Mount Polley Mining Corporation

IMPERIAL METALS CORPORATION

Annual Monitoring Plan - 2013
PE-11678

Submitted by: Colleen Hughes, EP

March 11, 2013

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1. Introduction

In November 2012, effluent permit PE-11678 was amended to include discharge of dam filtered water to Hazeltine Creek. This Plan satisfies the requirement of Section 3.1 of the amended permit, to submit a Surface and Groundwater Monitoring Plan annually for approval by the Director.

This 2013 Monitoring Plan was developed by Mount Polley environmental staff and reviewed by Colleen Hughes, EP as the Qualified Professional (QP). In addition, the Monitoring Plan table provided in Appendix 1 was reviewed by third party QP's (Section 4). This Monitoring Plan is a dynamic plan and may change as monitoring progresses. Appendix 2 includes a comprehensive list of parameters to be analyzed, and the detection limits to be achieved by the analytical laboratory. Any changes to this plan will be submitted to the Director for approval.

2. Objective

The objective of this Monitoring Plan is to provide a comprehensive plan for Mount Polley Mine (MPMC) that is effective for monitoring the quality and quantity of effluent sources, discharges, surface water, and groundwater associated with mining activities.

3. Scope

To monitor the quality and quantity of effluent sources and discharges, and the quality and quantity of surface and groundwater associated with the receiving environment. The area for monitoring will include the mine site and areas that may be impacted by mine discharges and mine activities.

4. Surface and Groundwater Monitoring Plan

4.1 Continuous Monitoring of the discharge

A plan is currently being developed to design and install a system to discharge dam filtered water to Hazeltine Creek. PE-11678 requires continuous flow monitoring and water quality (conductivity and temperature) at Hazeltine Creek (W7) and at the discharge outlet to Hazeltine (HD-1). MPMC is working with a local contractor to design the pipe and tank system and with our Electrical Department to design a monitoring system.

Details of this system will be forwarded to the Ministry of Environment (MOE) upon completion of the design as part of the Annual Discharge Plan.

4.1.1 W7 – Hazeltine Creek

MPMC has maintained a pressure transducer at W7 since 2008, resulting in the development of a strong gauging correlation. This pressure transducer will remain in place and will be connected by radio transmitter to the main control system located beside the discharge tank.

Continuous monitoring of conductivity and temperature will be accomplished with the installation of an YSI conductivity/temperature sensor that will also communicate to the main control system.

4.1.2 HD-1 – Hazeltine Discharge

As discussed, MPMC is presently designing this system and will submit a detailed description of the system in the Discharge Plan that is required 60 days prior to discharge. A real-time monitoring system will include flow rate, conductivity, and temperature of the discharge water. A SCADA (supervisory control and data acquisition) will be used to control the flow rate based on feedback from W7 water quality and a formula determining the flow rate and water quality of the discharge.

The Monitoring Plan for HD-1 also includes weekly monitoring at HD-1us located approximately 20 meters upstream of the discharge location.

4.2 Surface Water Quality Monitoring

The comprehensive Monitoring Plan table provided in Appendix1 outlines all surface water quality monitoring requirements by monitoring site, frequency, and parameter. This table has been reviewed by a third party QP, Pierre Stecko, M.Sc., EP, RPBio, Senior Aquatic Scientist, Minnow Environmental.

This Surface Water Monitoring Plan is designed to monitor through various seasonal changes to identify changes and trends in the water quality.

In 2013 there were several changes made to the Monitoring Plan in the previous version of PE-11678. Changes include:

- Additions
  - Hazeltine Discharge Site (HD-1)
  - Upstream of HD-1 (HD-1us)
- Changes
  - Increased frequency of monitoring at Bootjack Creek (W5) to monthly
  - Increased frequency of monitoring at Mine Drainage Creek (W3a) to monthly
  - Weekly TSS and Turbidity Monitoring during freshet at W4, W5, W7, and W8 to replace weekly full suite monitoring.
  - Decreased frequency at Edney Creek tributary (W8z) to quarterly (no changes have been observed at this site since monitoring began)
  - Decreased frequency at Tailings supernatant (E1) to quarterly (WQ changes not observed at this site and are not expected)
  - Removal of Cariboo Pit Supernatant (E8) (water is no longer to be stored here)
  - Removal of Site W13 (site no longer exists)

- Analysis for only Total metals at most surface sites (except at discharge). When the water quality guideline is in the Dissolved form, the Total metals value will be compared to the Dissolved Water Quality Guidelines.

4.3 Toxicity Testing at HD-1

Table 2 in Section 1.2 of PE-11678 requires that toxicity testing to be completed at HD-1. Acute bioassay and chronic bioassay testing will be completed following the Environmental Effects Monitoring (EEM) Guidance outlined by Environment Canada.

4.4 Groundwater Quality Monitoring

The comprehensive Monitoring Plan table provided in Appendix 1 outlines all groundwater monitoring requirements by groundwater well, frequency, and parameter. This Monitoring Plan table was reviewed by Dan Emerson, P. Geo, Senior Associate Hydrogeologist, AMEC.

There are currently 15 nested groundwater wells (one deep and one shallow), and three single wells surrounding the mine site. Five of the nested wells were installed in 2012 and have not been sampled as yet. Generally the wells are sampled twice per year; once in the spring and once in the fall. The exceptions to this sampling frequency are wells that have not shown any change in monitoring results in the past 7 years (these will be monitored annually).

In 2013 there were several changes made to the Monitoring Plan in the previous version of PE-11678. Changes include

- Additions
  - 2 new wells added in 2011
  - 5 new wells added in 2012
- Changes
  - Reduce frequency of monitoring at GW96-1a/b, GW96-3a, and GW96-4a/b to once annually as no changes have been observed since these wells were established
  - Remove GW96-8a/b as wells were buried in 2011
  - Remove 95R-4 as well no longer provides adequate data

4.5 Quality Assurance and Quality Control Manual

A complete and updated Quality Assurance, Quality Control (QA/QC) Manual has been compiled and will be issued to the Director with this monitoring plan. This manual provides detailed descriptions of the QA/QC requirements for environmental monitoring at Mount Polley Mining Corporation.

