Mount Polley Mining Corporation

IMPERIAL METALS CORPORATION

2011 Environmental and Reclamation Report

Submitted to:

Ministry of Energy and Mines
(*Mines Act* Permit M-200)

And

Ministry of Environment

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Table of Contents

1.0 INTRODUCTION

1.1 Company Profile

Imperial Metals Corporation is the sole owner/operator of the Mount Polley Mine, an open pit copper-gold mine, located approximately 60 km northeast of Williams Lake, B.C. (Figure 1). Access to the mine site from 150 Mile House is north along Likely Road for 60 km to Morehead Lake and then south at the Bootjack Lake turn-off for another 12 km on the site access road to the property. The mine is positioned on a ridge dividing the Polley Lake / Hazeltine Creek drainage from the Bootjack Lake / Morehead Creek drainage, both of which are situated within the Quesnel River Watershed.

The Mount Polley open pit operation is on a phased development schedule, ultimately involving the creation of six and possibly seven pits. The current project infrastructure consists of the mill site, one active open pit, three rock disposal sites and a Tailings Storage Facility (TSF), as well as the main access road, power line, tailings pipeline, drainage collection systems and sediment/ seepage control ponds. Initial construction activities in 1995 consisted primarily of clearing the mill site. Construction of the entire facility began in 1996 with the mill being commissioned in June 1997. The first full year of mining and milling at Mount Polley took place in 1998. The mine suspended operations in October 2001, then reopened in December 2004, with mill production commencing again in March of 2005. Current identified ore reserves indicate a projected mine life into the year 2016.

Approval of the Mount Polley Mine Reclamation and Closure Plan by the Ministry of Energy and Mines resulted in the issuance of Permit M-200 in July of 1997.

In May of 1997 the mine received a Ministry of Environment (MOE) (previously the Ministry of Water, Land and Air Protection) Effluent Permit (PE 11678) issued under the provisions of the provincial Waste Management Act. The permit authorized the discharge of concentrator tailings, mill site runoff, mine rock runoff, contaminated soil, open pit water, and septic tank effluent to a tailings impoundment. The most recent amendment to this permit (May 2005) allows for the discharge of effluent from the Main Embankment Seepage Collection Pond. There have been no discharges from this location since 2005.

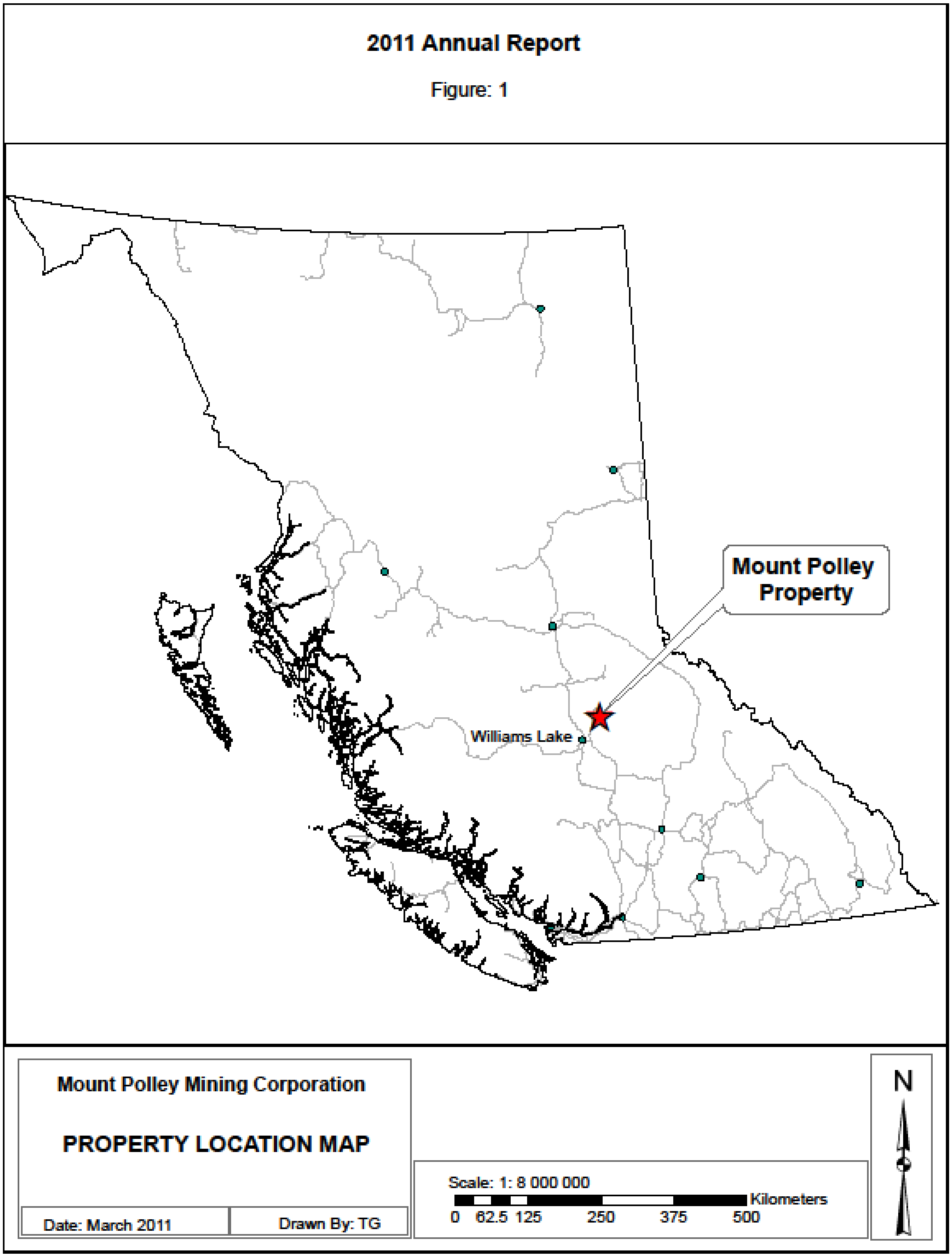

Figure 1: Location of Mount Polley Mining Corporation

In 2009, Mount Polley submitted an effluent discharge application to the MOE. This application is currently under review by MOE.

In August 2011, Mount Polley received an amendment to permit M-200 to mine the C2 and Boundary Zone pits. This will extend the mine to include a larger footprint in the Springer Pit, a temporary PAG rock dump, and a new South East Rock Dump

1.2 Purpose of Report

Mount Polley Mining Corporation is required to submit two reports annually. Beginning with the reporting year 2000, these two reports have been combined into one for submission to the Ministry of Energy, Mines and Petroleum Resources (now Ministry of Energy and Mines) and to the MOE. This reporting format of a combined report for both Ministries has been continued for the 2011 reporting year.

The Annual Reclamation Report for MNRO as required by permit M-200 requires a summary and description of the past years mining and reclamation program including;

- Area disturbed and disposal locations
- Reclamation of waste dumps, water courses, pits, and tailings impoundment
- ARD/ML prediction data, and prevention and control plans
- Drainage monitoring programs including flows and water quality
- Geological characterization, material characterization test work
- Reclamation costing.

The annual report for MOE, as required by PE-11678, includes a summary and description of all data collected as per requirements of the permit. The report generally depicts all historical data together with the current year's data in tabular and graphical formats and also provides supporting discussion of trends. The report provides the following:

- Summary of all water quality and climate data collected
- Information on the construction and performance of the tailings impoundment and dam
- Summary of disturbance and description of all reclamation activities
- Summary of biological and lake sampling program

- An evaluation of the impacts of the operation on the receiving environment.

1.3 Reclamation Objectives

In accordance with the BC Mines Act and the Health, Safety and Reclamation Code for Mines in British Columbia, the primary objective of the Reclamation Plan is to:

"return all mine-disturbed areas to an equivalent level of capability to that which existed prior to mining on an average property basis, unless the owner, agent or manager can provide evidence which demonstrates to the satisfaction of the chief inspector the impracticality of doing so".

In 1995 and 1996, a comprehensive environmental baseline-monitoring program, which expanded on previous studies (1989/1990), was designed and carried out in order to support mine planning, operations, and reclamation. The program included environmental baseline studies documenting the pre-development land use and conditions of the aquatic and terrestrial ecosystems. This provided the foundation upon which the operational and post–closure monitoring programs are based and reclamation activities are developed, such that the land may be returned to its original capability once mining has ceased. Environmental monitoring is ongoing, fulfilling both the requirements of the M–200 permit by the Ministry of Energy and Mines (MEM) and the effluent permit PE 11678 by the (MOE).

The reclamation plan specifies the primary end land uses for the Mount Polley project area are wildlife habitat and commercial forestry. Reclaimed areas will also be capable of supporting secondary end land uses such as hunting, guide-outfitting, trapping and outdoor recreation. Perpetuating, and, if possible, enhancing biodiversity are important considerations when planning for wildlife habitat as an end land use objective. The following objectives are implicit in achieving this primary goal:

- Long-term preservation of receiving water quality within and downstream of the receiving environment of the decommissioned operations;
- Long-term stability of engineered structures, including the rock disposal sites, TSF and open pits, as well as all exposed erodible materials;
- Natural integration of disturbed lands into surrounding landscape and, to the greatest possible extent, restoration of the natural appearance of the area after mining ceases;

- Establishment of a self-sustaining vegetative cover, consistent with the end land uses of wildlife habitat, commercial forestry, and outdoor recreation; and
- Removal and proper decommissioning of all secondary access roads, structures and equipment not required after the mine closes.

To achieve these objectives, reclamation planning must be flexible enough to allow for modifications to the mine plan, and to incorporate results from ongoing reclamation research programs into the plan.

1.4 Environmental Monitoring

Environmental monitoring at Mount Polley consists of the following components:

- Drainage chemistry of surface, seepage and groundwater
- Static Water levels in groundwater wells
- Stream flows and water levels
- Weather (temperature and precipitation)
- Evaporation rates
- Snowpack
- Biosolids shipments
- Mineral-enriched soil shipments

The main objective of the environmental monitoring program is to monitor and track changes to drainage chemistry from disturbed areas and waste material in surface water, seepage water and groundwater. Sampling procedures follow those that are described in the “British Columbia Field Sampling Manual for Continuous Monitoring plus the Collection of Air, Air Emission, Water, Wastewater, Soil, Sediment, and Biological Samples” 2003 edition and the Mount Polley “Quality Assurance/Quality Control Manual”.

Throughout the year, on a regularly scheduled basis, surface water and ground water samples are collected at locations and time intervals consistent with specifications listed in Permit PE 11678. The samples are then sent to an independent laboratory, ALS Laboratory Group (ALS), for analysis and reporting. These surface and groundwater monitoring locations are shown in Figure 2.0. In addition, surface water flows and static ground water levels are also measured and recorded on a regular basis at locations specified in permit PE 11678.

Static water levels are recorded in conjunction with water sampling of the groundwater monitoring wells.

Monitoring of Polley and Bootjack lakes consists of sampling water from the surface and 2 metres off the bottom at two locations in both lakes (P1, P2 and B1, B2 respectively). This sampling is conducted twice annually in the Spring and Fall. At the same time and once in late winter, when the ice is thickest, conductivity, pH, dissolved oxygen and temperature are measured from top to bottom to document the lake profiles.

The Mount Polley weather station continuously measures daily precipitation (rainfall during non freezing months only), and temperature. The weather data is downloaded on a monthly basis. Evaporation rates are measured on site with an evaporation pan (non-freezing months only) and are summarized at year-end along with the precipitation and temperature data. Winter snow pack measurements are taken at the end of each month. This data is used to update the water balance on a monthly basis.

At such time that the mine discharges under the current permit, or under a new discharge permit, a biological monitoring program initiated in accordance with the Metal Mining Effluent Regulations will be developed.

Mount Polley continues to recycle used materials including waste oil, scrap steel, batteries, plastic pails, and beverage containers. In 2011, Mount Polley donated the funds generated by its beverage container recycling program to the Big Brothers and Big Sisters of Williams Lake and to the Mountview School Association. As part of promoting our habitat stewardship initiatives, the mine discourages wildlife interaction through a garbage management program and bear awareness training. In 2011, there were no bear encounters or mortalities.

In 2011, Mount Polly accepted approximately 12, 492 tonnes of mineral-enriched soil from the Langley site. There were no shipments received from HAZCO. 2, 396 tonnes were placed on the leach pad and 10, 096 tonnes were stockpiled to be processed. After these materials are processed through the mill they report to the tailings pond. Generally, these materials are similar to mine waste material found at Mount Polley. Monthly composite tailings samples were taken when processing the Langley soil and all analytical results were below the lead level found in Table 1, Schedule 4 “Leachate Quality Standards" of the Hazardous Waste Regulation.

2.0 Surface and Groundwater Monitoring

2.1. Data Quality Assurance/Quality Control (QA/QC)

The purpose of a QA/QC program is to verify the reliability of monitoring data through the implementation of procedures for controlling and monitoring the measurement process. The QA/QC program provides information for the evaluation of the analytical procedures, and for the monitoring of issues pertaining to possible contamination both in the field and in the analytical laboratory. The QA/QC program is conducted at all stages of the sampling program: sample collection, transport, filtration, and analysis and for all sites including surface water quality sites, lakes, and groundwater wells. Appendix A includes the National Quality Manual Summary provided by ALS.

2.1.1. Data Quality Objectives

The Laboratory Data Quality Objectives provided to Mount Polley by ALS are also included in Appendix A.

2.1.2. Replicates and Travel Blanks

The field quality assurance program at Mount Polley includes one semi-blind replicate for standard parameters, one semi-blind replicate for total metals, one semi-blind replicate for dissolved metals and a travel blank that is submitted with each month's sample shipment.

The semi-blind replicates are intended to evaluate the QA/QC surrounding the sampling methods. Replicates are prepared by collecting two full sample suites from one location, labeling one with the correct sampling location name (e.g. E4) and labeling the second sample suite with anonymous name (e.g. ED). When the results are reported back from the analytical laboratory all parameters from the replicate and the actual sample are screened to confirm likeness or potential of sampling error/contamination. The screening process also considers small-scale natural variations in water quality which may occur over the timescale of collection (~10 minutes). In particular, there is considerable potential for variations in water quality over short-time scales during periods of high sediment loads.

Travel blanks, supplied by the analytical laboratory, are exposed to the same conditions and treatments as the water samples collected, and are intended to monitor contamination that may occur in the field.

When conducting lake water quality sampling, an equipment blank sample is taken with the Van Dorn bottle at the beginning of each sampling event.

2.2. Field Methodology

2.2.1. Sample Collection

All water sampling was done in accordance with the procedures described in the "British Columbia Field Sampling Manual: 2003 – For Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples" and the Mount Polley "Quality Assurance/Quality Control Manual".

2.2.2. Field Meters

Field Meters are used to measure; dissolved oxygen, conductivity, pH and water flow.

The conductivity and pH meter used for field analysis of surface water and groundwater is a WTW pH/Conductivity 340i meter. Prior to taking measurements, the meter is calibrated using buffer pH of 4.00 and 10.00.

Winter and fall lake profile samples were taken using an YSI 600QS Multi-meter with a 30 meter cable, rented form Hoskin Scientific in Burnaby, BC. Spring lake profile samples were taken using an YSI Professional Plus multi-meter instrument with a 30 meter cable, purchased in 2011 by Mount Polley.

Previously, Mount Polley staff used a portable flow monitoring device (Swoffer Model 3000). In 2010, the mine purchased a Sontek FlowTracker ADV (Acoustic Doppler Velocimeter). The FlowTracker handheld ADV meter is used for monitoring creek flow rates and calculating discharge reports an ISO (international standard calculation)) and Statistical (U.S. Geology Survey calculation) percent error for each calculated discharge. These values are based on depth, velocity, width, method, number of stations, and calibration accuracy. A summary of the level of error in the discharge at each site is presented in Table 2.1. Ideally, errors should be below 10%.

Table 2.1 ISO and Statistical error of 2011 discharge measurements using the FlowTracker

Site	No. of Samples	ISO (%)			Statistical (%)		
		Mean	Max	Min	Mean	Max	Min
W1a	7	4.0	4.9	3.0	9.2	15.9	6.0
W4	2	7.5	9.2	5.8	28.3	45.1	11.4
W5	10	5.0	7.6	3.7	9.5	27.7	4.6
H7	18	3.0	4.3	2.2	3.7	9.8	1.5
W8	1	4.2	4.2	4.2	3.2	3.2	3.2
H11	12	3.0	4.3	1.8	5.2	10.5	1.5
W12	7	3.4	3.8	2.5	4.5	9.2	2.4
LD	10	3.2	5.4	2.5	3.0	6.5	1.7
PTD	5	5.5	5.9	4.8	12.6	21.6	6.2
STD	4	4.9	5.5	4.2	10.8	20.1	3.9

2.2.3. Field Replicates

Semi-blind field replicates were compared for the purpose of evaluating the precision of the methods used (i.e. combined precision of field methods, lab methods and the environmental variability between the side-by-side samples). A relative percent difference (RPD) of ±20% was used to identify significant differences between the replicate and sample, where the RPD (as %) can be defined as:

RPD (%) = (Value 1 – Value 2)/mean X 100

There were 13 field replicate samples taken in 2011 (Table 2.2). For total metal analyses, RPDs of >20% were occasionally observed for several total metals including Al, Cu, Fe, Mn, Mo, Se, and Pb (Table A.1, Appendix A). Some degree of environmental variability can be expected in replicate samples for parameters influenced by Total Suspended Solids (TSS).

