Reclamation & Closure Plan Update 2004
Mount Polley Project

Prepared for:

Mount Polley Mining Corporation

For Submission to:

Ministry of Energy and Mines

Prepared by:

Greg Smyth

with assistance from

Mount Polley Mining Corporation

March 2005

1. INTRODUCTION 1
1.1. Overview & Project Location 1
1.2. History of Construction & Operations 1
1.3. Purpose of Reclamation & Closure Plan Update 2
1.4. Mine Infrastructure 3
2. MINING PROGRAM 5
2.1. Mine Plan Overview 5
2.2. Development Schedule 6
2.3. Details of Existing and Projected Surface Development 6
2.3.1. Existing Surface Development 6
2.3.2. Projected Surface Development 10
2.4. Access and Transportation 13
2.5. Mine and Processing Plant Description 14
2.6. Dams and Waste Emplacements 15
2.6.1. Tailings 15
2.6.2. Waste Rock 17
2.6.2.1. Existing Rock Disposal Sites 17
2.6.2.2. Future Rock Disposal Sites 18
2.6.3. Soil Storage 19
2.7. Additional Minesite Infrastructure 21
2.7.1. Administrative/Operational Offices 22
2.7.2. Maintenance Shops, Warehouse and Analytical Services 22
2.7.3. Power Supply and Distribution 23
2.7.4. Fuel Storage and Handling 24
2.7.5. Refuse Disposal and Recycling 24
2.7.6. Chemical, Oil & Grease Disposal and Recycling 25
2.7.7. Sewage Disposal 25
2.7.8. Fire Suppression System 26
2.7.9. Microwave Telephone System 26
2.8. Mine Water Use & Water Management Plan 26
2.8.1. General Water Usage 26
2.8.2. Water Management Plan 27
2.9. Watercourse and Water Quality Protection 29
3. ENVIRONMENTAL PROTECTION & RECLAMATION PROGRAM 32
3.1. Soil Handling Plan 32
3.2. Environmental Monitoring and Surveillance 33
3.3. Erosion Control & Sediment Retention Plan 34
3.4. Conceptual Final Reclamation Plan 37
3.4.1. End Land Use Objectives 38
3.4.2. Productivity or Capability Objectives 38
3.4.2.1. Commercial Forestry 38
3.4.2.2. Wildlife Habitat 39
3.4.2.3. Cattle Grazing, Hunting, Guide-Outfitting, Trapping & Outdoor Recreation 39
3.4.3. Long-Term Stability 40
3.4.3.1. Physical Stability 40
3.4.3.2. Chemical Stability 43

3.4.4. Removal of Structures and Equipment ... 44
3.4.5. Mill Site Reclamation ... 45
3.4.6. Waste Dump Reclamation ... 47
3.4.7. Tailings Reclamation ... 53
3.4.8. Pit Reclamation ... 60
3.4.9. Watercourse Reclamation ... 65
3.4.10. Sealing of Underground Workings ... 68
3.4.11. Road Reclamation ... 69
3.4.12. Trace Elements in Soils and Uptake in Vegetation ... 69
3.4.13. Disposal of Reagents and Waste Products ... 70
3.4.14. Operational and Post-Closure Monitoring ... 70
3.4.15. Detailed Five Year Mine Plan ... 70
3.4.15.1. Mine Plan Overview ... 70
3.4.15.2. Development Schedule ... 71
3.4.15.3. Northeast Zone ... 71
3.4.15.4. Pit Operations ... 72
3.4.15.5. Mill Operations ... 72
3.4.15.6. Tailings ... 72
3.4.16. Detailed Five Year Reclamation Plan ... 73
3.4.16.1. Reclamation Plan 2005 ... 75
3.4.16.2. Reclamation Plan 2006 ... 76
3.4.16.3. Reclamation Plan 2007 ... 78
3.4.16.4. Reclamation Plan 2008 ... 80
3.4.16.5. Reclamation Plan 2009 ... 82
3.5. RECLAMATION METHODOLOGY ... 84
3.5.1. Site Preparation ... 84
3.5.2. Overburden and Soil Stockpiles ... 85
3.5.3. Growth Media and Soil Amendments ... 87
3.5.4. Species Selection ... 88
3.6. RECLAMATION RESEARCH PROGRAM ... 94
3.6.1. Existing Research (1998 thru 2004) ... 94
3.6.2. Proposed Research (2005 thru 2009) ... 95

4. ACID ROCK DRAINAGE & METAL LEACHING ASSESSMENT ... 98

4.1. OVERVIEW ... 98
4.2. ASSESSMENT OF EXISTING PITS, RDS'S AND TAILINGS PONDS ... 101
4.2.1. Cariboo Pit and Cariboo Pit Backfill ... 102
4.2.2. Bell Pit ... 105
4.2.3. Springer Pit ... 107
4.2.4. East RDS and Low-Grade Stockpile ... 107
4.2.5. North RDS ... 109
4.2.6. Tailings Storage Facility ... 112
4.3. ASSESSMENT OF PROPOSED PITS, RDS'S AND TAILINGS PONDS ... 113
4.3.1. Cariboo Pit, Bell Pit, Springer Pit and Cariboo/Bell Pits RDS ... 115
4.3.2. Wight Pit and Wight RDS ... 117
4.3.3. North RDS ... 118
4.3.4. Leach Pad (if applicable) ... 119
4.3.5. Tailings Storage Facility ... 120

5. RECLAMATION COST ESTIMATES ... 121

5.1. OVERVIEW ... 121

5.2. COST ESTIMATES FOR 2004 DISTURBANCES 122
5.3. COST ESTIMATES FOR 2009 PROJECTED DISTURBANCES 123
5.4. COST ESTIMATES FOR 2009 PROJECTED DISTURBANCES AFTER 5-YR RECLAMATION PLAN 123

6. REFERENCES 125

List of Tables

2.3.1-1	Summary of Areas Disturbed and Reclaimed thru 2004
2.3.1-2	Disturbed Areas – Breakdown by Mine Component (2 sheets)
2.3.2-1	Existing and Anticipated Disturbance thru 2009
2.6.3-1	Soil Volume Stockpiled thru 2004
3.4-1	Stocking Standards for Mount Polley and the ICHwk Subzone
3.4.16-1	Five-Year Projection of Disturbance and Reclamation, 2005 thru 2009
4.2-1	Quantities of Waste Rock, Tailings and Low-Grade Ore, 1997 thru 2001
4.2-2	ABA Waste Characterization Summary – 1997 thru 2001 East RDS, North RDS, Cariboo Pit Backfill, Low-Grade Stockpile & Tailings (2 sheets)
4.2.1-1	Water Quality at Site E8 (Cariboo Pit) Operational and Post-Operational Stats (1998 thru 2003), (3 sheets)
4.2.2-1	Water Quality at Site E9 (Bell Pit) Operational and Post-Operational Stats (2001 thru 2003), (3 sheets)
4.2.4-1	Water Quality at Site MP1 (East RDS Seep) Operational and Post-Operational Stats (1998 & 2000 thru 2003), (3 sheets)
4.2.5-1	Water Quality at Site W4 (North Dump Creek) Mean Baseline (1990, 1995 & 1996) vs. Operational and Post-Operational Stats (1997 thru 2003), (3 sheets)
4.2.6-1	Water Quality at Site E1 (Tailings Supernatant) Operational and Post-Operational Stats (1997 thru 2003), (3 sheets)
5-1	Push Quantity and Distance Calculations for Slopes
5-2	Volume and Productivity Calculations for Slopes
5-3	Growth Medium Hauling and Spreading Unit Costs
5-4	Growth Medium Hauling Calculations for Lump Sum Worksheet

List of Figures

1	Property Location
2.3.1-1	Disturbed Areas 2004 (sheet 1)
2.3.1-2	Disturbed Areas 2004 (sheet 2)
2.3.2-1	Projected Disturbed Areas thru 2009 (sheet 1)
2.3.2-2	Projected Disturbed Areas thru 2009 (sheet 2)
3.1-1	Soil Test Pit Plan for Minesite
3.1-2	Soil Stockpile – M2, Final Configuration as of Sept. 25/96
3.1-3	Soil Stockpile – M3, Final Configuration as of March 31/99
3.1-4	Soil Stockpile – T1, Final Configuration as of Aug. 30/96
3.2	Surface and Groundwater Monitoring Locations
4.2.1-1	Water Quality at Site E8 (Cariboo Pit) Nitrate + Nitrite (N), Ortho-phosphorus (P), D-Sulphate, T-Al & D-Al
4.2.1-2	Water Quality at Site E8 (Cariboo Pit) Total and Dissolved: Copper, Iron, Molybdenum and Selenium
4.2.2-1	Water Quality at Site E9 (Bell Pit) Nitrate + Nitrite (N), Ortho-phosphorus (P), D-Sulphate, T-Al & D-Al
4.2.2-2	Water Quality at Site E9 (Bell Pit) Total and Dissolved: Copper, Iron, Molybdenum and Selenium
4.2.4-1	Water Quality at Site MP1 (East RDS Seep) Nitrate + Nitrite (N), Ortho-phosphorus (P), D-Sulphate, T-Al & D-Al
4.2.4-2	Water Quality at Site MP1 (East RDS Seep) Total and Dissolved: Copper, Iron, Molybdenum and Selenium
4.2.5-1	Water Quality at Site W4 (North Dump Creek upstream of Polley Lake FSR) Nitrate + Nitrite (N), Ortho-phosphorus (P), D-Sulphate, T-Al & D-Al
4.2.5-2	Water Quality at Site W4 (North Dump Creek upstream of Polley Lake FSR) Total and Dissolved: Copper, Iron, Molybdenum and Selenium
4.2.6-1	Water Quality at Site E1 (Tailings Supernatant) Nitrate + Nitrite (N), Ortho-phosphorus (P), D-Sulphate, T-Al & D-Al
4.2.6-2	Water Quality at Site E1 (Tailings Supernatant) Total and Dissolved: Copper, Iron, Molybdenum and Selenium

List of Appendices

A	Updated Waterbalance and Water Management Plan Prepared by: Knight Piésold Consulting Ltd.
B-1	Reclamation Costing Spreadsheets for 2004 Disturbances
B-2	Reclamation Costing Spreadsheets for 2009 Disturbances
B-3	Reclamation Costing Spreadsheets for 2009 Disturbances After the Five-Year Reclamation Plan
C	2001 Reclamation Research Report Prepared by: Inland Timber Management Ltd.
D	Soil Salvage and Stockpile Protocol 2001
E	Mount Polley Northeast Zone, Geochemical Characterization of Waste Rock Prepared by: SRK Consulting Engineers and Scientists
F	Photo Gallery of the Mining Cycle at Mount Polley (1997 – 2004)

1. INTRODUCTION

1.1. *Overview & Project Location*

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.

1.2. *History of Construction & Operations*

Construction activities for the Mount Polley Project began in 1995 and consisted primarily of clearing the mill site, while major construction of the entire facility began in 1996. The Mount Polley Mine was commissioned in June 1997 and had it’s first full year of production in 1998. Production ceased at the Mount Polley Mine in October 2001, after a prolonged period of low global prices of copper and gold. The mine has been on care and maintenance mode since the cessation of operations in 2001. Excellent prospects exist for the recommencement of operations at Mount Polley, with expectations to start production again in early to mid 2005.

During the operation period of June 1997 to October 2001, the Mount Polley Mine produced a significant volume of copper, gold and silver. The following lists the primary resources that were extracted during this period:

- 133 million pounds of copper
- 370,000 ounces of gold

In addition to the base and precious metals that were extracted from Mount Polley, there were large quantities of waste rock, tailings and low-grade ore generated during the operating time period. The various quantities are as follows:

- Waste Rock = 28 million tonnes
- Tailings = 27.5 million tonnes
- Low Grade Ore = 2.7 million tonnes

When mining operations ended in 2001, the Cariboo Pit had been totally exhausted and had 2,081,402 tonnes of waste rock deposited in the North end of the pit. About eight benches of ore has been extracted from the Bell Pit to date, but there remains a significant volume of material remained in this pit. The Springer Pit has yet to be mined, as there has only been 90,000 tonnes of ore removed, which was collected for grinding and flotation testing. Other than the waste placed in the North end of the Cariboo Pit, all other waste rock has been deposited in either the East Rock Disposal Site (East RDS) or the North Rock Disposal Site (North RDS).

Starting in the spring of 1998, a phased reclamation research program was initiated at Mount Polley. Phase I incorporated reclamation plots on the tops of the rock disposal sites, which were created in 1998 & 1999. Phase II research was created in 2000 on the slopes of the rock disposal sites. Approximately 6 Ha of rock disposal site tops and slopes has been used for research trials, as well as general reclamation, which applied some of the learning from the research trials.

1.3. *Purpose of Reclamation & Closure Plan Update*

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 also 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 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.

The purpose of this report entitled, "*Reclamation & Closure Plan Update 2004, Mount Polley Project*" is to revise the original Reclamation & Closure Plan to include the following:

- Identification of all areas of development, including pits, dumps, tailings facilities, buildings, soil stockpiles and all other areas associated with the mine.
- Identification of knowledge gained from site specific Reclamation Research and incorporate the results into the treatment plans for the reclamation of the mining disturbances.
- An updated assessment of the Metal Leaching and Acid Rock Drainage potential of all mine components.
- An updated set of cost estimates for the Reclamation of all mine components.
- Five-Year projections for mine development, reclamation research, metal leaching & acid rock drainage potential and reclamation cost estimates.

1.4. *Mine Infrastructure*

This open pit mine is on a phased development schedule, ultimately involving the creation of four pits. Project infrastructure consists of, or will consist of:

- A mill site (crushing plant, grinding/flotation plant, conveyors, load out facility, warehouse, assay lab & administration/operational offices)
- Four open pits (Cariboo, Bell, Springer & Wight)
- Four rock disposal sites (East, North, Cariboo/Bell Pit Backfill & Wight)
- A tailings storage facility (TSF)
- A main access road

- A 69 Kev power line
- A microwave telephone system
- A tailings pipeline
- A reclaim waterline; and
- Several sediment control ponds
- Biosolids Stockpile

2. MINING PROGRAM

2.1. *Mine Plan Overview*

The open pits, process plant and rock disposal sites will be situated on the ridge of land which rises to an elevation of 1,220 m above sea level, between Bootjack and Polley Lakes. The mine will consist of four open pits, namely the Cariboo, Bell, Springer and Wight Pits. There will be five rock disposal sites, namely the East RDS, North RDS, West RDS (not permitted), Cariboo / Bell Pits RDS & Wight RDS. The Cariboo, Bell & Springer Pits will all be interconnected, with a North-South distance of approximately 1,100 metres and an East-West distance of approximately 1,100 metres. The Wight Pit will be situated 1,200 metres to the northeast of the Bell Pit and will have a North-South distance of approximately 600 metres and an East-West distance of approximately 300 metres.

The Cariboo Pit has been exhausted, with 24.9 million tonnes of ore & 24.8 million tonnes of waste removed so far. Additionally, the Bell Pit has been partially mined, with 2.3 million tonnes of ore & 3.5 million tonnes of waste removed. The Springer Pit and Wight Pits have not been mined at all, which is where the remaining ore is located.

The Bell, Springer and Wight Pits contain approximately 40 million tonnes of ore and 120 million tonnes of waste rock for a total tonnage of 160 million tonnes. Ore will continue to be hauled to the primary crusher, which is situated to the southeast of the Cariboo Pit. Feed to the mill will average 20,000 tonnes per day or 7,300,000 tonnes per year, for a projected remaining mine life of 6.5 years, based on known ore reserves.

All tailings from the mill will be deposited in the tailings storage facility (TSF), which is located approximately 3.5 km's South of the mill site. Presently, there are 27,464,790 tonnes of tailings in the TSF. With present construction designs, the TSF can hold an additional 52.5 million tonnes of tailings, to a dam crest elevation of 965 metres.

2.2. *Development Schedule*

The planned development schedule for mining is as follows:

Year	Bell Pit		Wight Pit		Springer Pit	
	Ore (Mt)	Waste (Mt)	Ore (Mt)	Waste (Mt)	Ore (Mt)	Waste (Mt)
1	3.40	8.80	0.92	8.00	0	0
2	2.97	5.10	3.32	16.78	0	0
3	3.57	4.39	4.02	8.56	0.45	9.04
4	0	0	.66	.11	4.73	24.47
5	0	0	0	0	7.51	22.30
6	0	0	0	0	5.30	7.80
7	0	0	0	0	0.28	0.55

2.3. *Details of Existing and Projected Surface Development*

As stated earlier in this report, the mine operated between June 1997 & October 2001. During this period, there was nearly 500 Ha of disturbance created on the Mount Polley minesite. Section 2.3.1 will provide details about this existing disturbance and section 2.3.2 will outline the projected disturbance for the years 2005 thru 2009.

2.3.1. Existing Surface Development

At the end of 2004, the total disturbed area in all categories was 503.93 Ha. Surface areas of the various disturbed reclamation units are outlined in Table 2.3.1-1 and are detailed by mine component in Table 2.3.1-2 (2 sheets). All existing disturbances can be seen in Figures 2.3.1-1 and 2.3.1-2. Existing development consists of the following units:

- Three rock disposal sites (RDS):
    - East RDS, North RDS & Cariboo Pit Backfill
- One tailings storage facility (TSF)
- One mill site

- Various roads for access and mine haulage
- Three pit areas:
    - Cariboo Pit, Bell Pit & Springer Pit
- Six soil stockpiles
- One low-grade stockpile
- One high-grade stockpile
- One Biosolids stockpile
- Three explosive sites
- One rock borrow pit & four till borrows for tailings construction
- Several miscellaneous areas throughout the property, which does not fall into any specific category.

Generally speaking, about half of the disturbance is part of, or near to, the TSF, while the other half of the disturbance is made up of the pit areas, rock disposal sites & mill site. While the details of the existing disturbance can be viewed in the tables listed above, a narrative of the disturbance is described in the following paragraphs.

All three of the existing rock disposal sites combine to include 79.27 Ha of disturbance. The disturbance is made up of the tops and the slopes of the rock piles. The largest of the three is the East RDS, which has a total disturbed area of 63.83 Ha. This RDS also includes the approximately 2,712,181 tonnes of low-grade ore that makes up the low-grade stockpile. The Cariboo Pit Backfill is the second largest of the three, with an area of 7.94 Ha. And the North RDS is only slightly smaller than the Cariboo Pit Backfill, with an area of 7.50 Ha. The tops of the rock disposal sites contain approximately 59% of the total area disturbance for this unit, which equates to 46.90 Ha. The slopes contain the remaining disturbance with 32.37 Ha. It should be noted that the Cariboo Pit Backfill is named the Cariboo/Bell Pits RDS in Table 2.3.1-2 because this existing waste rock disposal site will become the latter upon the commencement of mining in 2005. Therefore, the Cariboo Pit Backfill is the Cariboo/Bell Pits RDS in any tables or figures in this report.

The tailings storage facility (TSF) & associated areas has a total disturbance of 248.22 Ha. The largest portion of the TSF is by far the combined area of the tailings pond & beach, which has a combined disturbance of 174.43 Ha. The second largest area consists of the four till borrows & till waste pile, which has an area of 30.88 Ha. The third largest area of the TSF disturbance is made up of the three embankments that combine to make the tailings impoundment. Together, the main, perimeter & south embankments have an area of disturbance of 21.33 Ha. With nearly as much disturbance as the three embankments is the combined areas of embankment & basin preparation, with an area of 18.50 Ha. The final 3.08 Ha is assigned to the seepage ponds and a tailings laydown, which are also considered part of the TSF.

The mill site has an area of disturbance of 20.21 Ha. It consists of: the crusher, concentrator, conveyors, crush piles, parking, core racks, core shack, weather station, fuel docks, mill site sump, spare parts laydown, two satellite warehouses and various other areas associated with the workings of the mine.

The category of roads has a total area of disturbance of 45.24 Ha. The mine & haul roads have the largest portion of this disturbance, with an area of 19.88 Ha. The second largest road disturbance comes from the tailings road, with an area of 14.29 Ha. The remaining 11.07 Ha is made up of the last 2.5 km of the Bootjack forest service road, the Polley Lake intake road and various other roads surrounding the TSF. It should be noted that some of these roads will remain in place, as part of the reclamation & closure plan. Details of which roads will remain and which ones will be reclaimed can be found in section 3.4.11.

There are three pit areas in the vicinity of the mill site and one near the TSF, which create a disturbance totalling 50.41 Ha. The only exhausted pit is the Cariboo Pit, which has an area of 36.59 Ha. This area consists of the pit lake, 20.55 Ha, and the pit walls, 16.04 Ha. The Cariboo Pit Backfill, previously mentioned, is at the north end of this pit, but the disturbance for this area has been kept separated from the pit area category. The partially excavated Bell Pit has a disturbance of 5.88 Ha and the starter Springer Pit, which only had approximately 90,000 tonnes of ore removed for test purposes, has a disturbance of 1.25 Ha. The rock borrow, located adjacent to the TSF and which is used for construction of the tailings impoundments, has a total disturbance of 6.69 Ha.

The stockpile category includes six soil stockpiles, one ore stockpile and one biosolids stockpile. The total area of all stockpiles is 30.42 Ha. The six soil stockpiles, three located around the pits & mill site and three located around the TSF, has a combined disturbance of 21.69 Ha. The ore stockpile, located adjacent to the crusher building, has an area of 5.51 Ha. And the biosolids stockpile, located upstream of the TSF, has an area of 3.22 Ha.

The linear category only consists of two separate areas of disturbance, which have a combined total of 6.21 Ha. The Waste Dump Diversion Ditch (WDDD), which collects runoff from the East RDS, has an area of 1.93 Ha. The southeast sediment pond (SESP), which receives water from the WDDD and sends it to the tailings line or booster pump house, has an area of 4.28 Ha.

The category that includes all areas that do not fit into the standard categories is called "Other" and it has a combined disturbance of 17.26 Ha. The largest component of this category is the Mine Miscellaneous, which has an area of 15.96 Ha. Mine Miscellaneous is made up primarily of areas surrounding the pits that is not specifically part of the pits, roads, stockpiles or mill site. The remaining 1.30 Ha is assigned to the three explosive sites, which are all located along & adjacent to the tailings line road, part way between the mill site and the TSF.

The final category is for Exploration disturbances. Most previous exploration disturbances have been eliminated as the pits were developed. The only disturbance that remains in this category is for work conducted in the Northeast Zone and it has an area of 6.69 Ha. It is expected that this area will also be eliminated as the Wight Pit in this zone is developed.

2.3.2. Projected Surface Development

Surface development over the next five years, from 2005 thru 2009, will increase the area of disturbance by approximately 200 Ha over the present level of disturbance. However, as will be discussed in other sections of this report, concurrent reclamation will be conducted throughout this period, so that the actual area of disturbance will be much less, both during and at the end of 2009. Surface areas of the anticipated disturbance from 2005 thru 2009 are outlined in Table 2.3.2-1 and are detailed by mine component only for the year 2009 in Table 2.3.1-2 (2 sheets). All anticipated disturbances can be seen in Figures 2.3.2-1 and 2.3.2-2.

The continued development during this time period will involved the excavation, construction or expansion of the following mine components:

- Bell Pit, Springer Pit & Wight Pit
- Wight Pit haul road
- North RDS, Cariboo/Bell Pits RDS, Wight RDS and possible Leach Pad
- Soil stockpiles near the Springer & Wight Pits, as well as the Wight RDS
- Expansion of the TSF till borrow 4, as well as the TSF rock borrow
- Expansion of the TSF Main, Perimeter & South embankments
- Diversion ditches associated with the Wight RDS; and
- Other miscellaneous items such as lay-downs, seepage ponds or ancillary items to support the five-year mining development plans.

The largest addition of disturbance for the next five years for the Rock Disposal Sites category comes from the construction of the combined Cariboo/Bell Pits RDS. Once the Bell Pit has been completed, the combined Cariboo & Bell Pits will serve as the waste rock disposal area for the Springer Pit. This RDS will ultimately encompass a disturbance of 55.99 Ha. The second largest projected area of disturbance for this category will come from the development of the Wight RDS. When complete, the top & slopes of the structure will contain an area of 34.79 Ha.

If the Leach Pad is constructed, it will add a similar area of disturbance as the Wight RDS, with a total area of 32.25 Ha. And the expansion of the North RDS will result in an increase of disturbance from its present 7.50 Ha to a maximum of 31.81 Ha. In total, the additional projected disturbance for the Rock Disposal Sites category will be 139.40 Ha.

The largest single increase in disturbance for the coming five years will occur at the tailings storage facility (TSF). It will increase by 56.25 Ha during this period, as the facility expands to incorporate the 7+ million tonnes of tailings that will be deposited each of the next five years. The largest increase in disturbance at the TSF will be from the expansion of the beach & pond area, which will grow by 43.51 Ha. This accounts for nearly 80% of the increase for the entire TSF category. The main, perimeter & south embankments will also be expanded during this period, with increases of 3.35 Ha, 5.33 Ha & 3.39 Ha, respectively. While one of the till borrows will be covered by the expanding tailings deposition, another borrow will be expanded due to the annual construction of the TSF. As a result, the total area for the till borrows & till waste piles will increase by 7.42 Ha during the next five years. Finally, both the TSF Miscellaneous & Basin OG Preparation will decrease by 4.24 Ha & 2.49 Ha, respectively, as the embankments, tailings beach & pond are expanded.

The Mill Site category will decrease by 1.73 Ha for a total disturbance of 18.48 Ha by the end of 2009. This area will decrease somewhat as the Leach Pad is developed starting in 2006. Should the mill facilities be expanded during this period, we anticipate that there will be enough space within this existing area to accommodate the expansion.

The Roads category of disturbance will decrease slightly during the development of the next five years. We expect the area of disturbance to decrease by 1.56 Ha, from 45.24 Ha to 43.68 Ha. While there will be the construction of the new haul road from the Wight Pit to the mill facility, there will be a decrease of other haul roads connected with the Cariboo & Bell Pits, as they are completed and backfilled with waste from the Springer Pit. Further, the Tailings Reclaim road &

TSF road will also decrease, as the embankments, tailings beach & pond areas are expanded and cover over parts of these roads.