5. Summary

A review of this implementation of this Monitoring Plan will be provided in the 2013 Annual Environmental and Reclamation Report. An updated Monitoring Plan will be provided to the Director for review by January 31st 2014.

Every five years MPMC will provide MOE with a Hydrogeological Assessment provided by a third party QP. This assessment will review the complete groundwater monitoring program and identify any changes observed in the groundwater.

Appendix 1

Site Name	BC EMS Code	*Full Sample Suite Frequency	Change from previous permit	Spring Weekly TSS and NTU Only	Flow Monitoring	Total and Dissolved Metals	96 hour LC50 rainbow trout toxicity (acute)	48 hour LC50 Daphnia Magna toxicity (acute)	EC25 RBT embryo/alvin toxicity (chronic)	7 day *Ceriodaphnia dubia* toxicity (chronic)	Comments
E1	E225309	Quarterly	yes			Total					
E4	E224221	Monthly				Total					remove toxicity requirement, no discharge from this site
E5	E232862	Monthly				Total					
E7	E724730	Quarterly	yes			Total					
E13	E291229	Monthly	yes			Total					
W1	E225084	Quarterly				Total					
W1b	E291449		yes		yes						Flow monitoring only
W3a	E216893	Monthly	yes			Total					
W4	E225124	Monthly		yes	yes	Total					
W5	E208039	Monthly	yes	yes	yes	Total					
W7	E208038	Monthly (weekly**)	yes	yes	Continuous	Total & Dissolved					continuous conductivity and temperature data collected
W8	E216743	Monthly	yes	yes		Total					
W8Z	E223292	Quarterly	yes			Total					no changes observed at this site
W10	E291209	Bi-Annually	yes		yes	Total & Dissolved					
W11	E224223	Bi-Annually				Total & Dissolved					
W12	E216744	Quarterly			yes	Total					
GW96-1a	E229679	Annually	yes			Dissolved					
GW96-1b	E229680	Annually	yes			Dissolved					
GW96-2a	E229681	Bi-Annually				Dissolved					
GW96-2b	E229682	Bi-Annually				Dissolved					
GW96-3a	E229683	Annually	yes			Dissolved					
GW96-3b	E229684	Bi-Annually				Dissolved					
GW96-4a	E229685	Annually	yes			Dissolved					
GW96-4b	E229686	Annually	yes			Dissolved					
GW96-5a	E229687	Bi-Annually				Dissolved					
GW96-7	E229690	Bi-Annually				Dissolved					
GW00-1a	E242385	Bi-Annually				Dissolved					
GW00-1b	E242384	Bi-Annually				Dissolved					
GW00-2a	E242387	Bi-Annually				Dissolved					
GW00-2b	E242386	Annually	yes			Dissolved					
GW00-3a	E242389	Bi-Annually				Dissolved					
GW00-3b	E242388	Annually	yes			Dissolved					
95-R-5	E229695	Bi-Annually				Dissolved					
GW05-01	E258923	Bi-Annually				Dissolved					
GW11-1a	E291210	Bi-Annually	yes			Dissolved					
GW11-1b	E291211	Bi-Annually	yes			Dissolved					
GW11-2a	E291212	Bi-Annually	yes			Dissolved					
GW11-2b	E291213	Bi-Annually	yes			Dissolved					
GW12-1a	E291969	Bi-Annually	yes			Dissolved					
GW12-1b	E291970	Bi-Annually	yes			Dissolved					
GW12-2a	E291971	Bi-Annually	yes			Dissolved					
GW12-2b	E291972	Bi-Annually	yes			Dissolved					
GW12-3a	E291973	Bi-Annually	yes			Dissolved					
GW12-3b	E291974	Bi-Annually	yes			Dissolved					
GW12-4a	E291976	Bi-Annually	yes			Dissolved					
GW12-4b	E291977	Bi-Annually	yes			Dissolved					
GW12-5a	E291978	Bi-Annually	yes			Dissolved					
GW12-5b	E291979	Bi-Annually	yes			Dissolved					
HD-1	E289717	Weekly**	yes	yes	continuous	Total & Dissolved	Monthly**	Monthly**	twice annually**	twice annually**	Flow measurement will be at top end of pipe. Continuous conductivity and temperature data also collected.
HD-1 US	E291249	Weekly**	yes			Total & Dissolved					

Quarterly
Groundwater Well Site
Effluent Monitoring Site
Surface Water Monitoring Site

* Full sample suite includes nutrients, anions, physical,metals, dissolved organic carbon, and in situ pH, conductivity, and temperature.
**when discharging

