Appendix 23: 2022 Blast Monitoring Report

ANNUAL REPORT MEMORANDUM

Agnico Eagle Mines Ltd - Meliadine Division, Engineering Department

SUBJECT: 2022 Meliadine Blast Monitoring Report for the Protection of Nearby Fish Habitat

1- Introduction and Objectives

In accordance with Term and Condition 11 of Project Certificate No.006 issued by the Nunavut Impact Review Board (NIRB), Agnico Eagle Mines Ltd (Agnico Eagle) - Meliadine Division developed a Blast Monitoring Program which complies with *The Guidelines for the Use of Explosives In or Near Canadian Fisheries Water* (Wright and Hopky, 1998) as modified by the Department of Fisheries and Oceans Canada (DFO) for use in the North and adhere to guidance provided in Monitoring Explosive-Based Winter Seismic Exploration in Waterbodies (Cott and Hanna, 2005). As a result, Agnico Eagle conducts monitoring to evaluate blast related peak particle velocity (PPV) and overpressure to protect nearby fish bearing waters.

The detonation of explosives in or near water produces compressive shock waves that can cause significant impacts to the swim bladders of fish, rupture other internal organs and/or damage or kill fish eggs and larvae. In addition, the effects of the shock waves can be intensified in the presence of ice. Consequently, the Guidelines for the Use of Explosives In or Near Canadian Fisheries Water guidelines have been developed by DFO to protect fish and fish habitat from works or undertakings that involve explosives in or near fisheries waters. Guidance provided in Monitoring Explosive-Based Winter Seismic Exploration in Waterbodies (Cott and Hanna, 2005) was also followed. It includes the following requirements:

1. No explosive is to be detonated in or near fish habitat that produces an instantaneous pressure change (IPC) greater than 100 kPa in the swim bladder of a fish; representatives from DFO requested that Agnico Eagle use a value of 50 kPa instead of 100 kPa; and

2. No explosive is to be detonated that produces a peak particle velocity greater than 13 mm/s in a spawning bed during the period of egg incubation (for lakes near the Meliadine mine, it takes place between August 15 and June 30).

PPV and overpressure monitoring data were recorded throughout 2022 during blasting activities at Meliadine. During 2022, one surface location was monitored: Tiriganiaq Open pit 1 (TIR01). No blasting activities occurred at Tiriganiaq Open Pit 2 (TIR02) in 2022. The locations of the blast monitoring stations used in 2022 are shown in Figure 1 below.

To improve vibration monitoring practices and data accuracy, permanent monitoring installations were commissioned on August 20th 2020, allowing the seismograph to be directly anchored into the bedrock via attachment to a steel rod drilled through the tundra. These permanent stations thereafter replaced the temporary locations used previously.

Table 1: Tiriganiaq Open pits 1 & 2 (TIR01 & TIR02) Surface blast monitoring station coordinates

LOCATION	EASTING	NORTHING	DESCRIPTION
Explo Camp	541927.162	6989073.053	Permanent location used for TIR01 & TIR02 (installed 2020-08-20)
Comm Tower P1	539803.785	6988836.212	Permanent location used for TIR01 & TIR02 (installed 2020-08-20)

