RECOMMENDATION 4 – For project components discharging to waters: effluent discharge standards as suggested below for operational period and transitional (closure transition) period.

Wastewater (effluent) discharge flow (for each potential effluent source in Go Creek watershed) regulated to ensure that combined load from the project for each contaminant of concern does not exceed assimilative capacity of Go Creek downstream of project facilities (thereby maintaining minimum receiving environment objective at W80 in Go Creek).

If the Board authorizes discharge of wastewater (eg. Effluent from dewatering mine area) to the Wolverine Creek watershed: then the same discharge limits would apply (however it is expected that cyanide would not be detected in this system). With this authorization: the Board could consider limiting the source of water discharge plus limitations on the volume of water discharged to not exceed baseline baseflow contribution to Wolverine Creek.

Underline that effluent discharge standards cover the operational period only which includes: mining/milling period, pre-closure/interim period, and any periods of temporary cessation. The source for each water stream/effluent and ensuing discharge location or locations (ie between the two affected watersheds) requires detailing. For enforceability: discharge standards to be considered to be applicable to a grab sample.

Suggested clause: ***No effluent that is discharged from the project during operation (including periods of temporary cessation and transitional closure period) shall exceed the following effluent quality concentration limits at any point of compliance (maximum concentration for any parameter in a grab sample):***

Effluent Quality Standards -- Concentration Limits for Discharges to Water

Parameter	Maximum Allowable Concentration (MAC)	Units	MAC (in µg/L units)
pH	6.5 to 9.0	pH Units	
TSS (mg/L)	15	mg/L	
Cyanide (total)	0.05	mg/L	50 µg/L
Cyanide (WAD)	0.02	mg/L	20 µg/L
Ammonia-N	5	mg/L	
Nitrate-N	10	mg/L	
Nitrite –N	0.6	mg/L	
Sulphate	1800	mg/L	

QZ04-065
Exhibit 6.8.1.1

water quality predictions and to finalize design of final closure mitigation measures.

- ***Proposals for monitoring and the development of a numerical model for groundwater rebound in the underground mine workings which should eventually be coupled with a transport model. .***
- ***Complete a hydrological model of the tailings impoundment to ensure the long-term stability of the water cover.***

RATIONALE

The Licencee has committed to undertaking ongoing ARD/ML studies of the deposit (page C-16 of Exhibit 1.6). Sulphides have been measured in all waste types, and PAG and SAG waste appears to be ubiquitous. Additional ARD/ML testwork and interpretation of the results is required to accommodate for uncertainty in the present understanding of rock/waste geochemistry. The additional testwork and interpretation could result with a change in our understanding of future geochemical conditions as a result of the project development. For instance: if the primary source of neutralization is different than presently understood, there are implications regarding ARD potential and possibility of liberating metal contaminants via ARD mechanisms.

Monitoring of groundwater rebound within the mine workings is necessary in the assessment of potential near and long-term impacts on groundwater quality and transport. The availability of a predictive numerical model is of obvious benefit in planning pollution prevention strategies.

The groundwater flow regime needs to be refined with the use of a numerical model to complete the following: Develop a more complete understanding of the groundwater system; Predict the amount of water expected to be pumped from the mine (mine inflow); Predict the changes to the groundwater system from mine pumping, including water table drawdown; Predict changes to surface waters in response to the drawdown; Predict potential changes in groundwater quality as a result of project development; Provide an additional tool for monitoring and project assessment during site operation.

The current best management practice in subaqueous disposal of mine tailings is to provide adequate depth to not allow for resuspension and subsequent oxidation of mine tailings or PAG/SAG materials. Exposed tailings during operation will allow for potentially unacceptable levels of oxidation where subsequent subaqueous disposal can allow for resuspension of tailings and further oxidation if the DMS float is not stable on the tailings surface or if during extreme drought conditions, the water cover decreases to within the DMS layer.