Appendix 2

		Detection Limits	Units
Field Parameters			
pH	all sites		pH
Conductivity	all sites		uS/cm
Temperature	all sites		celcius
NTU	W7, W5, W4, W8		NTU
Physical Tests			
Conductivity	all sites	2.0	uS/cm
Hardness (as CaCO3)	all sites	0.50	mg/L
pH	all sites	0.10	pH
Total Suspended Solids	all surface sites	3.0	mg/L
Total Dissolved Solids	all sites	10	mg/L
Turbidity	all surface sites	0.10	NTU
Anions and Nutrients			
Alkalinity, Total (as CaCO3)	all sites	1.0	mg/L
Ammonia, Total (as N)	all sites	0.0050	mg/L
Chloride (Cl)	all sites	0.50	mg/L
Fluoride (F)	HD-1 and W7 - only	0.020	mg/L
Nitrate and Nitrite (as N)	all sites	0.0051	mg/L
Nitrate (as N)	all sites	0.0050	mg/L
Nitrite (as N)	all sites	0.0010	mg/L
Total Nitrogen	all sites	0.050	mg/L
Orthophosphate-Dissolved (as P)	all surface sites	0.0010	mg/L
Phosphorus (P)-Total Dissolved	all surface sites	0.0020	mg/L
Phosphorus (P)-Total	all surface sites	0.0020	mg/L
Sulfate (SO4)	all sites	0.50	mg/L
Organic / Inorganic Carbon			
Dissolved Organic Carbon	all surface sites	0.50	mg/L
Total and Dissolved Metals			
Aluminum (Al)-Total		0.0030	mg/L
Antimony (Sb)-Total		0.00010	mg/L
Arsenic (As)-Total		0.00010	mg/L
Barium (Ba)-Total		0.000050	mg/L
Beryllium (Be)-Total		0.00010	mg/L
Bismuth (Bi)-Total		0.00050	mg/L
Boron (B)-Total		0.010	mg/L
Cadmium (Cd)-Total		0.000010	mg/L
Calcium (Ca)-Total		0.050	mg/L
Chromium (Cr)-Total		0.00050	mg/L
Cobalt (Co)-Total		0.00010	mg/L
Copper (Cu)-Total		0.00050	mg/L
Iron (Fe)-Total		0.030	mg/L
Lead (Pb)-Total		0.000050	mg/L
Lithium (Li)-Total		0.00050	mg/L
Magnesium (Mg)-Total		0.10	mg/L
Manganese (Mn)-Total		0.000050	mg/L
Molybdenum (Mo)-Total		0.000050	mg/L
Nickel (Ni)-Total		0.00050	mg/L
Potassium (K)-Total		0.050	mg/L
Selenium (Se)-Total		0.00050	mg/L
Silicon (Si)-Total		0.050	mg/L
Silver (Ag)-Total		0.000010	mg/L
Sodium (Na)-Total		0.050	mg/L
Strontium (Sr)-Total		0.00020	mg/L
Thallium (Tl)-Total		0.000010	mg/L
Tin (Sn)-Total		0.00010	mg/L
Titanium (Ti)-Total		0.010	mg/L
Uranium (U)-Total		0.000010	mg/L
Vanadium (V)-Total		0.0010	mg/L
Zinc (Zn)-Total		0.0030	mg/L

MPMC 2013 Annual Discharge Plan

Submitted to:

Ministry of Environment
Environmental Protection Division
South Interior Region – Cariboo

and

Environment Canada

Prepared by:

Mount Polley Mining Corporation
Environmental Department

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Revision Date: March 14, 2013

Background Information

In November 2012, Mount Polley Mining Corporation (MPMC) received an amendment to effluent permit PE-11678 issued by the Ministry of Environment (MOE) under the British Columbia *Environmental Management Act*. This amendment authorizes the discharge of dam filtered water from the tailings impoundment drains into Hazeltine Creek.

Once discharge of tailings effluent has commenced, MPMC is governed by the Metal Mining Effluent Regulations (MMER) under the Federal Fisheries Act. These regulations require a notification of our intent to discharge.

This Plan has been developed for submission to MOE and Environment Canada to satisfy the requirements of PE-11678 and the MMER respectively.

Scope

This 2013 Annual Discharge Plan, required under Section 1.2.6 of PE-11678, provides a detailed description of authorized discharge structures, and confirms that all actions required by the Permit prior to discharge have been complete. This Plan stipulates the expected volume, timing, and duration of effluent released to Hazeltine Creek, and demonstrates how the receiving environment environmental protection guidelines defined in the Permit will be met.

Pre-discharge Permit Requirements

As per Section 1.2.7 of the Permit, the following requirements have been met.

Permit Requirement	Date Submitted	Submitted to:
Traditional Use Study	21-Jan-2013	Ministry of Mines
QA/QC Manual	7-Feb-2013	MOE
Communication Plan	22-Feb-2013	First Nations
Surface and Groundwater Monitoring Plans	8-Feb-2013	MOE
Lake and Biological Monitoring Plan	21-Feb-13	MOE
Emergency Response Plan	-	Will be submitted prior to discharging.

Discharge Infrastructure and Design

The discharge infrastructure includes a pipeline and tank system, which are authorized works under Section 1.2.8 of the Permit. These works will be completed and in operation prior to the date discharge is planned to commence, as required by Section 1.2.9 of the Permit.

The Discharge system is designed using all potable water standard equipment and infrastructure. Details of the discharge system structure and design are included in Appendix 1, and include: sequence of operation; materials and construction method; and schematics of each of the two designed tanks.

The communication and controls for this system will be maintained using a microwave link between each control site (W7, HD-1, and the Main Containment tank). There will be an Ethernet connection at each site and these will operate on a separate network that communicates to the MMI Network at the mill. Details of the system, included in Appendix 1, outline all the Fail Safe systems for automatic shutdown should the system lose communication. The final as built drawings and design for the entire system will be included in an updated version of the QA/QC manual and submitted to MOE.

History of Discharge Location

MPMC is located 56 kilometers Northeast of Williams Lake, in central British Columbia (~N52O33'24", W121O38'08"). The final discharge point into Hazeltine Creek is located at N52 31.208, W121 35.140.

The location for the discharge was originally scoped by Knight Piésold prior to the submission of the PE-11678 Permit Amendment Application in 2007. The final location was chosen during a field program conducted by Minnow Environmental in 2010. The details of this program were published in the MPMC Annual Environmental and Reclamation Report 2011. The outlet of the discharge system was designed by Knight Piésold.

The final discharge structure was constructed in the fall of 2012. The construction plan included a Section 9 authorization from MOE, a guidance letter from Department of Fisheries and Oceans (DFO), a License of Occupation under the Lands Act, and a License to Cut from Ministry of Forests (MOF).

Discharge Plan

The effluent discharge will be entirely composed of water from the Tailings Storage Facility (TSF) Main Toe Drain (MTD). MTD water is TSF supernatant that filters through the Main Embankment of the dam and is collected by a pipe system. The supernatant sources are: concentrator tailings slurry from the milling of ore or contaminated soil; mill site runoff; rock disposal site runoff; open pit water; and septic tank effluent (all from Mount Polley copper/gold mining and milling operations).

The following sections outline expected volume, timing, and duration of effluent released based on predicted water quality and flow rates of the MTD and Hazeltine Creek.