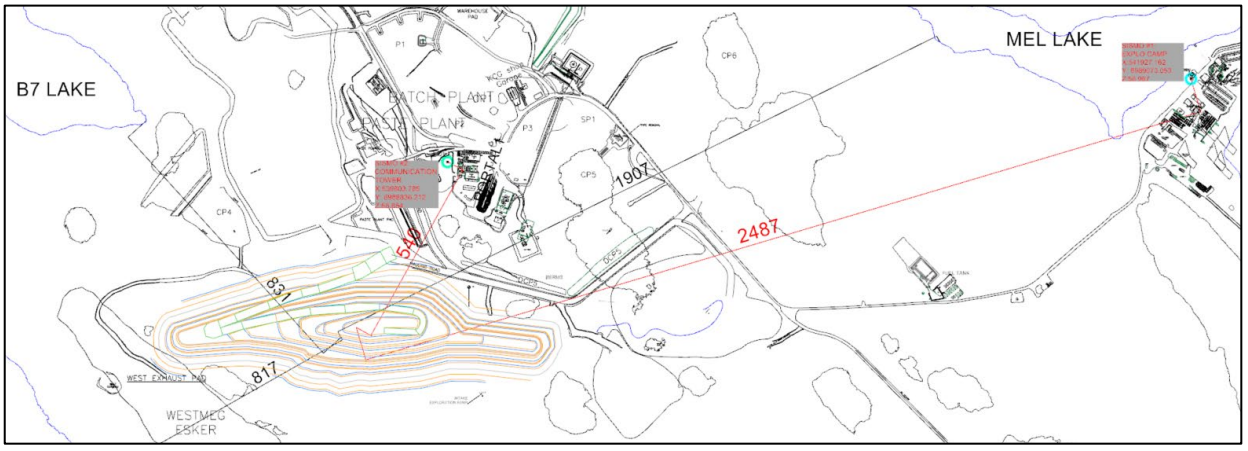


Figure 1: Surface blast monitoring station locations used for TIR01 blasts (distances in meters)

2- Methods

2.1- Blast Monitoring

Blasts were monitored using an Instantel Minimate Blaster which is fully compliant with the international Society of Explosives and Engineers performance specifications for blasting seismographs (Instantel, 2005). The transducer is installed as per the model specifications. For additional details on seismograph instrumentation and monitoring program detail, please refer to the Blast Monitoring Program; all monitoring protocols set forth in this program are followed by Agnico Eagle.

This instrument measures transverse, vertical and longitudinal ground vibrations. Transverse ground vibrations agitate particles in a side-to-side motion. Vertical ground vibrations agitate particles in an up and down motion. Longitudinal ground vibrations agitate particles in a back-and-forth motion progressing outward from the event site (Instantel, 2005). The Minimate Blaster calculates the PPV for each geophone and calculates the vector sum of the three axes. The final result is the Peak Vector Sum (PVS) and is the resultant particle velocity magnitude of the event:

$$PVS = \sqrt{(T^2 + V^2 + L^2)}$$

Where:
T = particle velocity along the transverse plane
V = particle velocity along the vertical plane
L = particle velocity along the longitudinal plane

2.2- Data Compilation and Analysis

The blast monitoring data is screened to ensure blast PPV and IPC monitoring results corresponded to a single blast event. As per the Blast Monitoring Plan, Mining Engineers & Technicians have thoroughly documented all blasting activities from design concept to final results – which include PPV and IPC measurements. If required, blasting procedure will be reviewed to ensure that the site remains within threshold limits and in continued compliance with regulations, as is part of the blast optimization process.

The following is a summary of the data collected for the 2022 Tiriganiaq Open Pit 1 operations with respect to Meliadine Lake, Lake B5 and Lake B7. These lakes were identified as the closest accessible fish bearing lakes to the blasting activities that would occur throughout 2022. Guidance may change as the footprint of the site evolves over time.

It should be noted Figures 2, 3 and Table 2 below only present data from the *Comm Tower P1* monitoring station, since the *Explo Camp* monitoring station did not record any value above zero (the seismograph was not triggered by the blasting events).

