

Water Licence SNP



- Focus is on Schedule J 'Conditions Applying to General and Aquatics Effects Monitoring' of Water Licence 2AM-DOH1323.
- · Specifically:
 - Table 1 Monitoring Groups outlines the parameters for sampling
 - Table 2 Monitoring Requirements outlines the SNP sites (TL and ST sites), sampling requirements, frequencies and applicable phases.

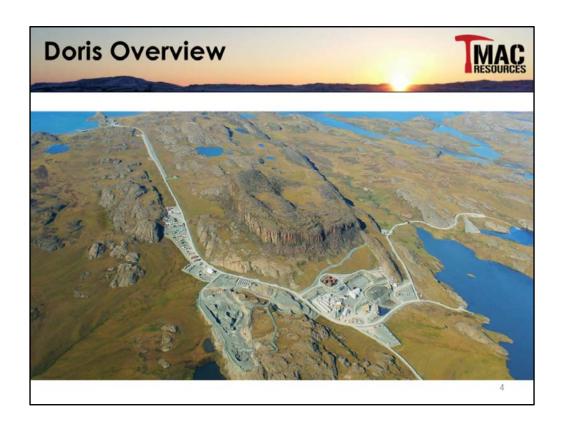
2

Proposed revisions have been focused on these tables, as changes to these tables would drive any related changes in the rest of the WL, as well as to the 'Group Reference' table.

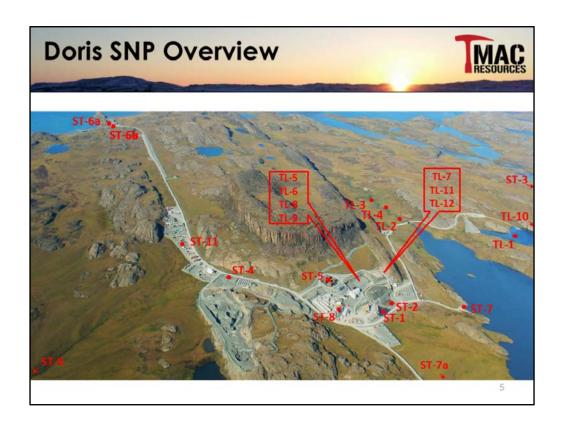
chedule		
onitoring	Groups	
Group	Analytical Parameters	Measurement Units
	pH	pH units
General(G)	TSS	mg/L
	Total Ammonia-N	100.7
Nutrients (N1)	Nitrate-N	mg-N/L
	Nitrite-N	mg-n/c
	Orthophosphate-P	
	Total Phosphate-P	mg/L
	T-Aluminum	
	T-Arsenic	_
	T-Copper	_
Total Metals - Unfiltered (MT)	T-Iron	mg/L
	T-Nickel	
	T-Lead	_
	T-Zinc	
	D-Iron	
	D-Copper	
Dissolved Metals - Filtered	D-Arsenic	
(MD)	D-Zinc	mg/L
	D-Cadmium	
	D-Nickel	
	Biological Oxygen Demand	mg/L
Biological (B)	19400	CFU or MFU /100
	Fecal Colforms	mL -(colony-forming
		unite)
	Total Oil and Grease	
	T-Lead	
Hydrocarbons (HC)	Benzene	mg/L
	Toluene	
	Ethyl-Benzene	
	Flow	m³/day
Discharge (D)	Volume	m ³
		Day

Text in red in this slide and those to follow indicates proposed changes to the existing Water Licence text.

'Colony Forming Units' or 'Most Probable Number' represent different methodologies for determining the same information, and results of either are comparable to the same guidelines and are acceptable to most regulators and health jurisdictions. The CALA-accredited analytical laboratory currently used (ALS Environmental), uses MFU.



Overview of Doris North Project and permitted infrastructure and description of relevant proposed infrastructure changes from the Amendment Application.



Current SNP sampling locations prescribed in Water Licence 2AM-DOH1323.

