AGNICO EAGLE

Meliadine Gold Mine

Water Quality and Flow Monitoring Plan

AUGUST 2021
VERSION 3

EXECUTIVE SUMMARY

The Water Quality and Flow Monitoring Plan (the Plan) has been prepared in accordance with the requirements of the Type A Amended Water Licence 2AM-MEL1631 (the Licence). The Plan is one component of the *Aquatic Effects Management Program* (AEMP) and is closely associated with the *Water Management Plan* and the *Metal and Diamond Mining Effluent Regulations (MDMER)*.

Section 2 of this Plan includes an overview of the monitoring programs and mine development schedule. Section 3 provides specific details (including sampling locations and parameters to be measured) for the compliance monitoring program, along with general guidance for the event monitoring program. An adaptive management program is described for regulated discharge and non-regulated discharges in Section 3. Requirements of the flow monitoring program are described in Section 4, and an overview of the reporting requirements in Section 5. Section 6 provides overview of Quality Assurance / Quality Control practices.

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DOCUMENT CONTROL

Version	Date (YM)	Section	Page	Revision
1	18/12	All	All	Comprehensive plan for Meliadine project. First version composed by Meliadine Environment Department.
2	20/03	All	All	Updated plan formatting and added information on QA/QC as Section 6. Previous Section 5.3.1 (SWTP sampling) moved to GWMP.
3	21/08	All	All	Updated plan to reflect changes in amended MDMER, amended Type A Water Licence and in updated Water Management Plan

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SECTION 1 • INTRODUCTION

The Water Quality and Flow Monitoring Plan (the Plan) has been prepared in accordance with the requirements of the Nunavut Water Board (NWB) Type A Amended Water Licence 2AM-MEL1631 (the Licence). The Plan is one component of the *Aquatic Effects Management Program* (AEMP) and is closely associated with the *Water Management Plan* and the *Metal and Diamond Mining Effluent Regulations (MDMER)*.

The Plan summarizes the monitoring locations, sampling frequency, monitoring parameters, compliance discharge criteria and an adaptive management plan for water quality at the Meliadine Gold Mine.

The purpose of this Water Quality and Flow Monitoring Plan is to establish the program that is to be implemented and followed by AEM's Meliadine environmental management team to monitor the performance of the waste and water management systems at the Meliadine Gold Mine. The program includes:

- Verifying and validating the predicted water quality values with empirical measurements of the mine site water quality and flows;
- A comparison of measured water quality data to compliance requirements stipulated in the Licence; and
- A framework for adaptive management that allows the identification and rectification, where necessary, of unexpected trends or non-compliance in water quality and flows.

The Plan provides information on the locations of the monitoring stations at the various stages of mining. These monitoring locations are used to evaluate the performance of the mine waste and water management system.

The objectives of the monitoring program are:

1. To track the chemistry of the contact and non-contact water prior to and during discharge;

2. To assist in identifying if water treatment is required prior to discharge; and

3. To minimize the potential impacts of mining activities on the surrounding environment.

Additional locations outside the footprint of the mine (and outside the scope of this Plan) will be monitored under the *Meliadine Gold Project Aquatic Effects Management Program* (Golder 2016).

SECTION 2 • OVERVIEW OF SITE WATER MANAGEMENT PLAN

Details of overall water management are discussed in the Meliadine Water Management Plan (WMP) which is updated annually. A network of berms, dikes, containment ponds, channels, culverts and sumps are in place and maintained to facilitate water management (Section 3 of WMP).

As specified in the WMP, surface contact water is intercepted, diverted and contained within various containment ponds prior to passive evaporation, treatment and/or discharge. Surface contact water collected in CP3 and CP4 is discharged into Culvert 2 where it flows to CP1. Surface contact water collected in CP5 is discharged into CP1. Surface contact water collected in CP6 is discharged into CP1. Surface contact water collected in CP1 is treated for total suspended solids (TSS) at the EWTP (housed within the WTC) and discharged through the diffuser located in Meliadine Lake.

Saline contact water from the Underground Mine (from saline groundwater) is collected in underground sumps, transported to a clarification system, and subsequently recirculated for use in various underground operations. Excess saline contact water is pumped to surface where it is stored in Saline Pond 1 (SP1), Saline Pond 4 (SP4) and Tiriganiaq Open Pit 2. Saline contact water that is not used for operations is treated at the Saline Effluent Treatment Plant (SETP). The treated water is then trucked to Itivia, Rankin Inlet, and discharged through a diffuser in Melvin Bay.

During the mine closure, the water management infrastructure will remain in place until closure activities are completed and monitoring demonstrates that water quality is acceptable for discharge to the environment without treatment.

SECTION 3 • OVERVIEW OF MONITORING PROGRAMS

This Plan has been divided into two levels of monitoring to characterize the range of impacts between the sources of contact water in the individual mine facilities and the point of discharge or release to the receiving environment. The two levels of monitoring include:

1. Compliance Monitoring (CM); and
2. Event Monitoring (EM).

3.1 Compliance Monitoring Program (CM)

The CM sites are those stipulated in the Licence; these sites vary from contact water collection ponds, structures such as ditches, culverts prior to discharge to the receiving environment and local lakes surrounding the mine site. The requirements of the Licence, including water quality limits, will be applied at the applicable mine discharge points identified in the CM program.

The CM program provides a mechanism to assess water quality at specified sites, and to confirm and document compliance of discharge with regulatory requirements. As part of adaptive water management, these internal monitoring stations provide protection to the receiving water environment, provide data to predict pit re-flooding water quality and ensure exceedances of predicted or regulated levels are appropriately managed or mitigated to reduce impacts.

3.2 Event Monitoring Program (EM)

The EM sites result from unexpected events such as spills, accidents, and malfunctions. The response programs for such events are discussed in greater detail in the following four (4) documents:

- Meliadine Spill Contingency Plan (December 2019);
- Meliadine Emergency Response Plan (October 2018);
- Meliadine Freshet Action Plan (March 2020); and
- Meliadine Water Management Plan (August 2021).

Each accidental release will require mobilization of site equipment to stabilize the release, procedures to contain, neutralize, and dispose of the discharge, and recommendations for monitoring the site following the incident.

SECTION 4 • OVERVIEW OF MINE DEVELOPMENT SCHEDULE

The Mine Plan and key mine development activities, including mine waste management are currently used concurrently with the *Water Management Plan*.

