Appendix 34

Meadowbank and Whale Tail 2024 Blast Monitoring Report

ANNUAL REPORT MEMORANDUM

Agnico Eagle Mines Limited
Meadowbank Complex

SUBJECT: 2024 Meadowbank and Whale Tail Mine Sites Blast Monitoring Report for the Protection of Nearby Fish Habitat

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1. Introduction and Objectives

In accordance with NIRB Project Certificate No.004 Condition 85 and Project Certificate No. 008 Condition 22, Agnico Eagle Meadowbank Complex developed a blasting program which complies with *The Guidelines for the Use of Explosives In or Near Canadian Fisheries Water*[1] (Wright and Hopky,1998) as modified by the DFO for use in the North and adhere to guidance provided in *Monitoring Explosive-Based Winter Seismic Exploration in Waterbodies*[2] (Cott and Hanna, 2005). As a result, Agnico Eagle conducts monitoring to evaluate blast related peak particle velocity (PPV) and instantaneous pressure change (IPC) 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* (Wright and Hopky,1998) 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 in or near fish habitat 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 Meadowbank Complex, it takes place between August 15 and June 30).

Peak particle velocity and instantaneous pressure change monitoring data was recorded throughout 2024 during blasting activities at Whale Tail and IVR pits, and after May 2024 for the Underground operations, for the protection of fish. The locations of the blast monitoring stations on surface in 2024 at the Whale Tail Mine site are highlighted in Table 1 and Figure 1. No blast monitoring was conducted at the Meadowbank mine site in 2024 as mining operations ceased in 2019.

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[1] *Wright, D.G., and G.E.Hopky.Guidelines for the use of explosives in or near Canadian fisheries Water. 1998.Can. Tech.Rep. Fish.Aquat. Scie.2107: IV+34P.*
[2] *Monitoring Explosive-Based Winter Seismic Exploration in Waterbodies, NWT 2000-2002 guidelines.*

Table 1: 2024 Surface Blast Monitoring Stations – Whale Tail Mine Site

Station	Easting	Northing	Status	Period
IVR Pit (Nemo Lake Station)	606,588	7,256,993	Active	August 2020 – Present
IVR Pit (Nemo Lake Station 2)	606,673	7,256,972	Active	May 2022 – Present
Whale Tail Pit (Kangislulik Lake Station 3)	605,872	7,255,000	Inactive[3]	October 2022 – February 2025
Whale Tail Pit (Kangislulik Lake Station 4)	605,913	7,255,160	Active	February 2025 – Present