For dissolved metals analyses, there were occasional RPD results >20% observed for parameters including Al, Cu, Fe, Mn, and Se (Table A.2, Appendix A).

For general parameters (Ammonia, Nitrate, Nitrite, Sulphate, and TSS), RPD results of >20% were observed occasionally in TSS only (Table A.3, Appendix A).

Table 2.2 Semi blind replicate samples taken in 2011

Date	Location	Name
02-Feb-11	W7	WG
07-Mar-11	W4	WD
05-Apr-11	E5	EE
04-May-11	W4	WD
12-May-11	E8	EH
09-Jun-11	W4	WD
04-Aug-11	W11	WK
25-Aug-11	W7	WG
08-Sep-11	W10	WJ
06-Oct-11	W7	WG
13-Oct-11	GW97-03	GW97-0C
01-Nov-11	E1	EA
05-Dec-11	W4	WD

2.2.4. Travel Blanks

Travel blanks were submitted with most monthly sets of samples for total metals and general parameter analyses in 2011. Results of these analyses are reported in table 2.3. All results were below detection limit which is expected.

Table 2.3 Results of analysis of travel blanks by ALS Environmental in 2011

Date	ALS File No.	TSS	Turbidity	Chloride	Ammonia Nitrogen	Nitrate	Nitrite
January	L969148	<3.0	<0.10	<0.50	<0.0050	<0.0050	<0.0010
March	L984697	<3.0	<0.10	<0.50	<0.0050	<0.0050	<0.0010
April	L992910	<3.0	<0.10	<0.50	<0.0050	<0.0050	<0.0010
May	L1004235	<3.0	<0.10	<0.50	-	<0.0050	<0.0010
June	L1016298	<3.0	<0.10	<0.50	<0.0050	<0.0050	<0.0010
July	L1032227	<3.0	<0.10	<0.50	<0.0050	<0.0050	<0.0010
August	L1041473	<3.0	<0.10	<0.50	-	<0.0050	<0.0010
September	L1056298	<3.0	<0.10	<0.50	<0.0050	<0.0050	<0.0010
October	L1071145	<3.0	<0.10	<0.50	<0.0050	<0.0050	<0.0010
November	L1081110	<3.0	<0.10	<0.50	-	<0.0050	<0.0010

2.3. Surface Water Monitoring

Surface water sampling and analysis is conducted in accordance with sub-section 3.1 of the Mount Polley Effluent Permit PE 11678. Field pH, temperature and conductivity were measured concurrently with surface water sampling using a WTW Multimeter and recorded in a field book. The sampling program included monthly sampling at six sites (E1, E4, E5, W4, W8 and W8z), quarterly sampling at six more sites (W1, W3a, W5, W7, W12, W13, and E8), bi-annual sampling at one site (W11), and intensive weekly week sampling for 5 weeks at three sites (W4, W8 and W8z) during spring freshet and autumn low flows. Table 2.4 outlines the number of sampling events at each site in 2011. Samples were submitted to ALS Laboratory Group for analysis of: physical parameters (turbidity, total suspended solids, total dissolved solids, and hardness); anions and nutrients (alkalinity, sulfate, total nitrogen, nitrate plus nitrite, ammonia and ortho-phosphorus); total metals; and dissolved metals.

Table 2.4 Sampling events in 2011 at surface water quality sites

Site	Sample Events
E1	12
E4	12
E5	12
E8	4
W1	4
W3a	5
W4	21
W5	14
W7	19
W8	19
W8z	10
W11	4
W12	4
W13	0

Thirteen parameters of concern were identified in the *Chemical Characterization of the Proposed Effluent for Discharge to Hazeltine Creek* (Knight Piesold, 2009) based on site geochemistry and historical characteristics, as well as existing and projected waste and water management practices..

To monitor changes in the effluent surface water quality, in the subsequent sections, thirteen key parameters of concern (POCs) are examined for each water quality site over time:

- **Physical Parameters**: Hardness, Total Suspended Solids
- **Anions**: Chloride, Sulphate
- **Nutrients** :Nitrate, Total phosphorus
- **Metals**: Dissolved Aluminum, Total Cadmium, Total Copper, Total Molybdenum, Total and Dissolved Iron, Total Selenium

Results for these POC concentrations were compared with current guidelines and regulations, and historical water quality trends. The data for all surface water quality sites is presented in tables and in figures in Appendix B.

2.3.1. Site E1 – Tailings Supernatant

Water quality at this site was sampled 12 times in 2011.

Notable observations in POC results:

Hardness: Increase began in 2006, continuing to a maximum of 970 mg/L in December 2010 and decreasing sharply in 2011 to a minimum of 409 mg/L in May.

TSS: Due to the continuous deposition of tailings into the pond, TSS are slightly elevated at this site. In 2011, the average TSS value recorded was 9.75 mg/L, ranging from less than detection (<3) to 24.2 mg/L (October 2011).

Chloride: Decrease from 2010 with a maximum of 37.6 and an annual mean of 25.07 mg/L.

Sulphate: Increased from September 2009 to December 2010, and then decreased in 2011. The mean value in 2011 was 647 mg/L

Nitrate + Nitrite: Increase began in late 2010 and decreased in 2011. The mean value in 2011 was 5.98 mg/L which exceeds the discharge limit of 3.0 mg/L.

Total Cadmium: Increases were observed in 2009 and 2010; however, levels decreased in 2011 with only five values above MDL for total cadmium.

Total and Dissolved Iron: A slight increase in total iron was observed in 2011 with a maximum value of 1.69 mg/L in November and an annual mean of 0.317 mg/L.

Total Molybdenum: 2011 saw a slight decrease in total molybdenum levels from previous years. The mean value reported in 2011 was 0.188 mg/L.

Total Selenium: Similar to the other metals, total and dissolved selenium levels decreased slightly in 2011. The mean value for total selenium in 2011 was 0.021mg/L.

There were no observed changes in total phosphorus, dissolved aluminum, or total copper at E1 in 2011.

2.3.2. Site E4 – Main Embankment Seepage Pond

Water quality at this site was sampled twelve times in 2011.

Notable observations in POC results:

This is the only site from which the mine is permitted a discharge; however, since the mine recommenced operation in 2005, there has been no discharge from this site. Although there have been no discharge, the following discussion provides a comparison of the permitted discharge levels of certain parameters and the values obtained in samples taken in 2010.

Hardness: An increasing trend has been observed since 2006. In 2011, a max hardness of 711 mg/L was observed in January and a minimum of 423 mg/L was observed in May.

TSS: A spike in TSS of 64.2 mg/L was observed at this site in April and exceeds the discharge limit of 25 mg/L. Five of the twelve samples collected were below detection limit (3.0 mg/L).

Chloride: Levels increased slightly in 2010 and then decreased again in 2011. The annual mean was 22.6 mg/L and the maximum observed was 31.9 mg/L.

Sulphate: An increasing trend has been observed since 2004. In 2011 a maximum of 756 mg/L was recorded in January and the annual mean was 556.9 mg/L which exceeds the discharge limit of 200 mg/L.

Nitrate + Nitrite: Increasing trend began in 2011. The maximum value reported in 2011 was 5.97 mg/L, and the annual mean was 3.95 mg/L, exceeding the discharge limit of 3.0 mg/L.

Total Phosphorus: A slight decrease was observed in 2011. A maximum value of 0.0993mg/L was reported with an annual mean of 0.025 mg/L.

Dissolved Aluminum: No trend recognized. In 2011, a maximum value of 0.0152 mg/L and an annual mean of 0.005 mg/L.

Total Cadmium: Cadmium levels continue to fluctuate somewhat at this location. The maximum in 2011 was 0.000178 mg/L (Cd-T), and the mean value was 0.000078 mg/L. Most of the dissolved cadmium results were below the MDL.

Total Copper: 2011 saw a slight increase in total copper levels (Maximum of 0.0309 mg/L) and mean of 0.0105 mg/L. With the exception of one result, all total copper levels were below the discharge limit of 0.02 mg/L.

Total and Dissolved Iron: An increase in total iron was observed in 2011 with a maximum of 3.34 mg/L and an annual mean of 0.544 mg/L. All results for total iron except for two were below the discharge limit of 1.0 mg/L.

Total Molybdenum: An increasing trend starting in 2005 continued through 2011 with a maximum total molybdenum result of 0.197 mg/L and an annual mean of 0.16 mg/L.

Total Selenium: An increase occurred late in 2010 and continued throughout 2011. The maximum value for total selenium was 0.0214 mg/L and the annual mean was 0.0133 mg/L which exceeds the discharge limit of 0.01 mg/L.

Toxicity analysis was conducted in February, June, August, and November by Nautilus Environmental. Analytical reports for the 96-hour LC50 toxicity (rainbow trout) tests can be found in Appendix B of this report; all toxicity results were non-lethal (i.e. no mortality observed in any test results).

2.3.3. Site E5 – Main Embankment Drain Composite

This site was sampled twelve times in 2011.

Notable observations in POC results:

Hardness: Increase began in 2006, continuing to a maximum of 547mg/L in April 2011, and then decreasing to a minimum 0f 399 mg/L by December.

Chloride: This parameter has only been reported since early 2009 and generally fluctuates between 20 and 28 mg/L. No trend has been observed.

Sulphate: An increasing trend has been observed since 2004. In 2011, a maximum of 577 mg/L was recorded in April and the annual mean was 497.8 mg/L.

Nitrate + Nitrite: A slight increase was observed in early 2011 with a maximum of 3.71 mg/L and an annual mean of 2.78 mg/L.

Total Phosphorus: A decreasing trend has been observed since 2005 with some fluctuations in 2008. The maximum in 2011 was 0.0404 mg/L and the annual mean was 0.0324 mg/L.

Total Cadmium: All but one cadmium reading was below MDL in 2011.

Total Molybdenum: An increasing trend beginning in 2007 continues at this site. In 2011, annual mean value was 0.177 mg/L and the maximum was 0.192 mg/L.

Total Selenium: Fluctuates significantly at this site, however, a trend has not been observed. In 2011, the annual mean was 0.008 mg/L and the maximum was 0.0131 mg/L.

There were no observed changes in total copper or total and dissolved iron in 2011.

All TSS results were below MDL. There were no changes observed in dissolved aluminum and results remain well below the BC Water Quality Guidelines (BC WQG).

2.3.4. Site E7 – Perimeter Seepage Pond

This site was previously a permitted discharge location from the mine site. In 2006 this permit was removed and sampling was no longer a requirement of PE 11678. The site has been sampled periodically and in 2011 there were 5 samples collected. The tables and figures presenting water quality data from this site have been included in this report in response to a request from MOE in August 2011.

Notable observations in POC results:

Hardness: A slight increase has been observed since 2008 to a maximum of 772 mg/L in June 2011, with an annual mean of 691 mg/L.

Chloride: This parameter has only been reported since early 2009. No trend has been observed.

Sulphate: No trend has been observed at this site. In 2011, a maximum of 701 mg/L was recorded in May and the annual mean was 701 mg/L.

Nitrate + Nitrite: A slight increase was observed between 2010 and 2011 with a maximum of 10 mg/L reported in May and an annual mean of 7.20 mg/L.

Total Selenium: Increase from 2008 to 2011 to a maximum of 0.0487 mg/L. The annual mean was 0.023 mg/L.

There were no observed changes in TSS, aluminum, copper, iron, molybdenum, or phosphorus, in 2011.

2.3.5. Site E8 - Cariboo Pit Supernatant

There were four samples taken from this location in 2011.

Notable observations in POC results:

Hardness: Increasing trend existed from 2002 to 2010, reaching a maximum of 838 mg/L in November 2010. 2011 saw a slight decrease to a minimum of 598 mg/L and an annual mean of 722.25 mg/L.

Chloride: Somewhat lower than in previous years with a maximum of 12.6 mg/L and an annual mean of 10.225 mg/L.

Sulphate: Increasing trend began in 2006 continuing to the end of 2010. The sulphate levels decreased notably again in 2011. The annual mean value was 632 mg/L and the minimum value was 474 mg/L in November.

Dissolved Aluminum: An increase was observed in the final sample of 2011. The maximum was 0.176 mg/L and the annual mean was 0.046 mg/L.

Total Selenium: Slight increase but relative to previous measurements. 2011 maximum was 0.042 mg/L and the annual mean was 0.024 mg/L.

All TSS results were low or below MDL. There was no change and no trend observed in nitrate, phosphorus, total cadmium, copper, iron, or molybdenum.

2.3.6. Supplemental Monitoring of Effluent Water Quality

In addition to the permit requirements, Mount Polley does supplemental monitoring in order to fill in any gaps of data. This includes:

Total and Dissolved Mercury at E1 and E4: All results below MDL.

Daphnia Magna toxicity at E1: All results “non-lethal”.

Coliform and Ecoli at E1, E4: Some bacteria detected as expected in this environment.

Mineral Oil and Grease samples collected at E4: all results below MDL.

Long Ditch (LD): Quarterly water samples and analysis are collected and recorded.

2.3.7. Site W1 – Morehead Creek

This site was sampled four times in 2011.

Notable observations in POC results:

Sulphate: Slight increasing trend since 2005. The 2011 maximum was 6.65 mg/L and the annual mean was 4.0 mg/L.

Dissolved Aluminum: A slight increase was observed in 2011, with a maximum of 0.114 mg/L (exceeding the maximum of the BC WQ Guideline) and an annual mean of 0.057 mg/L

There were no noted changes of hardness, TSS, chloride, nitrate, phosphorus, total cadmium, copper, iron, molybdenum, and selenium results in 2011

2.3.8. Site W3a – Mine Drainage Creek at Mouth

This site was sampled four times in 2011.

Notable observations in POC results:

Hardness: Increase observed in 2011, with a maximum of 82.4 mg/L and an annual mean of 57.13 mg/L.

Chloride: No change observed; maximum of 18.3 mg/L and annual mean of 11.32mg/L.

Sulphate: Slight increase observed in 2011 with a maximum of 54.1 mg/L and an annual mean of 39.35 mg/L.

Nitrate: Slight decrease observed in 2011 with a maximum of 0.111 mg/L and an annual mean of 0.067mg/L.

Total and Dissolved Iron: Slight decreasing trend started in 2006. Maximum for total iron in 2011 was 0.188 mg/L and the annual mean was 0.0998 mg/L.

There were no changes observed in TSS, chloride, phosphorus, dissolved aluminum, total cadmium, copper, molybdenum, and selenium values in 2011.

2.3.9. Site W4 – North Dump Creek

This site was sampled 22 times in 2011 (once per month, in addition to twice in February to confirm high conductivity readings, and for five consecutive weeks in spring and fall).

Notable observations in POC results:

Hardness: Decrease observed since 2009. 2011 maximum was 574 mg/L and the annual mean was 184 mg/L.

TSS: Below MDL with the exception of samples taken during spring freshet. The maximum TSS recorded was 111 mg/L on May 11.

Chloride: No change observed. All but four results were below MDL.

Sulphate: No change observed. Three high readings during winter months and the remainder were below 40 mg/L similar to 2010 results. In 2011 the maximum was 338 mg/L (exceeding the BC WQ Guideline of 250) and the annual mean was 54.04 mg/L.

Nitrate: Similar to sulphate, three higher results in the winter months then lower. The maximum was 22.9 mg/L and the annual mean was 1.85 mg/L.

Total Phosphorus: Slight increase during winter months with a maximum of 0.157 mg/L and an annual mean of 0.035 mg/L.

Dissolved Aluminum: A slight increase in dissolved aluminum was observed in 2011 with a maximum recorded value of 0.161 mg/L and an annual mean of 0.0346 mg/L.

Total Cadmium: While majority of values were below MDL the maximum reported level in 2011 was 0.000056 and the annual mean was 0.0000134 mg/L (using 0.5* MDL for values below MDL)

Total Copper: A slight increase was observed in 2011. The maximum recorded value was 0.0373 mg/L (exceeding the BC WQ Guideline) and the annual mean was 0.00824 mg/L.

Total and Dissolved Iron: While dissolved iron remains unchanged, total iron saw an increase during freshet, then leveled off through the remainder of the year. The maximum value recorded for total Iron was 4.66 mg/L and the annual mean was 0.473 mg/L.

Total Molybdenum: Decreased from 2009 through 2011, with a maximum of 0.0153 mg/L and an annual mean of 0.0089 mg/L in 2011.

Total Selenium: Decreasing trend from 2009 has continued through 2011. The maximum value recorded for 2011 was 0.0135 mg/L (in February, when other parameters also increased) and the annual mean was 0.0023 mg/L.

Background for W4:

Mount Polley staff have observed an increases in levels of nitrate, sulphate and selenium at this monitoring location in recent years, and have taken significant steps to remediate the situation. A coffer dam and pipeline to collect drainage from the North Dump was constructed in September of 2009 to divert flow to the long ditch (which reports to the TSF).

In June of 2010 there was a breach of the coffer dam when a valve in the pipeline was closed and the sulphate, nitrate, copper, and aluminum results reflect this event. This was remediated immediately by opening the valve and removing the handle, and subsequent sulphate values were much lower.

2.3.10. Site W5 – Bootjack Creek

This site was sampled 14 times in 2011. PE-11678 requires quarterly monitoring at this site; however, as there was a new diversion ditch being constructed above the creek and some changes in water quality were observed, which led to more frequent monitoring by Mount Polley staff.

Notable observations in POC results:

Hardness: A slight increase has been observed since 2007. The maximum value recorded in 2011 was 169 mg/L and the annual mean was 119.5 mg/L.