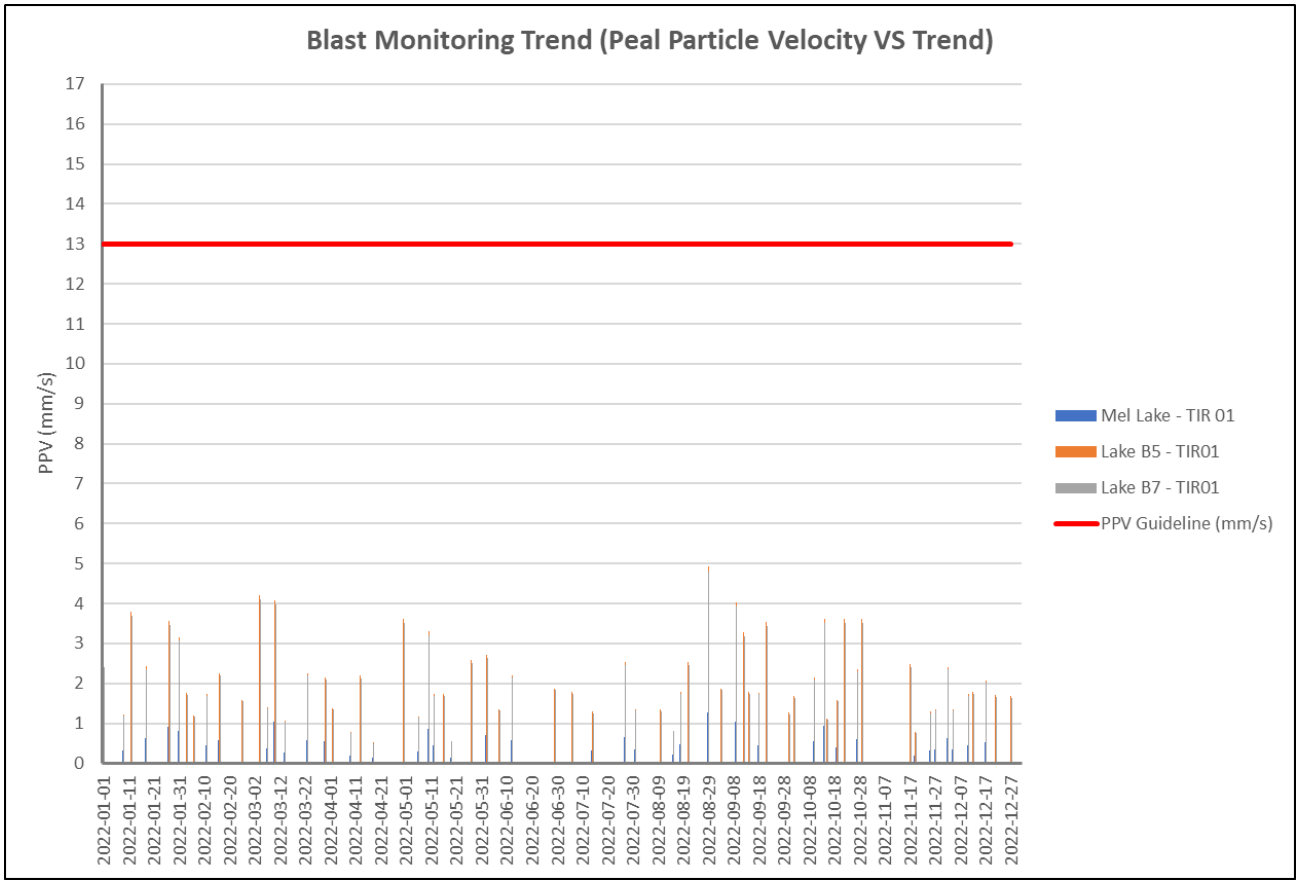
