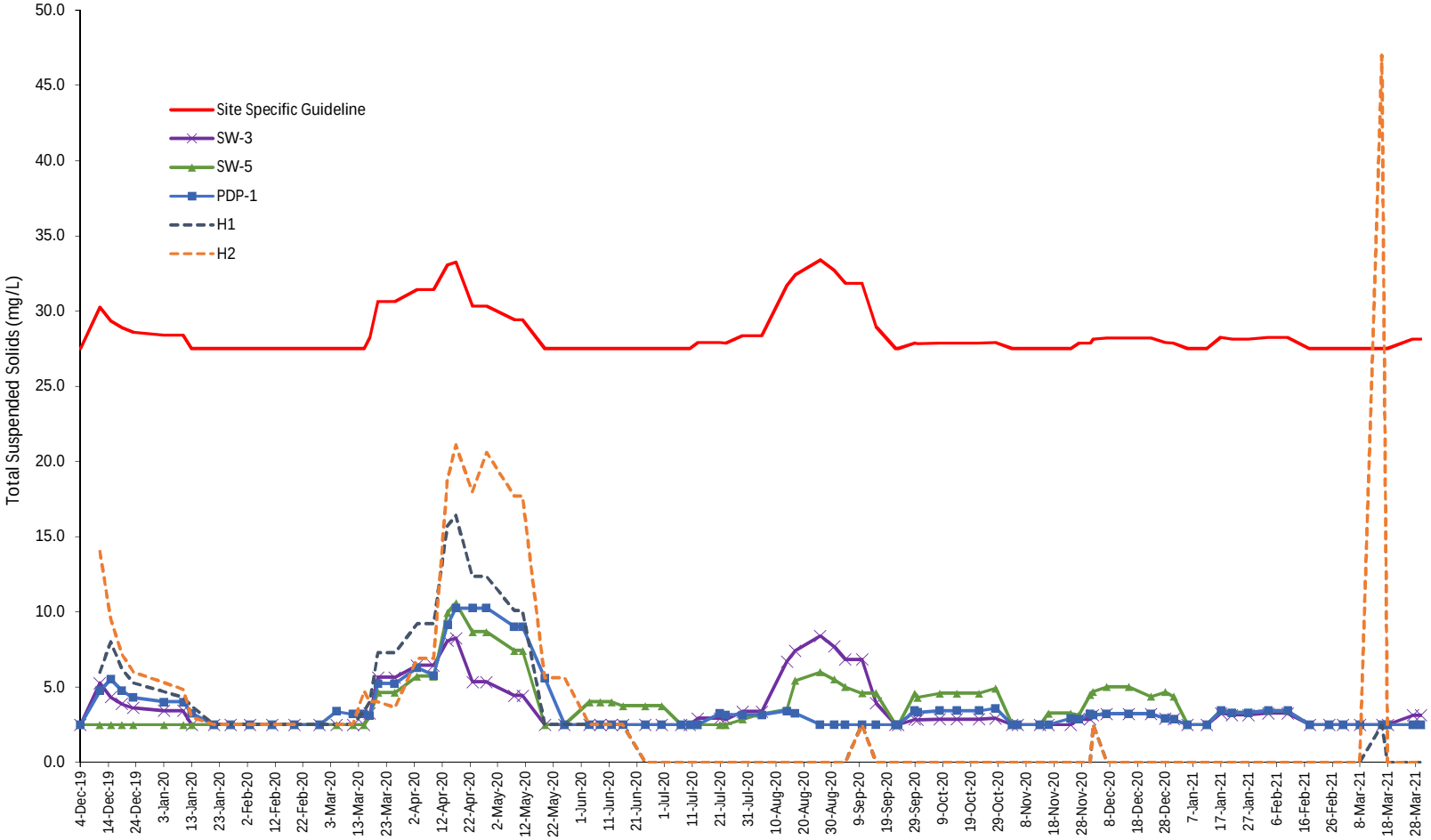
MAP CREATED BY: JH
MAP REVISED BY: JO
MAP CHECKED BY: GA
MAP PROJECTION: NAD_1983_CSRS_NEW_BRUNSWICK_STEREOGRAPHIC

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



Notes:
The detection limit for TSS is 5 mg/L; for results <5 mg/L, half the detection limit was used.
Monthly average is calculated based on results from the previous 30 days.
Site specific guideline is 25 mg/L above the monthly average.

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

Parameter		Ambient Air Temperature[a]	Precipitation 48 hours prior to sample collection[b]	Field Parameters					Laboratory Results										
				Water Temperature	Specific Conductivity	Turbidity	pH	Dissolved Oxygen	Total Suspended Solids[c]	Alkalinity (as CaCO3)	Calcium	Chloride	Hardness (as CaCO3)	Magnesium	Phosphorus	Potassium	Sodium	Sulphate	Total Dissolved Solids
Units		°C	mm	°C	mS/cm	NTU	-	mg/L	mg/L	mg/L					mg/L	mg/L	mg/L	mg/L	mg/L
Sample ID	Date																		
SW3	02-Mar-21	-17.10	27.90	Frozen over. No flow.															
PDP-1	02-Mar-21			0.00	0.247	5.64	-	-	<5	-	-	-	-	-	-	-	-	-	-
SW5	02-Mar-21			Frozen over. No flow.															
SW3	08-Mar-21	-2.7	0	Frozen over. No flow.															
PDP-1	08-Mar-21			Frozen over. No flow.															
SW-5	08-Mar-21			Frozen over. No flow.															
SW3[e]	16-Mar-21	-7.9	0.5	-	-	-	-	-	<5	21	74.5	11.8	190	0.97	0.015	0.49	6.12	155	288
SW5	16-Mar-21			0.72	0.577	1.2	8.44	7.43	<5	20	132	20.9	341	2.87	0.012	0.88	9.23	280	522
SW5 (FD)	16-Mar-21			0.72	0.577	1.2	8.44	7.43	<5	19	132	20.5	341	2.86	0.012	0.87	9.17	280	522
H1	16-Mar-21			0.76	0.092	0.2	9.21	11.91	<5	19	13.7	7.9	37.3	0.75	0.009	0.35	4.33	18	72
PDP-1	26-Mar-21	8.4	29.4	1.27	0.132	5.4	9.4	8.12	<5	6	23.3	5.4	60.8	0.65	0.02	0.4	3.23	50	113
H2	26-Mar-21			3.59	0.039	28.01	9.61	17.74	47	7	5.61	5	15.8	0.43	0.056	0.3	3.12	5	41
SW3	18-Mar-21	4.1	1.1	Frozen over. No flow.															
PDP-1	18-Mar-21			0.00	0.489	1.33	-	-	<5	-	-	-	-	-	-	-	-	-	-
SW5	18-Mar-21			0.50	0.496	1.83	-	-	<5	-	-	-	-	-	-	-	-	-	-
SW5 (FD)	18-Mar-21			0.00	0.494	1.2	-	-	<5	-	-	-	-	-	-	-	-	-	-
SW3	27-Mar-21	-1.80	29.40	0.00	0.920	9.24	-	-	5	-	-	-	-	-	-	-	-	-	-
PDP-1	27-Mar-21			0.00	0.114	10.11	-	-	<5	-	-	-	-	-	-	-	-	-	-
SW5	27-Mar-21			0.00	0.150	10.29	-	-	<5	-	-	-	-	-	-	-	-	-	-
SW3	30-Mar-21	4.30	29.80	2.20	0.165	4.44	-	-	<5	-	-	-	-	-	-	-	-	-	-
PDP-1	30-Mar-21			2.00	0.237	5.65	-	-	<5	-	-	-	-	-	-	-	-	-	-
SW-5	30-Mar-21			2.00	0.330	3.60	-	-	<5	-	-	-	-	-	-	-	-	-	-

a) Temperature based on data from the climate station at the Saint John airport. Temperature is the value recorded at 12:00pm on the day of sampling. Data available at: https://climate.weather.gc.ca/historical_data/search_historic_data_e.html
b) Preciptitation based on data from the climate station at the Saint John airport. Data available at: https://climate.weather.gc.ca/historical_data/search_historic_data_e.html
c) Site specific guideline, TSS cannot exceed 25 mg/L above the background monthly average.
d) Canadian Council of Ministers of Environment (CCME) for the Protection of Aquatic Life.
e) Water to shallow to collect field parameters.
SW3 is the background sample for Watercourse 3.
' - ' denotes no guideline, not analyzed, or not applicable; FD = field duplicate.
75 bold/shaded value denotes concentration exceeds CCME criteria or TSS background.

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

Date	Site Specific Guideline	Monthly Average				
		H1	H2	SW3	SW5	PDP-1
04-Dec-19	27.5	-	-	2.5	2.5	2.5
11-Dec-19	30.3	6.0	14.0	5.3	2.5	4.8
15-Dec-19	29.3	8.0	9.5	4.3	2.5	5.5
19-Dec-19	28.9	6.2	7.2	3.9	2.5	4.8
23-Dec-20	28.6	5.3	6.0	3.6	2.5	4.3
3-Jan-20	28.4	4.7	5.3	3.4	2.5	4.0
10-Jan-20	28.4	4.3	4.8	3.4	2.5	4.0
13-Jan-20	27.5	3.8	3.0	2.5	2.5	3.3
21-Jan-20	27.5	2.5	2.5	2.5	2.5	2.5
27-Jan-20	27.5	2.5	2.5	2.5	2.5	2.5
3-Feb-20	27.5	2.5	2.5	2.5	2.5	2.5
11-Feb-20	27.5	2.5	2.5	2.5	2.5	2.5
19-Feb-20	27.5	2.5	2.5	2.5	2.5	2.5
28-Feb-20	27.5	2.5	0.0	2.5	2.5	2.5
5-Mar-20	27.5	2.5	2.5	2.5	2.5	3.4
11-Mar-20	27.5	2.5	2.5	2.5	2.5	3.2
15-Mar-20	27.5	3.4	4.8	2.5	2.5	3.2
17-Mar-20	28.3	4.0	4.0	3.3	3.1	3.1
20-Mar-20	30.6	7.3	4.0	5.6	4.6	5.2
26-Mar-20	30.6	7.3	3.6	5.6	4.6	5.2
3-Apr-20	31.4	9.2	6.9	6.4	5.7	6.3
9-Apr-20	31.4	9.2	6.9	6.4	5.7	5.8
14-Apr-20	33.1	15.7	18.8	8.1	9.9	9.1
17-Apr-20	33.3	16.4	21.1	8.3	10.6	10.3
23-Apr-20	30.3	12.3	18.0	5.3	8.7	10.3
28-Apr-20	30.3	12.3	20.6	5.3	8.7	10.3
8-May-20	29.1	9.0	15.5	4.1	6.7	8.1
11-May-20	29.1	9.0	15.5	4.1	6.7	8.1
19-May-20	27.5	2.5	5.1	2.5	2.5	5.1
26-May-20	27.5	2.5	5.1	2.5	2.5	2.5
4-Jun-20	27.5	2.5	2.5	2.5	10.0	2.5
8-Jun-20	27.5	2.5	2.5	2.5	2.5	2.5
12-Jun-20	27.5	2.5	2.5	2.5	2.5	2.5
16-Jun-20	27.5	2.5	2.5	2.5	2.5	2.5
24-Jun-20	27.5	-	-	2.5	2.5	2.5
30-Jun-20	27.5	-	-	2.5	2.5	2.5
7-Jul-20	27.5	-	-	2.5	2.5	2.5
10-Jul-20	27.5	-	-	2.5	2.5	2.5
13-Jul-20	27.9	-	-	5.0	2.5	2.5
21-Jul-20	27.9	-	-	2.5	2.5	7.0
23-Jul-20	27.8	-	-	2.5	2.5	2.5
29-Jul-20	28.3	-	-	6	5	2.5
5-Aug-20	28.4	-	-	3.4	3.2	3.1
14-Aug-20	31.7	-	-	6.7	3.5	3.4
17-Aug-20	32.4	-	-	7.4	5.4	3.3
26-Aug-20	33.4	-	-	8.4	6.0	2.5
31-Aug-20	32.7	-	-	7.7	5.5	2.5
4-Sep-20	31.8	-	-	6.8	5.0	2.5
10-Sep-20	31.8	2.5	2.5	6.8	4.6	2.5
15-Sep-20	28.9	-	-	3.9	4.6	2.5
22-Sep-20	27.5	-	-	2.5	2.5	2.5

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

Date	Site Specific Guideline	Monthly Average				
		H1	H2	SW3	SW5	PDP-1
23-Sep-20	27.5	-	-	2.5	2.5	2.5
29-Sep-20	27.9	-	-	2.9	4.6	3.4
30-Sep-20	27.8	-	-	2.8	4.3	3.3
8-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
3-Nov-20	27.5	-	-	2.5	2.5	2.5
5-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	7.0	2.5
24-Nov-20	27.5	-	-	2.5	2.5	5.0
27-Nov-20	27.9	-	-	5	2.5	2.5
1-Dec-20	27.9	-	-	2.9	4.5	3.2
2-Dec-20	28.1	2.5	2.5	3.1	4.7	3.1
7-Dec-20	28.2	-	-	3.2	5.0	3.2
15-Dec-20	28.2	-	-	3.2	5.0	3.2
23-Dec-20	28.2	-	-	3.2	4.4	3.2
28-Dec-20	27.9	-	-	2.9	4.7	2.9
31-Dec-20	27.9	-	-	2.9	4.4	2.9
5-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
3-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
2-Mar-21	27.5	-	-	2.5	2.5	2.5
8-Mar-21	27.5	-	-	2.5	2.5	2.5
16-Mar-21	27.5	2.5	-	2.5	2.5	2.5
18-Mar-21	27.5	-	-	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

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. This applies to SW3, SW5, and PDP-1.
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
Surface Water Monitoring - QA/QC Results
Upham East Gypsum Project
Upham, New Brunswick
Project No. 18-8346

Parameter		Total Suspended Solids	Alkalinity (as CaCO3)	Calcium	Chloride	Hardness (as CaCO3)	Magnesium	Phosphorus	Potassium	Sodium	Sulphate	Total Dissolved Solids
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample ID	Date											
SW5	16-Mar-21	<5	20	132	20.9	341	2.87	0.012	0.88	9.23	280	522
SW5 (FD)	16-Mar-21	<5	19	132	20.5	341	2.86	0.012	0.87	9.17	280	522
RPD value		-	5%	0%	2%	0%	0%	0%	1%	1%	0%	0%
SW5	18-Mar-21	<5	-	-	-	-	-	-	-	-	-	-
SW5 (FD)	18-Mar-21	<5	-	-	-	-	-	-	-	-	-	-
RPD value		-	-	-	-	-	-	-	-	-	-	-

RPD calculations and acceptance criteria based on CCME (2016).
' - ' denotes RPD could not be calculated because one or more parameters was below detection limit.
75 bold/shaded value denotes RPD above criteria of 40%.