Surveillance Network Program (Partial)

Surface Water Monitoring Network Component (Partial)

Station No.	Analytical Suite & Sampling Frequency										Flow/Level & Frequency	Comment
	FP	LP	TSS	CN	MA	NP	TM	DM	DOC	Ra226		
Wolverine Creek Watershed												
W-82 (upper Wolverine Creek)	M/W*	M/W*	M/W*		M/W*	M/W*	M/W*	M/W*	M/W*		Continuous flow	*1,*6
W-9 (lower Woverine Creek)	M/W*	M/W*	M/W*		M/W*	M/W*	M/W*	M/W*	M/W*	M/W*	Continuous flow	*1
W-1 (Wolverine Lake Outlet)	Q	Q	Q		Q	Q	Q	Q	Q			
P-1 (Wolverine Lake)	A	A	A		A	A	A	A	A			
P-2 (Wolverine Lake)	A	A	A		A	A	A	A	A			
P-3 (Wolverine Lake)	A	A	A		A	A	A	A	A			
L-1 (Little Wolverine Lake)	M	M	M		M	M	M	M	M			
W-21 (Nougha Creek)	M	M	M		M	M	M	M			Continuous flow	
W-8 (Campbell Creek)	M	M	M		M	M	M	M			Monthly flow	
Go Creek Watershed												
W-31 (upper Go Creek)	M	M	M	M	M	M	M	M	M		Monthly flow	
W-16 (Go Creek d/s of discharge)	M	M	M	M	M	M	M	M	M		Monthly flow	
W-15 (Hawkowl Cr. u/s of Go Cr.)	M	M	M		M	M	M	M			Monthly flow	
W-81 (d/s of Hawkowl and Go Cr.)	M	M	M		M	M	M	M			Monthly flow	
W-80 (compliance pt. in Go Creek)	D*/M	D*/M	D*/M	D*/M	D*/M	D*/M	D*/M	D*/M	D*/M	D*/M	Continuous flow	*2
W-12 (Go Creek u/s of Money Creek)	M	M	M		M	M	M	M			Continuous flow	*3
Water Management												
WTI (influent to water treatment plant)	D	W					W	W			Daily flow (+ volume)*	*4
WTE (effluent from water treatment plant)	D	W					W	W			Daily flow (+ volume)*	*4
TP (tailings pond)	M	M		M	M	M		M			Monthly level	
RP (retention pond)	D*	D*	D*	D*	D*	D*	D*	D*		D*	Continuous flow (+ volume)*	*5
TS (tailings seepage)	W	M	M	M	M	M	M	M		W*	Daily flow (+ volume)	*1, *6
XXX(other discharges for site)	D*	D*	D*	D*	D*	D*	D*	D*		D*	Daily flow (+ volume)	*6, *7
Money Creek Watershed												
W-14 (upper Money Creek)	M	M	M	M	M	M	M	M			Monthly flow	
W-22 (Money Cr. u/s of highway)	M	M	M	M	M	M	M	M			Continuous flow	
W-40 (Money Cr. d/s of highway)	M	M	M	M	M	M	M	M			Monthly flow	
Road Access Route												
W-71 (Pitch Creek d/s of road crossing)	M	M	M	M	M	M	M	M			Monthly flow	
W-72 (Light Creek)	M	M	M	M	M	M	M	M			Monthly flow	
W-73 (Bunker Creek at road crossing)	M	M	M	M	M	M	M	M			Monthly flow	

Comments:
*1 = Weekly sampling if discharges occur (to Creek/watershed)
*2 = Daily sampling during site discharge periods
*3 Telemetry link
*4 = Daily when treatment system operating
*5 = Daily sampling when operating/discharging
*6 = Ra226 if discharges occur to Wolverine Creek
*7 = Sampling if discharge occurs

Legend:
FP= Field physical parameters (Field Temperature, Field Conductivity, Field Sp. Cond., Field pH)
LP = Lab physical parameters (Temperature, Conductivity, Sp. Cond., pH, Turbidity, Total Dissolved Solids)
TSS = Total Suspended Solids
CN = Total Cyanide, WAD Cyanide
MA = Major Anions (Total Alkalinity, Total Acidity, Bromide, Chloride, Flouride, Sulphate)
NP = Nutrient Parameters (Ammonia - N, Nitrate - N, Nitrite - N, Dissolved ortho-Phosphate)
TM = ICP Trace Metal Scan (Total Metals) + Hardness
DM = ICP Trace Metal Scan (Dissolved Metals)
DOC = Dissolved Organic Carbon
Ra226 = Radium 226
Metals to include: Al, Sb, As, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Mo, Ni, P, K, Se, Si, Ag, Na, Sr, Tl, V, Zn