The disturbance associated with the Pits category will increase by 18.56 Ha from 2005 to 2009. Since the combined Cariboo & Bell Pits will become the waste rock storage facility for the Springer Pit material, this disturbance will become part of the RDS category. As a result, these two pits will have zero disturbance at the end of 2009. The Springer Pit will increase in size by 38.44 Ha, for a total disturbance of 39.69 Ha, while the Wight Pit will have a disturbance of 20.36 Ha at the end of this period. Finally, the rock borrow at the TSF will grow only slightly by 2.23 Ha.

The only increase in disturbance associated with the Stockpiles category will be from the addition of several soil stockpiles at the minesite. These stockpiles will be created adjacent to the Springer & Wight Pits, as well as the Wight RDS. The increase in disturbance for the minesite soil stockpiles will be 3.31 Ha.

The Linear category will increase by only 0.68 Ha during this five year mine plan, which will come from the creation of a lower waste dump diversion ditch (lower WDDD). This ditch will collect runoff and drainage from the Wight RDS and convey it to the TSF. Further, the existing WDDD will become somewhat smaller, as the Wight RDS will cover over the upper reaches of this ditch.

The Other category will decrease in disturbance by 8.89 Ha during the coming five years. This decrease is entirely due to the decrease in the mine miscellaneous grouping, which consists of areas surrounding the Springer & Cariboo Pits. Some of these miscellaneous areas will become part of the Springer Pit and will therefore be removed from this miscellaneous category.

The last category for disturbance is Exploration. We expect that any exploration disturbance that presently exists, which is 6.69 Ha, will be encompassed by the development of the Wight Pit. Therefore, there will be no disturbance from Exploration at the end of the five-year plan that is outlined in this report.

2.4. *Access and Transportation*

The Mount Polley Mine is 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 then South from the Bootjack Lake turn-off for another 12 km on the site access road to the property. All mine personnel, supplies and concentrate hauling share the same 12 km forestry access road, which is named Bootjack Lake Forest Service Road (BLFSR). In addition, many people who camp, fish, hunt and trap in the area will stay at the Bootjack Lake forestry campsite, which is located at 8.5 km along this access road. There are several other forest service roads that extend from the BLFSR, and loggers as well as recreational users will utilized the BLFSR to access these other roads throughout the year. Finally, there are several private properties that are accessed via this section of road and the owners of these properties share the BLFSR to access their properties as well.

Mine personnel use secondary highway No. 115 from areas North & South of the BLFSR access. Employees live in many communities along this secondary highway, including: 150 Mile House, Beaver Valley, Big Lake, Morehead Lake, Hydraulic, Little Lake and Likely. Further, there are many mine personnel that live beyond the extent of this secondary highway, which utilize many other connecting highways or logging roads to reach No. 115.

The 12 km BLFSR does not have seasonal road restrictions, so there is no impact to the hauling of concentrate. The mine is responsible for the maintenance of the road year round, including grading, repairing and clearing of snow. When logging companies wish to use this road, they make an agreement with the mine as to payment. Typically, the mine charges per cubic metre of wood that is hauled on the road for any particular cut block, but the actual rate is subject to change and negotiation between the owner of the wood and the mine.

Secondary highway No. 115 typically has road restrictions during break-up, which runs from about March through May of each year. The British Columbia Ministry of Transportation notifies the mine through fax and signage along the highway itself, as to what the load restrictions will be and when they will occur. These restrictions do not usually affect the transportation of the concentrate, as the configuration of the concentrate haul trucks allows for a maximum load of concentrate that does not exceed 100% of axel weight.

The BLFSR is controlled by a radio frequency that is registered by the mine with the Federal Government. The frequency is 153.635 .

2.5. *Mine and Processing Plant Description*

Details of the crushing and processing plant can be found in section 3.4 of the report entitled, *"The Mount Polley Mine Project, Reclamation Plan, April 1996"*. Various flow charts can be viewed as part of section 3.4 as well. The process that will be used for the coming five years remains nearly the same as is discussed in this reference, with several exceptions.

First, the annual tonnage that is processed through the mill is closer to 7,300,000 tonnes, rather than the stated 6,500,000 tonnes. This equates to a daily rate of approximately 20,000 tonnes per day (tpd).

Second, the final concentrate is transported directly to Vancouver Wharves using 40 t B-Train trucks, rather than using 20 t containers that are first transported to Williams Lake, before being sent to Vancouver Wharves via rail car. The concentrate is loaded and weighed at the Mount Polley Minesite, transported via the access road and highway to the Vancouver Wharves and then stored in a shed at the wharves until it is loaded on a ship that is bound for a smelter overseas. Nearly all concentrate that was processed for the operating period of the mine so far was processed at smelters in Japan.

2.6. *Dams and Waste Emplacements*

2.6.1. Tailings

The tailings storage facility (TSF) at Mount Polley is located approximately 4 km South of the minesite. With its present configuration, it has three embankments, namely the Main, Perimeter & South embankments. All three embankments are presently at an elevation of 943.00 metres (end of 2004) and they will be raised to an elevation of 948.00 metres in 2005. Typically, each embankment is raised 3 metres annually, to provide enough capacity for the tailings deposition of the following year. Therefore, it is expected that by the end of the five year plan in 2009, all three embankments at the TSF will have an elevation of approximately 960 metres.

Generally speaking, the embankments are constructed of a till core and a downstream rock fill, with various zones of transition material between the till core and downstream rock fill. Some cyclone sand was used during several of the lifts in the past, but the use of this material has been eliminated in future designs of the embankments. There are two seepage collection ponds, one below the perimeter embankment and one below the main embankment. The seepage pond for the main embankment collects water from the runoff, upstream toe drains and foundation drains. The perimeter embankment pond is not connected to the drain system yet.

To date, till has been sourced from four separate till borrows, all of which are in the vicinity of the TSF. For any future embankment raises, till will come mostly from the expansion of the most recently used till borrow, which is Southeast of the TSF. All rock for the downstream shells has been sourced mostly from the rock borrow near the TSF, while some of the transition zone material was borrowed from the mine area. The rock borrow will be expanded for any future embankment raises as well, but the option to use mine rock from the Wight Pit as downstream fill material may be explored in the future.

The TSF is operated with a maximum water elevation that allows for the Probable Maximum Precipitation (PMP) plus 1 metre of wave run-up. Presently, this requires a minimum freeboard of 1.39 metres. There is no spillway for the TSF at this time, but a spillway will likely be part of the final closure design when mining permanently ceases at the Mount Polley facility. Under the existing operating plan for the TSF, if the water elevation reaches the minimum freeboard requirement, the reclaim pumping system can be started to draw down the water elevation and pump the water to the Cariboo Pit.

Knight Piésold Ltd. is a geotechnical consulting firm who has been involved in the design and construction of the TSF at Mount Polley since 1989. They have provided the following services to Mount Polley since that time (*Report on Stage 3 Construction, Ref. No. 11162/14-3)*:

- Detailed design of all stages of the TSF and Ancillary Works completed to date.
- Preparation of contract documents and technical specifications for all stages of the TSF construction to date.
- Construction supervision and quality assurance/quality control (QA/QC) for all stages of the TSF completed to date.
- Site investigations and evaluations for engineering design and construction materials suitability.
- Consulting services on all aspects of the operation and monitoring of the TSF.

All details of the latest designs for the TSF can be found in the report entitled, *"Mount Polley Mining Corporation, Mount Polley Mine, Tailings Storage Facility, Report on Stage 3c Construction, Ref. No. 101-1/5"*. Further, the latest Operation, Maintenance & Surveillance Manual for the TSF can be found in the report entitled, *"Mount Polley Mining Corporation, Mount Polley Mine, Tailings Storage Facility, Operation, Maintenance & Surveillance Manual , Ref. No.VA101-00001/9-1.*

2.6.2. Waste Rock

At present, there are three rock disposal sites (RDS) at the Mount Polley Mine, namely the East RDS, the North RDS & the Cariboo Pit Backfill. Plans for the coming five years of operations include the construction of the Wight RDS & the continued use of the North RDS and the Cariboo Pit Backfill. In fact, as the Bell Pit is excavated further to completion, the Cariboo & Bell Pits will be combined into one large pit. As a result, the Cariboo Pit Backfill will be converted into the Cariboo/Bell Pits RDS, since both exhausted pits will be used as the rock disposal site for waste rock coming from the Springer Pit.

2.6.2.1. Existing Rock Disposal Sites

The East RDS is the first of the three existing rock disposal sites at the Mount Polley Mine. It consists of three separate platforms, which have nominal elevations of 1170 metres, 1150 metres & 1115 metres. The low-grade stockpile is part of the 1150 metre platform of the East RDS. It is situated as the western-most lobe of the 1150 metre platform, which is immediately adjacent to the crusher & concentrator building complex. The East RDS contains a total of 24,993,553 tonnes of non-acid generating waste. The low-grade stockpile contains 2,712,181 tonnes of non-acid generating low-grade ore. Waste and low-grade ore originated primarily from the Cariboo Pit, with a much smaller volume originating from the Bell Pit.

The slope between the 1170 platform and the 1150 platform has been re-sloped and is presently being used as part of the reclamation research program. The slope between the 1150 platform and the 1115 platform has been re-sloped but has yet to be reclaimed any further. No other slopes of the East RDS have been re-sloped to date. The total area of the tops & slopes of the East RDS is 63.83 Ha. This includes the area of the low-grade stockpile as well.

The North RDS is the second RDS located at Mount Polley. It is situated to the West of the Bell Pit and consists of four separate platforms, which have nominal elevations of 1195 metres, 1190 metres, 1180 metres &

1170 metres. The North RDS contains 11,617 tonnes of acid generating (AG) waste, 35,385 tonnes of potentially acid generating (PAG) waste and 871,686 tonnes of non-acid generating (NAG) waste. All AG & PAG waste was mixed with NAG waste so that any acid generation will be sufficiently buffered throughout this rock disposal site. In total, the North RDS contains 918,688 tonnes of waste, all of which came from the Bell Pit. The total area of the tops & slopes of the North RDS is 7.5 Ha.

The Cariboo Pit Backfill is the third and final of the existing rock disposal sites at Mount Polley. It consists of waste from the Bell Pit, Springer Pit & Cariboo Pit. The majority of the waste was dumped over the Northern & Eastern walls of the pit from the Bell Pit. A smaller amount of waste was dumped over the Western wall from the Springer Pit. And during the final stages of mining from the Cariboo Pit, a small amount of waste from the Cariboo Pit was placed in the bottom of the pit at the North end. In total, 2,081,402 tonnes of waste was placed in the Cariboo Pit Backfill. This total consists of 69,214 tonnes of AG waste, 173,004 tonnes of PAG waste and 1,839,184 tonnes of NAG waste. As is the case for the North RDS, the waste was mixed to provide a sufficient ratio of NAG to PAG/AG waste, so that any acid generation that may occur will be buffered in the long-term. And of the total volume of waste in this RDS, approximately 500,000 tonnes is below the 1100 metre water elevation that is presently in the pit. The total area of the existing Cariboo Pit Backfill is 7.94 Ha.

2.6.2.2. Future Rock Disposal Sites

The next five years at Mount Polley, thru the end of 2009, will see the construction of one new rock disposal site, the Wight RDS, as well as the continued use of two existing sites, the North RDS & the Cariboo Pit Backfill (to be renamed the Cariboo/Bell Pits RDS). The East RDS will not be expanded over the next five years of mining. The low-grade stockpile may be utilized for mill feed during this time period, thereby decreasing the nearly 2.8

million tonnes of low-grade ore that is situated on the Western lobe of the 1150 platform of the East RDS.

The Wight RDS will receive non-acid generating waste from the Wight Pit for a period of three years, more or less. It will hold an expected 19,780,000 tonnes of waste rock. This new RDS will be situated below the East RDS, between the East RDS & Polley Lake. It will consist of 20 metre lifts, so that re-sloping costs will be minimized upon reclamation of this RDS. Any AG or PAG waste from the Wight Pit will be transported to the Cariboo Pit and placed below the flood elevation at this location. The total of the tops & slopes of the Wight RDS is expected to be 34.79 Ha.

The Cariboo Pit Backfill will be expanded to become the largest RDS at Mount Polley during the coming five years. As the Bell Pit is mined, it will be combined with the existing Cariboo Pit, so that a single Cariboo/Bell Pits RDS will result. Some of the existing waste at the Western, Northern & Eastern walls of the Cariboo Pit Backfill will likely need to be relocated to a different location within the Cariboo Pit Backfill in order to facilitate the completion of the Bell Pit. Waste from the Bell Pit and Springer Pit, as well as any AG or PAG waste from the Wight Pit, will be dumped into the expanded Cariboo/Bell Pits RDS. The expected volume of waste to be placed in the Cariboo/Bell Pits RDS is 51.25 million tonnes, with 29.32 million tonnes in the Cariboo side of the RDS and the remaining 21.93 million tonnes in the Bell side. Additional waste rock could be placed in lifts on top of this design, if required. The total area of the tops & slopes of the expanded Cariboo/Bell Pits RDS is expected to be 55.99 Ha.

2.6.3. Soil Storage

For all disturbed areas at Mount Polley, there has been soil salvaged and stockpiled for use upon reclamation of those areas. In total, there is 1,014,216 m^3 of soil & till stockpiled for use in reclamation. The two main areas where soil is stockpiled is at the TSF and the minesite. There are also various windrows of soil along roads and next to other disturbances, but the bulk of the material is at these two main locations. Soil is stored either in large stockpiles or in windrows. See Table 2.6.3-1 for the breakdown of soil stored at Mount Polley.

The TSF has material stored in three soil stockpiles, six soil windrows and one till stockpile. The three soil stockpiles have a combined volume of 183,228 m^3 of soil, the six windrows of soil have a combined volume of 57,300 m^3 of soil and the one till stockpile has a volume of 65,340 m^3 of till. As the TSF expands, recoverable soil will be collected and added to existing stockpiles or placed into new stockpiles or windrows. This soil and till will be used to reclaim all disturbed areas at the TSF.

The minesite has material stored in three soil stockpiles and one till stockpile. The three soil stockpiles have a combined volume of 495,648 m^3 and the one till stockpile has a volume of 92,000 m^3 of till. For the development of the Wight Pit & Wight RDS, there will be two additional soil stockpiles created, as well as two soil windrows for the development of the Wight haul road. At this point, it is not known what volume of soil will be stored in each of these stockpiles and windrows. However, all recoverable soil, identified in accordance with the soil stockpile salvage protocol (SSSP) for Mount Polley, will be collected and placed in these locations. One or two additional soil stockpiles will also be created near to the Springer Pit as it is cleared for development. All soil located at the minesite will be used to reclaim all rock disposal sites, pits, haul roads, the mill site and other disturbances within the vicinity of the minesite.

The four miscellaneous areas that have soil stored adjacent to them are the Tailings Reclaim Road (TRR), the Bootjack Forest Service Road (BJFSR), the Southeast Sediment Pond (SESP) & the Waste Dump Diversion Ditch (WDDD). The TRR has a soil windrow with a volume of 37,400 m^3, the BJFSR has a soil windrow with a volume of 27,500 m^3, the SESP has a soil stockpile with a volume of 25,000 m^3 and the WDDD has a soil windrow with a volume of 6,600 m^3. Some of these areas may remain permanently disturbed for area access for other land uses after mining ceases. For those areas that remain disturbed, the soil associated with their disturbance could be used to reclaim other areas of the mine.

It is expected that other disturbances will occur over the next five years of development that are not specifically mentioned here, such as the development of the lower WDDD. When those disturbances are created, soil will be salvaged and stockpiled in accordance with the SSSP for Mount Polley, as mentioned earlier. However, the majority of the expected disturbance until 2009 has been detailed in these paragraphs, so any other disturbance not mentioned will be minor in comparison.

2.7. *Additional Minesite Infrastructure*

All additional minesite infrastructure is located on, or is part of, the mill site, which is a 20.21 Ha plot of land located South of the Cariboo Pit and West of the East RDS. The mill building consists of the grinding/floatation plant, the administrative/operational offices, the maintenance shops, the main warehouse, the assay & sample preparation labs and the men’s & women’s showers/locker rooms. The crusher building is located between the Cariboo Pit and the mill building. Between the crusher & mill buildings are a network of ore stockpiles that contain various sizes of crushed ore, as well as many conveyors, which move the crushed ore from the crusher building to the stockpiles and finally to the mill building. Some additional operational offices for the Pit are located in a separate portable trailer from the main mill building.

The electrical power supply is a 69 KV powerline that ends in a sub-station, which is located immediately adjacent to the South end of the mill building. Several satellite warehouses are located throughout the mill site and are used to store parts in a non-heated environment. Also under control of the warehouse are two fuel docks, an oil & lube storage compound and several spare parts lay-downs, located at various points throughout the mill site area.

A landfill exists at the edge of the mill site, which is used for non-recyclable and non-putrescible waste. In addition, there are other areas within the mine site proper, which are used to hold recyclable materials and putrescible wastes, until they can be removed from site. One large area of the mill site is set aside for the storage of core from diamond drilling on the property. Further, a separate building has been constructed which is used for year-round core cutting and logging. This same building also houses the first-aid and mine rescue facilities for the mine. Adjacent to the mill building and the core logging building is the concentrator shed, with load out facilities.

Public & employee parking is immediately outside the gate at the end of the access road. All parking facilities also have electrical plug-ins, for cold weather use. Additional small vehicle parking is located adjacent to the mill building at the South end, for senior management and operations. The weather station and helicopter pad are located across from the fine ore stockpile. Finally, a microwave telephone system is mounted on the roof of the mill building, with a relay tower near to the planned Springer Pit.

The following sub-sections will provide greater details of the various infrastructure components listed previously.

2.7.1. Administrative/Operational Offices

The majority of the administrative/operational offices are located on two levels of the mill building, both down the centre of the building for it’s entire length, as well as at the South end of the building. All offices have electric heating, electrical outlets, access to the internet, access to the internal network and are part of the common air conditioning system. For offices at the South end of the mill building, there is also natural lighting and individual toilets on each level. The operational offices for the open pits are located separately from the mill building, to the East. They consist of a heated portable building, as well as water facilities.

2.7.2. Maintenance Shops, Warehouse and Analytical Services

The maintenance shops for the site are located primarily at the North end of the mill building. Four main bays exist to repair all heavy equipment for the mining operations (known as the truck shop). Adjacent to the truck shop is an area used for fabricating in the mill. There are also two separate areas that house maintenance work, one next to the crusher building and one as part of a cold storage building near to the pit operations office.

The tool crib is also adjacent to the main truck shop at the North end of the mill building. The main warehouse is located to the East of the mill building. Two spare parts lay-downs exist outside, one next to the crusher building and one East of the cold storage satellite warehouses. Most spare parts are stored in rows on top of used truck tires.

The analytical services are located on the first and third levels of the mill building. The sample preparation area (bucking room) is located on the first level at the South end of the mill building. From there, the samples are transported to the third level where the main assay lab is located. Part way down the centre of the mill building is the location of the assay lab, which includes furnaces, atomic absorption spectrophotometers, a balance & instrument room and a wet lab. A Leco furnace will be purchased in 2005 to carry out waste characterisation of selected mined material. There is a fume collection system that exhausts the assay lab hoods independently of the remainder of the mill building.

2.7.3. Power Supply and Distribution

The electrical power for the mine is supplied by an overhead, 69 KV, three phase transmission line (Circuit 60L30), from McLeese Lake, North of Williams Lake. This line originates at the Soda Creek sub-station, which presently supplies the Gibraltar Mine. The power line is 54 km long in total length. From McLeese Lake to Beaver Lake (approximately 34 km), the line runs within a 30 metre road easement. At Beaver Lake, the line intersects secondary highway No.115. At approximately Km 38, the line crosses secondary highway No.115 and follows the Gavin Lake Forest Service Road. At Gavin Lake, the line route leaves the Forest Service Road and follows a more direct route to the mine site.

At the mine site, the transmission line ends at a sub-station, located at the South end and immediately adjacent to the mill building. From this point, all electrical requirements of the mine are derived. Other than the electrical needs for the crusher and mill buildings, there are transmission lines that run to the Bell and Wight Pits, the Booster Pump House, the TSF barge pumps, the perimeter embankment seepage collection pond pumps and the main embankment seepage collection pond pumps.

2.7.4. Fuel Storage and Handling

All haul trucks and heavy mining equipment (with the exception of the electric shovels and drills) at the site operate with diesel fuel. Two large fuel tanks are located near the entrance to the Cariboo Pit, which were constructed on a containment platform to collect any fuel that may spill from the disposal or transfer of the fuel. To keep all small trucks and equipment separated from the large equipment, a separate fuel dock, which is located near the warehouse (NE corner of mill), holds two smaller fuel tanks, for gasoline as well as diesel fuel. Further, this 2nd fuel dock has a large propane fuel tank, which supplies propane for heaters in the truck shop, as well as for small tanks on warehouse equipment and other portable propane fuel needs.

There are also several other large & small propane tanks located at the crusher and near to the conveyer tunnels, to supply fuel for heaters during the winter months.

2.7.5. Refuse Disposal and Recycling

All scrap and waste material generated at Mount Polley is sorted into three main categories: putrescible waste, non-putrescible waste and recyclable materials.

Putrescible waste is considered as any perishable waste, such as from lunchrooms, which may attract bears or other animals. This waste is collected in metal waste containers with lids, which are located throughout the property. On a regular schedule each month, the waste is picked up by a local contractor and removed to a designated landfill in the town of Likely.

Non-putrescible waste is considered as all other scrap materials that cannot be recycled. This waste is collected in metal bins that are different than those used for the collection of the putrescible waste. These bins are located throughout the mine site, where waste is commonly created, such as near the maintenance shops. Routinely, these bins are emptied at the edge of the mine site area and buried with waste rock from the pits.

Recyclable materials are those such as scrap metal, broken mill rods, small truck tires, used drill bits and office paper. Other materials that are re-used both on-site and off-site are conveyor belts and large truck tires. Office paper is collected in containers on each floor of the administrative/operational offices and recycled in Williams Lake on a regular schedule. All other recycled materials are set aside in a spare parts lay-down and removed from site by a designated recycling dealer when the volume of material is sufficient.

2.7.6. Chemical, Oil & Grease Disposal and Recycling

All chemicals used in the milling process at Mount Polley are fully utilized, thereby not generating any waste. If some chemicals spill onto the basement floor, they are washed back into the process through the sump return system.

All used oil from the maintenance shops are collected and deposited in a tank, similar to the tanks used to store diesel and gasoline. All used grease from the mills and other areas of the mine are collected in empty environmental drums and stored in the oil & grease compound. When the used oil tank is full and there are enough drums with used grease, a contractor is hired to remove the materials from the mill site.

2.7.7. Sewage Disposal

All sewage at Mount Polley is fed to the Tailings impoundment via the tailings pipeline. Grey water is also sent to the tailings pond with the sewage.

2.7.8. Fire Suppression System

There is a separate diesel operated pump system that is located in a small building near the South end of the mill building, adjacent to the electrical sub-station. This system is tied into the reclaim water tank for water supply. Also, there are fire hoses and connections throughout the mill and crusher buildings, both inside and outside, which are tied into the fire water system. Hand-held fire extinguishers are located at strategic points throughout the mill & crusher buildings, and larger wheel-mounted fire extinguishers are located at points that could potentially require greater fire suppression than may be available from the hand-held units.

2.7.9. Microwave Telephone System

The telephone system is set up with a microwave relay that connects the mine site to the land-line system. An antenna mounted on the roof of the mill building sends and receives a signal from a relay tower, which is South of the planned Springer Pit, on a high point of land. This relay tower passes the telephone signals to and from a tower which is located immediately adjacent to secondary highway No.115, about 1 km North of the entrance to the Bootjack Forest Service Road. This tower is connected into the land-line telephone system.

2.8. *Mine Water Use & Water Management Plan*

2.8.1. General Water Usage

The Mount Polley Mine uses water for many aspects of the mining cycle. Potable water is needed for washrooms, showers and the assay lab. For the remainder of all water needs, the reclaim water is sufficient. Reclaim water is used in the milling circuit, for washing the basement floor, general house cleaning, dust suppression in the summer and for fire suppression, if the need should arise.

Potable water is drawn from several groundwater wells located to the South & East of the mill site. They are automated, so that when the potable water tank is full, they shut off, and when the water level in the tank falls to a prescribed level, they turn on. The two wells have small buildings around the well heads, which houses the electrical panels for the pumps. The water lines are insulated and heat traced as they come out of the buildings until they go into the ground. The water lines connect underground and run in a common pipe that enters the East side of the mill building. Potable water requirements vary from time to time, but typically run approximately 250,000 m^3/year or 0.5 m^3/min.

Reclaim water is continuously recycled between the mill building and the TSF. The reclaim water is used in the grinding/floatation circuit, as well as to transport the tailings down the tailings pipe line to the TSF. When the waterbalance projects a deficit of water for the following winter period, the shortfall in water is usually made up by pumping water from Polley Lake to the TSF in the spring freshet period. Since the shutdown in October 2001, a significant volume of water has been stored in the Cariboo Pit. Therefore, for the coming five years of operations, if there are annual water shortages, make-up water can be drawn from the Cariboo Pit rather than from Polley Lake.

Reclaim water is also used as dust suppression for the network of haul roads around the mine site. This is usually only needed during the very dry months of the summer. A water truck fills up at the reclaim water tank, which is located adjacent to the Southeast corner of the mill building. All housekeeping work, such as washing the basement floor, cleaning the maintenance shops and washing the various pieces of heavy equipment at the site, also utilize the reclaim water from the TSF.

2.8.2. Water Management Plan

The water management plan for the Mount Polley Mine has been updated by Knight Piésold Consulting Ltd, to include the new areas of mining, such as the Springer Pit and the Wight Pit, as well as the Wight RDS. The preliminary water management plan, in it’s entirety, can be found in Appendix A, attached to the end of this report. An excerpt from this report is included below, as a summary of the water management plan for the Mount Polley Mine starting in 2005.

Excerpt from Water Management Plan – Appendix A

For average precipitation conditions, a surplus of water will be produced on the site. Water reporting to the Tailings Storage Facility (TSF) includes precipitation and runoff from the TSF catchment, runoff from mine disturbed areas including Rock Disposal Sites (RDS), and groundwater from some of the open pits.