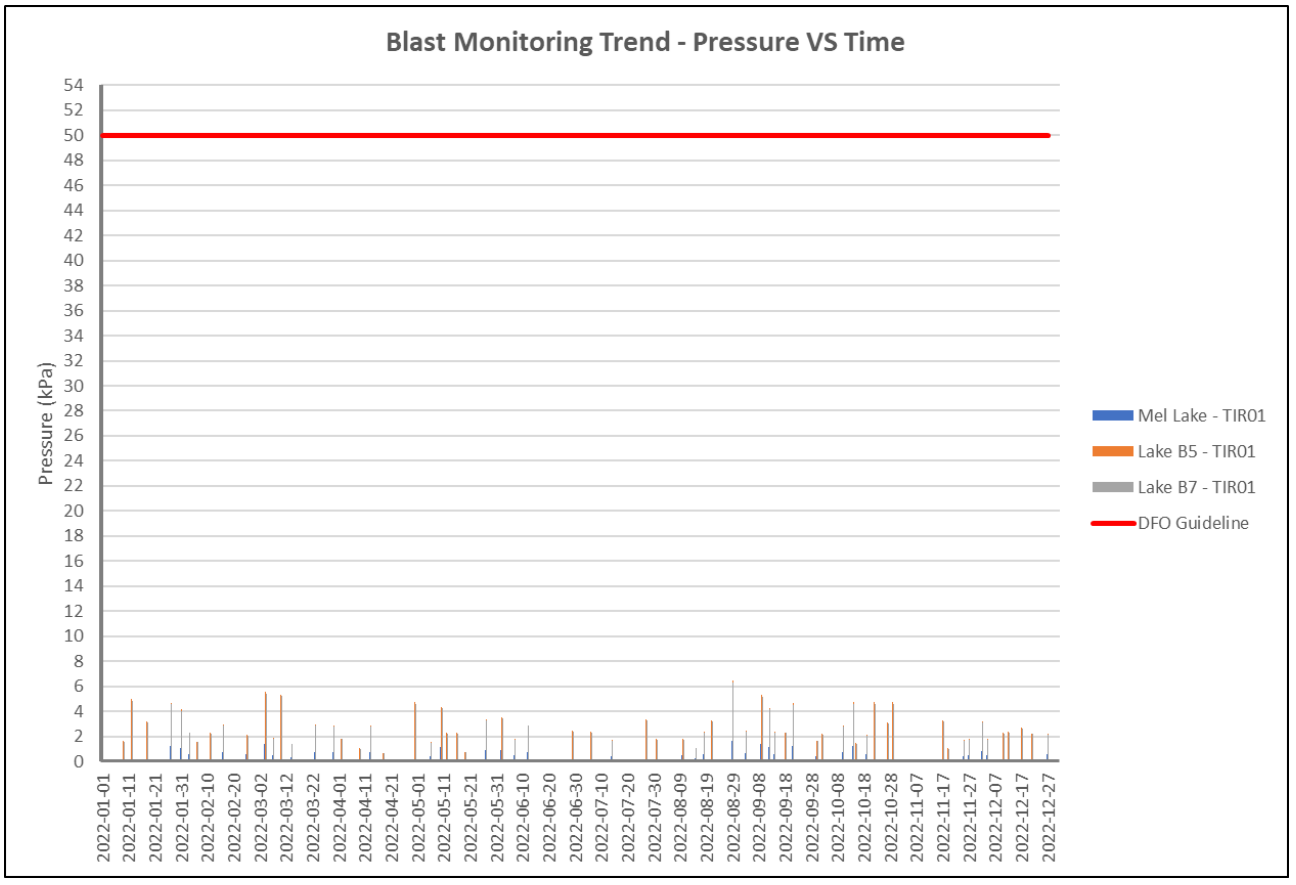