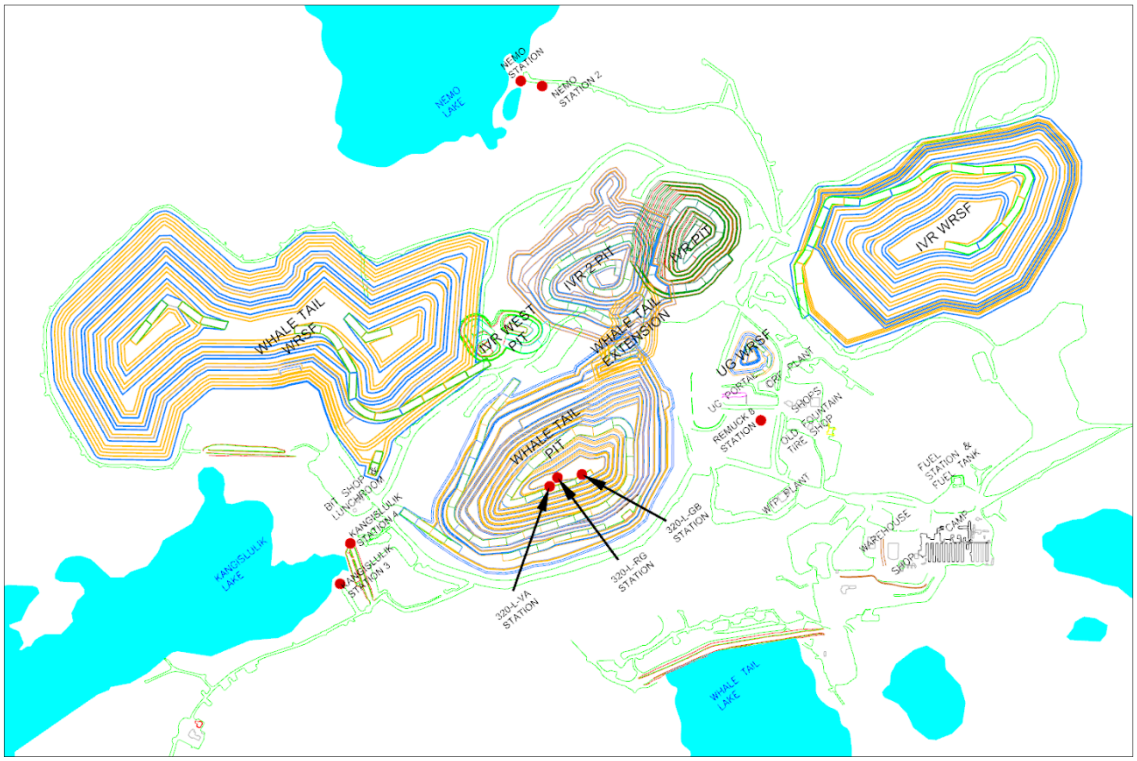

Figure 1 – Whale Tail Mine Site Blast Monitoring Stations

3 Inactive at the time of submission of this document. However, Kangislulik Lake Station 3 was active and solely used to monitor all data presented for the 2024 Blast Monitoring Report.

2. Methods

2.1- Blast Monitoring

Blasts were monitored using Instantel's Minimate & Micromate Blaster which is fully compliant and is annually calibrated with the international Society of Explosives and Engineers performance specifications for blasting seismographs (Instantel, 2005). The Minimate & Micromate Blaster has three main parts: a monitor, a standard transducer (geophone) and a microphone. The monitor contains the battery and electronic components of the instrument. It also verifies the two sensors to ensure they are functioning before each recording event. The transducer measures ground vibration with a mechanism called a geophone [4].

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 & Micromate Blasters calculate the PPV for each vector and calculate the vector sum of the three axes. The 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 (mm/s)
V = particle velocity along the vertical plane (mm/s)
L = particle velocity along the longitudinal plane (mm/s)

The transducer is installed as per the model specifications. All monitoring follows the Agnico Eagle Blast Monitoring Program.

2.2- Data Analysis

In 2024, the engineering department continued the work established in previous years of documenting blast patterns, sequences, and detonation results leading to both accurate material documentation and blast design optimization.

The blast monitoring data was screened to ensure blast PPV and IPC monitoring results corresponded to a single blast event. Data is collected for each blast date and may include a composite of blast patterns. As a result, data may include multiple blast patterns that could have occurred during the same monitoring event (i.e., a single PPV and IPC value for 3 blast patterns). The data was screened to remove all redundant data points, such as replicate readings.

[4] *Instantel INC.2005.Minimate Blaster Operation Manual.*

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2.3- Results, Discussion and Conclusions

Historical PPV and IPC blast monitoring exceedances are presented in Table 2 and results in Table 3. Blast monitoring results are reviewed after each blast and a blast vibration mitigation (Investigation & Corrective Measures) plan begins immediately, if the vibrations or the overpressure exceed the guidelines.

From January 1st to December 31st, 2024, 187 surface blasts were executed at the Whale Tail Mine Site, with 39 blasting events occurring in both IVR and Whale Tail pits simultaneously, giving a total of 226 recordable events.

At the IVR Pit, 80 blasts were monitored. There were zero (0) blasts exceeding the PPV concentration DFO limit of 13 mm/s and zero (0) blasts exceeding the IPC measurement DFO limit of 50 kPa.

At the Whale Tail Pit, 146 blasts were monitored. There were zero (0) blasts exceeding the PPV concentration DFO limit of 13 mm/s and zero (0) blasts exceeding the IPC measurement DFO limit of 50 kPa.

For the Underground mine, nine (9) blasts were monitored. There was one (1) blast exceeding the PPV concentration DFO limit of 13 mm/s and zero (0) blasts exceeding the IPC measurement DFO limit of 50 kPa. It is to note that only blasts that had chance of being detected on a blast monitoring station were monitored. Increase monitoring has been ongoing since the exceedance occurred, to further refine the vibration model, in addition to other corrective measures outlined in Appendix A.

Vibration data collected from the Nemo Lake and Kangislulik Lake monitoring stations in 2024 indicates 99.6% compliance with the aforementioned Guidelines.

