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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) (Appendix 2). 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 (Appendix 3). 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, powerline, 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 2001, 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 the 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. Maintenance and monitoring of the first two Phases of the research program continued in 2001.

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. Flows into the tailings pipeline, mill site sump and southeast sediment control pond are also monitored. Static water levels are 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, temperature and solar radiation. This data is downloaded bi-weekly and immediately backed up in the office.

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 will be conducted in 2002 and submitted with the Annual Environmental and Reclamation Report for that year.

All data collected pertaining to the PE-11678 permit can be found in Section 2.0 of this report.

1.3 BIOSOLIDS

Permit PE 15968 (Appendix 3 – MWLAP Permits), issued under the provisions of the Waste Management Act, allows Mount Polley to discharge biosolids to land for the purposes of mine site reclamation. The location of the biosolids storage facility and truck-washing site are shown in Figure 3. The amount of biosolids delivered to the mine site is recorded, as is the amount applied to each reclamation site. Biosolids brought to the storage facility are tested once per year and analysed for the parameters outlined in the permit as well as other typical parameters related to biosolids. Please see tables 1.3-1 through 1.3-3 for a detailed accounting of this info.

Biosolids from the Lulu Island Wastewater Treatment Plant were delivered to Mount Polley starting in April 2000. A total of 4,694.19 wet tonnes, or 1174 dry tonnes, were delivered from April to December 2000 to the biosolids stockpile near the TSF. In 2001, 5,863.34 wet tonnes were delivered to Mount Polley. Of this total, 1,431.68 wet tonnes were delivered and applied to the East 1170 RDS. The remaining amount of 4,431.66 wet tonnes were delivered to the biosolids stockpile near the TSF. To date, the biosolids stockpile near the TSF contains 9,125.85 wet tonnes.

As mining operations ceased in October 2001, no further hauling of biosolids to Mount Polley will likely occur until operations resume.

2.0 ENVIRONMENTAL PROTECTION & RECLAMATION PROGRAM

2.1 RECLAMATION FACILITIES AND STAFF

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.

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 2001. The findings are documented in the report entitled*, "Report on 2000 and 2001 Annual Inspection" (Ref. No. 11162/14-2, October 3, 2001*). This report was submitted to the Ministry of Energy and Mines, Mines Branch in October of 2001.

2.2.2 RE-VEGETATION TREATMENTS & FERTILIZER APPLICATIONS

In 2001, no additional areas were seeded, planted or fertilized. The total area that has been seeded, planted or fertilized throughout the mine site remains at 75.71 ha. This data is summarized in Table 3.1.1.-1.

2.2.3 ROCK DISPOSAL SITE RECLAMATION

During the final period of mining at Mount Polley, in late summer and early fall 2001, approximately 2.24 ha of the East RDS was re-sloped in preparation for future reclamation. The exact section of RDS was between the 1150 metre platform and the 1135 metre wrap-around RDS. This wrap-around section is located on top of the 1120 metre RDS platform. This section of RDS was resloped to an angle ratio of 2.5 horizontal : 1 vertical, or greater.

No other reclamation was conducted on the three RDS's at Mount Polley during 2001.

2.2.4 WATERCOURSE RECLAMATION

In the fall of 2001, again, during the last days of mining at Mount Polley, a water diversion ditch was constructed above the Tailings Storage Facility (TSF) to divert water around the TSF basin from an area known in the TSF Annual Construction and Inspection Reports as Area 4. The purpose of this ditch was two-fold:

1. As the TSF has a net positive water balance under non-operating conditions, there is a need to divert as much water as necessary from the TSF basin so as to minimize pumping and discharge requirements during the care and maintenance phase of Mount Polley; and

2. There is an agreement between Mount Polley Mining Corporation, the Federal Department of Fisheries and Oceans (DFO) and the Provincial Ministry of Water, Land and Air Protection to divert water from this area back to the tributaries of Edney Creek. This agreement goes back to 1996 when a Fisheries Compensation Agreement was signed in order for the construction of the TSF to begin. By diverting this water around the TSF, it fulfils this multi-stakeholder agreement, as scheduled.

The ditch was designed with a slope of 0.5%, with the exception of areas that already existed, as was the case with road-side ditches. In this case, when the grade was greater than 0.5%, rip-rap was placed to decrease the velocity of the water flow and minimize the erosion of the ditch. The ditch has now operated for the fall period of 2001 as well as the spring of 2002, and is working as designed.

A second water diversion from the remaining part of Area 4 (the area that could not be diverted to the Edney Tributaries because of terrain blockages) was at "Five-Corners" on the Tailings Line Road, immediately upstream of the TSF. This water is diverted in a series of existing ditches to the Perimeter Embankment Seepage Collection Pond, were it is discharged through the existing infrastructure of this pond.

A third water diversion is from the East RDS footprint. This area is undisturbed (only logging and no grubbing has occurred here) and is separate from the water that filters through the East RDS. This uncontaminated water is collected by the Waste Dump Diversion Ditch (WDDD), transported by the WDDD to the South-East Sediment Pond (SESP), piped to the 2^{nd} Tailings Drop Box (T2 Drop Box), conveyed to a ditch upstream of the Perimeter Embankment Seepage Collection Pond (PESCP) and ultimately discharged through the PESCP infrastructure. This water has been discharged as of Spring 2002.

A fourth water diversion is from the water that filters through the rock of the East RDS. This water is trapped in the upper reaches of the WDDD and pumped through 6" and 8" pipe to the Cariboo Pit. As one might expect, this system operates mostly in the spring during snow melt and is expected to be unnecessary during the late summer, fall and winter seasons, when water flows from this section of the minesite are minimal.

These four water course diversions were put in place to minimize the water reporting to the TSF during this Care and Maintenance period, while also protecting the environment from water that is not of sufficient quality at this time to discharge to the receiving environment. These water course diversions will be maintained until further changes in the status of Mount Polley come about, at which time the current water management scheme will be reviewed and adjusted accordingly.

2.2.5 PIT RECLAMATION

At the cessation of mining in October of 2001, there were two main pits (the Cariboo Pit and the Bell Pit) and a bulk sample removed from the Springer Pit. In essence, there were only two pits excavated at Mount Polley to the end of 2001.

No pit reclamation on any of the pits at Mount Polley was carried out in 2001. 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

No specific reclamation occurred at the TSF during 2001. However, completion of the Impoundment raise to 942.50 metres was completed during this reporting period. Details regarding the construction and on-going monitoring of the TSF can be found in the report prepared and submitted by Knight Piésold Ltd., which is referenced in section 2.2.1.2 of this report.

