Table of Contents

Tables

Surface Water Quality

Groundwater Quality

Climatology

Quality Assurance / Quality Control

Surface Water QA/QC Duplicates

Surface Water QA/QC Field Blank Review

Surface Water QA/QC Trip Blank Review

Groundwater QA/QC Duplicates

Figures

Groundwater Quality

Climatology

Hydrology

Appendices

1.0 INTRODUCTION

Imperial Metals Corporation is 100% 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 secondary highway No. 115 for 60 km to Morehead Lake and South from 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 and Bootjack Lake / Morehead Creek watersheds, both of which are tributaries of the Quesnel River.

A Reclamation and Closure Plan for the Mount Polley Project was approved by the Ministry of Energy and Mines (previously the Ministry of Employment and Investment) resulting in the issuance of Permit M-200 in July of 1997, last amended May 2001, which approves the Work System and Reclamation Program for Mount Polley (MPMC). The mine received a Ministry of Water, Land and Air Protection effluent permit PE 11678 (previously the Ministry of Environment, Lands and Parks) issued under the provisions of the “Waste Management Act” in May of 1997 and last amended in February of 2002. This permit authorizes the discharge of concentrator tailings, mill site runoff, mine rock runoff, open pit water, and septic tank effluent from the ore concentrator.

This open pit mine is on a phased development schedule, ultimately involving the creation of three pits. Project infrastructure consists of the mill site, three open pits, three rock disposal sites (RDS) and a tailings storage facility (TSF), as well as the main access road, power line, tailings pipeline and sediment control ponds. Construction activities in 1995 consisted primarily of clearing the mill site. Construction of the whole facility began in 1996, and the mill was commissioned in June of 1997. The first full year of mining and milling took place at Mount Polley in 1998.

All data collected throughout the year under permit PE 11678 is submitted in an

Annual Environmental Report by April 30th of the following year. This includes a report on the construction and performance of the tailings impoundment and dam; reclamation activities; and an evaluation of the impacts of the operation on the receiving environment. For the M-200 permit, an Annual Reclamation Report outlining the results of all geological characterization, material characterization test work, and water quality monitoring is submitted by March 31st of each year. Also provided in this report are details of the reclamation plan and a summary of the disturbance and reclamation activities for the previous years and for five subsequent years. For the reporting year 2000, these two reports were first combined into one for submission to the Ministry of Energy and Mines and to the Ministry of Water, Land and Air Protection to satisfy the requirements of the respective permits. For the reporting year 2002, this reporting format of a combined report for both Ministries has been continued.

1.1 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*".

To support mine planning, operations and reclamation, a comprehensive environmental baseline-monitoring program was designed and carried out in 1995 and 1996 to expand upon previous studies conducted in 1989/1990 (HKP 1996b, c, 1997; Blashill, 1996, 1997; ITM 1997). The environmental baseline studies document pre-development land use and conditions of the aquatic and terrestrial ecosystem. This provides 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 on-going, fulfilling both the requirements of the M – 200 permit by Ministry of Energy and Mines (MEM) and the effluent permit PE 11678 by the Ministry of Water, Land and Air Protection (MWLAP).

For the Mount Polley project area, the primary end land uses of the reclamation plan are wildlife habitat and commercial forestry. Reclaimed areas will be capable of supporting secondary uses of the wildlife resource, such as hunting, guide-outfitting, trapping and outdoor recreation. Perpetuating, and, if possible, enhancing biodiversity is an important wildlife consideration. The following goals are implicit in achieving this primary objective:

- Long-term preservation of receiving water quality within and downstream of decommissioned operations;
- Long-term stability of engineered structures, including the rock disposal sites, tailings storage facility 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 that are not required after the mine closes

To achieve these goals, 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. For instance, in 1998, a reclamation research test plot was established on the East 1170 RDS to monitor the effects of soil thickness and various other parameters on plant growth. Cells comprising new treatments were added to the test plot in 1999, and some of the cells planted in 1998 were repeated in the 1999 plots with the original prescriptions. In 2000, Phase II of the Reclamation Research program was initiated, with additional plots established on re-sloped areas of the 1170 RDS.

1.2 ENVIRONMENTAL MONITORING

The main objective of the environmental monitoring program is to evaluate all data collected so that site-specific objectives can be developed, which would focus on protecting the environment. Sampling procedures follow those 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" and the Mount Polley "Quality Assurance/Quality Control Manual".

Water sampling and analysis is conducted throughout the year at surface and groundwater locations specified in Table 1 and at times specified in Table 2 of Permit PE 11678. The locations of all surface and groundwater monitoring sites are shown in Figure 2. Flow measurements are recorded at surface water stations specified in Section 3.3 of permit PE 11678. Static water levels are also recorded in groundwater monitoring wells at the time of sampling.

The Handar 555 weather station measures continuous wind speed and direction, daily precipitation and evaporation and temperature. This data is downloaded on a regular schedule and saved at the minesite for summarization at year end.

Under Section 3.2 of the permit, a biological monitoring program is conducted once every three years, starting in 1999. The first of these reports was submitted with the 1999 Annual Environmental Report. The next was conducted in 2002 and can be found in the appendix labeled "Biological Monitoring Report" at the end of this report.

2.0 ENVIRONMENTAL PROTECTION & RECLAMATION PROGRAM

2.1 RECLAMATION FACILITIES AND STAFF

During operations, the Mount Polley reclamation research program and annual reclamation initiatives are under the direction of the Environmental Coordinator, who reports to the Mine Superintendent and Mine Manager. The assistant environmental coordinator, the survey crew, and a special projects coordinator also contribute to any reclamation activities undertaken at Mount Polley. Some programs also draw on the advice of reclamation specialists, including government and industry staff, Professional Agrologists and Registered Professional Foresters, for work such as soils inventory, classification and mapping.

In-house reclamation activities conducted by Mount Polley include:

- Drafting and surveying;
- Site preparation, land contouring;
- Installation of diversion ditches, drainage works and settling ponds;
- Placement of stockpiled materials on reclamation sites;
- Seeding of domestic grass-legume cover crops; and
- Monitoring/Reporting.

Mount Polley also has much of the heavy equipment necessary to carry out the reclamation activities, such as bulldozers, backhoes and haulage trucks, and will rent additional equipment, such as hydroseeders, harrows, plows and diskers, as needed.

However, since operations have ceased in October 2001, the personnel at the site have been reduced to a skeleton crew. As a result, experienced individuals are hired as need to help in any reclamation initiatives. This will likely continue until operations resume at the Mount Polley minesite.

2.2 RECLAMATION ACTIVITIES – 2001

2.2.1 STABILITY OF WORKS

2.2.1.1 ROCK DISPOSAL SITES

Examinations are made in accordance with section 6.12.1 of the "Health, Safety and Reclamation Code for Mines in British Columbia". A variance was granted by MEM on February 9, 2001. Mount Polley operates in accordance with the terms and reference of this variance. The rock disposal sites (RDS) that are monitored are the East RDS, the North RDS and the Cariboo Pit Back-fill RDS.

2.2.1.2 TSF AND ASSOCIATED WORKS

Knight Piésold Ltd. performed an annual inspection of the TSF and associated Works in 2002. The findings are documented in the report entitled*, "Report on 2002 Annual Inspection" (Ref. No. VA101-1/3-1*). This report was submitted to the Ministry of Energy and Mines and the Ministry of Water, Land, and Air Protection in June of 2003.

2.2.2 RE-VEGETATION TREATMENTS & FERTILIZER APPLICATIONS

In 2002, two areas were seeded/planted and one area was fertilized. The first area was 3.60 Ha on the 1170 East RDS platform. It surrounded the Phase I reclamation research trial. Soil and biosolids were applied and the area was seeded in the winter of 2002. As biosolids was used here, it was considered to have an application of fertilizer as well. The second area was 8 Ha in size on the tailings beach at the TSF. A wetland mixture of grass was used as the pond elevation rises and falls throughout the year. This area was also seeding the winter period of 2002.

The total area that has been seeded/planted throughout the minesite is 87.31 Ha, while the area fertilized is 79.31 Ha. This data is summarized in Table 3.1.1.-1.

2.2.3 ROCK DISPOSAL SITE RECLAMATION

As mentioned in the previous section, 3.6 Ha of the 1170 East RDS platform was covered with soil and biosolids and planted with a grass mixture. No other reclamation was conducted on the three RDS at Mount Polley during 2002.