Table 4
Air Quality Reporting
Upham East Gypsum Quarry

Test Start	Time	Duration	Flow Rate (L/min)	Air Volume (m^3)	Pressure (mm Hg)	Temperature (°C)	Initial Filter Weight (g)	Final Filter Weight (g)	TSP Mass (µg)	TSP (µg/m3)	Site Guideline (µg/m^3)
2020-07-22	14:51	24 hours	16.7	24.05	752	20.3	14.8415	14.8645	23000	39.848	120
2020-07-28	23:59	24 hours	16.46	23.7	747	24.4	14.8261	14.8278	1700	2.989	120
2020-08-04	13:55	24 hours	16.66	23.99	753	22.8	14.8264	14.8295	3100	5.384	120
2020-08-09	23:59	24 hours	16.74	24.1	752	21.2	14.8422	14.8444	2200	3.804	120
2020-08-15	23:59	24 hours	16.88	24.3	754	19.8	14.8243	14.8359	11600	19.89	120
2020-08-21	23:59	24 hours	16.87	24.3	749	17.9	14.8394	14.8415	2100	3.601	120
2020-08-27	23:59	24 hours	17.06	24.57	743	12.4	14.8233	14.845	21700	36.8	120
2020-09-02	23:59	24 hours	16.75	24.12	747	18.8	14.8417	14.8614	19700	34.031	120
2020-09-08	23:59	24 hours	17.02	24.51	759	19.1	14.8585	14.8706	12100	20.57	120
2020-09-14	23:59	24 hours	17.62	25.37	756	8	14.8275	14.8368	9300	15.274	120
2020-09-20	23:59	24 hours	18.03	25.97	764	4.8	14.8349	14.852	17100	27.436	120
2020-09-26	23:59	24 hours	17.1	24.62	753	15.3	14.8561	14.8594	3300	5.585	120
2020-10-02	23:59	24 hours	14.43	25.1	753	9.6	14.9721	14.9593	-12800	-21.248	120
2020-10-08	23:59	24 hours	17.69	25.48	748	3.8	14.8606	14.8894	28800	47.096	120
2020-10-14	23:59	24 hours	17.56	25.29	753	7.8	14.8828	14.8911	8300	13.675	120
2020-10-20	23:59	19:31	17.63	20.66	760	9.1	14.8749	14.8578	-17100	-34.487	120
2020-10-23	23:59	21:55	17.34	22.82	750	10.1	14.8592	14.8648	5600	11.195	120
2020-10-26	23:59	21:02	17.71	22.35	752	4.8	14.8541	14.8642	10100	21.519	120
2020-11-01	23:59	24 hours	17.19	24.75	732	5.9	14.8729	14.8802	7300	12.29	120
2020-11-07	23:59	24 hours	17.84	25.68	759	5.9	14.8692	14.8723	3100	5.03	120
2020-11-13	23:59	24 hours	17.79	25.62	748	1.9	14.86	14.8606	600	0.976	120
2020-11-19	23:59	24 hours	17.63	25.22	756	7.3	14.8476	14.8498	2200	3.635	120
2020-11-25	23:59	24 hours	17.83	25.68	756	4.4	14.8496	14.8563	6700	10.871	120
2020-12-01	23:59	24 hours	17.48	25.18	748	7	14.8427	14.861	18300	30.282	120
2020-12-07	23:59	24 hours	17.88	25.75	740	-2.1	14.8343	14.8362	1900	3.074	120
2020-12-13	23:59	24 hours	17.98	25.9	746	-1.3	14.8306	14.8389	8300	13.353	120
2020-12-19	23:59	24 hours	18.37	26.45	756	-3.6	14.8373	14.843	5700	8.979	120
2020-12-25	23:59	24 hours	17.34[a]	22.82[a]	753[a]	12.3[a]	14.84	14.85	10000	18.259	120
2020-12-31	23:59	24 hours	18.58	26.76	759	-5.8	14.8452	14.85	4800	7.474	120
2021-01-06	23:59	24 hours	18	24.73	744	-2.7	14.836	14.8523	16300	27.463	120
2021-01-12	23:59	24 hours	16.7	24.74	749	-6.7	14.8542	14.8724	18200	30.652	120
2021-01-18	23:59	24 hours	17.52	25.52	737	-0.8	14.8681	14.8767	8600	14.041	120
2021-01-24	23:59	24 hours	16.7	24.03	737	-8	14.8231	14.8273	4200	7.283	120
2021-01-30	23:59	24 hours	16.7	24.03	750	-11.2	14.829	14.8326	3600	6.242	120
2021-02-05	23:59	24 hours	17.9	25.8	744	-0.9	14.8504	14.8662	15800	25.5168	120
2021-02-11	23:59	24 hours	16.7	24.05	750	-12.6	14.829	14.8343	5300	9.1823	120
2021-02-17	9:59	24 hours	16.7	24.05	755	-9.9	14.818	14.8208	2800	4.8510	120
2021-02-23	23:59	24 hours	17.7	25.49	737	-0.6	14.8906	14.8966	6000	9.8078	120
2021-03-01	23:59	24 hours	17.87	25.74	741	-1.6	14.8584	14.8661	7700	12.4644	120
2021-03-07	23:59	24 hours	16.7	24.05	753	-8.9	14.8395	14.8513	11800	20.4435	120
2021-03-13	23:59	24 hours	17.92	25.81	743	-1.3	14.8283	14.8352	6900	11.1391	120
2021-03-19	23:59	24 hours	16.7	24.05	750	-5.3	14.8188	14.8234	4600	7.9695	120
2021-03-25	23:59	24 hours	17.52	24.23	754	8.9	14.8196	14.8257	6100	10.4898	120
2021-03-31	23:59	24 hours	16.7	24.05	756	6.8	14.8228	14.8314	8600	14.8995	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.

Report ID: 386940-IAS
Report Date: 11-Mar-21
Date Received: 04-Mar-21

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:			386940-1
Client Sample ID:			PDP-1
Date Sampled:			2-Mar-21
Analytes	**Units**	**RL**	
Solids - Total Suspended	mg/L	5	< 5

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

RL = Reporting Limit

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

Brannen Burhoe
Supervisor
Inorganic Analytical Services

Report ID: 386940-IAS
Report Date: 11-Mar-21
Date Received: 04-Mar-21

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	4.M05	APHA 2540 D	Filtration, Gravimetry

Report ID: 388501-IAS
Report Date: 29-Mar-21
Date Received: 17-Mar-21

CERTIFICATE OF ANALYSIS

for

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

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

Attention: Brandon Kirk
Project #: 20-3571
Location: Upham

Analysis of Water

RPC Sample ID:			388501-1	388501-2	388501-3	388501-4
Client Sample ID:			H1	SW5	SW3	SW9
Date Sampled:			16-Mar-21	16-Mar-21	16-Mar-21	16-Mar-21
Analytes	**Units**	**RL**				
Alkalinity (as $CaCO_3$)	mg/L	2	19	20	21	19
Chloride	mg/L	0.5	7.9	20.9	11.8	20.5
Sulfate	mg/L	1	18	280	155	280
Phosphorus - Total	mg/L	0.002	0.009	0.012	0.015	0.012
Solids - Total Dissolved	mg/L	5	72	522	288	522
Solids - Total Suspended	mg/L	5	< 5	< 5	< 5	< 5
Hardness (as $CaCO_3$)	mg/L	0.2	37.3	341.	190.	341.

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

RL = Reporting Limit

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

Matthew Norman
Senior Chemist
Inorganic Analytical Chemistry

Report ID: 388501-IAS
Report Date: 29-Mar-21
Date Received: 17-Mar-21

CERTIFICATE OF ANALYSIS

for

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

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

Attention: Brandon Kirk
Project #: 20-3571
Location: Upham

Analysis of Metals in Water

RPC Sample ID:			388501-1	388501-2	388501-3	388501-4
Client Sample ID:			H1	SW5	SW3	SW9
Date Sampled:			16-Mar-21	16-Mar-21	16-Mar-21	16-Mar-21
Analytes	**Units**	**RL**				
Calcium	mg/L	0.05	13.7	132.	74.5	132.
Magnesium	mg/L	0.01	0.75	2.87	0.97	2.86
Potassium	mg/L	0.02	0.35	0.88	0.49	0.87
Sodium	mg/L	0.05	4.33	9.23	6.12	9.17

Report ID: 388501-IAS
Report Date: 29-Mar-21
Date Received: 17-Mar-21

CERTIFICATE OF ANALYSIS

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

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

Methods

Analyte	RPC SOP #	Method Reference	Method Principle
Alkalinity (as $CaCO_3$)	4.M43	EPA 310.2	Methyl Orange Colourimetry
Chloride	4.M44	APHA 4500-CL E	Ferricyanide Colourimetry
Sulfate	4.M45	APHA 4500-SO_4 E	Turbidimetry
Phosphorus - Total	4.M17	APHA 4500-P E	Digestion, Manual Colourimetry
Solids - Total Suspended	4.M05	APHA 2540 D	Filtration, Gravimetry
Solids - Total Dissolved	-	APHA 2540 G	Evaporation, Gravimetry
Trace Metals	4.M01/4.M29	EPA 200.8/EPA 200.7	ICP-MS/ICP-ES

Report ID: 389183-IAS
Report Date: 01-Apr-21
Date Received: 23-Mar-21

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:			389183-1	389183-2	389183-3
Client Sample ID:			SW5	PDP-1	SW5 duplicate sample
Date Sampled:			18-Mar-21	18-Mar-21	18-Mar-21
Analytes	**Units**	**RL**			
Solids - Total Suspended	mg/L	5	< 5	< 5	< 5

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

RL = Reporting Limit

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

Brannen Burhoe
Supervisor
Inorganic Analytical Services

Report ID: 389183-IAS
Report Date: 01-Apr-21
Date Received: 23-Mar-21

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	4.M05	APHA 2540 D	Filtration, Gravimetry

Report ID: 389869-IAS
Report Date: 13-Apr-21
Date Received: 29-Mar-21

CERTIFICATE OF ANALYSIS

for

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

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

Attention: Brandon Kirk
Project #: 20-3571
Location: Upham

Analysis of Water

RPC Sample ID:			389869-1	389869-2
Client Sample ID:			H2 Down River bridge	PDP-01
Date Sampled:			26-Mar-21	26-Mar-21
Analytes	**Units**	**RL**		
Alkalinity (as $CaCO_3$)	mg/L	2	7	6
Chloride	mg/L	0.5	5.0	5.4
Sulfate	mg/L	1	5	50
Phosphorus - Total	mg/L	0.002	0.056	0.020
Solids - Total Dissolved	mg/L	5	41	113
Solids - Total Suspended	mg/L	5	47	< 5
Hardness (as $CaCO_3$)	mg/L	0.2	15.8	60.8

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

RL = Reporting Limit

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

Matthew Norman
Senior Chemist
Inorganic Analytical Chemistry

Report ID: 389869-IAS
Report Date: 13-Apr-21
Date Received: 29-Mar-21

CERTIFICATE OF ANALYSIS

for

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

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

Attention: Brandon Kirk
Project #: 20-3571
Location: Upham

Analysis of Metals in Water

RPC Sample ID:			389869-1	389869-2
Client Sample ID:			H2 Down River bridge	PDP-01
Date Sampled:			26-Mar-21	26-Mar-21
Analytes	**Units**	**RL**		
Calcium	mg/L	0.05	5.61	23.3
Magnesium	mg/L	0.01	0.43	0.65
Potassium	mg/L	0.02	0.30	0.40
Sodium	mg/L	0.05	3.12	3.23

Report ID: 389869-IAS
Report Date: 13-Apr-21
Date Received: 29-Mar-21

CERTIFICATE OF ANALYSIS

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

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

Methods

Analyte	RPC SOP #	Method Reference	Method Principle
Alkalinity (as $CaCO_3$)	4.M43	EPA 310.2	Methyl Orange Colourimetry
Chloride	4.M44	APHA 4500-CL E	Ferricyanide Colourimetry
Sulfate	4.M45	APHA 4500-SO_4 E	Turbidimetry
Phosphorus - Total	4.M17	APHA 4500-P E	Digestion, Manual Colourimetry
Solids - Total Suspended	4.M05	APHA 2540 D	Filtration, Gravimetry
Solids - Total Dissolved	-	APHA 2540 G	Evaporation, Gravimetry
Trace Metals	4.M01/4.M29	EPA 200.8/EPA 200.7	ICP-MS/ICP-ES

Report ID: 390039-IAS
Report Date: 09-Apr-21
Date Received: 30-Mar-21

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:			390039-1	390039-2	390039-3
Client Sample ID:			SW3	SW5	PDP-1
Date Sampled:			27-Mar-21	27-Mar-21	27-Mar-21
Analytes	**Units**	**RL**			
Solids - Total Suspended	mg/L	5	5	< 5	< 5

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

RL = Reporting Limit

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

Brannen Burhoe
Supervisor
Inorganic Analytical Services

Report ID: 390039-IAS
Report Date: 09-Apr-21
Date Received: 30-Mar-21

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	4.M05	APHA 2540 D	Filtration, Gravimetry

Report ID: 390429-IAS
Report Date: 12-Apr-21
Date Received: 01-Apr-21

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:			390429-1	390429-2	390429-3
Client Sample ID:			SW3	SW5	PDP-1
Date Sampled:			30-Mar-21	30-Mar-21	30-Mar-21
Analytes	**Units**	**RL**			
Solids - Total Suspended	mg/L	5	< 5	< 5	< 5

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

RL = Reporting Limit

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

Brannen Burhoe
Supervisor
Inorganic Analytical Services

Report ID: 390429-IAS
Report Date: 12-Apr-21
Date Received: 01-Apr-21

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	4.M05	APHA 2540 D	Filtration, Gravimetry

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

575 Crown Street
Saint John, New Brunswick
E2L 5E9
Phone: (506) 635-7565
Fax: (506) 635-8866
www.conquest-eng.com

Saint John
Moncton
Fredericton
Bedford

March 5, 2021

Project No.: 21S003.00

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

Re: Blast Vibration Monitoring – Blast No. 2021-07 – 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 at 14:16 on March 4, 2021. 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. 2021-07 – March 4, 2021

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)	14:16	1,026 m S	< 0.5 mm/s	<120	Unit was not triggered
2. Civic No. 4126 Route 111 (PW-10)		819 m S	0.51 mm/s @ 47 Hz	110	-
3. Civic No. 4150 Route 111 (PW-13)		646 m S	0.64mm/s @ 57 Hz	116	-
4. Civic No. 2447 Route 820 (PW-07)		932 m NE	0.57 mm/s @ 32 Hz	112	-
5. PW-03 - Route 820		736 m N	0.95 mm/s @ 16 Hz	116	-
6. Civic No. 2341 Route 820 (PW-05)		760 m NW	0.57 mm/s @ 22 Hz	100	Microphone Malfunction
7. Civic No. 50 Myron Road (PW-15)		1,002 m NW	< 0.5 mm/s	<120	Unit was not triggered
8. Civic No. 86 Myron Road (PW-16)		873 m W	0.64 mm/s @ 21 Hz	110	-
9. Civic No. 220 Myron Road (PW-01)		1,032 m S	< 0.5 mm/s	<120	Unit was not triggered
10. Civic No. 4140 Route 111 (PW-12)		721 m S	1.02 mm/s @ 27 Hz	124	-
11. Civic No. 2337 Route 820 (PW-04)		828 m NW	0.64 mm/s @ 11 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,
CONQUEST ENGINEERING
A Division of CBCL Limited

Robert Y. Cyr, M.A.Sc., P.Eng.
Senior Geotechnical Engineer

Attachments: Blast Record
Blast and Seismograph Location Plan
Event Reports

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

575 Crown Street
Saint John, New Brunswick
E2L 5E9
Phone: (506) 635-7565
Fax: (506) 635-8866
www.conquest-eng.com

Saint John
Moncton
Fredericton
Bedford

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	March 4, 2021
Project No.:	21S003.00	**Time of Blast:**	14:16
Inspector:	B. Fillmore	**Blast No.:**	2021-07
Client:	Hammond River Holdings		

IDENTIFICATION:

Blasting Contractor:	Gulf Operators Ltd.		
Blaster's Certification No.:	1318	**Blaster's Name:**	Daniel Blanchard
Blast Location:	N 45º28'50.7" E 65º37'56.5"		
Type of Rock:	Gypsum	**Est. Vol. or Tonnage:**	20,373 tonnes
Weather at time of Blast:	Sunny with few clouds	**Air Temp.:**	0ºC
Est. Wind Speed :	≈20 km/h	**Wind Direction:**	West
Cloud Cover:	Few	**Precipitation:**	No

BLAST DESIGN:

Total No. Holes:	123	**Hole Diameter:**	4.5"
Average Depth:	7.4 – 8.9 m	**Spacing:**	10 ft x 10 ft
No. Holes per Delay:	4	**Collar Length:**	7 ft
Delay between Holes:	25 ms	**Delay between Rows:**	17, 42 ms
Initiation Method:	Non -Electric		
Weight of Explosives per Delay:	Max.: 175 kg		
Type and weight of Explosives for Blast:	6,649 kg – Titan XL 1000		

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

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

575 Crown Street
Saint John, New Brunswick
E2L 5E9
Phone: (506) 635-7565
Fax: (506) 635-8866
www.conquest-eng.com

Saint John
Moncton
Fredericton
Bedford

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	March 4, 2021
Project No.:	21S003.00	**Time of Blast:**	14:16
Inspector:	B. Fillmore	**Blast No.:**	2021-07
Client:	Hammond River Holdings		

BLAST MONITORING

Distance to the Nearest Structure:	646 m
Direction to the Nearest Structure:	South
Structure Type:	House
Scaled Distance Factor: (distance / sq. rt. of max. wt. per delay):	48.8

SAFETY:

Type of Warning Signal Used:	Air horn
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.