2.2.7 ROAD RECLAMATION

Some reclamation of the Bootjack Forest Service Road (BJFSR) was carried out in the summer of 2001. During the construction of the Mount Polley Mine, several sections of the BJFSR were re-aligned to make the road safer for the employees and suppliers of the mine operations. As a result, the areas of this road that were no longer being used required reclamation.

During the Spring of 1997, when the intensive hydroseeding program was carried out, the majority of these areas were reclaimed by ripping the ground and then broadcast seeding or hydroseeding, as required. In subsequent years, additional applications of grass and fertilizer were reapplied to some areas or to new areas, as additional sections of the road were re-aligned.

During 2001, however, trees were planted on these old sections of road. As is the case for the reclamation research, a variety of pine and fir seedlings were used for the planting. However, some deciduous species (willow and poplar) were also planted, to provide a better mix of trees that exists along the BJFSR. Since these areas have been accounted for in previous years, no further accounting of these areas is present in this report for the year 2001, with the exception of this written explanation.

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 2001. 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

At least twice per year, Newalta removes all used grease and oil from the Mount Polley minesite, as part of an on-going program to recycle various used by-products from the mining operations. As part of this removal, any spill waste products are also removed in environmental barrels. During the fall of 2001, a final removal of used grease and oil as well as any spill wastes were removed from the site, prior to the start of the care and maintenance 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 part 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 part 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 part 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 analysed 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 nine sites (E1, W1, W3a, W4, W5, W7, W8, W8z, W12, E2), three times per year sampling at one site (W11) and five weekly intensive sampling periods during spring freshet and in fall at five monitoring sites (W3a, 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 copper and molybdenum were also analysed.

2.3.1 SITE E1 – TAILINGS SUPERNATANT

Tables 2.3.1-1 and 2.3.1-2 summarize the results of the water quality data collected in 2001 for site E1 (Tailings Supernatant). Table 2.3.1-1 also contains four charts that graphically represent the trends of Total Cadmium (T-Cd) and Total Arsenic (T-As) during 2001, as well as the comparisons of these two metals from 1998 to 2001. A few key parameters are discussed in the following paragraphs.

Average values of pH have been slightly decreasing from 8.19 in 1998 to 7.7 in 2000, but have returned to an average of 8.2 for the year 2001. 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.

There has been an increasing trend in the levels of Nitrite & Nitrate in the tailings supernatant. Values started at a low of 0.017 mg/l in 1998 (avg = 0.051 mg/l) and have increased to a high of 1.44 mg/l during 2001 (avg = 0.731 mg/l). This is not unexpected as residual blasting components are deposited with the tailings slurry.

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 had a high of 1.68 mg/l (avg = 0.97 mg/l) and 2.5 mg/l (avg = 0.65 mg/l) in 1998 and 1999, respectively, while it has decreased to a low of 0.0475 mg/l (avg = 0.17 mg/l) in 2001. D-Cu had a high of 0.601 mg/l (avg = 0.204 mg/l) in 1998 and has moved to a low of 0.0013 mg/l (avg = 0.0061 mg/l) during 2001. These decreases are most likely due to the improved recoveries of copper at the Mount Polley concentrator that were witnessed throughout this four year comparison.

Other metals, such as total selenium and total molybdenum, have remained relatively unchanged over this period of time.

2.3.2 SITE W1 – MOREHEAD CREEK

Tables 2.3.2-1 and 2.3.2-2 summarize the results of the water quality data collected in 2001 for site W1 (Morehead Creek). Additionally, figures 2.3.2-1 and 2.3.2-2 summarized the T-Cu and Nitrate + Nitrite-N from baseline through 2001, respectively. The following paragraphs highlight some of these comparisons.

pH has remained relatively stable, with an average of 7.06 in 1998 to an average of 7.25 in 2001. There is an anomalous minimum value of 2.03 in 1998, but this is likely a recording error, as there have never been acidic conditions of this nature anywhere on the Mount Polley site, let alone in Morehead creek, some seven km's from the site.

T-Cu has also remained relatively stable, with averages in the range of 0.005 to 0.007 mg/l. Further, Nitrate + Nitrite-N has maintained its baseline range below 0.1 mg/l. All other metals or nutrients remain relatively unchanged from previous years.

2.3.3 SITE W3a – MINE DRAINAGE CREEK AT BOOTJACK LAKE

Tables 2.3.3-1 and 2.3.3-2 summarize the results of the water quality data collected in 2001 for site W3a (Mine Drainage Creek at Bootjack Lake). Additionally, figures 2.3.3-1 and 2.3.3-2 summarized the T-Cu and Nitrate + Nitrite-N comparisons from baseline through 2001, respectively. The following paragraphs highlight some of these trends.

One should note that the monitoring site for W3a is a change in the original location on Mine Drainage Creek in the year 2000. The initial sampling point on this creek was much closer to the minesite in a swampy area (originally called W3). However, since sampling was only feasible during spring freshet, as the channel dried up for all months thereafter, the sampling point was moved to the mouth of the creek as it entered Bootjack Lake and named W3a. This allowed for more frequent sampling, as well as easier year-round access. Therefore, all data represented in the tables and figures for this site are the collection of data from both sites.

T-Cu has decrease some between baseline average values of 0.035 mg/l to 0.0265 mg/l in 2001. Further, most of this Cu is in the dissolved form, as D-Cu had corresponding temporal values of 0.031 mg/l during baseline to 0.0245 mg/l in 2001. 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. This diversion continues during the care & maintenance period.

2.3.4 W4 – NORTH DUMP CREEK

Tables 2.3.4-1 and 2.3.4-2 summarize the results of the water quality data collected in 2001 for site W4 (North Dump Creek). Additionally, figures 2.3.4-1 and 2.3.4-2 summarized the T-Cu and Nitrate + Nitrite-N comparisons from baseline through 2001, respectively. The following paragraphs highlight some of these trends.

As with site W3a, nearly all of the Cu is in the dissolved form. Since baseline, it has fluctuated some, with a low average of 0.00877 mg/l in 1998 to a high average of 0.0163 mg/l in 2000. For 2001, it has dropped back to an average of 0.0114 mg/l. Of note is the increased sampling at this site.