2.2.4 WATERCOURSE RECLAMATION

No further changes to the watercourses at the Mount Polley minesite were made during 2002. All diversion ditches and pipelines continue to operate as designed.

2.2.5 PIT RECLAMATION

No pit reclamation on any of the pits at Mount Polley was carried out in 2002. Since Mount Polley is in Care and Maintenance mode, it is expected that mining will resume once it is more economically feasible to do so. As a result, the existing pits will remain unreclaimed so that mining can easily commence once these conditions are met.

2.2.6 TAILINGS STORAGE FACILITY (TSF) RECLAMATION

As discussed in section 2.2.2, an 8 Ha area was seeded on the tailings beach. Results of this will be seen during 2003, as the planting occurred in late 2002.

2.2.7 ROAD RECLAMATION

No road reclamation occurred in 2002.

2.2.8 SECURING OF MINE OPENINGS

As the Mount Polley Mine is an exclusive open pit mine, there are no mine openings to secure.

2.2.9 METAL UPTAKE IN VEGETATION

No further work on metal uptake in vegetation at the Mount Polley minesite was carried out during 2002. Once operations resume at Mount Polley, a cursory review of the conditions of metal uptake will likely occur to determine what, if any, metal uptake has occurred on an average property basis.

2.2.10 CHEMICAL, REAGENT OR SPILL WASTE DISPOSAL

No chemicals, reagents or spill waste was generated at Mount Polley during 2002. As a result, nothing was removed or disposed during this period.

2.2.11 ACID ROCK DRAINAGE/ METAL LEACHING PROGRAM

As mining ended in 2001, so did the operational waste characterization program at the Mount Polley mine. However, some waste rock, mostly from the Bell Pit, was back-filled into the Cariboo Pit during 2001. Detailed characterization of this material was collected as part of the operational waste characterization program, along with the waste characterization of all other components that are part of this program.

Some of the waste characterization results attached to the material deposited into the Cariboo Pit from the Bell Pit showed indications of neutralization potential / Maximum Acid Potential (NP/MPA) ratios between the range of 1 to 2. Based on the ARD/ML guidelines issued by the Provincial Ministry of Energy and Mines, any waste that returns NP/MPA ratios between the values of 1 & 2 is considered potentially acid generating (PAG). However, as all waste characterization at Mount Polley since mining began, as well as all ARD/ML prediction work performed to date, has indicated that there is or will be no PAG or AG (acid generating) waste generated during mining operations, these results are being cross-checked through an additional detailed waste characterization study during 2002 and 2003.

Following an evaluation of the original waste characterization data for the material in question, Mr. Bill Price, of the Ministry of Energy and Mines, suggested a more detailed study to confirm these results. This study, referred to in the previous paragraph, will be summarized in a separate report that will be submitted in the latter half of 2003. As the various waste units can not be accurately recorded for this material, it was decided by Mount Polley to hold back on the submission of the table that documents the volumes of waste rock and tailings deposited (with associated characterization) in 2001. This table will be submitted as part of the updated waste characterization report that will be submitted in the latter half of 2003.

As a final note, as mining has ceased at Mount Polley, at least for the short-term, a finalized report detailing all waste characterization at Mount Polley since the start of mining will be collated and submitted in the latter half of 2003. The purpose of this report is to provide, in one document, a history of the waste characterization work that has been conducted at Mount Polley, so that any further work in the future, once mining resumes, can easily build on the previous work.

2.3 SURFACE WATER MONITORING

All surface water sampling and analysis was conducted in accordance with sub-section 3.1 of the Mount Polley Effluent Permit PE 11678. Grab samples were taken from sampling locations and at a frequency listed in Table 1 of the permit and analyzed for the parameters listed in Table 2.

The calibration, sampling, filtering, preservation and shipping procedures used for the monitoring program are outlined in the “Quality Assurance/ Quality Control Manual 2001”. The sampling program included monthly sampling at six sites (E4, E7, W4, W7, W8, W8z,), quarterly sampling at eight sites (E1, E5, E8, W1, W3a, W5, W12, W13), two-times per year sampling at one site (W11) and five weekly intensive sampling periods during spring freshet and in fall at four monitoring sites (W4, W7, W8, W8z). Samples were submitted to Philip Analytical Services for analysis of physical parameters (turbidity, alkalinity, total suspended solids, sulphate hardness, and D.O.C), nutrients (nitrate plus nitrite, ammonia and ortho-phosphorus) and total metals. Dissolved aluminum, copper and iron were also analyzed.

Additionally, there was one additional site monitored monthly, if there was a flow. The site name is MP1 and it is the East RDS seepage. This water is diverted by the waste dump diversion ditch (WDDD) and pumped back to the Cariboo Pit, mostly during spring runoff.

2.3.1 SITE E1 – TAILINGS SUPERNATANT

Table 2.3.1 summarizes the results of the water quality data from 1998 to 2002 for site E1 (Tailings Supernatant). Further, figures 2.3.1-1 thru 2.3.1-9 contain the graphical representation of all parameters from 1998 to 2002. A few key parameters are discussed in the following paragraphs.

Average values of pH remain around 8, but have risen above and below by a few fractions over the operating period. There is no concern for the pH to fall in the tailings water at Mount Polley, as all prediction work done to date has indicated an extreme buffering capacity of the rock that is processed and deposited in the tailings facility.

Sulphate values have increased during the operating period from 80 mg/l to 130 mg/l, but have fallen off slightly to about 120 mg/l. Levels of Nitrite & Nitrate in the tailings supernatant had increased up to 2001, but have since fallen back off to levels below 0.1 mg/l. Total suspend solids have been traditionally high at this site, due to continuous depositions of the tailings, however, as expected, with the cessation of tailings deposition, the values for TSS have dropped nearly to method detection limits of 4 ppm.

The levels of both Total Copper (T-Cu) and Dissolved Copper (D-Cu) have been steadily decreasing in the tailings supernatant since 1998. T-Cu has decreased to an average of less than 0.03 mg/l during 2002. Further, D-Cu has decreased to below 0.015 mg/l. Other metals, such as total selenium and total iron, have decreased during the 2002 monitoring period as well.

2.3.2 SITE E4 – MAIN EMBANKMENT SEEPAGE POND

Table 2.3.2 summarizes the results of the water quality data from 2001 to 2002 for site E4. Further, figures 2.3.2-1 thru 2.3.2-9 contain the graphical representation of all parameters from 2001 to 2002. As there has only been two years of data collected for this site, few conclusions can be drawn using this statistical data. However, as this is one of the two locations where there is a discharge from the minesite, a more detailed review is provided in section 2.4.1. A discussion of the parameters monitored for discharge limits is included in that section.

2.3.3 SITE E5 – MAIN EMBANKMENT DRAIN COMPOSITE

Table 2.3.3 summarizes the results of the water quality data from 1998 to 2002 for site E5. Further, figures 2.3.3-1 thru 2.3.3-9 contain the graphical representation of all parameters from 1998 to 2002. This site is scheduled to be sampled on a quarterly schedule. However, as the drain elevations that must be sampled are below the elevation of the discharge pipe from the seepage pond, the drains were only available for sampling at one time during the year when the pond level was low enough to sample. Isolation valves will likely be installed during 2003 so that the drains can be isolated from the pond water level to allow for sampling at the required schedule. Regardless, a few key parameters are discussed in the following paragraphs for the one sample point collected in 2002.

Dissolved sulphate had been climbing from 1998 to 2001, where it peaked just above an average of 110 mg/l. However, it has dropped off some to around 70 mg/l. Nitrate + Nitrite (N) followed the same path, with a peak in 2001 of 90 mg/l (average) and has since dropped to about 25 mg/l (average).

D-Cu started at a high of around 0.011 mg/l in 1998 and was falling to an average of 0.005 mg/l in 2000, where it remained until a further decrease to 0.003 mg/l in 2002. Additionally, D-Al was typically around 0.004 mg/l, but has dropped to around 0.002 mg/l in 2002.

2.3.4 SITE E7 – PERIMETER EMBANKMENT SETTLING POND

Table 2.3.4 summarizes the results of the water quality data from 2001 to 2002 for site E7. Further, figures 2.3.4-1 thru 2.3.4-9 contain the graphical representation of all parameters from 2001 to 2002. As there has only been two years of data collected for this site, few conclusions can be drawn using this statistical data. However, as this is one of the two locations where there is a discharge from the minesite, a more detailed review is provided in section 2.4.2. A discussion of the parameters monitored for discharge limits is included in that section.