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

575 Crown Street
Saint John, New Brunswick
E2L 5E9
Phone: (506) 635-7565
Fax: (506) 635-8866
www.conquest-eng.com

Saint John
Moncton
Fredericton
Bedford

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	March 4, 2021
Project No.:	21S003.00	**Time of Blast:**	14:16
Inspector:	B. Fillmore	**Blast No.:**	2021-07
Client:	Hammond River Holdings		

Data Collection – Seismometer #1

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5676
Calibration Date:	February 19, 2021
Location of seismograph:	Civic Number 4079 Route 111 (PW-09)
Distance and Direction from Blast:	1,026 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 Mini Mate, Serial #5673
Calibration Date:	February 28, 2020
Location of seismograph:	Civic Number 4126 Route 111 (PW-10)
Distance and Direction from Blast:	819 m South
Transverse Particle Velocity:	0.45 mm/s @ 21 Hz
Vertical Particle Velocity:	0.51 mm/s @ 47 Hz
Longitudinal Particle Velocity:	0.25 mm/s @ 20 Hz
Peak Particle Velocity:	0.54 mm/s @ 47 Hz
Maximum Airblast:	110 dB(L)

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

575 Crown Street
Saint John, New Brunswick
E2L 5E9
Phone: (506) 635-7565
Fax: (506) 635-8866
www.conquest-eng.com

Saint John
Moncton
Fredericton
Bedford

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	March 4, 2021
Project No.:	21S003.00	**Time of Blast:**	14:16
Inspector:	B. Fillmore	**Blast No.:**	2021-07
Client:	Hammond River Holdings		

Data Collection – Seismometer #3

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5632
Calibration Date:	October 22, 2021
Location of seismograph:	Civic Number 4150 Route 111 (PW-13)
Distance and Direction from Blast:	646 m South
Transverse Particle Velocity:	0.45 mm/s @ 24 Hz
Vertical Particle Velocity:	0.64 mm/s @ 57 Hz
Longitudinal Particle Velocity:	0.32 mm/s @ 12 Hz
Peak Particle Velocity:	0.64 mm/s @ 57 Hz
Maximum Airblast:	116 dB(L)

Data Collection – Seismometer #4

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5372
Calibration Date:	February 8, 2021
Location of seismograph:	Civic Number 2447 Route 820 (PW-07)
Distance and Direction from Blast:	932 m Northeast
Transverse Particle Velocity:	0.57 mm/s @ 32 Hz
Vertical Particle Velocity:	0.32 mm/s @ 16 Hz
Longitudinal Particle Velocity:	0.38 mm/s @ 21 Hz
Peak Particle Velocity:	0.57 mm/s @ 32 Hz
Maximum Airblast:	112 dB(L)

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

575 Crown Street
Saint John, New Brunswick
E2L 5E9
Phone: (506) 635-7565
Fax: (506) 635-8866
www.conquest-eng.com

Saint John
Moncton
Fredericton
Bedford

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	March 4, 2021
Project No.:	21S003.00	**Time of Blast:**	14:16
Inspector:	B. Fillmore	**Blast No.:**	2021-07
Client:	Hammond River Holdings		

Data Collection – Seismometer #5

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5489
Calibration Date:	May 15, 2020
Location of seismograph:	PW-03 - Route 820
Distance and Direction from Blast:	736 m North
Transverse Particle Velocity:	0.76 mm/s @ 17 Hz
Vertical Particle Velocity:	0.38 mm/s @ 16 Hz
Longitudinal Particle Velocity:	0.95 mm/s @ 16 Hz
Peak Particle Velocity:	0.95 mm/s @ 16 Hz
Maximum Airblast:	116 dB(L)

Data Collection – Seismometer #6

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5635
Calibration Date:	March 26, 2020
Location of seismograph:	Civic Number 2341 Route 820 (PW-05)
Distance and Direction from Blast:	760 m Northwest
Transverse Particle Velocity:	0.38 mm/s @ 18 Hz
Vertical Particle Velocity:	0.38 mm/s @ 30 Hz
Longitudinal Particle Velocity:	0.57 mm/s @ 22 Hz
Peak Particle Velocity:	0.57 mm/s @ 22 Hz
Maximum Airblast:	100 dB(L)

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

575 Crown Street
Saint John, New Brunswick
E2L 5E9
Phone: (506) 635-7565
Fax: (506) 635-8866
www.conquest-eng.com

Saint John
Moncton
Fredericton
Bedford

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	March 4, 2021
Project No.:	21S003.00	**Time of Blast:**	14:16
Inspector:	B. Fillmore	**Blast No.:**	2021-07
Client:	Hammond River Holdings		

Data Collection – Seismometer #7

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #21348
Calibration Date:	June 12, 2020
Location of seismograph:	Civic Number 50 Myron Road (PW-15)
Distance and Direction from Blast:	1,002 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 Mini Mate, Serial #5371
Calibration Date:	June 24, 2020
Location of seismograph:	Civic Number 86 Myron Road (PW-16)
Distance and Direction from Blast:	873 m West
Transverse Particle Velocity:	0.57 mm/s @ 17 Hz
Vertical Particle Velocity:	0.64 mm/s @ 21 Hz
Longitudinal Particle Velocity:	0.45 mm/s @ 10 Hz
Peak Particle Velocity:	0.64 mm/s @ 21 Hz
Maximum Airblast:	110 dB(L)

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

575 Crown Street
Saint John, New Brunswick
E2L 5E9
Phone: (506) 635-7565
Fax: (506) 635-8866
www.conquest-eng.com

Saint John
Moncton
Fredericton
Bedford

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	March 4, 2021
Project No.:	21S003.00	**Time of Blast:**	14:16
Inspector:	B. Fillmore	**Blast No.:**	2021-07
Client:	Hammond River Holdings		

Data Collection – Seismometer #9

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial # 21349
Calibration Date:	June 12, 2020
Location of seismograph:	Civic Number 220 Myron Road (PW-01)
Distance and Direction from Blast:	1,032 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 Mini Mate, Serial #5487
Calibration Date:	February 17, 2021
Location of seismograph:	Civic Number 4140 Route 111 (PW-12)
Distance and Direction from Blast:	721 m South
Transverse Particle Velocity:	0.32 mm/s @ 27 Hz
Vertical Particle Velocity:	1.02 mm/s @ 47 Hz
Longitudinal Particle Velocity:	0.45 mm/s @ 27 Hz
Peak Particle Velocity:	1.02 mm/s @ 47 Hz
Maximum Airblast:	124 dB(L)

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

575 Crown Street
Saint John, New Brunswick
E2L 5E9
Phone: (506) 635-7565
Fax: (506) 635-8866
www.conquest-eng.com

Saint John
Moncton
Fredericton
Bedford

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	March 4, 2021
Project No.:	21S003.00	**Time of Blast:**	14:16
Inspector:	B. Fillmore	**Blast No.:**	2021-07
Client:	Hammond River Holdings		

Data Collection – Seismometer #11

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5960
Calibration Date:	May 15, 2020
Location of seismograph:	Civic Number 2337 Route 820 (PW-04)
Distance and Direction from Blast:	828 m Northwest
Transverse Particle Velocity:	0.45 mm/s @ 9 Hz
Vertical Particle Velocity:	0.38 mm/s @ 27 Hz
Longitudinal Particle Velocity:	0.64 mm/s @ 11 Hz
Peak Particle Velocity:	0.64 mm/s @ 11 Hz
Maximum Airblast:	112 dB(L)

Blast and Seismograph Location Plan
Blast No: 2021-07
Upham East Gypsum Quarry, Upham, NB

Date: March 4, 2021
CE Project No.: 21S003.00

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

Saint John
Moncton
Fredericton
Bedford

Event Report

Date/Time Vert at 14:15:52 March 4, 2021
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: March 4, 2021 16:24:40 (V10.72.1)

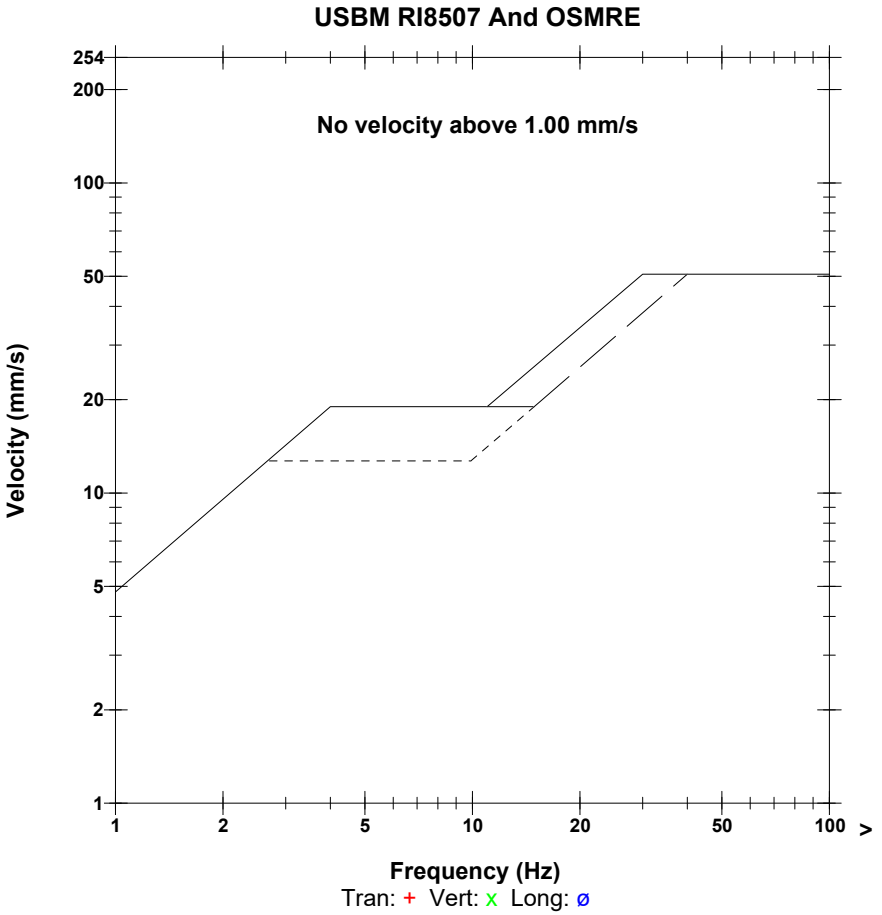
Extended Notes

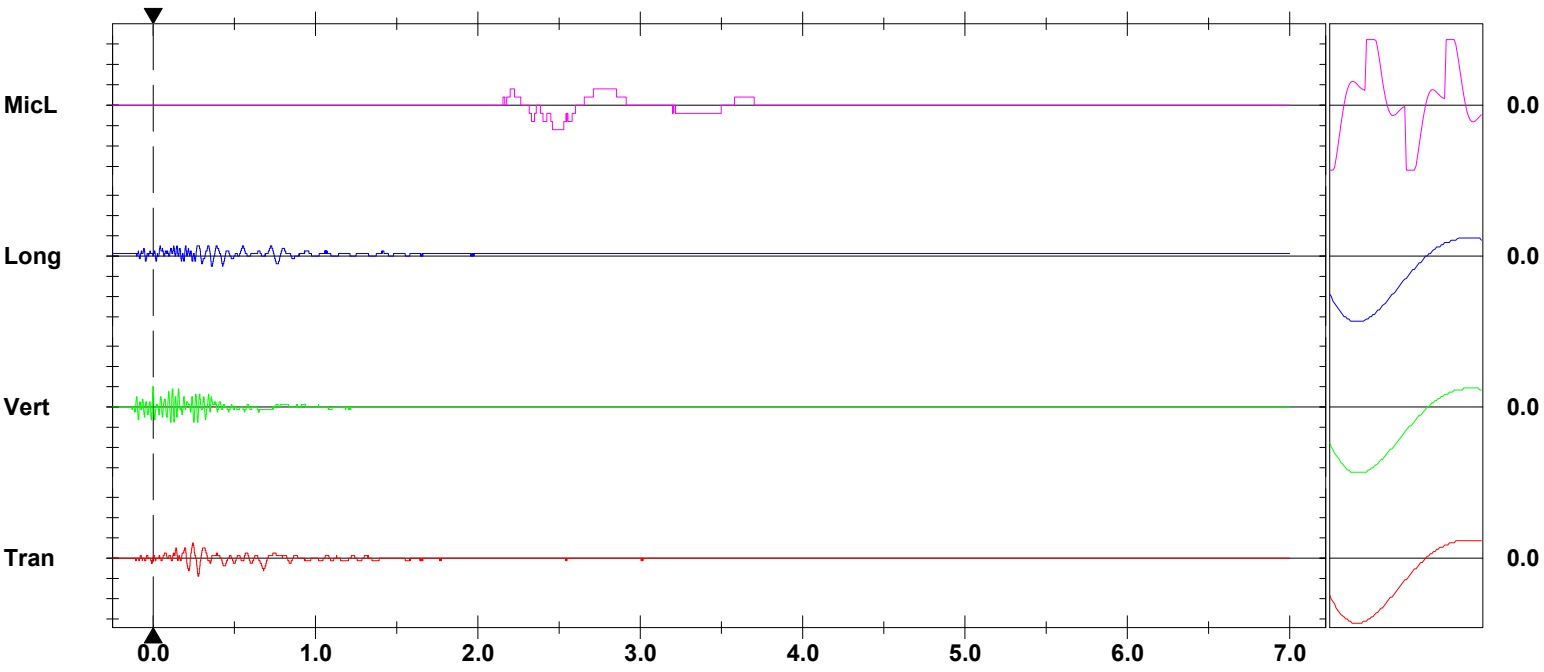
Serial Number 5673 V 2.61 MiniMate
Battery Level 6.0 Volts
Unit Calibration February 28, 2020 by Instantel
File Name G673IVNR.MG0
Post Event Notes
Location of Seismograph: Civic No.4126 Route 111 (PW-10)
Blast No.: 2021-07
CE Project No.: 21S003.00

Microphone Linear Weighting
PSPL 109.5 dB(L) 6.000 pa.(L) at 2.460 sec
ZC Freq 2.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 307 mv)

	Tran	Vert	Long	
PPV	0.445	0.508	0.254	mm/s
ZC Freq	21	47	20	Hz
Time (Rel. to Trig)	0.276	0.000	0.043	sec
Peak Acceleration	0.007	0.013	0.007	g
Peak Displacement	0.003	0.002	0.002	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.1	7.8	8.0	Hz
Overswing Ratio	3.8	3.6	3.7	

Peak Vector Sum 0.635 mm/s at 0.276 sec





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

Format © 1995-2015 Xmark Corporation

Event Report

Date/Time Vert at 14:16:00 March 4, 2021
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: March 4, 2021 16:29:08 (V10.72.1)