100000000		L Sche Monito			ements	N RES	AC
	Station	Description	Phase	Monitoring Parameters	Frequency during Care and Maintenance prior to any deposit of tailings to the TIA	Frequency (during operations and any time after initial deposit of Tailings to the TIA)	
'							•
							6

Column titled 'frequency during care and maintenance prior to any deposit of tailings to the TIA' will no longer be needed by the time the revised Water Licence is issued. The changes indicated here will be adopted ('accepted') in the following slides for improved readability.

JIC Z	Monitori	ng ke	quirements	A RE
Station	Description	Phase	Monitoring Parameters	Frequency
TL-1	Barge Depth 1.5 m below surface	Construction Operation, Closure, Post Closure (for up to nine (9) years after cessation of mining)	G, N1, N2, MT and TDS, CI, Free CN, Total CN, T-Rg, T-Ca, T-Cd, T- Cr,T-Hg, T-K, T-Mo, T-Mg, T-Na, T-Se, T-TI	Every second day for two (2) weeks prior to freshwater discharge and for two (2) weeks after discharge commence then reducing to once per week during remainder of annual discharge period
			Dissolved Oxygen and Redox Potential Acute Lethality	Every second month during discharge to freshwater Once prior to, and monthly during discharge to
			В	freshwater Monthly during discharge to freshwater
			D	Daily during periods of discharge to freshwater

There will no longer be any freshwater discharge during operations and closure. Once tailings deposition starts, the only discharge will be to the ocean.

As a result, milling-related parameters (Cyanide) have been removed.

TL 1 and TL 4 are equivalent (they represent either end of same pipe with no alteration of the water between them), so requirements have been combined here (addition of 'B' parameters and frequency).

Station	Description	Phase	Monitoring Parameters	Frequency
TL-2	Doris Outflow Creek - upstream (at the flow monitoring station adjacent to the bridge)	Construction Operation, Closure, Post Closure (for up to nine (9) years after cessation of mining)	G, N1, N2, MT and TDS, CI, Free CN, Total CN, T-Ag, T-Ca, T-Cd, T-Cr, T-Hg, T-K, T-Mo, T-Mg, T-Na, T-Se, T-TI,	Every second day for two (2) weeks prior to freshwater discharge and for two (2) weeks after discharge commences then reducing to once per week during remainder of annual discharge period
			D	Daily during periods o discharge from Tail Lake to freshwater

Clarification that this sampling pertains to freshwater discharge, and is limited to the construction phase.

Station	Description	Phase	Monitoring Parameters	Frequency
TL-3	Doris Outflow Creek (~80m downstream of the base of the waterfall)	Construction Operation Closure, Post Closure (for up to nine (9) years after cessation of mining)	G, N1, N2, MT and TDS, CI, Free CN, Total CN, T-Ag, T-Ca, T-Cd, T-Cr, T-Hg, T-K, T-Mo, T-Mg, T- Na, T-Se, T-TI, Total Oil and Grease	Every second day for two (2) weeks prior to discharge and for two (2) weeks after discharge commences, then reducing to once per week during remainder of annual discharge period. Annually post breaching of dam. Daily during periods of pumping discharge from Tail Lake

Total oil and grease is not included in the WL criteria for TL1 or 2, and appears to have been erroneously added here.

Frequency reduced during post-closure, and discharge monitoring tied specifically to active pumping (the construction phase).

		ilg ite	quirement	IIILO
Station	Description	Phase	Monitoring Parameters	Frequency
TL-4	TIA Discharge End-of- Pipe (taken at a valve at the discharge end-of-the transfer-pump-pipeline)	to nine (9) years	G, N1, N2, MT, and TDs, Cl, Free CN, Total CN, T Ag, T Co, T Cd, T Cr, T Hg, T K, T Mo, T Mg, T No, T Se, T TI, T Radium 226	Weekly-during period of discharge
			Acute Letholity	Monthly during discharge
			B .	Monthly Daily during periods of discharge from Tail Lake

TL-1 and TL-4 will be the same (either end of same pipe, no change between). Have combined requirements into TL-1.