2.3.5 SITE E8 – CARIBOO PIT

Table 2.3.5 summarizes the results of the water quality data from 1998 to 2002 for site E8. Further, figures 2.3.5-1 thru 2.3.5-9 contain the graphical representation of all parameters from 1998 to 2002. A few key parameters are discussed in the following paragraphs.

Average values of pH remain around 8, but have risen slightly above to around 8.5 for the year 2002. During the period of 1999 to 2000, dissolved sulphate values increased from an average of 50 mg/l to around 90 mg/l. However, this average of 90 mg/l has remained thru the most recent monitoring year of 2002. Levels of Nitrite & Nitrate in the Cariboo Pit supernatant had peaked in 2000 with a high of nearly 20 mg/l but have been decreasing steadily to an average in 2002 of around 1 mg/l.

T-Cu has decreased to an average of less than 0.027 mg/l during 2002. Further, D-Cu has decreased to 0.025 mg/l. As can be seen, nearly all Cu in this water is in the dissolved form, as was expected following the cessation of mining activity.

2.3.6 SITE MP1 – EAST ROCK DISPOSAL SITE SEEPAGE

Table 2.3.6 summarizes the results of the water quality data from 1998 & 2000 to 2002 for site MP1. Further, figures 2.3.6-1 thru 2.3.6-9 contain the graphical representation of all parameters from 1998 & 2000 to 2002. A few key parameters are discussed in the following paragraphs. The source of this sample is groundwater that has come to the surface under the base of the East RDS. As the East RDS advanced, the this small creek was covered by the rock of the East RDS and now interacts with this waste rock. As a result, it is a good indicator of the water quality coming from the RDS.

Average values of pH have remained constant during this time period between 7.5 & 8. High conductivity is typical for this sample and has risen significantly from a low of 400 ųS/cm in 2001 to an average high of 1000 ųS/cm in 2002.

Dissolved sulphate values increased from an average of 50 mg/l in 1998 to an average of around 500 mg/l in 2002. Levels of Nitrite & Nitrate in this seepage sample have also increased from an average of 3 mg/l in 1998 to an average in 2002 of 22 mg/l. Further, ortho-phosphorus values had peaked in 2001 with an average of nearly 0.09 mg/l, but have since fallen off in 2002 with an average of 0.01 mg/l.

T-Cu has decreased to an average of less than 0.02 mg/l during 2002 from an average high of 0.08 mg/l in 2000. Further, D-Cu has decreased to 0.015 mg/l in 2002 from just above 0.02 mg/l in 2000. T-Fe has also decreased during this time period, from an average high of nearly 0.8 mg/l to below 0.01 mg/l. Finally, T-Se has been on the rise, from an average of 0.02 mg/l in 1998 to an average high in 2002 of nearly 0.19 mg/l.

2.3.7 SITE W1 – MOREHEAD CREEK

Table 2.3.7 summarizes the results of the water quality data from 1998 to 2002 for site W1. Further, figures 2.3.7-1 thru 2.3.7-9 contain the graphical representation of all parameters from 1998 to 2002. A few key parameters are discussed in the following paragraph.

Average values of pH remain similar to previous years at just below 7.5. Dissolved sulphate values also remain flat with an average just below 4 mg/l. Levels of Nitrite & Nitrate are also flat, with averages in the range of 0.04 mg/l. Finally, T-Cu values have always ranged between 0.004 mg/l & 0.007 mg/l, and for 2002, are in the vicinity of 0.004 mg/l.

2.3.8 SITE W3a – MINE DRAINAGE CREEK AT BOOTJACK LAKE

Table 2.3.8 summarizes the results of the water quality data from 2000 to 2002 for site W3a. Further, figures 2.3.8-1 thru 2.3.8-9 contain the graphical representation of all parameters from 2000 to 2002. A few key parameters are discussed in the following paragraphs.

Dissolved sulphate values have increased some over this period, with an average of 8 mg/l in 2000 to an average of 35 mg/l in 2002. However, Nitrate + Nitrite values have remained relatively flat, ranging between 0.1 mg/l and 0.22 mg/l, with the most recent averages around 0.15 mg/l in 2002. Ortho-phosphorus, additionally, had increased to an average of 0.05 mg/l in 2001, but has since fallen off to 0.01 mg/l in 2002.

T-Cu has decrease some with average values of 0.028 mg/l in 2000 to 0.014 mg/l in 2002. The copper concentration in this creek (along with North Dump Creek – W4) has always been higher than at other sites around Mount Polley. This is likely due to the long-term drainage coming from the elevated copper materials where the ore body lays. Decreases where expected, since the runoff from the ore body area no longer feeds this creek since the mine has been in operation. This diversion continues during the care & maintenance period.

2.3.9 SITE W4 – NORTH DUMP CREEK

Table 2.3.9 summarizes the results of the water quality data from 1998 to 2002 for site W4. Further, figures 2.3.9-1 thru 2.3.9-9 contain the graphical representation of all parameters from 1998 to 2002. A few key parameters are discussed in the following paragraphs.

Dissolved sulphate values have fluctuated over this period, starting at an average of nearly 20 mg/l in 1998, then moving to a low of 5 mg/l during

1999 to 2000 and finally increasing again to averages of 15 mg/l in 2002. Nitrate + Nitrite values have mostly remained flat with averages around 0.05 mg/l, but have increased slightly to 0.12 mg/l in 2002.

T-Cu values have returned to similar values seen in 1998, with an average of around 0.008 mg/l, falling from a high average of nearly 0.019 mg/l in 2000. D-Cu follows an almost identical curve, demonstrating that most of the Cu is in the dissolved form in this creek.

2.3.10 SITE W5 – BOOTJACK CREEK ABOVE HAZELTINE CREEK

Table 2.3.10 summarizes the results of the water quality data from 1998 to 2002 for site W5. Further, figures 2.3.10-1 thru 2.3.10-9 contain the graphical representation of all parameters from 1998 to 2002. A few key parameters are discussed in the following paragraphs.

Dissolved sulphate values have remained constant with averages below 5 mg/l, however an anomalous reading in 2001 of nearly 1700 mg/l give the appearance of a decrease from the previous year. This value is likely an error in the database, as no values of this magnitude have every been encountered at Mount Polley. Additionally, Nitrate + Nitrite values have mostly remained flat with averages ranging from 0.02 mg/l to 0.07 mg/l, with the most recent value in 2002 at 0.06 mg/l.

T-Cu values have typically been around 0.005 mg/l, however a high reading in 2001 of nearly 0.065 mg/l has given the perception that values have decreased from the previous year. This high value in 2001 should be considered suspect, as all others from this site during the baseline and operational monitoring program are closer to the typical value of 0.005 mg/l.

2.3.11 SITE W7 – UPPER HAZELTINE CREEK

Table 2.3.11 summarizes the results of the water quality data from 1998 to 2002 for site W7. Further, figures 2.3.11-1 thru 2.3.11-9 contain the graphical representation of all parameters from 1998 to 2002. A few key parameters are discussed in the following paragraphs.

Dissolved sulphate values have remained constant, with averages between 4 mg/l & 6 mg/l. Additionally, Nitrate + Nitrite values have mostly remained flat with averages ranging from 0.02 mg/l to 0.05 mg/l.

T-Cu values have typically ranged between 0.001 mg/l & 0.004 mg/l, however a high reading in 2001 of nearly 0.08 mg/l has given the perception that values have decreased from the previous year. This high value in 2001 should be considered suspect, as all others from this site during the baseline and operational monitoring program are closer to the typical value of 0.0025 mg/l.

2.3.12 SITE W8 – NORTHEAST EDNEY CREEK TRIBUTARY

Table 2.3.12 summarizes the results of the water quality data from 1998 to 2002 for site W8. Further, figures 2.3.12-1 thru 2.3.12-9 contain the graphical representation of all parameters from 1998 to 2002. A few key parameters are discussed in the following paragraphs.

Dissolved sulphate values have typically averaged 4 mg/l, but have increased to an average of 24 mg/l in 2002. This is most likely due to the discharge that has emanated from the main embankment seepage pond starting in spring of 2002. Additionally, Nitrate + Nitrite values have increase (likely for the same reasons) from averages around 0.065 mg/l to an average of 0.084 mg/l in 2002. However, ortho-phosphorus has remained relatively constant, with averages between 0.03 mg/l and 0.09 mg/l. One anomalous reading of 0.12 mg/l in 2001 gives the impression that ortho-phosphorus has decreased from the previous year, however, this one value should be considered suspect.