QZ04-065
Exhibit 6.8.1.1

Surveillance Network Program (Partial)

Groundwater Monitoring Network Component (Partial)

Station No.	Phase of Mine Life and Monitoring Frequency				Location of Monitoring Well
	Construction	Operations	Closure	Post Closure	
Wolverine Creek Watershed					
Existing Wells					
MW05-3A/B	Monthly	Monthly	Quarterly	Annual	In the vicinty of the mine underground and plantsite
MW05-4A/B	Monthly	Monthly	Quarterly	Annual	In the vicinty of the mine underground and plantsite
MW05-5A/B	Monthly	Monthly	Quarterly	Annual	In the vicinty of the mine underground and plantsite
MW06-8S/M	Monthly	Monthly	Quarterly	Annual	Located just downgradient of mine underground
MW06-9S/M	Monthly	Monthly	Quarterly	Annual	Located to the west of Wolverine Creek in the vicinty of the mine underground and plantsite
MW06-10S/M/D	Monthly	Monthly	Quarterly	Annual	In the vicinty of the mine underground and plantsite
MW06-11S	Monthly	Monthly	Quarterly	Annual	In the vicinty of the mine underground and plantsite
MW06-12S	Monthly	Monthly	Quarterly	Annual	In the vicinty of the mine underground and plantsite
Potential Future Monitoring Well Installations					
Monitor potential impacted groundwater seepage to Little Wolverine Lake	Monthly	Quarterly	Quarterly	Annual	Downgradient of Orebody
Monitor the groundwater-surface water interaction along Wolverine Creek in vicinty of proposed Biopass	Monthly	Quarterly	Quarterly	Annual	West of Wolverine Creek near portal and downgradient of mine underground and plantsite
Monitor background groundwater conditions of Wolverine Creek Watershed	Monthly	Quarterly	Quarterly	Annual	The drainage divide between Wolverine Creek and Go Creek
Go Creek Watershed					
Existing Wells					
MW05-1A/B	Monthly	Quarterly	Quarterly	Annual	Upper reaches of Go Creek - downgradient of waste rock pad
MW05-2A/B	Monthly	Quarterly	Quarterly	Annual	Downgraadient of tailings impoundment
MW05-3A[1]	Monthly	Quarterly	Quarterly	Annual	Northwest of tailings impoundment
MW05-6	Monthly	Quarterly	Quarterly	Annual	Upgradient of tailings impoundment facilty
MW05-7A/B	Monthly	Quarterly	Quarterly	Annual	Downgraadient of tailings impoundment
Potential Future Monitoring Wells					
MW07-1 Shallow/Medium/Deep	Monthly	Quarterly	Quarterly	Annual	Downgradient of tailings impoundment
MW07-2 Shallow/Medium/Deep	Monthly	Quarterly	Quarterly	Annual	Downgradient of tailings impoundment seepage dam
MW07-3 Shallow/Medium/Deep	Monthly	Quarterly	Quarterly	Annual	Immediately upgradient of tailings impoundment

Analytical Suite
FP= Field physical parameters (Field Temperature, Field Conductivity, Field Sp. Cond., Field pH)
LP = Lab physical parameters (Temperature, Conductivity, Sp. Cond., pH, Turbidity, Total Dissolved Solids)
MA = Major Anions (Total Alkalinity, Total Acidity, Bromide, Chloride, Flouride, Sulphate)
NP = Nutrient Parameters (Ammonia - N, Nitrate - N, Nitrite - N, Dissolved ortho-Phosphate)
TM = ICP Trace Metal Scan (Total Metals) + Hardness
DM = ICP Trace Metal Scan (Dissolved Metals)
DOC = Dissolved Organic Carbon
DIC = Dissolved Inorganic Carbon
Metals to include: Al, Sb, As, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Mo, Ni, P, K, Se, Si, Ag, Na, Sr, Tl, V, Zn

Notes
1 - Monitoring Well is disucssed in Table 37.8 Exhibit 1.6 as being located northwest of the tailings impoundment.

QZ04-065
Exhibit 6.8.1.1