Sulphate: Slight increasing trend since 2001. Maximum in 2011 was 60.5 mg/L, and the annual mean was 32.7 mg/L.

Nitrate: Increase recorded starting in June 2011. The maximum recorded value was 2.57 mg/L and the annual mean was 0.46 mg/L.

Total Molybdenum: Increasing since 2008. The maximum in 2011 was 0.007 mg/L and the annual mean was 0.0046 mg/L.

Total Selenium: A slight increase observed in 2011 with a maximum of 0.00155 mg/L and 11 of the 15 samples were less than MDL.

There were no noted changes in TSS, chloride, total phosphorus, dissolved aluminum, total cadmium, total copper, and total and dissolved iron levels in 2011.

2.3.11. Site W7 – Upper Hazeltine Creek

This site was monitored 19 times in 2011. PE-11678 only requires quarterly sampling at W7; however, Mount Polley required further information in preparation for the eventual discharge of water to this creek.

Notable observations in POC results:

TSS: No change observed with the exception of one higher than expected TSS reading in September, which may have been a sampling error.

Sulphate: An increasing trend began in 2005 reaching a maximum of 33.9 in April 2011. The annual mean was 26.8 mg/L down slightly from a mean of 28.76 mg/L in 2010. These results are well below the BC WQG of 250 mg/L.

Nitrate: No trend observed. The maximum recorded value was 0.799 mg/L with an annual mean of 0.111 mg/L.

Total Molybdenum: A slight increase has been observed since 2005. The maximum in 2011 was 0.0025 mg/L and the annual mean was 0.0019 mg/L. The BC WQG 30 day average for molybdenum is 1 mg/L.

Total Selenium: No changes observed; 50 % of results were below MDL.

There were no noted changes in hardness, chloride, phosphorus, dissolved aluminum, total cadmium, copper, and iron values in 2011. Total and dissolved molybdenum levels are showing an increasing trend, however they remain far below the guidelines.

2.3.12. Site W8 – Northeast Edney Creek Tributary

This site was sampled nineteen times in 2011, (once per month with the exception of February when no flow was observed, and for five consecutive weeks in spring and fall). This site is downstream of the main embankment seepage pond (E4) - the permitted discharge point; however there was no discharge from E4 in 2011.

Notable observations in POC results:

TSS: No change observed with the exception of one high reading in May; it should be noted that there was heavy rainfall that day (approximately 11 mm).

Chloride: No change observed with the exception of a slightly elevated reading in May. The maximum for 2011 was 8.25 mg/L and the annual mean was 3.86 mg/L.

Nitrate: A slight decrease from previous years with a maximum of 0.282 mg/L and an annual mean of 0.0886 mg/L.

Total and Dissolved Iron: Slight decrease observed from 2009 through 2011. The maximum total iron was 0.456 mg/L and the annual mean was 0.16 mg/L.

There were no noted changes in hardness, sulphate, phosphorus, dissolved aluminum, total cadmium, copper, molybdenum and selenium in 2011.

2.3.13. Site W8z – Southwest Edney Creek Tributary

This site was sampled 10 times in 2011, once per month (except March, April, and September through to December when no flow was observed) and for five consecutive weeks in the spring.

It should be noted that this is a control site, as it is not downstream of any Mount Polley mine component.

There were no changes in water quality observed at this location compared to past years.

2.3.14. Site W11 – Lower Edney Creek U/S of Quesnel Lake

This site was sampled four times in 2011. This site is a far-field site, selected for comparisons to the sites downstream from the mine disturbance.

Notable observations in POC results:

Sulphate: Slight increase since 2000. Maximum value in 2011 was 19.7 mg/L and the annual mean was 14.5 mg/L.

There were no other changes in water quality observed at this site in 2011.

2.3.15. Site W12 – 6K Creek At Road

This site was sampled four times in 2011.

Notable observations in POC results:

Sulphate: Decreased from higher levels observed in 2009 and 2010. The maximum in 2011 was 15.4 mg/L and the annual mean was 11.4 mg/L.

There were no other significant changes in water quality observed at this monitoring location in 2011.

2.3.16. Site W13 – 9.5K Creek On Bootjack Forest Service Road

There were no samples taken from this site in 2011 as there were no flows observed.

2.4. Groundwater Monitoring

Groundwater sampling and analysis was conducted in accordance with sub-section 3.1 of Effluent Permit PE-11678. The calibration, sampling, filtering, preservation and shipping procedures outlined in the "Quality Assurance/ Quality Control Manual 2003" and the BC Field Sampling Manual are followed in the monitoring program. Field pH, temperature and conductivity were measured at the time of sampling using a WTW Multimeter. Refer to Section 2.1 for additional information on Data Quality Assurance/Quality Control, and Field Methodology for groundwater monitoring on site.

In 1995, groundwater-monitoring wells (series 95) were installed in the vicinity of the open pits and the mill site. Two of these wells (95R-4, 95R-5) continue to be monitored. In 1996, in order to monitor aquifers in both surficial deposits and bedrock, the B.C. Ministry of Water, Land and Air Protection requested the establishment of additional monitoring wells down slope of the pit, rock disposal site and TSF. In conjunction with these 'down slope' wells, background wells were established upslope of any potential impacts by mining activities. Nine groundwater-monitoring locations were established in 1996. Six of these sites are multi-level, consisting of "A" (deep) wells and "B" (shallow) wells, while the remaining three sites monitor a single depth. A commitment to install three additional multi-level monitoring locations along the southeast embankment of the TSF was made in 1996. These wells were subsequently installed in 2000. In 2005, GW05-01 was established to capture groundwater moving from Polley Lake towards the Wight Pit and pump it back into Polley Lake.

In 2011, to monitor potential impacts of newly disturbed areas, two additional multi-level monitoring sites were established below the temporary potential acid-generating (PAG) dump on Bootjack Road, and below the Southeast Rock Disposal Site (SERDS) on Polley Lake. Drilling of the wells was completed by Mud Bay and overseen by AMEC Environment and Infrastructure. Refer to Appendix C for borehole logs. In late November 2011, these new wells were developed by RL-7 Mechanical and compressed air was used to percolate out any sediment that had accumulated in the well. For a map of all well locations, refer to Figure 2.0. As requested by MOE, Table 2.5 shows the depth and elevation of all wells.

Table 2.5 Depth and surface elevation of wells on the Mount Polley Mine Site

Well ID	Well Depth	Elevation
95-R4	123.4	1050.43
95-R5	79.2	977.69
GW96-1a	59.0	927.89
GW96-1b	38.72	927.81
GW96-2a	54.88	931.42
GW96-2b	35.67	931.42
GW96-3a	52.59	912.06
GW96-3b	19.97	912.06
GW96-4a	24.7	940.56
GW96-4b	7.16	940.46
GW96-5a	19.82	973.55
GW96-5b	6.71	973.44
GW96-7	14.12	1021.32
GW96-8a	39.33	1050.10
GW96-8b	15.4	1050.09
GW00-1a	21.03	939.18
GW00-1b	10.58	939.13
GW00-2a	21.55	943.4
GW00-2b	10.64	943.32
GW00-3a	24.29	943.07
GW00-3b	13.66	943.22
GW11-1a	15.85	1030
GW11-1b	8.23	1030
GW11-2a	29.4	938
GW11-2b	14.3	938

Objectives of the groundwater-monitoring program include the following (Knight Piésold Ltd., 1996):

- To determine the direction and volume of groundwater flow from the mine site and other disturbed areas to receiving waters
- To identify the locations of all surficial and deep groundwater aquifers underlying the mine site and their points of discharge to surface water
- To establish background groundwater quality in aquifers prior to mine developmen
- To calculate seepage and groundwater contamination dilution ratios in surface receiving waters in order to minimize impacts

Prior to drawing water from each well, phreatic (static) water levels are recorded during each purging and sampling event (Section 4.3). Samples are collected and then submitted to ALS Laboratory Group for water chemistry analysis, including: physical parameters (alkalinity, turbidity, total suspended solids, and hardness); anions and nutrients (sulfate, ammonia (N), nitrate, nitrite, nitrogen and phosphorus); and dissolved metals.

To monitor changes in groundwater quality, in the subsequent sections, nine key parameters of concern (POCs) are examined for each well over time:

- **Physical Parameters**: Hardness
- **Anions**: Sulphate
- **Nutrients**: Nitrate
- **Dissolved Metals**: Aluminum, Cadmium, Copper, Molybdenum, Selenium, Arsenic

These POCs were identified in the *Chemical Characterization of the Proposed Effluent for Discharge to Hazeltine Creek* (Knight Piesold, 2009) based on site geochemistry, concentrations relative to current guidelines and regulations, historical water quality trends, and existing and projected waste and water management practices.

To establish if changes in water quality at any well are cause for concern, analysis, and intervention, sample and POC results are compared with water quality guidelines. There are currently no provincial criteria for groundwater quality, because the BC WQG for freshwater aquatic life have not been adapted to subsurface water that does not have major aquatic life and is affected by geological conditions. For this reason, groundwater results were compared with the BC MOE *Contaminated Sites Regulation Schedule 6: Selected Water Standards* (Table 2.6)

Table 2.6 BC MOE *Contaminated Sites Regulation Schedule 6: Selected Water Standards*

Substance	Aquatic Life (µg/L)	Drinking Water (µg/L)
Dissolved aluminum	no standard	9,500
Total ammonia	11,300 @ pH8 to 18,400 @ pH7	no standard
Dissolved antimony	200	6
Dissolved arsenic	50	10
Dissolved barium	10,000	1,000
Dissolved beryllium	53	no standard
Dissolved boron	50,000	5,000
Dissolved cadmium	0.5 @ H 90-150 0.6 @ H 150-210	5
Dissolved chromium	10 (Cr VI), 90 (Cr III)	50
Dissolved cobalt	40	no standard
Dissolved copper	40 @ H 75-99 to 60 @ H 125-<150	1,000
Dissolved fluoride	3000 @ H≥50	1,500
Dissolved iron	no standard	6,500
Dissolved lead	40 @ H <50 to 60 @ H= 100 - <200	10
Dissolved magnesium	no standard	100 mg/L
Dissolved manganese	no standard	550
Dissolved mercury	1	1
Dissolved molybdenum	10,000	250
Dissolved nickel	250 @ H <60 to 1,100 @ H 120 - <180	no standard
Nitrate N	400 mg/L	10,000
Nitrite N	200 (Cl < 2 mg/L)	3,200
Dissolved selenium	10	10
Dissolved silver	0.5 @ H ≤ 100 to 15 @ H > 100	no standard
Sulphate	1,000 mg/L	500 mg/L
Dissolved thallium	3	no standard
Dissolved titanium	1,000	no standard
Dissolved uranium	3,000	20
Dissolved zinc	75 @ H ≤ 90 to 900 @ H = 100 – 200	5,000

The following wells have been deactivated due to mine disturbances, or no longer have enough water to be sampled due to fluctuations in the water table, and were not included in the 2011 sampling program:

- GW96-5b (insufficient flow as of spring 2007)
- GW96-6 (deactivated fall 2006)
- GW96-9 (deactivated spring 2006)
- GW05-1(pumping terminated as of June 2010)
- GW00-2b (insufficient flow as of spring 2011)

Table 2.6 shows the number of sampling events at each well in 2011. All groundwater results are presented in Appendix D of this report. This includes tables by site, and graphs of the nine POCs (selenium was only graphed when results were above MDL).

Table 2.6 Groundwater sampling events in 2011

Well ID	Sample Events		Well ID	Sample Events
95-R4	1		GW96-8a	1
95-R5	2		GW96-8b	1
GW96-1a	2		GW96-9	0
GW96-1b	2		GW00-1a	2
GW96-2a	2		GW00-1b	2
GW96-2b	2		GW00-2a	2
GW96-3a	2		GW00-2b	0
GW96-3b	2		GW00-3a	2
GW96-4a	2		GW00-3b	2
GW96-4b	2		GW05-01	0
GW96-5a	2		GW11-1a	1
GW96-5b	0		GW11-1b	1
GW96-6	0		GW11-2a	1
GW96-7	2		GW11-2b	1

2.4.1. 95R-4 (Springer Pit Well)

95-R-4 is located to the west of the Springer Pit on the old Bootjack Forest Service Road at the 10 km marker. This well was drilled to a depth of 123.4 m and is sampled once annually. Significant changes in static water level should be considered when reviewing water quality data from this well. The water level dropped by approximately 3 m in spring 2010, and an additional 6.9 m in spring 2011. In light of these changes, a second sample was attempted in fall 2011; however the phreatic surface had dropped a further 20.3 m, and the water level was too low to pump.

Notable observations in POC results:

Hardness: Increased between 1995 and 2002. In the past few years, results have fluctuated, but the 2011 sample shows a 58 mg/L increase to 154 mg/L since 2007.

Nitrate: Has increased 1.07 mg/L to 1.09 mg/L since the increase began in 2010.

Sulphate: Increased between 2007 and 2010, but decreased 10.2 mg/L to 52.6 mg/L in 2011.

Molybdenum: Increased between 1995 and 2003, but has since decreased 0.051 mg/L to 0.012 mg/L.

Selenium: Has increased 0.0051 mg/L since 2010.

For the remaining POCs, 2011 values were similar to historic results, and any fluctuations or spikes in previous years have discontinued (notably the copper, arsenic and aluminum increases in 2009 and/or 2010). All results are below the Contaminated Sites Regulation (CSR) guidelines (Table 2.6).

The interception of groundwater by the Springer Pit has caused a large water level drop in 95R-4, accompanied by significant changes in water quality. If results are compared to those of the neighbouring well (GW97-03, which provides fresh water to the mine), however, Hardness, Sulphate, Nitrate, Molybdenum, and Selenium have all decreased since 2010. This indicates that fluctuations in 95R-4 results may be related to the changes in water level and flow. It is likely that this well will continue to have insufficient water for sampling, in which case, groundwater quality in the area will have to be monitored the new using GW11-1a/b wells, as well as GW97-03 (which is beside 95R-4 and provides fresh water to the mine), and GW96-8a/b.

2.4.2. 95R-5 (Lower SERDS Well)

95R-5 is located along the old Polley Lake Forest Service Road, northwest of the east rock disposal site and immediately east of the northeast zone soil stockpile location. This well was drilled to a depth of 79.2 m and is now being monitored twice annually in order to follow changes and trends more closely. In reviewing the water quality data from this well, it should be noted that the phreatic level dropped significantly in 2008 (Figure 4.4).

Notable observations in POC results:

Hardness: Increased between 2004 and 2009, but has since stabilized (with seasonal fluctuations) at approximately 705 mg/L.

Sulphate: Has increased 505 mg/L to 524 mg/L since 2005, although the spring 2011 result was 125 mg/L below the fall 2010 and 2011 levels.

Arsenic: Has decreased approximately 0.0011 mg/L to 0.00039 mg/L since sampling began in 1995.

Cadmium: Increased in 2007 and 2008, but has since remained stable at approximately 0.00029 mg/L.

Molybdenum: Has decreased approximately 0.018 mg/L since sampling began in 1995.

For the remaining POCs, 2011 values were similar to historic results, and any fluctuations or spikes in previous years have discontinued (notably the nitrate spike in 2007, and the copper spike between 2008 and 2010). All results are below the CSR guidelines.

In response to comments from Chris Swan at MOE regarding changes at 95R-5 and potential impact on Polley Lake a brief report of the water quality changes associated with 95R-5 has been included below.

The arrows in Figure 2.1 (Groundwater Monitoring Program, Knight Piésold 1996) indicate that groundwater flow to the well 95R-5 (as shown by the yellow highlighted point) comes generally from the direction of Mt. Polley summit. Surface flow travels a similar path based on the surface topography. Given these flow patterns, disturbances potentially affecting the water quality at this well are the Wight Pit access road, a soil stockpile below the road, the northern portion of the NEZ Dump, and the northernmost portion of the East RDS.

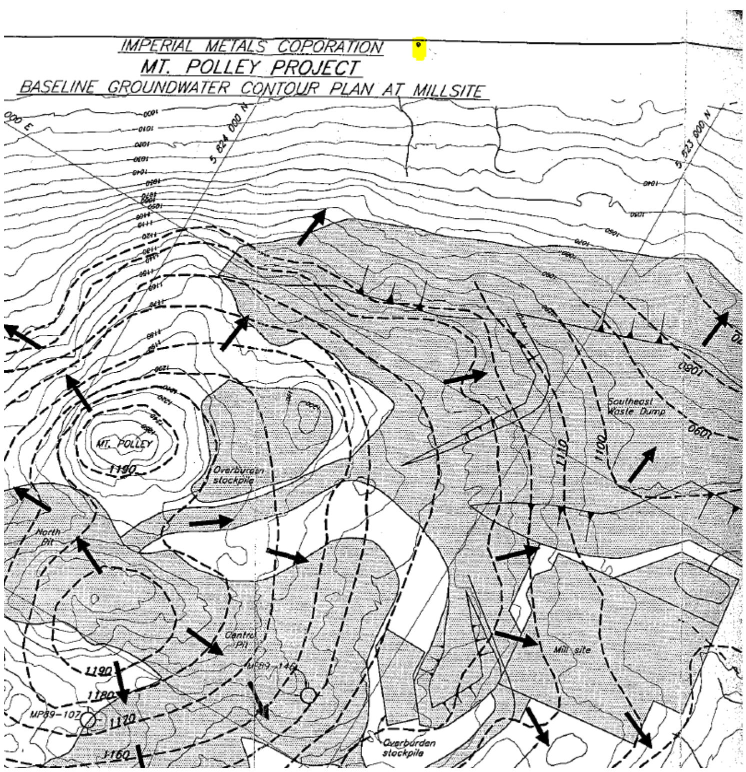

Figure 2.1 Groundwater flow at Mount Polley Mine

The measured flow rate into this well at drilling was 0.15 L/s. In spring 2011, the recharge rate was re-assessed, and found to be roughly 0.13 L/s. This relatively quick flow rate may have allowed mine affected water to travel quickly enough to affect the water quality at 95R-5.