T-Cu values have typically ranged between 0.0017 mg/l & 0.0035 mg/l, however a high reading in 2001 of nearly 0.085 mg/l has given the perception that values have decreased from the previous year. This high value in 2001 should be considered suspect, as all others from this site during the baseline and operational monitoring program are closer to the typical values. Further, the D-Cu graph follows the same pattern, indicating that nearly all Cu is in the dissolved form.

2.3.13 SITE W8z – SOUTHWEST EDNEY CREEK TRIBUTARY

Table 2.3.13 summarizes the results of the water quality data from 1998 to 2002 for site W8z. Further, figures 2.3.13-1 thru 2.3.13-9 contain the graphical representation of all parameters from 1998 to 2002. A few key parameters are discussed in the following paragraphs. It should be noted that this is a control site, as it is not downstream of any mine component at Mount Polley.

Dissolved sulphate values have typically averaged between 1 mg/l & 2.5 mg/l, and have remained in this range for 2002. Additionally, Nitrate + Nitrite values have averaged below 0.1 mg/l and remain here for 2002.

T-Cu values have typically ranged between 0.003 mg/l & 0.004 mg/l, however a high reading in 2001 of nearly 0.09 mg/l has given the perception that values have decreased from the previous year. This high value in 2001 should be considered suspect, as all others from this site during the baseline and operational monitoring program are closer to the typical values. Further, the D-Cu graph follows the same pattern, indicating that nearly all Cu is in the dissolved form.

2.3.14 SITE W11 – LOWER EDNEY CREEK U/S OF QUESNEL LAKE

Table 2.3.14 summarizes the results of the water quality data from 1998 to 2002 for site W11. Further, figures 2.3.14-1 thru 2.3.14-9 contain the graphical representation of all parameters from 1998 to 2002. A few key parameters are discussed in the following paragraphs. One point to note is that this site is a far-field site selected for comparisons to the sites downstream from the mine disturbance. As with the control site W8z, it is not likely to show any effects from the mine operations.

Dissolved sulphate values have typically averaged between 2 mg/l & 7 mg/l, with the most recent value in 2002 at 7 mg/l. Additionally, Nitrate + Nitrite values have averaged as high as 0.09 mg/l, with the most recent values in 2002 averaging 0.06 mg/l.

T-Cu values have typically ranged between 0.0015 mg/l & 0.004 mg/l, with the most recent reading at the low average of 0.0015 mg/l. Further, the D-Cu graph follows the same pattern, indicating that nearly all Cu is in the dissolved form.

2.3.15 SITE W12 – 6K CREEK AT ROAD

Table 2.3.15 summarizes the results of the water quality data from 1999 to 2002 for site W12. Further, figures 2.3.15-1 thru 2.3.15-9 contain the graphical representation of all parameters from 1999 to 2002. A few key parameters are discussed in the following paragraphs.

Dissolved sulphate values have typically averaged between 2.5 mg/l & 4 mg/l, with the most recent value in 2002 at 4 mg/l. Additionally, Nitrate + Nitrite values have remained flat averaging around 0.05 mg/l, with the most recent values in 2002 being the same.

T-Cu values have typically ranged between 0.004 mg/l & 0.007 mg/l, with the most recent reading at the low average of 0.004 mg/l. Further, the D-Cu graph follows the same pattern, indicating that nearly all Cu is in the dissolved form.

2.3.16 SITE W13 – 9.5 K CREEK ON BJFSR

Table 2.3.16 summarizes the results of the water quality data from 2000 to 2002 for site W13. Further, figures 2.3.16-1 thru 2.3.16-9 contain the graphical representation of all parameters from 2000 to 2002. A few key parameters are discussed in the following paragraphs. It should be noted that this site was added to the monitoring program to find any effects that may have come from the mining of the Springer Pit. As this pit development never occurred, no changes to the water quality at this site are expected.

Dissolved sulphate values have typically averaged between 1.5 mg/l & 2.75 mg/l, with the most recent value in 2002 at 2.75 mg/l. Additionally, Nitrate + Nitrite values have increased during 2002 from averages of 0.006 mg/l to 0.14 mg/l.

T-Cu values have typically averaged 0.03 mg/l, with the most recent reading in 2002 at this level. Further, the D-Cu graph follows the same pattern, indicating that nearly all Cu is in the dissolved form.

2.4 SURFACE WATER – DISCHARGE AND RECEIVING SITES

In February 2002, a discharge permit was received from the Ministry of Water, Land and Air Protection as part of the existing effluent permit PE 11678. Discharges were permitted from the Main Embankment Seepage Pond (E4) and the Perimeter Embankment Settling Pond (E7). There were eight parameters that were required to be monitored specifically for the allowance of a discharge from these two locations.

The first two sections, 2.4.1 & 2.4.2, provide a discussion about these eight parameters and the compliance with the permit. The last two sections, 2.4.3 and 2.4.4, provide an evaluation of the two receiving sites that are downstream of these two discharge sites.

2.4.1 SITE E4 – MAIN EMBANKMENT SEEPAGE POND

Figures 2.4.1-1 & 2.4.1-2 contain the graphical representation of seven parameters that are specifically monitored for discharge compliance. Further, these graphs provide the discharge limit for each parameter and when discharges occurred. The sampling period was from 2001 to 2002. Finally, the data for the 96 hour LC_{50} toxicity (rainbow trout) tests can be found in the last appendix of this report.

The discharge limit for non-filterable residue (TSS) is 25 mg/l. When discharges began on June 15th, 2002, the levels of TSS were 10 mg/l and have since fallen to the method detection limit of 4 mg/l.

Toxicity data for this site showed 100% survival of rainbow trout. Please see results in the last appendix of this report.

Nitrate (as Nitrogen) has a discharge limit of 10 mg/l for this site. When discharges began on June 15th, 2002, the levels of nitrate were 7 mg/l and have since leveled off to 3 mg/l by the end of 2002.

Ortho-phosphorus (as Phosphorus) has a discharge limit of 0.05 mg/l for this site. When discharges began on June 15th, 2002, the levels of ortho-phosphorus were 0.005 mg/l and have remained around this level through most of 2002, with a rise to 0.013 mg/l at the end of the year.

Dissolved sulphate has a discharge limit of 100 mg/l for this site. When discharges began on June 15th, 2002, the levels of dissolved sulphate were 45 mg/l and have ended the year at 75 mg/l.

Total Copper (T-Cu) has a discharge limit of 0.020 mg/l for this site. When discharges began on June 15th, 2002, the levels of T-Cu were 0.007 mg/l, but have been decreasing throughout the year and have ended 2002 at 0.003 mg/l.

Total Iron (T-Fe) has a discharge limit of 1.0 mg/l for this site. When discharges began on June 15th, 2002, the levels of T-Fe were 0.6 mg/l, but have been decreasing throughout the year and have ended 2002 at 0.05 mg/l. T-Fe did peak slightly above 1.0 mg/l at the beginning of June, just prior to discharge, but fell steadily to allow for a compliant discharge.

Total Selenium (T-Se) has a discharge limit of 0.01 mg/l for this site. When discharges began on June 15th, 2002, the levels of T-Se were 0.001 mg/l, and have remained at this level throughout the year.

2.4.2 SITE E7 – PERIMETER EMBANKMENT SETTLING POND

Figures 2.4.2-1 & 2.4.2-2 contain the graphical representation of seven parameters that are specifically monitored for discharge compliance. Further, these graphs provide the discharge limit for each parameter and when discharges occurred. The sampling period was from 2001 to 2002.

Finally, the data for the 96 hour LC_{50} toxicity (rainbow trout) tests can be found in the last appendix of this report.

The discharge limit for non-filterable residue (TSS) is 25 mg/l. When discharges began on April 20th, 2002, the levels of TSS were 7 mg/l. They rose to a high of 11 mg/l during the discharge period and have since fallen to the method detection limit of 4 mg/l.

Toxicity data for this site showed 100% survival of rainbow trout. Please see results in the last appendix of this report.

Nitrate (as Nitrogen) has a discharge limit of 10 mg/l for this site. When discharges began on April 20th, 2002, the levels of nitrate were 7 mg/l and have since leveled off to less than 2 mg/l by the end of 2002. There was also a brief period of time when the levels were below 0.5 mg/l.

Ortho-phosphorus (as Phosphorus) has a discharge limit of 0.05 mg/l for this site. When discharges began on April 20th, 2002, the levels of ortho-phosphorus were 0.005 mg/l and have remained around this level through most of 2002, with a rise to 0.01 mg/l at the end of the year.