During Years 1 to 3, the Wight and Bell Pits are being developed. All runoff and groundwater from these pits will be directed to the TSF. In addition, water from the Cariboo Pit (500,000 m^3/year for 3 years) will be pumped to the TSF for storage to facilitate mining of the Bell Pit and to make room for the placement of waste rock from the Bell and Springer Pits into the Cariboo/Bell Pits RDS. "Clean" waste from the Bell Pit will be placed in the North RDS. During Year 2, development of the Springer Pit will commence, adding that pits runoff and groundwater to the tailings facility. At Year 3, the maximum water surplus will occur (approximately 1.5 million m^3 for the base case) as the Wight and Bell Pits are completed and the Wight Rock Disposal Site (RDS) is fully developed. It is assumed that the maximum runoff from the Wight RDS will also occur in Year 3, once runoff from the entire area is captured and directed to the TSF.

After Year 3, the Wight Pit will be allowed to fill with water. Runoff and groundwater from this pit will therefore no longer be directed to the TSF, but will be allowed to accumulate in place. Runoff from the Wight RDS will be directed to the Wight Pit in Year 4 to accelerate pit filling. Also during Year 4, the Wight RDS will be reclaimed and the runoff from this area will be released to the environment in subsequent years.

Development of the Springer Pit and North RDS will continue to Year 7. "Clean" waste rock from the Springer Pit will be placed in the North RDS. Runoff from this area is not captured. Other waste from the Springer Pit will be backfilled into the Cariboo/Bell Pits RDS. Water will continue to be pumped from the Cariboo Pit to the TSF until Year 3 to increase the pit's storage capacity for waste rock. Between 1.5 and 2 million m^3 of water will be allowed to remain in the Cariboo Pit to fill the voids in the rock pile. Runoff and groundwater from the Bell Pit will be allowed to accumulate in the Bell Pit to fill the voids in the waste rock as well. It is expected that an equilibrium will be established over time. Runoff and groundwater from the Bell Pit will no longer contribute to the TSF volume after Year 3. Runoff and groundwater from the Springer Pit will report to the TSF for the life of the mine.

When development ceases in Year 7, the TSF will be drained by pumping the water to the Springer Pit to accelerate pit filling.

Another iteration of the water balance was conducted assuming that the seepage, groundwater, and surface runoff that collects in the seepage ponds were discharged. Approximately 400,000 m^3 of water was assumed discharged per year. A discharge of 2,000 m^3/day (or approximately 700,000 m^3) is allowed in Mount Polley's present permit for the care and maintenance period. During the coming operational period starting in 2005, the main embankment seepage collection pond will be allowed to discharge to the Edney Creek Tributary NE, while the perimeter embankment seepage collection pond will not be allowed to discharge to the environment. Water quality monitoring of the seepage pond by Mount Polley staff reports consistent water quality from during operations to the present; at levels well below those in the existing permit. If discharge through the seepage pond were to continue throughout operations, the volume of stored water in the TSF would be reduced, increasing the tailings beach and increasing the stability of the facility. The discharge of good quality water would also help maintain the water levels in downstream waterways.

2.9. *Watercourse and Water Quality Protection*

Mount Polley uses a comprehensive series of collection ditches, drains, spillways, sediment control and collection ponds to protect existing watercourses. The majority of water that interacts with the minesite disturbance is collected and becomes part of the recycled water used for the mining and milling process. However, there are two areas at the mine site that do have a discharge of water that does not impact negatively on the receiving environment. Further, some smaller areas that have not been disturbed by the mining process are diverted to the environment around various mining features. A breakdown of the various collection, discharge and diversion features for the mine site are provided below.

The mill complex is surrounded by collection ditches that funnel all surface water to the mill site sump (MSS). This water is then pumped to the tailings line to become part of the mill process water. The waste dump diversion ditch (WDDD) collects water from the East RDS, Wight Pit & East RDS extension and sends this water to the TSF via the southeast sediment pond (SESP). The Cariboo & Bell Pit water will be used for the mining process directly from the pits. When the Springer Pit is commissioned, water from this pit will also be sent to the mill for use in the process.

During shut-down periods, the main embankment seepage collection pond (MESCP) and the perimeter embankment seepage collection pond (PESCP) are discharged to the receiving environment, when water quality meets discharge criteria. The main embankment seepage ponds receive water from the TSF through foundation drains, as well as runoff from the downstream faces and areas of the tailings impoundments. During operations, however, these seepage ponds return collected water to the TSF via pumps and pipelines, using an automated system. Runoff from the North RDS is not collected and returned to the mining system. Any water that interacts with the waste rock in this disposal site simply percolates into the surrounding environment, and the drainage eventually reaches North Dump Creek, which empties into Polley Lake.

The receiving creeks for the two seepage ponds at the TSF, as well as the runoff from the North RDS are monitored on a monthly schedule, with more frequent monitoring during spring freshet and fall turnover. Further, the water from the two seepage ponds at the TSF is monitored monthly as well.

For areas of diversion, the area immediately above the haul road for the Wight Pit is diverted using a ditch upstream of this haul road. Where the road crosses a creek or drainage feature, the diverted water from the ditch crosses through the road and eventually reaches Polley Lake. The second major water diversion at the site is at the TSF. The area upstream of the TSF, known as Area 4, is diverted past the South embankment using a diversion ditch that was constructed in 2001. This water makes its way to Edney Creek Tributary Southwest, which eventually feeds into Quesnel Lake.

The environmental monitoring program is provided in greater detail in section 3.2 of this report. It provides a ringed approach to protection of the environment, which includes the most frequent monitoring of creeks and discharges that are closest to the mine disturbance, followed by slightly less frequent sampling of creeks that are farthest away from the mine disturbance. Further, groundwater sampling is conducted several times per year at all stations. Finally, biological sampling of the lakes & creeks in the Mount Polley area is conducted every three years, to pick up very subtle & small impacts that may occur to the downstream environment over a longer period of time.

3. ENVIRONMENTAL PROTECTION & RECLAMATION PROGRAM

3.1. *Soil Handling Plan*

Soil salvage is a critical component of reclamation planning, as it will provide the soil material necessary to reclaim the mine site for other land uses. Proper salvage and stockpiling of surficial materials will be sufficient to facilitate future reclamation requirements.

Site-specific soil surveys have been undertaken to determine the depth of the soil layers that can be salvaged at each location. All available soils will be salvaged. This will include surface humus layers, and lower B-horizons down to the level of the effective rooting depth. The B-horizons to be salvaged include the Bm, Bf and Bt layers. The Bm (brown) and Bf (reddish brown) horizons are recognizable by colour. The Bt is most easily recognized by the presence of clay skins (shiny surfaces on the soil peds). In the absence of diagnostic colour for the Bt horizon (i.e. colour is similar to the C), depth will govern the salvage. All soil will be salvaged to the bottom of the effective rooting zone. If roots are still visible after an initial scraping, then another pass will be required to salvage all available soil materials.

Salvage in soils shallow-to-bedrock will require care when stripping. Rock rubble from the fractured bedrock surface may become incorporated into the stockpile, reducing topsoil quality. Machine blades will be raised to avoid the rubble while still removing the soil. Very thin soils (<10 cm) will not be stripped at all, since too much rock rubble would be lifted. The C-horizon material underlying the topsoil horizons can be used for supplemental reclamation and contouring. This will be stripped and piled adjacent to the topsoil stockpile, if required. Organic soils from wetlands are recognized by their black colour and mucky texture. Organic soils, which occur in depths up to 2 m, will be salvaged and stockpiled separately from the topsoil or it will be blended with the top soil. Otherwise, the material will be pushed up by dozers and loaded into trucks for transport to the stockpile sites.

Figure 3.1-1 shows the soil test pits and modelled volumes of soil for most of the major areas at the mine site that have been stripped of soil since the start of mining in 1997. When new areas are developed, new test pits are excavated to determine the depth and quality of the soil to be recovered. As these new areas are stripped, this new information is added to this drawing. Once the major soil stockpiles were created at the mine site and TSF, surveyed volumes of the stockpiled soil were taken and recorded. A plan area, as well as cross-sections, of two of the major soil stockpiles at the mill site and one of the major soil stockpile at the TSF are shown in Figures 3.1-2 thru 3.1-4. Further, the surveyed volumes of soil from these three stockpiles, as well as all other soil that has been stored at various locations around the project area, has been tabulated and can be seen in Table 2.6.3-1.

3.2. *Environmental Monitoring and Surveillance*

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 (2001)".

Water sampling and analysis is conducted throughout the year at surface and groundwater locations specified and at times specified in Permit PE 11678 (Table 1 and Table 2). The locations of all surface and groundwater monitoring sites are shown in Figure 3.2. 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. Additional water sampling sites will be established with the development of the Wight Pit, which is scheduled to be in early 2005. The Handar 555 weather station measures continuous wind speed and direction, daily precipitation, 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, while the second was conducted in 2002. Any future biological monitoring programs will need to be harmonized with the new Environmental Effects Monitoring (EEM), which is part of the updated Federal Metal Mining Effluent Regulation (MMER).

3.3. *Erosion Control & Sediment Retention Plan*

Comprehensive measures have been implemented to prevent the erosion of soil stockpiles, especially during heavy summer rainstorms or spring snowmelt. Topsoil stockpiles have been located at least 10 m away from excavated cuts, steep slopes or active streams. They have not been located near the headwalls of steep, sullied or unstable terrain. Wherever run-off from the stockpiles may become concentrated, hay bales are placed upslope of the silt fences, to slow the force of the run-off. Settling ponds, lined with filter fabric, will be established upstream of ephemeral creeks, gullies and draws. Clean water will drain from the settling ponds through small culverts. Ditches and berms will be built to direct excess run-off into forested or flat areas, for infiltration into the soil. The surface of the soil stockpiles has been seeded with the domestic grass-legume mix to provide further erosion control. These erosion-prevention measures will remain in place until the topsoil is replaced during reclamation.

De-watering of the Cariboo Pit will be on-going as needed, so as to ensure a low enough level for access to the Bell & Springer Pits, as well as to allow enough space for the waste rock that may be received from each of the three remaining pits. Water pumped from the Cariboo Pit will be piped to the mill to supplement process water requirements. De-watering of the Bell Pit will likely be minimal, as the groundwater profile has been drawn down previously during the mining of the Cariboo Pit. However, any de-watering of the Bell Pit will be sent to the Cariboo Pit and removed from there to the mill process circuit, as necessary. The proposed Wight Pit will be de-watered using a combination of in-pit pumps, as well as submersible groundwater pumps installed up-slope of the pit. This water will be pumped to the

WDDD Extension (Waste Dump Diversion Ditch Extension), below the proposed Wight RDS, which will then feed to the existing WDDD. As has been the case since mine start-up in 1997, the WDDD ends at the SESP (Southeast Sediment Pond), which then empties into the tailings line / reclaim water line at the T2 Drop Box / Booster Pump House system. The proposed Springer Pit will likely be de-watered to the Cariboo Pit system as well, but this plan will be devised in more detail as the start date to develop this pit moves closer.

Drainage from the East RDS is captured by the WDDD, which feeds to the SESP and then either to the TSF through the T2 Drop box or to the mill through the Booster Pump House. Drainage from the proposed Wight RDS will be picked-up by the WDDD Extension, which empties into the existing WDDD. The proposed Leach Pad will drain into the WDDD, as it is situated next to the existing East RDS and upstream of the WDDD. However, should the proposed Leach Pad be used as an actual leaching system, rather than simply as an extension of the East RDS, then a separate drainage system will be installed and described in a sub-sequent report. The drainage from the North RDS will continue to be discharged to the North Dump Creek system, ultimately draining into Polley Lake. Close monitoring of the water quality in this creek will ensure that the protection of the receiving environment is maintained as the North RDS is developed further. Should the water quality come close to acceptable limits, a revised system of drainage control for the North RDS will be devised.

The mill site is surrounded by a berm, constructed in 1995, and all drainage from the mill site area will be contained in the MSS (Mill Site Sump), which is located at the entrance to the mine, adjacent to Bootjack Forest Service Road. An automated pumping system sends water from the MSS to the tailings line and on down to the TSF.

The ditches on the TSF side of the GLFSR (Gavin Lake Forest Service Road), starting at the western end of the Main Embankment and continuing until the eastern end, drain into the MESCP (Main Embankment Seepage Collection Pond). During operation, water from this pond is continually pumped back into the TSF. All ditches downstream of the Perimeter Embankment feed into the PESCP (Perimeter Embankment Seepage Collection Pond), which is also pumped back into the TSF during operations. Should any tailings spills occur along the Perimeter or Main Embankments during tailings discharge, the drainage will be automatically collected by this ditching system and returned to the TSF. The ditches on the TSF side of the GLFSR, from the western end of the Main Embankment to the Northern end of the South Embankment drain to the environment at this time. However, since no tailings are presently discharged along this side of the TSF, and the South Embankment is only several metres tall, there is no need to turn these ditches into the TSF at this time. However, as the South Embankment starts to rise in the coming years, a new Seepage Control Pond will be installed below the South Embankment. It will be called the South Embankment Seepage Collection Pond (SESCP). The ditches on the TSF side of the GLFSR adjacent to the South Embankment will then be turned into the TSF system by draining into the SESCP and the water from this pond will then be pumped into the TSF.

The till borrows below the GLFSR presently drain into the MESCP. However, the active till borrow first drains into an in-active till borrow, which acts as a sediment pond. If the sediments from the drainage of the active till borrow settle out enough in this pond, then the option to divert this water to the environment is available. If diverted, it would be sent to Edney Creek Tributary NE, along the downstream ditch of the GLFSR to the headwaters of the tributary. Drainage from the Rock Borrow at the TSF, along with drainage from the Biosolids Storage Facility (BSF), both feed into the TSF, as they are located immediately upstream of the TSF.

As part of a Fisheries Compensation Agreement with the Federal Department of Fisheries and Oceans, as well as the Provincial Ministry of Water, Land and Air Protection, a diversion ditch was constructed upstream of the TSF, to divert clean water into the Edney Creek system, rather than continuing to allow this water to enter the TSF system. This ditch collects water from the southern edge of the rock borrow, immediately above the BSF, and carries the water to just past the South Embankment. The end of this ditch is rip-rapped with broken rock sourced from the tailings rock borrow, so as to minimize any siltation that may result due to the diversion structure prior to the water reaching the receiving environment.

The tailings discharge pipework and reclaim water system have been designed to ensure that any spills will be diverted into the tailings impoundment, and not into existing watercourses. Surface runoff control ditches have been designed to handle peak flows from the 1-in-10-year storm. Sediment ponds have been built downstream of the rock disposal sites, mill and TSF, to protect watercourses, both during construction and operations.

3.4. *Conceptual Final Reclamation Plan*

The primary objective of the reclamation plan is to return all areas that have been disturbed by mining operations (except open pit walls) to their pre-mining level of productivity and to ensure the safety of the public, livestock and wildlife. For the Mount Polley Project, the primary end land uses of the reclamation plan are wildlife habitat and commercial forestry. Reclaimed areas should be capable of supporting secondary uses of the wildlife resources, such as hunting, guide-outfitting, trapping and outdoor recreation. Perpetuating and, if possible, enhancing biodiversity will be an important wildlife consideration in formulating the reclamation plan.

To obtain these objectives, the reclamation activities will be directed to the:

- Long-term preservation of receiving water quality within and downstream of decommissioned operations;
- Long-term stability of engineered structures, including the rock disposal sites, haulage roads, open pits and the tailings storage facility, as well as all exposed erodible materials;
- Removal and proper decommissioning of all secondary access roads, structures and equipment that are not required after the mine closes;
- Natural integration of disturbed lands into the surrounding landscape and, to the greatest possible extent, restoration of the natural appearance of the area after mining ceases; and

- Establishment of a self-sustaining vegetative cover, consistent with the end land uses of wildlife habitat, commercial forestry, grazing and outdoor recreation.

To achieve these goals, the reclamation plan must be flexible enough to allow for changes in the mine plan, and to incorporate new information from the ongoing reclamation research program.

3.4.1. End Land Use Objectives

The primary end land use objectives for the Mount Polley Project are wildlife habitat and commercial forestry. However, there are also several secondary end land use objectives, which include cattle grazing, hunting, guide-outfitting, trapping and outdoor recreation. The disturbances associated with the mining operation can be broken up into several main categories: the Mill Site, Rock Disposal Sites, Tailings Storage Facility and Pit areas. These main disturbance categories can be found in sections 3.4.5 thru 3.4.8, where the specific end land use objectives are identified for each of these disturbance categories.

3.4.2. Productivity or Capability Objectives

3.4.2.1. Commercial Forestry

The reclamation research report entitled, "Mount Polley Mining Corporation, Reclamation Research Report, 2001" is the reference for the productivity objectives and the end land use objective of commercial forestry. This report can be found in Appendix C. The growth target for the reclamation research program at Mount Polley is to obtain 130 cm of vertical growth at 6 years of age.

Presently, this target has been achieved on plots that have soil thicknesses of 40 cm, 65 cm and 15 cm that have been mixed with biosolids at a rate of 75 dry tonnes/ha. Continued monitoring of the reclamation research plots for the next 5 to 7 years will provide an accurate estimate of the forest site productivity. This information will assist in developing the precise reclamation prescription to be used in order to meet the above stated growth target.

3.4.2.2. Wildlife Habitat

It is expected that, through reclaiming each of the disturbed areas for the end land use objective of commercial forestry, that the productivity objectives for the end land use objective of wildlife habitat will be met. As well as planting conifers, native shrubs and other woody species will be planted to provide additional wildlife habitat.

The measurement of the success of this objective will be through visual observations, as has been done throughout the past 8 years at the site, to ensure that these species are continuing to make use of the habitat, as they have prior to and throughout the operating period.

3.4.2.3. Cattle Grazing, Hunting, Guide-Outfitting, Trapping & Outdoor Recreation

All of the secondary end land use objectives can be met with the successful establishment of the commercial forest within the disturbance of the Mount Polley area. Domestic grasses and legumes are typically planted at the same time as the tree seedlings, so there will be a healthy vegetative cover available for cattle grazing and forging by other wildlife. The productivity objectives for the human end land uses will simply be the continued and expanded use of the area by the individuals that take part in each of these activities.

Observation of cattle grazing and recreation users as well as interviews with the local guide/outfitter will provide information as to the amount of usage the reclaimed area provides.

3.4.3. Long-Term Stability

3.4.3.1. Physical Stability

The physical long-term stability of the rock disposal sites began prior to dumping of waste rock, continued through the construction of the rock piles and will be completed when the reclamation techniques are implemented. A chronology of events to ensure this stability is as follows:

- A qualified consultant conducted a footprint stability assessment to determine if any special construction techniques are required to ensure the long-term stability of the rock disposal sites. Further, the materials of the original ground within the base of the disposal site are tested, using a standard grid pattern, to evaluate if any unstable areas exist;
- The soft organic soils within the footprint of the rock disposal sites are removed and stockpiled, so that they can be used for reclamation once the disposal site is complete. By removing the soft organic materials prior to dumping, the stability of the site will be improved, as the waste will be constructed on more solid materials such as tills and bed rock;
- When the rock disposal sites are under construction, a qualified consultant conducts annual visits to determine if the construction technique being utilized will ensure long-term stability;
- When the rock disposal sites are complete, the slopes will be re-sloped from an angle of 37º to 26.5º (or from the angle-of-repose to a slope ratio of 2:1). Some areas of the East RDS have already been re-sloped in this fashion.

Since a large portion of the waste rock from the Bell and Springer Pits will be placed in the Cariboo/Bell Pits RDS, greater long-term physical stability can be achieved in this location, as the waste will fill excavated pits, rather than being constructed on flat to gently sloping land, as is the case with the East RDS, North RDS and Wight RDS.

During the excavation of the pits, stability of the surrounding surfaces and pit walls has been a priority, as this is necessary for the safety of the workers at the mine. As a result, there will not be many steps required upon completion of the pits to ensure its long-term stability. However, there will be some measures taken upon completion to maximize the stability for the future. A chronology of events to ensure this stability is as follows:

- The pits are excavated with wall angles that have been discussed and agreed to with a qualified geotechnical consultant. The angle of the walls will be chosen to ensure the stability of the pits throughout the excavation phase, as well as for the long-term stability; and
- Prior to the excavation of benches below the top surfaces, all soils and tills are removed and pulled away from the area immediately surrounding the maximum boundary of the pits. This will prevent the continual sloughing of loose materials down the walls of the pits.

The long-term stability of the various access and haul roads will be ensured using similar techniques as those employed for the rock disposal sites, but will differ in some areas. A chronology of events to ensure this stability is as follows:

- The soft organic soils from within the footprint of the roads will be salvaged and stockpiled, so that they can be used for reclamation once they are no longer required. Through this technique, the stability of the road will be improved, as it will be constructed on harder materials, such as tills and bedrock;
- Upon decommissioning, all culverts that were used in the construction of the road will be removed and water bars will be dug across the roads to continue to facilitate the movement of water past the structure to the downstream slopes. This is a common technique used in the decommissioning of forestry roads throughout British Columbia and other regions, to ensure long-term stability; and

- Any steep fills of the road will be re-contoured, as is typical for any fills less than 10 metres in height throughout the mine property.

The long-term stability of the TSF will be ensured through the careful design and construction of the facility, as well as through the operational and post-closure monitoring of the embankments and spillway. A chronology of events to ensure this stability is as follows:

- The soft organic soils from within the footprint of the embankments will be salvaged and stockpiled, so that they can be used for reclamation once they are no longer required. Through this technique, the stability of the embankments are improved, as they will be constructed on more competent construction materials;
- The embankments are constructed with the most careful selection of materials and are placed in accordance with the construction techniques outlined by the geotechnical consultant hired to design and construct the TSF;
- Various instruments such as vibrating wire piezometers and slope inclinometers are monitored as per the Operation, Maintenance and Surveillance Manual, prepared by the qualified geotechnical consultant;
- Annually, the TSF is inspected by the qualified geotechnical consultant, to ensure stability is being maintained and to provide changes to the monitoring program, if required;
- Every five years, a different geotechnical consultant is hired to conduct a Dam Safety Review of the TSF, to ensure that the facility is safe and is being maintained according to the Canadian Dam Safety Guidelines; and
- Upon closure of the mine and TSF, a spillway will be installed, so that the long-term water table will be maintained at a safe level, which will be identified through consultations with the qualified geotechnical consultant.

3.4.3.2. Chemical Stability

The long-term chemical stability of the various components of the mine site will be ensured through the careful characterization, monitoring and placement of materials both during operations and after mine closure. When the pits are being excavated, any potentially acid generating (PAG) or acid generating (AG) material will be either mixed with sufficient quantities of non-acid generating (NAG) materials or will be placed below the flood elevation of the Cariboo Pit. This will prevent the potential for these materials to generate acid in the long-term. Throughout mining operations from 1997 thru 2001, as well as through the care and maintenance period of 2001 thru 2004, seepage from the East RDS has been collected, which has provided insight into the long-term characteristics of the drainage from the waste rock at Mount Polley. Collection of this data will continue through the next phase of mining, so that all the data can be utilized in modelling studies, to determine when the drainage from the rock disposal sites will be safe enough to discharge to the environment.

The pit water from the Cariboo & Bell Pits has been monitored for about the same period as the drainage from the East RDS. It is also providing insight into what the drainage will look like from the pits, when they are complete and have filled to the point of discharge. The water quality from the Wight Pit is expected to be somewhat different from the other pits, since it is heavily influenced from infiltration from Polley Lake. As a result, the quality of drainage from this pit will likely be much better, due the much greater dilution from this water source. Operational and post-operational monitoring will be an important part of determining the long-term chemical stability of drainage from the pits as well.

Finally, the water quality of the TSF has been monitored with great detail from 1997 thru 2004, both during operations and through the care and maintenance period. When operations ceased at the end of 2001, water quality from the TSF which reached the seepage ponds, quickly improved to the point of meeting the discharge limits set by the MWLAP. Based on this full-scale field trial, the long-term ability of the TSF to discharge clean water to the environment is expected. To ensure that this will continue to be the case, post-closure monitoring will be necessary.

3.4.4. Removal of Structures and Equipment

All buildings, overhead structures and pipelines will be catalogued and their potential for salvage or other uses will be determined. All infrastructure that is not required for future use will be dismantled and removed from the site.

Non-salvageable, non-combustible materials will be buried within the RDS. Combustible, non-salvageable materials will be burned pending receipt of a refuse permit, and the burned residues will be buried in the RDS. Water intake systems and all above-ground pipework will be lifted and removed from the site. Underground pipework, such as fire, sewage and communications lines, will remain buried. Above-ground foundations will be broken down to ground level, covered with stockpiled soils and prepared for reclamation.

During the first operation period from 1997 thru 2001, there was some discussion with the MWLAP officials about the potential to convert the mill building into a truck repair shop or some other industrial complex. Since the mill building has offices, electricity, telephone and all the other requirements of an industrial complex, as well as a close proximity to several communities that are home to many people in the forest industry, there may be benefits to keep the mill building and infrastructure in place and then convert the land use of the mill site to a permanent industrial complex. This potential conversion should be evaluated further through the next operating period, to see if there is interest in following this alternate path for the future of the mill site.

3.4.5. Mill Site Reclamation

Location and Area

The mill site area occupies approximately 20.21 ha. It contains the crusher, concentrator, electrical sub-station, maintenance shops, offices, laboratory, fuel storage facilities and potable water systems. It is situated on a gently-sloping south-facing plateau, most of which is blanketed with glacial till deposits to 7 metres deep, although there was a small inclusion of organic soils in the centre of the area. (Blashill 1995a, 1995b). This mill area was cleared, grubbed and stripped in 1995. Blashill (1995b) presents the results of a detailed soil survey of the mill area, together with recommendations for the stockpiling of soils and overburden.

Prior Land Uses

The mill site area was clearcut in 1972, except for isolated red cedar stands. It is presently labelled NSR (not sufficiently restocked) on forest cover maps. Areas to the east, north and west of the mill site area were selectively logged in 1972, and these areas have had good natural regeneration by Douglas-fir, western red cedar and sub-alpine fir. In general, the mill site area has a medium (M) site class capability for commercial forestry. South and west-facing slopes, located west of the mill site, have a good capability (Class 2) as summer range for moose and mule deer, but a fair to poor capability for winter range (Classes 3, 4). These high-quality ranges will not be cleared for mine development. The selectively logged areas surrounding the mill have a fair capability for marten, weasel, hare, squirrel and lynx. Breeding bird densities and bird species diversity are both high. Prior to clearing, the mill area had a very low capability for waterfowl and aquatic furbearers such as beaver, muskrat or mink. The two small intermittent streams that drained the mill site area do not constitute fisheries habitat. There are no heritage resources or historic features within the mill site area.