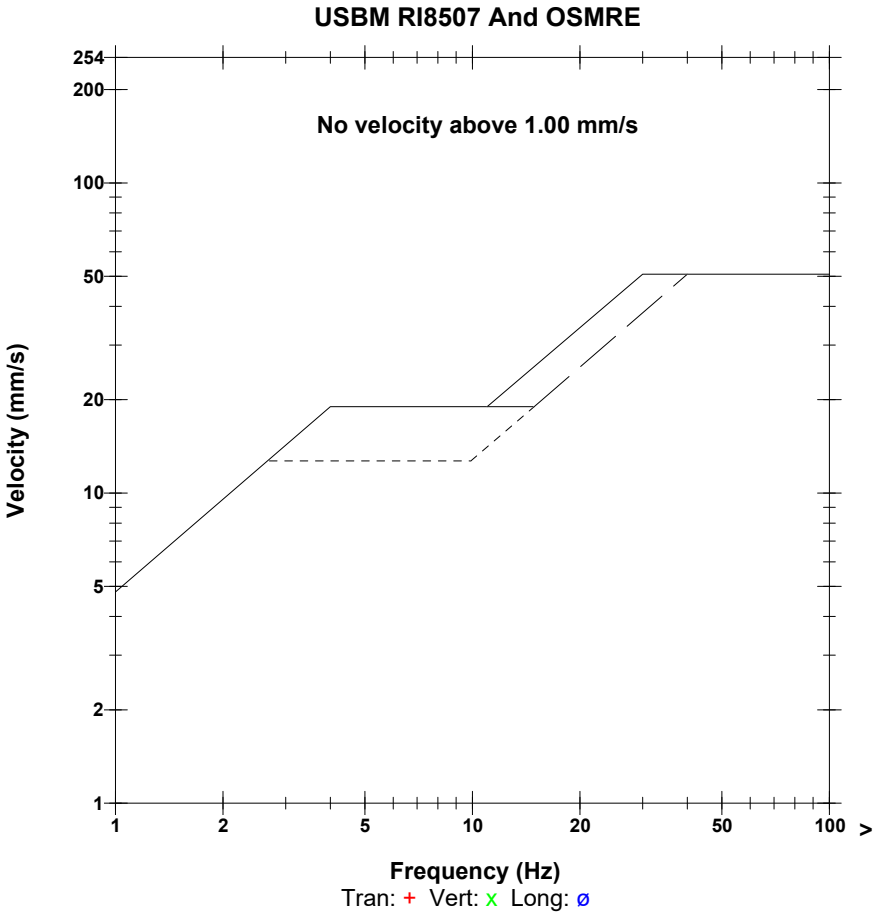
Extended Notes

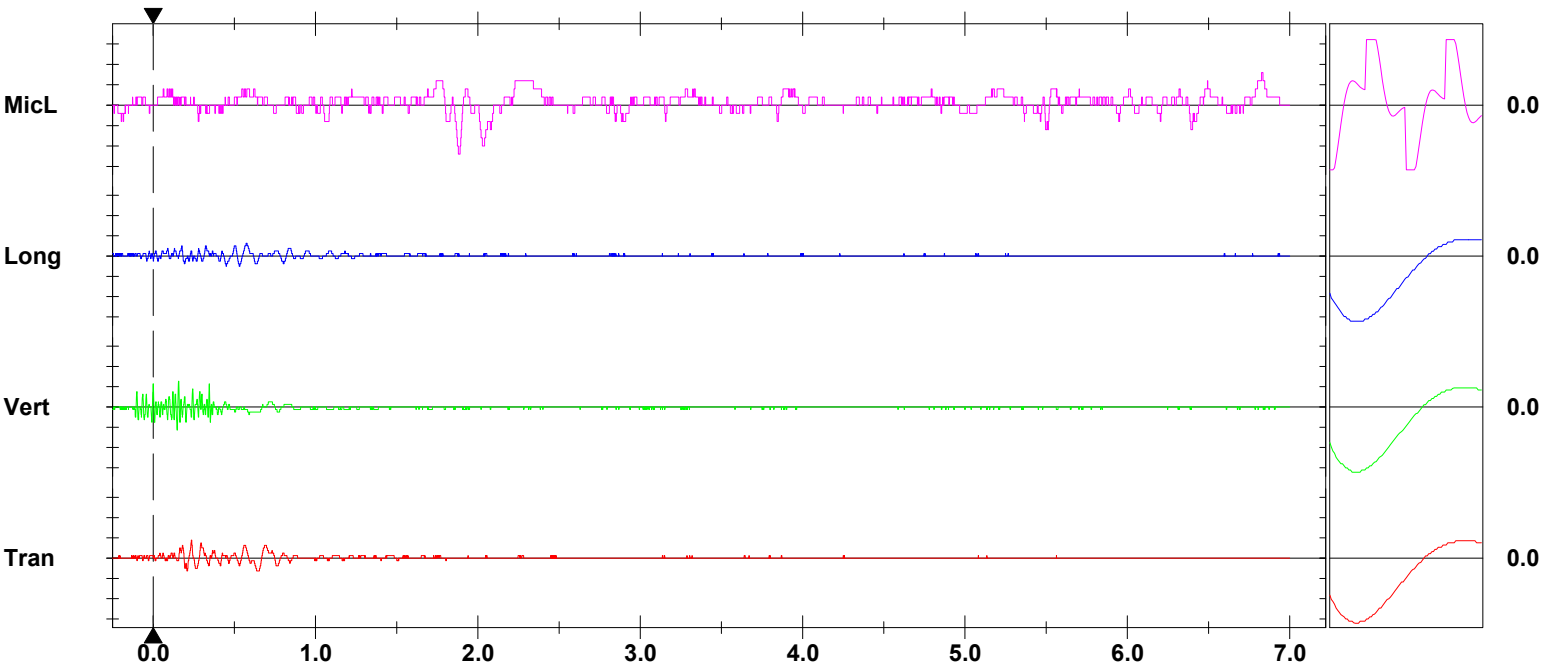
Serial Number 5632 V 2.61 MiniMate
Battery Level 5.8 Volts
Unit Calibration October 22, 2020 by Instantel
File Name G632IVNR.MO0
Post Event Notes
Location of Seismograph: Civic No.4150 Route 111 (PW-13)
Blast No.: 2021-07
CE Project No.: 21S003.00

Microphone Linear Weighting
PSPL 115.6 dB(L) 12.00 pa.(L) at 1.881 sec
ZC Freq 10 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 305 mv)

	Tran	Vert	Long	
PPV	0.445	0.635	0.318	mm/s
ZC Freq	24	57	12	Hz
Time (Rel. to Trig)	0.235	0.157	0.573	sec
Peak Acceleration	0.007	0.027	0.007	g
Peak Displacement	0.004	0.002	0.003	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.2	8.3	8.0	Hz
Overswing Ratio	3.8	3.6	3.8	

Peak Vector Sum 0.635 mm/s at 0.157 sec





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

Format © 1995-2015 Xmark Corporation

Event Report

Date/Time Tran at 14:16:33 March 4, 2021
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: March 4, 2021 16:32:46 (V10.72.1)

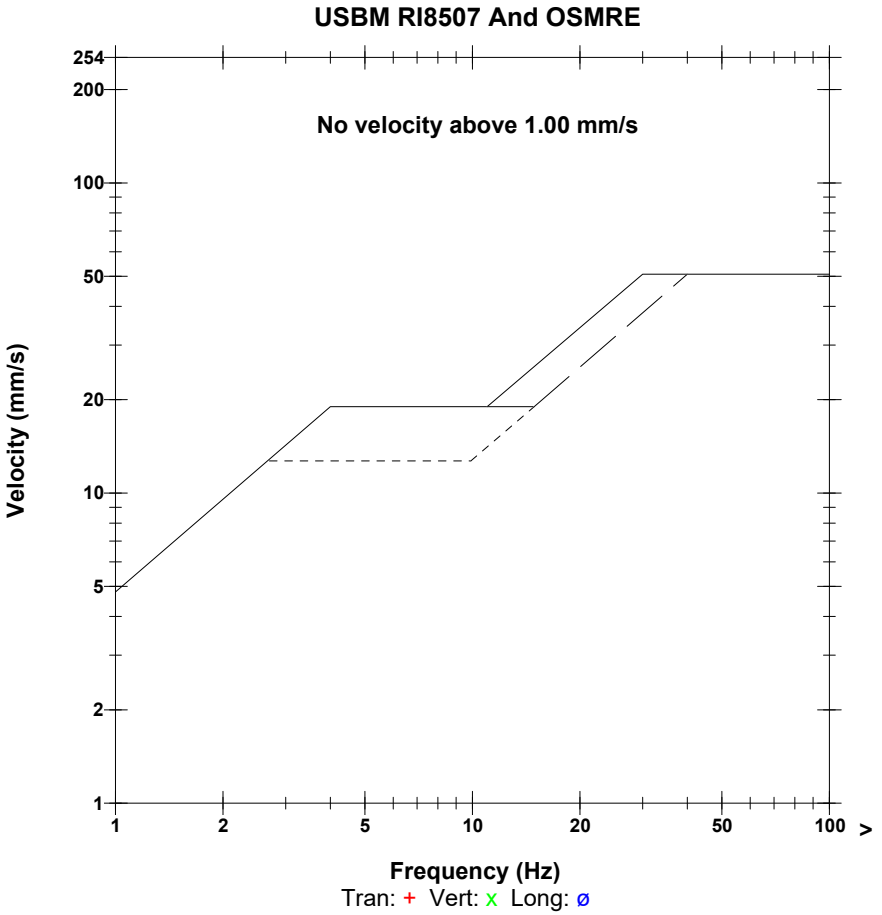
Extended Notes

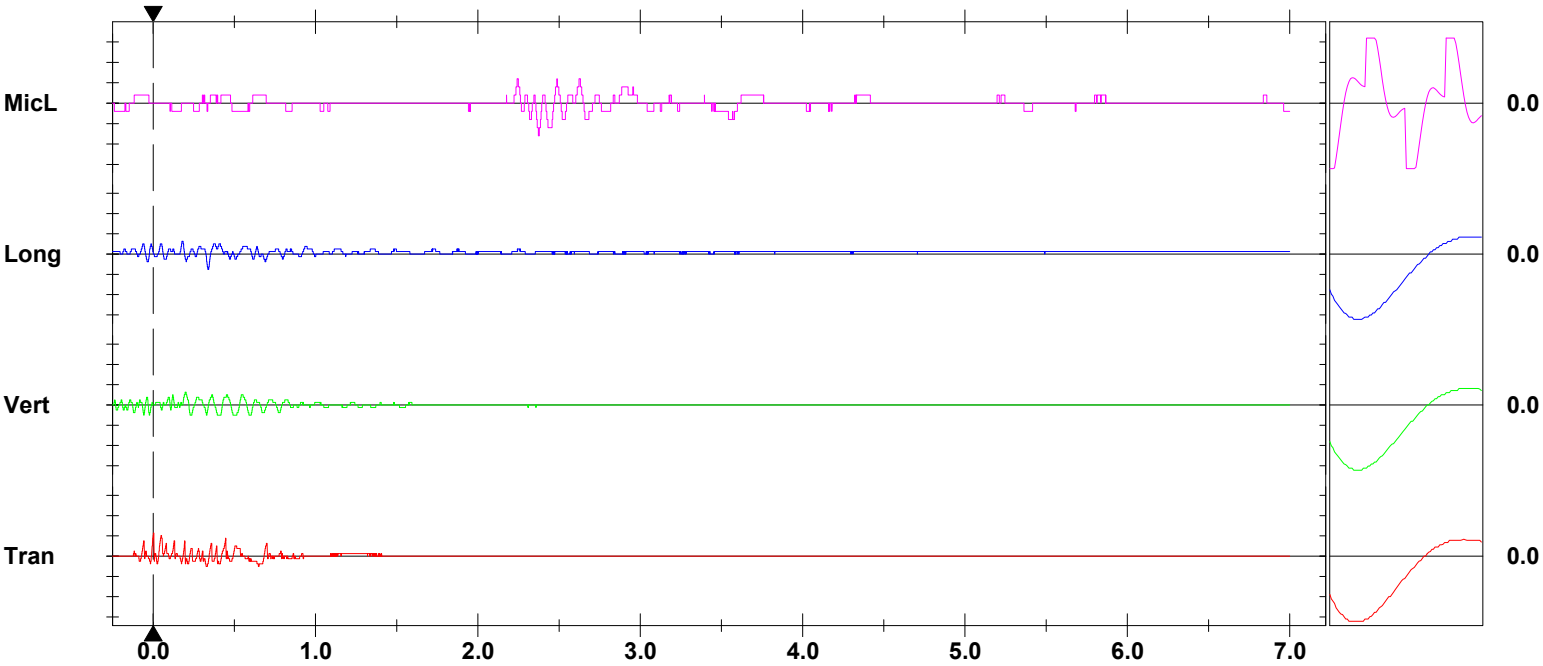
Serial Number 5372 V 2.61 MiniMate
Battery Level 5.9 Volts
Unit Calibration February 8, 2021 by Instantel
File Name G372IVNR.NL0
Post Event Notes
Location of Seismograph: Civic No. 2447 Route 820 (PW-07)
Blast No.: 2021-07
CE Project No.: 21S003.00

Microphone Linear Weighting
PSPL 112.0 dB(L) 8.000 pa.(L) at 2.373 sec
ZC Freq 14 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 295 mv)

	Tran	Vert	Long	
PPV	0.572	0.318	0.381	mm/s
ZC Freq	32	16	21	Hz
Time (Rel. to Trig)	0.004	0.197	0.337	sec
Peak Acceleration	0.027	0.007	0.007	g
Peak Displacement	0.004	0.003	0.003	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.1	7.8	7.8	Hz
Overswing Ratio	3.4	3.6	4.2	

Peak Vector Sum 0.587 mm/s at 0.051 sec





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

Format © 1995-2015 Xmark Corporation

Event Report

Date/Time Long at 14:16:18 March 4, 2021
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: March 4, 2021 16:35:58 (V10.72.1)