Station	Description	Phase	Monitoring Parameters	Frequency
TL-S	Tailings Discharged into TIA (Water Component) taken from a valve in the mill at the discharge end of the mill tailings pumps	Operations	G, N1, MT, and Free CN, Total CN, WAD CN, Sulphate, T Cd, T Cr, T Hg, T Mo, T Se, and Total Metals by ICP MS	Daily initially, reduced to weekly after 3 months of operation
			Cyanate and Thiocyanate	Quarterly
			Đ	Weekly initially, reduced to monthly after 3 months of

Characterization of waters discharged into the TIA for the purposes of Water and Load balance model calibration will be outlined in the Water Management Plan. TIA water will be discharged to the ocean.

Station	Description	Phase	Monitoring Parameters	Frequency
TL-6	Combined-Tailings Discharged into TIA (Solid Component) taken from a valve in the mill at the discharge end of the mill tailings pumps	Operations	Tonnage of dry tailings solids	Monthly during period of discharge
			MT and T-Cd, T-Cr, T-Hg, T-Mo, T-Se, Total Inorganic Carbon and Total Metals by ICP-MS (must Include Sulphur	Sampled on a weekly basis with analyses carried out monthly on a composite sample of the TL-6 weekly samples

Permanent deposition of solid waste in TIA.

Detoxified cyanide leach tailings will be placed underground.

Station Description Phase Monitoring Parameters Frequency TL-7 Filtered Cyanide-leach residue-Detoxified tailings sent underground as backfill Dry tonnage of detoxified tailings Suphurl, Molature content of backfill trucked underground, Cyanate and Thiocyanate Quarterly

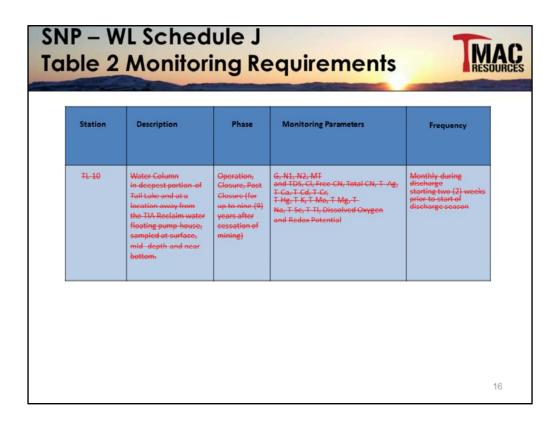
Language correction

Station	Description	Phase	Monitoring Parameters	Frequency
TL-8	Reclaim water pumped from TIA to Mill Process water tank taken from a valve at the discharge end of the reclaim water pump	Operation	G, N1, N2, MT and Free CN, Total CN, T Ag, T Cd, T Cr, T Hg, T Mo, T Se, T TI,	Monthly Daily during periods o pumping

Any characterization required for re-use of this waste would be done as needed, based on operational needs.

Station Descriptio	n Phase	Monitoring Parameters	Frequency
TL9 Barren-Bleed Solution Sent taken from a valve within	t to tailings - sampling	MD and pH, Total and WAD CN, Chemical Oxygen Demand,	Menthly

This is no longer a product of the amended Project (it was a part of the Merrill Crowe process).



Sampling at TL-1 is sufficient to characterize the water being discharged.

		eters Frequency
ge from Operation	Visual inspection for s If seepage present par monitored include N1 Trace metals by ICP M Acidity, Sulphate, Tota	rameters to be and pH, EC; IS, Alkalinity,

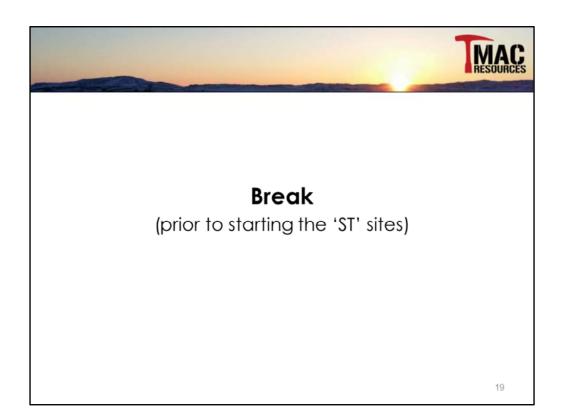
Groundwater will either be discharged directly to the ocean, or to the TIA and then to the ocean.