Land Use Objectives

The land use objectives for the reclamation of the mill site area are:

- Ensure the safety of the public and livestock, by removing all surface structures that are not required at the end of mine life;
- Ensure the safety of the public, livestock and wildlife, by removing and safely disposing of all waste products;
- Protection of watersheds and fish habitat by controlling siltation and by removing and safely disposing of all substances that are potentially deleterious to aquatic life;
- Restoration of natural flow regimes and drainage patterns;
- Reclaim the upland portions of the mill site area as Class 2 summer range for mule deer and moose, and Class 3 winter range for moose, with seedling plantations of palatable shrub and herb species;
- Distribute some coarse woody debris, logging slash and/or boulder piles over portions of the reclaimed area, to provide cover for black bear, marten, weasels and small mammals; and
- Seed and plant upland portions of the mill site area with seedlings of Douglas-fir, western red cedar, hybrid spruce and lodgepole pine, in conformity with the stocking standards of the 05 and 07 Site Series.

Reclamation Considerations

Initial steps toward the reclamation of the mill site area commenced in 1995, with a detailed soil survey, prior to the stripping and stockpiling of soils and overburden. Additional materials were added to this stockpile in 1996. These stockpiles were further stabilized and protected in the spring of 1997, as they were seeded and fertilized as part of the post-construction, site-wide reclamation program.

The remainder of the reclamation of the mill site area must be deferred until mine closure, when decommissioning of the plant can begin. The proposed reclamation of the mill site area includes the following steps:

- Recovery, removal and recycling of products that may be hazardous to the environment;
- Removal and salvage of buildings, pipelines and overhead structures;
- Break-up and burial of concrete pads and foundations;
- Restoration of natural drainage patterns;
- Site preparation and re-distribution of stockpiled soils;
- Seeding with a cover crop to stabilize reclaimed soils;
- Planting with tree and shrub seedlings; and
- Post-reclamation monitoring

Several of the reclamation considerations mentioned above for the reclamation of the mill site area are also covered in sections 3.4.4 and 3.4.13, which discuss the reclamation of structures, equipment and waste products. However, they were repeated as part of the mill site reclamation, because the mill site area encompasses nearly all the structures, equipment and waste products that exist at the Mount Polley Mine.

3.4.6. Waste Dump Reclamation

Location and Area

The total area occupied by the rock disposal sites (RDS) will be about 218.67 Ha, consisting of the East RDS (63.83 Ha), the North RDS (31.81 Ha), the Cariboo/Bell Pits RDS (55.99 Ha), the Wight RDS (34.79 Ha) and the Leach Pad (32.25 Ha). The East RDS will extend southward from the southern toe of Mount Polley, occupying a sloping plateau surface that faces generally eastward, overlooking the south end of Polley Lake. The Wight RDS is an extension to the

East RDS, between the East RDS & Polley Lake. The North RDS occupies a side valley enclosed by rock knobs, located west and north of the Bell Pit. The Cariboo/Bell Pits RDS occupies an area of ridge crests and rocky knobs, lying between Polley and Bootjack Lakes. And if the Leach Pad is constructed, it would be an extension of the East RDS to the west and south.

Prior Land Uses

The existing vegetation of the East RDS, Wight RDS and Leach Pad is a complex mosaic of young seral, mid-seral and mature forest. Much of the area east of the mill site was selectively logged in 1972, and it now supports a rich and diverse patchwork of deciduous shrub thicket, veteran black cottonwoods, and vigorous advance regeneration by Douglas-fir, western red cedar and sub-alpine fir. Parts of the East RDS, Wight RDS and Leach Pad overlap stands of mature forest, dominated by large, well-grown western red cedars and Douglas-firs, with a rich and variable shrub understorey, of the 05 and 07 Site Series. Forest cover maps rate the forest site capability as medium (M) to good (G). There is no evidence of livestock grazing in this unit prior to mining activity.

The East RDS, Wight RDS and Leach Pad areas had the highest breeding bird density of any portion of the project area, and the highest number of resident species. Pellet group counts and range surveys indicate that it has moderate value as moose and deer habitat. It has a rich and diverse understorey of herbs and shrubs, including many species that are highly palatable to ungulates. The structure and composition of the vegetation indicates fair to good black bear habitat. One marten was seen on Transect 11.

Most of the North RDS area was logged in 1975, and the area has regenerated to a dense second-growth mixed forest dominated by alder, willow, cottonwood and tall shrubs, with a scattered veteran Douglas-fir and western red cedar, and with strong advance regeneration by sub-alpine fir. Forest cover maps rate the site capability of this area as good (G). There is no evidence of livestock grazing in this unit prior to mining.

The North RDS had moderate densities of breeding birds, but fewer species than the East RDS, Wight RDS and Leach Pad areas. No pellet groups were found on pellet group plots, but moose dropping groups and deer tracks were found along an abandoned road. Ungulate browsing was very localized, but tall willows, Douglas maple and western mountain-ash were heavily browsed at favoured locations. Some individual alders and willows in the North RDS were girdled and killed by snowshoe hares.

The areas for the East RDS, Wight RDS, Leach Pad and North RDS do not have permanent lakes or ponds, although there are small seepages and swampy areas in ravines of all four locations. The creeks draining the ravines are small, and intermittent. By mid-June, these creeks are reduced to small trickles. These creeks have a very low capability for waterfowl, shorebirds or aquatic mammals such as beach, due to their small sizes and intermittent flows. No amphibian eggs, larvae or adults were found near any of the creeks draining these existing or proposed waste rock locations. These streams do not support fish. There are no cliffs, caves canyons, talus slopes, permanent streams, lakes, wetlands or mineral licks in either of these areas.

The southern portions of the Cariboo Pit were selectively logged in the 1970’s, leaving a variable forest with some advance regeneration by western red cedar and sub-alpine fir. Northern portions of the Cariboo and Bell Pits do not appear to have been logged, but consist of mid-seral Douglas-fir and lodgepole pine stands, which date back to forest fires some 120-160 years ago. Forest cover Maps indicate that most of the areas for the Cariboo/Bell Pits RDS has a poor (P) to low (L) site class rating for commercial forestry.

Pellet group counts and range surveys indicate that the area occupied by the Cariboo/Bell Pits RDS offer poor to fair summer range for mule deer and moose, poor winter range for moose, and very poor winter range for mule deer. Better mule deer and moose habitat exists on the west-facing slopes below this area, overlooking Bootjack Lake. Further, the area for this RDS probably has low to moderate capability as black bear habitat, due to the high cover by black huckleberry and kinnickinnick, which provide some berries in season. Habitat capability for marten, squirrel and hare appears low to moderate. Call count transects indicate that breeding bird densities are low, with few species. This area presently has no capability for waterfowl, or aquatic fur-bearers such as beaver, mink or muskrat. There are no permanent ponds, lakes or streams in this area, and thus has no potential as fish habitat. No wildlife trees, cliffs, caves or other special wildfire features have been found in the pit area. As nearly as can be determined, the Cariboo/Bell Pits RDS area has a very low potential for heritage resources.

Land Use Objectives

The land use objectives for the reclamation of the rock disposal sites are:

- Ensure public safety;
- Minimize visual impact on the views from Polley Lake;
- Retain and enhance specialized microhabitats such as boulder piles;
- Increase habitat diversity, where possible, by distributing coarse woody debris over reclaimed areas so as to provide cover from small mammals and small carnivores. This will depend on the stripping and grubbing practices, as well as Ministry of Forests approval.
- Establish a dense and variable cover of willows, Douglas maple, alder, mountain-ash, grasses and forbs to provide a maximum amount of forage for moose, mule deer and black bear;
- Hand-plant the upper plateau surfaces of the rock disposal sites with coniferous tree seedlings, following the stocking standards of the 01 or 05 Site Series for mesic sites;
- Hand-plant the sloping faces of the rock disposal sites with tree seedlings, following the stocking standards of the 02 or 03 Site Series.

Reclamation Considerations

For all reclamation sites, public safety is the most important consideration. The rock disposal sites will be constructed on level to moderate slopes, where there will be no downslope movement of the stockpiled materials. In the case of the Cariboo/Bell Pits RDS, the construction will be the filling of the Cariboo and Bell Pits. Once all rock disposal sites are completed, all slopes will be re-sloped to 2:1 or less. Surfaces of the rock disposal sites will be graded lightly to eliminate large voids or craters.

The East RDS, North RDS, Leach Pad and Cariboo/Bell Pits RDS were salvage-logged by a variety of contractors starting in 1995, to recover merchantable timber. Soil volumes were identified through test pits and all recoverable soil from several of these areas was stockpiled for use during the reclamation activities. The Wight RDS and Leach Pad will be salvage-logged in a similar manner to the other three rock disposal sites, with soil recovered and stockpiled prior to the placement of the waste.

All rock disposal sites have been or will be constructed through end dumping of the waste rock. Dump heights have been or will be kept relatively small so that re-sloping costs will be minimized and there is sufficient access for reclamation. For the Wight RDS, the proposed Leach Pad and the Cariboo/Bell Pits RDS, waste rock will be placed in 20 metre lifts, with stepped-out platforms, so that no slope will be greater in height than 20 metres for the purpose of re-sloping. When the waste rock is placed, there will be some segregation of materials, because large rocks and boulders will tend to roll downhill, while the fines will tend to segregate in the upper surface layers of the dump. This top surface of fines will be graded over larger material to provide good draining substrate for the replaced soil layer. Overall final slopes will be reclaimed to approximately 26.5º.

The East RDS presently has 63.83 Ha of disturbance, incorporating the tops and slopes of the pile. Approximately 6.01 Ha of the East RDS, on the 1170 platform and the slope between the 1170 & 1150 platforms, is being utilized for Phase I & II of the Reclamation Research Program. The southern-most part of the

East RDS, constituting about 15 Ha, will be tied into the haul road for the Wight Pit. And the low-grade stockpile, which has an area of about 7 Ha on the western side of the East RDS, will be utilized during the start-up of the mine in 2005. As a result, of the 63.83 Ha of disturbance for the East RDS, approximately 35 Ha is available for reclamation at this time. The remaining portion, broken down previously, will be available for reclamation when the low-grade stockpile has been closed and the excavation of the Wight Pit is complete. The location for the low-grade stockpile will likely remain active until the end of mining, while the Wight Pit will likely be completed at the end of year 4 or 5, of this five year plan.

The East RDS & Cariboo/Bell Pits RDS will be reclaimed with the soil that is stockpiled to the south of Mount Polley Peak as well as the soil that is stockpiled to the south of the Cariboo Pit. The North RDS will receive waste from the Springer Pit for some years to come, so it will likely not be reclaimed until the resource has been exhausted. Soil stripped from the footprint of this RDS will be stockpiled and used when reclamation commences. The Wight RDS will be constructed over the next 3 or 4 years, and it can be reclaimed once the Wight Pit has been completed. Soil will be stockpiled immediately above on the East RDS, which will allow for easier and less costly reclamation of this RDS. And if the Leach Pad is ever constructed, it will be reclaimed with soil that will be stripped from it's footprint.

All the rock disposal sites will be hand-planted with conifer seedlings obtained from tree nurseries. The level to gently sloping surfaces of the rock disposal sites will have a nutrient and moisture regime that approximates the 01 or 05 Site Series. The steeper slopes on the margins of the RDS areas are slightly more coarse-textured and free-draining, and their moisture and nutrient regimes will approximate the 02 or 03 Site Series. Tree species selection and stocking standards for these Site Series are given in Table 3.4-1.

In reclaiming the RDS areas, wildlife values could be enhanced by plantings of native shrub species that are palatable to moose and deer. These include western mountain-ash, Douglas maple, Scouler willow, Bebbian willow, gray-leaved willow, little-tree willow, saskatoon-berry, baldhip rose and red elderberry. Logging slash, especially if it is fresh enough to contain viable root balls or rooted offsets, is a valuable potential source of these native plant materials.

If public safety is not threatened, it is desirable to leave large rocks and boulder piles in place, rather than trying to cover and reclaim them all. These features could provide cover for small mammals (such as bushy-tailed woodrat, northwestern chipmunk and deermouse) and denning areas for small carnivores (such as marten and long-tailed weasel), thus increasing the biodiversity of the area.

The water quality of seepage from the rock disposal sites will be monitored regularly, to ensure that seepage from these areas are acceptable for direct release to the environment. Runoff will be directed to supplement the flooding of the Wight Pit, as well as for filling in the void spaces of the waste located in the Cariboo & Bell Pits. The seepage collection systems and settling ponds will be breached and the natural drainage system will be reinstated. The margins of all water courses will be re-vegetated with riparian plant species.

3.4.7. Tailings Reclamation

Location and Area

The total area occupied by the tailings storage facility (TSF) at the completion of mining is expected to be approximately 305 Ha. Presently, the TSF accounts for about 248 Ha and this disturbance will increase incrementally each year until the maximum disturbance of 305 Ha is reached at the end of mining in year 6 or 7. Because tailings solids will be deposited throughout the mining cycle, reclamation of the tailings beach and pond cannot be reclaimed until the milling of ore has stopped. Some other areas of the TSF can be reclaimed earlier, depending on their uses during the mining process. For instance, several of the till borrows that are used for sources of material for impoundment construction can be reclaimed as their materials are exhausted. Further, the downstream slopes of the three tailings impoundments will be reclaimed during their final lifts, which could be a year or two prior to the completion of mining.

The largest component of the TSF disturbance is the tailings pond & beach (217.94 Ha). These two areas are grouped as one, since the beach area increases as the pond elevation drops and it decreases as the pond elevation increases. Throughout each year after reclamation, there will always be a fluctuating change in these areas, as evaporation and precipitation levels change with the seasons. The second largest area of disturbance will come from the various till borrows (31.25 Ha). At the present time, Mount Polley has four till borrows, but this will change over the coming five years, as some of the till borrows will become covered with tailings solids. The three embankments will have a combined disturbance of 33.40 Ha, the till waste piles will have a disturbance of 7.05 Ha, the seepage ponds and drainages will disturb about 2.55 Ha, the tailings laydown will encompass only 0.51 Ha and various miscellaneous areas will make up the remaining disturbance of 11.76 Ha.

Prior Land Uses

Large portions of the tailings area were clearcut logged in 1970, 1979 and 1983. Cut stumps indicate that the original vegetation was a closed forest of large, vigorous western red cedars and Douglas-firs. After harvest, these clear cuts were subjected to moderate to intense slash-burning. Portions of the clear cuts were re-planted with spruce seedlings, which show poor vigour and high mortality. Forest cover maps assign a poor (P) site class code to most of the tailings area. Most of the clear cuts would probably be judged NSR (not sufficiently re-stocked). There was no evidence of recent cattle grazing in these clear cuts in 1995. However, throughout the mining operations from 1997 thru 2001, as well as the care and maintenance period of 2001 thru 2004, the TSF area was used extensively by various herds of cattle for summer grazing.

Breeding bird densities are very low in these clearcut areas, and there are very few bird species. This habitat has moderate numbers of northwestern chipmunk. Moose and mule deer appear to make little use of open, exposed areas in the clear cuts, although use of forest edge areas with better cover may be high to very high. Several coyote tracks were seen in this habitat.

Approximately 20% of the tailings area is occupied by a stand of mature to old growth forest, dominated by western red cedar, with lesser cover by sub-alpine fir and Douglas-fir. Breeding bird densities and the number of bird species in this forested area are both high. Red squirrels are present in low densities. Neither moose nor deer appear to use the interior of this stand, as little of the available vegetation is palatable to ungulates. However, the edges of this stand appear to be heavily used by moose. Stand edges combine good thermal cover with abundant forage.

The remaining 20% is occupied by a small wetland dominated by wet shrub thickets of Sitka alder, scrub birch and hardhack, containing a 3 Ha bog pond. It is the only permanent wetland in the mine development area, but it is neither unique nor important in a regional context. It supports one or two pairs of each of green-winged teal, bufflehead, common snipe, willow flycatcher, common yellowthroat, Lincoln's sparrow and song sparrow. Although the first four species are not found elsewhere in the mine development area, they are widespread and common in British Columbia. Moose and mule deer do not appear to utilize the surrounding shrub vegetation, probably due to the low palatability of hardhack and alder, the dominant shrubs.

Land Use Objectives

The land use objectives for the tailings area are:

- Ensure the safety of the public and livestock, by removing all surface structures that are not required at the end of mine life;
- Protection of watersheds and fish habitat; by controlling siltation and by removing and safely disposing of all substances that are potentially deleterious to aquatic life;
- Protection of watersheds and fish habitat; by promptly reclaiming all diversion ditches, sediment ponds and spillways;
- Restore and enhance the wetland in southwestern portions of the tailings area;

- Reclaim upland portions of the tailings area as Class 2 summer and winter range for mule deer and moose;
- Distribute available coarse woody debris and logging slash over the reclaimed area, to provide cover for small mammals and small carnivores; and
- Seed and plant upland portions of the mill area with seedlings of Douglas-fir, western red cedar, hybrid spruce and lodgepole pine, in conformity with the stocking standards of the 05 and 07 Site Series.

Reclamation Considerations

Waste characterization studies have confirmed that the tailings solids will not be acid-generating. Thus, no special soil remediation measures appear to be indicated at this time, although the issue will be studied in detail during the reclamation research program. The general concept is to reclaim the tailings beaches as a mosaic of forested and wetland habitats, with a gradual transition towards a pond and artificial wetland above the outflow spillway. Reclamation of the tailings embankment could start early in mine life, as soon as the final toe positions and slope configurations have been established. Diversion ditches will be required to conduct water towards the tailings area. They were constructed in 1996 and 1997, and then were hydro-seeded in the spring of 1997 after they were constructed. The object of the reclamation was to establish a dense grass turf that slows the force of running water, and protects against siltation of downstream waters. Reclamation will entail seeding the banks and channels of diversion ditches with the grass-legume mix given in Section 3.5.4. This seed mix does well in moist areas, and creeping fescue is likely to be especially successful in this situation.

The tailings embankments will be constructed from a combination of glacial till and various sizes of broken or crushed rock. The till will be sourced both within and outside of the tailings facility, while the rock will be sourced from a rock borrow outside of the tailings facility, as well as from the mine area itself. The tailings embankments will be constructed in a series of raises, by means of the modified centreline method of construction. The inner faces of the embankment will be covered by the rising surface of the tailings beaches, and so will not be reclaimed. Reclamation of the outer faces of the tailings embankment will begin soon after the tailings embankments have reached its final crest elevation and final toe configuration. The outer faces will be reclaimed by seeding with the domestic grass-legume mix given in Section 3.5.4.

After mine closure, the tailings embankments will be hand-planted with seedlings of Douglas-fir, pine and aspen. The three embankments will be named the Main, Perimeter and South embankments. The Main embankment will face southeast, the Perimeter embankment will face northeast and the South embankment will face southwest. Each of these embankments will be constructed with a slope of 2:1 and will consist of a glacial till core with a free-draining rock shell on the downstream side. The Main and South embankments will conform to Site Series 03, while the Perimeter embankment will conform to Site Series 04. For silvicultural purposes, the preferred tree species on such sites are Douglas-fir and lodgepole pine, with stocking standards given in Table 3.4-1. On sites such as these, supplementary plantings of aspen would provide forage for moose and beaver, and improve the habitat capability for several songbird species.

Intensive reclamation of the tailings beaches will commence when tailings production has ceased. Upon mine closure, surface facilities will be removed in stages, salvaged and sold. The tailings delivery system will be dismantled and removed at the same time. The seepage reclaim pond, seepage reclaim pumps and seepage recovery wells will be retained for several years after closure, until monitoring results indicate that seepage from the tailings area is of suitable quality for direct release to the environment. At that time, the seepage reclaim pond and pumps will be removed. However, the seepage recovery wells and monitoring piezometers in the tailings dam will be maintained as long-term monitoring devices.

A spillway will be constructed, which will be designed to accommodate the flows during the 1-in-200 year flood and the Probable Maximum Flood (PMF) within the tailings basin. The spillway will include the outflow channel, will be constructed in competent rock south of the Main embankment and will likely discharge into the Edney Creek North tributary drainage. The elevation of this spillway and outflow channel will control the water elevation over the tailings surface, to allow sufficient freeboard at the crest of the Main embankment. The spillway and discharge channel will be designed to ensure stability for all hydrological and geotechnical conditions. The channels of the spillway will be lined and rip-rapped as appropriate. Any exposed soil in the banks and channels will be seeded with the grass-legume mix listed in Section 3.5.4. The banks of the spillway will be planted with rooted willow cuttings, propagated from local sources.

Upland portions of the tailings beaches will consist of a fine-textured, stone-free, sandy to silty deposit, up to 10 metres thick. The tailings beach will occupy a valley floor position, with the water table controlled by the spillway and outflow channel described earlier. In terms of topographic position, soil texture and soil depth, the tailings beach is expected to have many of the same biophysical characteristics as a glaciolacustrine site, similar to the habitat prior to mine development.

The existing mature forests in the north-central portion of the tailings area conform to the 06 and 07 Site Series. The existing stand is dominated by western red cedar, while Douglas-fir and sub-alpine fir are secondary tree species. Cut stumps indicate that much of the tailings area was once dominated by large Douglas-firs and western red cedars, with trunk diameters from 1 – 1.2 metres at breast height. After clear-cutting, the southeastern portion of the tailings area was hand-planted with spruce seedlings, which show poor vigour, slow growth and high mortality. A clearcut immediately north of the tailings area was hand-planted with lodgepole pine, which shows good vigour and good growth. This indicates that lodgepole pine is likely to have better seedling survival than spruce, on reclaimed portions of the tailings area.

Reclamation of the dryland portions of tailings area will aim at re-creating the 05 or 06 Site Series, with western red cedar, Douglas-fir and lodgepole pine as the preferred tree species. Black cottonwood, trembling aspen and paper birch are all found within the tailings area, and are desirable secondary species for wildlife habitat purposes. Natural regeneration by these deciduous trees will not be discouraged. Table 3.4-1 gives stocking standards for such sites. Reclamation should aim at a patchy mosaic of closed coniferous forest, deciduous shrub thickets and small openings.

The ungulate carrying capacity will be enhanced, by encouraging the natural regeneration of shrubs that are adapted to the site, and palatable to wild ungulates. Good species for the tailings area include red-osier dogwood, Scouler willow, Bebbian willow, little-tree willow, grey-leaved willow, western mountain ash and red elderberry. Although they presently dominate the wetland area, hardhack, scrub birch and Sitka alder are rarely utilized by moose or deer, and are less desirable. The reclamation research program will examine the feasibility of propagating these shrubs from rooted stem cuttings using local sources.

The area of the final pond at closure is not known at this time. However, it appears to be possible to create an extensive artificial wetland in the southwestern portion of the tailings area, several times larger than the existing one. Before the final spillway is activated, the tailings surface will be surveyed and mapped, to determine the bathymetry of the pond that will be retained by the spillway. Efforts will be made to create bays, channels and islands in the pond, thereby increasing its shoreline complexity. Agencies such as Ducks Unlimited, with a long experience in wetland management, will be consulted on the design. Turfs, offsets, stolons, cuttings and winter buds of aquatic plants will be collected from local sources, and planted in the pond. Water sedge, beaked sedge, common cattail, river horsetail, yellow pond lily, narrow-leaved bur-reed are all present in Bootjack Lake, Polley Lake and in small wetlands adjacent to the Mount Polley project area. All appear to be suitable candidates for transplantation into an artificial wetland in the tailings area. If properly designed and managed, the artificial wetland in the tailings area will more than compensate for the small wetland that existed prior to mine development. The key wildlife species for the management of this wetland could include: spotted frog, northwestern toad, Canada goose, mallard, green-winged teal, bufflehead, common snipe, common yellowthroat, Lincoln's sparrow, beaver, muskrat and moose.

3.4.8. Pit Reclamation

Location and Area

Once mining at Mount Polley is complete, the total area occupied by the four open pits and the one rock borrow near the TSF will be 124.96 Ha. However, because the Cariboo and Bell Pits will be completely backfilled with waste, they will become one combined RDS. The disturbance associated with the Cariboo/Bell Pits RDS will therefore be included as part of the RDS areas rather than as part of the pit areas. As a result, the actual total area occupied by the two remaining pits and one rock borrow at the TSF will be 68.97 Ha. This revised total consists of the Wight Pit (20.36 Ha), the Springer Pit (39.69 Ha) and the Tailings Rock Borrow (8.92 Ha). The walls of the Wight Pit will consist of 10.48 Ha, while the pit lake will be 9.88 Ha. As the Springer Pit is somewhat larger, its walls will have an area of 18.89 Ha and the pit lake will measure 20.80 Ha. The rock borrow at the TSF will have an overall area of disturbance of 8.92 Ha.

The Springer Pit occupies an area of ridge crests and bedrock knobs, ling between Polley and Bootjack Lakes. It cannot be seen from Polley Lake at all, but it can be seen from various locations on the western side of Bootjack Lake. The Wight Pit, on the other hand, is located about 1.5 km Northeast of the Bell Pit and sits on the western shore and near the north end of Polley Lake. It will be visible from the northern part of Polley Lake. The rock borrow at the TSF is located on a rocky hillside, immediately north of the TSF.

Prior Land Uses

The area of the Springer Pit does not appear to have been logged, but consist of mid-seral Douglas-fir and lodgepole pine stands, which date back to forest fires some 120-160 years ago. Forest cover Maps indicate that most of the area for the Springer Pit has a poor (P) to low (L) site class rating for commercial forestry.

Pellet group counts and range surveys indicate that the area occupied by the Springer Pit offer poor to fair summer range for mule deer and moose, poor winter range for moose, and very poor winter range for mule deer. Better mule deer and moose habitat exists on the west-facing slopes below this area, overlooking Bootjack Lake. The area for this pit probably has low to moderate capability as black bear habitat, due to the high cover by black huckleberry and kinnickinnick, which provide some berries in season. Habitat capability for marten, squirrel and hare appears low to moderate. Call count transects indicate that breeding bird densities are low, with few species. This area presently has no capability for waterfowl, or aquatic fur-bearers such as beaver, mink or muskrat. There are no permanent ponds, lakes or streams in this area, and thus has no potential as fish habitat. No wildlife trees, cliffs, caves or other special wildfire features have been found in the pit area. As nearly as can be determined, the Springer Pit area has a very low potential for heritage resources.