As the Bell Pit and North dump were mainly constructed in 2001, increased sampling at this site was initiated. Whereas only three samples were taken in 2000, there were 21 separate samples taken in 2001. This increased sampling frequency allowed for more detailed detection from the operation, as well as more confidence in the annual chemistry fluctuations in this creek.

2.3.5 W5 – BOOTJACK CREEK

Tables 2.3.5-1 and 2.3.5-2 summarize the results of the water quality data collected in 2001 for site W5 (Bootjack Creek). Additionally, figures 2.3.5-1 and 2.3.5-2 summarized the T-Cu and Nitrate + Nitrite-N comparisons from baseline through 2001, respectively. Further, table 2.3.5-1 also provides some detailed graphical comparisons for certain metals that have some anomalous outliers in one year or the next. The following paragraphs highlight some of these trends.

Average values for T-Cu typically range from 0.004 mg/l in1998 to 0.012 mg/l in 2001. However, as can be seen, if an outlier of 0.0649 mg/l in 2001 is removed, the average is closer to 0.006 mg/l. As most values for this site are much lower than this outlier value for T-Cu, it is expected to be an anomalous reading and should be considered suspect.

Several other metals are graphed accordingly, with some similar outliers from years other than 2001.

2.3.6 W7 – HAZELTINE CREEK

Tables 2.3.6-1 and 2.3.6-2 summarize the results of the water quality data collected in 2001 for site W7 (Hazeltine Creek). Additionally, figures 2.3.6-1 and 2.3.6-2 summarized the T-Cu and Nitrate + Nitrite-N comparisons from baseline through 2001, respectively. Further, table 2.3.6-1 also provides some detailed graphical comparisons for certain metals that have some anomalous outliers in one year or the next. The following paragraphs highlight some of these trends.

Average values for T-Cu typically range from 0.0023 mg/l in 1998 to 0.0096 mg/l in 2001. However, as can be seen, if an outlier of 0.0771 mg/l in 2001 is removed, the average is closer to 0.004 mg/l. As most values for this site are much lower than this outlier value for T-Cu, it is expected to be an anomalous reading and should be considered suspect. Further, it is the exact same sampling date as for a similar anomalous reading for T-Cu at site W5.

Several other metals are graphed accordingly, with some similar outliers from years other than 2001.

2.3.7 W8 – EDNEY CREEK TRIBUTARY NE

Tables 2.3.7-1 and 2.3.7-2 summarize the results of the water quality data collected in 2001 for site W8 (Edney Creek Tributary NE). Additionally, figures 2.3.7-1 and 2.3.7-2 summarized the T-Cu and Nitrate + Nitrite-N comparisons from baseline through 2001, respectively. Further, table 2.3.7-1 also provides some detailed graphical comparisons for certain metals that have some anomalous outliers in one year or the next. The following paragraphs highlight some of these trends.

Average values for T-Cu typically range from 0.0017 mg/l in 1998 to 0.0082 mg/l in 2001. However, as can be seen, if an outlier of 0.0824 mg/l in 2001 is removed, the average is closer to 0.003 mg/l. As most values for this site are much lower than this outlier value for T-Cu, it is expected to be an anomalous reading and should be considered suspect. Further, the exact same sampling date at sites W5 & W7 have a similar anomalous reading for T-Cu.

Several other metals are graphed accordingly, with some similar outliers from years other than 2001.

2.3.8 W8z – EDNEY CREEK TRIBUTARY SW

Tables 2.3.8-1 and 2.3.8-2 summarize the results of the water quality data collected in 2001 for site W8z (Edney Creek Tributary SW). Additionally, figures 2.3.8-1 and 2.3.8-2 summarized the T-Cu and Nitrate + Nitrite-N comparisons from baseline through 2001, respectively. The following paragraphs highlight some of these trends. One point to note is that this site is a background site selected for comparisons to the sites downstream from the mine disturbance.

Average values for T-Cu typically around 0.004 mg/l. However, there is an outlier of 0.0859 mg/l in 2001 on the same date as there were anomalous readings for T-Cu at W5, W7 and W8. Therefore, as this site is a background site (a control site), confirmation has been received that the other anomalous readings should be discarded as well.

2.3.9 W11 – LOWER EDNEY CREEK UPSTREAM OF QUESNEL LAKE

Tables 2.3.9-1 and 2.3.9-2 summarize the results of the water quality data collected in 2001 for site W11 (Lower Edney Creek Upstream of Quesnel Lake). Additionally, figures 2.3.9-1 and 2.3.9-2 summarized the T-Cu and Nitrate + Nitrite-N comparisons from baseline through 2001, respectively. The following paragraphs highlight some of these trends. 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.

Average values for T-Cu typically range from 0.002 mg/l to 0.004 mg/l. As in many of the other sites, D-Cu is the majority of the copper phase in T-Cu, with ranges from 0.002 mg/l to 0.0037 mg/l.

This site is heavily affected by beaver activity. As a result, some parameters appear to fluctuate from season to season or from year to year. Further, the sampling frequency (three times per year) can also contribute to the high standard deviation associated with this site.

2.3.10 W12 – 6K CREEK

Tables 2.3.10-1 and 2.3.10-2 summarize the results of the water quality data collected in 2001 for site W12 (6K Creek). Additionally, figures 2.3.10-1 and 2.3.10-2 summarized the T-Cu and Nitrate + Nitrite-N comparisons from baseline through 2001, respectively. The following paragraphs highlight some of these trends.

Average values for T-Cu typically range from 0.006 mg/l to 0.007 mg/l. As in many of the other sites, D-Cu is the majority of the copper phase in T-Cu, with ranges from 0.006 mg/l to 0.0065 mg/l.

This site was meant to pick up any effects coming from the Springer Pit (or West Rock Disposal Sites). However, since the operations at Mount Polley ceased prior to the development of these areas, no impacts are expected to show at this monitoring site.

2.3.11 E2 – SOUTHEAST SEDIMENT POND

Tables 2.3.11-1 and 2.3.11-2 summarize the results of the water quality data collected in 2001 for site E2 (Southeast Sediment Pond). The following paragraphs highlight some of these trends. This site is an effluent site that collects drainage from the East Rock Disposal Site. The water from this area feeds down to the T2 drop box and is conveyed to the TSF via the tailings line.