Dissolved sulphate has a discharge limit of 100 mg/l for this site. When discharges began on April 20th, 2002, the levels of dissolved sulphate were about 50 mg/l and rose to about 100 mg/l when discharge ended on June 10th, 2002. The cessation of discharge from this site coincided with the end of runoff at Mount Polley. Since this time, levels of dissolved sulphate have continued to rise to 180 mg/l, where it ended the year. Values have since fallen off significantly in 2003 to well below 100 mg/l, but this data will be reported in the 2003 annual report.

Total Copper (T-Cu) has a discharge limit of 0.020 mg/l for this site. When discharges began on April 20th, 2002, the levels of T-Cu were 0.005 mg/l, and rose to nearly 0.018 mg/l during the discharge period. However, levels have been decreasing throughout the year and have ended 2002 below 0.005 mg/l.

Total Iron (T-Fe) has a discharge limit of 1.0 mg/l for this site. When discharges began on April 20th, 2002, the levels of T-Fe were 0.6 mg/l, but have been decreasing throughout the year and have ended 2002 around 0.12 mg/l.

Total Selenium (T-Se) has a discharge limit of 0.01 mg/l for this site. When discharges began on April 20th, 2002, the levels of T-Se were 0.0024 mg/l. However, levels rose to a high of 0.0102 mg/l (0.2 ppb over the discharge limit). Since that peak the levels have fallen off considerably and have ended the year at about 0.003 mg/l.

2.4.3 SITE W7 – UPPER HAZELTINE CREEK

Hazeltine creek is the monitoring site that checks for any impacts from the water discharged from site E7. The seven parameters that are monitored at the discharge site (not including toxicity data) are used to compare these specific criteria and see if any increases can be seen due to the discharges. As these parameters have been tested at this site for many years, a timeline from 1998 to 2002 is provided.

Dissolved sulphate typically ranged between 2 mg/l & 8 mg/l, with one peak of 12 mg/l in September 2002. The levels ended the year around 6 mg/l.

Nitrate (N) has typically ranged between 0.005 mg/l and 0.2 mg/l, with a peak of 0.23 mg/l in March 2002. However, there was even a higher peak above 0.4 mg/l in December 1998.

Ortho-phosphorus typically remained below 0.005 mg/l, with several peaks as high as 0.08 mg/l in 2001. Levels ended 2002 below 0.01 mg/l.

Non-filterable residue (TSS) has always been around the method detection limit of 4 mg/l, with some peaks around 20 mg/l in 1998 and March 2002.

T-Cu have remained constant around 0.002 mg/l throughout the discharge period in 2002.

T-Fe has ranged as high as 1 mg/l (2000), but is typically below 0.4 mg/l. 2002 ended the year for this parameter below 0.03 mg/l.

T-Se is usually at the method detection limit, but had gone as high as 0.0009 mg/l in May 2002. The year ended with a T-Se value of 0.0005 mg/l (MDL).

2.4.4 SITE W8 – NORTHEAST EDNEY CREEK TRIBUTARY

Northeast Edney Creek Tributary is the monitoring site that checks for any impacts from the water discharged from site E4. The seven parameters that are monitored at the discharge site (not including toxicity data) are used to compare these specific criteria and see if any increases can be seen due to the discharges. As these parameters have been tested at this site for many years, a timeline from 1998 to 2002 is provided.

Dissolved sulphate was typically around 5 mg/l prior to discharge, but have since increased to about 40 mg/l since discharge began in June 2002. This is likely the result of the higher sulphate levels from the discharge location (between 60 mg/l & 70 mg/l).

Nitrate (N) has typically ranged between 0.01 mg/l and 0.2 mg/l, but has since increased to about 1.75 mg/l since discharge began from E4. This is also likely from the elevated Nitrate (N) levels from E4 (around 3 mg/l).

Ortho-phosphorus typically remained below 0.02 mg/l, with several peaks as high as 0.12 mg/l in 2001. However, levels ended 2002 below 0.02 mg/l.

Non-filterable residue (TSS) has always been around the method detection limit of 4 mg/l, and this is also the case once discharges began in June 2002.

T-Cu have remained constant around 0.002 mg/l before and after the discharge period in 2002.

T-Fe has ranged below 0.5 mg/l prior to the discharge from E4, and this the level that it ended at in 2002.

T-Se is usually around 0.0005 mg/l and no changes were seen before or after the start of discharge from E4.

2.5 GROUNDWATER MONITORING

All groundwater sampling and analysis was conducted in accordance with sub-section 3.1 of Effluent Permit PE 11678. Grab samples were taken from sampling locations and at a frequency listed in Table 1 and analyzed for the parameters listed in Table 2 of the permit.

The sampling, filtering, preservation and shipping procedures used for the monitoring program are outlined in the "Quality Assurance/ Quality Control Manual 2001". Field temperature, pH and conductivity were measured at the time of sampling using the WTW Multimeter.

In 1995, groundwater-monitoring well 1995 series were installed in the vicinity of the open pits and mill site. Two of these wells (95-R4, 95-R5) continue to be monitored. Well 95-R7, which had been monitored until the previous year, is no longer monitored as it is used as a fresh water make-up well and the sampling requires that the pumping mechanism in place is working at the time of sampling. In 1996, the B.C. Ministry of Water, Land and Air Protection requested the establishment of additional monitoring wells down-gradient from the pit, Rock Disposal Site and Tailings Storage Facility in order to sample aquifers in both surficial deposits as well as bedrock. They included the establishment of background wells up-gradient 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 installed in 2000. The locations of the monitoring wells are shown in Figure 2.

Objectives of the groundwater-monitoring program include the following (Knight

Piésold Ltd., 1996):

- To determine the direction and volume of groundwater flow from the minesite 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 development; and
- To calculate seepage and groundwater contamination dilution ratios in surface receiving waters in order to minimize impacts.

Samples were submitted to Philip Analytical Services for water chemistry analysis, including: physical parameters (alkalinity, sulphate and hardness), nutrients (nitrate plus nitrite, ammonia and ortho-phosphorus) and dissolved metals. The statistical results from 1998 to 2002 are graphed and discussed in the following sections.

2.5.1 GW96-1A

GW96-1A is located down gradient of the seepage collection pond of the Perimeter Embankment. Table 2.5.1-1 summarizes the results of the water quality data from 1998 to 2002 for this well. Further, figures 2.5.1-1 thru 2.5.1-7 contain the graphical representation of all parameters from 1998 to 2002. Finally, figure 2.5.1-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

The average pH has typically been around 9.0, but has dropped off some for 2002 to just above 7.0. Sulphate values remained consistent with previous years at just above 50 mg/l. Dissolved metals remained flat and comparable similar to previous years.

2.5.2 GW96-1B

GW96-1B is located down gradient of the seepage collection pond of the Perimeter Embankment. Table 2.5.2-1 summarizes the results of the water quality data from 1998 to 2002 for this well. Further, figures 2.5.2-1 thru 2.5.2-7 contain the graphical representation of all parameters from 1998 to 2002. Finally, figure 2.5.2-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

The average pH has followed a similar path as its twin well (GW96-1A) moving from around 9.0 to around 6.5. Further, average sulphate concentration has dropped some to 27 mg/l. Dissolved metal concentrations remained similar to previous years.

2.5.3 GW96-2A

GW96-2A is located approximately 900 m Southeast from the GW96-1 monitoring wells and is designed to monitor any groundwater effects from the Tailings Storage Facility on Hazeltine Creek. Table 2.5.3-1 summarizes the results of the water quality data from 1998 to 2002 for this well. Further, figures 2.5.3-1 thru 2.5.3-7 contain the graphical representation of all parameters from 1998 to 2002. Finally, figure 2.5.3-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has remained relatively flat, ranging from 7.8 to 8.2, with the most recent readings in 2002 at 7.8. Further, sulphate remained consistent with previous years at 27 mg/l. Dissolved metal concentrations remained similar to previous years.

2.5.4 GW96-2B

GW96-2B is located approximately 900 m Southeast from the GW96-1 monitoring wells and is designed to monitor any groundwater effects from the Tailings Storage Facility on Hazeltine Creek. Table 2.5.4-1 summarizes the results of the water quality data from 1998 to 2002 for this well. Further, figures 2.5.4-1 thru 2.5.4-7 contain the graphical representation of all parameters from 1998 to 2002. Finally, figure 2.5.4-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has fallen off some, from averages of 8 in previous years to about 7 in 2002. Further, sulphate remained consistent with previous years at 5 mg/l. Dissolved metal concentrations remained similar to previous years.