Despite this steady groundwater flow rate, a 2 m drop in static water level has persisted since 2008. This indicates that mine site activity may have affected the well beyond natural fluctuations. Attributing this water level drop to the Long Ditch (as suggested in previous annual reports), however, is likely incorrect, as the well is actually slightly above the ditch on the hillside. Thus, other mine operations are likely intercepting water further upslope. Additional investigation would be necessary to identify the cause.

To evaluate how widespread these water quality changes are across the hillside above Polley Lake, water quality results were compared between 95R-5 and the new GW11-2a/b wells on the Polley Lake Road. While fall 2011 is the only sample available for comparison, GW11-2a/b wells do not have high levels of POCs present at 95R-5, indicating that contamination does not spread that far southwest (Table 2.7). Apart from these wells, no others exist on this hillside.

Table 2.7 Fall 2011 groundwater well comparison of parameters of concern

Parameter	GW11-2A	GW11-2B	95R-5
Conductivity	686	585	1032
Hardness	46.2	264	746
Sulphate	37.7	38.7	524
Cadmium	<0.000010	<0.000010	0.000029

While groundwater and surface water have different characteristics and concentrations of parameters, levels of POCs are lower at W4 than 95R-5 (Table 2.8). Since installation of the Joe's Creek Coffer Dam, W4 water quality has improved, and the dam appears to intercept this source of mine affected water.

Table 2.8 Average 2011 results for POCs at 95R-5 and W4

Parameter	95R-5	W4
Conductivity	1123	351
Hardness	685	182
Cadmium	0.000284	0.000015
Sulphate	464	53.3

Certain parameters, such as sulphate, molybdenum, and strontium, increased in Polley Lake in 2008 and have remained elevated. As increases at W4, 95R-5 and Polley Lake water quality POCs all occurred between 2005 and 2007, is difficult to know if this change in water quality was due to W4 water (before installation of the coffer dam), due to groundwater, or due to other surface water contamination (or a combination of these sources). Results from a Polley Lake shoreline conductivity study indicate that the conductivity along the southeast shore of Polley Lake is stable and the water appears to be well mixed with the rest of the lake (Figures 2.2 and 2.3). The only fluctuation is the slight decreases in conductivity with depth (which is expected given conductivity's relationship with temperature). Given that there does not appear to be a specific location with elevated conductivity (as would be expected from a contaminated tributary), and that POCs are no longer increasing in Polley Lake, it is possible that construction of the Long Ditch and Joe's Creek Coffer Dam have removed the lake's contaminant sources.

To ensure increases in POCs do not occur in Polley Lake again, a pro-active sampling campaign will be implemented in 2012:

- Sampling will continue, as per Permit PE 11678, to ensure that POCs do not increase Polley Lake, and to monitor if the affected lake water is gradually being diluted.
- To confirm all mine affected surface water is being collected by constructed dams and ditches, Mount Polley staff will find and sample any of the intermittent streams flowing into Polley Lake during spring runoff.
- A sampling program of upslope sources of potential contamination (materials from the access road and other mining activity) will also be implemented for an improved understanding of 95R-5 water quality.
- Water Quality trends in W4, 95R-5, and Polley Lake will continue to be compared.

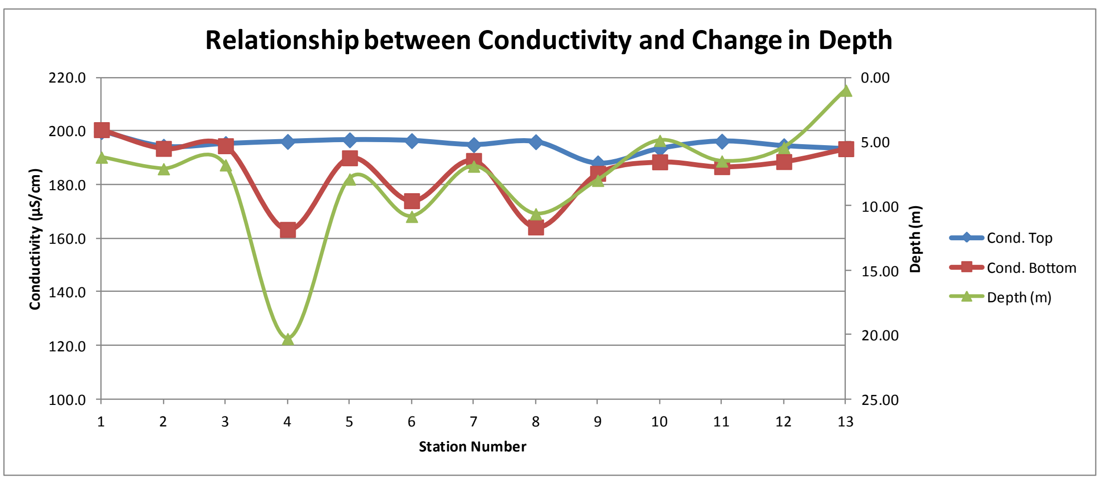

Figure 2.2 Results from 2011 Polley Lake conductivity study

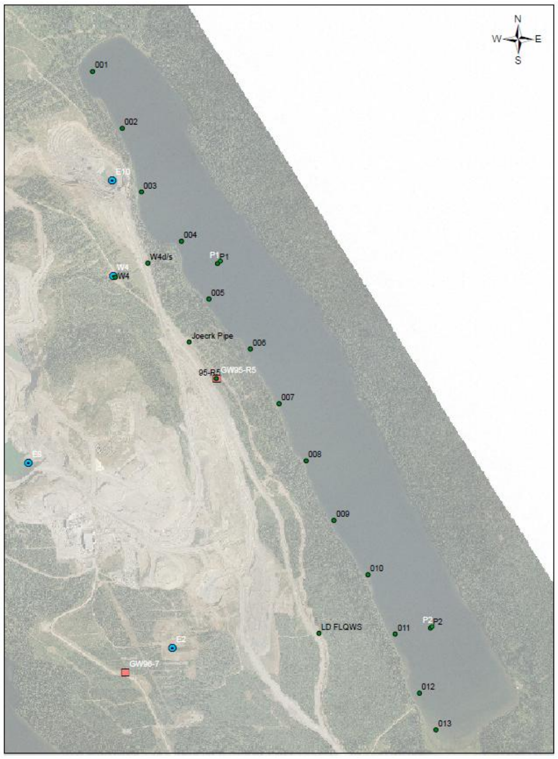

Figure 2.3 Test locations for Polley Lake conductivity study (2011)

2.4.3. GW96-1a (TSF North Well – Deep)

GW96-1a is located down slope of the seepage collection pond of the Perimeter Embankment. The total depth of this well is 59.0 m. This well was sampled twice in 2011, in May and October. There were no significant changes in water quality at this well in 2011. For all of the POCs, 2011 values were similar to historic results, or slightly below average, and any fluctuations or spikes in previous years have stabilized. All results are below the CSR guidelines.

2.4.4. GW96-1b (TSF North Well – Shallow)

GW96-1b is located down slope of the seepage collection pond of the Perimeter Embankment. The total depth of this well is 38.72 metres. This well was sampled twice in 2011, in May and October.

Notable observations in POC results:

There were no significant changes in water quality at this well in 2011. For all POCs, 2011 values were similar to past results, and any fluctuations or spikes in previous years have stabilized. All results are below the CSR guidelines.

2.4.5. GW96-2a (TSF East Well – Deep)

Groundwater monitoring well GW96-2a is located approximately 900 m southeast of the GW96-1 monitoring wells and was commissioned to monitor potential groundwater effects from the TSF on Hazeltine Creek. The total depth of this well is 54.88 m. This well was sampled twice in 2011, in May and October. For all of the POCs, 2011 values were similar to historic results. Any fluctuations or single outliers in previous years have stabilized. All results are below the CSR guidelines.

2.4.6. GW96-2b (TSF East Well – Shallow)

GW96-2b is located approximately 900 m Southeast from the GW96-1 monitoring wells and was commissioned to monitor potential groundwater effects from the Tailings Storage Facility on Hazeltine Creek. The total depth of this well is 35.67 m. This well was sampled twice in 2011, in May and October.

Notable observations in POC results:

Sulphate: Has increased approximately 40 mg/L to 45 mg/L since 1998.

Arsenic: Has increased 0.0002 mg/L to 0.0015 mg/L since 2004.

Cadmium: Has decreased more than 0.00001 mg/L to below MDL since 2009.

For the remaining POCs, 2011 values were similar to historic results and fluctuations. Any outliers in previous years have stabilized, and all results are below the CSR guidelines.

2.4.7. GW96-3a (TSF Southeast Well – Deep)

GW96-3a is located adjacent to the seepage collection pond of the Main Embankment. The total depth of this well is 52.59 m. This well was sampled twice in 2011, in June and November. Throughout the monitoring period, many parameters have exhibited constant fluctuations (including hardness, sulphate, aluminum, arsenic, cadmium, copper, and molybdenum). For all POCs, 2011 values were similar to historic results and fluctuations, and any single outliers from fluctuations in previous years have stabilized. All results are below the CSR guidelines.

2.4.8. GW96-3b (TSF Southeast Well – Shallow)

GW96-3b is located adjacent to the seepage collection pond of the Main Embankment. The total depth of this well is 19.97 m. This well was sampled twice 2011, in May and October.

Notable observations in POC results:

Nitrate: Has increased 0.025 mg/L since 2010 to a historic maximum of 0.0281 mg/L in fall 2011.

Sulphate: Has increased 6 mg/L to 12.1 mg/L in fall 2011 since 2005.

Aluminum: Values have shown fluctuations to high levels (roughly corresponding to pH changes) since sampling began.

For all other POCs, 2011 values were similar to historic results and fluctuations, and any spikes in previous years have stabilized. All results are below the CSR guidelines.

2.4.9. GW96-4a (TSF Southwest Well – Deep)

GW96-4a is located down slope of the south and main embankments. The total depth of this well is 24.7 m. There were two sampling events at this well in 2011; in May and in October.

Notable observations in POC results:

Sulphate: Has increased 1.6 mg/L to 3.91 mg/L since 2009 (although results are below pre-2002 values).

Aluminum: Jumped to 0.11 mg/L in spring 2011, but returned to below MDL in fall 2011.

Molybdenum: Has decreased by approximately 0.003 mg/L since 1998 to 0.00147 mg/L in fall 2011.

For all other POCs, 2011 values were similar to historic results. Some parameters (hardness and nitrate) have increased since 2010, but are still within the range of past fluctuations. All results are below the CSR guidelines

2.4.10. GW96-4b (TSF Southwest Well – Shallow)

GW96-4b is located down slope of the South and Main Embankments. The total depth of this well is 7.16 m. There were two sampling events at this well in 2011, in May and in October.

Notable observations in POC results:

Hardness: Has increased approximately 150 mg/L since monitoring began in 1998 to 328 mg/L in fall 2011.

Nitrate: Increased from below MDL to 0.173 mg/L between spring and fall 2011.

Sulphate: Has increased 67 mg/L since 2010 up to 69 mg/L in fall 2011.

For all other POCs, 2011 values were similar to historic results and any fluctuations or spikes in previous years have stabilized. All results are below the CSR guidelines.

2.4.11. GW96-5a (Tailings Storage Facility Control Well – Deep)

GW96-5a is located at the north end and upstream of the TSF and is monitored as a control site. The total depth of this well is 19.82 m. There were two sampling events at this well in 2011, in May and in October.

Notable observations in POC results:

Molybdenum: Has decreased 0.006 mg/L since monitoring began in 1998 to 0.00117 mg/L in fall 2011.

For all POCs, 2011 values were similar to or lower than historic results and any fluctuations or spikes in previous years have stabilized. All results are below the CSR guidelines.

2.4.12. GW96-5b (TSF Control Well – Shallow)

GW96-5b is located at the north end and upstream of the TSF and is monitored as a control site. The total depth of this well is 6.71 m. 2007 construction of a ditch upslope of the well intercepted flow into this shallow well. Since construction of the ditch, the well has not produced enough water to sample.

2.4.13. GW96-6 (Southeast Rock Disposal Site Well)

GW96-6 was covered by construction of a rock disposal dump in 2006.

2.4.14. GW96-7 (Southeast Sediment Pond Well)

GW96-7 is located down slope of the Mill Site, half way down the tailings access road (near the booster pump station). The total depth of this well is 14.12 m. There were two sampling events at this well in 2011, in May and in October.

Notable observations in POC results:

Hardness: Was stable through to 2010, but increased approximately 100 mg/L to an average of 249 mg/L in 2011.

Sulphate: Was stable through to 2010, but increased approximately 120 mg/L to 150 mg/L in 2011.

Molybdenum: Was stable through to 2010, but increased 0.005 mg/L to 0.01 mg/L in 2011.

Selenium: Increased from below MDL in 2010 to 0.00151 mg/L in spring 2011, but returned to below MDL in fall 2011.

For the remaining POCs, 2011 values were similar to historic results and any fluctuations or spikes in previous years have stabilized. All results are below the CSR guidelines.

2.4.15. GW96-8a (Bootjack Forest Service Rd. @ 11 K Well – Deep)

GW96-8a is located on the old Bootjack Forest Service Road at 10.75 km. The total depth of this well is 39.33 m. There was one sampling event at this well in May 2011.

Notable observations in POC results:

Nitrate: Was stable through to 2010, but increased approximately 0.03 mg/L to 0.0975 mg/L in 2011.

For the remaining POCs, 2011 values were similar to historic results, and any fluctuations or spikes in previous years have stabilized. All results are below the CSR guidelines.

2.4.16. GW96-8b (Bootjack FSR @ 11 K Well – Shallow)

GW96-8b is located on the old Bootjack Forest Service Road at 10.75 km. The total depth of this well is 15.4 m. There was one sampling event at this well in May 2011.

Notable observations in POC results:

Nitrate: Was stable through until 2010, but increased approximately 0.03 mg/L to 0.1 mg/L in 2011.

Copper: Has decreased 0.002 mg/L to 0.00143 mg/L in 2011 since 2007.

Molybdenum: Was stable through until 2010, but has increased 0.0009 mg/L to 0.00962 mg/L in 2011.

For the remaining POCs, 2011 values were similar to historic results, and any fluctuations or spikes in previous years have stabilized. All results are below the CSR guidelines.

2.4.17. GW96-9 (TSF Southeast Pressure Well)

GW96-9 was located south of the Main Embankment. This well was deactivated in the spring of 2006.

2.4.18. GW00-1a (TSF Northwest Well – Deep)

GW00-1a is located across the Gavin Lake FSR, beside the South Embankment at the TSF. The total depth of this well is 21.03 m. There were two sampling events at this well in 2011; in May and in October.

Notable observations in POC results:

Sulphate: Decreased between 2000 and 2005 and increased from 2005 to 2010, but the 2011 average of 263 mg/L remains stable with 2010 results.

For the remaining POCs, 2011 values were similar to or below historic results, and any fluctuations or spikes in previous years have stabilized. All results are below the CSR guidelines.

2.4.19. GW00-1b (TSF Northwest Well – Shallow)

GW00-1b is located across the Gavin Lake FSR, beside the South Embankment at the TSF. The total depth of this well is 10.58 m. There were two sampling events at this well in 2011, in May and in October.

Notable observations in POC results:

Hardness: Has increased approximately 330 mg/L to 593 mg/L since 2007.

Nitrate: Has increased from below MDL in 2007 to 17.1 mg/L in fall 2011.

Sulphate: Since 2007, has increased 337 mg/L to 345 mg/L in 2011.

Cadmium: Has remained stable at approximately 0.00011 mg/L since the 0.0001 mg/L increase in 2008.

Molybdenum: Since 2009, has increased approximately 0.023 mg/L to 0.0274 mg/L in 2011.

Selenium: Since 2008, has increased from below MDL to 0.029 mg/L in 2011.

For the remaining POCs, 2011 values were similar to historic results, and any fluctuations or spikes in previous years have stabilized. All results are below the CSR criteria, except selenium which exceeds the guideline of 0.01 mg/L with results of 0.0139 mg/L in spring 2011, and 0.029 in fall 2011.

At well GW00-1b, 2011 results showed the main parameters of concern to be nitrate, sulphate, selenium, and molybdenum. It is of note that nitrate and sulphate have also increased at GW96-3b and GW96-4b along the south side of the dam, but they have very low levels of these parameters compared to GW00-1b. GW00-3b has not shown changes, and GW00-2b no longer has enough water for samples to be taken.

GW00-1b nitrate and selenium levels exceed those of the tailings supernatant (E1), while sulphate levels at are lower. When comparing these parameters between E1, GW00-1b, and the South Toe Drain (STD), STD water is similar to E1 and exhibits the same differences from GW00-1b. This indicates that the water quality changes at GW00-1b are likely not due to water seeping through the dam. The high nitrate levels may be from leaching of nitrate into water coming off the waste rock on the outside of the dam. Similar changes in water quality (nitrate, sulphate, selenium) observed at Joe’s Creek above W4 were the result of rock contents leaching into runoff water, and this may be the case at GW00-1b.