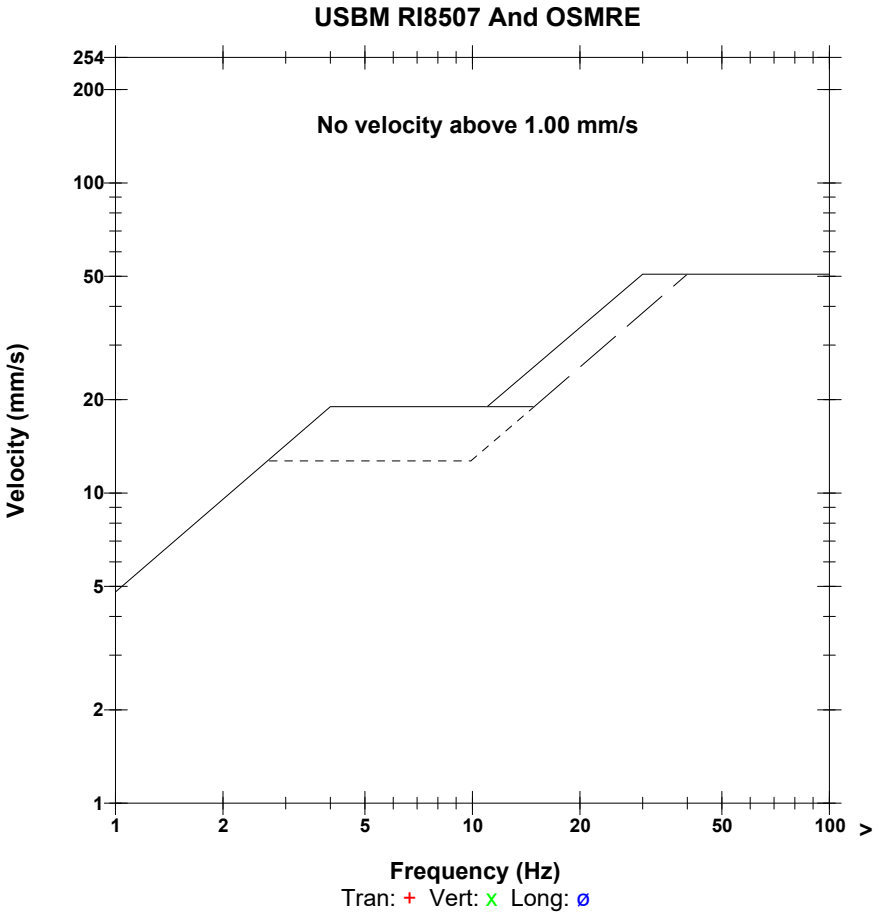
Extended Notes

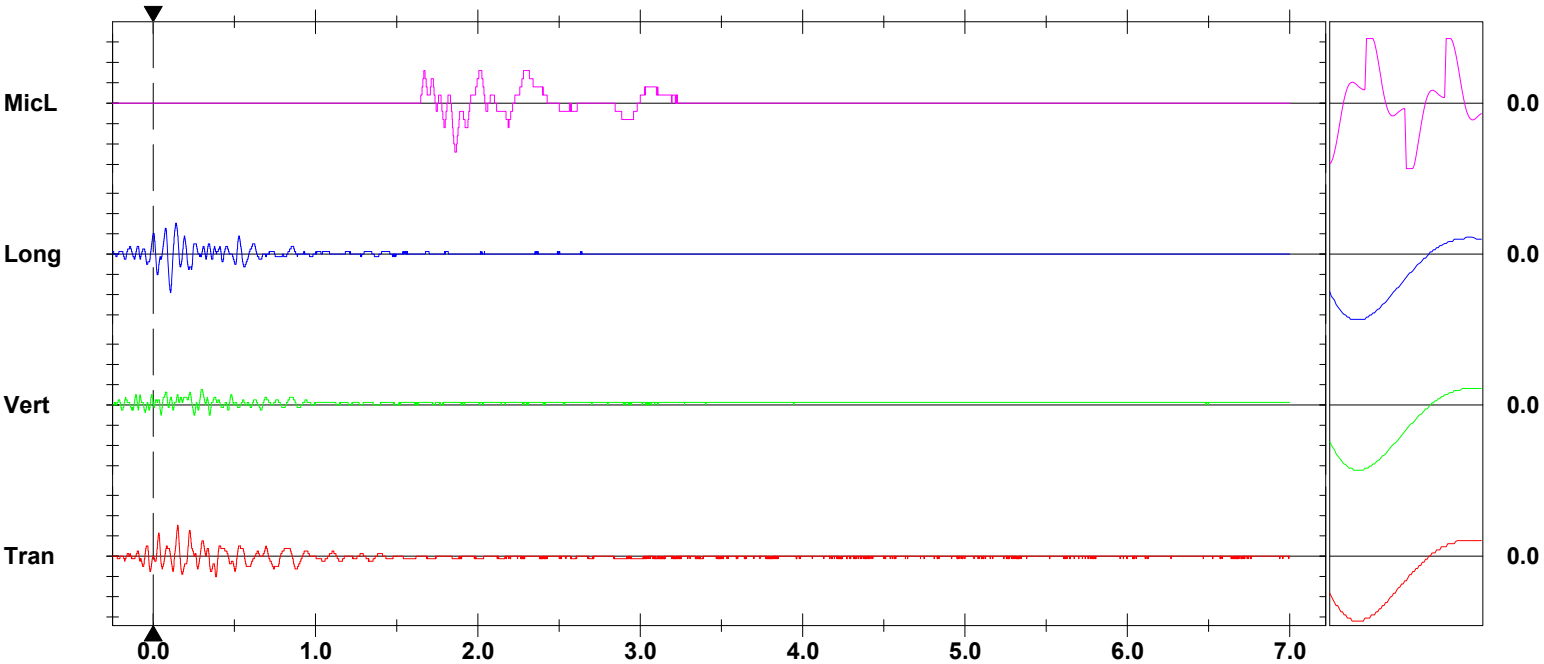
Serial Number 5489 V 2.61 MiniMate
Battery Level 5.8 Volts
Unit Calibration May 15, 2020 by Instantel
File Name G489IVNR.N60
Post Event Notes
Location of Seismograph: Cottage - Route 820 (PW-03)
Blast No.: 2021-07
CE Project No.: 21S003.00

Microphone Linear Weighting
PSPL 115.6 dB(L) 12.00 pa.(L) at 1.858 sec
ZC Freq 4.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 272 mv)

	Tran	Vert	Long	
PPV	0.762	0.381	0.953	mm/s
ZC Freq	17	16	16	Hz
Time (Rel. to Trig)	0.151	0.296	0.106	sec
Peak Acceleration	0.013	0.007	0.013	g
Peak Displacement	0.007	0.003	0.009	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.7	7.7	7.8	Hz
Overswing Ratio	4.1	4.0	3.9	

Peak Vector Sum 0.968 mm/s at 0.106 sec





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

Format © 1995-2015 Xmark Corporation

Event Report

Date/Time Long at 14:16:24 March 4, 2021
Trigger Source Geo: 0.492 mm/s, Mic: 119.6 dB(L)
Range Geo: 127.0 mm/s
Record Time 7.0 sec at 1024 sps

Serial Number 5635 V 2.61 MiniMate
Battery Level 6.1 Volts
Unit Calibration March 26, 2020 by Instantel
File Name G635IVNR.NC0

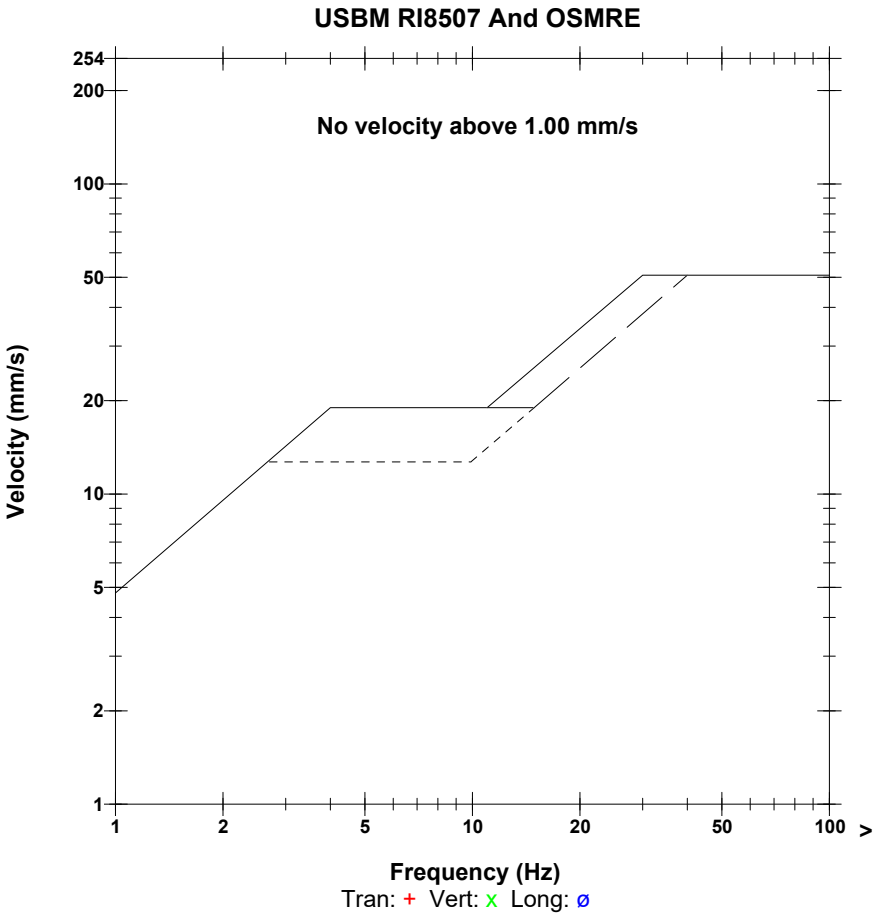
Notes
Location:
Client:
User Name:
Converted: March 4, 2021 16:40:00 (V10.72.1)

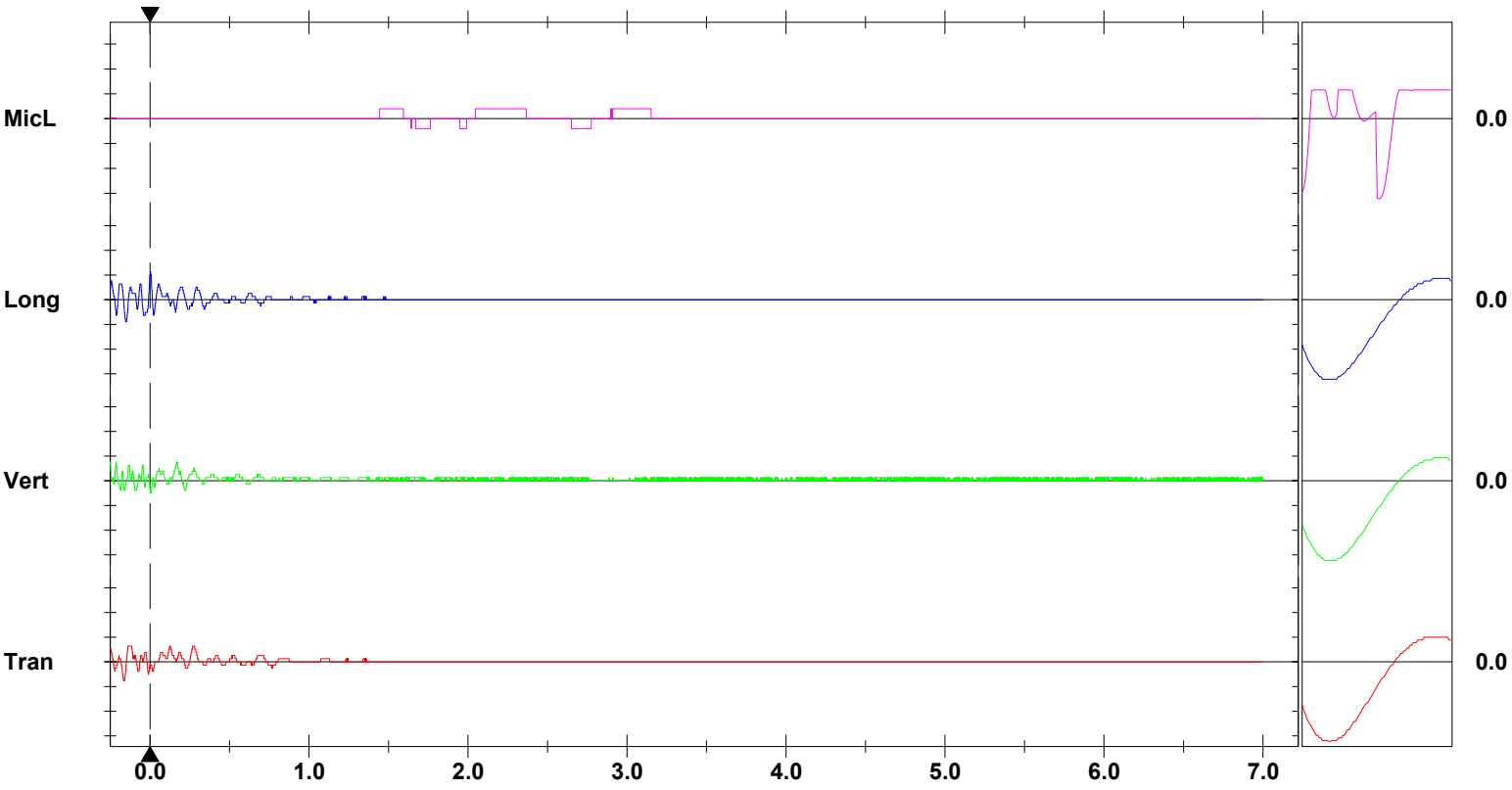
Extended Notes

Microphone Linear Weighting
PSPL 100.0 dB(L) 2.000 pa.(L) at 1.445 sec
ZC Freq 3.0 Hz
Channel Test Check (Freq = 0.0 Hz Amp = 353 mv)

	Tran	Vert	Long	
PPV	0.381	0.381	0.572	mm/s
ZC Freq	18	30	22	Hz
Time (Rel. to Trig)	-0.159	-0.213	0.004	sec
Peak Acceleration	0.007	0.007	0.007	g
Peak Displacement	0.005	0.003	0.004	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.2	7.8	7.7	Hz
Overswing Ratio	3.2	3.6	3.8	

Peak Vector Sum 0.635 mm/s at 0.004 sec





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

Format © 1995-2015 Xmark Corporation

Event Report

Date/Time Vert at 14:16:45 March 4, 2021
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: March 4, 2021 16:48:33 (V10.72.1)

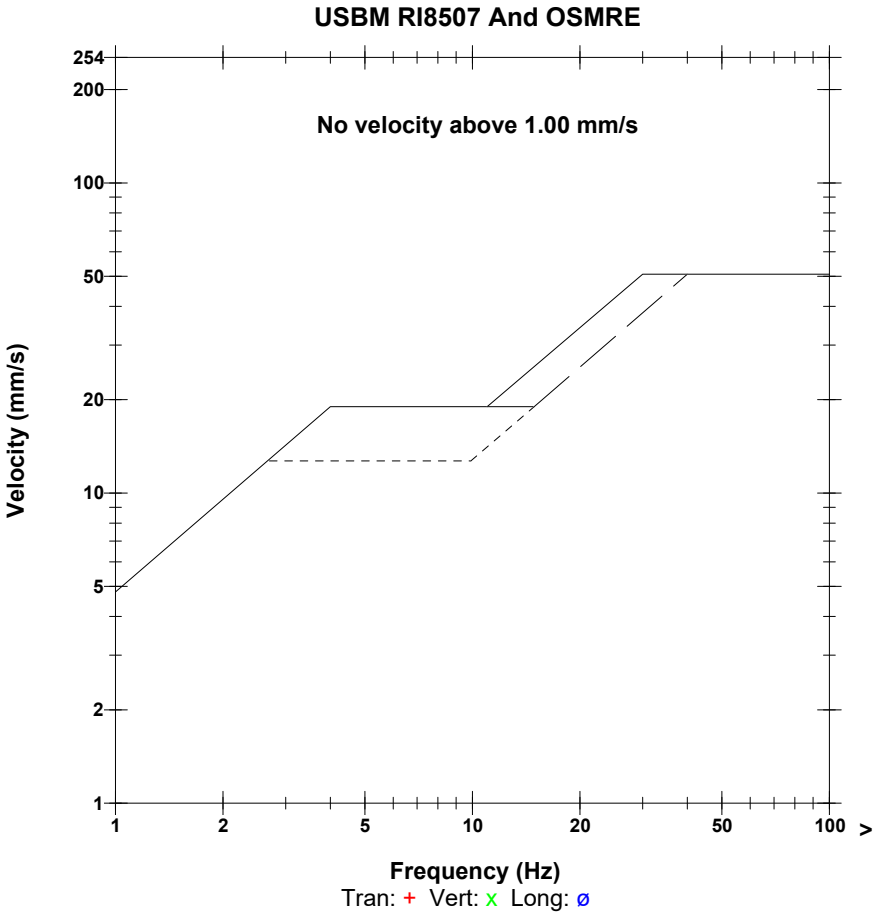
Extended Notes

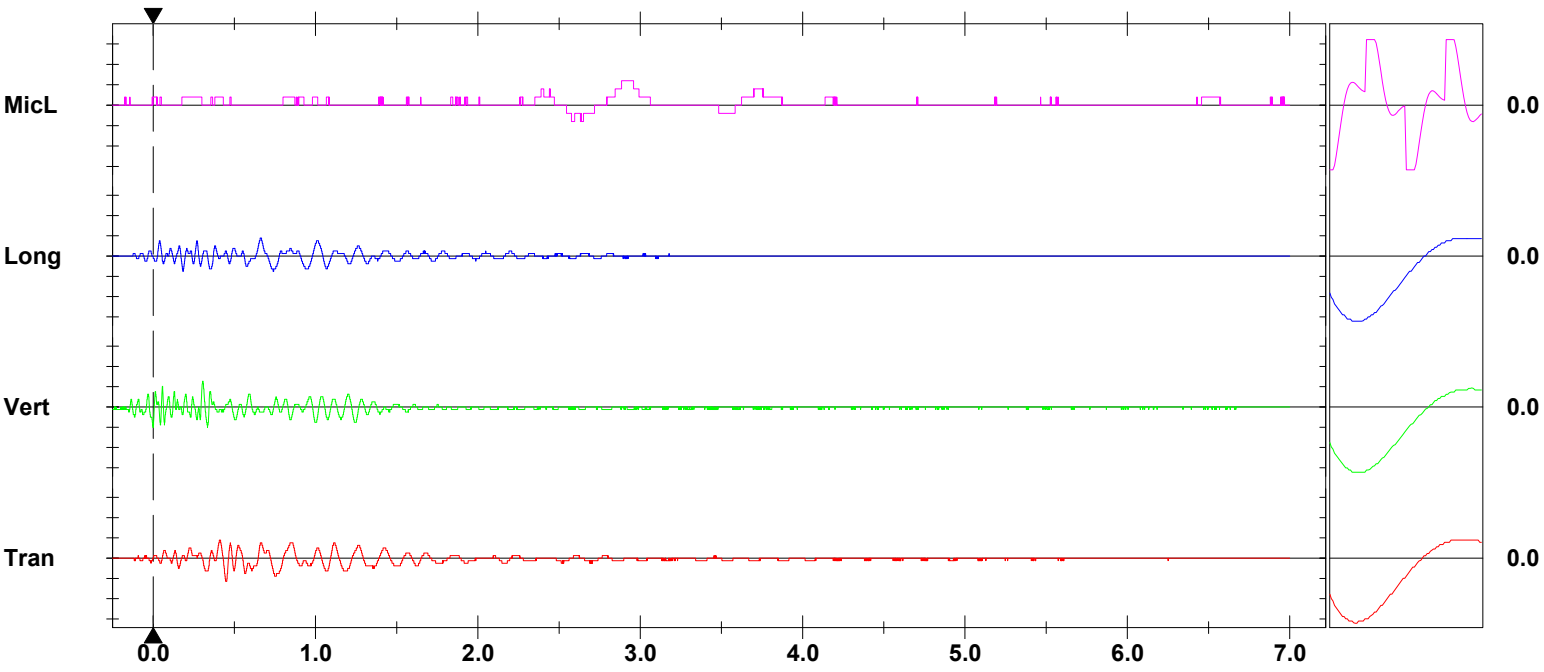
Serial Number 5371 V 2.61 MiniMate
Battery Level 6.1 Volts
Unit Calibration June 24, 2020 by Instantel
File Name G371IVNR.NX0
Post Event Notes
Location of Seismograph: Civic No.86 Myron Road (PW-16)
Blast No.: 2021-07
CE Project No.: 21S003.00