The Mine Plan proposes one underground mine (Tiriganiaq Underground Mine) and two open pits (Tiriganiaq Open Pit 1 and Tiriganiaq Open Pit 2) for the development of the Tiriganiaq gold deposit.

The Mine is estimated to produce approximately 15.0 million tonnes (Mt) of ore, 32.8 Mt of waste rock, 8.0 Mt of overburden waste, and 15.0 Mt of tailings. The following phased approach is proposed for the development of the Tiriganiaq gold deposit;

- Phase 1: 3.5 years for Mine Construction (Q4 Year -5 to Year Q2 -1);
- Phase 2: 8.5 years for Mine Operations, beginning in 2019 (Q2 Year -1 to Year 8);
- Phase 3: 3 years Mine Closure (Year 9 to Year 11); and
- Phase 4: Post-Closure (Year 11 forward).

Mining facilities on surface include a plant site and accommodation buildings, an ore stockpile, a tailings storage facility (TSF), two waste rock storage facilities (WRSFs), a water management system that includes containment ponds, water diversion channels, retention dikes/berms, and a series of water treatment plants.

SECTION 5 • MONITORING PROGRAMS

The monitoring program is presented in three sections; requirements of the compliance monitoring program, an overview of the event monitoring program, and then details of the adaptive management program for monitoring results.

5.1 Compliance Monitoring Program

The CM program monitors the chemistry of four local lake surrounding the mine site (E3, G2, H1 and B5) as well as mine contact water collected and diverted at specified locations prior to release into the receiving water environment. The sampling is conducted to confirm and document compliance with regulatory requirements. The nature of water monitored within the CM program include:

- Non-contact water from local lakes;
- Mine surface contact water collected from drainage of different structures;
- Monitoring points located within the water management system prior to release into the receiving water environment; and
- Effluent released to Meliadine Lake and water within Meliadine Lake at the diffuser.

The CM sampling program has multiple monitoring stations across the project site, with sampling at different stages of the mine life. Table 5.1 provides a list of all CM stations, a description of their location, parameters to be monitored and sampling frequency. Specific details for the monitoring parameter groups are provided in Table 5.2. Agnico Eagle follows 5 groups of parameters as identified in Schedule I, Table 1 of the Licence. Additionally, Agnico Eagle follows the analytical requirements and authorized limits of deleterious substances as identified in Schedule 3 and Schedule 4 of the MDMER (Government of Canada, 2002).

Figures 3.1 shows the approximate location of each of the sampling sites. The actual location of each sampling site is determined by access and safety considerations and are marked by a stake that defines the exact location of the collection point for sampling events with appropriate attached signage in English, Inuktitut and French.

GPS coordinates for all compliance monitoring stations were confirmed, as required in Part I, Item 5 of the Licence.

5.1.1 General Sampling and Analysis Program

Samples are collected in clean laboratory-supplied containers and preserved as directed by the analytical laboratory. During all phases, samples are analyzed offsite at a CALA accredited commercial lab (ALS in Burnaby, BV Labs in Nepean, AquaTox in Puslinch, H2Lab in Val d'Or, or Nautilus Environmental in Burnaby). Samples sent to commercial laboratories may change as the site matures and additional requirements occur. Sampling procedures are further detailed in Section 6 (Quality Assurance/Quality Control Procedures) and in the Quality Assurance/Quality Control Plan (Agnico Eagle, 2019).

Table 5.3 summarizes the minimum sample volumes, container, preservation, and holding times for each analyte. This information is from the *USEPA Methods for Chemical Analysis of Water and Waste Water* (*EPA-600/4-79-020, 1983*).