In 2012, water from the collection ditch (flowing into the wetland above GW00-1b) on the northwest side of the dam will be sampled, and ABA samples of the rock on the dam above GW00-1b will be sampled to identify the source of the increasing parameters of concern. In addition, the south sump pond will be expanded and a ditch above GW00-1b (flowing into the south pond) will be constructed to help divert any potentially contaminated water.

2.4.20. GW00-2a (TSF West Well – Deep)

GW00-2a is located downstream of the South Embankment at the TSF. The total depth of this well is 21.55 m. There were two sampling events at this well in 2011, in May and in October.

For all POCs, 2011 values were similar to or below historic results, and any fluctuations or spikes in previous years have stabilized, and all results are below the CSR guidelines.

2.4.21. GW00-2b (Tailings Storage Facility West Well – Shallow)

GW00-2b is located downstream of the South Embankment at the TSF. The total depth of this well is 10.64 m. There were two sampling events attempted at this well in 2011, in May and in October. In 2009 and in 2010 Mount Polley staff were only able to sample this well in the Spring. There was insufficient water available for collecting a sample in spring or sall 2011.

2.4.22. GW00-3a (TSF Southwest Well – Deep)

GW00-3a is located downstream of the South Embankment at the TSF. The total depth of this well is 24.29 metres. There were two sampling events attempted at this well in 2011, in May and in October.

Notable observations in POC results:

Copper: increased to a historical maximum of 0.00313 mg/L in spring 2011, but decreased to below MDL in fall 2011.

For the remaining POCs, 2011 values were similar to historic results, and any fluctuations or spikes in previous years have stabilized, and all results are below the CSR guidelines.

2.4.23. GW00-3b (TSF Southwest Well – Shallow)

GW00-3b is located downstream of the South Embankment at the TSF. The total depth of this well is 13.66 m. There were two sampling events at this well in 2011, in May and in October. For all POCs, 2011 values were similar to historic results. Many parameters have exhibited fluctuations or spikes in the past few years, but have now stabilized. All results are below the CSR guidelines.

2.4.24. GW05-01 (Wight Pit/Polley Lake Interface Well)

GW05-01 is located between the Wight Pit and Polley Lake. It was established in 2005 to capture groundwater as it moved from Polley Lake towards the Wight Pit. The captured groundwater was continuously pumped and returned to Polley Lake. This well was last sampled in May 2010, and in June of 2010 the pumping was terminated making it impossible to sample.

2.4.25. GW11-1a (Below Temp PAG on Bootjack Road - Deep)

GW11-1A is located below the temporary PAG Dump on Bootjack Road. It was established in 2011 to monitor potential impacts of the PAG Dump on Bootjack Lake. The total depth of this well is 15.85 m. There was one sampling event at this well in December 2011. There are no prior samples with which comparisons can be made; however, this first sample presented no major concerns. All POCs were below the CSR Guidelines, and nitrate, copper, and selenium were below MDL.

2.4.26. GW11-1a (Below Temp PAG on Bootjack Road - Shallow)

GW11-1B is located below the temporary PAG Dump on Bootjack Road. It was established in 2011 to monitor potential impacts of the PAG Dump on Bootjack Lake. The total depth of this well is 8.23 m. There was one sampling event at this well in December 2011. There are no prior samples with which comparisons can be made; however, this first sample presented no major concerns. All POCs were below the CSR Guidelines, and nitrate, copper, and selenium were below MDL.

2.4.27. GW11-2a (Below SERDS on Polley Lake Road - Deep)

GW11-2A is located below the SERDS on Polley Lake Road. It was established in 2011 to monitor potential impacts of these dumps on Polley Lake. The total depth of this well is 29.4 m. There was one sampling event at this well in December 2011. There are no prior samples with which comparisons can be made; however, based on this first sample, the only cause for concern that needs to be monitored closely in the future is pH; the in situ reading was 11.89. All POCs were below the CSR Guidelines, and nitrate, cadmium, and selenium were below MDL.

2.4.28. GW11-2b (Below SERDS on Polley Lake Road - Shallow)

GW11-2B is located below the SERDS on Polley Lake Road. It was established in 2011 to monitor potential impacts of these dumps on Polley Lake. The total depth of this well is 14.3 m. There was one sampling event at this well in December 2011. There are no prior samples with which comparisons can be made; however, this first sample presented no major concerns. All POCs were below the CSR Guidelines, and nitrate, cadmium, copper, and selenium were below MDL.

3.0 Biological Monitoring and Lake Sampling

3.1. Biological Monitoring

Section 3.2 of PE 11678 requires that, prior to discharge of any effluent from the mine, Mount Polley must develop a biological monitoring program in accordance with the Metal Mining Effluent Regulations. In preparation for this Mount Polley implemented a pre-discharge aquatic environmental study. In late August 2007, Minnow Environmental Inc. (Minnow) conducted a study including biophysical conditions, water quality, sediment quality, benthic invertebrate communities, fish communities and sentinel fish populations. The study was conducted at four upper creek areas, two lower creek areas, and at the mouth of Hazeltine Creek at Quesnel Lake.

Mount Polley has conducted biological monitoring studies for both the valuation of potential mine related impacts and to establish baseline conditions for potential effluent discharge. In 2009, 2010, and 2011, Mount Polley focused its monitoring specifically on selenium analysis of water, sediment, periphyton, benthic invertebrates and fish (fish muscle and ovary tissue). Water quality has been routinely monitored by Mount Polley staff since 1995. Minnow summarized the data collected in 2011 (Appendix E) and recommended the following:

- Conduct sediment sampling of the depositional location of Hazeltine Creek (approximately 200 m upstream of Station W7) in 2012.
- At an annual frequency (August or September)
    - Monitor the Hazeltine Creek cross-section (to track potential bank erosion) at an established location approximately 20 m downstream of Station W7
    - Repeat photo-documentation (to track primary productivity) at stations established at the mouth of Hazeltine Creek
    - Monitor periphyton chlorophyll a and selenium concentrations at Hazeltine Creek stations W7 and W11
- At a frequency of every three years (August or September concurrent with Environmental Effects Monitoring under the Metal Mining Effluent Regulations):
    - Monitor metal concentration in aquatic plants

- Monitor sediment quality at the depositional location of Hazeltine Creek

3.2. Lake Sampling

Mount Polley has preformed water quality sampling in both Polley and Bootjack Lakes twice annually since 2006, collecting both physical and chemistry data. The 2011 Lake Sampling Program at Mount Polley included:

- dissolved oxygen, temperature, and conductivity profile sampling in late winter (under ice) and at spring and fall overturn
- water chemistry sampling at lake surface and two metres above lake bottom during spring and fall overturn
- Secchi disk measurements twice per month between spring and fall overturn.

3.2.1. Data Quality Assurance/Quality Control (QA/QC)

In order to ensure the most accurate secchi disc readings are recorded, whenever possible secchi disc readings are done by the same technician throughout the season with random checks done by a second person (supervisor).

Section 2.1 of this report outlines the complete data quality assurance program and sampling methodology followed by Mount Polley for the Lake Sampling Program.

3.2.2. Lake Sampling Locations

In Polley Lake, station P1 is located near the Northwest end of the lake while station P2 is near the Southeast end. In Bootjack Lake, station B1 is located at the Northwest end of the lake and station B2 is located at the Southeast end. These locations are shown in Figure 2.0. In 2011, bathymetric surveys of both lakes were completed to ensure that the sample sites are at the deepest point at the north and south ends of the lakes. Figure 3.1 shows the survey results, and presents the findings that B1, B2, and P1 are not at the deepest possible locations. Consequently, a recommendation has been included in the discussion portion of this document (section 8) to shift the sample locations.

3.2.3. Analysis of In-situ Data

Profiles of conductivity, dissolved oxygen and temperature are measured at all stations on Polley and Bootjack Lakes three times per year (late winter under ice, spring overturn, and fall overturn). Over the years, different depths have been recorded at the sample locations. For this reason Mount Polley has purchased a depth finder to ensure that future measurements are taken precisely at the deepest point. These data are plotted and compared with profiles from past years. Each station is measured for clarity using a standard secchi disk twice per month between spring and fall overturn. Winter and fall profile samples were taken using an YSI 600QS Multi-meter with a 30 metre cable, rented form Hoskin Scientific in Burnaby, BC. Spring profile samples were taken using an YSI Professional Plus multi-meter instrument with a 30 m cable, purchased in 2011 by Mount Polley. Because of the 30 m cable, profiles for sample locations in Polley Lake that are greater than 32 m deep cannot be completed to within two metres of the lake bottom. Appendix F includes all tables and graphs of in-situ data and water chemistry data for Polley Lake and Bootjack Lake.

3.2.4. Polley Lake

During the late winter under ice sampling stations P1 & P2 reported similar results for dissolved oxygen as previous years, although both station appear to have slightly elevated pH, and P1 shows warmer than average temperatures. Profile results recorded during spring overturn at both stations are consistent with previous years. At both stations during fall overturn, profiles show an increase in conductivity while other parameters remain consistent.

Secchi depth was recorded ten times in 2011 and is reported by monthly average in Appendix F. The water clarity was lower than past years, which is likely due to the occurrence of an algae bloom.

3.2.5. Bootjack Lake

During the late winter under ice sampling and fall overturn at stations B1 and B2, dissolved oxygen, pH, and temperature results were similar to previous years, although there appears to be a very slight increase in conductivity. During spring overturn there were no noted changes in the in-situ parameters at both stations.

Secchi depth was recorded was recorded ten times in 2011 at both stations and is reported by monthly average in Appendix F. The water clarity was lower than past years, which is likely due to the occurrence of an algae bloom.

3.2.6. Lake Water Chemistry

3.2.6.1. Polley Lake

Appendix F of this report contains water chemistry data tables from 2001 to 2011, and graphs for Polley Lake from 2006 to 2011.

There have been a few increases in parameters from baseline results. While sulphate, hardness, total dissolved solids, molybdenum, and strontium increased slightly up until 2008, results are now stable for these parameters. There were slight increases in phosphorus, ammonia, nitrate, and manganese this year, and while these increases are within the range of past fluctuations, these parameters should continue to be monitored closely. The elevated surface pH in 2011 is attributed to the algal bloom that occurred this year, and is unrelated to mining activities. Chlorophyll a samples were taken on August 15, 2011 at P1-S and P2-S, and results were 3.78 µg/L and 2.63 µg/L, respectively. This indicates oligotrophic conditions characteristic of algal blooms. Copper levels have fallen from the naturally high baseline levels and are now below the BC WQG.

3.2.6.2. Bootjack Lake

Appendix F contains water chemistry data tables from 2001 to 2011 and graphs for Bootjack Lake from 2006 to 2011.

There have been no significant changes in water chemistry in Bootjack Lake, however certain parameters have increased (if only very slightly in some cases), and should be closely monitored in the future: chloride; sulphate; ammonia; manganese; and molybdenum. In spring 2011 dissolved aluminum reported an increase, but returned to historic normal levels in the fall. Ammonia at B1-Bottom and B2-Surface, and nitrate at B1-Bottom followed this same pattern.

4.0 Climatology and Hydrology

4.1. Meteorology

Mount Polley's Effluent Permit (PE 11678) requires the collection of detailed meteorology data. The main objective of this data collection program is to provide site-specific precipitation and evaporation data for use in water balance prediction (included as Appendix G of this report). To meet the permit requirements, Mount Polley operates an automated weather station, which records temperature (at three metre elevation) and precipitation at half hour intervals. Evaporation is measured using a standard Class A evaporation pan. Total monthly precipitation and minimum, maximum, and average monthly temperatures for 2011 are included in Table 4.1.

4.1.1. Temperature

In 2011, the lowest monthly mean temperature was – 9.63 degrees Celsius recorded in February, and the highest monthly mean temperature of 14.31 occurred in August. Temperatures in Spring and Summer 2011 were below average. Figure 4.1 presents Mount Polley's monthly average temperature data from 2006 to 2011. Monthly minimum, maximum, and average temperatures as well as daily average temperature are shown.

Table 4.1 Monthly precipitation and temperature data from Mount Polley weather station

Month	Monthly Precipitation (mm as rain)	Average Temperature	Max Temperature	Minimum Temperature
January	0.0	-7.30	3.74	-22.60
February	0.0	-9.63	3.31	-26.11
March	0.0	-1.65	8.23	-23.44
April	71.4	1.13	12.55	-5.81
May	92.8	7.34	19.81	-0.16
June	80.2	11.13	22.48	3.74
July	104.1	11.73	22.86	2.89
August	63.2	14.31	24.79	4.15
September	19.4	12.15	26.34	2.46
October	35.2	3.77	12.93	-1.97
November	24.0	-3.71	4.57	-16.68
December	0.0	-3.75	3.74	-11.70

Note: precipitation records for June, July, and August are based on manual rain gauge data, because the automated weather station rain gauge was overgrown with vegetation, and underreported precipitation values.

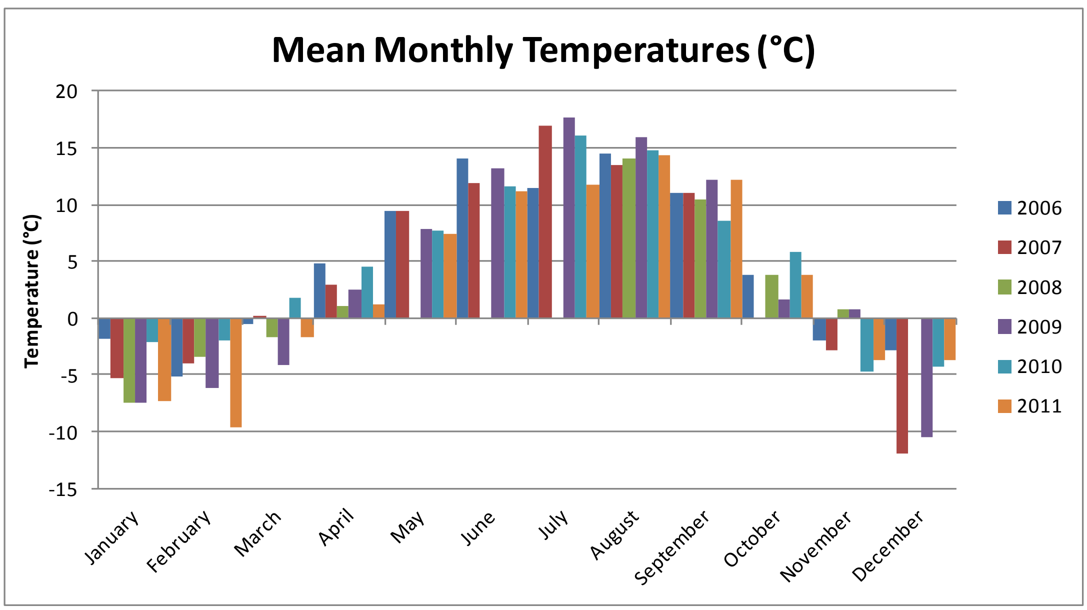

Figure 4.1 Mean monthly temperatures from 2006 to 2011 at Mount Polley

4.1.2. Precipitation

2011 was a wet year; recording 822 mm of precipitation, 490 mm as rain and the equivalent of 332 mm as snow. Mount Polley received the most precipitation in July, with 104 mm recorded. The driest non-freezing month was September, with 19 mm of rain recorded. Monthly rainfall data from 2006 through 2011 are presented as bar graphs in Figure 4.2.

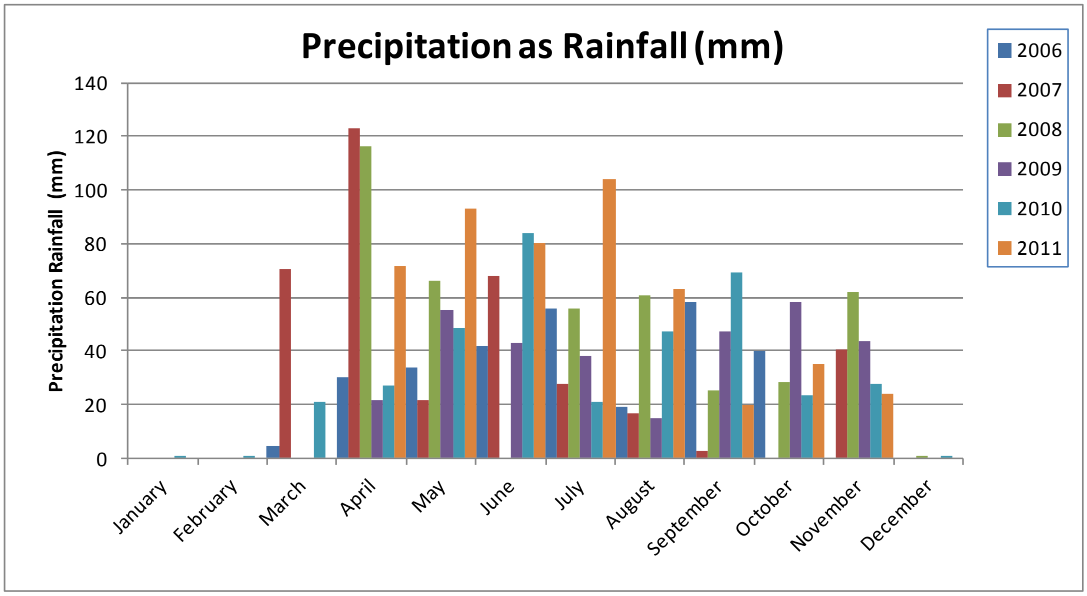

Figure 4.2 Total monthly precipitation from 2006 to 2011 at Mount Polley

4.1.3. Evaporation

Evaporation data for May to October (non-freezing period) is presented below. Total evaporation for 2011 amounted to 391 mm. July experienced the greatest amount of evaporation at 103.4 mm. Figure 4.3 below represents the comparison of precipitation amounts to evaporation for each month in 2011.