One (1) PPV exceedance was recorded in 2024. The exceedance occurred on May 20th, 2024 (egg incubation period is from August 15 to June 30). The event was located at Kangislulik Station 3 following blasting activities related to the Underground mine. Analysis of the blast monitoring station data showed that the PPV was 15.969 mm/s and that the IPC was 18.691 kPa. This is the first instance of an underground blast vibration exceedance recorded at the surface. To mitigate the probability of another exceedance, the corrective measures taken are provided in Appendix A.

Table 2: Whale Tail Mine Site PPV and IPC exceedances for the period 2018-2024

Year	PPV exceedances	IPC exceedances
2018	2	0
2019	8	0
2020	4	0
2021	0	0
2022	2	0
2023	0	0
2024	1	0
Total	**17**	**0**

As an effort to uphold continuous improvement within the Drill and Blast department, the mining team has worked on improving several work standards and field implementations to ensure compliance. In summary, these items are as follows:

Item: Significant investment to install a permanent blast monitoring station.
Objective: After the recorded exceedance, an action plan was put in place to install a second monitoring station with more advanced and sensitive equipment. This will allow the Engineering team to gather more data on specific blasting timings and refine the prediction model used when designing underground stopes, and in turn, avoid any further vibration exceedances.

Item: Recalibrated vibration model with 2024 monitored data.
Objective: Continuously adapt the predictive accuracy of the vibration model by utilizing the most recent and representative data collected from previous blasts.

Item: Reduced maximum charge per delay in geological sensitive areas.
Objective: Known Komatiite areas consist of more brittle and delaminated rock, allowing for an easier transfer of shockwaves, hence a need for a higher vibration control. Timings are designed to mitigate to the lowest possible value of charge per delay, leading to a minimized value of propagatable vibrations.

Item: Optimized maximum charge per delay for overlapping shockwaves of Underground blasts.
Objective: After the initial exceedance was discovered due to rapid underground blasting near the Kangislulik Lake, an immediate rectification of the timing plans was put in place. With the help of a third-party consultant, Agnico Eagle measured and analyzed the overlapping vibrations and, through multiple iterations of simulations, found the optimal timing in between holes to minimize the constructive amplitude of the shockwaves.

In addition to the items listed above, each blast design is subject to an approval checklist, that includes a vibration review and timing consideration, completed by a minimum of two (2) qualified people (Designer and Approver). The blasting direction is also considered in the design process to limit shockwave propagation towards sensitive areas.

Vibration prediction, or modeling, is also completed for each blast. The modeling is based on using historical seismograph data to help predict expected vibrations from blasts of similar size, location, geometry, and geology. It is calibrated to overestimate vibration in order to maintain a factor of safety within the calculated values.

In 2024, for Whale Tail Pit, the average PPV was 2.45 mm/s with a maximum of 8.42 mm/s. For IVR Pit, the average PPV was 1.85 mm/s with a maximum of 7.35 mm/s. For the Underground mine, only measured at the surface Kangislulik Station 3, the average PPV was 3.88 mm/s with a maximum of 15.97 mm/s. See Table 3 for detailed information.

Table 3: Whale Tail Mine Site Maximum and average PPV and IPC per year

Location	Parameters	2018	2019	2020	2021	2022	2023	2024
Whale Tail Pit	Max PPV (mm/s)	26.1	20.9	14.6	12.7	11.05	6.24	8.42
	Average PPV (mm/s)	4.5	2.16	0.98	1.6	3.36	2.42	2.45
	Max IPC (kPa)	30.54	24.46	17.09	14.90	12.93	7.30	9.85
	Average IPC (kPa)	5.01	2.23	1.19	1.40	3.93	2.90	2.87
IVR Pit	Max PPV (mm/s)	N/A	N/A	6.5	8.6	17.37	7.37	7.35
	Average PPV (mm/s)	N/A	N/A	0.67	1.22	3.98	3.01	1.85
	Max IPC (kPa)	N/A	N/A	7.59	10.10	20.33	8.62	8.60
	Average IPC (kPa)	N/A	N/A	0.81	1.20	4.66	3.52	2.16
UG Mine	Max PPV (mm/s)	N/A	N/A	N/A	N/A	N/A	N/A	15.97
	Average PPV (mm/s)	N/A	N/A	N/A	N/A	N/A	N/A	3.88
	Max IPC (kPa)	N/A	N/A	N/A	N/A	N/A	N/A	18.69
	Average IPC (kPa)	N/A	N/A	N/A	N/A	N/A	N/A	4.54

In conclusion, Agnico Eagle is committed to keeping the vibrations below the limit authorized and to monitoring all blasts to fully comply with regulations.