Figure 2: PPV values over time for TIR01 blast monitoring

As seen in the previous chart, there are no PPV value close to the PPV threshold guideline of 13 mm/s. The average PPV value for 2022 was 1.58 mm/s, with a minimum of 0.13 mm/s and a maximum of 4.92 mm/s. The

maximum value was logged during the first blast of bench no. 10035 with little open face for the phase 2 of the TIR01 pit. With limited open face and void available for blast movement, a higher value for vibration was expected.



As seen in the previous chart, there are no kPa value close to the kPa DFO guideline of 50 kPa. The average kPa value for 2022 was 2.07 kPa, with a minimum of 0.17 kPa and a maximum of 6.46 kPa. The maximum value was logged during the first blast of bench no. 10035 with little open face for the phase 2 of the TIR01 pit (same blast as the maximum value for PPV). With limited open face and void available for blast movement, a higher value was expected.

Table 2 - 2022 PPV and IPC Blast Monitoring Results – TIR01

DFO Limits: Peak Particle Velocity - PPV = 13, Peak Sound Pressure - kPa = 50

Date	Seismo Serial #	Location	PPV (mm/s)			Pressure Pw (kPa)		
			Mel Lake	Lake B5	Lake B7	Mel Lake	Lake B5	Lake B7
2022-01-01	MP14206	Comm tower P1	0.6	2.5	2.4	0.84	3.25	3.16
2022-01-09	MP14206	Comm tower P1	0.3	1.2	1.2	0.42	1.61	1.57
2022-01-12	MP14206	Comm tower P1	1.0	3.8	3.7	1.28	4.98	4.85
2022-01-18	MP14206	Comm tower P1	0.6	2.4	2.4	0.82	3.18	3.10

2022-01-27	MP14206	Comm tower P1	0.9	3.6	3.5	1.20	4.67	4.54
2022-01-31	MP14206	Comm tower P1	0.8	3.2	3.1	1.07	4.14	4.03
2022-02-03	MP14206	Comm tower P1	0.5	1.8	1.7	0.59	2.31	2.25
2022-02-06	MP14206	Comm tower P1	0.3	1.2	1.2	0.40	1.56	1.52
2022-02-11	MP14206	Comm tower P1	0.4	1.7	1.7	0.59	2.27	2.21
2022-02-16	MP14206	Comm tower P1	0.6	2.3	2.2	0.76	2.96	2.88
2022-02-25	MP14206	Comm tower P1	0.4	1.6	1.5	0.54	2.09	2.03
2022-03-04	MP14206	Comm tower P1	1.1	4.2	4.1	1.42	5.53	5.38
2022-03-07	MP14206	Comm tower P1	0.4	1.4	1.4	0.48	1.85	1.80
2022-03-10	MP14206	Comm tower P1	1.0	4.1	4.0	1.38	5.35	5.20
2022-03-14	MP14206	Comm tower P1	0.3	1.1	1.0	0.36	1.39	1.35
2022-03-23	MP14206	Comm tower P1	0.6	2.3	2.2	0.76	2.96	2.88
2022-03-30	MP14206	Comm tower P1	0.6	2.2	2.1	0.73	2.83	2.75
2022-04-02	MP14206	Comm tower P1	0.4	1.4	1.3	0.47	1.80	1.76
2022-04-09	MP14206	Comm tower P1	0.2	0.8	0.8	0.26	1.02	1.00
2022-04-13	MP14206	Comm tower P1	0.6	2.2	2.1	0.74	2.87	2.79
2022-04-18	MP14206	Comm tower P1	0.1	0.5	0.5	0.17	0.68	0.66
2022-04-30	MP14206	Comm tower P1	0.9	3.6	3.5	1.22	4.73	4.60
2022-05-06	MP14206	Comm tower P1	0.3	1.2	1.1	0.40	1.54	1.50
2022-05-10	MP14206	Comm tower P1	0.8	3.3	3.2	1.11	4.33	4.21
2022-05-12	MP14206	Comm tower P1	0.4	1.7	1.7	0.59	2.27	2.21
2022-05-16	MP14206	Comm tower P1	0.4	1.7	1.7	0.59	2.29	2.23
2022-05-19	MP14206	Comm tower P1	0.1	0.6	0.5	0.19	0.74	0.72
2022-05-27	MP14206	Comm tower P1	0.7	2.6	2.5	0.87	3.39	3.30
2022-06-02	MP14206	Comm tower P1	0.7	2.7	2.6	0.91	3.55	3.45
2022-06-07	MP14206	Comm tower P1	0.3	1.4	1.3	0.46	1.78	1.73
2022-06-12	MP14206	Comm tower P1	0.6	2.2	2.1	0.75	2.90	2.82
2022-06-29	MP14206	Comm tower P1	0.5	1.9	1.8	0.63	2.46	2.40
2022-07-06	MP14206	Comm tower P1	0.5	1.8	1.7	0.61	2.35	2.29
2022-07-14	MP14206	Comm tower P1	0.3	1.3	1.3	0.44	1.69	1.64
2022-07-27	MP14206	Comm tower P1	0.7	2.5	2.5	0.86	3.33	3.24
2022-07-31	MP14206	Comm tower P1	0.3	1.4	1.3	0.46	1.78	1.73
2022-08-10	MP14206	Comm tower P1	0.3	1.3	1.3	0.46	1.77	1.72
2022-08-15	MP14206	Comm tower P1	0.2	0.8	0.8	0.28	1.08	1.05
2022-08-18	MP14206	Comm tower P1	0.5	1.8	1.7	0.61	2.35	2.29
2022-08-21	MP14206	Comm tower P1	0.6	2.5	2.5	0.85	3.31	3.22
2022-08-29	MP14206	Comm tower P1	1.3	4.9	4.8	1.66	6.46	6.28
2022-09-03	MP14206	Comm tower P1	0.5	1.9	1.8	0.63	2.46	2.40
2022-09-09	MP14206	Comm tower P1	1.0	4.0	3.9	1.36	5.28	5.14