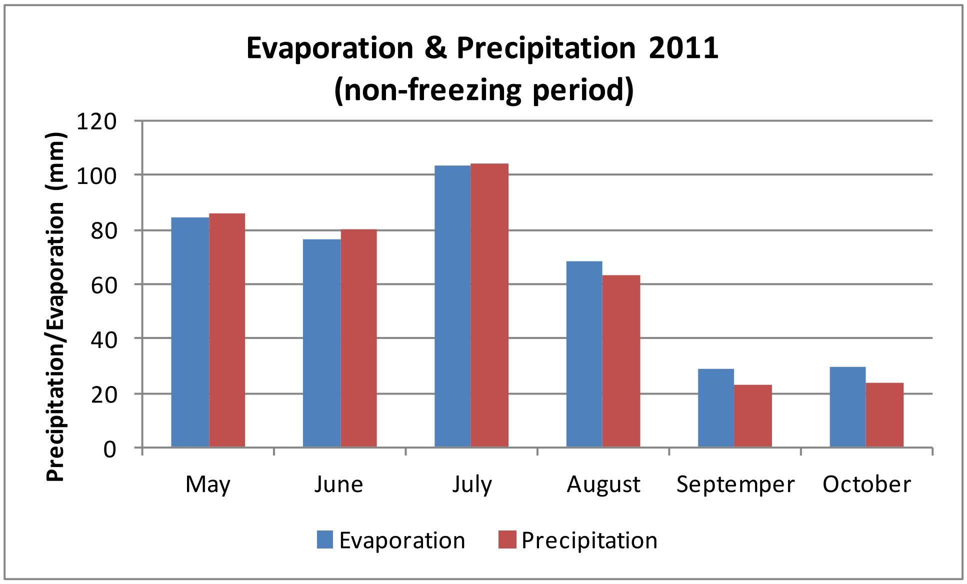

Figure 4.3 Total monthly precipitation and evaporation in 2011

4.1.4. Water Balance

Appendix G contains the updated water balance spreadsheet for the 2011 period. An annual water balance spreadsheet for the Mount Polley Mine site was first developed in 2005 in order to facilitate water planning and predict water surplus or deficit volumes after the resumption of the operations in 2005. Each year, the spreadsheet is updated by adding new development areas (including Springer Pit, Wight Pit and the Northeast rock disposal site), updating precipitation estimates, and modifying other aspects of the water balance to match the new mine plan. On December 31, 2011 the inventory of water stored in the TSF was 2.850 M m^3.

4.2. Surface Flow Monitoring

As discussed in Section 4.1.2, precipitation levels were above average in 2011, which resulted in higher flows in the creeks. In an effort to fill existing hydrology data gaps, a structured flow monitoring program was put in place, and the swoffer flow measurement device was replaced with a more accurate FlowTracker handheld ADV meter. Refer to Section 2.2.2 for FlowTracker QA/QC records.

In 2011, hydrological monitoring included calibration (benchmarking) of staff gauges and recording of staff gauge measurements during non-freezing months at six surface water monitoring sites (W1a, W4, W5, H7, W8, H11, and W12) situated in the vicinity of the Mount Polley mine site (see Figure 2.0 for site locations). When sufficient water was flowing at these sites, flow (discharge) rates were measured weekly or bi-weekly. It is recommended that flow monitoring be started earlier in the season in Spring 2012, as the peak of the hydrograph was missed at some sites.

From discharge and staff gauge data collected, discharge rating curves were generated for the sites. This allows estimation of creek discharge at various stages, when field measurements are not available. The curves are based on the equation **$Q= C(H-A)^n$,** where **Q** is discharge, **C** is a multiplier that is a function of channel width (generally approximately two times channel width), **H** is stage, **A** is the point of zero flow, and **n** is a dimensionless number between 1.8 and 2.8.

Pressure transducers at H7 (same location as W7), W8, and H11 (Edney Creek near its confluence with Hazeltine Creek at the Ditch Road bridge crossing) continuously monitored pressure, allowing the creation of pressure-stage rating curves. Stage values estimated from pressure readings using the stage-pressure rating curve equation can then be substituted into the rating curve equation for discharge estimates. This results in an estimation of a creek's stage and discharge throughout the monitoring season.

Tables and figures for the 2011 hydrology results at all sites, including hydrographs, rating curves, and pressure transducer figures, are presented in Appendix H.

4.2.1. Site W1a – Upper Morehead Creek

A benchmark survey conducted at W1A on June 9, 2011 determined that the staff gauge moved 0.2 cm since the previous survey on June 27, 2010. Prior to June 9, 2011, however, the staff gauge was loosely secured and the post was in loose gravel. It is recommended that the staff gauge be moved and re-benchmarked in 2012. Ten staff gauge readings and seven discharge measurements were recorded in 2011, from which a hydrograph was produced. The highest recorded discharge rate was 1.0479 m^3/s on May 12, 2011, although it appears the peak of the hydrograph was missed. Monitoring continued until the water level was too low for the FlowTracker in early August. The 2011 stage-discharge rating curve equation was calculated to be $Q=2.25(H)^{1.9}$.

4.2.2. Site W3a – Mine Drainage Creek at Mouth

From 1995 through 1999, water volumes were monitored on this creek at site W3, which is located just downstream from the mine site. Starting in 2001, water volumes were monitored from a new location on this creek, labeled W3a. This location is at the end of the creek, immediately before it empties into Bootjack Lake. Flow data is no longer collected at this location due to its remote location and access limitations.

4.2.3. Site W4 – North Dump Creek

In 2010, the damaged staff gauge was replaced, and a new benchmark location established. A benchmark survey conducted on June 3, 2011 indicates that the staff gauge moved 0.3 cm since 2010. 24 staff gauge readings and 20 discharge measurements were recorded in 2011, from which a hydrograph was produced. On June 16, 2011, a small weir was constructed to allow for bucket discharge estimates to be made, creating a pool which altered staff gauge readings. The highest recorded discharge rate was 0.0286 m^3/s on May 19, 2011, although it appears the peak of the hydrograph was missed. Monitoring continued with bucket discharge estimates after the water level became too low for the FlowTracker starting in early June. The 2011 stage-discharge rating curve equation was calculated to be $Q=2.4(H-0.08)^{2.75}$.

4.2.4. Site W5 – Bootjack Creek above Hazeltine Creek

A benchmark survey conducted on June 3, 2011 indicated that the staff gauge moved 0.1 cm since July 2010. Twenty-four staff gauge readings and ten discharge measurements were recorded in 2011, from which a hydrograph was created. The highest recorded discharge rate was 1.0479 m^3/s on May 19, 2011, although it appears the peak of the hydrograph was missed. Monitoring continued until the water level was too low for the FlowTracker in early August. The 2011 stage-discharge rating curve equation was calculated to be $Q=4.5(H-0.8)^{2.8}$.

4.2.5. Site H7 – Upper Hazeltine Creek

No benchmark survey was completed in 2011, as there was still too much snow in late spring when the surveys were being conducted. The last benchmark survey was in April 2010, when the new staff gauge fixture was installed (hanging from the bridge to prevent ice jacking of the post). 38 staff gauge readings and 29 discharge measurements were recorded in 2011, from which a hydrograph was produced. The highest recorded discharge rate was 1.38 m^3/s on May 13, 2011.

In 2010, an assessment of that year's H7 hydrological data was completed by Knight Piesold to create a stage-discharge rating curve and an estimate of daily discharge rates for the monitoring season. This year the 2011 data was analyzed by Mount Polley technologists following the same procedure. The 2011 stage-discharge rating curve equation was calculated to be $Q=7.6(H-0.16)^{0.9}$.

Pressure transducer data was recorded from May 27 to October 27, 2011. A stage-pressure rating curve and equation were developed from monitoring results. Continuous records of stage and discharge values for the monitoring season were then estimated from pressure transducer data (Appendix H).

4.2.6. Site W8 – Northeast Edney Creek Tributary

No benchmark survey was conducted in 2011. 2010 results showed no change in the staff gauge position. Thirteen staff gauge readings and one discharge measurement were recorded in 2011. Only one discharge measurement was able to be taken in 2011 (0.0145 m^3/s on May 31, 2011), as flow rates were too low to monitor using the FlowTracker the rest of the year. Not enough discharge data was available to create rating curves.

Pressure transducer data was recorded from May 31 to November 8, 2011. A stage-pressure rating curve and equation were developed from monitoring results. A continuous record of stage values for the monitoring season was then estimated from pressure transducer data (Appendix H).

4.2.7. Site H10 – Edney Creek

A benchmark survey conducted on June 3, 2011 indicated that the staff gauge has moved 0.3 cm. Seventeen staff gauge readings and 13 discharge measurements were recorded in 2011, from which a hydrograph was produced. The highest recorded discharge rate was 1.57 m^3/s on May 31, 2011, although it appears the peak of the hydrograph was missed. The 2011 stage-discharge rating curve is shown equation was calculated to be $Q=13.5(H-0.505)^{2.6}$.

A stage-pressure rating curve and equation were developed from monitoring results. Continuous records of stage and discharge values for the monitoring season were then estimated from pressure transducer data (Appendix H).

4.2.8. Site W12 – 6 km Creek at Bootjack Road

A benchmark survey conducted on June 3, 2011 indicates that the staff gauge has moved 0.2 cm. Eleven staff gauge readings and eight discharge measurements were recorded in 2011, and from which a hydrograph was produced. The highest discharge rate was 0.1470 m^3/s on June 2, 2011, although it appears the peak of the hydrograph was missed. The 2011 stage-discharge rating curve equation was calculated to be $Q=5.3(H-0.52)^{2.4}$.

4.2.9. Supplemental Sites – Perimeter Toe Drain, South Toe Drain, Long Ditch

Flow monitoring was also done at supplemental sites, including the Perimeter Toe Drain, South Toe Drain, and Long Ditch. Results are presented Appendix H. Fluctuations in Long Ditch discharge rates occur, depending on whether water is being pumped from the Wight Pit.

4.3. Groundwater Static Levels

Figure 4.4 presents graphs of static water levels (SWL) for wells 95R-4 and 95R-5, for the period 1996 to 2011.

SWLs in 95R-4 have generally been approximately 11.0 metres until June of 2010, when the level had dropped to 13.7 metres. By October 2011, the SLW had dropped to 40.91 metres.

In 95R-5, the SWL was shifting between zero and two meters, with no specific trend until 2008 when levels dropped to 4.5 metres. Levels have now remained between 3.5 and 5 metres for four years.

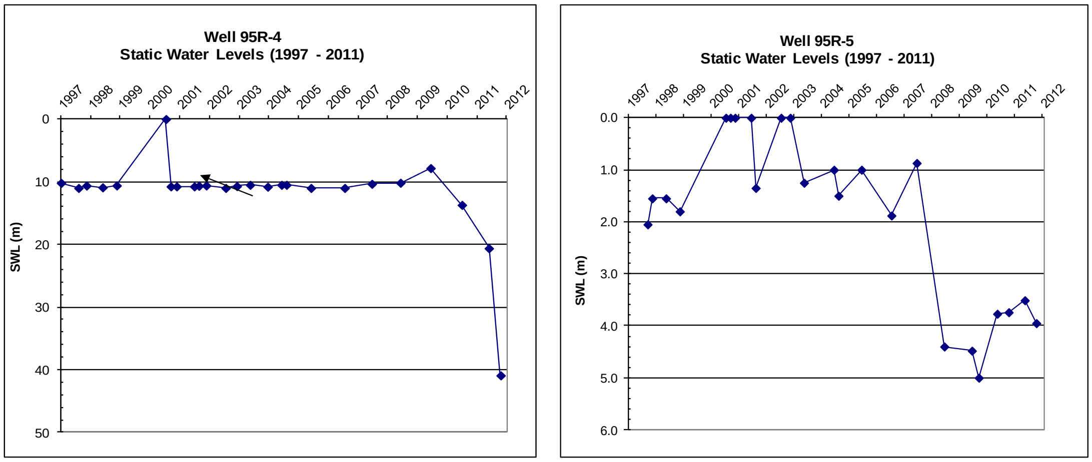

Figure 4.4. Static water levels at wells 95R-4 and 95R-5, from 1996 to 2011.

Figure 4.5 presents the graphs of the static water levels at GW96-1a, GW96-1b, GW96-2a and GW96-2b for the period of 1996 to 2011.

SWLs in well GW96-1a have predominantly fluctuated between 10 and 20 metres, but have dropped to as low as 40 metres (Spring 2001) and risen to as high as 2.5 meters in the summer of 2001. By comparison, levels in well GW96-1b have been very consistent at 13 metres, with only 3 occasions where the level rose to near zero (June of 2001, 2004 and 2008). 2011 SWLs at these remained consistent with previous levels.

In well GW96-2a, SWLs were typically observed at approximately 30 metres, except between 2007 and 2010 when seasonal fluctuations were recorded. The SWL in well GW96-2b has been consistent at 15 metres, with brief rises to nearly 5 metres in 2001 and 2004. 2011 SWLs at these remained consistent with previous levels.

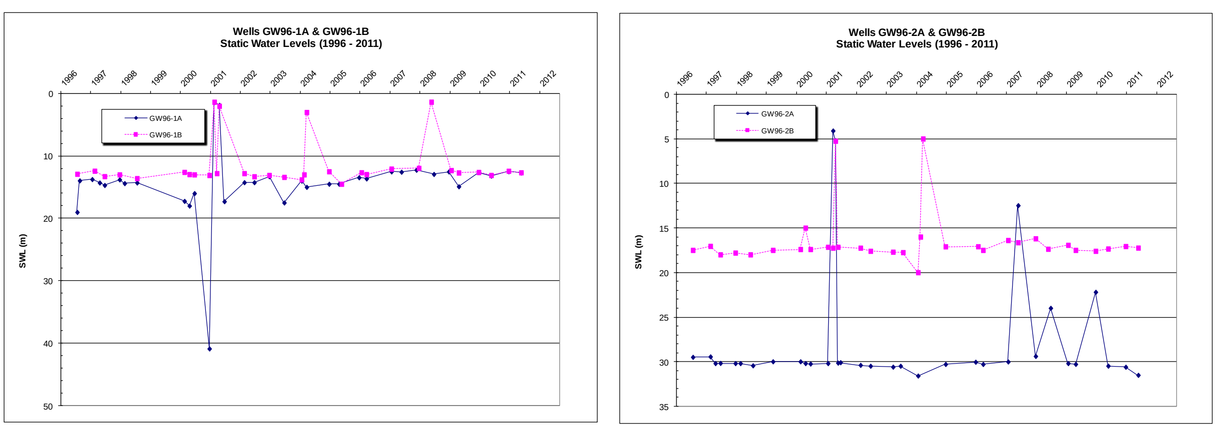

Figure 4.5 Static Water Levels at GW96-1a, GW96-1b, GW96-2a, and GW96-2b

Figure 4.6 presents the graphs of the static water levels at GW96-3a, GW96-3b, GW96-4a and GW96-4b for the period of 1996 to 2011.

In well GW96-3a, the SWLs have fluctuated greatly, with a range of just below 0 to 30 metres. In 2011 SWL's in this well remained in the upper levels of this range. SWLs in well GW96-3b continue to be very consistent remaining at or near zero.

Static water levels in well GW96-4a have ranged between 0 and 4 metres. Levels in 2011 continue to remain in this range. Static water levels in well GW96-4b have mirrored those of its twin well GW96-4a, fluctuating with a similar pattern at slightly greater depths. This trend has continued in 2011.

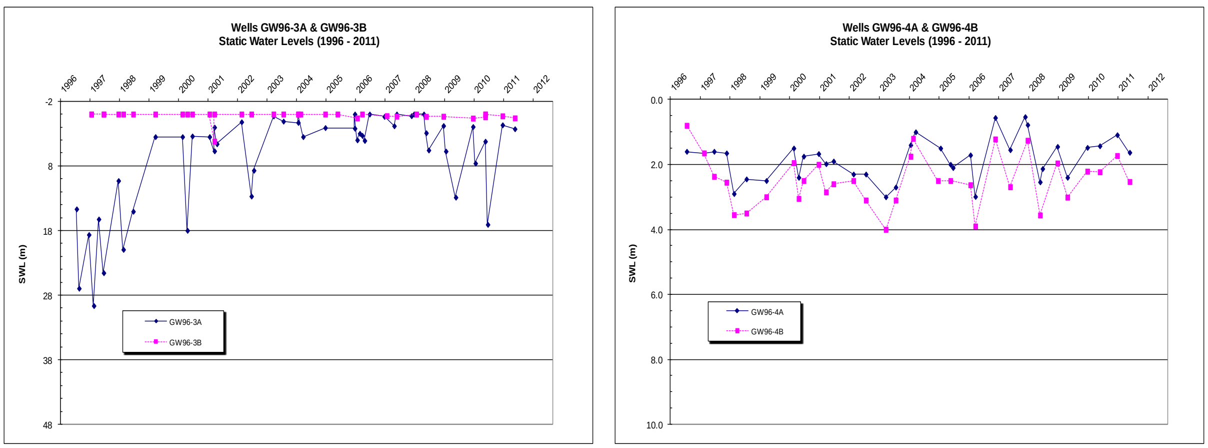

Figure 4.6 Static Water Levels at GW96-3a, GW96-3b, GW96-4a, and GW96-4b

Figure 4.7 presents the static water levels for wells GW96-5a and GW96-7 for the period 1996 to 2011.