Average values for T-Cu have risen slightly, from an average of 0.041 mg/l in 1998 to an average high of 0.0585 mg/l in 2000 and then back to an average of 0.0482 mg/l in 2001. T-Se has been increasing steadily, from a low average of 0.0016 mg/l in 1998 to a high average of 0.0546 mg/l in 2001. Most other metals have remained fairly constant from year to year.

Of note for this sample is the increase in nitrates from the RDS. The values have increased from a low average of 0.3 mg/l in 1998 to a high average of 7.13 mg/l in 2001. Paralleling this increase is sulfate, hardness and conductivity.

2.3.12 E5 – FOUNDATION & TOE DRAIN COMPOSITE

Tables 2.3.12-1 and 2.3.12-2 summarize the results of the water quality data collected in 2001 for site E5 (Foundation & Toe Drain Composite). The following paragraphs highlight some of these trends. This site is an effluent site that collects drainage from the foundation and upstream toe drains associated with the Main Embankment of the TSF. The water from this area feeds into the Main Embankment Seepage Collection Pond and is conveyed to the TSF via a 6” line with two 75 HP vertical turbine pumps.

There has been a significant increase in sampling frequency in 2001 compared to previous years, so as to collect more data in preparation for a discharge permit of this water during the care & maintenance period, starting in 2002. Permit requirements were usually three times per year. However, sampling was often sporadic in the past due to operational water levels in the pond and the design configuration of the drains feeding into the pond. As a result, most data is in 2001, with some from 1998 to 2000.

In 2001, T-Cu ranged from a low of 0.0046 mg/l to a high of 0.0084 mg/l. Additionally, T-Se ranged from 0.001 mg/l to 0.008 mg/l. Some parameters, such as sulfate, hardness and conductivity increased over this period of time, mostly between 1999 and 2001. The reasons for this (& nitrates, mentioned in the following paragraph) is due to the construction of the downstream rockfill shell on the main embankment in 2000.

Nitrates increased over the duration of 1999 to 2001. Average values in 1999 were around 1.7 mg/l, while 2000 and 2001 had average values of 40 mg/l and 90 mg/l, respectively. The main reason for these increases is not due to the addition of the upstream toe drain but rather the addition of nearly 1,000,000 metric tones of broken rock as part of the 942.5 metre dam raise on the main embankment. Although this rock is not from the pit, it was blasted to create the necessary size for construction. As a result, the residual blasting powder is washed off the rock and picked up by the foundation drains. It is expected that these values will decrease in the next year or so, as there is a finite amount of nitrates associated with this volume of material.

2.4 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 analysed 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. The one deviation from sampling protocol occurs at well GW96-5B. This well was damaged and has not yet been repaired, so is sampled manually rather than with the Grundfoss pump.

In 1995, groundwater-monitoring well 1995 series were installed in the vicinity of the open pits and mill site. Three of these wells (95-R4, 95-R5, 95-R7) continue to be monitored. In 1996, the B.C. Ministry of Water, Land and Air Protection (formerly the Ministry of Environment, Lands and Parks) 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. Site E5, which drains the foundation and upstream toe of the Main Embankment of the TSF to the Main Embankment Seepage Collection Pond, was added to the groundwater-monitoring program in 1998. 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 results were compared to baseline values to monitor the effects of the mine on the local groundwater regime.

2.4.1 GW96-1A / GW96-1B

Wells GW96-1A & GW96-1B are located down gradient of the seepage collection pond of the Perimeter Embankment. Three samples were taken in 2001 from each well. Tables 2.4.1-1 & 2.4.1-2 tabulate the statistical data collected from 1998 thru 2001. Further, figure 2.4.1 graphically represents dissolved copper & dissolved sulphate from both wells for this period of time. The following paragraphs discuss some of the parameters presented in these tables and figure.

For well GW96-1A, the average alkalinity for the three samples was 333 mg/l, which is similar to, but slightly elevated from, values of previous years, starting at 300 mg/l in 1998. The average pH is again slightly basic at 8.73. Dissolved sulphate values remained consistent with previous years at around 55 mg/l. Three dissolved metals had values higher than typical for one of the sampling periods (June 19th) in 2001. D-Cu, D-Fe & D-Zn had values of 0.044 mg/l, 0.239 mg/l & 0.029 mg/l, respectively. This equates to an increase of 50 times, 10 times & 30 times for the respective dissolved metals. It is more likely that the elevations of these three dissolved metals result from sampling contamination rather than from drainage originating at the TSF, as no other parameters were elevated and all parameters returned to typical levels after this sampling period. Other dissolved metals remained similar to values from previous years.

For well GW96-1B, the average alkalinity for the three samples was 159 mg/l, which is similar to, but slightly elevated from, values of previous years, starting at 137 mg/l in 1998. The average pH is again slightly basic at 9.07. Dissolved sulphate values remained consistent with previous years at around 30 mg/l. Only dissolved iron had a value higher than typical in 2001 (May 22nd). D-Fe had a value of 0.071 mg/l, which equates to an increase of about 14 times over typical values. Other dissolved metals remained similar to values from previous years.

2.4.2 GW96-2A / GW96-2B

Wells GW96-2A & GW96-2B are located approximately 900 m Southeast from the GW96-1 monitoring wells and are designed to monitor any groundwater effects from the Tailings Storage Facility on Hazeltine Creek. Three samples were taken in 2001 from each well. Tables 2.4.2-1 & 2.4.2-2 tabulate the statistical data collected from 1998 thru 2001. Further, figure 2.4.2 graphically represents dissolved copper & dissolved sulphate from both wells for this period of time. The following paragraphs discuss some of the parameters presented in these tables and figure.

For well GW96-2A, the average alkalinity for the three samples was 233 mg/l, which is similar to values of previous years. The average pH is again slightly basic at 7.89. Dissolved sulphate values remained consistent with previous years at around 30 mg/l. Three dissolved metals had values higher than typical for one of the sampling periods (June 29th) in 2001. D-Cu, D-Ni & D-Zn had values of 0.0574 mg/l, 0.0107 mg/l & 0.0353 mg/l, respectively. This equates to an increase of 140 times, 10 times & 20 times for the respective dissolved metals. As with well GW96-1A, it is more likely that the elevations of these three dissolved metals result from sampling contamination rather than from drainage originating at the TSF, as no other parameters were elevated and all parameters returned to typical levels after this sampling period. Other dissolved metals remained similar to values from previous years.