Microphone Linear Weighting
PSPL 109.5 dB(L) 6.000 pa.(L) at 2.886 sec
ZC Freq 2.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 306 mv)

	Tran	Vert	Long	
PPV	0.572	0.635	0.445	mm/s
ZC Freq	17	21	10	Hz
Time (Rel. to Trig)	0.446	0.305	0.659	sec
Peak Acceleration	0.007	0.013	0.007	g
Peak Displacement	0.010	0.004	0.006	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.3	7.8	8.1	Hz
Overswing Ratio	3.7	3.6	3.8	

Peak Vector Sum 0.635 mm/s at 0.307 sec





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

Format © 1995-2015 Xmark Corporation

Event Report

Date/Time Vert at 14:16:20 March 4, 2021
Trigger Source Geo: 0.492 mm/s, Mic: 119.6 dB(L)
Range Geo: 127.0 mm/s
Record Time 7.0 sec at 1024 sps

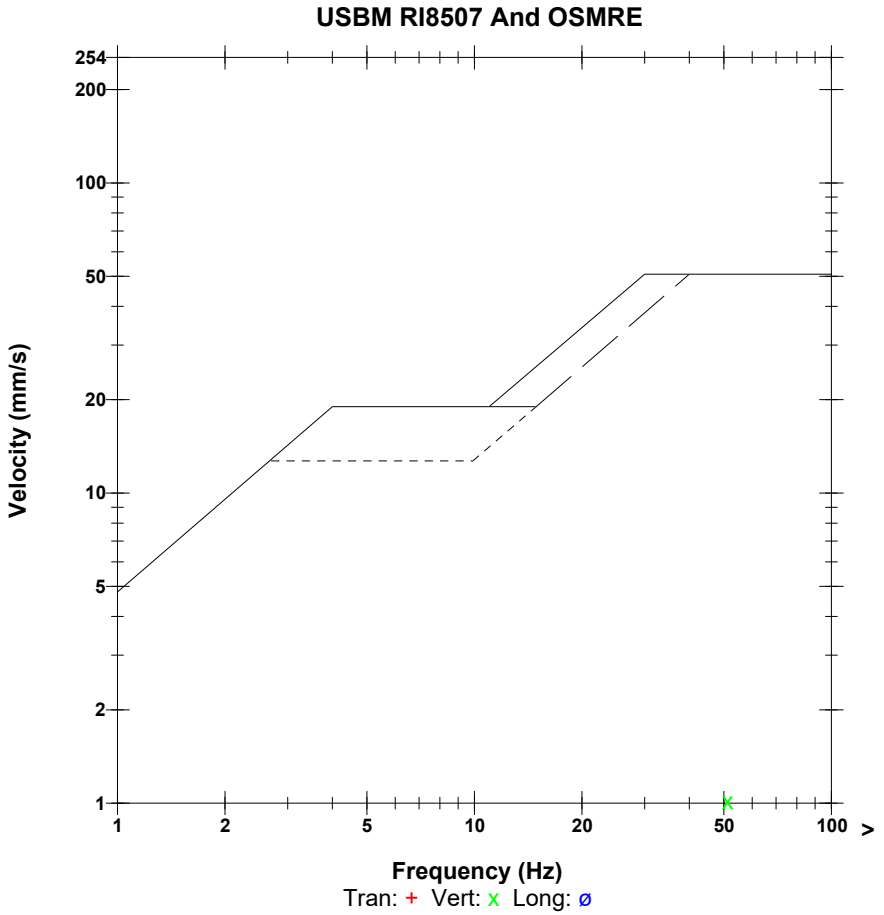
Notes
Location:
Client: UUUUUUUUUUUUUU
User Name: UUUUU
Converted: March 4, 2021 16:53:25 (V10.72.1)

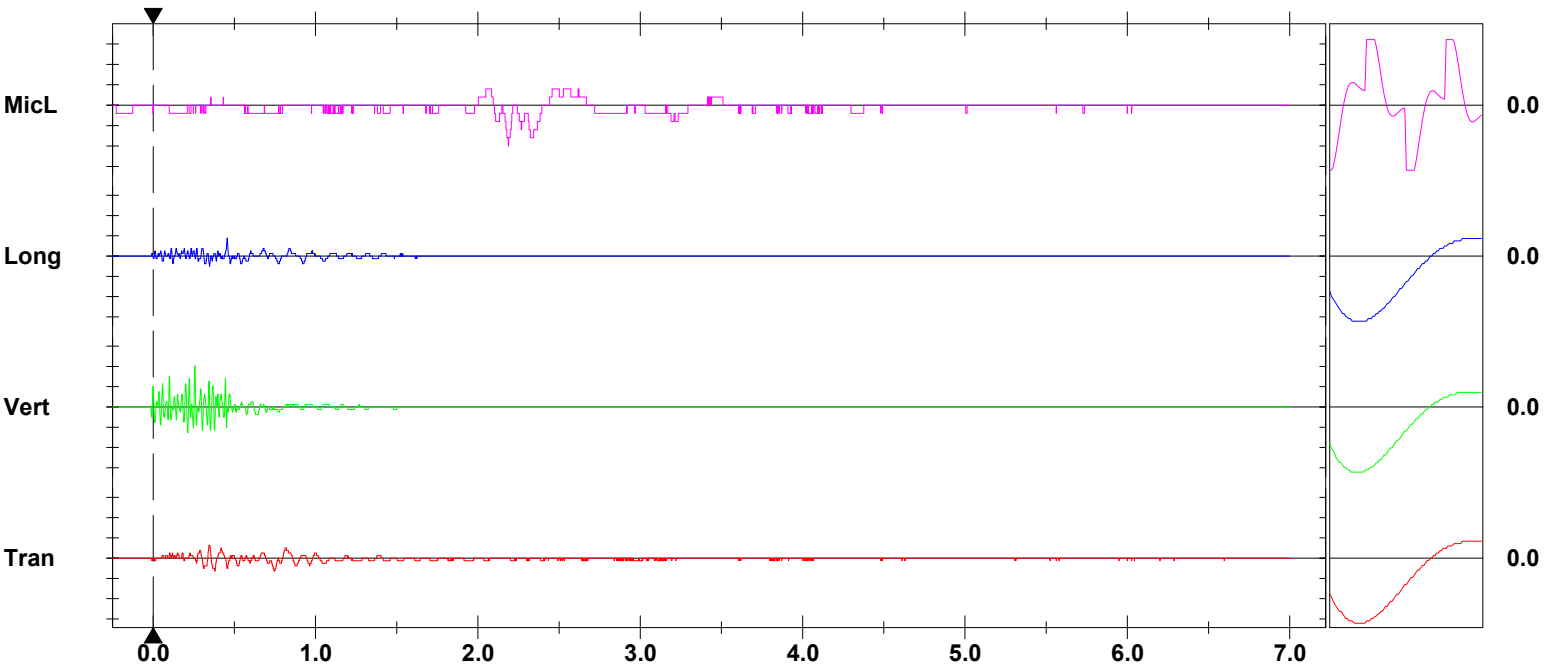
Microphone Linear Weighting
PSPL 114.0 dB(L) 10.000 pa.(L) at 2.188 sec
ZC Freq 8.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 288 mv)

	Tran	Vert	Long	
PPV	0.318	1.016	0.445	mm/s
ZC Freq	27	47	27	Hz
Time (Rel. to Trig)	0.344	0.258	0.456	sec
Peak Acceleration	0.007	0.033	0.007	g
Peak Displacement	0.003	0.003	0.002	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.6	7.7	7.6	Hz
Overswing Ratio	3.4	4.1	4.1	

Peak Vector Sum 1.016 mm/s at 0.258 sec

Serial Number 5487 V 2.61 MiniMate
Battery Level 6.1 Volts
Unit Calibration February 17, 2021 by Instantel
File Name G487IVNR.N80
Post Event Notes
Location of Seismograph: Civic No.4140 Route 111 (PW-12)
Blast No.: 2021-07
CE Project No.: 21S003.00





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

Format © 1995-2015 Xmark Corporation

Event Report

Date/Time Long at 14:15:39 March 4, 2021
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: March 4, 2021 16:56:52 (V10.72.1)

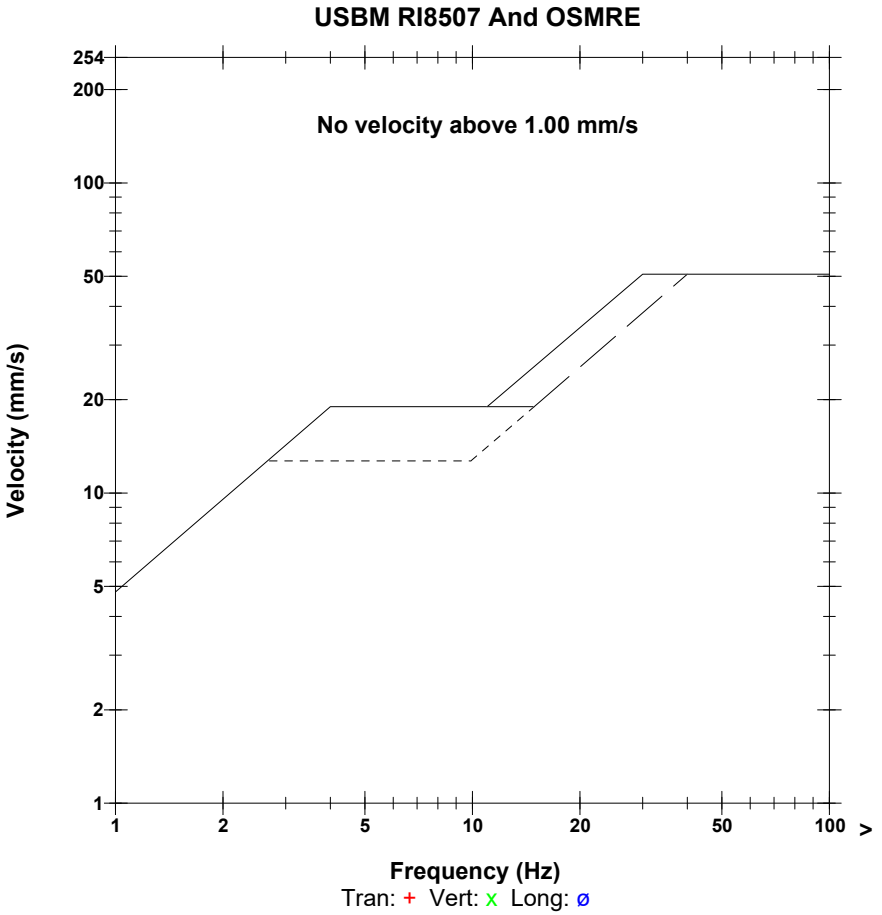
Extended Notes

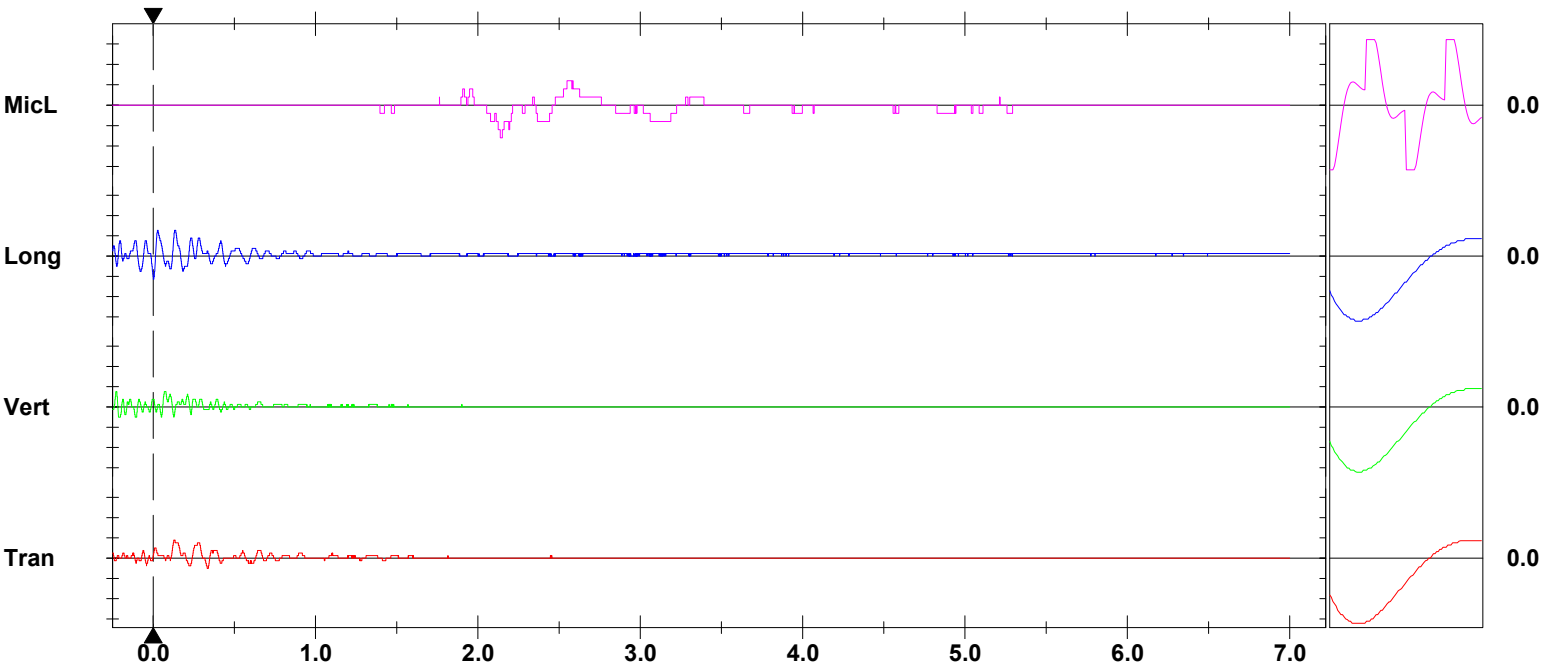
Microphone Linear Weighting
PSPL 112.0 dB(L) 8.000 pa.(L) at 2.139 sec
ZC Freq 3.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 301 mv)

	Tran	Vert	Long	
PPV	0.445	0.381	0.635	mm/s
ZC Freq	9.0	27	11	Hz
Time (Rel. to Trig)	0.127	-0.224	0.027	sec
Peak Acceleration	0.007	0.007	0.013	g
Peak Displacement	0.008	0.005	0.008	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.7	7.7	7.6	Hz
Overswing Ratio	3.8	3.7	4.2	

Peak Vector Sum 0.794 mm/s at 0.133 sec

Serial Number 5960 V 2.61 MiniMate
Battery Level 6.1 Volts
Unit Calibration May 15, 2020 by Instantel
File Name G960IVNR.M30
Post Event Notes
Location of Seismograph: Civic No.2337 Route 820 (PW-04)
Blast No.: 2021-07
CE Project No.: 21S003.00





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

Format © 1995-2015 Xmark Corporation

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

575 Crown Street
Saint John, New Brunswick
E2L 5E9
Phone: (506) 635-7565
Fax: (506) 635-8866
www.conquest-eng.com

Saint John
Moncton
Fredericton
Bedford

March 24, 2021

Project No.: 21S003.00

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

Re: Blast Vibration Monitoring – Blast No. 2021-08 – 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 at 14:02 on March 24, 2021. For the monitoring we positioned ten (10) digital seismographs in the area. The location of each monitoring point is noted in the following table.