Figure 5.1: Sampling site locations

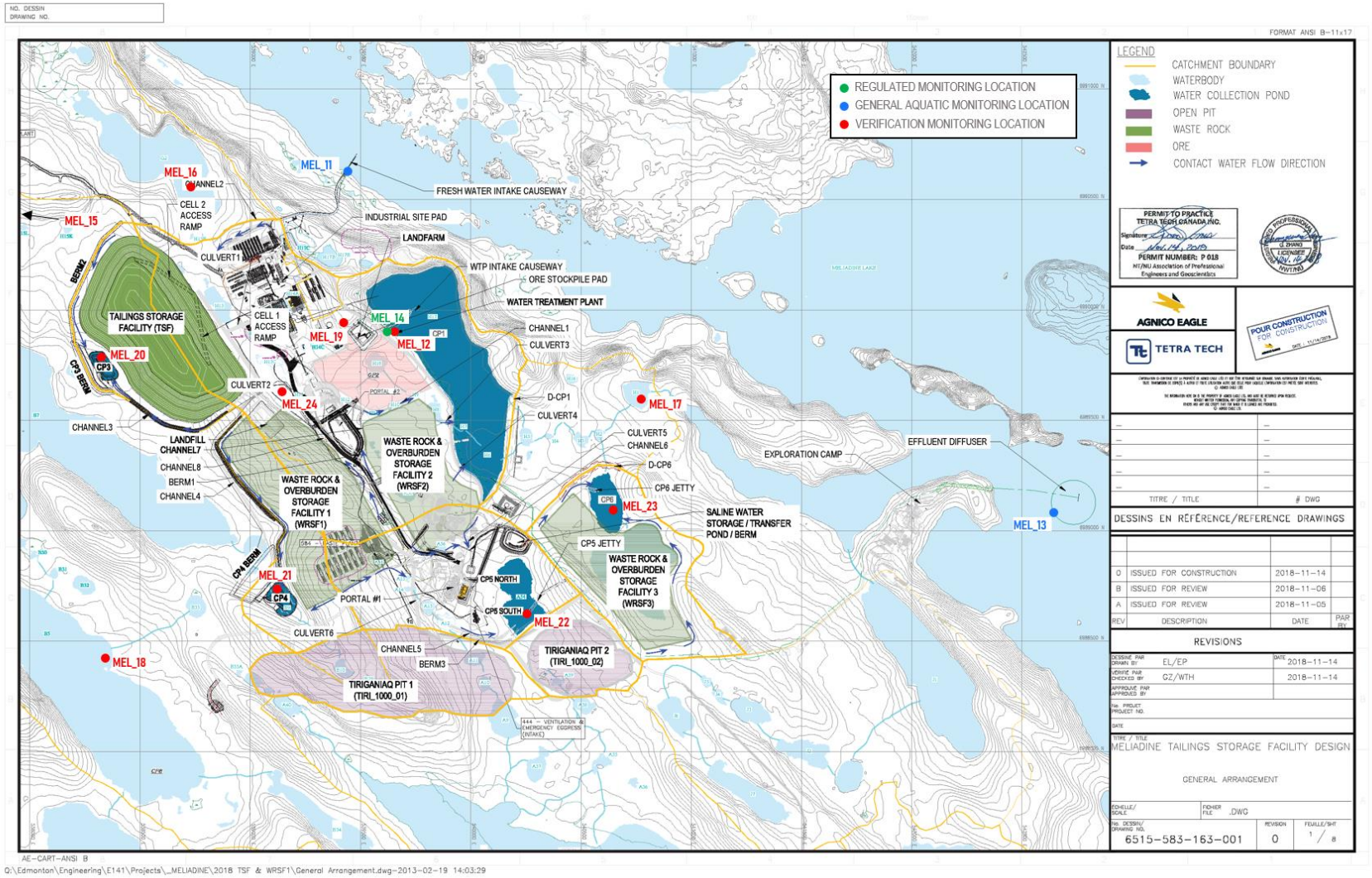

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Table 5.1: Monitoring Program

Station	Description	Phase	Monitoring Parameters	Frequency
Mine Site				
MEL-D-1	Dewatering: Water transferred from lakes to Meliadine Lake during dewatering of lakes	Construction	As defined in the Water Management Plan referred to in Part D, Item 12	Prior to discharge and Weekly during discharge
			Volume (m3)	Daily during periods of discharge
MEL-SR-1 to TBD	Surface Runoff: runoff downstream of Construction areas at Meliadine Site and Itivia Site, Seeps in contact with the roads, earthworks and any Runoff and/or discharge from borrow pits and quarries	Construction, and Operation	As defined in the Water Management Plan referred to in Part D, Item 18	Prior to Construction, Weekly during Construction
			Group 1	Monthly during open water or when water is present upon completion
MEL-11	Water Intake from Meliadine Lake	Construction, Operation, and Closure	Full Suite	Monthly during periods of intake
			Volume (m^3)	Daily during periods of intake
MEL-12	Contact Water Treatment Plant (pre-treatment) coming from CP1, off the pipe and not in the pond	Construction (prior to release), Operations, and Closure	Group 1	Monthly during periods of discharge
MEL-13[(a)] (and AEMP Stations)	Mixing zone in Meliadine Lake and MDMER exposure stations for final discharge point within mixing zone	Construction (prior to release), Operations, and Closure	Full Suite, Group 3 (MDMER)	Monthly during periods of discharge
MEL-14	Contact Water Treatment Plant from CP1 (post-treatment): end of pipe in the plant before offsite release	Construction (upon effluent release), Operations, and Closure	Full Suite, Group 3	Prior to discharge and Weekly during discharge

			Volume (m3)	Daily during periods of discharge
			Acute Lethality	Once prior to discharge and monthly thereafter
MEl-15	Local lake E-3	Operations, and Closure	Group 2	Bi-annually during open water
MEL-16	Local Lake G2	Construction, Operations, and Closure	Group 2	Bi-annually during open water
MEL-17	Local Pond H1	Construction, Operations, and Closure	Group 2	Bi-annually during open water
MEL-18	Local Lake B5	Construction, Operations, and Closure	Group 2	Bi-annually during open water
MEL-19	CP2, Collection of drainage from WRSF3	Construction, Operations, and Closure	Group 1	Monthly during open water or when Water is present
MEL-20	CP3 Collection of drainage from dry stacked tailings	Operations, and Closure	Group 1	Monthly during open water or when Water is present
MEL-21	CP4 Collection of drainage from WRSF1	Operations, and Closure	Group 1	Monthly during open water or when Water is present
MEL-22	CP5 Collection of drainage from WRSF1 and WRSF2	Construction, Operations, and Closure	Group 1	Monthly during open water or when Water is present
MEL-23	CP6 Collection of drainage from WRSF3	Construction, Operations, and Closure	Group 1	Monthly during open water or when Water is present
MEL-24	Seepage from the Landfill between the landfill and Pond H3	Construction, Operations, and Closure	Group 1	Monthly during open water or when Water is present
MEL-25	Secondary containment area at the Itivia Site Fuel Storage and Containment Facility	Construction, Operation, Closure	Group 4, Volume (m3)	Prior to discharge or transfer of Effluent
MEL-26	Melvin Bay end of pipe (before offsite release) for treated saline effluent	Operations, and Closure	MDMER	As per MDMER requirements

Table 5.2: Monitoring Parameters

Group	Parameters
1	pH, turbidity, hardness, total alkalinity, sodium, magnesium, potassium, calcium, chloride, fluoride, silicate, sulphate, total dissolved solids (TDS; calculated[a,b]), total suspended solids (TSS), total cyanide, ammonia nitrogen, nitrate, nitrite, phosphorus, orthophosphate, Total Metals (aluminum, arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, thallium, and zinc)
2	**Total and Dissolved Metals**: aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, iron, lead, lithium, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, tin, titanium, uranium, vanadium, and zinc. **Nutrients**: ammonia-nitrogen, total Kjeldahl nitrogen, nitrate-nitrogen, nitrite-nitrogen, orthophosphate, total phosphorus, total organic carbon, dissolved organic carbon, and reactive silica. **Conventional Parameters**: bicarbonate alkalinity, chloride, carbonate alkalinity, turbidity, conductivity, hardness, calcium, potassium, magnesium, sodium, sulphate, pH, total alkalinity, TDS (calculated[a,b]), TSS, total cyanide, free cyanide, and weak acid dissociable (WAD) cyanide..
3	**MDMER parameters**: total cyanide, arsenic, copper, lead, nickel, zinc, radium-226, TSS, pH, total ammonia and temperature. **MDMER additional requirements**: Effluent volumes and flow rate of discharge, Acutely Lethality tests (Rainbow Trout and Daphnia magna) and environmental effects monitoring (EEM).
4	Total arsenic, total copper, total lead, total nickel, TSS, ammonia, benzene, toluene, ethylbenzene, xylene, total petroleum hydrocarbons (TPH), and pH
Full Suite	Group 2, Total Petroleum Hydrocarbons, Turbidity. Non Acutely-lethal (Rainbow Trout and Daphnia magna) for discharge only.
Flow	Flow data-logger
Field measurements	Field pH, specific conductivity, dissolved oxygen, and temperature.