For well GW96-2B, the average alkalinity for the three samples was 272 mg/l, which is similar to, but slightly elevated from, values of previous years, starting at 236 mg/l in 1998. The average pH is again slightly basic at 8.16. Dissolved sulphate values remained consistent with previous years at around 5 mg/l. One dissolved metal had values higher than typical for two of the sampling periods (June 29^{th} & August 28^{th}) in 2001. D-Fe had values of 0.059 mg/l 0.051 mg/l, respectively, which equates to an increase of 10 times over typical values. Other dissolved metals remained similar to values from previous years.

2.4.3 GW96-3A / GW96-3B

Wells GW96-3A and GW96-3B are located down gradient of the seepage collection pond of the Main Embankment. Three samples were taken in 2001 from each well. Tables 2.4.3-1 & 2.4.3-2 tabulate the statistical data collected from 1998 thru 2001. Further, figure 2.4.3 graphically represents dissolved copper & dissolved sulphate from both wells for this period of time. The following paragraphs discuss some of the parameters presented in these tables and figure.

For well GW96-3A, the average pH is again very basic at 11.64. Previous years have fluctuated at this well, from 7.86 in 1998 to as high as 12.45 in 1999. It is a very deep well with a very slow recharge rate, resulting in fluctuating parameter values at times. Dissolved sulphate values remained somewhat consistent with previous years at around 45 mg/l. However, there have been several spikes to 300 mg/l in 1998 & 2000.

Further, four dissolved metals had values higher than typical for one of the sampling periods (June 26th) in 2001. D-Pb, D-Mn, D-Se & D-Sr had values of 0.086 mg/l, 0.54 mg/l, 3.45 mg/l & 105 mg/l, respectively. This equates to an increase of 200 times, 5 times, 8600 times & 175 times for the respective dissolved metals. As with well GW96-1A & GW96-2A, it is more likely that the elevations of these three dissolved metals result from sampling contamination rather than from drainage originating at the TSF, as no other parameters were elevated and all parameters returned to typical levels after this sampling period. Other dissolved metals remained similar to values from previous years.

For well GW96-3B, the average alkalinity for the three samples was 243 mg/l, which is similar to values of previous years. The average pH is again slightly basic at 7.98. Dissolved sulphate values remained consistent with previous years at around 5 mg/l. All dissolved metals remained similar to values from previous years.

2.4.4 GW96-4A / GW96-4B

Wells GW96-4A and GW96-4B are located down gradient of the south and main embankments. Three samples were taken in 2001 from each well. Tables 2.4.4-1 & 2.4.4-2 tabulate the statistical data collected from 1998 thru 2001. Further, figure 2.4.4 graphically represents dissolved copper & dissolved sulphate from both wells for this period of time. The following paragraphs discuss some of the parameters presented in these tables and figure.

For well GW96-4A, the average alkalinity for the three samples was 125 mg/l, which is similar to, but slightly lower than, values of previous years, which were usually around 156 mg/l. The average pH is again slightly basic at 8.18 and dissolved sulphate values remained somewhat consistent with previous years at around 4 mg/l. All dissolved metals remained similar to values from previous years.

For well GW96-4B, the average alkalinity for the three samples was 221 mg/l, which is similar to, but slightly higher than, values of previous years, starting at a low of 196 mg/l in 1998. The average pH is again slightly basic at 7.72. Dissolved sulphate values remained consistent with previous years at around 2 mg/l. All dissolved metals remained similar to values from previous years.

2.4.5 GW96-5A / GW96-5B

Wells GW96-5A and GW96-5B are located at the north end and upstream of the Tailings Storage Facility and are monitored as control wells. Three samples were taken in 2001 from each well. Tables 2.4.5-1 & 2.4.5-2 tabulate the statistical data collected from 1998 thru 2001. Further, figure 2.4.5 graphically represents dissolved copper & dissolved sulphate from both wells for this period of time. The following paragraphs discuss some of the parameters presented in these tables and figure.

For well GW96-5A, the average alkalinity for the three samples was 293 mg/l, which is similar to, but slightly lower than, values of previous years, which were usually around 318 mg/l. The average pH is nearly neutral at 7.12 and dissolved sulphate values remained consistent with previous years at around 8 mg/l. However, there was a value of nearly 120 mg/l for dissolved sulphate during the last sampling period in 2001. This value is likely a result of sampling contamination or analytical error as there have never been values of this magnitude at either of the GW96-5 wells. All dissolved metals remained similar to values from previous years.

For well GW96-5B, the average alkalinity for the three samples was 246 mg/l, which is similar to values of previous years. The average pH is again slightly basic at 7.60. Dissolved sulphate values remained consistent with previous years at around 3 mg/l. Two dissolved metals had values higher than typical for one of the sampling periods (August 22nd) in 2001. D-Al & D-Fe had values of 0.13 mg/l & 0.03 mg/l, respectively. This equates to an increase of 10 times & 20 times for the respective dissolved metals. As this well is upstream of the TSF and not within the influence of the minesite, it is likely that the elevations of these two dissolved metals result from sampling contamination. Other dissolved metals remained similar to values from previous years.

2.4.6 GW96-6

GW96-6 is located down gradient of the East Rock Disposal Site. Three samples were taken in 2001 from this well. Tables 2.4.6-1 tabulates the statistical data collected from 1998 thru 2001. Further, figure 2.4.6 graphically represents dissolved copper & dissolved sulphate from this well for this period of time. The following paragraph discusses some of the parameters presented in this table and figure.

For well GW96-6, the average alkalinity for the three samples was 97 mg/l, which is similar to, but slightly elevated from, values of previous years, which started at 77 mg/l. The average pH is again slightly basic at 8.76. Dissolved sulphate values remained consistent with previous years at around 25 mg/l. All dissolved metals remained similar to values from previous years.

2.4.7 GW96-7

GW96-7 is located down gradient of the Mill Site, half way down the tailings access road, near the Booster Station. Three samples were taken in 2001 from this well. Table 2.4.7-1 tabulates the statistical data collected from 1998 thru 2001. Further, figure 2.4.7 graphically represents dissolved copper & dissolved sulphate from this well for this period of time. The following paragraph discusses some of the parameters presented in this table and figure.