GW96-5a SWLs have predominantly fluctuated between 0 and 2 metres, with which 2011 results are consistent. SWLs have dropped as low as 4.75 and 13 metres in the spring and winter of 2001, respectively, and to 5.8 metres in 2009.

Well GW96-7 SWLs have consistently measured between 2 and 4 metres. In 2001 SWL briefly dropped to 5.25 metres. Levels in 2008 rose to above ground level (10 cm above ground in PVC housing pipe) but have dropped to a low of 8.1 metres in fall 2011.

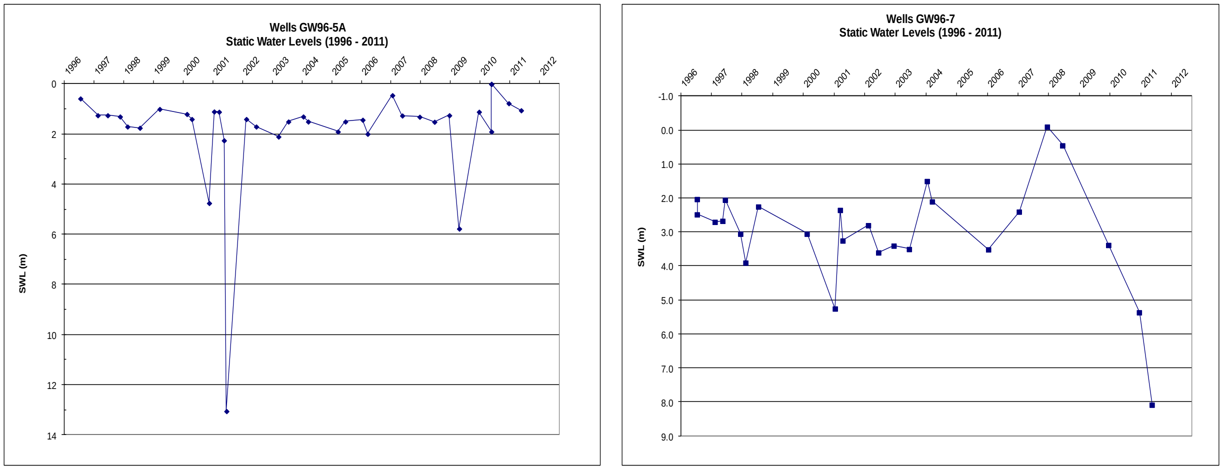

Figure 4.7 Static Water Levels at GW96-5a and GW96-7

Figure 4.8 presents the SWLs for GW96-8a/8b for the period 1996 to 2011. SWLs in GW96-8a and GW96-8b have historically been at ground level (0 metres), and this trend continued in 2011.

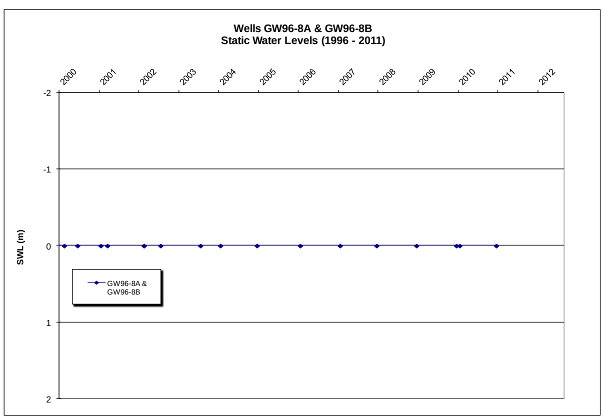

Figure 4.8 Static Water Levels at GW96-8a and GW96-8b

Figure 4.9 presents graphs of static water levels for wells GW00-1a/1b and GW00-2a/2b for the period 2000 to 2011.

The SWL in GW00-1a has always fluctuated both seasonally and annually. In 2011, an annual fluctuation was observed with little seasonal fluctuation. In well GW00-1b, SWLs have historically mirrored those in GW00-1a, fluctuating between 0.5 and 3 metres. This trend continued into 2011. In contrast from SWLs from 2000 to 2007, fluctuations in both have remained above 1.5 metres since 2007.

Static water levels in wells GW00-2a and 2b have remained relatively flat over the entire monitoring period, with small fluctuations (which are often seasonal) exhibited between 3 and 6 metres. This trend continued in 2011.

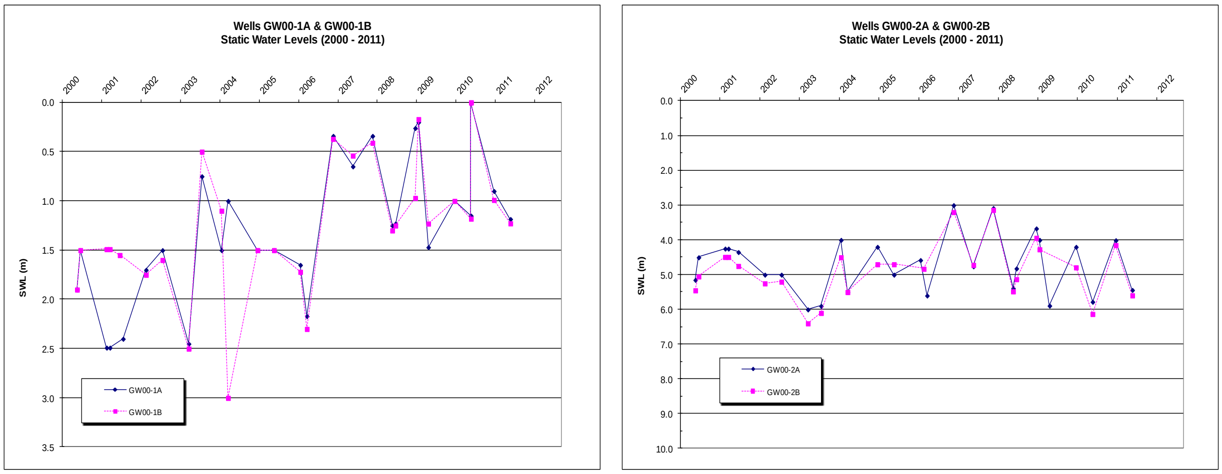

Figure 4.9 Static Water Levels at GW00-1a, GW00-1b, GW00-2a, and GW00-2b

Figure 4.10 presents graphs of SWLs for wells GW00-3a/3b for the period 2000 to 2011. The SWL in well GW00-3a has fluctuated slightly, with the majority of the samples between 3 metres and 6 metres, with the exception of spring 2005 (9 metres) and summer 2003 (18 metres). With the exception of Fall 2005, the SWL in well GW00-3b has been very consistent remaining within the range of 4 to 6 metres. SWLs in both wells continued to follow this trend in 2011.

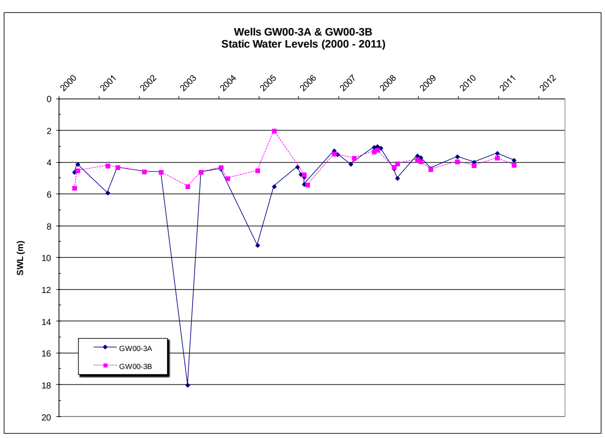

Figure 4.10 Static Water Levels at GW00-3a and GW00-3b

Table 4.2 shows the SWL of the new wells installed in 2011. Results are not graphed because only one sample has been collected to date at each site (on November 24, 2011).

Table 4.2 Static Water Levels at GW11-1a/1b and GW 11-2a/2b

Well	SWL
GW11-1a	0.0
GW11-1b	3.6
GW11-2a	3.0
GW11-2b	2.1

5.0 WILDLIFE MONITORING

5.1. Wildlife Sightings

Mount Polley Mine and the surrounding area are home to a wide variety of common wildlife.

In a conversation with MOE, Mount Polley was requested to document wildlife sightings on the mine sight and the surrounding area. There were 68 documented wildlife sightings between August and December 2011.

6.0 RECLAMATION PLANNING AND ACTIVITIES

The objective of the reclamation program is to develop and implement the methods, materials and protocol for achieving end land use objectives defined in the Mount Polley Reclamation Plan. The primary end land use objectives are wildlife habitat and commercial forestry. Secondary objectives include cattle grazing, hunting, guide-outfitting, trapping and outdoor recreation.

6.1. Reclamation Facilities and staff

During operations, the Mount Polley reclamation research program and annual reclamation initiatives are under the direction of the Environmental Superintendent, who reports to the General Manager. The environmental technologists, survey crew, mine operations, and the engineering department also contribute to reclamation activities undertaken at Mount Polley. Some programs also draw on the advice of reclamation specialists, including government and industry staff, professional agrologists, registered professional foresters, professional geologists and professional biologists. Some of this work includes: soils inventory, soil classification and mapping, waste characterization, and fish and fish habitat assessments.

In-house reclamation activities conducted by Mount Polley include:

- Drafting and surveying
- Site preparation, and land contouring
- Installation of diversion ditches, drainage works, sediment control and settling ponds
- Placement of stockpiled materials on reclamation sites (including biosolids)
- Seeding of domestic grass-legume cover crops
- Tree planting
- Monitoring/Reporting

Mount Polley has much of the heavy equipment necessary to carry out a majority of the reclamation activities, such as bulldozers, backhoes and haulage trucks. Mount Polley will also rent additional equipment, such as hydro seeders, harrows, plows and diskers as they are required.

6.2. Reclamation Cost update

A detailed reclamation cost update for the end of 2011 has been completed. The summary tables and detailed categories of disturbance can be found in Appendix L: Bond Costing.

6.3. Research

6.3.1. Tree Growth Plots

A research report written by R. Meister, *Forestmeister Services,* was included in the 2008 Annual Environmental and Reclamation Report submitted by Mount Polley. There was no research summary reported in 2011.

6.3.2. Seed Plots

In conjunction with the planting of native seed on the NEZ dump in 2010, 27 seed trial plots were established. These plots were monitored for the success of the growth rate in June of 2011 and will be monitored again in 2012. A summary of the monitoring of the seed plots on the NEZ dump is provided in Appendix I of this report. A review of this summary and a site visit of the NEZ dump was conducted by Moss Giasson of Montaine Environmental Services (Appendix N)

Additionally, in 2011, as part of the reclamation of the North Bell Dump, some research is being conducted to determine the requirement for fertilizer and mulch while hydroseeding. Appendix O provides further details.

6.3.3. Biosolids Program

In 1999, the MOE issued Mount Polley Mining Corporation a permit to import biosolids from the Greater Vancouver Regional District for the purposes of mine site reclamation (Permit PE15968). After initial receipt and stockpiling of the biosolids shipments in 2000, the program was suspended. Biosolids shipments recommenced in 2007. The following is a summary of the biosolids deliveries for 2011;

Biosolids Source: Annacis Island Wastewater Treatment Plant Class A cake and Lulu Island Wastewater Treatment Plant Class B cake

Period of deliveries: April 4th to July 4th 2011.

Total tonnage: 6 264 wet tonnes Class A Biosolids

Delivered to: 1 206 wt to the Main stockpiling area (TSF), 50 058 wt to NEZ dump mixing area.

Biosolids quality confirmation: All biosolids delivered to Mount Polley in 2011 met the requirements of Permit PE 15968 as well as the Organic Matter Recycling Regulation criteria for Class A or Class B biosolids. Analytical results are presented in Table 6.1.

Table 6.1 Analytical results for biosolids.

FRESH SHEET - AVERAGE METRO VANCOUVER'S BIOSOLIDS COMPOSITION

	BC Organic Matter Recycling Regulation		Annacis I. WWTP (Routine QC Station)			
			Number of Samples Collected	Dewatered Biosolids (Class A)		
	Class A Biosolids	Class B Biosolids		Period:	28-Mar-11	- 10-Jul-11
				Mean	Min	Max
Physical Parameters						
Total Solids (%)			15	27.8	26.6	28.9
Volatile Solids (%)			4	70.5	66.1	73.4
Electrical Conductivity (ds/m)			4	5.98	5.60	6.30
pH			4	8.2	8.0	8.3
Macronutrients (mg/kg dw)						
Total Kjeldahl Nitrogen (TKN)			4	53,275	48,000	57,900
Ammonia distillation			4	9,920	9,080	10,400
Nitrate-N			4	<5	<5	<5
Nitrite-N			4	<5	<5	<5
Phosphorus (Total)			4	24,525	21,800	27,200
Potassium (Total)			4	2,018	1,870	2,230
Calcium (Total)			15	25,813	23,600	27,500
Magnesium (Total)			15	6,063	5,210	6,790
Total Trace Elements (mg/kg)						
Aluminum			15	10,365	8,830	12,500
Arsenic	75	75	15	6.6	5.5	8.8
Cadmium	20	20	15	2.5	2.3	2.6
Chromium		1,060	15	71	51	116
Cobalt	150	150	15	4.4	4.0	4.9
Copper		2,200	15	829	779	916
Iron			15	36,813	29,300	40,700
Lead	500	500	15	81	60	103
Manganese			15	377	340	423
Mercury	5	15	15	1.5	1.2	1.9
Molybdenum	20	20	15	10.9	10.1	11.5
Nickel	180	180	15	30	26	34
Selenium	14	14	15	8.0	7.3	9.2
Silver			15	7.5	6.0	8.6
Zinc	1,850	1,850	15	1301	1190	1490
Bacteriology (MPN/g)						
Fecal Coliform - discrete	<1,000		45	94	47	800

6.3.4. Genomics Scientific Research

In December 2009, a "100GPM ABR" was constructed and commissioned. The Anaerobic Biological Reactor ("ABR") forms part of the Passive Water Treatment system on site, and represents the latest in scientific methodology and research. Details of the monitoring results for 2011 are provided in Appendix J.

6.4. Stability of Works

6.4.1. Rock Disposal Sites

Examinations of rock disposal sites (RDS) are made in accordance with section 6.10.1 of the "Health, Safety and Reclamation Code for Mines in British Columbia". A variance was granted by MEM on February 9, 2001 and Mount Polley operates in accordance with the terms and reference of this variance. Monitoring occurs at the East RDS, the North RDS, Northeast Zone RDS and the Cariboo Pit RDS.

6.4.2. Tailings Storage Facility and Associated Works

The TSF and associated works were inspected in October of 2011 by AMEC Engineering. The findings are documented in a report found in Appendix M: Tailings Storage Facility Report on 2011 Annual Inspection (Ref. No VM00560A*). Note - At the time that this report was published the Final Tailings Inspection Report was not available. This report will be distributed in early May.*

6.1. Reclamation Activities – 2011

The tables in Appendix K included in this report provide a summary of all disturbed and reclaimed areas, as well as the five year projections for disturbance and reclamation on the mine site. An inventory of soil stockpiles is also provided.

In 2011, reclamation work at Mount Polley focused on a de-activated waste rock dump area on site; the NBD. Details of this reclamation work are included in appendix O of this report.

6.2. Re-vegetation Treatments

In 2011 reclamation re-vegetation activities focused on the NBD with additoinal applications done along roads sides where disturbances had occurred. Recommendations for the reclamation and re-vegetation of the NBD were provide by Moss Giasson (Appendix N). Details of the re-vegetation are provided in Appendix O and a summary of areas re-vegetated are in Appendix K.

6.2.1. Rock Disposal Site Reclamation

In 2011, 10.6 hectares of the NDB were re-sloped and seeded (Appendix O). A preliminary reclamation project also occurred on the NEZ dump in 2010. Appendix I provides details on monitoring activities of this project in 2011.

No other reclamation was conducted on RDS in 2011.

6.2.2. Watercourse Reclamation

The disturbed area along the Long ditch (installed in 2008) was seeded in 2009 to provide erosion and sediment control. There were no changes to the watercourses at the Mount Polley mine site made in 2011. All diversion ditches and pipelines continue to operate as designed.

6.2.3. Pit Reclamation

In 2011, no reclamation was conducted on pits at Mount Polley. The Cariboo pit has been used as a PAG dump and a catchment for tailings supernatant. Mining of the Bell pit was completed in 2008 and it is being used as a rock dump. An amendment to Permit PE-11678 was received allowing the transfer of tailings supernatant to the Cariboo/Bell Pit. From a reclamation standpoint, the transfer of supernatant provides for rapid filling of pits and submergence of pit walls that may otherwise have contributed to metal leaching.

6.2.4. Tailings Storage Facility Reclamation

No reclamation was conducted at the Tailings Storage Facility in 2011.

6.2.5. Road Reclamation

Plans were in place to seed along the road side on the new access road in 2011 however these plans were postponed due to weather related safety concerns. More seed will be applied in 2012.

6.3. Securing of Mine Openings

In 2011 $50 000 was added to the reclamation/closure costing based on the best estimate for sealing of underground workings. See section 7.4 for description of workings.