[(a)]Standard Methods (Method 1030E, American Public Health Association (APHA) 2012. Standard Methods for the Examination of Water and Wastewater, 22nd Edition, with updates to 2015.)
[(b)]TDSCalc (mg/L) = (0.6 x Total Alkalinity as CaCO3) + Sodium + Magnesium + Potassium + Calcium + Sulfate + Chloride + Nitrate + Fluoride + Silicate

Table 5.3: Summary of Sampling Requirements for Each Analyte

Parameters	Matrix Holding Time				Type of Bottle	Preservative	Volume
	Drinking Water	Waste Water	Surface Water	Ground Water (1)			
Microbiology							
Escherichia coli, total coliforms, A.A.H.B	48h	48h	48h	48h	PPS	TS, E	250ml
Enterococcus	48h	48h	48h	48h	PPS	TS, E	250ml
Thermo tolerant coliforms (fecal)	48h	48h	48h	48h	PPS	TS, E	250ml
Inorganic Chemistry							
Absorbance UV, Transmittance UV				24h	P. T. V	N	125ml
Alkalinity, Acidity, Bicarbonates, Carbonates	14d	14d	14d	14d	P, T, V	N	250ml
Ammonia nitrogen (NH_3-NH_4)	28d	28d	28d	28d	P, T, V	AS	125ml
Kjeldahl ammonia (NTK)		28d	28d	28d	P, T, V	AS	125ml
Anions (Cl, F,SO_4)	28d	28d	28d	28d	P, T, V	N	250ml
Color, Free & total Chlorine	48h	48h	48h	48h	P, T, V	N	125ml
Conductivity	28d	28d	28d	28d	P, T, V	N	250ml
Cyanides total/available, Cyanides	14d	14d	14d	14d	P, T, V	NaOH	250ml
BOD_5/Carbonated BOD_5 (2)		48h/4°	48h/4°		P, T, V	N	250ml
COD (chemical oxygen demand)		28d	28d		P, T, V	AS	125ml
Mercury (Hg)	28d	28d	28d	28d	P, T, V	AN	250ml
Total/dissolved metals (filtered on field)	180d	180d	180d	180d	P, T, V	AN	250ml
Dissolved Metals (filtered in the laboratory)	24h	24h	24h	24h	P, T, V	N	250ml
Total suspended solids & Volatile TSS		7d	7d	7d	P. T. V	N	500ml
NH_3 or NH_4		24h	24h	24h	P.T.V	N+AS	2/125ml
Nitrites (NO_2), Nitrates (NO_3), Turbidity	48h	48h	48h	48h	P, T, V	N	250ml
Nitrites-Nitrates (NO_2-NO_3)	28d	28d	28d	28d	P, T, V	AS	250ml
O-Phosphates (O-PO_4)	48h	48h	48h	48h	P, T, V	N	500ml
pH	24h	24h	24h	24h	P, T, V	N	125ml
Total Phosphorus (P-tot)	28d	28d	28d	28d	P, T, V	AS	125ml
Dissolved solids (TDS)		7d	7d	7d	P. T. V	N	250ml
Total solids		7d	7d	7d	P. T. V	N	250ml
Sulphides (H_2S) (3)	28d	28d	28d	28d	P. T. V	AcZn + NaOH	125ml
Thiosulfates	48h	48h	48h	48h	P. T. V	N	125ml
Radioactive & Organic Chemistry							
Fatty resin acids (S-T)	--	28d	28d	--	VA, VT	AS	1L
Congeners PCB (S-T)	28d	28d	28d	28d	VA, VT	N	1L
Chlorobenzene	28d	28d	28d	28d	2 Vial+1 blank	TSS	2/40ml
Total Organic Carbon (TOC)	28d	28d	28d	28d	P, T, V (B)	AC	100ml
Dissolved Organic Carbon (DOC)	48h	48h	48h	48h	P, T, V (B)	N	100ml
Total Inorganic Carbon (CIT)	48h	48h	48h	48h	P, T, V (B)	N	100ml
Phenolic compound (GC-MS)	28d	28d	28d	28d	VA, VT	AS	1L
Glyphosate (S-T)	14d	14d	14d	14d	P.T	N	500ml
PAH	28d	28d	28d	28d	VB	AS	1L
Oil & Greases (total and non-polar)	28d	28d	28d	28d	VA, VT	AS	1L

C10-C50 HP and/or Petroleum Product Identification	28d	28d	28d	28d	VA, VT	AS	1L
Phenol index	28d	28d	28d	28d	VA, VT	AS	500ml
Radium-226	180d	180d	180d	180d	P, T. V	AN	1L
VOC (MAH, CAH, THM, BTEX) (3)	28d	28d	28d	28d	2 Vial+1 blank	TSS	2/40ml

Type of bottle:
P.S.V.T.: plastic bottle, bag or glass bottle with Teflon cap
P, T: Plastic bottle or plastic bottle with Teflon cap
P.T.V.: Plastic bottle or glass bottle with plastic or Teflon cap
PPS: Sterile propyl ethylene bottle
VA: Clear or amber glass with aluminium or Teflon seal
VB: Amber glass (or clear glass covered with aluminium paper) aluminium seal of Teflon
VT: Clear or amber glass bottle with Teflon seal
Preservative:
AC: 0.1ml (100µl) of HCl per 100ml of sample
AcZn: 0.2ml zinc acetate 2N per 100ml of sample and NaOH 10N to pH >9
AN: HNO3 to pH <2
AS: H2SO4 to pH <2
E: 2.5ml EDTA 1.5% (p/v) per 100ml of sample if heavy metals are suspected
ED: 0.1ml diamine ethylene 45 mg/l per 100 ml of sample
EDTA: 1ml EDTA 0.25M per 100ml of sample
N: No preservative
NaOH: NaOH 10N to >12
TS: Sodium thiosulfate final concentration in the sample of 0.1% (p/v)

5.1.2 Compliance Monitoring Stations and Discharge Criteria

Further details of the specific CM stations and discharge criteria stipulated under the Licence are provided below.

Dewatering Activities

All Waters from dewatering activities at Monitoring Program Stations MEL-D-1 through MEL-D-TBD shall be directed to Meliadine Lake and shall not exceed the quality limits presented in Table 3.4 as stipulated in Part D, Item 12 of the Licence.