2.5.5 GW96-3A

GW96-3A is located down gradient of the seepage collection pond of the Main Embankment. Table 2.5.5-1 summarizes the results of the water quality data from 1998 to 2002 for this well. Further, figures 2.5.5-1 thru 2.5.5-7 contain the graphical representation of all parameters from 1998 to 2002. Finally, figure 2.5.5-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has fluctuated significantly, from 8 to 12 over this period of time. The most recent value in 2002 averages 8. Further, sulphate has fluctuated over the same time period, starting at nearly 300 mg/l in 1998, but has dropped to around 30 mg/l for 2001 & 2002. Dissolved metal concentrations remained similar to previous years.

2.5.6 GW96-3B

GW96-3B is located down gradient of the seepage collection pond of the Main Embankment. Table 2.5.6-1 summarizes the results of the water quality data from 1998 to 2002 for this well. Further, figures 2.5.6-1 thru 2.5.6-7 contain the graphical representation of all parameters from 1998 to 2002. Finally, figure 2.5.6-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has typically remained around 8, but has dropped off to an average of just below 6 in 2002. Further, sulphate has remained flat, averaging between 6 mg/l and 8 mg/l, with the most recent values in 2002 at 6 mg/l. Dissolved metal concentrations remained similar to previous years.

2.5.7 GW96-4A

GW96-4A is located down gradient of the south and main embankments. Table 2.5.7-1 summarizes the results of the water quality data from 1998 to 2002 for this well. Further, figures 2.5.7-1 thru 2.5.7-7 contain the graphical representation of all parameters from 1998 to 2002. Finally, figure 2.5.7-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has remained flat, with values slightly above or below 8. The most recent value in 2002 averaged above 7.5. Further, sulphate has dropped some since 1998, with a high of 12 mg/l to a low average in 2002 of 4 mg/l. Dissolved metal concentrations remained similar to previous years.

2.5.8 GW96-4B

GW96-4B is located down gradient of the south and main embankments. Table 2.5.8-1 summarizes the results of the water quality data from 1998 to 2002 for this well. Further, figures 2.5.8-1 thru 2.5.8-7 contain the graphical representation of all parameters from 1998 to 2002. Finally, figure 2.5.8-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has fallen slightly from 1998, with values slightly below 8 to the most recent value in 2002 averaging slightly above 7.2. Further, sulphate has remained flat since 1998, ranging between 1.5 mg/l & 2 mg/l. Dissolved metal concentrations remained similar to previous years.

2.5.9 GW96-5A

GW96-5A is located at the north end and upstream of the Tailings Storage

Facility and is monitored as a control site. Table 2.5.9-1 summarizes the results of the water quality data from 1998 to 2002 for this well. Further, figures 2.5.9-1 thru 2.5.9-7 contain the graphical representation of all parameters from 1998 to 2002. Finally, figure 2.5.9-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has fallen slightly, with averages typically around 8 to averages in 2002 of 7. Further, sulphate had increased to above 40 mg/l in 2001, but has since fallen back to its typical level of 10 mg/l in 2002. This increase in 2001 was due to an anomalously high reading of above 100 mg/l. If this single reading were discarded, the sulphate concentration remains constant throughout this period. Dissolved metal concentrations remained similar to previous years.

2.5.10 GW96-5B

GW96-5B is located at the north end and upstream of the Tailings Storage Facility and is monitored as a control site. Table 2.5.10-1 summarizes the results of the water quality data from 1998 to 2001 for this well. Further, figures 2.5.10-1 thru 2.5.10-7 contain the graphical representation of all parameters from 1998 to 2001. Finally, figure 2.5.10-8 presents the static water level for this same period. As this well had been damaged, it was not sampled in 2002. When and if the well can be repaired, it can again be included in the sampling program.

2.5.11 GW96-6

GW96-6 is located down gradient of the East Rock Disposal Site. Table 2.5.11-1 summarizes the results of the water quality data from 1998 to 2002 for this well. Further, figures 2.5.11-1 thru 2.5.11-7 contain the graphical representation of all parameters from 1998 to 2002. Finally, figure 2.5.11-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has fallen slightly, with averages typically around 9, but with values in 2002 at just below 8. Further, sulphate has remained constant with averages around 25 mg/l. D-Cu ha typically been below 0.001 mg/l, but has increased some to 0.005 mg/l in 2002. Other dissolved metal concentrations remained similar to previous years.

2.5.12 GW96-7

GW96-7 is located down gradient of the Mill Site, half way down the tailings access road, near the Booster Station. Table 2.5.12-1 summarizes the results of the water quality data from 1998 to 2002 for this well. Further, figures 2.5.12-1 thru 2.5.12-7 contain the graphical representation of all parameters from 1998 to 2002. Finally, figure 2.5.12-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has fallen slightly, with averages typically around 8, but with values in 2002 at just below 7. Further, sulphate has remained constant with averages around 25 mg/l. Dissolved metal concentrations remained similar to previous years.

2.5.13 GW96-8A

GW96-8A is located on Bootjack Road at 10.75 km. Table 2.5.13-1 summarizes the results of the water quality data from 1998 to 2002 for this well. Further, figures 2.5.13-1 thru 2.5.13-7 contain the graphical representation of all parameters from 1998 to 2002. Finally, figure 2.5.13-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has fallen slightly, with averages typically around 8, but with values in 2002 averaging around 7.5. Further, sulphate has remained constant with averages ranging between 10 mg/l & 13 mg/l and the most recent values in 2002 at 10 mg/l. Dissolved metal concentrations remained similar to previous years.

2.5.14 GW96-8B

GW96-8B is located on Bootjack Road at 10.75 km. Table 2.5.14-1 summarizes the results of the water quality data from 1998 to 2002 for this well. Further, figures 2.5.14-1 thru 2.5.14-7 contain the graphical representation of all parameters from 1998 to 2002. Finally, figure 2.5.14-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has remained flat around 7.5. Further, sulphate has fluctuated slightly, ranging between 6 mg/l & 10 mg/l, with the most recent reading in 2002 at 10 mg/l. Dissolved metal concentrations remained similar to previous years.

2.5.15 GW96-9

GW96-9 is located south of the Main Embankment. Table 2.5.15-1 summarizes the results of the water quality data from 1998 to 2002 for this well. Further, figures 2.5.15-1 thru 2.5.15-7 contain the graphical representation of all parameters from 1998 to 2002. Finally, figure 2.5.15-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has been typically averaged around 8, but has dropped in 2002 to just below 6. Further, sulphate has remained flat with averages around 2.5 mg/l. Dissolved metal concentrations remained similar to previous years.

2.5.16 95R-4

95R-4 is located at Bootjack 10 km. Table 2.5.16-1 summarizes the results of the water quality data from 1998 to 2002 for this well. Further, figures 2.5.16-1 thru 2.5.16-7 contain the graphical representation of all parameters from 1998 to 2002. Finally, figure 2.5.16-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has been typically been around 8.5, but has dropped in 2002 to around 7. Further, sulphate has remained flat with averages around 15 mg/l. Dissolved metal concentrations remained similar to previous years.

2.5.17 95R-5

95R-5 is located along Polley Lake FSR road, Northwest of the East Rock Disposal Site. Table 2.5.17-1 summarizes the results of the water quality data from 1998 to 2002 for this well. Further, figures 2.5.17-1 thru 2.5.17-7 contain the graphical representation of all parameters from 1998 to 2002. Finally, figure 2.5.17-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has been typically been around 7.8, but has dropped in 2002 to around 6.8. Further, sulphate has remained flat with averages around 20 mg/l. Dissolved metal concentrations remained similar to previous years.

2.5.18 GW00-1A

GW00-1A is located downstream of the starter South Embankment at the TSF. Table 2.5.18-1 summarizes the results of the water quality data from 2000 to 2002 for this well. Further, figures 2.5.18-1 thru 2.5.18-7 contain the graphical representation of all parameters from 2000 to 2002. Finally, figure 2.5.18-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has fallen, from a high in 2000 of 10 to the most recent average in 2002 of 7. Further, sulphate has decreased from averages of 330 mg/l in 2000 to 250 mg/l in 2002. Dissolved metal concentrations remained similar to previous years.