APPENDIX A – May 20th, 2024 Blast Exceedance Notification Letter

May 23rd, 2024

José Audet-Lecouffe
Senior Biologist
Fish and Fish Habitat Protection Program
Fisheries and Oceans Canada
301-5204 50th Ave (Franklin)
5204, 50th Avenue
Yellowknife, NT
X1A 1E2

Re: 20-HCAA-00275 – 2022-04-18 Agnico Eagle Underground Blast Exceedance

Dear José Audet-Lecouffe,

Agnico Eagle Mines would like to notify Fisheries and Oceans Canada that on May 20th, 2024 an exceedance in the peak particle velocity (PPV) occurred during the blasting activities related to the underground mine at the Meadowbank Complex. As such, please find below information in relation to this event.

As detailed in the Blast Monitoring Program, Agnico Eagle aims to comply with the DFO's Guidelines for Use of Explosives in or Near Canadian Fisheries Waters and shall adhere to the guidance provided in the Monitoring Explosive-Based Winter Seismic Exploration in Waterbodies, NWT 2000-2002. Those guidelines stipulated that:

- No explosive is to be detonated in or near fish habitat that produces an instantaneous pressure change (IPC) greater than 50 KPa; and
- No explosive is to be detonated that produces a peak particle velocity (PPV) greater than 13 mm/s in a spawning bed during the period of egg incubation (for lakes near the Meadowbank Complex, it takes place between August 15 and June 30).

Description of Event

On May 20th, 2024, stope 320-ST-180 blast #1 was blasted in the west panel of the underground mine. Analyze of the blast monitoring station data at Kangislulik station 3 (Figure 1) showed that the PPV was 15.969 mm/s and IPC was 0.00262 Kpa. This is the first instance of a underground blast vibration exceedance at the surface at Whale Tail.

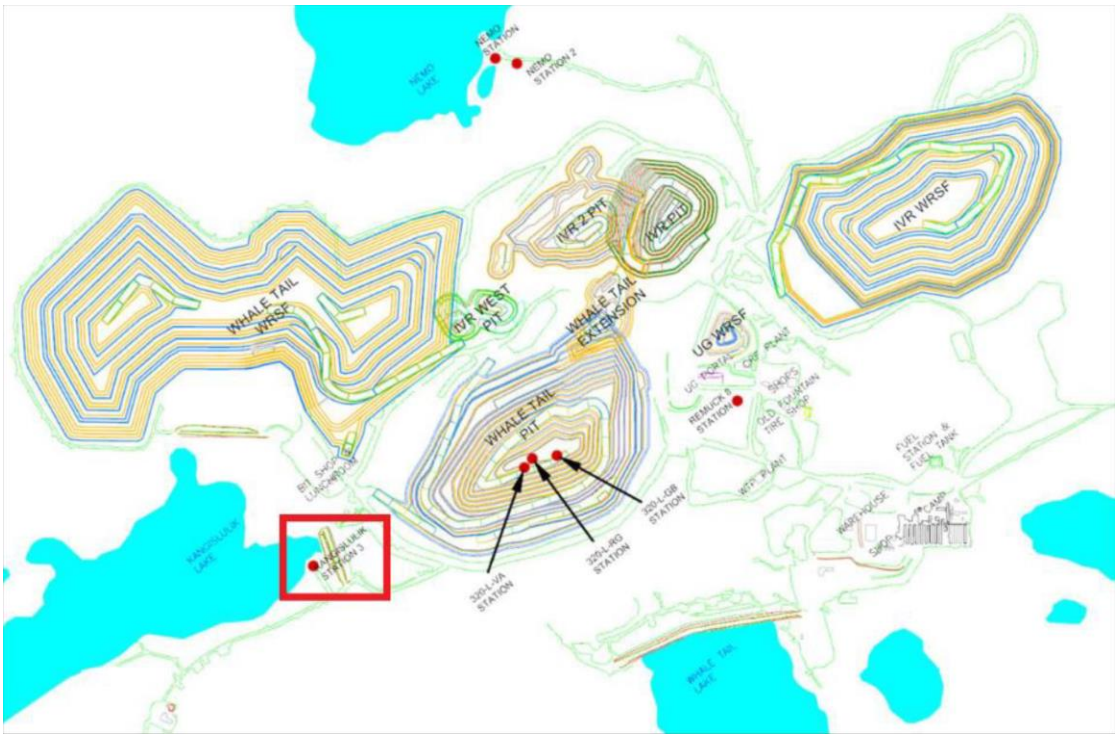

Figure 1: Kangislulik Blast Monitoring Station 3

Investigation of Exceedance

The blast #1 of the stope 320-ST-180 was a normal size blast in term of tonnage (2,724 tonnes) compared to a similar adjacent stope blast (320-ST-182: 3,130 tonnes). From the result of the 320-ST-182 (5.659 mm/s), there was no indication of a potential future vibration exceedance in the area.