The Wight Pit will be located in an area identified as MOG (mature and old growth habitat), CL (clear-cut) and RSS (riparian zone of small stream). It contains a mixture of Western Red Cedar, Douglas Fir, Spruce and Balsam trees. The stands are all greater than 141 years, with some greater than 251 year. Forest cover Maps indicate that the area for the Wight Pit has a poor (P), medium (M) to good (G) site class rating for commercial forestry. While there were no studies in the specific area where the Wight Pit will be located, mature and old growth forests in the Interior Cedar-Hemlock zone may be home to the following wildlife: moose, mule deer, black beer, wolverine, marten, owls, woodpeckers and several passerine species. In a field study during the spring of 2004, riparian vegetation near the creeks flowing into Polley Lake from the west were dominated by devils club, ferns, alder, huckleberry and willow species. The area of the Wight Pit will encompass the mid and upper reaches of an un-named creek called Drainage 1. Fisheries studies in the spring of 2004 concluded that this drainage does not provide rearing or spawning habitat for the rainbow trout in Polley Lake. Further, it provided no nutrients (benthic invertebrates), as this drainage does not connect with the lake.

While the rock borrow at the TSF is included with the areas associated with the pits, it has been grouped with the TSF reclamation due to its proximity to the TSF. All prior land uses, land use objectives and reclamation considerations are similar or the same as those for the TSF. As a result, we will not repeat them here. Please refer to Section 3.4.6 for the reclamation requirements for the rock borrow at the TSF.

Land Use Objectives

The land use objectives for reclamation of the open pits are:

- ensure the safety of the public and livestock, by posting and re-sloping the top overburden bench of the open pits in potentially dangerous locations;
- Minimize visual impact of the remaining pit walls from Bootjack Lake and Polley Lake;
- Retain and enhance specialized microhabitats such as cliffs, caves and boulder piles;
- Retain and enhance the potential of flooded portions of the pits to support aquatic life;
- Reclaim accessible non-flooded areas to an open forest association dominated by lodgepole pine and Douglas-fir, adapted to xeric sites with thin soils. Upon closure, most of the accessible area will be the former ramp of the open pit, which will be ripped up and covered with stockpiled soil down to the level of flooding;
- There will be no attempt to reclaim the inaccessible portions of the pit walls.

Reclamation Considerations

Public safety is the most important issue connected with the reclamation of the open pits. When mining of the pits is complete, the perimeter of the pits will be fenced. The fence will consist of a tightly spaced line of boulders, approximately 4 km long, which will be marked with metal signs on metal posts.

At the end of mine life, little of the interior of the open pits will be visible from either Bootjack or Polley Lakes. When both the Wight and Springer Pits are nearing completion, a landscape analysis will be conducted to determine specific requirements for seeding and planting the rims of the pits, so as to blend the visible edges of the pits with the appearance of the natural vegetation immediately below it. With selective blasting, it may be possible to avoid creating a straight-edged, ‘bench-like’ structure that appears against the skyline.

The reclamation strategy for the open pits provides opportunities to increase the diversity of microhabitats available to wildlife. The flooded Springer Pit will create a new 20.80 Ha pond, while the flooded Wight Pit will create a nearly 10 Ha pond. The Springer pond may have little potential as fish habitat, because they will not have the necessary instream spawning or rearing habitat. The Wight Pit, on the other hand, is expected to have a flood elevation at the same level as Polley Lake. While there are no plans at this time to connect the Wight pond to Polley Lake, it could provide good trout habitat if they are connected. An evaluation of the water quality and discussions with WLAP and DFO will determine if a connection should be made or not. Ponds in both pits will be very deep in relation to their surface areas, and as a result, may have limited potential for development as an artificial wetland. However, the shorelines and surface waters of the ponds could have some potential to support aquatic invertebrates, and may provide useable spawning habitat for northwestern toad and spotted frog. It will also provide drinking water for wildlife. Secondly, the sub-aerial portions of the open pits will contain substantial areas of cliff faces, overhangs, boulder piles and niches. These features could provide nesting habitat for a variety of cliff-nesting birds such as common raven, red-tailed and other hawks, cliff swallow and barn swallow. Boulder piles and screes could provide nesting and denning cover for bats, deer mice, bushy-tailed woodrat, long-tailed weasel, marten and other mammals.

Upon completion of the Wight Pit, the groundwater & runoff from this pit will be allowed to accumulate in place. Further, runoff from the Wight RDS will be directed to the Wight Pit to accelerate pit filling. It is not known at this time exactly how long it will take to fill this pit to the expected elevation of approximately 924 metres, however, based on estimates of groundwater infiltration, the pit will likely fill quickly. Throughout the mining of the Wight Pit, actual groundwater infiltration rates will be collected to calculate the time of filling with better accuracy. Unlike the lowering of the groundwater regime surrounding the Cariboo & Bell Pits during mining, the Wight Pit will have constant groundwater infiltration from Polley Lake, as the bottom of the pit moves below the surface elevation of the lake. It is this reason that the pit is expected to fill rather quickly. After four years of filling, the Wight Pit is expected to have a pond water elevation of 920 metres. However, modelling studies show that the pit will take an additional eight years to rise from 920 metres to 925 metres.

The Springer Pit will be completed last of all four pits. Once the resource has been exhausted, all groundwater and surface runoff for this pit will be allowed to remain, to begin the filling process. Further, the TSF will be drained of water by pumping it to the Springer Pit, to accelerate the creation of this pond. As the Cariboo/Bell Pits RDS is filled with waste rock from the Springer Pit, water will also fill the void spaces within this combined RDS. It is expected that water will fill the void spaces of the Cariboo/Bell Pits RDS to an elevation of approximately 1100 metres, as this is the access elevation to the Springer Pit. The Springer Pit is expected to fill to an elevation of approximately 1080 metres. The Springer Pit will likely fill much more slowly than the Wight Pit, as it does not have the infiltration pressures from Polley Lake. It will likely fill in a similar fashion to the Cariboo Pit, during the care & maintenance period of 2001 thru 2004. That is, with inputs from groundwater, runoff and TSF water, it was still filling after three years. Several years after mining operations have been completed, it is expected that an equilibrium will be established over time between the groundwater regime for the

Cariboo, Bell & Springer Pits, as they fill to their maximum elevations. At this time, the groundwater flow regime and surface discharges to the surrounding watersheds will return to pre-mining conditions.

After mining is complete, exposed pit faces will have an average slope of 52º. Little or non of the upper pit walls can be reclaimed. After mining ceases, some of the benches may not be accessible to heavy equipment. Only the safely accessible benches and ramps of the open pits will be re-vegetated. If accessible on foot, piles of rock debris will be fertilized and broadcast-seeded with a domestic grass-legume mixture that is recommended for dry sites. These sites would then be hand-planted with seedlings of Douglas-fir, aspen, lodgepole pine and common juniper, which grow naturally on colluvial veneers and steep droughty sites within the project area. Some of the associated native grasses and herbs can be expected to recolonize the area naturally. The reclamation program for the safely accessible benches of the open pit will aim at the stocking standards for the 02 Site Series.

Due to steep terrain, poor access and/or lack of soil, it will only be possible to revegetated a limited amount of the open pits. However, the unvegetated rock face areas could add to the area's biodiversity, by providing microhabitats that do not presently exist in the project area. Cliff faces, particularly those with ledges and overhangs, may provide nest sites for common raven, various hawks and falcons, cliff swallows, barn swallows and Say's phoebe. Cavities in boulder piles can provide nesting and denning habitat for certain bats, bushy-tailed woodrat, deermouse, northwestern chipmunk, marten, weasels and perhaps other carnivores.

3.4.9. Watercourse Reclamation

Prior to the mining disturbance at Mount Polley, the areas that encompass the Cariboo and Springer Pits were part of the Bootjack Lake watershed, while the areas of the Bell & Wight Pits drained into the Polley Lake watershed. During mining operations, the water from each of these pits is diverted into the TSF, to be used for the milling process. After mining has been completed and reclamation work is finished, these pre-mining water courses will be re-established.

Specifically, the Cariboo Pit will be filled with waste rock and water will fill the void spaces of this waste rock to the point of discharge to the Springer Pit, likely around the 1100 metre elevation. The Springer Pit will fill with water to approximately the 1080 metre elevation, where it will discharge as well. The Bell Pit will be backfilled with waste like the Cariboo Pit, and water will fill the void spaces here as well, until the water reaches the discharge point of around the 1100 metre elevation. And the Wight Pit will fill with water to create a pond, similar to the Springer Pit, which will likely discharge to Polley Lake at the elevation of approximately 924 metres.

Since any PAG or AG waste at Mount Polley will be either intimately mixed with NAG rock or placed below flood elevation in the Cariboo Pit, no ARD is expected from the waste rock or from the four pits mentioned above. Once the groundwater regimes return to a fully charged state and the pit waters have reached an equilibrium between the groundwater inflow and surface discharge, the expected water volumes from each area will be similar or the same as that prior to the mining disturbance. For the Cariboo, Bell and Springer Pits, water from these areas will have a significant buffer zone prior to entering their respective lakes. The Wight Pit, on the other hand, is located immediately next to Polley Lake and will have only a minor buffer zone prior to entering the lake, if this pit and the lake are connected.

A great deal of data has been collected from the East RDS seepage, as well as from the Cariboo and Bell Pits, which will help to model the expected water quality coming from each of the pits. Since the Cariboo and Bell Pits will be backfilled with waste, the water that will drain from these two locations may resemble that which is coming from the East RDS. Further, the Springer Pit will initially be filled with not only groundwater and surface runoff, but also with water from the TSF, as it is drained after mine closure. Since the Cariboo Pit was filled in a similar fashion from 2001 thru 2004, the data during this time period from the Cariboo Pit may give good insight into the water quality of the water that will be discharged from the Springer Pit.

Presently, all water from the mill site area is funnelled in ditches to the Mill Site Sump (MSS), located immediately south of the mill site. All water from the MSS is pumped to the TSF and into the mill process during operations and throughout the care and maintenance period. However, upon mine closure, the water quality of this sump will be monitored frequently until such a time as this water can be released to its pre-mining drainage of Mine Drainage Creek (MDC). Even thought the MSS has an overflow culvert to allow for this discharge without modifying the design, the MSS will likely be breached, so that the water will not pond to such a high extent and will drain into MDC without constriction.

Various structures will be installed for crossing the creeks on the West side of Polley Lake, which will be designed to accommodate a minimum of a 1 in 100 year event. These structures will remain in place to provide access during the reclamation work in the Wight Pit. At completion of reclamation of the Wight Pit, the culverts at North Dump Creek and Mount Polley Creek will be removed. The banks will be pulled back and vegetated to minimize erosion of the area. The diversion of Drainage1 will remain in place to allow the continued flow into Polley Lake. The settling ponds established along the haulage road will remain in place. The outlet and channels to the watercourses will be rip rapped to insure the possibility of erosion is minimized.

The Waste Dump Diversion Ditch (WDDD) surrounding the East RDS, and the extension of this ditch which will collect drainage from below the Wight RDS, will both be breached once the water quality from these rock disposal sites is of good enough quality to discharge. The natural drainages along these two ditches will be identified using the contours from the flyover and breaches will be created at these locations. The Southeast Sediment Pond (SESP), which presently collects water from the WDDD, and sends it to the TSF, will be breached so that no water ponds in this location. As with the WDDD and extension ditch, the contours will help identify the correct location to breach when the time comes.

The ditch that carries the tailings and reclaim water lines is continuous from the mill site through to the TSF during operations. Once the pipes have been removed after the mill has been shut down and the TSF has a spillway installed, this ditch will be breached at various points, to allow all water that it has been intercepting to return to it's natural watercourse. Several breaches will occur between the mill site and the booster pump house, and several more breaches will occur after the booster pump house, so that water will feed into Bootjack Creek via several drainage channels. The remaining ditch below Bootjack Creek will feed to the Perimeter Embankment Seepage Collection Pond (PESCP), which will discharge to Hazeltine Creek. Since the tailings reclaim road will remain in place in perpetuity, to be utilized for forestry, hunting, guide-outfitting and trapping, any overflow drainage from Bootjack Lake, which flows under this road to Bootjack Creek, will remain.

The diversion ditch upstream of the TSF, which diverts watch to the Edney Creek system to the South of the TSF, will remain in place in perpetuity, as part of an agreement with the Department of Fisheries and Oceans (DFO). If this ditch needs to be moved to a higher elevation, due to the expansion of the TSF in the coming years, then this ditch will also remain in place permanently. The seepage ponds below each of the three embankments will remain in place until such a time as the water is of sufficient quality to discharge and the seepage return infrastructure is no longer needed. At that time, the ponds will be either breached or will have much larger discharge culverts installed at the lowest points possible, so that the smallest amount of water remains in the seepage ponds in the long-term. However, as a great deal of operational and post-operational data has been collected over the past 8 years, other concepts for the long-term discharge of water from the TSF are presently being evaluated by Mount Polley, which may alter these plans somewhat.

3.4.10. Sealing of Underground Workings

There are no underground workings current or planned for the Mount Polley Mine.

3.4.11. Road Reclamation

All the area that is presently occupied by exploration roads and drill pads will be encompassed by the mining operation. As these areas will all be required during operation, they will not be reclaimed during the early years of the project.

Approximately 20.75 Ha of access roads may be required for post-closure monitoring and site maintenance. Further, it is part of this reclamation and closure plan to utilize these roads as part of the land uses, such as logging roads for forestry, access roads for ranchers to reach their grazing cattle, as well as access for guide-outfitting, hunting and trapping. All other access and haul roads, which constitute approximately 23 Ha, will be reclaimed as forest lands. Culverts will be removed and cross-drainages will be reinstated. Side-cast material and cutbanks will be recovered, re-sloped with a backhoe and spread over the road surface. Cutbanks will be re-contoured below the angle of repose, to reduce future slumping. Surface runoff channels will be improved to accommodate design capacity flows, stabilized with large rocks, and cleared of debris, to prevent new channels from interfering with newly reclaimed areas. The surface will then be seeded with an appropriate grass-legume mixture.

3.4.12. Trace Elements in Soils and Uptake in Vegetation

Soil salvaged for reclamation purposes is analyzed for metal content, prior to excavation and stockpiling. As part of the reclamation research program, vegetation will be sampled and analyzed for metal content, and the resulting data will be compared to the baseline data collected in both 1989 and 1995. More details of the reclamation research program for metals in the vegetation can be found in Section 3.5 of this report. Post-closure monitoring of the metal uptake by the vegetation will be required as confirmation of the research collected during the reclamation research program. This post-closure monitoring program will be fashioned after more data has been collected from the reclamation research program. Since reclamation has begun and will continue throughout the operations of the mine, much of the long-term trends of metal uptake by vegetation can be predicted prior to mine closure, thereby limiting the need for a large-scale post-closure research program.

3.4.13. Disposal of Reagents and Waste Products

All tanks and fuel storage facilities will be emptied of their contents before they are removed from their foundations. Tank residues will be transferred by a proven and reputable waste oil reprocessing company or by a special waste recycling company, as appropriate. This will follow similar procedures that have been in place throughout the operating period of the mine. Unused reagents and laboratory chemicals will be repackaged and shipped to other authorized users, or to a special waste disposal facility. Any contaminated soils will be collected and stockpiled for treatment or disposed of in an approved manner. Foundations and confining walls will be broken down and covered will glacial till, seeded with a grass-legume cover crop, and hand-planted with tree seedlings that are appropriate to the climate and site.

3.4.14. Operational and Post-Closure Monitoring

Permit PE 11678 will be reinstated upon start up to several of the original monitoring requirements. Generally, these requirements include surface and groundwater water sampling on a monthly and quarterly basis. A post-closure monitoring and water management plan will be developed and submitted to the MEM once site-specific water quality objectives have been established.

3.4.15. Detailed Five Year Mine Plan

3.4.15.1. Mine Plan Overview

Prior to the resumption of mill operations, pre-stripping of the Bell Pit is required along with the development of the Northeast Zone. Initial mill feed will be supplied from the Bell Pit and the low-grade stockpile. After approximately two months of stripping and development work, the Wight Pit will begin ore production. Mining will continue for approximately three years, at which time the Bell Pit will be almost finished and ore production will be from the Springer Pit.

The Wight Pit will be mined by conventional open pit methods utilizing the same equipment as the Bell and Springer pits. Processing of the Wight Pit ore will be through the existing crusher and mill facilities. Minor modifications to the mill facilities may be required.

The current designed mine life is approximately six years. Exploration work will continue to outline additional reserves to extend the mine life.

3.4.15.2. Development Schedule

The Mount Polley mine has been under care and maintenance since operations ceased in October 2001 due to low metal prices. Resumption of operations requires mine development work, equipment acquisition and commissioning, mill modifications and commissioning as well as the development work associated with the new Northeast Zone Wight Pit. Please refer to Section 2.2 for a detailed mining development schedule.

3.4.15.3. Northeast Zone

Following approval to amend Permit M-200, additional permits, approvals or amendments will be obtained to enable necessary activities such as timber removal (Ministry of Forests), stream crossings of the haulage road or any other items required as part of the conditions of the M-200 permit amendment.

Logging of the project areas (pit, stockpile, haulage road, rock disposal sites and water structures) will be followed by removal and stockpiling of soils and appropriate overburden for future reclamation work. There will be an initial road built to the pit area to provide access. This road will be completed to haul road design grade and width, with material from the pit development. The electrical power line will be constructed on the haulage road right-of-way.

3.4.15.4. Pit Operations

Since the cease of operations in 2001, operating equipment has left the property and replacement equipment had to be obtained. The equipment acquired will consist of a mix of new and used equipment. This equipment will require assembly and commissioning prior to being put into service.

At initial mill start-up, feed will be provided from the low-grade stockpile. Prior to the delivery of ore from the Bell Pit, approximately 500,000 tonnes of waste will be excavated, in order to access the new benches of ore in this pit.

3.4.15.5. Mill Operations

At shut-down in 2001, the crushing, grinding, flotation and associated equipment were serviced to facilitate resumption of operations. It will be necessary to put the equipment back into service condition prior to resumption of operations. A portion of the mill will be operational this summer to process the bulk sample received from International Wayside.

Test work has been ongoing to improve the operations of the mill process and to increase recovery of the valuable metals. As a result, some minor modifications to the milling circuit are planned.

3.4.15.6. Tailings

The tailings pumps have been used during the shut-down and are in good operating condition. The tailings and reclaim pipelines will be inspected and tested prior to resumption of service.

Approval has been received for the construction of another lift to the tailings dam. This will increase the elevation from 942.5 metre to 945.0 metres. Work is planned for completion in early 2005.

3.4.16. Detailed Five Year Reclamation Plan

Of the approximately 500 Ha of disturbance that exists at the site through the end of 2004, only a small fraction has been reclaimed to date, primarily because the majority of the disturbed areas will be required when production resumes in early 2005. While there have been significant portions of the site that have been revegetated with grass as well as fertilized, most of this work has been for the purpose of stabilization and aesthetics rather than for full-scale reclamation. Through the end of 2004, a total of 3.35 Ha has been re-contoured, 94.46 Ha has been seeded, 79.77 Ha has been fertilized and 6.01 Ha has been revegetated. All details of the existing re-contouring, seeding, fertilizing and re-vegetation at the site can be found in Table 3.4.16-1 and Table 2.3.1-1.

Phases I and II of the reclamation research program, as well as some of the area surrounding the test plots, is the only disturbance that has been reclaimed to date. This area is located entirely on the top and slope of the 1170 platform of the East RDS. It encompasses a total of 6.01 Ha, with 1.35 Ha on the slope and the remaining 4.66 Ha on the top of the RDS. Also, 2 Ha of the slope of the 1150 platform for this RDS has also been re-sloped, but additional reclamation work has not been completed at this location.

For the five years starting in 2005, larger scale reclamation will be conducted by Mount Polley Mining Corporation, as the areas become available for reclamation. Since 2005 will be a year focused on re-starting the mine, actual work on the ground will commence in 2006, but 2005 will remain the start of this five-year reclamation plan. The slopes and platforms for the majority of the East RDS will be reclaimed starting in 2006, as these parts will no longer be required for waste placement during any future plans of mining at the site. The low-grade stockpile, which is located on the west side of the East RDS at the 1150 platform, will not be reclaimed along with the other portions of the East RDS at this time, as it will be utilized throughout the next phase of mining operations. Since the Bell Pit will be the first pit completed during this phase of mining, the North RDS will be the next target of reclamation. The slopes and platforms of this RDS will be reclaimed starting in 2007, but some of the work may be able to start even earlier. The Wight RDS may be partially completed towards the end of 2007, so starting in 2008, some of it can be re-sloped and prepared for further reclamation. The remaining part of the Wight RDS as well as the proposed Leach Pad, if applicable, are expected to be totally complete by the end of 2008, so reclamation work there will commence in 2009. All other disturbances at the site will be reclaimed after the scope of this five year plan. As is the case with many mines, exploration continues throughout the operating period in an effort to extend the length of the mine by finding new ore bodies. If new ore zones can be located, this will likely extend the life of the mine and, as a result, the reclamation plan for the final year or two of this five year plan may change somewhat. All anticipated areas of reclamation for the next five years can be found in Table 3.4.16-1.

When the reclamation work for this five year plan has been fulfilled, a total of 68.92 Ha will be re-contoured, 238.04 Ha will be seeded, 223.35 Ha will be fertilized and 145.60 Ha will be planted with trees.

3.4.16.1. Reclamation Plan 2005

For 2005, 2.68 Ha will be seeded and fertilized. No re-contouring or tree planting will occur during 2005.

As mining operations will be resuming in mid-2005, much of the efforts of site personnel will be focused on moving the mining and milling work to full capacity in as short a time as possible. Therefore, all reclamation work planned for this year will consist of continuing the stabilization program at the mine. Some new areas may be seeded and fertilized during 2005, or may be deferred to 2006, depending on when the soil stockpiles and collection ditch are constructed. As can be seen in Table 3.4.16-1, there will be 2 Ha of soil stockpiles that will need seeding and fertilization. Additionally, there will be an addition to the Waste Dump Diversion Ditch (WDDD), which will collect runoff from the proposed Wight RDS. This addition to the ditch will encompass an area of approximately 0.68 Ha and will be seeded and fertilized in a similar fashion as the soil stockpiles.

3.4.16.2. Reclamation Plan 2006

For 2006, 10.93 Ha will be re-contoured and 1.31 Ha will be seeded & fertilized. No tree planting will occur in 2006.

The reclamation plan for 2006 will focus on the re-sloping of East RDS slopes as well as the placement of till, rock fines and soil on the platforms and slopes of this RDS. Further, there will be a small amount of seeding and fertilization as part of the stabilization program. More specifically, approximately 10.93 Ha of slopes of the East RDS will be re-sloped to their final geometry of 26.5º. Since 2 Ha of slopes on the 1150 platform of the East RDS have already been re-sloped to it's final geometry, a total of 12.93 Ha of slopes will be available for further reclamation work at this RDS. A total of 21.70 Ha of platforms from the East RDS will be ripped, prior to the placement of stockpiled till and rock fines that are presently sitting on top of the 1150 platform. Once the till and rock fines have been spread, soil will be placed across these platforms and slopes of the East RDS. Combining the slopes and platforms mentioned previously, a total of 34.63 Ha that will be partially reclaimed during 2006. Seeding, fertilization and tree planting is scheduled for 2007. Details of the areas targeted for reclamation in 2006 can be seen in Table 3.4.16-1.

An estimated 92,000 m^3 of till and rock fines has been stockpiled on the 1150 platform of the East RDS. When the re-sloping of the slopes on this RDS has been completed and the platforms have been ripped, this material will be spread over the slopes and tops. While this material does not meet the specifications of the growth medium that will be used for reclamation at the site, it will be able to create an excellent base, covering the larger boulders and filling any large gaps in the slopes. This will keep more of the prime growth medium closer to the surface, resulting in the use of less material for this part of the project.

The spreading of the overburden from the soil stockpiles will follow the spreading of the till and rock fines. The timing of this work will depend on the availability of equipment, but since the re-sloping work and spreading of the till & rock fines needs to happen prior to the placement of any soil, this work is not expected to occur until the latter half of 2006. The soil from the stockpiles will be spread across the slopes and platforms to the prescribed depth of at least 15 cm. Based on a thickness of 15 cm covering an area of 34.63 Ha, a minimum of 51,945 m^3 will be spread across the slopes and platforms of the East RDS. Additionally, the 92,000 m^3 of till and rock fines that was spread across this area prior to the application of soil will add an additional 26 cm to the overall thickness that covers this RDS.

A continuation of the stabilization program at the mine will see a small area of the soil stockpiles seeded and fertilized during 2006. As can be seen in Table 3.4.16-1, there will be 1.31 Ha of soil stockpiles that will need seeding and fertilization. In addition, if the soil stockpiles and WDDD Extension was constructed too late during 2005, the 2.68 Ha associated with these items will also be seeded and fertilized during 2006.

As the development of the North RDS continues through 2006 from the previous year, there may be opportunities to reclaim some of the completed sections of this RDS during 2006. Some of the completed 10 metre slopes can be re-sloped to their final geometry of 26.5º and the completed platforms can be ripped. Also, the soil that is stripped from the expanding footprint of this RDS can be placed on the completed sections that have been re-sloped and ripped. And if this re-contouring and soil placement work is complete, it can be seeded, fertilized and planted with tree seedlings as per Section 3.4.6. However, the details of the reclamation of the North RDS will be included for the Reclamation Plan 2007 and 2008, found in Section 3.4.16.3 and Section 3.4.16.4, since the schedule has the reclamation of the North RDS planned for the years 2007 and 2008.

3.4.16.3. Reclamation Plan 2007

For 2007, 7.15 Ha will be re-contoured and 34.63 Ha will be seeded, fertilized and planted with trees..