Table 5.4: TSS and pH Criteria at CM Stations MEL-D-1 through MEL-D-TBD

Parameter	Maximum Average Concentration (mg/L)	Maximum Concentration of Any Grab Sample
Total Suspended Solids (TSS) (mg/L)	15.0	30.0
pH	6.0 to 9.5	6.0 to 9.5

All surface runoff and/or discharge from drainage management systems, at the Monitoring Program Stations MEL-SR-1 to MEL-SR-TBD during the Construction/Operation of any facilities and infrastructure associated with this project, including laydown areas and All-weather Access Road, where flow may directly or indirectly enter a Water body, shall not exceed the Effluent quality limits presented in Table 5.5, as stipulated in Part D, Item 18 of the Licence.

Table 5.5: Effluent Criteria at CM Station MEL-SR-1 to MEL-SR-TBD

Parameter	Maximum Average Concentration	Maximum Concentration of Any Grab Sample
Total Suspended Solids (TSS) (mg/L)	50.0	100.0
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	6.0 to 9.5	6.0 to 9.5

Site Water Collection System

Effluent discharged from CP1 at CM station MEL-14 shall be directed to Meliadine Lake through the Meliadine Lake Outfall Diffuser and shall not exceed the effluent quality limits presented in Table 5.6, as stipulated in Part F, Item 3 of the Licence and within MDMER.

Table 5.6: Effluent Criteria at CM Station MEL-14

Parameter	Unit	Maximum Authorized Monthly Mean Concentration	Maximum Authorized Concentration in a Grab Sample
Conventional Constituents			
pH		6.0 to 9.5[(a)]	6.0 to 9.5[(a)]
Total Dissolved Solids (TDS) (calculated)	mg/L	3,500	4,500
Total Suspended Solids (TSS)	mg/L	15[(a)]	30[(a)]
Nutrients			
Total Ammonia (NH_3-N)	mg-N/L	14	18
Un-ionized Ammonia[(a)]	mg-N/L	0.50	1.00
Total Phosphorous (P)	mg-P/L	2.0	4.0
Total Metals			
Aluminum (Al)	mg/L	2.0	3.0
Arsenic (As)	mg/L	0.3	0.6
Cyanide (CN)	mg/L	0.5	1.0
Copper (Cu)	mg/L	0.2	0.4
Lead (Pb)	mg/L	0.1[(a)]	0.2[(a)]
Nickel (Ni)	mg/L	0.5[(a)]	1.0[(a)]
Zinc (Zn)	mg/L	0.4	0.8
Others			
Total Petroleum Hydrocarbons (TPH) (mg/L)	mg/L	5.0	5.0
Radium 226[(a)]	Bq/L	0.37	1.11

[(a)](MDMER, 2002)

The Discharge of Effluent from the Final Discharge Point at Monitoring Program Station MEL-14 shall be demonstrated to be non-Acutely Lethal under the following test in accordance with the Schedule I of the Licence:

a. Acute Lethality of Effluents to Rainbow Trout (as per Environment Canada's Environmental Protection Series Biological Test Method EPS/1/RM/13 July 1990, published by the Department of the Environment, as amended in December 2000, and as may be further amended from time to time.

Saline effluent discharged at CM station MEL-26 shall be directed to Melvin Bay through a submarine Pipeline and Diffuser and shall not exceed the effluent quality limits presented in Table 5.7, as stipulated in MDMER Schedule 4 (GC, 2002).

Table 5.7: Effluent Criteria at CM Station MEL-26

Parameter	Unit	Maximum Authorized Monthly Mean Concentration	Maximum Authorized Concentration in a Grab Sample
Arsenic (As)	mg/L	0.5	1.0
Copper (Cu)	mg/L	0.3	0.6
Cyanide (CN)	mg/L	1.0	2.0
Lead (Pb)	mg/L	0.2	0.4
Nickel (Ni)	mg/L	0.5	1.0
Zinc (Zn)	mg/L	0.5	1.0
Total Suspended Solids (TSS)	mg/L	15.0	30.0
Radium-226	Bq/L	0.37	1.11
Un-ionized ammonia	mg-N/L	0.50	1.00

The Discharge of Effluent from the Final Discharge Point at Monitoring Program Station MEL-26 shall be demonstrated to be non-Acutely Lethal in accordance with MDMER Division 2, Item 14.2 (GC, MDMER), in which the testing shall be conducted in accordance with the procedures set out in section 5 or 6 of Reference Method EPS 1/RM/190.

Itivia Marshalling Area

Surface water runoff from the bulk fuel tank storage areas is collected within the tank's secondary containment enclosures that are equipped with an HDPE liner; these are designed to contain petroleum products released due to spill events. Water collected in the secondary containment enclosures at CM station MEL-25 is discharged to land in a controlled manner according to the Licence.

All effluent being discharged from the secondary containment enclosures at the Itivia marshalling facility shall not exceed the effluent quality limits presented in Table 5.8, as stipulated in Part F, Item 5 of the Licence.

Table 5.8: Effluent Criteria at CM Station MEL-25

Parameter	Unit	Maximum Authorized Monthly Mean Concentration	Maximum Authorized Concentration in a Grab Sample
pH		6.0 to 9.5	6.0 to 9.5
Total Suspended Solids (TSS)	mg/L	15.0	30.0
Benzene	µg/L	370	370
Toluene	µg/L	2	2
Ethylbenzene	µg/L	90	90
Lead (mg/L)	mg/L	0.1	0.1
Oil and Grease (mg/L)	mg/L	5 and no visible sheen	5 and no visible sheen

Receiving Environment

Receiving water quality monitoring is discussed in the Aquatic Effects Management Program (AEMP) (Golder, 2016) and the Ocean Discharge Monitoring Plan (ODMP) (Agnico Eagle, 2020). Within the AEMP and ODMP are numerous monitoring programs: water quality, sediment quality, benthic invertebrate communities, and fish health and fish tissue chemistry.

5.2 Event Monitoring

The Event Monitoring (EM) program addresses the site-specific monitoring that is required following any accidental release. A "release" may be caused by:

- Spills, including unidentified seepage (Meliadine Spill Contingency Plan; December 2019); or
- Emergencies (Meliadine Emergency Response Plan; October 2018).

The EM program is designed to verify whether contamination of the surface soil and/or any nearby receiving environment and active zone has occurred as a result of an accidental release of a hazardous material or contaminated water. Verification is done through monitoring of surface runoff and nearby receiving environment during and following remedial activity. It is anticipated that due to the presence of permafrost beneath most of the mine footprint (active layer app 1.5m in depth), there will be minimal impact to groundwater from surface spills or accidental releases.

The EM plan is developed on a site-specific basis subsequent to a spill or other incident, and considers the type of product spilled, the potential receptors and the potential for any remaining contamination after clean-up. The plan is coordinated by the Environment Department.