2022-09-12	MP14206	Comm tower P1	0.8	3.3	3.2	1.11	4.29	4.17
2022-09-14	MP14206	Comm tower P1	0.5	1.8	1.7	0.61	2.35	2.29
2022-09-18	MP14206	Comm tower P1	0.5	1.8	1.7	0.60	2.33	2.26
2022-09-21	MP14206	Comm tower P1	0.9	3.5	3.4	1.20	4.64	4.51
2022-09-30	MP14206	Comm tower P1	0.3	1.3	1.2	0.43	1.66	1.61
2022-10-02	MP14206	Comm tower P1	0.4	1.7	1.6	0.57	2.22	2.16
2022-10-10	MP14206	Comm tower P1	0.6	2.1	2.1	0.73	2.82	2.74
2022-10-14	MP14206	Comm tower P1	0.9	3.6	3.5	1.22	4.73	4.60
2022-10-15	MP14206	Comm tower P1	0.3	1.1	1.1	0.38	1.46	1.42
2022-10-19	MP14206	Comm tower P1	0.4	1.6	1.5	0.54	2.08	2.03
2022-10-22	MP14206	Comm tower P1	0.9	3.6	3.5	1.22	4.73	4.60
2022-10-27	MP14206	Comm tower P1	0.6	2.4	2.3	0.80	3.10	3.02
2022-10-29	MP14206	Comm tower P1	0.9	3.6	3.5	1.22	4.73	4.60
2022-11-17	MP14206	Comm tower P1	0.6	2.5	2.4	0.84	3.26	3.17
2022-11-19	MP14206	Comm tower P1	0.2	0.8	0.8	0.26	1.02	1.00
2022-11-25	MP14206	Comm tower P1	0.3	1.3	1.3	0.44	1.69	1.64
2022-11-27	MP14206	Comm tower P1	0.4	1.4	1.3	0.46	1.79	1.74
2022-12-02	MP14206	Comm tower P1	0.6	2.4	2.3	0.82	3.17	3.08
2022-12-04	MP14206	Comm tower P1	0.4	1.4	1.3	0.46	1.79	1.74
2022-12-10	MP14206	Comm tower P1	0.4	1.7	1.7	0.58	2.26	2.20
2022-12-12	MP14206	Comm tower P1	0.5	1.8	1.7	0.61	2.35	2.29
2022-12-17	MP14206	Comm tower P1	0.5	2.1	2.0	0.70	2.72	2.65
2022-12-21	MP14206	Comm tower P1	0.4	1.7	1.7	0.58	2.24	2.18
2022-12-27	MP14206	Comm tower P1	0.4	1.7	1.6	0.57	2.20	2.14

Note: *Zero value occur when the blast levels are too low to trigger the seismograph.*