The Bell Pit will be the first pit to be completed of the remaining ore bodies at Mount Polley. The present mine plan has scheduled the completion of the Bell Pit, and therefore the North RDS, during 2007. The Wight Pit will continue production through the end of 2007 and perhaps into 2008, depending on the continued exploration drilling program in this area of the mine. Also, the Springer Pit will come online during 2007, as the Bell Pit winds down. The Bell Pit will become part of the combined Cariboo/Bell Pits RDS and will be backfilled with waste from the Springer Pit as it is developed and mined starting in 2007. Consequently, it will not be reclaimed in any fashion during 2007. Therefore, the 34.63 Ha of the East RDS slopes and platforms, as well as the 7.15 Ha of the North RDS slopes and platforms will be available for reclamation in 2007. Details of the areas targeted for reclamation in 2007 can be seen in Table 3.4.16-1.

The 7.15 Ha of slopes that will be part of the North RDS upon completion in 2007 will be re-sloped to their final geometry of 26.5º. All slopes will have a maximum height of 10 metres, which will make the re-sloping work very small and cost-effective compared to the higher slopes that exist on the East RDS. The platforms, which will make up the remaining 24.66 Ha, will be ripped prior to the placement of any growth medium. Therefore, the total area that may be reclaimed during 2007 could be as much as 66.44 Ha, of which 31.81 Ha will be on the North RDS and 34.63 Ha will be on the East RDS. Both the East RDS and North RDS will be reclaimed with growth medium that has been excavated from its footprint.

Prior to the expansion of each new platform of the North RDS, all recoverable soil will be stripped and stockpiled on top of the existing platforms of the North RDS. This may allow for reclamation of parts of this RDS in 2006, but for the purposes of planning reclamation, 100% of the disturbance for the North RDS will be scheduled for re-contouring, ripping and soil spreading in 2007 and seeding, fertilizing and tree planting in 2008, since we cannot predict exactly how the North RDS will develop from month to month during 2006. Growth medium will be spread to a thickness of at least 15 cm, which equates to a volume of 47,715 m^3 for the entire 31.81 Ha.

Since the East RDS was prepared with growth medium during 2006, it will be seeded with grass and fertilized to the specifications stated in Section 3.5.4. The slopes will be hydro-seeded with a grass mixture that also contains fertilizer. The platforms, on the other hand, will be seeded and fertilized using a hand-seeder or seeded from the back of a quad. Following seeding and fertilization, trees will be planted at a rate of 2,000 stems/Ha. The slopes and platforms of the North RDS will follow the same seeding, fertilization and tree planting prescriptions as is set out for the East RDS during 2007. If, on the other hand, the growth medium is not spread over the North RDS in time for a spring or fall seeding schedule or for a spring tree planting schedule, then this work will be deferred until 2008 for the North RDS only. The reclamation schedule shows the seeding, fertilization and tree planting for the entire 31.81 Ha of the North RDS to be completed in 2008, but the details of this work are included here, in the reclamation plan for 2007, as there may be an excellent opportunity to complete this work during this operating year. All other reclamation considerations for the North RDS can been found in Section 3.4.6.

3.4.16.4. Reclamation Plan 2008

For 2008, 10 Ha will be re-contoured, while 46.81 Ha will be seeded, fertilized and planted with trees.

While the Wight Pit is scheduled to be complete by the end of 2007 or the start of 2008, we will not plan the total reclamation of the Wight RDS until after 2008, in case there is additional ore found in the pit which would require mining into 2009 and additional use of the Wight RDS after 2008. Therefore, only 10 Ha of slopes (~50%) and 5 Ha of tops (~30%) of the Wight RDS will be scheduled for reclamation during 2008. In addition to work on the Wight RDS, the seeding, fertilization and tree planting is scheduled for the North RDS during 2008. The entire disturbance of the North RDS, including slopes and platforms, will encompass a total of 31.81 Ha. As was mentioned in the previous section, some or all of this work may be completed during 2006 & 2007, as the North RDS is reclaimed platform by platform. However, for scheduling purposes and because the window is narrow each year for seeding and tree planting, this part of the reclamation work is set for 2008. All details regarding the reclamation for the North RDS has been included in the reclamation plan for 2007, found in Section 3.4.16.3. Also, details of the areas targeted for reclamation in 2008 can be seen in Table 3.4.16-1.

When completed, the Wight RDS will have a total of 19.72 Ha of slopes. During 2008, approximately 10 Ha will be re-sloped to a final geometry of 26.5º and approximately 5 Ha of platforms will be ripped in preparation for reclamation. The Wight RDS will be constructed somewhat differently than the East RDS, in that it will be constructed with a maximum of 20 metre lifts, so that the re-sloping costs will be minimized. Growth medium will be sourced from a soil stockpile located adjacent to the Wight RDS. It will be spread to a minimum thickness of 15 cm. However, as is the case with the East RDS, there may be excess overburden stockpiled from the area of the Wight Pit. If this is the case, there may be additional overburden available to cover these areas of the Wight RDS. Based on the 15 Ha that is planned to be covered with growth medium during this operating year, a thickness of 15 cm equates to a volume of 22,500 m^3.

Once the growth medium has been suitably spread across the target area, it will be seeded with grass and planted with trees to the specifications stated in Section 3.5.4. The slopes will be hydro-seeded with a grass mixture that also contains fertilizer. The platforms, on the other hand, will be seeded and fertilized using a hand-seeder or seeded from the back of a quad. After grass seeding and fertilization, trees will be planted at a rate of 2,000 stems/Ha. All other reclamation considerations for the Wight RDS can been found in Section 3.4.6.

3.4.16.5. Reclamation Plan 2009

For 2009, 37.49 Ha will be re-contoured, while 58.15 Ha will be seeded, fertilized and planted with trees.

The year of 2009 will see the most aggressive reclamation at Mount Polley of this five year plan. The main reason being is that the Wight Pit is expected to be exhausted by this time, leaving the remaining unreclaimed area of the Wight RDS available for reclamation. As the slopes of the 1115 platform of the East RDS will also no longer be required, they will also be re-sloped and reclaimed. And the proposed Leach Pad, if implemented, is expected to be complete and ready for reclamation in its entirety as well. The remaining area of the Wight RDS includes 9.72 Ha of slopes and 10.07 Ha of platforms for a total of 19.79 Ha. The slopes of the 1115 platform provide a total of 6.11 Ha. And the Leach Pad is designed to have slopes totalling 21.66 Ha and a platform of 10.59 Ha for a total disturbance of 32.25 Ha. As stated in the previous section, the Wight RDS will be constructed with a maximum of 20 metre lifts, allowing for less costly and less time consuming re-sloping work. Also, the Leach Pad will likely be constructed with even shorter lifts (perhaps 6 metres or so), but will certainly be no greater than 20 metres. Details of the areas targeted for reclamation in 2009 can be seen in Table 3.4.16-1.

The slopes of the Wight RDS, East RDS and the Leach Pad will be re-sloped to their final geometry of 26.5º. The platforms will be ripped in preparation for placement of growth medium. Each of the Wight RDS, East RDS and Leach Pad will source growth medium from stockpiles located adjacent to their locations. As with the other previously reclaimed areas, the growth medium will be spread across the slopes and platforms to a thickness of at least 15 cm, which equates to a total volume of material for all three locations of 87,225 m^3. However, as with the earlier reclamation of the East RDS, if there is an excess of overburden from the Wight Pit area, it may be used to increase the volume of material placed on all of these locations.

Once the growth medium has been suitably spread across the target area, it will be seeded with grass and planted with trees to the specifications stated in Section 3.5.4. The slopes will be hydro-seeded with a grass mixture that also contains fertilizer. The platforms, on the other hand, will be seeded and fertilized using a hand-seeder or seeded from the back of a quad. After grass seeding and fertilization, trees will be planted at a rate of 2,000 stems/Ha. All other reclamation considerations for the Wight RDS, East RDS and Leach Pad can been found in Section 3.4.6.

While we have included the area of the Leach Pad in this five year reclamation plan, this mining technique has not been submitted to the Ministry of Energy and Mines for approval at the time that this report was written. As a result, the reclamation of the Leach Pad has simply followed the same techniques and considerations as the rock disposal sites. This logic was followed since the oxide copper material from the Springer Pit, which will make up the Leach Pad, will be placed as waste in the same location if the leaching technique is not implored. As a result, the Leach Pad will simply be an addition to the East RDS. If the leaching technique is approved and utilized at Mount Polley, then we expect the reclamation techniques to be changed somewhat for the Leach Pad.

3.5. *Reclamation Methodology*

The following sub-sections provide a broad overview of the methods that will be employed during all phases of reclamation. These methods may be modified as additional information is gained from the reclamation research program.

3.5.1. Site Preparation

All sites will require some form of preparation to provide a suitable environment for seeding or transplanting. Areas of compacted rock and till mixtures are normally the most difficult to prepare and will require scarifying to a depth of between 15 and 25 cm, using available heavy equipment. Compacted waste rock surfaces can normally be “roughed up” with a bulldozer equipped with multiple rippers. During Phase I of the reclamation research program in 1998, excellent results were achieved with the use of rippers mounted on the back of the Cat 16G Grader. Because this is a rubber-tire machine, it did not re-compact the scarified surface as much as the D10 Cat, and productivity was about the same as with the dozer, if not better.

RDS slopes and crests will be re-contoured within the limitations of equipment to operate in such locations, in order to integrate their sharp relief into the surrounding terrain, to optimize slopes for plant propagation and to provide surface drainage and erosion control. A cover of salvaged soils will be placed on top of the RDS slopes and surfaces.

Where access is possible (primarily access ramps to water elevation), surface materials will be spread on the open pit benches prior to planting.

Before the final pond in the TSF is allowed to fill, efforts will be made to create islands, bays and channels in the bed of the pond, increasing the amount and complexity of waterfowl habitat. The top of the embankments and the upland portions of the exposed tailings beach will be tilled to a depth of 5 to 10 cm, using a commercial disc and harrow, or with other typical farming type equipment.

Foundations in the mill site area will be broken down to ground level and covered with a layer of overburden and soils. Compacted areas will be scarified to a depth of between 15 and 25 cm prior to planting.

For some roads, side cast material and cutbanks may be recovered and re-sloped with a backhoe and then spread over the road surface, otherwise, road surfaces will require only scarification. Cutbanks will be re-contoured below the angle of repose to minimize future slumping.

Surface runoff channels will be upgraded to accommodate design capacity, stabilized with rip-rap and cleaned out to minimize the possibility of new channels from interfering with newly prepared areas. Riparian areas will be covered, wherever possible, with organic material salvaged from the immediate area.

3.5.2. Overburden and Soil Stockpiles

Soil Salvage and Stockpile Requirements

A Soil Salvage and Stockpile Protocol was created by Mount Polley in 1997, based on work conducted by Blashill (1995b, 1995c) and Meister (1997). This report is updated annually and submitted with the Reclamation and Environmental Report each year, as test pits and soil surveys are conducted from year to year. In accordance with this protocol, site-specific soil surveys are undertaken before soil salvage operations. The soil surveys determine the depth of the soil layers than can be salvaged at each location. All available soils are salvaged. This will include surface humus layers, and lower B horizons down to the level of the effective rooting depth. The B-horizons to be salvaged include the Bm, Bf and Bt layers. The Bm (brown) and Bf (reddish brown) horizons are recognizable by colour. The Bt is most easily recognized by the presence of clay skins (shiny surfaces on the soil peds). In the absence of diagnostic colour for the Bt horizon (i.e. colour is similar to the C), depth will govern the salvage. All soil will be salvaged to the bottom of the effective rooting zone. If roots are still visible after an initial scraping, then another pass will be required to salvage all available soil materials.

Salvage in soils shallow-to-bedrock will require care when stripping. Rock rubble from the fractured bedrock surface may become incorporated into the stockpile, reducing topsoil quality. Machine blades will be raised to avoid the rubble while still removing the soil. Very thin soils (<10 cm) will not be stripped at all, since too much rock rubble would be lifted. The C-horizon material underlying the topsoil horizons can be used for supplemental reclamation and contouring. This will be stripped and piled adjacent to the topsoil stockpiles, if required, or in other designated areas. Organic soils from wetlands are recognized by their black colour and mucky texture. Organic soils, which occur in depths up to 2 m, will be salvaged and stockpiled separately from the topsoil.

Earth-movers are ideal for scraping upland topsoil, since depths can be regulated. Excavators and gravel trucks work well for salvage or organic soils, due to the saturated conditions. The preceding guidelines will apply to open slope salvage, road access routes and other mine and mill area disturbances.

Soil Quality and Erosion Control

The maintenance of soil quality and elimination of erosion in the stockpiles are critically important to the final reclamation objectives. The stockpiled B-horizon soils will be of high quality. These loam soils generally have a coarse fragment content of less than 30% and they will make excellent reclamation materials when mixed with humus layers. Care must be taken when stripping soils that are very shallow over bedrock, to avoid incorporating excess rock rubble into the topsoil stockpiles. For all soil salvage operations at Mount Polley to date, if there is less than 10 cm of soil over bedrock, no salvage of soil occurs in these areas.

Comprehensive measures are implemented to prevent the erosion of soil stockpiles, especially during heavy summer rainstorms or spring snowmelt. Topsoil stockpiles are located at least 10 metres away from excavated cuts, steep slopes or active streams. They are not located near the headwalls of steep, gullied or unstable terrain. Silt fencing is installed around the perimeters of all soil stockpiles as required, according to a standard design. Wherever run-off from the stockpiles may become concentrated, hay bales are placed upslope of the silt fences, to slow the force of the run-off. Settling ponds, lined with filter fabric, are established upstream of ephemeral creeks, gullies and draws. Clean water will drain from the settling ponds through small culverts. Ditches and berms are built to direct excess run-off into forested or flat areas, for infiltration into the soil. After the silt fences, settling ponds and diversions have been installed, the surface of the soil stockpiles are seeded with the domestic grass-legume mix described in Section 3.5.4, to provide further erosion control. All these erosion-prevention measures will remain in place until the topsoil is replaced during reclamation.

Soil Replacement

Following the removal of the mill site infrastructure and surface preparation, the stockpiled soils will be replaced on the mill site. Unweathered soil parent materials (C-horizon materials or "overburden") may be used to increase soil depth where soils are shallow over bedrock. Where available, stockpiled organic soils will be mixed with stockpiled B-horizon and LFH-horizon materials, and the mixture will then be replaced on upland areas.

3.5.3. Growth Media and Soil Amendments

For successful growth, most plants require a medium that provides adequate root penetration, aeration, moisture and nutrients. As outlined above, topsoil and overburden is stockpiled wherever possible, for later use as a growth medium during reclamation. Presently, there is approximately 92,000 m^3 of till stockpiled on the 1150 metre platform of the East RDS. Also, there is approximately 65,340 m^3 of till located southeast of the main embankment of the TSF. Preliminary information regarding the area that will become the Wight Pit shows that there may be a significant volume of till that will need to be removed prior to excavation at this location. If this is the case, it will likely be stored in a separate stockpile or on top of the East RDS, to be used during operational reclamation.

Phase I & Phase II of the reclamation research program, initiated in 1998 and continuing thru today, use various thicknesses or growth medium, as well as fertilizers, biosolids and even tailings, to test which combination will be best suited for the site-specific conditions at Mount Polley. Because of the excellent results from the use of biosolids in the test plots, a large volume has been stockpiled in a specific area at the TSF, to be used in the reclamation of the tailings beaches. When operations resume in 2005, Mount Polley may enter into a contract with the Greater Vancouver Regional District (GVRD) to bring more biosolids to the site, so that it can be used in the reclamation of the rock disposal sites. All other parameters of the reclamation research program can be found in the latest Reclamation Research Report from 2001, found in Appendix C.

3.5.4. Species Selection

Grasses and Seeding

All soil stockpiles are stabilized by seeding with a cover crop, consisting of a mixture of domestic grasses and legumes, suitable for the ICHmk Zone of Horsefly forest District. The typical domestic mixture of grasses that has been used on all stockpiles and for the majority of the reclamation work at Mount Polley is as follows:

- Canada bluegrass (*Poa compressa*) = 5 %
- red clover (*Trifolium pratense*) = 20 %
- white clover (*Trifolium repens*) = 5 %
- creeping red fescue (*Festuca rubra*) = 20 %
- redtop (*Agrostis alba*) = 2 %
- timothy (*Phleum pratense*) = 5 %
- birdsfoot trefoil (*Lotus corniculatus*) = 10 %
- sheep fescue (*Festuca ovina*) = 8 %
- ryegrass (*Lollum perenne*) = 25 %

When additional seeding work is required at the site, both for the stability of stockpiles, as well as for reclamation work, this same seed mixture will be obtained.

However, from year to year, the seed supplier may slightly change the composition of the mixture and obtaining precisely the same mixture may not be possible. If this is the case, then the closest combination of seed is purchased for this work. This general-purpose silvicultural wet seed mix is suitable for the Interior Cedar-Hemlock Zone. Application rates vary, but have typically been about 35 kg/ha on most areas. A nitrogen fertilizer is also typically applied at a rate of about 100 kg/ha at the same time as the seed, to provide a ready nutrient for the seed as it establishes itself. Seeding for the majority of the site usually occurs in the early spring period, as the saturated ground has an ample supply of moisture to help in the germination process. When seeding has been done on the tailings beach, it is typically done in the early or late winter period, as the tailings is frozen and it is much easier to spread the seed at this time.

Establishing this cover crop provides a number of benefits (Lloyd et al. 1990). It stabilizes the soil and prevents the loss of fines through water and wind erosion. Establishing the cover crop also increases the aesthetic appeal of reclaimed areas, improves soil texture and fertility and prevents the invasion of undesired weedy species. It also provide forage for domestic livestock, and for wild ungulates, particularly mule deer.

However, indiscriminate seeding may result in the establishment of tall dense stands of grass that are not grazed, but which also retard the establishment of conifers and native vegetation (Lloyd et al. 1990). Successful establishment of forage species depends upon species choice, rate of seeding, seedbed quality and the time of application. Silvicultural seed mixes typically include rapidly establishing, short-lived species as well as slowly developing, longer-lived species. The clovers are typically added for their role as hosts of nitrogen-fixing microbes.

Creeping red fescue is an aggressive rhizomatous species which establishes well and becomes the dominant species after two years in both the ESSF and ICH Zones, tolerating a wide range of site conditions (Steen and smith 1991). However, its dense and vigorous growth can damage young crop tree seedlings. In field trials in the ESSF and ICH Zones, first-year establishment of orchard grass is less dense than either creeping red fescue or perennial ryegrass. Clover and alsike are often seeded on blade-scarified areas, to aid the restoration of soil nitrogen levels. However, their establishment success is sometimes poor at high elevations in the Horsefly Forest District, where birdsfoot trefoil (*Lotus corniculatus*) may be more successful (Steen and Smith 1991).

Shrubs and Forbs

Wildlife habitat and commercial forestry will be the principal end land uses of reclaimed areas at Mount Polley. Thus, there must be a careful evaluation of which species are considered “desirable” or “undesirable” from a reclamation perspective. Some native species that are usually considered “weedy” by silviculturalists (for example Sitka alder, devil’s club or fireweed) may be valuable to wildlife. Although they may compete with commercial tree species, mountain and Sitka alder are ecologically important because they can fix atmospheric nitrogen, and because they are adapted to colonizing steep, nutrient-poor mineral soils (Haeussler et al. 1990).

Hallam Knight Piésold (1995) has compiled a list of plant species that appear to be heavily used by moose and deer at Mount Polley, as indicated by range surveys conducted in 1995. Preferred forage species in the mine area include western mountain-ash, red-osier dogwood, saskatoon-berry, Scouler willow, gray-leaved willow, Bebbian willow, other willows, Douglas maple, falsebox, baldhip rose, snowberry and red elderberry. The young shoots, but not mature plants, of fireweed are often heavily nipped. Species that are occasionally and lightly utilized are: black buckleberry, black twinberry, black cottonwood, sub-alpine fir seedlings, Douglas-fir seedlings, highbush cranberry, black gooseberry, prickly rose and fringed aster. Besides providing forage for ungulates and snowshoe hares, many of these plants are good berry-producers, and an important seasonal food sourced for black bears, marten, robins, thrushes and waxwings. Together with alder, these native plants are the most desirable shrub and forb species for the reclamation of upland sites at Mount Polley.

Except for red-osier, black cottonwood, Douglas-fir and sub-alpine fir, few of these plants are readily available from commercial nurseries or tree nurseries. Thus, if they are to be used in reclamation, some means of propagating these plants from local sources must be developed. Haeussler et al. (1990) have reviewed the scientific literature on the autecology of most of the plants on this list, including studies of seed production, natural seed banking, seedling survivorship and vegetative propagation. Haeussler et al. (1990) are a useful primary reference source for the selection of species and propagation methods for the plant materials used in the reclamation program at Mount Polley.

The primary source of propagules for native plant materials will be topsoil stockpiles. If fresh, then soil stockpiles will contain a rich and varied bank of soil microbes, dormant seeds, winter buds, root cuttings and offsets, which have already been pre-selected for sites where they will be used. Fresh topsoil has been stripped from the surface of the rock disposal sites, mill site area, pit areas and TSF area, prior to the construction within these areas. During reclamation, the stockpiled topsoil will be re-distributed across reclaimed areas, to condition the soil surface, and to re-introduce the native flora and soil fauna onto the site.

Tree Species Selection

Steen (1989) does not provide silvicultural stocking standards for any biogeoclimatic zone or subzone in the Cariboo Forest Region. However, Lloyd et at. (1990) do provide stocking standards for the ICKwk1 in the Kamloops Forest Region, and Banner et al. (1993) give detailed stocking standards for the ICHwc of the Prince Rupert Forest Region. Mr. Bill Ashman and Mr. Wayne Johnson, who are timber and range officers with the Horsefly Forest District, were asked to recommend stocking standards for the ICHmk zone and the Mount Polley project area (pers. Comm.. to D. Karasiuk).

Suggested stocking standards for the project area given in Table 3.4-1. These silvicultural standards provide useful guidelines for the selection of tree species and planting densities for each of the reclamation units in the project area.

At closure, the exposed subaerial portions of the open pits would have similar moisture and nutrient characteristics to an exposed rock knob or ridge crest, covered by a thin veneer of till or colluvium (Site Series 02 or 03). On such sites, the preferred species would be lodgepole pine and Douglas fir.

The East RDS, Wight RDS, Leach Pad, North RDS and Cariboo/Bell Pits RDS will be composed of shattered waste rock with a variable texture, ranging from large boulders (<50 cm diameter) downward to fine gravel. The resulting landform, with the exception of the Cariboo/Bell Pits RDS, will resemble a medium-textured colluvial fan or apron, with a slope below the angle of repose. The underlying material will be free-draining and pervious, with a very low likelihood of duripan formation. After the replacement of stockpiled topsoil, the level to gently sloping surfaces of the rock disposal sites will have a nutrient and moisture regime that approximates the 01 or 05 Site Series. For such sites, the preferred silvicultural species would be Douglas-fir, lodgepole pine and hybrid spruce. The steeper slopes on the margins of the RDS areas are slightly more coarse-textured and free-draining, and their moisture and nutrient regimes will approximate the 02 or 03 Site Series. On such sites, the preferred silvicultural species would be Douglas-fir and lodgepole pine, while hybrid spruce would be an acceptable alternative species.

The existing vegetation of the mill site area conforms to the 05 and 06 Site Series, although the vegetation was extensively modified by logging in the 1970's and the area has now been entirely cleared. The mill site area is located on a gently sloping plain, with small inclusions of organic soil and lacustrine deposits. Some forest stands near this area contain indicators of a high moisture and nutrient status. The preferred silvicultural species for reclamation would be hybrid spruce, Douglas-fir and lodgepole pine, while western red cedar is an attractive alternate species. The stocking standards of 05 or 06 would probably apply.

Prior to mine development, the tailings area was a gently rolling to nearly flat morainal plain, in which the till overlies discontinuous lacustrine deposits. There were two inclusions of organic terrain within the tailings area, as well as a small bog pond. The vegetation was heavily modified by clearcut logging in the

1970's, but a tract of mature forest remained in the centre of the area. The original vegetation conforms to the 06 and 07 Site Series, with a high moisture and nutrient status, and with areas of impeded drainage. The preferred species for silviculture on such site series are hybrid spruce, western red cedar and lodgepole pine.

Stocking standards are the recommended densities of seedlings to be planted on each site type, and the recommended densities of pole saplings that can be expected to reach the free-growing stage. These stocking standards were developed for silvicultural purposes, where the end land use is commercial timber production based on conifers. The target stocking rates would be 1100 to 1300 seedlings/ha at the regeneration stage, and 1000 to 1200 seedlings at the fee-growing stage. For forestry purposes, the minimum stocking at the free-growing stage would be 500 to 700 saplings, and plantations could be expected to take 9 to 15 years to reach the free-growing stage.

Weed Control Program

In this reclamation plan, the definition of what constitutes a "weed" species has been interpreted in terms of the wildlife and biodiversity guidelines of the *Forest Practices Code*. Non-commercial native trees and shrubs, such as Sitka and mountain alder, willow, black cottonwood, paper birch and trembling aspen, are valuable components of wildlife habitat, even though historically there has been little demand for these species by commercial timer interests. Similarly, native pioneer herbs, such as fireweed and common horsetail, are efficient colonizers of disturbed areas and provide useful forage for deer and black bears, but were once viewed as weeds because they compete with conifer seedlings.

For the purposes of this reclamation plan, a "weed" is defined as an invasive, *non-native,* pioneer plant species, which retards the natural succession of native plant communities. Under this definition, no native plants are considered weeds. Further, the requirements for weed control are much less stringent than they would be if livestock grazing was the primary end land use objective.

No herbicides will be used to control native plant species. Herbicides need only be used to control localized, dense infestations of non-native noxious weeds.

Where it proves necessary to suppress dense plant growth (such as along roads that are currently in use) hand-clearing or mechanical clearing will be the method of choice.

The weed control program will thus consist of:

- seeding and planting all disturbed areas as soon as possible, to establish a cover crop of the desired species for each site;
- regular monitoring to identify infestations of non-native noxious weeds; and
- immediately controlling noxious weed infestations with appropriate doses of government-approved herbicides. It is expected that the requirement for herbicide use will be minimal, if any at all.