For well GW96-7, the average alkalinity for the three samples was 131 mg/l, which is similar to values of previous years. The average pH is again slightly basic at 7.85. Dissolved sulphate values remained consistent with previous years at around 25 mg/l. Two dissolved metals had values higher than typical for one of the sampling periods (June 29^{th}) in 2001. D-Cu & D-Zn had values of 0.0516 mg/l & 0.0315 mg/l, respectively. This equates to an increase of 30 times & 10 times for the respective dissolved metals. As these two parameters were the only two that had elevated values and they returned to typical levels after this data, it is likely that the elevations of these two dissolved metals result from sampling contamination. Further, the same metals had elevated concentrations for the same sampling periods at wells surrounding the TSF, indicating a general contamination for this sampling period, rather than a localized contamination from the minesite or TSF. Other dissolved metals remained similar to values from previous years.

2.4.8 GW96-8A / GW96-8B

Groundwater wells GW96-8A and GW96-8B are located on Bootjack Road at 10.75 km. Three samples were taken in 2001 from each well. Tables 2.4.8-1 & 2.4.8-2 tabulate the statistical data collected from 1998 thru 2001. Further, figure 2.4.8 graphically represents dissolved copper & dissolved sulphate from both wells for this period of time. The following paragraphs discuss some of the parameters presented in these tables and figure.

For well GW96-8A, the average alkalinity for the three samples was 125 mg/l, which is similar to values of previous years. The average pH is again slightly basic at 7.95. Dissolved sulphate values remained consistent with previous years at around 12 mg/l. One dissolved metal had values higher than typical for two of the sampling periods (June 27^{th} & August 28^{th}) in 2001. D-Fe had values of 0.041 mg/l & 0.056 mg/l, respectively. This equates to an increase of 8 times & 11 times for the respective sampling periods. Other dissolved metals remained similar to values from previous years.

For well GW96-8B, the average alkalinity for the three samples was 102 mg/l, which is similar to values of previous years. The average pH is nearly neutral at 7.41. Dissolved sulphate values remained consistent with previous years at around 8 mg/l. All dissolved metals remained similar to values from previous years.

2.4.9 GW96-9

Well GW96-9 is located south of the Main Embankment. Three samples were taken in 2001 from this well. Table 2.4.9-1 tabulates the statistical data collected from 1998 thru 2001. Further, figure 2.4.9 graphically represents dissolved copper & dissolved sulphate from this well for this period of time. The following paragraph discusses some of the parameters presented in this table and figure.

For well GW96-9, the average alkalinity for the three samples was 219 mg/l, which is similar to, but slightly elevated from, values of previous years, which were as low as 150 mg/l in 1999. The average pH is again slightly basic at 7.61. Dissolved sulphate values remained consistent with previous years at around 3 mg/l. One dissolved metal had values higher than typical for one of the sampling periods (June 27th) in 2001. D-Cu had a value of 0.0563 mg/l, which equates to an increase of 40 times more than typical values. Other dissolved metals remained similar to values from previous years.

2.4.10 95R-4 / 95R-5 / 95R-7

Well 95R-4 is located at Bootjack 10 km. Table 2.4.10-1 presents the statistical data for this well from 1998 to 2001. Further, figure 2.4.10 graphically presents dissolved copper and dissolved sulphate for this time period. There were essentially no changes in water quality between the samples collected in 2001 compared to previous years.

Well 95R-5 is located along Polley Lake FSR road, Northwest of the East

Rock Disposal Site. Table 2.4.10-2 presents the statistical data for this well from 1998 to 2001. Further, figure 2.4.11 graphically presents dissolved copper and dissolved sulphate for this time period. As with the previous 95 series well, there were essentially no changes in water quality between the samples collected in 2001 compared to previous years.

Well 95R-7 is located approximately 500 metres southeast of the concentrator building. Table 2.4.10-3 presents the statistical data for this well from 1998 to 2001. Further, figure 2.4.12 graphically presents dissolved copper and dissolved sulphate for this time period. As with the previous two 95 series wells, there were essentially no changes in water quality between the samples collected in 2001 compared to previous years.

2.4.11 GW00-1A / GW00-1B / GW00-2A / GW00-2B / GW00-3A / GW00-3B

All 2000 series wells are located down gradient of the south embankment. These wells have baseline data for 2000 and a first full years data in 2001. As the south embankment is only a few metres high and has very little water against it, there will likely be no indications of seepage from the TSF in these wells. When the TSF embankments are raised another 4 or 5 metres, these wells will be of more use for monitoring purposes. Table 2.4.11-1 present the data and statistics for all samples from these wells. Further, figures 2.4.13-1 thru 2.4.13-3 graphically present the dissolved copper for each well.

For well GW00-1A, average pH has fallen off slightly to 8.96 from a baseline of 10.07. Alkalinity has risen some to an average of 137 mg/l from 107 mg/l. Several dissolved metals, D-Al, D-As & D-Mn, have all increased slightly from baseline levels. However, there is no indication that these increase are due to the supernatant from the TSF. Ongoing monitoring will confirm this assertion. All other dissolved metals remain similar to baseline levels.

For well GW00-1B, average pH has remained level at about 7.5. Alkalinity has risen some to an average of 305 mg/l from 287 mg/l. All dissolved metals remain similar to baseline levels.

For well GW00-2A, average pH has fallen off slightly to 7.99 from a baseline of 8.28. Alkalinity has risen some to an average of 249 mg/l from 229 mg/l. All dissolved metals remain similar to baseline levels.

For well GW00-2B, average pH has fallen off slightly to 7.87 from a baseline of 8.12. Alkalinity has risen some to an average of 298 mg/l from 280 mg/l. All dissolved metals remain similar to baseline levels.

For well GW00-3A, average pH has fallen off slightly to 7.51 from a baseline of 7.73. Conductivity has also fallen, from 707 μS/cm to an average of 562 μS/cm. However, alkalinity has increase from 264 mg/l to and average of 294 mg/l. Dissolved iron increased from less than the MDL, 0.005 mg/l, to an average of 0.138 mg/l. All other dissolved metals remain similar to baseline levels.

For well GW00-3B, average pH has fallen off slightly to 7.68 from a baseline of 7.85. Alkalinity has increase from 264 mg/l to and average of 294 mg/l. Dissolved iron has decreased from 0.267 mg/l, to an average of 0.055 mg/l. All other dissolved metals remain similar to baseline levels.

2.5 CLIMATOLOGY

As a requirement of Effluent Permit PE 11678, the collection of detailed meteorology data was again performed in 2001. 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, some data was unavailable during the monitoring period for each of the sensors. Specifically, no wind data was recorded in January or September, no temperature data was available from parts of the months of January, March, June, July, September & October, precipitation data was unavailable for parts of September & October, evaporation data was unavailable after August and solar radiation data was only available from March until July.