Hazeltine Creek Flow Predictions

Hazeltine Creek flows are predominantly snowmelt driven, with the majority of annual runoff occurring in late spring. Thus, creek flow predictions (and corresponding discharge volumes) are primarily based on snowpack data from the Mount Polley Mine site, and regional automated snow pillow stations run by the BC Ministry of Forests, Lands and Natural Resources River Forecast Centre. As of March 1, 2013, the River Forecast Centre Snow Survey and Water Supply Bulletin reported the snowpack to be 88% of the average for this time of year in the Middle Fraser Basin (BC River Forecast Centre, 2013). At Mount Polley Mine, the average snowpack from three sample locations on February 22, 2013 was 84% of the

site average (based on data from 2000 to 2013). Given these statistics, the conservative estimate is that in 2013 Hazeltine Creek flow will be 84% of average Hazeltine Creek Flow. Average monthly flows (based on data from 1995 to 2008 compiled by Knight Piésold, and data from 2010 to 2012 collected by MPMC staff), and the anticipated 84% flows are presented in Table 1. Note that these predictions may be altered slightly as additional site specific and River Forecast Centre snowpack data becomes available this spring.

Table 1 Average and 2013 projected (84%) flow rates for Hazeltine Creek.

Month	Average Flow (m^3/s)	84 % of Average (m^3/s)
April	0.737	0.619
May	0.652	0.548
June	0.201	0.169
July	0.096	0.080
August	0.033	0.028
September	0.023	0.019
October	0.023	0.019

Projected Discharge Volumes

To calculate the discharge volumes, MTD water quality was based on samples taken between April 2010 and November 2012 (refer to Appendix 2). These sample results were averaged because MTD water quality does not fluctuate significantly seasonally due to the filtration and water retention properties of the dam. The only exception was temperature, in which monthly averages were used. For Hazeltine Creek monthly average water quality (to reflect natural seasonal changes) was calculated from 75 samples taken between January 2008 through 2012 at site W7 (refer to Appendix 2).

Calculations were completed based on 84% of average Hazeltine Creek flow rates (as discussed above) and average MTD flow rates (as calculated from 2008, 2009, and 2010 measurements). The maximum MTD discharge rate (as a percentage of Hazeltine Creek flow) that did not exceed any receiving environment guidelines was calculated, assuming proportional mixing. This is a conservative approach, which does not account for the potential of the creek water ameliorating certain parameters in the effluent water (Minnow, 2009).

During freshet months (April and May), the limiting factor for the volume of effluent discharged is the MTD flow rate, as water quality predictions show PE-11678 targets are not at risk of being exceeded even when 100% of the MTD is being discharged. From June to October, water quality predictions show that only a portion of the MTD water may be discharged or receiving environment guidelines will be exceeded. A 25% safety factor has been applied to the predicted maximum allowable MTD discharge for these months.

Table 2 provides the 2013 planned monthly discharge rates, accounting for the 30 day wait period after MOE approval of this Plan. In the discharge system, the allowable MTD discharge as a percentage of

Hazeltine Creek flow will be applied in real-time to actual Hazeltine Creek flow rates. The corresponding effluent discharge rate will be continuously monitored (as required under Section 3.4 of the Permit and MMER Section 19 (3). The monthly discharge volumes are projected values based on the predicted Hazeltine Creek Flow rates (84% of average). An estimated 76, 727 m^3 of water will be discharged in 2013 plus an estimated additional 700 m^3 during system testing. The total volume of 77, 427 m^3 of water discharged does not exceed the permitted maximum of 1.4 million m^3 per year.

Table 2 Planned 2013 discharge rates and volumes

Month	Hazeltine Q	MTD Discharge		Discharge Days	Discharge Volume
	m^3/s	%	m^3/s	days	m^3/month
Jan	0.050	0.0	0.000	0	-
Feb	0.050	0.0	0.000	0	-
Mar	0.070	0.0	0.000	0	-
Apr	0.619	0.00	0.0000	0	-
May	0.548	2.2	0.012	19	19,791
Jun	0.169	4.5	0.008	30	19,712
Jul	0.081	8.9	0.007	31	19,309
Aug	0.025	11.3	0.003	31	7,566
Sep	0.019	11.3	0.002	30	5,565
Oct	0.019	9.4	0.002	31	4,784
Nov	0.080	0.0	0.000	0	-
Dec	0.050	0.0	0.000	0	-
				Total	76,727 m^3/year

Notes:

1) Maxiumum % Effluent in Hazeltine Creek = 35 (as per PE 11678)
2) Discharge period is from April - October (as per PE 11678)
3) Maximum MTD Discharge = 0.012 m^3/s
4) ~ 100 m^3/day discharge testing May 6 - 12, 2013 not included in discharge volume calculations
5) Full MTD discharge during May 13 - 31 (freshet)
6) 25% safety factor applied June - October (only 75% of predicted allowable discharge volume will be discharged)

MPMC maintains a site water balance primarily for monitoring and predicting TSF supernatant levels and assessing dam building requirements. In 2013, the dam will be raised to an elevation deemed appropriate based on historic and projected data. These projections will not take the discharge into account as a conservative measure in the event that MPMC is unable to discharge due to unforeseen circumstances. As of February 28, 2013 there was approximately 6, 300, 000 m^3 of supernatant in storage. Comparatively, the discharge volumes are very small, and sufficient supernatant will remain TSF to be reclaimed for milling processes.

Discharge Timeline Summary

- **March 14, 2013:** Submit final Discharge Plan to the MOE.

- **March 15, 2013:** Submit digital copy of final Discharge Plan to the Soda Creek Indian Band and Williams Lake Indian for review.
- **April 1, 2013:** Deadline for First Nations comments on the Discharge Plan.
- **April 1 – 5, 2013:** MPMC to respond to First Nations Comments, allowing MOE to approve the Discharge Plan.
- **May 6, 2013:** Discharge system testing start date (approximately 100 m^3/day). Final Discharge Plan to be submitted to the Environment Canada Authorization Officer within 60 days.
- **May 13, 2013:** Full MTD flow discharge (sufficiently diluted by freshet runoff)
- **June 1, 2013:** Discharge start date (using 25% safety factor)
- **October 31, 2013:** Discharge end date

Protection of Receiving Environment

Water Chemistry

The predicted downstream water quality based on the planned discharge scenario in Table 2 is provided in detail in Appendix 3. Table 3 shows the projected change in Hazeltine Creek water quality at monitoring site W7 (downstream of the discharge) for key parameters of concern. Water quality projections for all parameters in each discharge month are below the guidelines in Table 1 of PE-11678. Note that "Hazeltine (After)" water quality predictions as referred to in Table 3 and Appendix 3 are for monitoring location W7.