3.6. *Reclamation Research Program*

3.6.1. Existing Research (1998 thru 2004)

Mount Polley started a multi-phased reclamation research program in 1998 that continues through today. Phase I focused on the reclamation of the tops of the rock disposal sites while Phase II focused on the slopes of the rock disposal sites. Both phases are located on the East RDS, with Phase I on the 1170 platform and Phase II on the slope between the 1170 & 1150 platforms. In 1998, 25 plots, each 15 m^2, were established on the top of the East RDS to test the response of grasses and tree seedlings to various thicknesses of soils, the use of fertilizer and various concentrations of biosolids. In 1999, an additional 11 plots were added to the overall configuration, to repeat some of the prescriptions as well as test the use of tailings as an amendment to the growth medium. In 2000, Phase II of the reclamation research program was initiated, were a total of 12 plots were created on the re-sloped surface between the 1170 & 1150 platforms of the East RDS. These plots tested various soil thicknesses as well as the use of biosolids in a similar manner to the Phase I plots.

Each year in September or October, starting from 1998 thru 2001, the trees on each of the plots are monitored for parameters such as total height, leader height, diameter at base and vigour. This data is collated and presented in an annual report each year which is written by a consultant hired by Mount Polley. This report is then included with the annual reclamation report that is submitted to the Ministry of Energy and Mines in March of the following year. The last of these reports from information collected in 2001 can be found in Appendix C at the end of this report.

Starting in 2002 and continuing thru 2004, there was also an attempt to grow grass on the tailings beach while the mine was in a care and maintenance period and the TSF was not operating. Through visual observations, Mount Polley personnel could see vegetation growing on the beach in the spring and summer months of 2002. It was believed that this was due to the manure from the cattle that graze in the area during this period, combined with native seeds blown onto the beach from the surrounding areas. To test if grass could grow on the tailings beach under these conditions, but with a greater concentration of seed spread across the area, a typical grass seed mixture was purchased and spread across about 8 Ha of the beach at the northeast corner of the TSF. The results of this work were quite surprising as grass did germinate the following spring in 2003 after the winter seeding program of 2002. There was no formal research conducted on this area of the TSF, but photos were collected in 2003 and 2004 to record the success of the work. This information may be useful for the phase of the reclamation research program which will focus on the reclamation of the TSF in its entirety.

Photos of the most recent reclamation research are included in Appendix F.

3.6.2. Proposed Research (2005 thru 2009)

Once mining commences again at Mount Polley starting in 2005, several new phases of reclamation research will be initiated to help answer any remaining questions about the reclamation and closure of the Mount Polley property. In addition to this new research, the existing two phases will be monitored annually to continue collecting data and strengthening the existing assertions.

Phase III will likely focus on the reclamation of the TSF. One or several plots will be created to test various thicknesses of soil and the use of biosolids on the reclamation of the beach, as well as the success of a variety of species for the wetland portion of the TSF. The location of the plot for this research will be located in the vicinity of the TSF, but the exact location will be chosen by site personnel during 2005.

Phase IV will focus on the metal uptake of plants from each of the existing test plots at Mount Polley. This research will simply require the collection of various grass and legume species that may be forged by cattle and other ungulates at the site. The samples will be analyzed for metal content to see which plots provide for the least concentration of metal uptake by the species that have grown since the plots were established.

Phase V will be the final phase of reclamation research and will focus on the drainage chemistry from each of the mining units that will remain upon the permanent closure of the mine. Each part of this phase of the research is listed below:

- The East RDS provides the longest-term research from the seepage that originates from under its footprint. This full size plot will be used to determine the drainage quality that is expected from the other rock disposal sites that will be established over the next five years.
- While the Cariboo/Bell Pits RDS will be active through 2009 and beyond, there may not be much data that can be collected from this unit for research. However, the present mine plan expects to keep some water in the Cariboo Pit as it is developed, so the collection of regular water samples may be possible as it is developed. The drainage chemistry may behave differently as it will have water interacting with the area that was the ore zone and may also have PAG material buried below water elevation.
- The drainage from the Wight Pit may be very different from that of the other three pits, since it will likely fill very quickly once it is complete, due to it's

excavated depth and proximity to Polley Lake. Regular sampling from the dewatering pumps will provide data to help in predictions of this unit.

- The TSF is the final area that will require research into what the final quality of the drainage chemistry will be once mining ceases. Fortunately, a significant volume of data has been collected during the care and maintenance period while the TSF was dormant. This data, along with drainage collected from the Phase III test plot(s) will help in making this determination.

4. ACID ROCK DRAINAGE & METAL LEACHING ASSESSMENT

4.1. *Overview*

During the operational period between 1997 and 2001, a detailed waste characterization program was conducted to identify all excavated materials so that they can be disposed of in the appropriate manner to ensure long-term chemical stability. The data collected during each year of operation was collated and included in the Annual Reclamation Report submitted to the Ministry of Energy and Mines. For the final year of operations, a separate waste characterization report was submitted in April 2004 with the data that was collected in 2001, along with follow-up data collected in 2002. Since the Cariboo Pit provided the majority of ore through the four-year operating period, it also provided the vast majority of waste rock, low-grade ore and tailings that were excavated and deposited. Nearly all the remaining volume of waste rock, low-grade ore and tailings was generated from the Bell Pit. Only a minor amount of waste rock was generated from the starter Springer Pit, so that 90,000 tonnes of ore could be removed for testing purposes. A break-down of the sources and destinations of all excavated materials for this period can be found in Section 4.2.

This ARD/ML Assessment is broken down into two parts: (1) an assessment of the existing condition at the site; and (2) an assessment of what is expected for the proposed mining plan from 2005 thru 2009. In the first part, Section 4.2, a summary of the existing data will be reviewed, including Neutralization Potential Ratios (NPR) and water chemistries associated with each of the disposal locations. In the second part, Section 4.3, a prediction for each of the new mining areas will be generated, based mostly on diamond drill core data from each of these zones. The tools that have been used for the characterization of the waste at Mount Polley include:

- Acid-Base Accounting
- Elemental Scans
- Metal Solubility Analysis
- Size Fraction Distribution
- Kinetic Rates from Humidity Cells
- Mineralogy Analysis
- Geological Characterization; and
- Drainage Chemistry

Since the details of all waste excavated and deposited at Mount Polley from 1997 thru 2001 have already been reported in the annual reports, the assessment found below will only be a review of some of this data, rather than a complete re-reporting in this document. A list of each of the Annual Reports and documents that hold this detailed information is as follows:

- **Annual Reclamation Report for 1997**, Mount Polley Holding Company Limited, Mount Polley Mine, Reclamation Permit M-200, March 31, 1998.
- **Annual Reclamation Report for 1998**, Mount Polley Holding Company Limited, Mount Polley Mine, Reclamation Permit M-200, March 31, 1999.
- **Annual Reclamation Report for 1999**, Mount Polley Holding Company Limited, Mount Polley Mine, Reclamation Permit M-200, March 31, 2000.
- **Annual Environmental and Reclamation Report 2000**, Prepared by: Mount Polley Mining Corporation, April 2001; Prepared for: Ministry of Energy & Mines, M-200 Permit AND Ministry of Environment, Lands and Parks, Permit PE 11678.

- **Annual Environmental and Reclamation Report 2001**, Prepared by: Mount Polley Mining Corporation June 2002; Prepared for: Ministry of Energy & Mines, M-200 Permit AND Ministry of Water, Land and Air Protection, Permit PE 11678.
- **Annual Environmental and Reclamation Report 2002**, Prepared by: Mount Polley Mining Corporation, July 2003; Prepared for: Ministry of Energy & Mines, M-200 Permit AND Ministry of Water, Land and Air Protection, Permit PE 11678.
- **2001 ML/ARD Waste Characterization – Final Report**, Prepared for: Mount Polley Mining Corporation; For submission to: Ministry of Energy & Mines; Prepared by: Greg Smyth with assistance from Mount Polley Mining Corporation, April 2004.
- **Annual Environmental and Reclamation Report 2003**, Prepared for: Mount Polley Mining Corporation; For submission to: Ministry of Energy & Mines AND Ministry of Water, Land and Air Protection; Prepared by: Greg Smyth with assistance from Mount Polley Mining Corporation, June 2004.

For the ML/ARD prediction of the proposed mining zones of the Wight Pit and Springer Pit, two additional reports will be referenced, which have also been submitted to the Ministry of Energy and Mines in past years. These reports are as follows:

- Mount Polley Mining Corporation, Mount Polley Mine, **Springer Pit Material Characterization Review 2001**, Prepared by: Mount Polley Mining Corporation, June 28, 2001.
- **Mount Polley Northeast Zone Geochemical Characterization of Waste Rock**, Prepared for: Imperial Metals Corporation, Prepared by: SRK Consulting Engineers and Scientists, Project Reference No: 1Cl008.00, July 2004.

4.2. *Assessment of Existing Pits, RDS's and Tailings Ponds*

Of the 24,993,553 tonnes of waste that makes up the East RDS, only 568,482 tonnes originates from the Bell Pit, with the remaining 98% of material coming from the Cariboo Pit. The North RDS has a total mass of 918,688 tonnes, all of which comes from the Bell Pit. And the Cariboo Pit Backfill has a total of 2,081,402 tonnes of waste, with 95% coming from the Bell Pit and the remaining 105,470 tonnes from the starter Springer Pit. The low-grade stockpile has a total mass of 2,712,181 tonnes, with 83% originating from the Cariboo Pit and the remaining 17% coming from the Bell Pit. And the Tailings Storage Facility (TSF) is presently holding 27,464,790 tonnes of material. The tailings originated exclusively from the Cariboo Pit in 1997 & 1998, but a small volume of ore was excavated from the Bell Pit in 1999 & 2000 to complement the main ore supply from the Cariboo Pit. For 2001, the Bell Pit supplied about 35% of the tailings, with the remaining 65% coming from the Cariboo Pit ore. Table 4.2-1 contains the break-down of waste rock, low-grade ore and tailings that was distributed throughout the site from 1997 thru 2001.

Each of the separate pits and waste disposal locations have been described below in the following six sub-sections. The Cariboo Pit & Cariboo Pit Backfill have been grouped together, since the waste and pit walls will interact together to produce the resultant drainage from this location. The Bell Pit and Springer Pit each have separate sections, since they are distinct units at this time. The East RDS and Low-Grade Stockpile are grouped into the fourth section, since the Low-Grade Stockpile is part of the 1150 platform of the East RDS. The North RDS has it's own section since it is not connected specifically with any other pit, RDS or stockpile. And the last section is the Tailings Storage Facility, which is separated from all other pits and disposal locations. Table 4.2-2 (2 sheets) summarizes some of the pertinent ABA parameters that are used to help establish the geochemical characterization of the waste units. Additionally, each sub-section below has an associated water chemistry data set, which is presented in tabular form along with a graphical representation of several of the parameters. The following parameters that are shown graphically will be:

- Nitrate + Nitrite (N)
- Ortho-Phosphorus (P)
- Dissolved Sulphate
- Total & Dissolved Aluminum
- Total & Dissolved Iron
- Total & Dissolved Copper
- Total & Dissolved Molybdenum; and
- Total & Dissolved Selenium

4.2.1. Cariboo Pit and Cariboo Pit Backfill

Presently, the Cariboo Pit Backfill contains a total of 2,081,402 tonnes of waste rock, originating almost entirely from the Bell Pit, with a small quantity (105,470 tonnes) from the Springer Pit. Of this total volume of waste rock, 69,214 tonnes is considered Acid Generating (AG) waste rock, 173,004 tonnes is considered Potentially Acid Generating (PAG) waste rock and the remaining 1,839,184 tonnes is considered Non-Acid Generating (NAG) waste rock. All AG and PAG waste rock originated from the Bell Pit. The Cariboo Pit Backfill has been divided into three rock disposal sites, as each RDS is distinct from each other either by the volume of waste rock deposited and/or by the characteristics of the waste rock. The Northeast corner of the Cariboo Pit Backfill is named the Cariboo Pit RDS, the North end of the Cariboo Pit Backfill is named the High Wall RDS and the Northwest corner of the Cariboo Pit Backfill is named the Springer RDS. Each of these names will likely be abandoned after the implementation of the mine plan for the 2005 thru 2009 period, since the completed Cariboo and Bell Pits will become one large rock disposal site, collectively named the Cariboo/Bell Pits RDS.

For the purpose of this review, all three sections of the Cariboo Pit Backfill will be considered together, since the drainage chemistry will be affected by all parts of this waste rock. The weighted average of the Total Neutralization Potential Ratio (TNPR) for the waste rock that has been deposited in the Cariboo Pit Backfill is 11.0, while the weighted average of the Carbonate Neutralization Potential Ratio (CNPR) is 8.1. As stated earlier, there is 242,218 tonnes of AG & PAG waste rock deposited with 1,839,184 tonnes of NAG waste rock, which equates to about 11.6% of the total volume. Alternatively, the ratio of NAG to AG/PAG waste rock is 7.6:1.

When reviewing the water chemistry data of the water from the Cariboo Pit, it is difficult to draw conclusions about how the waste rock from the Cariboo Pit Backfill is affecting this water. This is primarily due to the fact that there has been large volumes of water pumped from the TSF to the Cariboo Pit starting in late 2001 and continuing through 2004. The sources of water for the Cariboo Pit are: direct precipitation, snow melt and precipitation from some areas immediately surrounding the pit, runoff from the East RDS and Low-Grade Stockpile and supernatant from the TSF. The volume of water and associated dates that was transferred from the TSF to the Cariboo Pit is as follows:

- November 2001 = 483,417 m^3
- May 2002 = 513,000 m^3
- May 2004 = 517,666 m^3
- **Total from TSF = 1,514,083 m^3**

Further adding to this difficulty of assessing the drainage is that the runoff from the East RDS and Low-Grade Stockpile was only pumped to the Cariboo Pit in the spring of 2002 and 2003, but the practice was discontinued for the spring freshet of 2004. However, this runoff has it's own characteristics, as will be discussed in Section 4.2.4, when we look at the East RDS and Low-Grade Stockpile. Regardless of these caveats, a summary of the water chemistry for the Cariboo Pit thru the end of 2003 is provided in Table 4.2.1-1 (3 Sheets). No data beyond this period was available at the time that this report was prepared. Additionally, Figures 4.2.1-1 & 4.2.1-2 graphically represent several of the parameters listed in the table.

Dissolved sulphate levels typically ranged between 65 mg/L & 130 mg/L during the operational period thru the fall of 2001, but have had a much greater range for the post-operational period of between 10 mg/L & 130 mg/L. The increase from 10 mg/L to 120 mg/L in the spring of 2002 coincides with the transfer of approximately 500,000 m^3 of water from the TSF, as well as runoff coming from the East RDS seep named MP1. Concentrations in the TSF water are typical of the highs that are seen in the Cariboo Pit (median of 115 mg/L for post-operational data at the TSF), but the values in MP1 are much, much higher, ranging up to 850 mg/L. Dissolved sulphate levels remained high thru the end of 2002, but dropped off again in the spring of 2003, only to increase back to nearly 120 mg/L in the summer of 2003. The increase in the summer 2003 sample is likely due to the inputs from the MP1 site during the spring of 2003, since there was no water pumped to the pit from the TSF during spring 2003. Values for T-Cu have remained below 0.05 mg/L, with some values an order of magnitude smaller as well. T-Se has fallen off to below 0.03 mg/L, with one sample below 0.005 mg/L. T-Mo, however, has followed the exact same trend as dissolved sulphate. That is, it has mimicked the water quality of the TSF water or that from site MP1 when they were pumped to the Cariboo Pit. It ranged as high as 0.07 mg/L and as low as 0.015 mg/L during this post-operational period.

Because of the heavy water volume inputs from the TSF and site MP1, both of which have elevated dissolved sulphate values above the Cariboo Pit values, it is difficult to evaluate if sulphate levels are increasing due to the pit walls or the waste rock deposited in the North end of the Cariboo Pit. Therefore, further monitoring of this site is needed to better evaluate where the contributions are originating. At this point in time, it appears that any increases in dissolved sulphate or any metals in the Cariboo Pit water is entirely from the inputs from the TSF and site MP1, rather than from the pit walls and waste rock. Since the Cariboo Pit ore body was exhausted prior to the temporary closure of the mine in fall 2001, along with the fact that the Cariboo Pit waste rock generally has a very high TNPR value, the pit walls are not expected to generate acidity in the long-term. As for the waste rock deposited in the Cariboo Pit, the NAG to AG/PAG ratio of 7.6:1 is believed to be sufficient to buffer any acid generation that may occur from this waste rock. Finally, as will be discussed more thoroughly in Section 4.3.1, the waste rock in the Cariboo Pit will be excavated and removed as part of the mining plan to access the Bell Pit through the North end of the Cariboo Pit. Since there is some identified AG & PAG waste rock mixed in with the larger volume of NAG waste rock, most of the waste rock presently located in the Cariboo Pit Backfill will be relocated to the bottom of the Cariboo Pit, below the expected flood elevation. As a result, the geochemical stability of this waste rock will be improved in the long-term.

4.2.2. Bell Pit

Upon the cessation of mining in the fall of 2001, approximately 2 million tonnes of high-grade ore had been removed from the Bell Pit, but a significant ore body remained at this location. Based on pre-blast and post-blast samples from the Bell Pit for waste rock characterization, there was some AG & PAG waste rock located in the north-eastern side of the pit, ranging from the 1170 bench on down to the 1130 bench. Since there is ore remaining in the Bell Pit, it is expected that some of the walls on the East side of the pit, ranging from the 1170 bench down to the 1130 bench, may contain AG or PAG waste rock. Using the current configuration of the Bell Pit, the water elevation is expected to flood to a level of between 1055 metres and 1060 metres, as this is the elevation where the pit opens to the North. Therefore, long-term geochemical stability will exist for all walls from the Bell Pit below this point that may have some AG or PAG material. This leaves only two bench walls on the East side of the pit that may have some AG or PAG material exposed above the expected flood level. Confirmation testing of the pit walls that will remain above water in the long-term is necessary to identify if there is indeed any AG or PAG material. If there is any material, then a prediction model will be conducted to estimate if there is enough NAG material in the vicinity to buffer the effects of oxidation in the long-term. Section 4.3.1 will go into greater details about the future mining plans for the Bell Pit. It is expected that as the remaining Bell Pit ore body is mined out starting in 2005, any AG or PAG waste rock that may be in the walls above the expected flood elevation will be excavated and placed below flood elevation in the Cariboo Pit, thereby ensuring long-term geochemical stability for all of the walls of the Bell Pit.

The sources of water for the Bell Pit are groundwater infiltration, spring melt runoff and precipitation from some surrounding areas. Water only started to collect in the Bell Pit during the last few months of mining, starting in July 2001. Several samples where collected from the groundwater sump during these final days of mining the Bell Pit, but most samples have been collected since this time, after mining operations ceased. As a result, some significant differences in the water chemistry from the Bell Pit can be seen between the start of the data set in summer 2001 and after mining ceased in fall/winter 2001. Table 4.2.2-1 (3 sheets) contains the operational and post-operational statistics for the Bell Pit water thru the end of 2003. Also, Figures 4.2.2-1 & 4.2.2-2 graphically represent some of the parameters listed in this table.

Dissolved sulphate levels where the highest in the first sample from the Bell Pit in July 2001, with a concentration of nearly 420 mg/L. The last few samples of the operational period thru the fall/winter of 2001 returned values closer to 200 mg/L. Since this time, as the water in the Bell Pit increased in elevation, the values of dissolved sulphate have steadily increased from about 200 mg/L to 300 mg/L. No more data was available for the Bell Pit water at the time that this report was prepared, but clearly the concentrations were increasing for the first two years after mining activity stopped, and this trend may or may not continue on into the future. Because the Bell Pit did have a significant volume of sulphide ore remaining, it is likely that the sulphate concentrations are increasing due to the oxidation of this material. Values for T-Cu have remained very consistent at 0.02 mg/L and T-Se has remained flat at around 0.03 mg/L. T-Mo, however, has followed a similar trend as dissolved sulphate. It ranged from a low of about 0.07 mg/L at the start of 2002 to a high of nearly 0.23 mg/L at the end of 2003.

As with the water from the Cariboo Pit, T-Mo seems to be increasing along with dissolved sulphate. However, unlike the Cariboo Pit water, the Bell Pit water is not influenced by water from other sources with elevated levels of dissolved sulphate and T-Mo. Therefore, these two parameters are likely elevated due to the oxidation of the remaining ore that is exposed in the walls of the Bell Pit. Monitoring of this water quality site will continue on into the future to better understand the drainage chemistry from this pit and help predict the long-term concentrations from this location. Based on the five-year mine plan, which is expected to commence in 2005, the Bell Pit will be dewatered to the Cariboo Pit, so that the remaining ore body can be mined out. Should there be groundwater inflows during mining operations, this water will be monitored to add to the database for the ongoing ML/ARD prediction for this Pit.

4.2.3. Springer Pit

The Springer Pit only had 90,000 tonnes of ore removed in the fall of 2001, for testing purposes. Based on all diamond drilling work conducted to date in the vicinity of the Springer Pit, the top of this ore body is heavily oxidized, similar to some of the material that was encountered in the Cariboo Pit. All waste samples that were collected from the West side of the Cariboo Pit Backfill, named the Springer RDS, returned a median TNPR value of 16, with a maximum of more than 100. Since such a small quantity of material was excavated from the Springer Pit and all ore and waste rock for the top benches of the Springer Pit is known to consist of heavily oxidized material, long-term geochemical stability is expected. There are no seepages or water chemistry associated with this pit at this point, so there will be no discussion about water chemistry for the Springer Pit.

4.2.4. East RDS and Low-Grade Stockpile

Presently, the East RDS contains a total of 24,993,553 tonnes of waste rock, originating almost entirely from the Cariboo Pit, with a small quantity (568,482 tonnes) from the Bell Pit. All waste rock in the East RDS is considered NAG. The Low-Grade Stockpile, which is a lob on the western side of the 1150 platform of the East RDS, contains a total of 2,712,181 tonnes of low-grade ore, most of which originated from the Cariboo Pit. Only 342,088 tonnes, or 14% of the low-grade ore, came from the 1160 thru 1210 benches of the Bell Pit. As is the case for all of the waste in the East RDS, all of the low-grade ore in this stockpile is considered NAG.

For the purpose of this review, the East RDS waste rock and the low-grade ore are being considered together, since the drainage chemistry will be affected by both materials. The weighted average of the TNPR for the waste rock that has been deposited in the East RDS is 13.2, while the weighted average of the CNPR is 8.1. As for the low-grade ore stockpile, the weighted average of the TNPR is 9.8, while the weighted average of the CNPR is 5.0. It is not unexpected that the low-grade ore has a lower TNPR & CNPR than the waste rock in the East RDS, since the sulphide values of the low-grade ore are elevated compared to the waste rock, reflecting the low-grade ore content in this material. However, as with all excavated materials at Mount Polley to date, the buffering capacity is very high, which provides for long-term protection from acid generation, for both waste rock and low-grade ore.

The seepage from the East RDS & Low-Grade Stockpile originates as a groundwater spring that comes to surface under the East RDS and has been designated MP1. This groundwater spring was covered over as the East RDS advanced and it now interacts with the waste rock prior to the appearance of the seep at the toe of the rock pile. One sample was collected in the summer of 1998, prior to the groundwater spring being covered over by the East RDS. Continuous sampling of this site started in spring 2000, after it was covered over by the waste rock. A summary of the water chemistry for MP1 thru the end of 2003 is provided in Table 4.2.4-1 (3 Sheets). No data beyond this period was available at the time that this report was prepared. Additionally, Figures 4.2.4-1 & 4.2.4-2 graphically represent several of the parameters listed in the table.

Dissolved sulphate levels have been steadily increasing, from a low of 41 mg/L in July 1998 to a high of 836 mg/L in August 2003. However, the concentrations seem to fluctuate seasonally, with an increasing trend from spring runoff thru to the summer season and then a decreasing trend as fall and winter approaches. Nitrate + Nitrite (N) concentrations have been following the same cyclic trend as dissolved sulphate, with lows of about 4 mg/L to highs of 34 mg/L. Values for T-Cu have remained fairly steady since the summer of 2001, ranging between 0.01 mg/L and 0.03 mg/L. Based on the prediction work done by Morin and Hutt (March 2001) for the waste rock humidity cells at Mount Polley, it is believed that copper concentrations are controlled by the solubility of tenorite. The copper concentrations seen at MP1 seem to be following this prediction nicely, not exceeding the solubility of tenorite since early 2001. As is the case with dissolved sulphate and Nitrate + Nitrite (N), concentrations of T-Se has been on an increasing trend and with the same cyclic pattern. The lowest value was in July 1998, which was about 0.015 mg/L and the highest was seen in August 2003, which was nearly 0.33 mg/L. With the exception of only one low concentration sample in October 2001, concentrations of T-Mo have been on an increasing trend as well, with a range of about 0.02 mg/L and 0.06 mg/L. However, there does not seem to be the same cyclic seasonal trend as is seen with dissolved sulphate, Nitrate + Nitrite (N) and T-Se.

The sampling site of MP1 is a very important sampling point for helping predict the characteristics of the long-term drainage chemistry, both from the East RDS and Low-Grade Stockpile, as well as for other waste rock that may be deposited throughout the coming five years. The waste characterization data as well as the drainage chemistry for MP1 indicate that ARD will not commence from this material in the long-term. Some concentrations of metals have increased over the past several years at MP1 and continued monitoring of this site will help predict at what concentration those metals may become stable. This site will also figure prominently in Phase V of the reclamation research program, found in Section 3.6.2 of this report, which focuses on the prediction of the drainage chemistry for the entire site.

4.2.5. North RDS

Presently, the North RDS contains a total of 918,688 tonnes of waste rock, originating entirely from the Bell Pit. Of this total volume of waste rock, 11,617 tonnes is considered AG waste rock, 35,385 tonnes is considered PAG waste rock and the remaining 871,686 tonnes is considered NAG waste rock. The weighted average of the TNPR for the waste rock that has been deposited in the North RDS is 9.9, while the weighted average of the CNPR is 6.7. The combined AG & PAG waste rock totals 47,002 tonnes, which equates to 5% of the total volume of waste rock in the North RDS. Alternatively, the ratio of NAG to AG/PAG waste rock is 19:1.