Groundwater seepage will be monitored under the Groundwater Management Plan.

Station	Description	Phase	Monitoring Parameters	Frequency
TL-12	Underground Minewater - water pumped from the underground mine into the Mill tailings pump box	Operations	G-N1 and Sulphate-and-Total Metals by-ICP-MS	Menthly Menthly Daily during pumping

Groundwater chemical characterization will now be monitored under the Groundwater Management Plan and will be discharged to the ocean.

Discharge monitoring has been increased to daily to effectively monitor surface water drawdown effects and mine operability.



Station	Description	Phase	Monitoring Parameters	Frequency
\$T-1	Discharge from Sedimentation Pond taken at a depth of 0.25 m	Construction, Operation, Closure	G. N1, MT and Total Sulphate, Total CN, Total Oil and Grease,	Once-before any discharge, daily when discharging onto the tundra Daily during periods of Discharge

ST-1 was a sedimentation control pond which is now used as a holding pond for site contact water (including ST-2 water) prior to pumping to the TIA, as per the Water Management Plan. As a result, no water will be discharged from this site to the tundra.

Characterization of waters discharged into the TIA for the purposes of Water and Load balance model calibration will be outlined in the Water Management Plan. TIA water will be discharged to the ocean.

Station	Description	Phase	Monitoring Parameters	Frequency
ST-2	Discharge from Pollution Ponds taken at a depth of 0.25 m	Construction, Operation, Closure	G, N1, MT and Total Sulphate, Total CN, Total Oil and Grease, Alkalinity, Chloride, and Total Metals by ICP MS	Monthly-during-open water season Daily during periods o discharge

Characterization of waters discharged into the TIA for the purposes of Water and Load balance model calibration will be outlined in the Water Management Plan. TIA water will be discharged to the ocean.

Station	Description	Phase	Monitoring Parameters	Frequency
ST-3	Discharge from Non-hazardous Landfill pollution control sump	Construction, Operation, Closure	G, MT and Total Ammonia-N, Total Sulphate, Total CN, Total Oil and Grease,	Once before any discharge, daily-once when discharging onto the tundra Daily during periods of discharge

Station	Description	Phase	Monitoring Parameters	Frequency
ST-4	Discharge from Landfarm sump	Construction, Operation, Closure	G, HC	Once before any discharge, daily once when discharging onto the tundra Daily during periods of discharge

Station	Description	Phase	Monitoring Parameters	Frequency
ST-5	Discharge from the Plant Site Fuel Storage and Containment Area Sump	Construction, Operation, Closure	G, HC	Once before any discharge, daily once when discharging onto the tundra Daily during periods of discharge

Station	Description	Phase	Monitoring Parameters	Frequency
ST-6a and ST-6b	Discharge from the Roberts Bay Fuel Storage and Containment Area Sumps	Construction, Operation, Closure	G, HC	Once before any discharge, daily once when discharging ont the tundra Daily during periods of discharge

Station	Description	Phase	Monitoring Parameters	Frequency
ST-7	Freshwater pumped from Dorls Lake teken from a valve on the discharge end of the freshwater pump	Construction, Operation, Closure	G, N1, N2, MT and Free CN, Total CN, T-Ag, T-Cd, T-Cr, T-Hg, T-Mo, T- Se, T-TI, T-Ca and Total Oil Grease	
			D	Monthly during period of use as potable water Monthly during periods of

Sampling location is currently in the uptake line or from near uptake point (shoreline, or ice surface) when the pump is not in operation, but would routinely be determined in discussion with the INAC inspector.

Coliform data is highly time sensitive, and would only be pertinent if water is being used for potable purposes, which has not been the case in recent years.