2.5.19 GW00-1B

GW00-1B is located downstream of the starter South Embankment at the TSF. Table 2.5.19-1 summarizes the results of the water quality data from 2000 to 2002 for this well. Further, figures 2.5.19-1 thru 2.5.19-7 contain the graphical representation of all parameters from 2000 to 2002. Finally, figure 2.5.19-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has remained constant around 7.5. Further, sulphate has decreased from averages of 13 mg/l in 2000 to 9 mg/l in 2002. Dissolved metal concentrations remained similar to previous years.

2.5.20 GW00-2A

GW00-2A is located downstream of the starter South Embankment at the TSF. Table 2.5.20-1 summarizes the results of the water quality data from 2000 to 2002 for this well. Further, figures 2.5.20-1 thru 2.5.20-7 contain the graphical representation of all parameters from 2000 to 2002. Finally, figure 2.5.20-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has fallen slightly, from 8.2 to 7.3. Further, sulphate has decreased from averages as high as 100 mg/l in 2000 to below 20 mg/l in 2002. Dissolved metal concentrations remained similar to previous years.

2.5.21 GW00-2B

GW00-2B is located downstream of the starter South Embankment at the TSF. Table 2.5.21-1 summarizes the results of the water quality data from 2000 to 2002 for this well. Further, figures 2.5.21-1 thru 2.5.21-7 contain the graphical representation of all parameters from 2000 to 2002. Finally, figure 2.5.21-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has fallen slightly, from 8 to 7. Further, sulphate has decreased from averages as high as 18 mg/l in 2000 to below 3 mg/l in 2002. Dissolved metal concentrations remained similar to previous years.

2.5.22 GW00-3A

GW00-3A is located downstream of the starter South Embankment at the TSF. Table 2.5.22-1 summarizes the results of the water quality data from

2000 to 2002 for this well. Further, figures 2.5.22-1 thru 2.5.22-7 contain the graphical representation of all parameters from 2000 to 2002. Finally, figure 2.5.22-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has remained constant around 7.5. Further, sulphate has decreased from averages as high as 100 mg/l in 2000 to below 103 mg/l in 2002. Dissolved metal concentrations remained similar to previous years.

2.5.23 GW00-3B

GW00-3B is located downstream of the starter South Embankment at the TSF. Table 2.5.23-1 summarizes the results of the water quality data from 2000 to 2002 for this well. Further, figures 2.5.23-1 thru 2.5.23-7 contain the graphical representation of all parameters from 2000 to 2002. Finally, figure 2.5.23-8 presents the static water level for this same period. A few key parameters are discussed in the following paragraph.

Average pH has fallen slightly, from above 7.5 to below 7.5. Further, sulphate has decreased from averages as high as 12 mg/l in 2000 to below 10 mg/l in 2002. Dissolved metal concentrations remained similar to previous years.

2.6 CLIMATOLOGY

As a requirement of Effluent Permit PE 11678, the collection of detailed meteorology data was again performed in 2002. The main objective of the meteorology data collection program is to provide site-specific precipitation and evaporation data for use in water balance prediction. The automated weather station records prevailing wind speed and wind direction, temperature (at 1m and 5m elevations), precipitation and evaporation, and solar radiation. Due to technical difficulties with the weather station, however, no wind data was recorded in April, no temperature data was recorded for part of April & May, no evaporation data was recorded in part of July & August and no solar radiation data was available for any of 2002.

2.6.1 WIND SPEED BY DIRECTION & PREVAILING WIND DIRECTION

Prevailing wind speeds and direction can be seen in figures 2.6.1-1 thru 2.6.1-6. Prevailing winds were again from the northwest in the winter months and the south & southwest during the summer months. Highest wind speeds were recorded in March at approximately 2.7 m/s.

2.6.2 TEMPERATURE – AVERAGE, MINIMUM AND MAXIMUM

Graphical comparisons of daily mean, maximum and minimum air temperature at the 1m elevation and 5m elevation sensors are presented in figures 2.6.2-1 thru 2.6.2-2. Temperatures ranged from below -25°C in February to above +35°C in July of 2002.

2.6.3 PRECIPITATION

The precipitation and evaporation record at the weather station spanned from May to November 2002. Figure 2.6.3-1 illustrates the daily precipitation values for this period. There where three peak precipitation events recording greater than 12 mm of rain during this time in 2002, ranging from 13.25 mm to 21.75 mm.

2.6.4 EVAPORATION

Net daily evaporation is calculated from the difference between daily water levels, corrected inputs from daily rainfall, and any changes to the water volume in the evaporation pan. Levels recorded in 2002 are shown in figure 2.6.4-1.

2.6.5 SOLAR RADIATION

Solar radiation data was not available for 2002. The probe had been replace in 2001 and was recording data for some time during that period, but ceased to work near the end of 2001. No work was conducted in 2002 to repair the probe.

2.6.6 WATERBALACE

Table 2.6.6-1 contains the waterbalance spreadsheet for the period 1997 to 2003. A review of the waterbalance is included in the Annual Tailings

Inspection report, referred to in section 2.2.1.2. As discussed in this report, a discharge scheme will be required prior to spring freshet 2004, in order to maintain the freeboard requirements of the TSF. Of course, the water pumping system to remove water from the TSF to the Cariboo Pit remains intact, however, the focus at Mount Polley is to move forward with a discharge permit from the TSF for spring 2004, so that no further pumping of TSF water to the Cariboo Pit will be required.

2.7 HYDROLOGY

Seven sites were monitored for flow discharges during the year in the vicinity of the Mount Polley minesite. Flow determinations and stage discharge curves were performed at stations: W1a, W3a, W4, W5, W7, W8 and W12.

No flow transect studies were conducted in 2002. Instead, staff gauge readings were recorded and applied to a formula determined from the previous years measurements to give a stage discharge curve for each monitoring site. Staff gauges were covered in snow and ice from January to April and in November and December. Continuous water level data is recorded at Station W7 on Hazeltine Creek from approximately March to November of each year.

2.7.1 SITE W1A

Figure 2.7.1 shows the flow measurement comparisons from 1997 to 2002. Only one staff gauge measurement was recorded at site W1a in 2002. Discharge for this point was similar to others taken in previous years.

2.7.2 SITE W3A

Figure 2.7.2 shows the flow measurement comparisons from 1997 to 2001. No flow measurements were recorded at W3a in 2002.

2.7.3 SITE W4

Figure 2.7.3 shows the flow measurement comparisons from 1997 to 2002. Five staff gauge readings were recorded during 2002. Discharge for these points were similar to others taken in previous years.

2.7.4 SITE W5

Figure 2.7.4 shows the flow measurement comparisons from 1997 to 2002. Two staff gauge readings were recorded during 2002. Discharge for these points were similar to others taken in previous years.

2.7.5 SITE W8

Figure 2.7.5 shows the flow measurement comparisons from 1997 to 2002. Eleven staff gauge readings were recorded during 2002. Discharge for these points were similar to others taken in previous years.

2.7.6 SITE W12

Figure 2.7.6 shows the flow measurement comparisons from 1997 to 2002. One staff gauge reading was recorded during 2002. Discharge for this point was similar to others taken in previous years.

2.7.7 SITE W7 – HAZELTINE CREEK HYDROGRAPH

Figure 2.7.7 shows the flow measurement comparisons from 2001 & 2002. This is a continuous flow measurement station, when temperatures are above freezing. Flows in 2002 were higher than in 2001, with peaks of 1.3 m^3/sec versus 0.5 m^3/sec. Also, the runoff was later in 2002, starting in May rather than April, as was the case in 2001.

2.8 QUALITY ASSURANCE / QUALITY CONTROL

Field duplicates, field blanks (FB) and trip blanks (TB) are collected as part of the Mount Polley QAQC program. Field blanks contain distilled water that is carried to the sampling site and subjected to the same conditions as the site sample. Field blanks provide information about contamination that may occur as a result of sampling techniques or exposure to the atmosphere. Trip blanks contain distilled water that has been poured into sample bottles and sealed in the laboratory. The bottles remain sealed for the duration of the trip and help detect contamination resulting from the container or preservative during transport and storage. Duplicates are samples taken in the field concurrently with the site sample. Duplicates are treated and analyzed exactly as the site sample. Duplicates provide rough estimates of the precision associated with the field technique and laboratory analysis.

For the site and duplicate samples, precision is expressed as a relative percent mean difference calculated by:

[(Sample value – duplicate value) x 100] / [(Sample value + duplicate value) / 2]

Since precision is influenced by how close the analytical value is to the Method Detection Limit (MDL), the use of percent mean difference is limited to analytical values that are at least five times the MDL (RIC 1998, Guidelines for Interpreting Water Quality Data). When there is a 25% or greater difference between the site and duplicate results, the data should be viewed with caution.