2.5.1 WIND SPEED BY DIRECTION & PREVAILING WIND DIRECTION

Wind speed by direction and prevailing wind direction can be seen in figures 2.5.1-1 thru 2.5.1-5. Prevailing winds were again from the northwest in the winter months and switched to the south & southwest in the summer months. Highest wind speeds were recorded in the fall months at approximately 2.5 m/s.

2.5.2 TEMPERATURE – AVERAGE, MINIMUM AND MAXIMUM

Graphical comparisons of daily average, minimum and maximum air temperature at the 1m elevation and 5m elevation sensors are presented in figures 2.5.2-1 and 2.5.2-2. Temperatures ranged from below -20°C in December to above +35°C in August.

2.5.3 PRECIPITATION

Figure 2.5.3-1 illustrates the daily precipitation values for the recording period of March thru November. There where three peak precipitation events recording greater than 16 mm of rain during this time in 2001, ranging from 16 mm to 19 mm. Total precipitation for the year is recorded as 708 mm.

2.5.4 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 2001 are shown in figure 2.5.4-1. Two days of net evaporation stood out, with about 9 mm on

July 10th and nearly 7 mm on July 28th. However, typical daily net evaporation ranged between 2 mm & 4 mm. Annual net evaporation was estimated as 369.6 mm for 2001.

2.5.5 SOLAR RADIATION

Solar radiation data was available for about four months in 2001, from March thru July. However, problems with the new probe arose after this period and a solution has not been forthcoming. Regardless, the trend of solar radiation for the recording period started at about 12 Mj/m^2 and continued to rise to about 25 Mj/m^2 thru the end of the recording period in early July. This data agrees well with past years.

2.5.6 WATERBALACE

Table 2.5.6-1 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 of this report.

In past years, the focus of the waterbalance has been on ensuring that enough water remains in the pond to operate through the winter months, when inputs are at a minimum. However, as the operations ceased at Mount Polley in October 2001, the focus of the waterbalance is to ensure that enough freeboard remains in the TSF. That is, the waterbalance has switched from a negative waterbalance to a positive waterbalance. Further, as no further increases of the impoundments are planned to deal with the rise in water during the care and maintenance period, alternative schemes are required to deal with the water in the TSF.

Mount Polley proposed to store the excess water from the TSF in the completed Cariboo Pit, through the use of the existing reclaim water pumping system. The only modification required was to use pumps within the concentrator building to pump the water the remaining distance to the pit. Approval was received in the fall of 2001 from the Ministry of Water, Land and Air Protection to pump 1,000,000 m^3 /year of water from the TSF to the Cariboo Pit, for the years 2001 thru 2003. Thereafter, total inputs to the Cariboo Pit must be limited to 100,000 m^3 /year, starting in 2004.

In the fall of 2001, 483,417 m^3 of water from the TSF was pumped to the Cariboo Pit. A further 1,000,000 m^3 of water is planned for pumping in the spring of 2002. The plan for pumping from the TSF to the Cariboo Pit can be seen in table 2.5.6-1. Also, as mentioned earlier, the pumping schedule for the TSF is discussed in the Annual Tailings Inspection Report, prepared by Knight Piésold Ltd.

This pumping scheme was created as a short-term solution, as Mount Polley intends to work towards a discharge permit for the TSF in the coming years. A discharge permit for the spring of 2003 or 2004 is the present plan. Further, the time of operating the TSF during the care & maintenance period as well as with the new water diversions (mentioned in an earlier section of this report) will provide data to support a discharge permit from the TSF.

2.6 HYDROLOGY

All flow-measuring requirements conducted in 2001 were in accordance with sub-section 3.3 of Effluent Permit PE 11678. 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.

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.

2.6.1 W1a

Discharge in 2001 at site W1a corresponded with levels recorded in previous years from May thru July, ranging from 0.3 m3/s down to 0.12 m3/s, but were higher than typical levels in August, at 0.16 m3/s vs. 0.05 m3/s. See figure 2.6.1 that compares all data from 1997 thru 2001.

2.6.2 W3a

Discharge in 2001 at site W3a was higher than levels recorded in previous years from May thru July, ranging from 0.0025 m3/s to 0.015 m3/s. However, one should note that the flows presented from 1995, & 1997 thru 1999 are from the previous site location further upstream on this creek. Therefore, one would expect higher flows downstream on this creek at the same time of year. See figure 2.6.2 that compares all data from 1995, 1997 thru 1999 & 2001.

2.6.3 W4

Discharge in 2001 at site W4 was slightly higher and a runoff a little later than levels recorded in previous years from May thru July, ranging from 0.023 m3/s to 0.007 m3/s, compared to 0.019 m3/s to 0.001 m3/s. Also, a peak in August was higher than previous years, with the exception of1995, where both reached levels of 0.015 m3/s. See figure 2.6.3 that compares all data from 1995 & 1997 thru 2001.

2.6.4 W5

Discharge in 2001 at site W5 was similar to levels recorded in previous years from May thru September, ranging from 0.065 m3/s to 0.005 m3/s. However, a peak in October was much higher than previous years, at nearly 0.16 m3/s compared to 0.04 m3/s. See figure 2.6.4 that compares all data from 1995 & 1997 thru 2001.

2.6.5 W8

Discharge in 2001 at site W8 was similar to levels recorded in previous years from May thru September, ranging from 0.024 m3/s to 0.005 m3/s. However, a peak in October was slightly higher than previous years, at nearly 0.05 m3/s compared to 0.025 m3/s. See figure 2.6.5 that compares all data from 1995 & 1997 thru 2001.

2.6.6 W12

Discharge in 2001 at site W12 was similar to levels recorded in previous years from May thru September, ranging from 0.16 m3/s to 0.02 m3/s. However, a peak in October was much higher than previous years, at nearly 0.25 m3/s compared to 0.05 m3/s. See figure 2.6.6 that compares all data from 1997 thru 2001.

2.6.7 W7 – HAZELTINE CREEK HYDROGRAPH

Discharge in 2001 at site W7 was similar to levels recorded in 2000 from April thru June and August thru November, ranging from 0.520 m3/s to 0.200 m3/s and 0.100 m3/s to 0.001 m3/s. See figure 2.6.7 that compares all data from 2000 thru 2001.