6.4. Chemical, Reagent or Spill Waste Disposal

In the course of its ongoing operations, Mount Polley utilizes chemicals and reagents that are subject to a waste disposal management plan. Included in this plan are provisions for dealing with the waste products. In 2011 Sumas Environmental Services Ltd. was scheduled on a routine basis to remove and dispose of these waste products in an environmentally safe manner compliant with all relevant waste management legislation.

6.5. Acid Rock Drainage/Metal Leaching Program

The Acid Rock Drainage / Metal Leaching (ARD/ML) Monitoring Program for the Mount Polley Mine continued through 2011. The program characterizes all material types that will be handled during the mine life. Mount Polley's LECO analytical machine allows the mine to best manage mine waste by directing it to suitable storage sites, or to construction usage when required and if deemed suitable. The following sub-sections cover general discussions regarding the present program.

6.5.1. Waste Rock - Springer Pit

On each bench, a sample of cuttings was collected from each blast hole and analyzed for total copper, non-sulphide copper, iron, and gold. Blast hole patterns were on average 7.4m burden by 8.5m spacing. Bench height is 12m in the Springer Pit. Areas of ore and waste were identified by indicator kriging and assigning assay values, mill head value, etc. using an inverse distance calculation. The mine Geologist then established ore/waste boundaries based on the calculated mill head values. For purposes of ARD/ML monitoring, ore areas were excluded from acid based accounting (ABA) analysis, as this material is run through the mill. Only samples in waste blocks are submitted for ABA. In areas of known non-acid generating (NAG), the waste tonnage in each blast is divided by 40,000 in order to determine the number of ABA samples to be submitted (ie. 1 per 40,000 tonnes of waste). In areas of potentially acid generating (PAG), (or where NAG and PAG may coincide), the sample density is doubled to 1 per 20,000 tonnes. This helps to determine NAG/PAG boundaries, and provides a more robust dataset for the PAG. Survey data by pit is included in Appendix P of this report.

A summary (by individual pit) of materials classified NAG and PAG, follows below in Table 6.3.

The majority of Springer waste is NAG except for a distinct zone of PAG along the south margin of the Pit. Diamond drilling data indicated substantial quantities of pyrite in this area; this PAG-rich zone was modeled in 2009. Springer NAG was hauled to the Bell Pit dump while Springer PAG was hauled to the Wight Pit, Cariboo Pit, and Southeast Zone Pit.

Table 6.3 Tonnes of waste taken from each pit in 2011. Data is summarized using survey data.

Pit	NAG	PAG	Overburden	LSW	Total Waste + Overburden
Boundary	79,214	0	0	0	79,214
Springer	17,649,158	2,712,590	0	0	20,361,748

6.5.2. Tailings Storage Facility

Total NAG pit material to the dam in 2011 was: 630 965 tonnes.

6.5.3. ABA Data

There were 661 ABA samples analyzed from 136 blasts in 2011. Most of the samples were from the Springer Pit. A couple benches were mined from the Boundary Pit before the new mine access road was opened. The results of these are summarized here in Table 6.4 and are tabulated in Appendix P, Tables Q.1, Q.1.2, and Q.3.

Table 6.4 Summary of ABA data from the operating pits in 2011. Given are total samples taken, tonnes of waste material (NAG or PAG), as well as averages of S (%), AP, C (%), NP, and NPR.

Pit	Samples	Tonnes	S (%)	AP	C (%)	NP	NPR
Springer - NAG	494	17,238,489	0.094	2.941	0.279	23.23	7.898
Springer - PAG	139	2,681,684	1.036	32.725	0.266	24.69	0.754
Boundary - NAG	14	195,969	0.685	21.393	0.885	73.745	3.447

6.5.4. Low Grade Stockpile

At 2011 year end, the low-grade Non-economic ore was estimated to contain 1,949,246 tonnes of ore.

6.5.5. Rock Borrow Pit

No rock was extracted from the rock borrow in 2011.

6.5.6. Tailings

Representative composite tailings samples were collected to represent the tonnage of tailings deposited to the TSF. Samples were collected and analyzed for 10 of the 12 months. Table 6.5 displays the ABA data for each of these samples. From January to December 2011, approximately 2,862,263 tonnes of tailings were deposited into the TSF. The composite tailings sample had an average NPR value of 11 and a range of NPR values from 1.4 to 24.4.

Table 6.5 ABA Results for Tailings Composite Samples 2011

Mount Polley Tailings Composite		
Tails ABA		NPR
2011	Jan	14.0
	Feb	
	Mar	13.1
	April	24.4
	May	
	June	1.4
	July	8.3
	Aug	7.0
	Sept	8.47
	Oct	11.4
	Nov	11.515
	Dec	10.15
2011	Average	11.0

6.5.7. Soils and Till

No soil or till ABA samples were taken in 2011. Refer to section 7.2.2 for a summary of soil salvaging and stockpiling activities.

6.5.8. Field Grab Samples

In 2011 Mount Polley collected fourteen grab samples for ABA analysis.

Four were collected from the tailings storage facility. These samples had an average NPR value of 9.93 and a range of NPR values 8.7 to 13.08.

Six samples were taken from the new SERD with an average NPR of 35.38 and a range from 0.64 to 113.85.

Two samples were taken from the connector of the new access road to the parking lot with an average NPR of 33.33.

One(sample was taken from the new waste haul road with an NPR value of 7.86.

One sample was taken from the Temporary PAG dump with an NPR of 0.36.

6.5.9. Quality Control and Assurance

In 2011, the pulps from 6 ABA grab samples were submitted to ALS for independent ABA analysis as part of Mount Polley's Quality Control and Assurance program. From the analysis Mount Polley's lab consistently reported a higher AP than the external lab. There were no samples submitted in 2011.

6.5.10. Geological Characterization

Mount Polley ore bodies are alkalic porphyry copper-gold deposits hosted within Jurassic - Triassic Polley Stock that intrudes the Nicola Group volcanic rocks. The Polley Stock is a northwesterly, elongated body approximately five kilometers long and extends from Bootjack to Polley Lakes in the east west direction. The stock is a multi-phase pluton with composition ranging from diorite -to- monzodiorite -to- monzonite. It is variable altered and brecciated. Felsic (plagioclase phyric) and mafic (augite phyric) dykes occur as late stage intrusive phases. Late brittle faults offset lithologies, alteration, and mineralization.

Lithologies

Volcanics: These volcanic and volcaniclastic rocks are the oldest on the property, form part of the Nicola Group, and are Upper Triassic in age. They consist mainly of andesitic basalt or augite phyric alkali basalt, and volcanic breccias. Volcanic rocks do not make up a significant component of material from the pits.

Diorite: The diorite occurs mainly in the eastern section of the Springer Pit and is bluish-grey, fine to medium grained and equigranular to weakly porphyritic. Phenocrysts are plagioclase, minor augite, and occasional magnetite, biotite, calcite, and apatite.

Monzonite: The monzonite unit is brown to pinkish grey or greenish grey, medium to coarse-grained, and equigranular to weakly feldspar phyric. Predominate feldspars are orthoclase and albite. Accessory minerals include magnetite, augite, biotite, calcite, apatite, and epidote. This unit is variably flooded with potassic alteration. This unit is variable brecciated and hosts copper / gold mineralization.

Potassium feldspar phyric dykes: These dykes are pinkish orange to orangish grey. The matrix is fine to medium grained, orangish grey and composed largely of potassium feldspar. The phenocrysts are elongated subhedral to euhedral plagioclase laths up to 10mm long. These dykes are often planar, occurring in various orientations and filling fractures of the brecciated monzonite. They vary in width from fractions of a metre to 5 metres wide.

Augite Phyric Dykes: These dykes are distinctive dark green with a fine to medium grained mafic matrix and scattered up to 3mm augite phenocrysts (up to 8% of rock) and occasionally up to 2% euhedral magnetite phenocrysts. Dykes are generally planar in form and tend to fill fractures and faults. They occasionally exhibit orange potassic alteration.

Alteration and Mineralization:

Brecciation and hydrothermal alteration variably affected the Polley Stock and the surrounding Nicola Group volcanics. Alteration can be described in terms of a potassic core enveloped by a propylitic zone. In core of the system, intense potassic alteration is accompanied by variable strong albite, magnetite, and actinolite alteration. Propylitic alteration (calcite – chlorite – minor pyrite) occurs near the perimeter of the system. In the Springer Pit, alteration is generally characterized by veins of actinolite, epidote, and magnetite which cut across the earlier kspar and albite flooding in the breccia.

Mineralization is variable, but strongly associated with brecciation and alteration. In the Springer Pit, chalcopyrite is the dominant copper sulphide, with local accumulations of bornite in the higher-grade areas. Sulphides occur disseminated to finely blebbed within kspar, albite, magnetite, and actinolite alteration. In the southern portion of the Springer Pit, pyrite occurs strongly disseminated in both ore and waste rock. The pyritic waste generally constitutes PAG rock, with sulphur values up to 3%. This pyritic zone extends south to encompass the neighbouring WX Zone, where gold values are typically higher.

Structures

Faults recognized to date are late and brittle. Two dominate fault sets have been recognized. One is a north-north-east trending, steeply dipping set. The other is a west northwest trending, also steeply dipping. Both fault sets offset and terminate the ore.

6.5.11. Drainage Monitoring Program

Mount Polley's Effluent Permit (PE 11678) with the MOE requires that water samples be collected from the tailings supernatant pond (Sample Site E1) and the main embankment seepage collection Pond (Sample Site E4). Composite samples of the foundation drains (Sample Site E5) of the TSF are also collected. Sampling occurs twelve (12) times per year. These samples are analyzed for total metals using ICP scan and for conventional parameters such as nutrients, pH, alkalinity and sulphate. Discussion of sampling results for these and other sample sites are found in Section 2.3.

6.5.12. ARD/ML Research – Kinetic Testing

Kinetic rate information is a critical part of drainage chemistry prediction that provides a measure of the dynamic performance or "reactivity" of the material being tested. Steve Day of *SRK Consulting Engineers and Scientists* (SRK) has been retained by Mount Polley Mining Corporation to interpret results of the kinetic-testing program and suggest other recommended testing, if required.

The final analysis and report from SRK is included in Appendix Q of this report.

7.0 MINING PROGRAM

A detailed mine plan was presented in the Reclamation and Closure Plan submitted in 2004 to MEM and approved under Permit M-200. A new closure plan is in the process of being developed for 2012. For this updated document, disturbed areas on the mine site were re-assessed; certain components of the mine site have been re-assigned, and differences exist in surface area of mine components.

7.1. Surface Development to Date

7.1.1. Areas of Disturbance to End of 2011

At the end of 2011, the total disturbed area in all categories was 897.67 hectares. Surface areas of the various disturbed and reclaimed units are outlined in Table K.1 of Appendix K of this report. Table K.2 provides a breakdown of disturbed areas. Due to the disturbed area revision with development of a new closure plan, it is difficult to directly compare changes in disturbed areas by component; however, the “Disturbed Area” columns in Tables K.1 and K.2 have been adjusted to accurately reflect 2011 surface development.

Figure 7.1 depicts newly disturbed areas in 2011, displayed on an updated (as of 2011) aerial orthophoto mosaic. Figure 7.2 illustrates all of the mine components in Table K.2 (Disturbed Areas – Breakdown by Mine Component), and their projected footprint for 2016 (areas labeled with numbers are referred to in the drawing reference column of Table K.2, Appendix K).

7.1.2. Surface Development in 2011

In 2011, the total disturbed area of the mine increased by 19.44 hectares, due to expansions of the Springer Pit (2.53 ha), SERDS (14.68 ha), and New Access Road (2.23 ha). Notable changes were the conversion of the SEZ Pit and Pond Zone Pit into rock waste dumps, and the Bell Dump is now part of the North Bell Dump. The South Drainage Ditch was constructed in the fall of 2011. This ditch is designed to collect water below the SERD and deliver it to the Long Ditch. Aside from area changes due to revision of the map, there were no major changes in the areas of the TSF, stockpiles, roads, or miscellaneous components.

7.2. Projected Surface Development from 2011 to 2016

7.2.1. Areas of Disturbance

Table K.3 (Appendix K) outlines the projection of further disturbance for the next five years and mine life.

7.2.2. Salvaging and Stockpiling of Surficial Materials

Soil salvage is a critical component of reclamation planning, as it will provide the soil material necessary to reclaim the mine site for desired end land uses. In 1997 Mount Polley prepared a Soil Salvage and Stockpile Protocol, SSSP-97, which addressed site-specific criteria relating to soil management.

In 2011, approximately 148 141 m^3 of soil was salvaged from the plant site area (137 429 m^3 from the Springer Pit to the Bell Dump, and 10 712 m^3 from the Pond Zone and Boundary Pit to the Boundary Dump), while 15 367 m^3 from the Highway to Heaven stockpile was used in North Bell Dump reclamation. This equals a total of 3 525 476 m^3 of soil material in storage at Mount Polley (Table K.4, Appendix K). This amount over 717 hectares (ha) (total area disturbed minus pits, stockpiles, and reclaimed areas) yields a nominal 49 cm (vertical equivalent) of soil in storage for each hectare disturbed.

7.2.3. Drainage Control and Protection of Water Courses

Mount Polley maintains several ditches around the property. These ditches are observed daily by the pit operations shifter and weekly by environmental staff. These ditches are inspected bi-annually by environmental staff. Sediment and erosion control systems are put in place as required.

7.3. Test Heap Leach

In 2006, Mount Polley applied for an amendment to the M-200 permit allowing them to build a Heap Leach Pad and Copper Recovery facility. The amendment was granted on March 29, 2007. The M-200 permit requires that all monitoring data from this facility is included in this report.

In 2011, the total volume from the Leachate collection and removal system (LCRS) was 90 078 gallons; for the majority of the year, the pad was in recirculation mode with an average flow rate of 48.7 m³/h (214 USGPM). The recirculation pump flow rate ranged from a low of 10.5 m³/h (or 46.2 USGPM) to a high of 97.4 m³/h (430 USGPM). No materials were sent to the mill for cementation, and there were zero spills to ground during operation. The recycling pump handled 269 644 gallons or 1 020 m³ of solution in 2011.

The Leach Pad operated for approximately 90% of the year; the downtime was due to cold winter temperatures that froze piping and valves. Table 7.1 reports the average monthly temperatures, conductivity, dissolved content (DO), oxygen-reduction potential (ORP), as well as dissolved copper and iron content in the solution:

	Monthly Averages					Leachate Solution				
Month	Temperature (°C)	Conductivity (S/cm³)	Dissolved Oxygen (DO) (%)	pH	ORP (mV)	Sump Level (ft)	Copper (ppm)	Iron (ppm)	Free Acid (g/L)	Comments
January	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Winter conditions; heap leach offline due to frozen valves and pumps
February	10.9	17.3	3.7	3.6	433.1	11.6	885.3	26.3	5.2	
March	8.8	23.6	4.2	3.7	456.0	13.0	935.3	22.3	7.5	
April	8.6	28.4	2.9	3.7	346.0	15.2	992.9	26.0	7.7	
May	9.3	9.3	24.7	3.6	3.4	21.6	904.6	45.8	7.9	
June	11.7	16.0	3.3	3.3	404.5	23.0	596.0	66.0	6.0	
July	13.2	14.9	2.7	3.1	410.1	19.7	251.3	84.5	5.3	
August	14.8	14.8	6.2	3.4	479.5	12.0	N/A	N/A	5.2	
September	15.1	15.7	20.6	3.4	487.5	10.9	100.7	7.5	5.6	
October	11.9	17.1	18.9	3.2	496.9	11.5	204.4	30.4	6.8	
November	13.3	16.7	40.1	3.2	482.0	13.3	273.9	35.6	4.2	
December	8.2	17.8	30.7	3.1	490.3	14.3	N/A	N/A	N/A	Winter conditions; heap leach offline due to frozen valves and pumps

Table 7.1 2011 Monthly averages at Heap Leach Test Pad

7.4. Underground Mining Program

In January and February of 2011, Procon Mining and Tunneling completed the last 130m of the 500m long exploration drift in the Zuke Zone underground project. Following the completion of the underground workings, Atlas Drilling was retained for exploration drilling; completing 46 holes spread over five drill bays. Positive drilling results led to Mount Polley Mining Corporation deciding to proceed further with the underground exploration of the Zuke Zone, and in October of 2011, underground exploration development was re-started; this time with Mount Polley Mining Corporation undertaking the work. Exploration development will continue through 2012 under the existing Notice of Work.

8.0 DISCUSSION

This report satisfies the reporting requirements of the MOE effluent permit (PE 11678) and the MEM permit M-200. Mount Polley continues to monitor and report as required by all permits.

As discussed in section 3.2, bathymetric surveys of Polley Lake and Bootjack Lake conducted in 2011 show that P2, B1, and B2 are not at the deepest possible sites. Consequently, Mount Polley is recommending an amendment to Permit PE-11678 to shift these sample locations to the deeper locations listed in Table 8.1 (and illustrated in Figure 3.1).

Table 8.1 Depths and Locations of Bootjack Lake and Polley Lake Existing and Proposed Sample Sites

Existing Location	Depth (m)	UTM Easting	UTM Northing		Proposed Location	Depth (m)	UTM Easting	UTM Northing
P2	26.7	595343	5821862		**P2a**	32.7	595166	5822182
B1	13.3	590281	5823350		**B1a**	17.3	590049	5823527
B2	13.8	591943	5820868		**B2a**	17.3	591263	5821646

Mount Polley intends to follow the recommendations for biological monitoring as outlined in Section 3.1 of this report.

REFERENCES

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