Table 3 Projected receiving environment levels of key parameters of concern

Month	Hazeltine (Before)						Hazeltine (After)				
	Cd (mg/L)	SO_4 (mg/L)	Cu (mg/L)	Se (mg/L)	Temp (°C)		Cd (mg/L)	SO_4 (mg/L)	Cu (mg/L)	Se (mg/L)	Temp (°C)
Jan	0.000007	26	0.00226	0.00077	0.1		0.000007	26	0.002257	0.00077	0.1
Feb	0.000007	27	0.00273	0.00074	0.1		0.000007	27	0.002727	0.00074	0.1
Mar	0.000007	26	0.00198	0.00072	0.5		0.000007	26	0.001975	0.00072	0.5
Apr	0.000009	21	0.00473	0.00044	1.3		0.000009	21	0.004734	0.00044	1.3
May	0.000010	22	0.00345	0.00068	6.9		0.000012	31	0.004306	0.00072	6.9
Jun	0.000008	22	0.00416	0.00079	12.7		0.000012	41	0.005843	0.00086	12.5
Jul	0.000006	25	0.00273	0.00059	14.6		0.000014	60	0.006036	0.00074	14.0
Aug	0.000007	22	0.00154	0.00055	14.7		0.000016	66	0.005770	0.00074	14.1
Sep	0.000029	23	0.00157	0.00049	9.9		0.000036	66	0.005792	0.00069	9.7
Oct	0.000008	25	0.00246	0.00032	3.5		0.000016	62	0.005962	0.00050	3.9
Nov	0.000009	22	0.00408	0.00042	1.1		0.000009	22	0.004075	0.00042	1.1
Dec	0.000006	24	0.00270	0.00044	0.0		0.000006	24	0.002698	0.00044	0.0

To ensure these predictions are accurate, monitoring will occur throughout the discharge season as outlined in the *MPMC Annual Monitoring Plan – 2013* (MPMC, 2013) submitted to an approved by MOE. Sample site details are provided in Table 4 and their locations are shown in the map in Figure 1. Planned monitoring under PE-11678 and MMER during the discharge season includes:

- Continuous conductivity monitoring of the effluent.

- Weekly sampling at HD-1 to ensure effluent guidelines in PE-11678 Section 1.2.4 and MMER Schedule 4 are not exceeded.
- Weekly sampling at W7 to ensure that guidelines in PE-11678 Section 2.6 are not exceeded. The rolling 30-day mean will be recorded and report to the MOE as per Section 2.6.1.
- Weekly sampling at HD-US to provide Hazeltine Creek water quality prior to mixing with effluent for comparison with W7 results.

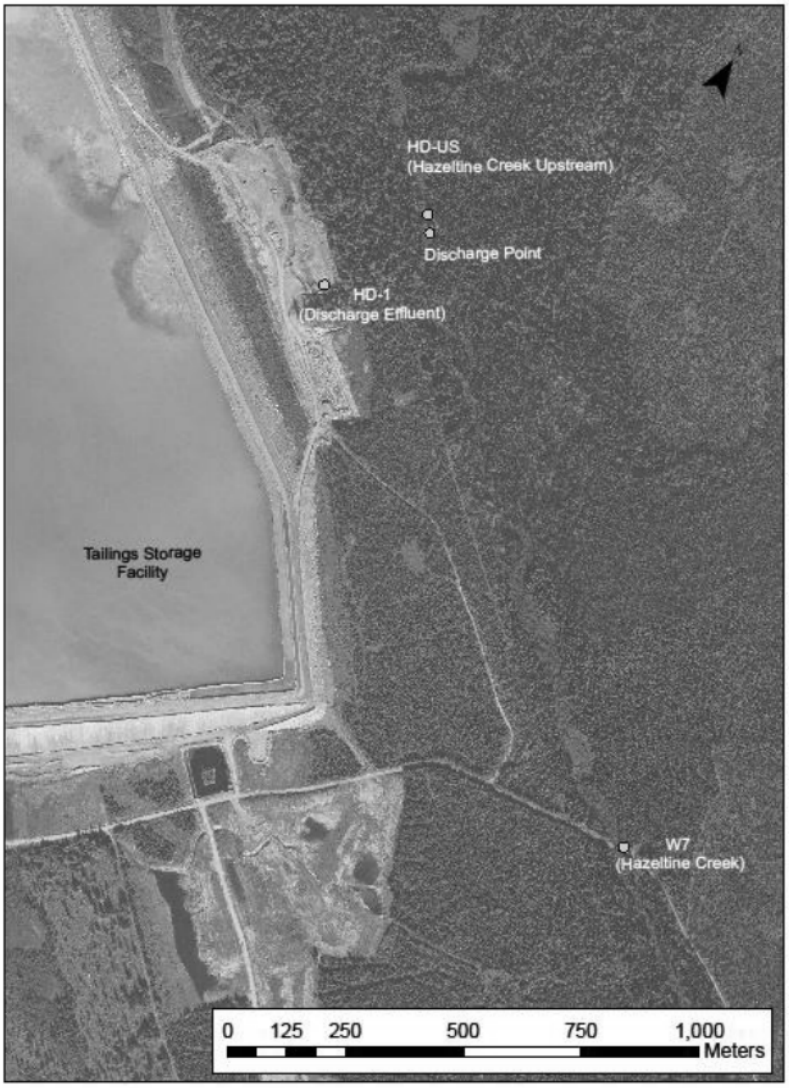


Figure 1 Discharge Monitoring Locations

Table 4 Discharge sample locations

Site Name	EMS Number	Location
HD-1	E289717	Discharge effluent sampled from mixing tank.
HD-US	E291249	Hazeltine Creek approx. 20 m upstream of the discharge point.
W7	E208038	Hazeltine Creek approx. 800 m downstream of the discharge point, under the Gavin Lake Forest Service Road bridge.