Oil and Grease is similarly unnecessary.

Station	Description	Phase	Monitoring Parameters	Frequency
ST-7a	Freshwater pumped from the Windy Lake freshwater intake (Appendix H of the Application), taken from a valve on the discharge end of the freshwater pump-	Construction, Operation, Closure	G, N1, N2, MT and Free CN, Total CN, T-Ag, T-Cd, T-Cr, T-Hg, T-Mo, T- Se, T-TI, T-Ca and Total Oil and Grease	Monthly during period of pumping Monthly during period of pumping

Sampling location is currently in the uptake line or from near uptake point (shoreline or ice surface) when the pump is not in operation, but would routinely be determined in discussion with the INAC inspector.

There is no pathway for CN contamination of Windy Lake due to Doris Activities, it is in a separate watershed from the milling process.

T-Ca was listed in Schedule J, Table 1 Group Reference of the existing WL, so was added here as well.

Station	Description	Phase	Monitoring Parameters	Frequency
ST-8	Discharge from Wastewater Treatment Plant bio- membrane	Construction, Operation, Closure	G, B, and Total OII and Grease	Monthly during discharge to tundra
			Location of discharge	Monthly during period of discharge
			D	Monthly during period

Discharge is either to tundra (two designated locations) or to TIA.

Station	Description	Phase	Monitoring Parameters	Frequency
ST-9	Runoff from Wastewater Treatment Plant discharge - downstream of wastewater treatment plant discharge point and just prior to flow entering Doris Lake Glenn Lake	Construction, Operations, Closure	G, B, and Total OII and Grease	Monthly during tundra discharge

Tundra discharge points are $^{\sim}$ 1 km upslope from Glenn Lake and may be used if necessary through closure.

				Frequency
T-10	Site-Runoff from-Sediment-Controls-	Construction, Operations, Closure	TSS	Daily during-periods of discharge-

Rock is used solely for construction on site in accordance with the construction technical specifications.

Re	ischarge from the eagent and yanide Storage Facility Imps.	Construction, Operation, Closure	G, HC, MT, Total Ammonia, Total CN and D	Once before any discharge, daily once when discharging onto the tundra

Added parameters that were indicated in WL text.

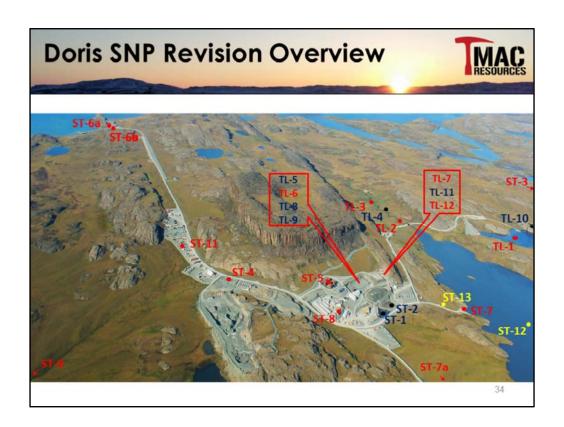
Station	Description	Phase	Monitoring Parameters	Frequency
ST-12 (new)	Doris Lake	Operations, Closure	Water Level	Continuous recording with Monthly download
			Ice thickness	Annually in April

New proposed SNP station for water level and ice thickness monitoring.

Station	Description	Phase	Monitoring Parameters	Frequency
ST-13 (new)	Discharge from Sedimentation Pond	Construction, Operation, Closure	G, N1, MT and Total Sulphate, Total CN, Total Oil and Grease,	Once before any discharge, daily when discharging onto the tundra Daily during periods of Discharge

ST-13 represents the new sedimentation control pond for Pad U.

Proposed sampling is based on ST-1, the previous sedimentation pond which is now used as a holding pond for site water pumping to the TIA.



Review and discussion of the proposed changes.

Black SNP locations – those no longer necessary.

Yellow SNP locations – those added.

Red SNP locations – those from 2AM-DOH1323.