In the event of an accidental release, the water quality of any downstream receptor as well as an upstream reference (background) is sampled to determine severity of impact. Should the spill have happened over snow cover, as much contaminated snow will be removed as possible. Verification sampling would occur in the area after thaw to determine if the clean-up is complete or if further remediation is necessary. The specific parameters monitored as part of the EM program will depend on the nature of the spill and will be determined for the specific material released.

The EM program for a particular spill will cease upon obtaining satisfactory analytical results from the potentially affected areas or as required by regulators.

5.3 Adaptive Management Program

Results of the water quality monitoring are reviewed by the Meliadine Environment Department. Chemical trends of constituents of interest are tracked for mine site monitoring and for the AEMP program. This allows for early detection of significant changes in water quality within the mine site prior to discharge. If triggers and thresholds, such as in the AEMP program, are exceeded in the receiving environment action plans are then implemented to ensure that environmental protection objectives are met.

An adaptive management program has been designed for the Meliadine Gold Project to evaluate the monitoring data and provide a framework for action, if necessary. The program has two levels - a trigger level to compare the monitoring data against, and an action plan of mitigative measures for identified exceedances.

The adaptive management program is divided into two sections, one for parameters with regulated discharge criteria at specific monitoring locations, as specified in the Licence and by the Metal Diamond Mining Effluent Regulations (MDMER). The second section is for measured parameters for which no discharge limits have been identified in the Licence such as those in the AEMP or EEM.

5.3.1 Adaptive Management Program for Regulated Discharge

Action Plan

In the case of an exceedance of a Licence limit or MDMER discharge limit, an action plan will be implemented. The adaptive management program requires that if one or more of the key monitored parameters exceed the respective limits, a staged sequence of responses will follow. Table 5.9 summarizes the staged adaptive action plan for the CM program for regulated discharge. Figure 5.2 is a logic diagram showing the decision path for evaluating analytical results for regulated discharges.

In addition to the mitigative measures listed above, a number of other possible alternatives are available to reduce or treat contaminants. These mitigation measures include:

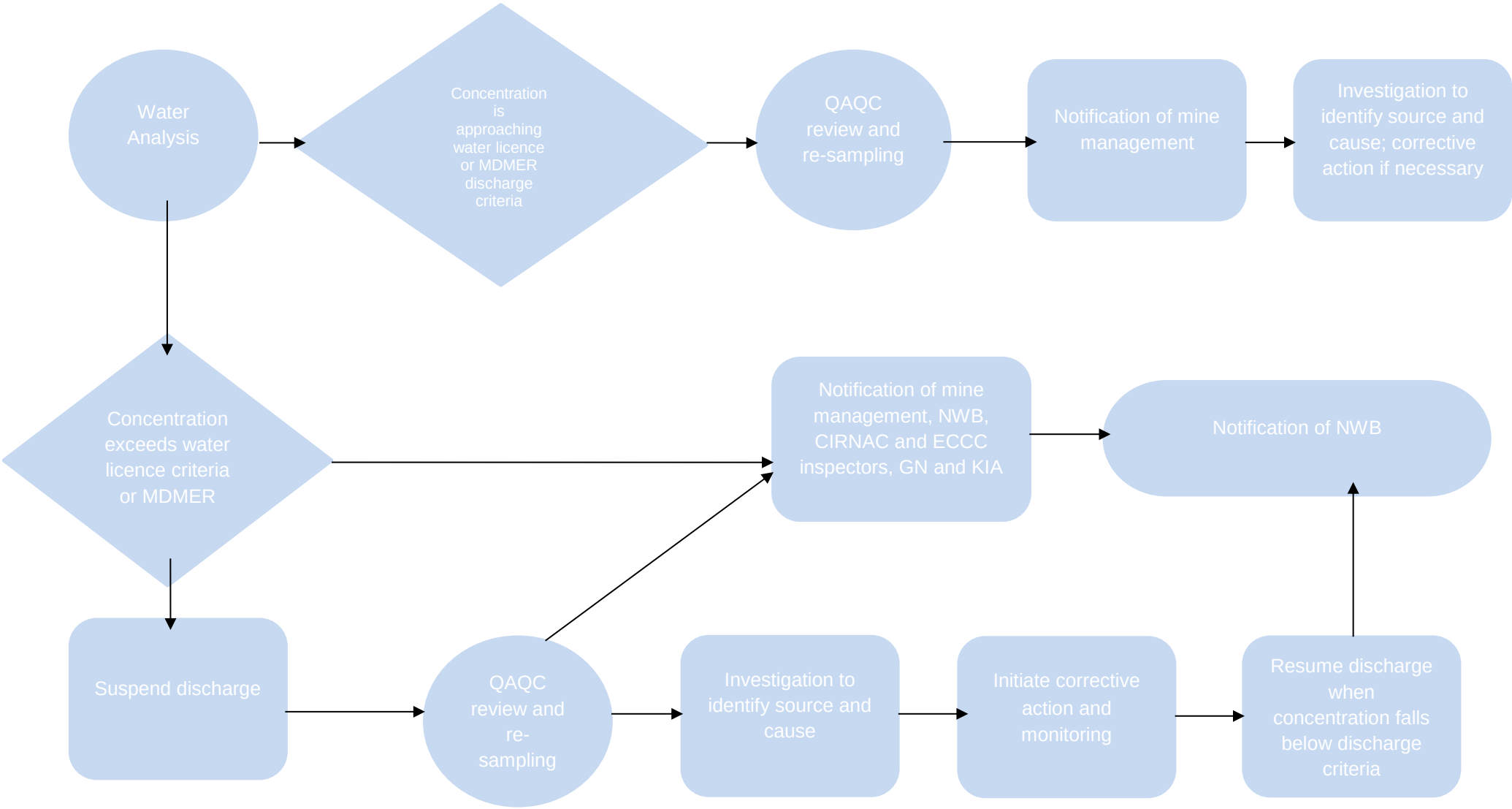
- Best management practices for sediment and erosion control would be employed to reduce TSS concentrations (i.e., flow control, sedimentation basin construction silt fencing, etc; see Sediment and Erosion Management Plan);
- Addition of a coagulant for the reduction of TSS in pond water;
- Use of geotextile or re-armoring of banks to filter and reduce TSS in pond/ditch water;
- Deployment of absorbent booms and/or barriers within ponds to isolate surface petroleum hydrocarbon films for removal and/or treatment;
- Adjustments to on-site sewage treatment for the reduction of BOD and E. coli concentrations;
- Addition of lime to increase a low pH value or reduce metal concentrations;
- Removal of the offending source rock or the prevention of surface waters coming into contact with the offending source rock in the case of ARD; and/or

- Implementation of the Freshet Action Plan to proactively identify any issues around areas of concern; conduct additional monitoring, and control and contain seepage or movement of TSS on site.