Water Temperature

To protect aquatic habitats, the BC Water Quality Guideline for aquatic life is the water temperature should not change greater than 1 °C beyond the optimum range for each life history phase for the most sensitive salmonid present and the hourly rate of change should not exceed 1 °C. As shown in Table 5, the discharge is not projected to change the water temperature in Hazeltine Creek greater than 1 °C for any month, thus maintaining appropriate water temperatures for fish development.

Continuous temperature monitoring of the effluent and of Hazeltine Creek downstream of the discharge (at W7) will be conducted.

Table 5 Projected effects of MTD discharge on water temperature in the receiving environment

Month	MTD		Hazeltine (before)		Hazeltine (after)		BCWQG
	Flow	Conc.	Flow	Conc.	Flow	Conc.	
Jan	0.000		0.05	0.1	0.05	0.1	<1 degree C deviation from optimum range for each life stage
Feb	0.000		0.05	0.1	0.05	0.1	
Mar	0.000		0.07	0.5	0.07	0.5	
Apr	0.000	6.5	0.62	1.3	0.62	1.3	
May	0.012	5.7	0.55	6.9	0.56	6.9	
Jun	0.008	8.8	0.17	12.7	0.18	12.5	
Jul	0.007	7.8	0.08	14.6	0.09	14.0	
Aug	0.003	9.2	0.03	14.7	0.03	14.1	
Sep	0.002	8.3	0.02	9.9	0.02	9.7	
Oct	0.002	7.3	0.02	3.5	0.02	3.9	
Nov	0.000		0.08	1.1	0.08	1.1	
Dec	0.000		0.05	0	0.05	0.0	

Note: MTD annual averages w ere used in calculations for all other parameters,
as parameters do not fluctuate seasonally due to the retention and filtration properties of the dam.
Temperature, how ever, does show slight seasonall fluctuations, and monthly averages w ere used.

Physical Stability

Section 5.5.1 of the *Mount Polley Mine Technical Assessment Report for a Proposed Discharge of Mine Effluent* (Minnow, 2009) assessed the potential for adverse effects of discharge on channel stability through quantification of erosion potential and regime modelling. Changes associated with the proposed discharge were found to be well within the range of natural variability, and are well below the historical decrease caused by the diversion of Bootjack Creek from Hazeltine Creek to Morehead Creek which represented an approximate 34% reduction in catchment area and associated flow. Nonetheless, to ensure that adverse changes do not occur, ongoing monitoring of erosional and depositional sites

below the discharge point, as outlined in the *Biological Monitoring and Lake Sampling Plan (*MPMC, 2013).

Fish Habitat

In addition to water quality and physical stability monitoring, MPMC will collect additional data to ensure no adverse changes to fish habitat occur:

- Photo documentation at the mouth of Hazeltine Creek will be conducted annually to monitor primary productivity.
- Sediment sampling at a depositional area downstream of the discharge will be completed annually to monitor selenium levels.
- Periphyton sampling will be completed downstream of the discharge (at W7) annually to monitor chlorophyll a and selenium levels.
- Toxicity testing of the effluent at HD-1 (96 hour LC50 rainbow trout toxicity (acute) and 48 hour LC50 Daphnia Magna toxicity (acute) monthly, as well as EC25 rainbow trout embryo/alvin toxicity (chronic) and 7 day *Ceriodaphnia dubia* toxicity (chronic) bi-annually).
- As required under MMER, MPMC will complete an Environmental Effects Monitoring Program in 2014 which will include sublethal toxicity testing on a fish species, invertebrate species, plant species, and algal species.
- As part of the Towards Sustainable Mining Program (developed by the Mining Association of Canada), MPMC is working towards developing a corporate biodiversity policy, and will implement a biodiversity conservation plan. This will encompass the Hazeltine Creek environment.

Exceedances

Ministry of Environment

- If the effluent quality guidelines in PE-11678 Section 1.2.4 are exceeded, discharge will immediately cease, and will resume only when two subsequent tests meet the effluent requirements (as per Section 1.2.5 of the Permit).
- Any toxicity test failures will be reported to the MOE Environmental Protection Director immediately, and MPMC will make immediate arrangements to complete a re-test.
- If any receiving environment guidelines in PE-11678 Table 1 or the water quality targets outlined in Appendix 3 are exceeded, the MOE Environmental Protection Director will be notified and discharging will cease immediately. The Annual Discharge Plan will then be amended and re-approved by the MOE Environmental Protection Director before discharging resumes (as per Sections 2.6.2. and 2.6.3 of the permit).

Environment Canada

- As required under MMER Section 24 (1-2), the Inspector will be notified, without delay, if effluent monitoring guidelines in MMER Schedule 4 are exceeded, if the effluent is outside the pH range of 6.5 to 9.5, or if the effluent is acutely lethal. A written report will follow within 30 days of the tests being completed.

- If the effluent is determined to be acutely lethal, the effluent water quality samples will be characterized without delay and additional acute lethality sampling will be conducted as required under MMER Section 15.
- If deposits outside of the normal course of events occur, acute lethality testing will be completed without delay as per MMER Section 14 (1). A written report meeting the requirements outlined in MMER Section 31 (2) will be submitted within 30 days, as required under Section 31 (2).

Reporting

Ministry of Environment

A summary of the 2013 discharge program and monitoring results will be included in the 2013 Annual Environmental and Reclamation Report (March 31, 2014 deadline). The submission will include a statement outlining any permit breaches or guideline exceedences. This material will be reviewed and audited by a third party (Minnow Environmental), and the audit findings will be appended to the Annual Report.

This Annual Discharge Plan provides the information required under Section 2.6 of PE-11678. Any necessary changes based on outcomes of the 2013 discharge season, and will be incorporated into the 2014 discharge plan.