The stope blast was designed with a normal drill bit diameter of 4.5inches similar to other stope blast underground.

The distance between the stope 320-ST-180 and Kangislulik Lake is the closest one we had to date (759m 3d distance) (Figure 2).

The event was analyzed within the first 24 hours and observed to be a Peak Particle Velocity of 15.969mm/s and an Instantaneous Pressure Charge of 0.00262 Kpa.

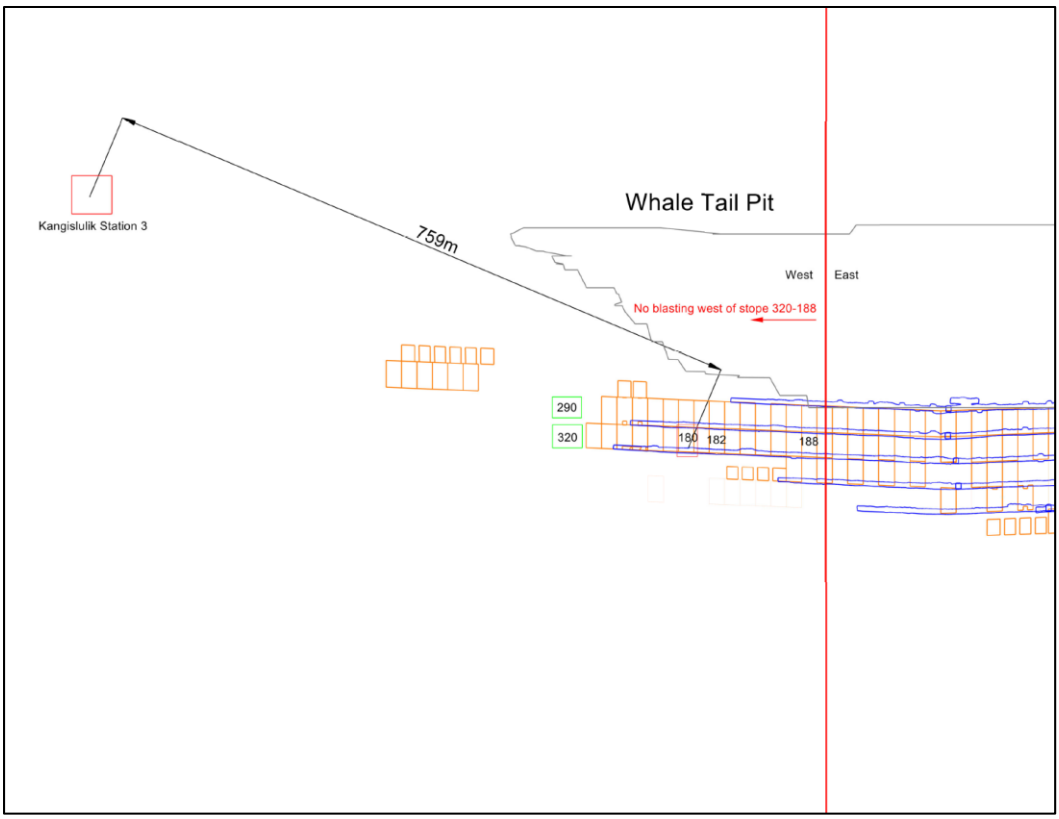

Figure 2: Longitudinal View - Kangislulik Blast Monitoring Station 3 vs 320-ST-180 Stope

Corrective Measures

To minimize the risk of another exceedance, here are the corrective measures that will be implemented:

- Integration of underground blast vibration data to the surface theorical model to help estimate underground blast vibration.
- Third party assessment of underground drill and blast parameters to evaluate potential vibration reduction.
- No underground stope blasting activities west of stope 320-ST-188. (Figure 2) until analysis is completed and mitigation actions are put in place.

Should you have any questions or require further information, Agnico Eagle remains available at your convenience.

Regards,

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Christian Tremblay, P.Eng.
Engineering General Supervisor
Meadowbank Division, Agnico Eagle Mines