Table 5.9: Action Plan for Regulated Discharge

Example	Action Plan
Exceeds water licence discharge criteria or MDMER	1. Suspension of discharge activities; 2. QA/QC review and analysis, and re-sample water at the particular location if necessary; 3. Notification of mine management (General Mine Manager or designate and Environment Superintendent, or designate) and the regulators: Nunavut Water Board, CIRNAC and ECCC inspectors, GN and the Kivalliq Inuit Association; 4. Investigation to identify possible source(s) and cause(s) of the exceedance; 5. Initiation of corrective actions or water treatment, and follow up monitoring; and 6. Resumption of discharge when concentrations are below the discharge criteria

Figure 5.2: Logic Diagram for Regulated Discharge



5.3.2 Adaptive Management Program for Non-Regulated Discharge

Aside from targeted monitoring studies (i.e. "Effects Assessment Studies") such as those following construction, the AEMP is the main program aimed at measuring and assessing potential impacts of contaminants in the receiving aquatic environment that are not regulated under MDMER or NWB. This program combines with the Environmental Effects Monitoring (EEM) required under MDMER.

The program is designed to take an integrated, ecosystem-based approach that links mitigation and monitoring of physical/chemical effects to key ecological receptors in the receiving environment. It addresses key issues identified in the Meliadine EA (i.e., mining-related activities with the potential to affect water quality, fish habitat and fish populations). Monitoring results are intended to inform the "adaptive management" process, supporting the early identification of potential problems and development of mitigation options to address them by comparing results to established threshold and trigger levels.

AEMP Action Level and Significance Threshold

The AEMP Response Framework links monitoring results to management actions, with the purpose of maintaining the assessment endpoints within acceptable ranges. It is a systematic approach for evaluating AEMP results and responding appropriately, such that potential unexpected effects are identified and mitigation is undertaken to reduce or reverse them, thereby preventing the occurrence of a significant adverse effect. This is accomplished by continually evaluating monitoring data and implementing follow-up actions (e.g., confirmation, further study, mitigation) at pre-defined levels of change in measurement endpoints (i.e., Action Levels). For purposes of this Response Framework, the following terms are used: effect, normal range, benchmark, Action Level, and Significance Threshold.

Action Level – Action Levels (Low, Moderate, and High) are pre-defined levels of environmental change that exceeds normal ranges or benchmarks, or results of statistical tests, or a combination of these. For example, exceedance of the normal range and approach of a benchmark by a water quality parameter in the near-field exposure area may be defined as the Low Action Level. A change that falls within the normal range of variability for the study area would not trigger an Action Level.

Significance Threshold – The Significance Threshold, for the purposes of an AEMP Response Framework, is a magnitude of change that would result in significant adverse effects. It is a clear statement of environmental change that must never be reached. The AEMP Response Framework is designed to prevent reaching the significance threshold for all assessment endpoints.

Action Levels

The proposed Action Levels are designed to provide an early warning indication of potential adverse effects to plankton and benthos (i.e., food for fish), to fish health, and to the assurance of normal ecological function (including water quality and sediment quality). The proposed Low Action Levels (Table 8-2 and 8-3) are designed such that changes of sufficient magnitude to trigger a Low Action Level response are reported, documented, investigated, and ultimately addressed (i.e., mitigation measures or operation

changes are implemented) before Significance Thresholds would ever be reached; if a Low Action Level is reached, Medium and High Action Levels (with response actions) are developed to provide further adaptive management guidance to the Mine to avoid reaching the Significance Thresholds. The type of management response taken after reaching an Action Level will depend on the type and magnitude of effect observed.

Further details on AEMP action levels and significance thresholds are provided in Golder (2016).

SECTION 6 • QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

Quality Assurance (QA) refers to plans or programs that encompass a wide range of internal and external management and technical practices designed to ensure the collection of data of known quality that matches the intended use of the data. Quality Control (QC) is a specific aspect of QA that refers to the internal techniques used to measure and assess data quality. Specific QA and QC procedures that will be followed during compliance-related sampling are described in Section 6.1 and 6.2 and are further detailed in the Quality Assurance/Quality Control Plan (Agnico Eagle, 2019).

6.1 Quality Assurance

Quality assurance protocols are diligently followed so data are of known, acceptable, and defensible quality. There are three areas of internal and external management, which are described in the following three sections.

6.1.1 Field Staff Training and Operations

To make certain that field data collected are of known, acceptable, and defensible quality, field staff are trained to be proficient in standardized field sampling procedures, data recording, and equipment operations applicable to the monitoring program. All field work will be completed according to specified instructions and established technical procedures for standard sample collection, preservation, handling, storage, and shipping protocols. Thus, minimizing risk of operational errors.

6.1.2 Laboratory

To make sure that high quality data are generated, external CALA accredited laboratories have been selected for sample analysis. Accreditation programs are utilized by the laboratories so that performance evaluation assessments are conducted routinely for laboratory procedures, methods, and internal quality control.

The assay lab at the Mine site is not an accredited laboratory but will be used periodically for “real-time” results for some parameters like pH, total suspended solids, and Weak Acid Dissociable Cyanide. These results are for observational purposes and do not meet the standards of an accredited laboratory.

6.1.3 Office Operations

A data management system is utilized so that an organized consistent system of data control, data analysis, and filing will be applied to the monitoring program. Relevant elements will include, but are not limited to the following:

- All required samples are collected;
- sampling stations are clearly identified, and GPS coordinates collected and stored;
- chain-of-custody and analytical request forms are completed correctly (as per Agnico Eagle 2019);

- proper labelling and documentation procedures are followed, and samples will be delivered to the appropriate locations in a timely manner;
- laboratory data will be promptly reviewed once they are received to validate data quality;
- appropriate logic checks will be completed to ensure the accuracy of the calculations.

6.2 Quality Control

The QC component consists of applicable field and sample handling procedures, and the preparation and submission of two types of QC samples to the various laboratories involved in the program. The QC samples include blanks (e.g., travel, field, equipment) and duplicate/split samples.