Environment Canada

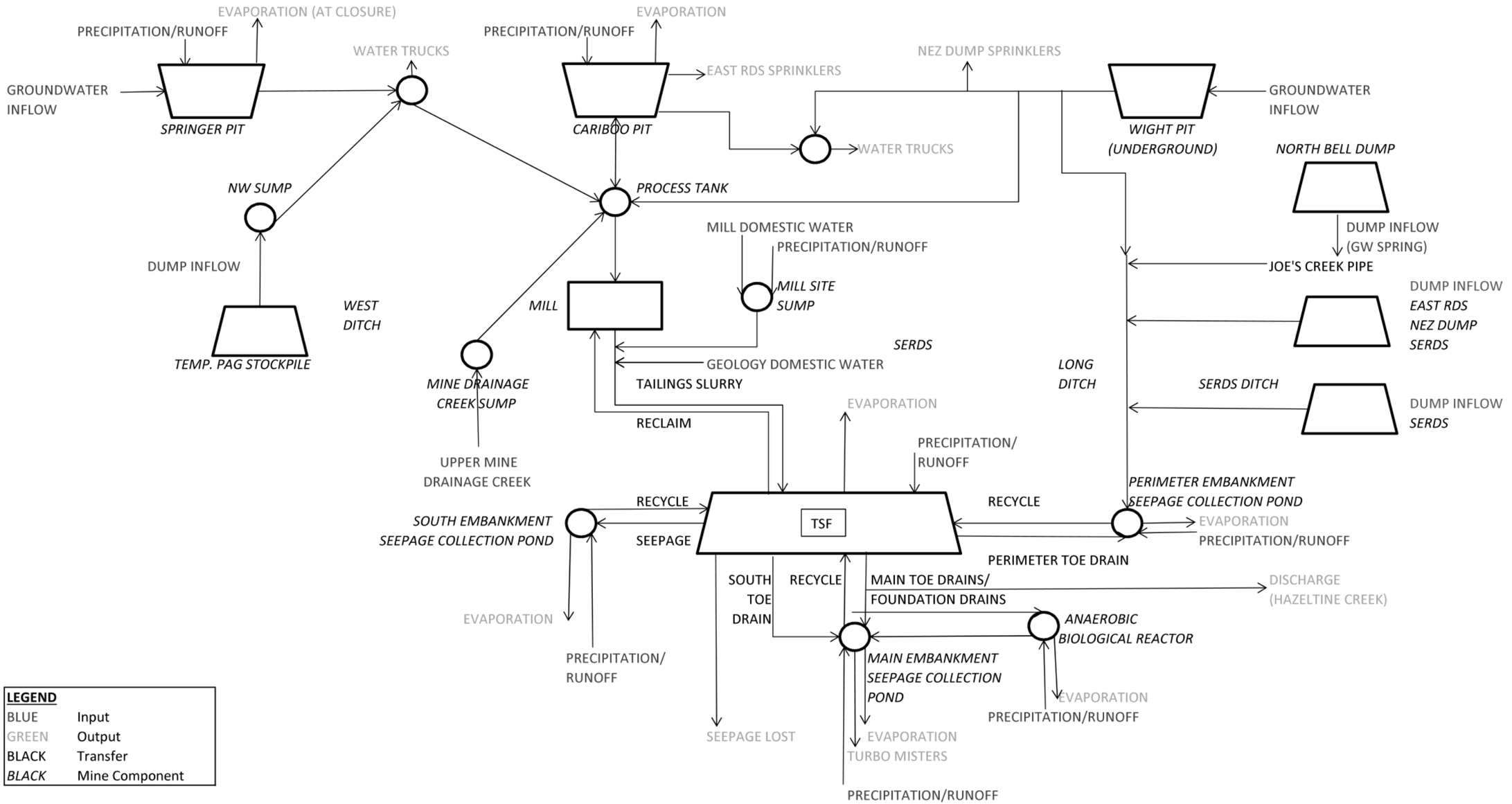
An annual report summarizing the effluent monitoring results for the 2013 and meeting the requirements outlined in MMER Schedule 6 will be submitted to Environment Canada by March 31, 2014.

References

BC River Forecast Center, 2013. Snow Survey and Water Supply Bulletin – February 1st, 2013. Retrieved February 12, 2013 from http://bcrfc.env.gov.bc.ca/bulletins/watersupply/current.htm

Minnow Environmental, 2009. Mount Polley Mine Technical Assessment Report for a Proposed Discharge of Mine Effluent. Report prepared for Mount Polley Mining Corporation, Likely, BC. July 2009.