2.7 RECLAMATION RESEARCH – 2001

In 1998, Phase I of the Reclamation Research Program was initiated on the top of the East 1170 RDS. 1999 saw an expansion of Phase I with the addition of eleven more plots. In 2000, test plots were initiated on the 1170 RDS. Approximately one hectare was re-sloped from angle of repose to a range of 2.5:1 to 3:1, covered with different prescriptions of soil and biosolids, planted with seedlings and seeded with a domestic grass mixture. In 2001, no additional work was carried out on the reclamation test plots. However, a detailed monitoring program was performed at the end of the growing season in the fall of 2001. This results of this monitoring program are summarized in the Appendix "Annual Reclamation 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

3.3.1 AREAS OF DISTURBANCE TO END OF 2001

A new flyover of the Mount Polley area was conducted in July of 2001. A complete digital terrain model of the entire disturbed area was created as well as an orthophoto. This allowed for some of the most detailed categorizing of disturbed areas that has been conducted at Mount Polley since mining began, as the various units could be delineated with the most recent contours and flyover photo using CAD software. Further, as mining ceased in October of 2001, no further areas of disturbance was created after the date of the flyover. Figure 3 presents a 1:10,000 map of the orthophoto with the disturbed areas outlined for the end of 2001.

At the end of 2001, 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. The mine components and the areas that they occupied at the end of 2001 are:

- The East RDS increased to 58.46 ha, the North RDS grew to 6.69 ha and the Cariboo Pit RDS finished at 7.28 ha for a total disturbance from rock disposal sites of **72.43 ha**;

- The tailings storage facility, including the main, perimeter & south embankments, embankment original ground (OG) preparation, basin original ground (OG) preparation, future tailings pond zone, tailings pond and beach, drainage & seepage ponds and the barge channel, occupied **216.83 ha**;

- The plant site, with ancillary facilities such as the mill, warehouse/office complex, maintenance buildings, crusher and conveyor system occupied **20.21 ha**;

- The total area for roads, which included the Bootjack Forest Service Road, mine & haul roads, Polley Lake intake road, the Tailings reclaim road and all other tailings roads occupied **45.24 ha**.

- The Cariboo Pit occupied 37.07 ha, the Bell Pit occupied 5.88 ha, the Springer Pit occupied 1.25 ha and the Tailings Rock Borrow occupied 6.69 ha for a total pit area of **50.90 ha**;

- Overburden, topsoil, ore and biosolids stockpile areas covered a total area of **30.42 ha**.

- The linear areas, which is limited to the waste dump diversion ditch (WDDD) and the southeast sediment pond (SESP) occupied an area of **6.21 ha**; and

- Miscellaneous areas, labelled "other", which include three explosive sites, general miscellaneous areas near the minesite, a tailings laydown, four till borrows at the TSF and a till waste pile occupied an area of **48.64 ha**.

3.2 SURFACE DEVELOPMENT IN 2001

Approximately 21.14 ha were disturbed in 2001, for a total disturbance to date of 490.87 ha. This equates to a 4% increase from 2000. A short discussion of the development in 2001 follows.

The rock disposal sites increased in area by **17.41 ha**, mostly due to the development of the North RDS and the Cariboo Pit RDS. The tailings area decreased slightly by **7.16 ha** due to the re-classification of areas into the roads & other categories. The mill site increased slightly in size by **0.55 ha**. The roads area increased by **3.41 ha**, as some areas where re-classified from the TSF area and due to small road construction. The pit areas increased by only **2.45 ha**, as both the Cariboo & Bell Pits had already maximized their respective disturbed areas at the end of 2000. The majority of the increase to this area was from the starter Springer Pit. The area covered by the stockpiles increased in area by **3.51 ha**, while the total linear disturbed area decreased by **2.62 ha**, mostly due to the re-assessment of the disturbance from the WDDD. Finally, the area covered by the “other” category increased slightly by **3.59 ha**, mostly due to re-classification of areas from the TSF category. Tables 3.1.1-1 & 3.1.1-2 contain all info presented above.

As mentioned in section 2.2.11 of this report, the table that summarizes the various quantities of waste generated at Mount Polley in 2001 will not be included in this report. Once the detailed ARD/ML program has been completed in 2003, a table summarizing the various quantities of waste rock, tailings and low grade ore deposited in 2001, and for the entire operating life of Mount Polley, will be submitted as an addendum to this report.

3.3 PROJECTED SURFACE DEVELOPMENT FROM 2002 TO 2006

3.3.1 AREAS OF DISTURBANCE

As mining operations ceased in October 2001 and the Mount Polley mine will be in care & maintenance for an indefinite period of time, no further disturbance will be created until operations resume. As a result, tables 3.3.1-1 & 3.3.1-2 present no further disturbance for the five-year projection to 2006. When mining operations resume at Mount Polley, a detailed annual and five-year plan of development will be created and submitted to the various governing agencies.

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. The report is updated each year reflecting the changes and increased knowledge of the requirements.

No soil stripping, salvage or stockpiling occurred at the Mount Polley mine site in 2001. 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. It is designed to prevent any unscheduled surface discharge from the tailings storage facility and the open pit areas. The water management strategy for the project includes a comprehensive series of collection ditches, drains, and sediment control and collection ponds to protect existing watercourses. All surface and groundwater flows within disturbed areas are re-directed toward the milling process & tailings storage facility. Groundwater from de-watering wells near the mill site is piped directly to the mill to provide fresh make-up water. All open pit water is stored in the Cariboo & Bell pits for future use in the milling process.

The mill site is surrounded by a berm, constructed in 1995, and all drainage from the mill site area is routed to the mill site sump (MSS). The water is pumped to into the tailings pipeline and stored in the TSF. Water flow from the East Rock Disposal Site (RDS) is intercepted by a perimeter ditch, which is then pumped to the Cariboo Pit for storage. Water from the remaining undisturbed area of the future East RDS is also intercepted by a perimeter ditch and is directed to a sediment pond at the southeast part of the footprint (SESP). The water in this pond is redirected to the tailings pipeline.

4.0 FUTURE RECLAMATION PROGRAMS

4.1 RECLAMATION RESEARCH FOR 2002

No further reclamation research is planned for 2002 or subsequent years at Mount Polley. Should operations resume, then monitoring of the existing reclamation research will continue, as well as the creation of additional research programs.

5.0 RECLAMATION COST PROJECTIONS

Detailed cost projections for the end of 2001 and end of planned minelife (2006) can be found in the ANNUAL RECLAMATION COSTING appendix.