Blast No. 2021-08-A & 2021-08-B at once – March 24, 2021

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)	14:02	1,390 m & 1,330 m South	< 0.5 mm/s	<120	Units were not triggered
2. Civic No. 4126 Route 111 (PW-10)		975 m & 910 m South	< 0.5 mm/s	<120	
3. Civic No. 4150 Route 111 (PW-13)		735 m & 804 m South	< 0.5 mm/s	<120	
4. Civic No. 2447 Route 820 (PW-07)		855 m & 879 m Northeast	< 0.5 mm/s	<120	
5. PW-03 - Route 820		577 m & 638 m North	0.76 mm/s @ 37 Hz	116	-
6. Civic No. 2341 Route 820 (PW-05)		601 m & 670 m Northwest	2.22 mm/s @ 34 Hz	118	-
7. Civic No. 50 Myron Road (PW-15)		893 m & 957 m Northwest	< 0.5 mm/s	<120	Units were not triggered
8. Civic No. 86 Myron Road (PW-16)		878 m & 946 m West	< 0.5 mm/s	<120	
9. Civic No. 220 Myron Road (PW-01)		1,430 m & 1,390 m South	< 0.5 mm/s	<120	
10. Civic No. 4140 Route 111 (PW-12)		897 m & 830 m South	0.51 mm/s @ 57 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,
CONQUEST ENGINEERING
A Division of CBCL Limited

Robert Y. Cyr, M.A.Sc., P.Eng.
Senior Geotechnical Engineer

Attachments: Blast Record
Blast and Seismograph Location Plan
Event Reports

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

575 Crown Street
Saint John, New Brunswick
E2L 5E9
Phone: (506) 635-7565
Fax: (506) 635-8866
www.conquest-eng.com

Saint John
Moncton
Fredericton
Bedford

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	March 24, 2021
Project No.:	21S003.00	**Time of Blast:**	14:02
Inspector:	L. Collins	**Blast No.:**	2021-08
Client:	Hammond River Holdings		

IDENTIFICATION:

Blasting Contractor:	Gulf Operators Ltd.		
Blaster's Certification No.:	1318	**Blaster's Name:**	Daniel Blanchard
Blast Location:	2021-08-A – N 45°28'55.4" E 65°37'59.7" & 2021-08-B – N 45°28'53.5" E 65°37'57.9" at once		
Type of Rock:	Gypsum	**Est. Vol. or Tonnage:**	15,656 tonnes
Weather at time of Blast:	Sunny with few clouds	**Air Temp.:**	14°C
Est. Wind Speed :	≈15 km/h	**Wind Direction:**	Southwest
Cloud Cover:	Few	**Precipitation:**	No

BLAST DESIGN:

Total No. Holes:	171	**Hole Diameter:**	4.5"
Average Depth:	3.6 – 6.2 m	**Spacing:**	10 ft x 10 ft
No. Holes per Delay:	8	**Collar Length:**	7 ft
Delay between Holes:	25 ms	**Delay between Rows:**	42 ms
Initiation Method:	Non -Electric		
Weight of Explosives per Delay:	Max.: 200 kg		
Type and weight of Explosives for Blast:	5,002 kg – Titan XL 1000		

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

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

575 Crown Street
Saint John, New Brunswick
E2L 5E9
Phone: (506) 635-7565
Fax: (506) 635-8866
www.conquest-eng.com

Saint John
Moncton
Fredericton
Bedford

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	March 24, 2021
Project No.:	21S003.00	**Time of Blast:**	14:02
Inspector:	L. Collins	**Blast No.:**	2021-08
Client:	Hammond River Holdings		

BLAST MONITORING

Distance to the Nearest Structure:	646 m & 638 m
Direction to the Nearest Structure:	South
Structure Type:	Cottage
Scaled Distance Factor: (distance / sq. rt. of max. wt. per delay):	46.7 & 45.1

SAFETY:

Type of Warning Signal Used:	Air horn
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.

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

575 Crown Street
Saint John, New Brunswick
E2L 5E9
Phone: (506) 635-7565
Fax: (506) 635-8866
www.conquest-eng.com

Saint John
Moncton
Fredericton
Bedford

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	March 24, 2021
Project No.:	21S003.00	**Time of Blast:**	14:02
Inspector:	L. Collins	**Blast No.:**	2021-08
Client:	Hammond River Holdings		

Data Collection – Seismometer #1

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #23148
Calibration Date:	June 12, 2020
Location of seismograph:	Civic Number 4079 Route 111 (PW-09)
Distance and Direction from Blast:	1,390 m & 1,330 m South
Transverse Particle Velocity:	<0.5 mm/s – Unit was not triggered
Vertical Particle Velocity:	<0.5 mm/s – Unit was not triggered
Longitudinal Particle Velocity:	<0.5 mm/s – Unit was not triggered
Peak Particle Velocity:	N/A
Maximum Airblast:	<120 dB(L) – Unit was not triggered

Data Collection – Seismometer #2

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5637
Calibration Date:	March 12, 2021
Location of seismograph:	Civic Number 4126 Route 111 (PW-10)
Distance and Direction from Blast:	975 m & 910 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

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

575 Crown Street
Saint John, New Brunswick
E2L 5E9
Phone: (506) 635-7565
Fax: (506) 635-8866
www.conquest-eng.com

Saint John
Moncton
Fredericton
Bedford

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	March 24, 2021
Project No.:	21S003.00	**Time of Blast:**	14:02
Inspector:	L. Collins	**Blast No.:**	2021-08
Client:	Hammond River Holdings		

Data Collection – Seismometer #3

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5371
Calibration Date:	June 24, 2020
Location of seismograph:	Civic Number 4150 Route 111 (PW-13)
Distance and Direction from Blast:	735 m & 804 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 #4

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5632
Calibration Date:	October 22, 2020
Location of seismograph:	Civic Number 2447 Route 820 (PW-07)
Distance and Direction from Blast:	855 m & 879 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

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

575 Crown Street
Saint John, New Brunswick
E2L 5E9
Phone: (506) 635-7565
Fax: (506) 635-8866
www.conquest-eng.com

Saint John
Moncton
Fredericton
Bedford

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	March 24, 2021
Project No.:	21S003.00	**Time of Blast:**	14:02
Inspector:	L. Collins	**Blast No.:**	2021-08
Client:	Hammond River Holdings		

Data Collection – Seismometer #5

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5676
Calibration Date:	February 19, 2021
Location of seismograph:	PW-03 - Route 820
Distance and Direction from Blast:	577 m & 638 m North
Transverse Particle Velocity:	0.76 mm/s @ 37 Hz
Vertical Particle Velocity:	0.51 mm/s @ 34 Hz
Longitudinal Particle Velocity:	0.57 mm/s @ 47 Hz
Peak Particle Velocity:	0.76 mm/s @ 37 Hz
Maximum Airblast:	116 dB(L)

Data Collection – Seismometer #6

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5489
Calibration Date:	May 15, 2020
Location of seismograph:	Civic Number 2341 Route 820 (PW-05)
Distance and Direction from Blast:	601 m & 670 m Northwest
Transverse Particle Velocity:	2.22 mm/s @ 34 Hz
Vertical Particle Velocity:	1.84 mm/s @ 34 Hz
Longitudinal Particle Velocity:	2.22 mm/s @ 64 Hz
Peak Particle Velocity:	2.22 mm/s @ 34 Hz
Maximum Airblast:	118 dB(L)

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

575 Crown Street
Saint John, New Brunswick
E2L 5E9
Phone: (506) 635-7565
Fax: (506) 635-8866
www.conquest-eng.com

Saint John
Moncton
Fredericton
Bedford

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	March 24, 2021
Project No.:	21S003.00	**Time of Blast:**	14:02
Inspector:	L. Collins	**Blast No.:**	2021-08
Client:	Hammond River Holdings		

Data Collection – Seismometer #7

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial #5487
Calibration Date:	February 17, 2021
Location of seismograph:	Civic Number 50 Myron Road (PW-15)
Distance and Direction from Blast:	893 m & 957 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 Mini Mate, Serial #5960
Calibration Date:	May 15, 2020
Location of seismograph:	Civic Number 86 Myron Road (PW-16)
Distance and Direction from Blast:	878 m & 946 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

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

575 Crown Street
Saint John, New Brunswick
E2L 5E9
Phone: (506) 635-7565
Fax: (506) 635-8866
www.conquest-eng.com

Saint John
Moncton
Fredericton
Bedford

BLAST RECORD

Project Name:	Upham Gypsum Quarry	**Date of Blast:**	March 24, 2021
Project No.:	21S003.00	**Time of Blast:**	14:02
Inspector:	L. Collins	**Blast No.:**	2021-08
Client:	Hammond River Holdings		

Data Collection – Seismometer #9

Make, Model and Serial # of unit:	Instantel Mini Mate, Serial # 21349
Calibration Date:	June 12, 2020
Location of seismograph:	Civic Number 220 Myron Road (PW-01)
Distance and Direction from Blast:	1,430 m & 1,390 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 Mini Mate, Serial #5372
Calibration Date:	February 8, 2021
Location of seismograph:	Civic Number 4140 Route 111 (PW-12)
Distance and Direction from Blast:	897 m & 830 m South
Transverse Particle Velocity:	0.51 mm/s @ 57 Hz
Vertical Particle Velocity:	0.25 mm/s @ 73 Hz
Longitudinal Particle Velocity:	0.25 mm/s @ 73 Hz
Peak Particle Velocity:	0.51 mm/s @ 57 Hz
Maximum Airblast:	110 dB(L)

Blast and Seismograph Location Plan
Blast No: 2021-08
Upham East Gypsum Quarry, Upham, NB

Date: March 42, 2021
CE Project No.: 21S003.00

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

Saint John
Moncton
Fredericton
Bedford

Event Report

Date/Time Long at 14:02:43 March 24, 2021
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: March 24, 2021 16:15:42 (V10.72.1)

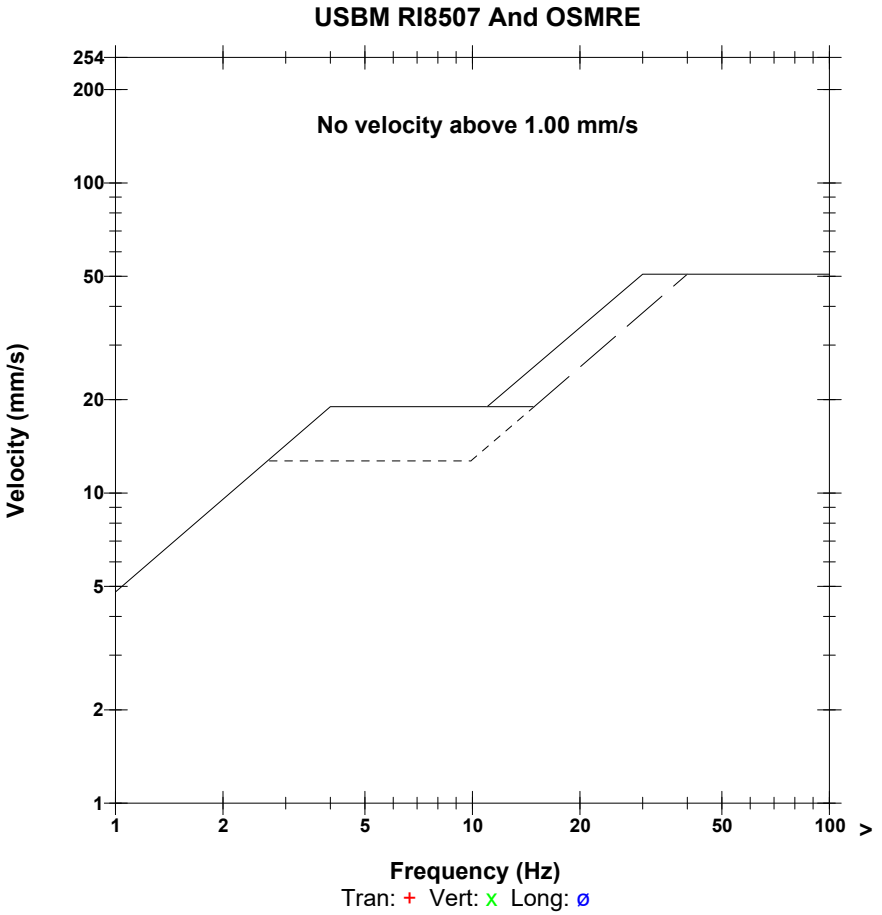
Extended Notes

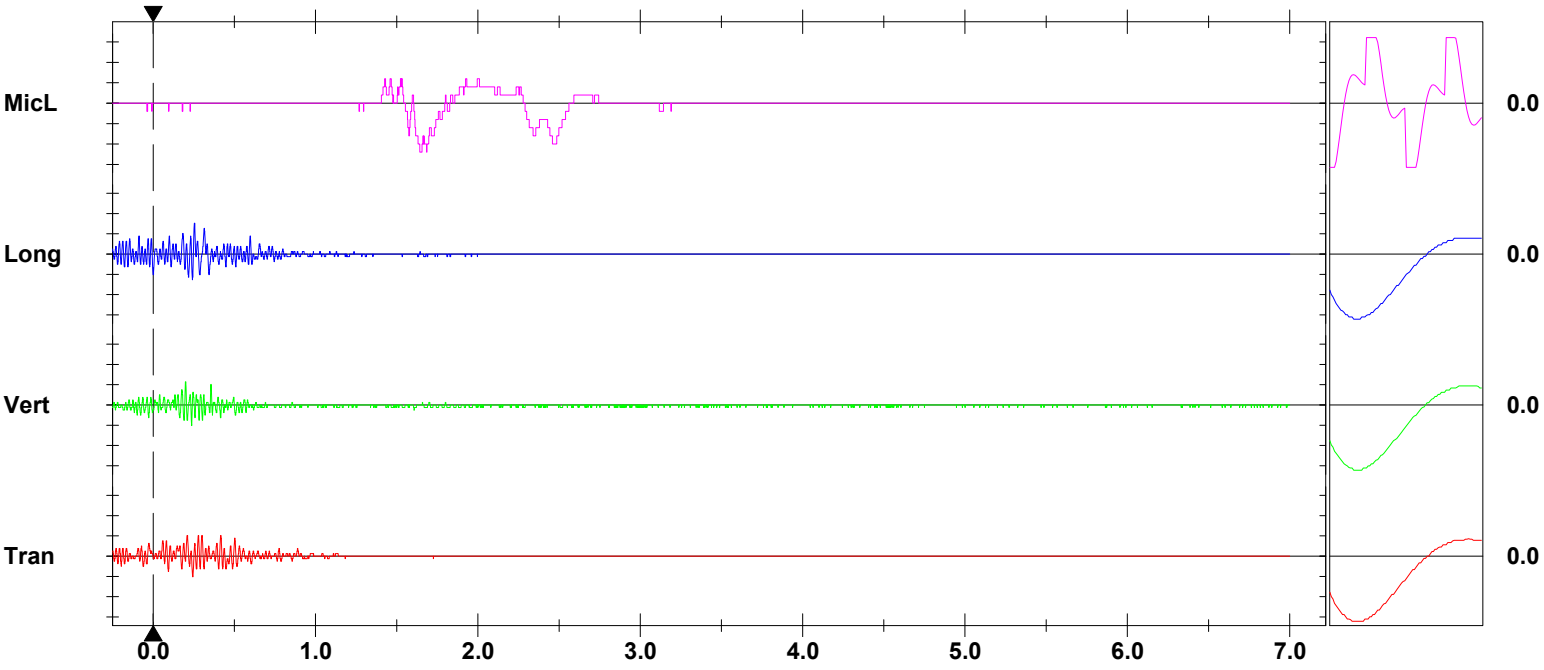
Microphone Linear Weighting
PSPL 115.6 dB(L) 12.00 pa.(L) at 1.643 sec
ZC Freq 3.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 299 mv)