MOUNT POLLEY MINE WATER BALANCE SCHEMATIC



LEGEND	
BLUE	Input
GREEN	Output
BLACK	Transfer
BLACK	Mine Component

Component		Data Source	Calculation Method
CARIBOO PIT SUMP			
Water In	**Precipitation (on water surface)**	Weather Station	= precipitation * area
	Precipitation Runoff	Weather Station	= precipitation * runoff area * runoff coefficient
	Groundwater Infiltration	KP 2004 Water Balance/Estimate	= constant
Water Out	**Evaporation**	Weather Station	= evaporation * water surface area
	Dust control/sprinklers	Calculated	= water truck volume * average # loads (may - oct) + sprinklers flow * time
Balance	**Water Volume (month end)**	Calculated	= projected (based on fill curves from surveyed pit topography)
	Water Transferred (mill/pits)	Calculated	= monthly change in volume - (water in - water out)
SPRINGER PIT SUMP			
Water In	**Precipitation (on water surface)**	Weather Station	= precipitation * area
	Precipitation Runoff	Weather Station	= precipitation * runoff area * runoff coefficient
	Groundwater Infiltration	KP 2004 Water Balance	= constant
Water Out	**Evaporation**	Weather Station	= evaporation * water surface area
Balance	**Water Volume (month end)**	Calculated	= projected (based on fill curves from surveyed pit topography)
	Water Transferred Out (West Ditch)	Calculated	= monthly change in volume - (water in - water out)
Mill Process Tank (overflow to Cariboo Pit)			
Water In	**Pumped from Cariboo Tank**	Estimation	= volume water "transferred" from Cariboo Pit (actually from tank)
	Pumped from NW Sump	In Situ Flow Data	= average measured flow rate
	Pumped from Mine Drainage Creek Sump	In Situ Flow Data	= average measured flow rate
	Pumped from Wight Pit (minus NEZ Sprinklers)	KP 2004 Water Balance/Estimate	= estimated infiltration rate - sprinkler flow rate*time
	Pumped from Springer	Estimation	= volume water "transferred" from Springer
Water Out	**To Mill (estimated)**	Calculated	= balance of process tank inputs/outputs
	To Mill (actual)	Mill data	= from mill reports
GEOLOGY/MILL SUMP			
Water In	**Precipitation (on water surface)**	Weather Station	= precipitation * area
	Minimum Freshwater Input (from 10 km well)	Estimate	= constant (based on estimate from Ron Martel)
	From Geology	Estimation	= based on average person/equipment water use
Water Out	**Evaporation**	Weather Station	= evaporation * water surface area
Balance	**Water Pumped to TSF**	Calculated	= water in - water out
LONG DITCH & SERDS DITCH (INCLUDES WEST DITCH & MINE DRAINAGE CREEK SUMP)			
Water In	**Runoff/Seepage Collection**	In Situ Flow Data	= average measured discharge rate
WATER INTO TAILINGS (m^3)			
Precipitation	Supernatant	weather station data	= precipitation * area
	Beach	weather station data	= Same as supernatant (except * runoff coefficient)
Mill	Tailings Slurry	mill production report	= data from mill
	Tailings Ditch (runoff)	estimation (visual/calculation)	= observation/area*precipitation*runoff coefficient
	Mill Site Sump	see above	= total from Mill Sump above
Seepage Ponds	Perimeter	weather station + field data	= precip + runoff + PTD+ LD+ SERDS/West Ditch (incl. MDC Sump) - evap
	Main	weather station + field data	= precip + runoff + MTD + STD - evap
	South	weather station + field data	= precip + seepage in - evap (runoff negligible)
Bulk Transfers	From pits, leachpad, etc.	Calculated	= Pit transfers + misc. estimates
TOTAL			= sum of all "water in" + mill sump
WATER OUT OF TAILINGS (m^3)			
Evaporation	Supernatant	weather station data	= evaporation * area
	Beach	weather station data	= evaporation * evaporation factor * area
	Turbomisters (bank of 3)	Calculated	= evaporation rate (from specs)*flow*runtime
Recycled Supernatant	Recycled Supernatant	mill data	= data from mill
Seepage	Toe Drains	flow monitoring	= average measured flow rates
	Seepage Lost	KP 2004 Water Balance	=constant
Retained in Tailings		mill production report, constants	= tailings*((water density/dry density) * (1/specific gravity))
Discharge		flow monitoring	= dischrge hours * discharge rate
TOTAL			= sum of all "water out"
SUPERNATANT SURPLUS/DEFICIT VOLUME (m^3)			
Monthly (Projected based on calculations)			= monthly water in - water out (surplus/deficit)
Cumulative (Projected based on calculations)			= annual sum of monthly totals
Cumulative (Projected based on fill curve)			= based on fill curve
Cumulative (Actual - Bathymetric Survey)			= based on bathymetric survey
DIFFERENCE			= actual - projected
TAILINGS VOLUME INTO BASIN (m^3)			
Monthly		mill production reports; constants	= (monthly tailings throughput)/ specific gravity
Cummulative (Annual)			= annual sum of monthly totals
Cumulative (Since Startup)			= sum of monthly totals + cummulative total from previous year
Cummulative Water Retained in Tailings (Since Startup)			= sum of water retained (monthly + cummulative form previous year)
TOTAL VOLUME (TAILINGS + SUPERNATANT + WATER RETAINED IN TAILINGS) (m^3)			
Monthly (Projected)			= supernatant + tailings
Cumulative (Annual - Projected)			=annual sum of monthly totals
Cumulative (Since Startup - Projected)			= sum of monthly totals + cummulative total from previous year
TAILINGS WATER SURFACE ELEVATION (masl)			
Actual Elevation		survey value	= surveyed
Projected Elevation		bathymetric survey	= formula based on fill curve
DIFFERENCE			= actual - projected

MPMC Site Water Balance - Constants

Assumed Constants	
beach evaporation factor	0.8
soilds content	35%
dry density	1.4
tailings specific gravity	2.65
water density	1
water content in ore	2.98%
TSF unrecoverable seepage (m^3/month)	5840
sprinkler use (m^3/h) - 3 to 4 sprinklers	204
turbomister bank of 3 (m^3/month) - summer	19659
turbomister bank of 3 (m^3/month) - fall	8425
water truck daily water use (m^3/day)	8180

Area (m^2)	
Cariboo Pit Sump	19000
Cariboo Pit Runoff	72900
Springer Pit Sump	100
Springer Pit Runoff	748000
Mill Sump	4000
TSF Supernatant Area	1820000
TSF Beach Area	530000
Perimeter Seepage Pond	5252
Perimeter Seepage Pond Runoff - Veg	38000
Perimeter Seepage Pond Runoff - Rock	23091
Main Seepage Pond	12500
Main Seepage Pond Runoff - Grass	124000
Main Seepage Pond Runoff - Rock	116000
South Seepage Pond	300

Pump/Flow Rates	
Geology Input into mill sump (m^3/mo)	76
Minimum water input from 10km well (m^3/d)	545

Groundwater/Seepage Infiltration Rates (m^3/month)	
Cariboo Pit	0
Springer Pit	49,868
Wight Pit	40,010
South Seepage Pond	2500

Runoff Coefficients			
Component	Low Flow	General	Freshet
Beach	0.90	0.90	0.90
Downstream Tailings Areas	0.00	0.30	1.00
Disturbed RSD Areas	0.00	0.15	0.90
Open Pit Areas	0.50	0.50	0.50
Undisturbed Catchment	0.25	0.25	0.25

(Revised version of Table 9 from KP 2004 water balance)

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