Sample bottle preparation, field measurement and sampling handling QC procedures include the following:

- New laboratory supplied containers are used for sample collection. The bottles are either polyethylene plastic or glass, dependent on the specific parameter being analyzed.
- Sample bottles are kept in a clean environment, capped at all times, and stored in clean shipping containers. Samplers keep their hands clean, wear gloves, and refrain from eating or smoking while sampling.
- All bottles are identified with station number and date of collection.
- Where sampling equipment must be reused at multiple sampling locations, sampling equipment is cleaned appropriately between locations.
- Temperature, pH, and specific conductivity are measured in the field using hand held meters such as HACH test kit – 2100 Q Portal Turbidimeter (turbidity), Oakton PCS35 Meter (pH and conductivity), and Eureka Manta II (pH, dissolved oxygen and conductivity). The instruments are calibrated before each sample event to ensure optimal performance and record of the calibration are kept in a Calibration log. Maintenance procedures will be followed as set out by the supplier's operation manual.
- Samples are cooled to between 4 °C and 10˚C as soon as possible after collection, and maintained at approximately 4 °C in a refrigerator until shipping. Care is taken when packaging samples for transport to the laboratory to maintain the appropriate temperature (between 4°C and 10˚C) and minimize the possibility of rupture. Where appropriate, samples are treated with laboratory-provided preservatives to minimize physical, chemical, biological processes that may alter the chemistry of the sample between sample collection and analysis.
- Samples are shipped to the laboratory as soon as reasonably possible to minimize sample hold times. If for any reason, samples do not reach the laboratory within the maximum sample hold time for individual parameters, the results of the specific parameters will be qualified, or the samples will not be analysed for the specific parameters.
- Chain of custody sample submission forms are completed by field sampling staff and submitted with the samples to the laboratory. Furthermore, an electronic copy is emailed to the laboratory upon shipping and a second electronic copy is maintained at the Mine Site for reference.

- Only staff with the appropriate training in the applicable sampling techniques conduct water sampling.

Quality control procedures implemented consist of the preparation and submission of QA/QC samples, such as field blanks, trip blanks, and duplicate water samples. These are defined as follows:

- Field Blank: A sample prepared in the field using laboratory-provided deionized water to fill a set of sample containers, which is then submitted to the laboratory for the same analysis as the field water samples. Field blanks are used to detect potential sample contamination during collection, shipping and analysis.
- Travel Blank: A sample prepared and preserved at the analytical laboratory prior to the sampling trip using laboratory-provided deionized water. The sample remains unopened throughout the duration of the sampling trip. Travel blanks are used to detect potential sample contamination during transport and storage.
- Duplicate Sample: Two samples collected from a sampling location using identical sampling procedures. They are labelled, preserved individually and submitted for identical analyses. Duplicate samples are used to assess variability in water quality at the sampling site. Duplicates are collected and submitted for analyses at approximately 10% of sampling locations. For smaller batches of samples (less than 10), at least one duplicate will be collected and submitted for analysis. Upon receipt of analytical results, the field/trip blank and duplicate analyses are verified for potential contamination and accuracy, respectively. Results are interpreted, and recommended actions are taken if necessary.

SECTION 7 • FLOW VOLUMES

Where applicable, flow volumes within the mine footprint will be tracked daily during periods of discharge. Flow volume measurements will be conducted using volumetric flow meters attached to applicable pumps or by applying pump time and capacity methods when flow meters are not possible (e.g., when a power source is not available). For applicable permanent pumping arrangements, such as fresh water pumping systems, flows will be measured using permanent in line flow meters. For periodic batch discharges, such as secondary containment sumps, portable flow meters or calculated pump time and capacity methods will be used.

The monitoring locations for water flow volumes, in accordance with Part I, Item 9, and Table 2 of the Licence, include:

- The volume of fresh Water obtained from Meliadine Lake at Monitoring Program Station MEL-11;
- The volume of fresh Water transferred to the Meliadine Lake during lakes' dewatering activities;
- The volume of fresh Water obtained along the road and Meliadine River for dust suppression activities;
- The volume of Effluent discharged from Final Discharge Point at Monitoring Program Station MEL-14;
- The volume of reclaim Water obtained from CP1;
- The volume of Effluent discharged onto tundra at Monitoring Program Station MEL-25 or transferred to CP1 from the Itivia Site Fuel Storage and Containment Facility; and
- The volume of Effluent and Fresh Water transferred to the pits during pits' flooding.

SECTION 8 • REPORTING

Reporting of water quality results is to be conducted on two levels a) monthly and annually with the results of the monitoring program and per MDMER requirements and b) in response to exceedances.

8.1 Annual Reporting

An annual report is to be submitted to the NWB, KIA, Department of Fisheries and Oceans, Crown-Indigenous Relations and Northern Affairs Canada, Nunavut Impact Review Board, Government of Nunavut, and other interested parties by March 31st of the following year. The report is to summarize the following:

- Monitoring results for each sampling station during the year and for the life of mine (construction to end of closure); activities during the year at each station; and any exceedances at stations, the action plan applied to the exceedance, and the results of the action plan;
- Annual seep water chemistry results; including location of the samples, sources of the water collected, and results of chemical analyses of the samples;
- Receiving water monitoring results;
- Spills and any accidental releases; event monitoring activities conducted following containment, remediation, and reclamation; and the results of EM program, any exceedance in EM results, and the action plan following the exceedance;
- Measured flow volumes;
- Effluent flow rates, volumes and calculated chemical loadings following the requirements of MDMER; and
- Results of QA/QC analytical data.

8.2 Exceedance Reporting

Any measured concentration at a CM station exceeding a regulated discharge criterion stipulated in the Licence or MDMER will be reported to the NWB and Environment Canada and Climate Change upon receipt of the analysis. In addition, results of the action plan will be reported and, where necessary, mitigation options identified within 90 days after receipt of the analyses.

Exceedances in the concentration of a parameter in receiving water will be reported as specified in the AEMP and EEM – MDMER accordingly.

SECTION 9 • REFERENCES

Agnico Eagle. 2019. Meliadine Gold Project Quality Assurance/Quality Control Plan. Version 3. 6513-QQY-01. March 2019.

Agnico Eagle. 2021. Meliadine Gold Project Water Management Plan. Version 11. 6513-MPS-11. August 2021.

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Government of Canada. (2002). Metal and Diamond Mining Effluent Regulations. SOR/2002-222. Minister of Justice of Canada. Current to July 26, 2021, last amended on June 10, 2021.