	Tran	Vert	Long	
PPV	0.508	0.572	0.762	mm/s
ZC Freq	34	47	37	Hz
Time (Rel. to Trig)	0.209	0.199	0.255	sec
Peak Acceleration	0.013	0.020	0.020	g
Peak Displacement	0.002	0.002	0.003	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.8	8.1	8.0	Hz
Overswing Ratio	3.7	3.6	4.0	

Peak Vector Sum 0.841 mm/s at 0.257 sec

Serial Number 5676 V 2.61 MiniMate
Battery Level 5.9 Volts
Unit Calibration February 19, 2021 by Instantel
File Name G676IWOS.CJ0
Post Event Notes
Location of Seismograph: Cottage on Route 820 (PW-03)
Blast No.: 2021-08
CE Project No.: 21S003.00





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

Format © 1995-2015 Xmark Corporation

Event Report

Date/Time Vert at 14:02:45 March 24, 2021
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: March 24, 2021 16:22:03 (V10.72.1)

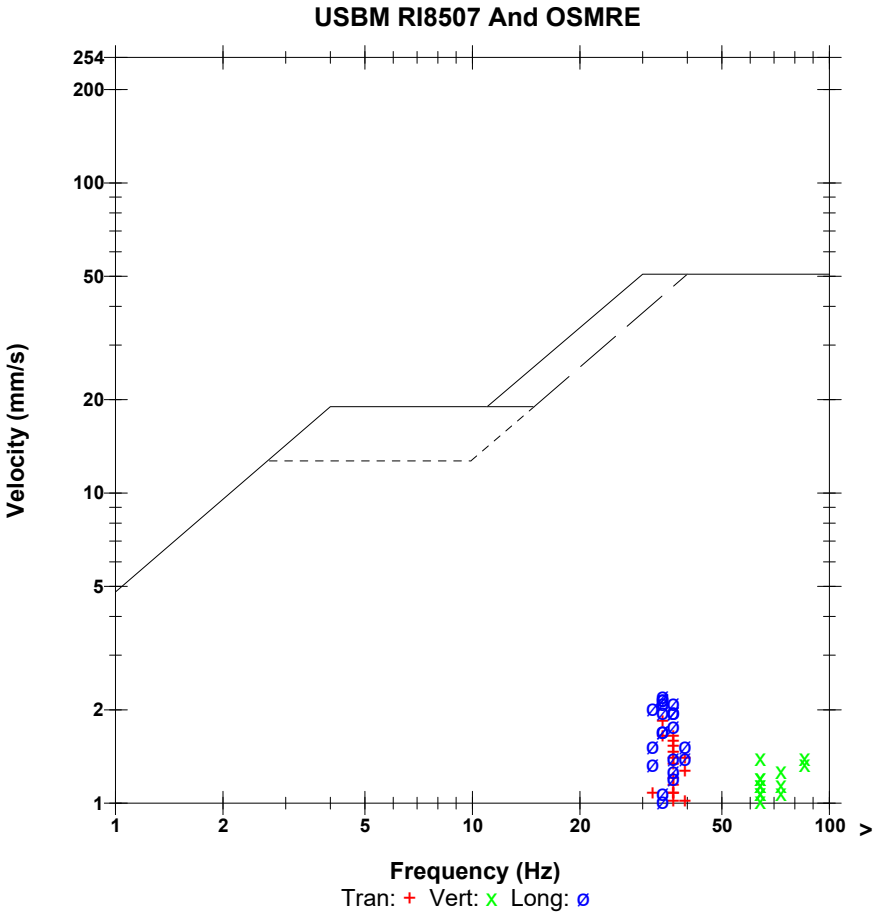
Extended Notes

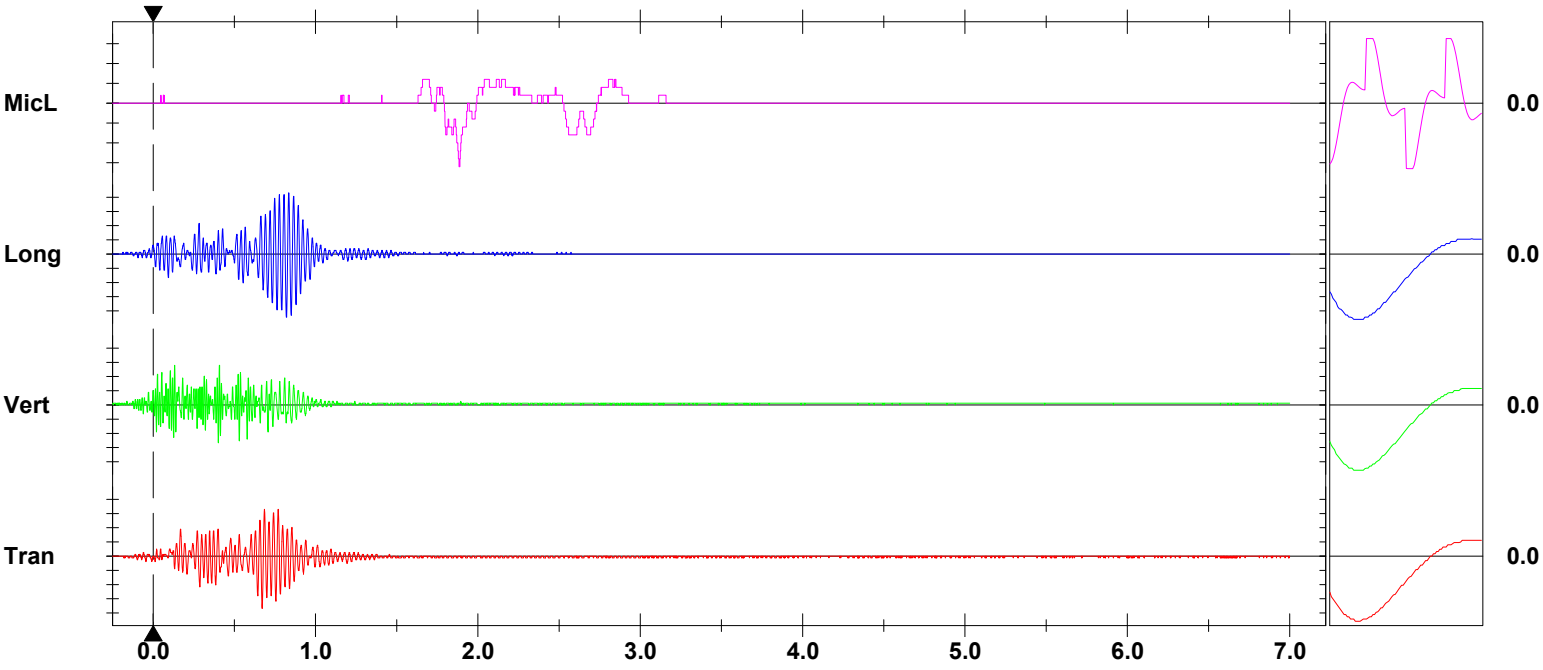
Serial Number 5489 V 2.61 MiniMate
Battery Level 6.2 Volts
Unit Calibration May 15, 2020 by Instantel
File Name G489IWOS.CL0
Post Event Notes
Location of Seismograph: Civic No. 2341 Route 820 (PW-05)
Blast No.: 2021-08
CE Project No.: 21S003.00

Microphone Linear Weighting
PSPL 118.1 dB(L) 16.00 pa.(L) at 1.885 sec
ZC Freq 4.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 272 mv)

	Tran	Vert	Long	
PPV	1.842	1.397	2.223	mm/s
ZC Freq	34	64	34	Hz
Time (Rel. to Trig)	0.672	0.134	0.821	sec
Peak Acceleration	0.040	0.066	0.053	g
Peak Displacement	0.009	0.003	0.011	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.6	7.7	7.7	Hz
Overswing Ratio	4.0	4.0	4.1	

Peak Vector Sum 2.365 mm/s at 0.852 sec





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

Format © 1995-2015 Xmark Corporation

Event Report

Date/Time Long at 14:02:46 March 24, 2021
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: March 24, 2021 16:24:47 (V10.72.1)

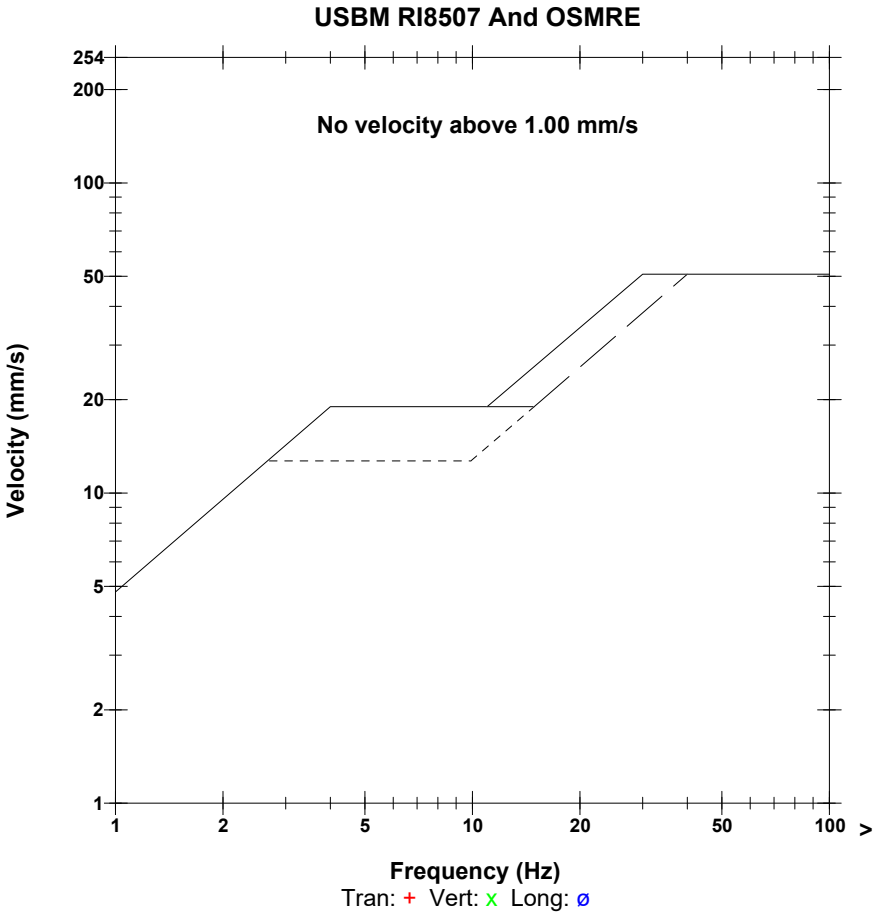
Extended Notes

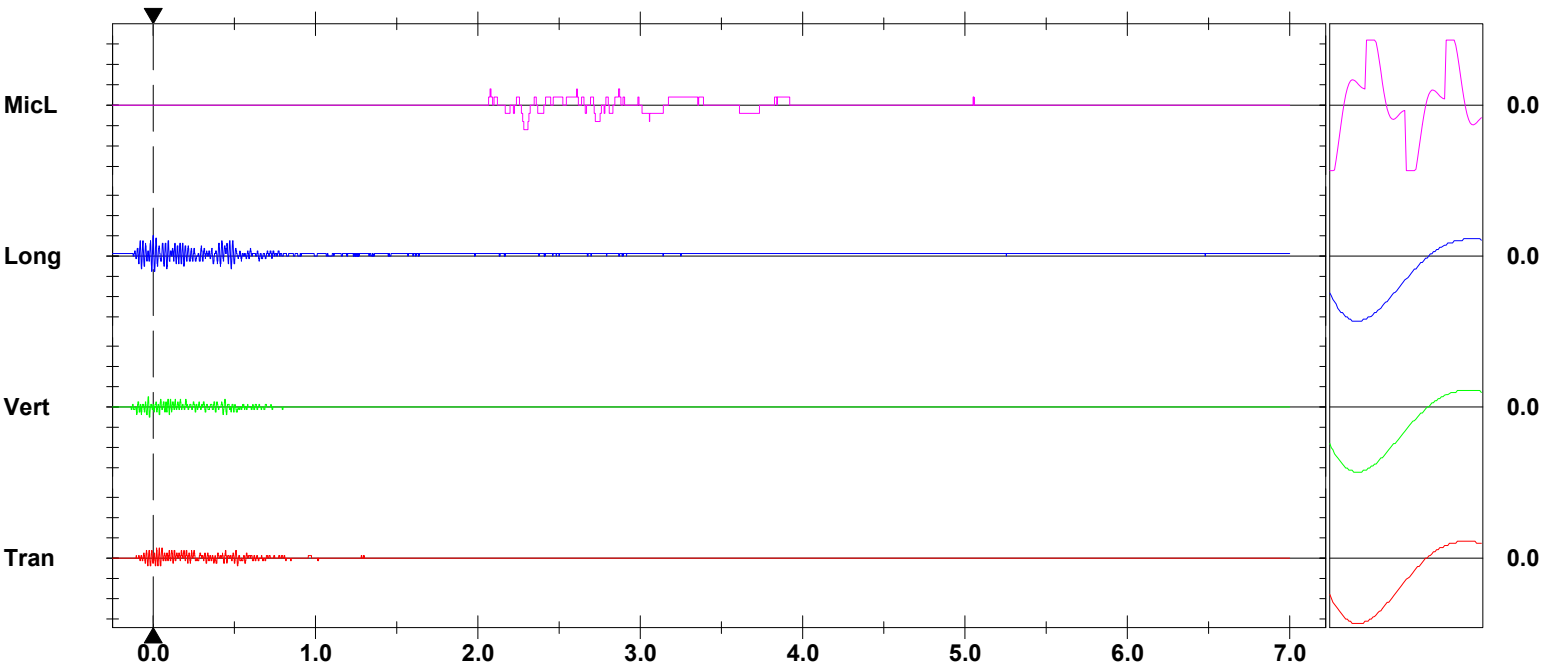
Microphone Linear Weighting
PSPL 109.5 dB(L) 6.000 pa.(L) at 2.283 sec
ZC Freq 9.1 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 295 mv)

	Tran	Vert	Long	
PPV	0.254	0.254	0.508	mm/s
ZC Freq	73	73	57	Hz
Time (Rel. to Trig)	0.022	-0.021	0.001	sec
Peak Acceleration	0.013	0.013	0.020	g
Peak Displacement	0.000	0.001	0.001	mm
Sensor Check	Passed	Passed	Passed	
Frequency	8.0	7.8	7.8	Hz
Overswing Ratio	3.5	3.6	4.2	

Peak Vector Sum 0.524 mm/s at 0.001 sec

Serial Number 5372 V 2.61 MiniMate
Battery Level 6.1 Volts
Unit Calibration February 8, 2021 by Instantel
File Name G372IWOS.CM0
Post Event Notes
Location of Seismograph: Civic No. 4140 Route 111 (PW-12)
Blast No.: 2021-08
CE Project No.: 21S003.00





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

Format © 1995-2015 Xmark Corporation