FB's and TB's are assessed for contamination by comparing the results to the parameter MDL and the site value. Contamination is suspected if more that 5% of the blanks exceed the MDL or if blanks exceed 100% of the environmental value.

2.8.1 SURFACE WATER MONITORING – DUPLICATES

Tables 2.8.1-1 thru 2.8.1-8 contain the site and duplicate data for all duplicates sampled in 2002. There were 14 duplicates taken at 8 sites in 2002. The following paragraphs highlight the parameters and sites that do not meet QAQC guidelines.

At site E7, one duplicate was taken in February 2002. Only D-Fe had a % Relative Difference greater than 25%. All other parameters met QAQC specifications.

Site W1 had two duplicates, one in September & one in December, 2002. For the duplicate in September, only Turbidity had a % Relative Difference greater than 25%. For the December duplicate, T-PB had a % Relative Difference that reached 88%.

Site W3a had one duplicate in September 2002. Two parameters, ortho-phosphorus and T-Se, had % Relative Differences of 29%.

Site W4 had four duplicate samples taken in 2002. Only one parameter, Turbidity, in February had a % Relative Difference of 33%, with all other parameters for all duplicates less than 25%.

W7 had two duplicates in 2002, with one in May and one in November. Two parameters in May did not meet spec, with Turbidity having a % Relative Difference of 26% and T-Fe had a value of 89%.

W8 had two duplicates in 2002, with one in May and one in October. Two parameters in October had values greater than 25%, with D-Al at 26% and T-PB at 35%.

W8z had one duplicate in November 2002. Two parameters had values greater than 25%, with TDS at -45% and T-MO at 130%.

W11 had one duplicate in July 2002. One parameter had a value greater than 25%, with Turbidity at 45%.

2.8.2 SURFACE WATER MONITORING – FIELD BLANK REVIEW

Tables 2.8.2-1 thru 2.8.2-10 contain the site and field blank data for all field blanks prepared in 2002. There were 16 field blanks prepared at 10 sites in 2002. The following paragraphs highlight the parameters and sites that do not meet QAQC guidelines.

There was one FB prepared for sites E4, E7, W5, W8 & W8z and two FB's prepared for site W1. No %FB/Sample values exceeded the QAQC guidelines for these locations.

There was one field blank prepared at site W3a. One %FB/Sample, T-Fe, exceeded the QAQC guidelines with a value of 292%.

Four FB's were prepared at site W4 during 2002. For one blank, two parameters did not meet the guidelines. That is, D-Al was 168% and T-PB was 150%. Further, for another FB at this site, D-FE had a value of 240%.

Three FB's were prepared at site W7 in 2002. For each FB there was at least one parameter that exceeded the QAQC guidelines. For one blank, ortho-phosphorus and D-Cu had values of 160% & 105%, respectively. For a separate blank, Nitrate + Nitrite and D-Cu had values of 120% & 256%, respectively. Finally, for the third FB, T-Zn had a value of 840%.

Only one FB was prepared for site W12 in 2002. Further, D-Al, D-Cu and T-Pb all had values that exceeded the guidelines, with 119%, 100% & 100%, respectively.

2.8.3 SURFACE WATER MONITORING – TRIP BLANK REVIEW

There were 15 TB's prepared during the 2002 surface water monitoring program. Of the 15 TB's prepared, 8 samples have 5% or more parameters that exceed the MDL's. That is, about half of the samples meet the QAQC requirements for validity. Table 2.8.3-1 has the data for all TB's prepared in 2002.

2.8.4 GROUNDWATER MONITORING – DUPLICATES

Table 2.8.4-1 shows the site and duplicate data for the 2nd set of groundwater sampling for 2002. Unfortunately, no duplicates were taken for the first set of sampling. This oversight had been corrected for the 2nd set of sampling in 2002.

Well GW96-8A had three parameters with % Relative Difference values greater than 25%. That is, Total Alkalinity, N+N and Sulphate had values of 54%, 49% & 42%, respectively.

Well GW96-9 had two parameters with % Relative Difference values greater than 25%. That is, Total Alkalinity and D-As had values of 70% & -29%, respectively.

Well 95-5 had three parameters with % Relative Difference values greater than 25%. That is, Total Alkalinity, N+N and D-Cu had values of 48%, 118% & 29%, respectively.

2.8.5 GROUNDWATER MONITORING – FIELD BLANK REVIEW

Only one field blank was prepared for the 2nd set of groundwater sampling in 2002. This oversight was corrected between the first and the 2nd set of sampling for this period. Table 2.8.5-1 has this data tabulated.

The FB was prepared at well 95-R5 and there were only two parameters that had %FB/Sample values greater than 100%. That is, D-Al & D-Cu had values of 800% & 450%, respectively. All other parameters met QAQC specification.

2.8.6 GROUNDWATER MONITORING – TRIP BLANK REVIEW

Two TB's were prepared, one for each of the sampling periods. Only three parameters did not meet specification for the 2nd set of sampling. However, it should be noted that two of these three parameters are at MDL or extremely close to MDL's, so it is unlikely that any contamination occurred with these samples. Table 2.8.6-1 has this data tabulated.

2.9 RECLAMATION RESEARCH – 2002

No further formal reclamation research was conducted in 2002. Further, the research test plots on the 1170 RDS will be maintained, but will not be monitored in detail until operations resume at Mount Polley or the need arises to do so.

However, an informal trial of wetland grasses were planted at the end of 2002 on the Tailings beach at the TSF. 8 ha of area were grassed to see if a vegetative cover could be established with minimal preparation. Since operations are expected to resume in a short period of time, final reclamation on the TSF was not planned, as the work would be covered over once deposition of tailings resumes. An update of the progress of this TSF grass planting will be provided in the 2003 annual report.

3.0 MINING PROGRAM

A detailed Mine Plan was presented in the Reclamation and Closure Plan submitted to MEM and approved under Permit M-200.

3.1 SURFACE DEVELOPMENT TO DATE

3.1.1 AREAS OF DISTURBANCE TO END OF 2002

Since mining operations ceased in 2001, no further areas of disturbance were created in 2002. The disturbed areas drawing (figure 3 – front cover of report) has been updated from the 2001 report as the electronic copy of the drawing had been lost. Therefore, some areas may be slightly different than from the previous year. Areas of disturbance were determined from analysis of an orthophoto taken in July 2001, just prior to the shut down of the mine and any further disturbance. Disturbed areas were identified and categorized by disturbance type, and then digitized into AutoCAD.

At the end of 2002, the total disturbed area in all categories was 490.87 ha. Surface areas of the various disturbed reclamation units are outlined in Table 3.1.1 – 1 and are detailed by mine component in Table 3.1.1 – 2.

As no mining took place in 2002, there is no update to the quantities of waste rock, tailings or low-grade ore from the year that mining ceased in 2001.

3.2 SURFACE DEVELOPMENT IN 2002

As discussed in the previous section, as mining operations ceased in 2001, no further disturbance was created in 2002.

3.3 PROJECTED SURFACE DEVELOPMENT FROM 2003 TO 2007

3.3.1 AREAS OF DISTURBANCE

There will be no further projection of disturbance at Mount Polley until mining operations resume. However, tables 3.3.1-1 & 3.3.1-2 have been completed to demonstrate the projection of no further disturbance for the next five years and mine life.

3.3.2 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.

No soil stripping, salvage or stockpiling occurred at the Mount Polley mine site in 2002. Present soil stockpiles are indicated on Figure 3 and are summarized with respect to area stripped, soil volumes recovered, source description and target depths for salvage in Table 3.3.2 – 1.

3.3.3 DRAINAGE CONTROL / PROTECTION OF WATERCOURSES

Knight Piésold (Ref. No. 1624/1, 1995) has developed an overall water management plan for the project. This plan had been changed in 2001 for the care and maintenance period. Please refer to the Annual Environmental and Reclamation Report 2001 for an update of the water management plan.

4.0 FUTURE RECLAMATION PROGRAMS

4.1 RECLAMATION RESEARCH FOR 2003

No formal reclamation research is planned for 2003. However, the 8 ha plot of wetland grass on the TSF beach will be monitored for its success while the Mount Polley site is in care and maintenance. This will be reported on in the 2003 annual report.

5.0 RECLAMATION COST PROJECTIONS

Detailed cost projections for the end of 2002 have been completed. The summary tables and detailed categories of disturbance can be found in the ANNUAL RECLAMATION COSTING appendix.