All runoff from the North RDS reports to the North Dump Creek, which drains into Polley Lake. The sampling site code for North Dump Creek is W4. This site has been monitored as far back as 1990, when the first baseline samples were collected. As a result, there is an excellent baseline, operational and post-operational database for this site. A summary of the water chemistry for the site W4 thru the end of 2003 is provided in Table 4.2.5-1 (3 Sheets). No data beyond this period was available at the time that this report was prepared. Additionally, Figures 4.2.5-1 & 4.2.5-2 graphically represent several of the parameters listed in the table.

Dissolved sulphate values have been rising somewhat since the cessation of mining activities at the end of 2001. With the exception of one sample in November 1998, all samples during the operating period were around the mean baseline of 6.4 mg/L. However, during the post-operating period starting in 2002, most samples have increased to two or three times the mean baseline level. The highest ever value was recorded in October 2003 at 61.9 mg/L. The samples that followed this date were also elevated well above the baseline level, but below the peak in October. There appears to be a cyclic nature to this parameter, where the highest values are seen with high flows, such as during spring freshet and fall turnover, and the lowest values are seen with low flows, such as the dry summer or cold winter months. This additional data would support the contention that the increase in concentrations of dissolved sulphate at this site is occurring because of runoff from the North RDS.

Nitrate + Nitrite values have mostly remained flat throughout the monitoring period of this site. Levels have been at or below the mean baseline value of 0.123 mg/L, with only several exceptions. During the spring runoff periods in 2002 & 2003, several samples returned values as high as 0.88 mg/L in 2002 & 0.716 mg/L in 2003. As was the case with dissolved sulphate, the elevated levels of Nitrate + Nitrite may be due to runoff from the North RDS. As is typical for this parameter, it fluctuates with the seasons and seems to be highest during the spring runoff periods. As Nitrate is removed from this RDS over time, it is expected that the levels that are seen in this creek will continue to decrease until they return to the background levels discussed earlier.

T-Cu values have always remained below the mean baseline of 0.035 mg/L throughout the operational & post-operational monitoring period. For the post-operating period starting in 2002, T-Cu has fluctuated between 0.003 mg/L to 0.015 mg/L. T-Iron has typically been at or below the baseline level of 0.097 mg/L during the operational & post-operational monitoring period, with only a few exceptions. Specifically, in the spring freshet periods of 2001 & 2002, T-Fe was in the order of 0.50 mg/L, which is about half an order of magnitude higher than the majority of the other samples from this site. Spring freshet 2003 saw a peak of 0.126 mg/L, which is about the same as the mean baseline level, so it appears that T-Fe has come back down to levels closer to the baseline. T-Mo has seen an increase above the mean baseline of 0.003 mg/L since 2001, but the concentrations fluctuate between 0.0015 mg/L and 0.006 mg/L. Unlike dissolved sulphate and Nitrate + Nitrite (N), this parameter does not appear to cycle with the seasonal flows. And T-Se had only a few spikes above the MDL of 0.0005 mg/L in the spring of 2002, with a maximum value of 0.0015 mg/L, but the concentrations have since returned to the limit of detection.

While there was some AG & PAG waste rock deposited in the North RDS, the volume of this material relative to the NAG waste rock is so tiny (5%) that long-term ARD stability is predicted. Most metals do not seem to have increased in the creek collecting the drainage from this RDS. Dissolved sulphate has been on the rise, so continued monitoring will be necessary to evaluate at what point this and other parameters will stabilize. As with site MP1, this data from this creek will be used as part of the Phase V reclamation research program which will attempt predict the drainage chemistry from each area of the mine.

4.2.6. Tailings Storage Facility

Presently, the TSF contains a total of 27,464,790 tonnes of tailings. In 1997 & 1998, all of the tailings originated from the Cariboo Pit ore. For 1999 & 2000, a small volume of the total tailings for these years originated from the Bell Pit ore. And in 2001, about 35% came from the Bell Pit ore, with the remaining 65% coming from the Cariboo Pit ore. All waste that has been deposited in the TSF is considered NAG. The weighted average of the TNPR for the waste that has been deposited in the TSF is 25.5, while the weighted average of the CNPR is 8.4.

Since the tailings storage facility started operations in 1997, water samples have been collected on a regular schedule, creating an extensive water chemistry database from which to help predict the long-term drainage chemistry. A summary of the water chemistry for the TSF thru the end of 2003 is provided in Table 4.2.6-1 (3 Sheets). No data beyond this period was available at the time that this report was prepared. Additionally, Figures 4.2.6-1 & 4.2.6-2 graphically represent several of the parameters listed in the table.

Dissolved Sulphate values reached a high of nearly 180 mg/L at the end of 2001, when operations ceased. Since then, values have dropped to a median of 115.0 mg/L, with a minimum of 52.0 mg/L as recent as May 2003. Levels of Nitrate & Nitrite in the tailings supernatant had increased up to the end of 2001, but have since fallen back off to levels below 0.1 mg/l. The levels of both T-Cu and D-Cu have been steadily decreasing in the tailings supernatant since mining activities stopped at the end of 2001. T-Cu has decreased to an average of less than 0.025 mg/l during the period of 2002-2003. Further, D-Cu has decreased to below 0.013 mg/l during this same period. Based on the prediction work done by Morin and Hutt (March 2001) for the tailings humidity cells at Mount Polley, it is believed that copper concentrations are controlled by the solubility of tenorite. The copper concentrations seen in the post-operational data set for E1 seem to be following this prediction nicely, not exceeding the solubility of tenorite at all. T-Se has fallen off dramatically in the post-operational period as well, with concentrations around

0.001 mg/L most recently in 2003. And T-Mo has dropped to a lower concentration as well, ranging from 0.03 mg/L to 0.06 mg/L.

The care & maintenance period at Mount Polley, from fall 2001 thru the end of 2004 has been helpful in collecting data to help predict the long-term water chemistry that will result from the TSF. When comparing the data sets from the operational and post-operational periods, we can see stark differences in the characteristics of the water. This data will be used as part of the Phase V reclamation research program, which will attempt to predict the drainage chemistry for the entire site. The waste characterization data as well as the drainage chemistry for E1 indicate that ARD will not commence from this material in the long-term. Most concentrations of metals have decreased over the past several years at E1 and continued monitoring of this site will help predict at what concentration those metals may become stable.

4.3. *Assessment of Proposed Pits, RDS's and Tailings Ponds*

The five-year mine plan for the Mount Polley Mine starts in 2005 and runs thru the end of 2009. During this period of operations, the remaining ore in the Bell Pit will be mined out completely, the Wight Pit will be started & completed, and the Springer Pit will be started, but will likely not be completed by the end of 2009. The waste rock from the Bell Pit will be placed in the North RDS and the Cariboo/Bell Pits RDS. Waste rock from the Wight Pit will be placed in the extension to the East RDS, which will be called the Wight RDS. Additionally, the NAG waste rock from the Wight Pit may be used to construct a haul road to the TSF, so that additional NAG waste rock from the Wight Pit can be placed in future raises in the outer shells of the three embankments at the TSF. And waste rock from the Springer Pit will be placed entirely in the Cariboo/Bell Pits RDS. All AG & PAG waste rock that may be encountered from any of these three pits will be placed below flood elevation in the bottom of the Cariboo Pit. In addition to the excavation of the waste rock from these three pits, most of the existing waste rock that is located in the Cariboo Pit Backfill will be relocated to the bottom of the Cariboo Pit as well, as the access of the Bell Pit is mined out through the North end of the Cariboo Pit. There is also a significant volume of oxide copper ore located at the top of the Springer Pit. The present plans are to place this material in a separate location adjacent to the East RDS, named the Leach Pad. The assessment of leaching the copper from this oxide ore continues to be evaluated and is presently under financial review. Therefore, as of the writing of this report, the oxide ore from the Springer Pit will not be heap leached. However, in anticipation of a successful review and approval for this process, the oxide material will be stockpiled separately from the other waste rock at the site, so that the leach pad can be started at any time.

The groupings of the various pits and rock disposal sites have changed for this assessment from the existing ML/ARD assessment, which will reflect the proposed changes that are planned over the coming five years.

The Cariboo Pit, Bell Pit, Springer Pit and Cariboo/Bell Pits RDS are all grouped into one section for this part of the assessment. The Bell Pit will be mined out starting in 2005, with it's new access going through the North end of the Cariboo Pit. The completed Bell Pit will then be open to the completed Cariboo Pit, creating one large pit, rather than two separate pits. Further, this combined pit will become one large rock disposal site called the Cariboo/Bell Pits RDS. This RDS will receive waste rock from the Springer and Bell Pits, as well as any AG & PAG waste rock from the Bell, Wight and Springer Pits. Additionally, in order to create the access to the Bell Pit, most of the waste rock in the existing Cariboo Pit Backfill will be relocated to the southern portion of the Cariboo Pit. The Springer Pit has also been included in this section, as it will be open to the Cariboo Pit on the West side. The Bell, Cariboo and Springer Pits will then be connected hydrologically, with the Springer Pit being the point of discharge to the environment. As a result, the pit walls in each pit, as well as the waste rock that is placed in the Cariboo/Bell Pits RDS, will contribute to the water chemistry that will exist as the lake in the completed Springer Pit and the resultant drainage that will come from that combined pit. The Wight Pit and Wight RDS are being grouped together since a separate study has been created to assess its ML/ARD potential. And the North

RDS, Leach Pad and TSF each have their own sections in this part of the assessment, since they are physically separate units, generally speaking.

4.3.1. Cariboo Pit, Bell Pit, Springer Pit and Cariboo/Bell Pits RDS

The ML/ARD prediction of the Cariboo Pit has already been outlined in Section 4.2.1, in combination with the waste that has been placed in the Cariboo Pit Backfill. The Bell Pit has also been covered previously in Section 4.2.2, however, unlike the Cariboo Pit, it will be reviewed again here, since a significant volume of ore and waste will be removed from this pit through the next five years, thereby changing the existing configuration of the walls that will be exposed. The Springer Pit only had about 90,000 tonnes of ore removed and 105,000 tonnes of waste rock removed previously, so the exposed walls and waste rock will change dramatically as it is mined out during this five year operating period. And since the Cariboo & Bell Pits will become one large RDS upon the completion of the Bell Pit, the new Cariboo/Bell Pits RDS will be reviewed, as it will be holding waste from at least the Bell and Springer Pits, and potentially the Wight Pit as well.

The configuration of the Bell Pit will change significantly as it is mined out starting in 2005. Presently, the bottom of the pit is at about 1130 metres and the planned continued excavation of this pit will move the bottom down an additional 100 metres to about 1030 metres. The access to the Cariboo Pit at the South end of the Bell Pit will be at elevation 1100 metres, which is about the same elevation as the access from the Springer Pit to the Cariboo Pit. Therefore, when the Bell Pit is complete and is allowed to fill with water, it is expected to fill to the 1100 metre elevation. Based on all waste characterization data collected to date from the Bell Pit, the only walls of this pit that may be of concern for ARD are those located on the Northeast side. This is the location where some AG & PAG waste rock has been excavated from the 1170 thru 1130 benches. Through the detailed operational waste characterization program for the Bell Pit, we will be able to evaluate if the walls in this part of the pit will end with AG or PAG material exposed above the flood elevation.

Since the Springer Pit was barely started in fall 2001, there is very little operational waste characterization data that is available from which a prediction of its ML/ARD potential can be made. However, Section 4.2.3 has reviewed the data that was collected in 2002 from the 105,000 tonnes of waste that was placed in the West side of the Cariboo Pit Backfill. The planned Springer Pit is expected to have a bottom at an elevation of 920 metres. It will connect with the Cariboo Pit on the West side at about 1100 metres. The Springer Pit is expected to flood to an elevation of about 1080 metres, where it will discharge to the environment at the South side of the pit. All benches and walls below the 1080 metre elevation will therefore be buried in water, which will leave the benches and walls up to the 1200 metre elevation exposed upon closure.

For the bulk of the waste in the Springer Pit, the data from the report entitled, "Springer Pit Material Characterization Review 2001" will be utilized to provide expectations for the ML/ARD potential from this pit. In this report on the Springer Pit, the ABA data from the diamond drilling programs in 1988, 1989 & 2001 was used for the predictions. There were a total of 54 samples from drill holes and of these samples, six returned NPR values between 1 & 2, indicating PAG material, and one sample returned an NPR value <1, indicating AG material. In addition, six of the seven samples with NPR values <2 are from three drill holes (MP–150, MP–01–56, & MP–01–67), which are in close proximity to each other at the intervals that the composite samples were obtained. Based on the present design of the Springer Pit, the bottom will be above or marginally cross these intervals. Therefore, most, if not all material from this zone will not be excavated under the largest Springer Pit scenario. The point that the zone crosses the proposed pit is in the last two benches. Since nearly all of the material in the bottom of a pit is ore, all material from this area will be processed through the mill. Should there be any PAG waste rock from this area, it will be placed below flood elevation in the Cariboo Pit. Based on this data, there is not expected to be any ARD from the walls of the Springer Pit, as the only areas that may have any potential is at the bottom of the pit which will be flooded with water in perpetuity.

The Cariboo/Bell Pits RDS will consist of waste rock from the Bell Pit and Springer Pit, and the potential from some AG or PAG waste rock from the Wight Pit. All AG & PAG waste rock that will be deposited from the Bell Pit, Springer Pit and Wight Pit will be placed below flood elevation, which is expected to be about the 1100 metre level, as this is the elevation of the access to the Springer Pit. Since the existing bottom of the Cariboo Pit is at the 1050 metre elevation, there will be approximately 5 benches or 50 metres of depth in the Cariboo Pit where any AG & PAG waste rock can be placed. The far North end of the Cariboo/Bell Pits RDS will have a maximum elevation of about 1150 metres, while the far South end will have a maximum elevation of about 1125 metres. As waste rock is placed in this RDS, water will fill in the void spaces of the waste rock, with approximately 50 metres of water in the South end (Cariboo Pit) and approximately 70 metres of water in the North end (Bell Pit).

The majority of the waste rock will be from the Springer Pit and the remaining volume will be made up of waste rock from the Bell Pit. The Springer Pit waste rock was described earlier in this section, which indicates that nearly all will be NAG, similarly to the Cariboo Pit. The Bell Pit waste rock has been mostly NAG, but there has been some AG & PAG waste rock that has been mixed with the NAG waste rock, both in the North RDS and the Cariboo Pit Backfill. For all remaining waste rock that is to be excavated from the Bell Pit, a detailed operational waste characterization program will allow the separation of all NAG waste rock from AG & PAG waste rock, so that only NAG waste rock will be placed above flood elevation in the North RDS and Cariboo/Bell Pits RDS. This configuration of waste rock separation within this RDS will provide for long-term ARD stability.

4.3.2. Wight Pit and Wight RDS

The Wight Pit and its associated waste has been reviewed and assessed in a separate report entitled, "Mount Polley Northeast Zone Geochemical Characterization of Waste Rock". This report was prepared in summer 2004 by SRK Consulting Engineers and Scientists, as part of a permit amendment application to the Ministry of Energy and Mines and it is included Appendix E to this report. For a full and detailed assessment of the Wight Pit and Wight RDS, please refer to this report. A paraphrased summary of the findings of this report is as follows:

> SRK found that the majority of the rock from the Wight Pit is expected to have negligible potential for ARD and ML. A small area near the centre of the pit was identified to have PAG material, but the operational waste characterization program will be able to identify this material when it is to be excavated and the PAG waste rock will be separated and placed in the bottom of the Cariboo Pit below flood elevation. All material that intersects with the pit walls appears to be NAG rock, with only one exception, which intersects the North wall. However, this intersection with the North wall is expected to be below flood elevation, thereby providing long-term protection against acid generation.
>
> Based on block modelling studies, it is estimated that less than 2% of the total volume of waste rock in the Wight Pit may be PAG. Further, much of this material is adjacent to high-grade copper material, which means that much of this waste may in fact be processed through the mill, rather than being sent to the RDS. With such a small volume of waste that is PAG, adjacent to high-grade ore and most being separated out for disposal under water in the Cariboo Pit, it is expected that the remaining small portion of PAG material will be well mixed with the copious amount of NAG waste, through the blasting, loading and dumping processes.

4.3.3. North RDS

An assessment of the existing waste that is in the North RDS can be found in Section 4.2.5. For the five-year mine plan, the North RDS is expected to receive waste entirely from the Bell Pit. A detailed operational waste characterization program will be able to identify and segregate any AG & PAG waste rock from NAG waste rock. All NAG waste rock from the Bell Pit will be placed in the North RDS, adding to the 918,688 tonnes of waste rock that is presently there. Of the

3,463,103 tonnes of waste rock removed from the Bell Pit to date, approximately 289,220 tonnes have been considered AG or PAG. This equates to approximately 8% of the total waste rock to date. While it is expected that most of the AG & PAG waste rock from the Bell Pit has already been excavated during the first phase of mining of the Bell Pit, there may be additional AG & PAG waste rock in this pit. However, if there is any, it is expected to be less than the 8% that has occurred to date.

Since only NAG waste rock from the Bell Pit will be placed in the North RDS, the ARD and ML potential from this material is expected to be similar, if not more stable in the long-term, than the material that presently makes up the North RDS. The North Dump Creek, site W4, will be monitored as part of the existing environmental monitoring program, to see if there continues to be increases in dissolved sulphate. Further, data from this site will be included in Phase V of the reclamation research program, which will attempt to determine the concentrations of metals from the drainage chemistry for this RDS in the long-term.

4.3.4. Leach Pad (if applicable)

As mentioned in Section 4.3.1, the proposed Leach Pad will consist of oxide copper ore from the top benches of the Springer Pit. Since the feasibility of heap leaching this material has not been fully evaluated, the ML/ARD assessment of this material will only consider this material as oxide copper waste rock. If and when a heap leach system is applied for, a detailed ML/ARD assessment will be conducted as part of that application process.

The Cariboo Pit had a significant volume of oxide copper ore in the top benches, similar to the Springer Pit. This material was simply sent to the East RDS, as there were no plans to remove the copper from this rock at the time that it was excavated. Therefore, the prediction of the ML/ARD potential for the East RDS can be applied to the Leach Pad material quite nicely. Referring back to Section 4.2.4, the waste from the East RDS is not expected to generate acid in the long-term, due to the low-sulphide content and the high buffering capacity of the rock. The weighted average of the TNPR for the waste rock that has been deposited in the East RDS is 13.2, while the weighted average of the CNPR is 8.1. Since the Springer Pit waste rock is so similar to that of the Cariboo Pit, a similar TNPR and CNPR is expected for all oxide copper materials that will be deposited in the Leach Pad.

The drainage chemistry from the East RDS is represented by site MP1, which is called the East RDS Seep. Also discussed in Section 4.2.4, MP1 has elevated levels of dissolved sulphate, T-Mo and T-Se, but has had a fairly steady level of T-Cu. The Leach Pad will likely have similar drainage chemistry to what is seen from the East RDS at site MP1. Since MP1 will be incorporated into Phase V of the reclamation research program, long-term water chemistry from the Leach Pad will be better predicted.

4.3.5. Tailings Storage Facility

All the tailings that will be deposited in the TSF over the coming five years is expected to be NAG, similar to that which exists there already. The large amount of buffering capacity in the rock from all three pits that will be mined during this time frame ensure that any AG or PAG ore that is milled can be easily controlled. Further, the milling process at Mount Polley removes the sulphides from the ore, prior to its disposal to the TSF. Therefore, any AG or PAG ore that is identified will likely not be AG or PAG tailings, when it is deposited at the TSF. The drainage chemistry is expected to be the same as that which was seen during the care and maintenance period from fall 2001 thru the end of 2004.

5. RECLAMATION COST ESTIMATES

5.1. *Overview*

In order to estimate the reclamation costs for the disturbances that have been created or will be created at the Mount Polley Mine, we used the Reclamation Costing Spreadsheets version 3.5.1, supplied by the Ministry of Energy and Mines. Three scenarios were generated which estimate the reclamation costs based on:

- The existing disturbance at the end of 2004;
- The projected disturbance at the end of 2009; and
- The projected disturbance at the end of 2009 after the five-year reclamation plan has been completed.

There are 32 pages of tables for each of these scenarios and they can all be found in Appendix B. In support of the values used in these costing estimates, we have provided additional tables to demonstrate how various rates were calculated. For the re-sloping of the rock disposal site slopes, Table 5-1 shows the geometry of the repose and re-sloped faces. The table also provides the cut areas and slope lengths for each 5 metres of vertical dump height, which are then used in the calculations for determining re-sloping costs. Table 5-2 provides the volume and productivity calculations for the re-sloping of the rock disposal sites. The hours per hectare for each 5 metres of vertical dump height has been determined and it is these rates that are used in the Reslope Worksheet of the costing sheets to calculate the total cost for re-sloping the RDS faces. Table 5-3 presents the hauling and spreading unit costs for the growth medium that will be transported and spread across nearly all disturbances at the mine. These unit costs are then applied in Table 5-4, which calculates the actual hauling and spreading costs for each of the three scenarios that have been identified.

The present Reclamation Bond that Mount Polley has with the Ministry of Energy and Mines is set at $1,900,000. The existing disturbance at the end of 2004 is estimated to cost $2,173,380 for complete reclamation, while the projected disturbance at the end of 2009 is estimated to cost a total of $3,119,895. The third scenario, which estimates reclamation costs at the end of 2009, assuming that the five-year reclamation plan is completely fulfilled, is expected to be $2,284,419. In each of the following three sections, the details of each scenario will be described.

For the reclamation of all areas except for the tailings beaches, a combination of three scrapers and one push cat will be used to move and spread the growth medium. In the case of the tailings beaches, a combination of five scrapers and one push cat will be used, since the distance is greater between the stockpiles and the disturbance. The slopes of the rock disposal sites will be re-sloped using a D9 Cat with a U-blade pushing downslope. With the exception of the slopes, all areas will be seeded and fertilized using a dry broadcast method, while the slopes will be seeded and fertilized using a hydroseeder.

5.2. *Cost Estimates for 2004 Disturbances*

The total area of disturbance at the end of 2004 stands at 503.93 Ha. Of this total, 52.49 Ha will remain permanently disturbed and 30.61 Ha is already reclaimed, which leaves 420.83 Ha remaining for reclamation. The permanently disturbed area consists of the angle of repose slopes of the Cariboo Pit RDS (5.44 Ha), the pit walls of the Cariboo and Bell Pits (21.69 Ha) and the roads that will remain for area access (25.36 Ha). The reclaimed area consists of the slope between the 1170 & 1150 platforms on the East RDS (1.35 Ha), part of the 1170 platform on the East RDS (4.66 Ha), the lakes in the Cariboo and Bell Pits (22.03 Ha) and the two seepage ponds at the TSF (2.57 Ha).

The total estimated cost to reclaim the existing disturbance to the end of 2004 is $2,173,380. The largest component of the reclamation cost is due to the revegetation, which is estimated to be $786,770. The next largest component is for the transport of growth medium to each of the disturbed areas and it is estimated to cost $616,627. Site preparation, such as re-contouring and spreading of growth medium, is expected to cost $283,971, while maintenance of the reclamation work will total $144,345. The remaining $341,667 is reserved for solid waste disposal, engineering fees and post-closure costs. Appendix B-1 has the summary worksheet as well as all detailed costing sheets for each of the disturbance categories for 2004.

5.3. *Cost Estimates for 2009 Projected Disturbances*

The total area of disturbance at the end of 2009 is estimated to be 703.26 Ha. Of this total, 50.05 Ha will remain permanently disturbed and 8.56 Ha is already reclaimed, which leaves 644.65 Ha remaining for reclamation. The permanently disturbed area consists of the pit walls of the Wight and Springer Pits (29.37 Ha) and the roads that will remain for area access (20.68 Ha). The reclaimed area consists of the slope between the 1170 & 1150 platforms on the East RDS (1.35 Ha), part of the 1170 platform on the East RDS (4.66 Ha) and the two seepage ponds at the TSF (2.55 Ha).

The total estimated cost to reclaim the anticipated disturbance to the end of 2009 is $3,119,895. The largest component of the reclamation cost is due to the revegetation, which is estimated to be $1,195,530. The next largest component is for the transport of growth medium to each of the disturbed areas and it is estimated to cost $923,646. Site preparation, such as re-contouring and spreading of growth medium is expected to cost $440,675, while maintenance of the reclamation work will total $218,377. The remaining $341,667 is reserved for solid waste disposal, engineering fees and post-closure costs. Appendix B-2 has the summary worksheet as well as all detailed costing sheets for each of the disturbance categories for 2009.

5.4. *Cost Estimates for 2009 Projected Disturbances After 5-yr Reclamation Plan*

This third reclamation costing scenario was generated because we felt it is important to determine the cost of reclamation of the remaining disturbance, should the entire five-year reclamation plan be fulfilled. The philosophy is that, if some areas of the mine have been reclaimed, then the costs associated with those areas should be removed from the running tally of costs to reclaim the mine. As each year passes starting in 2005, additional disturbance will be created. However, existing disturbances will be reclaimed, which means that the actual disturbance will increase from year to year at a slower rate. Hence, any increase in the reclamation bond from year to year may not need to be associated only with the increase in disturbance but could reflect the incremental increase in disturbance.

The total area of disturbance at the end of 2009 is estimated to be 703.26 Ha. Of this total, 50.05 Ha will remain permanently disturbed. Assuming the five-year reclamation plan is fulfilled, 158.03 Ha will have been reclaimed. Therefore, the remaining area to be reclaimed will be 495.18 Ha. The permanently disturbed area consists of the pit walls of the Wight and Springer Pits (29.37 Ha) and the roads that will remain for area access (20.68 Ha). The reclaimed area consists of the slopes of the East RDS, Wight RDS, North RDS and Leach Pad (68.92 Ha), the tops of the East RDS, Wight RDS, North RDS and Leach Pad (76.68 Ha), the lake in the Wight Pit (9.88 Ha) and the two seepage ponds at the TSF (2.55 Ha).

The total estimated cost to reclaim the anticipated disturbance to the end of 2009, assuming that the five-year reclamation plan is fulfilled, will be $2,284,419. The largest component of the reclamation cost is due to the revegetation, which is estimated to be $797,014. The next largest component is for the transport of growth medium to each of the disturbed areas and it is estimated to cost $729,654. Site preparation, such as re-contouring and spreading of growth medium, is expected to cost $253,543, while maintenance of the reclamation work will total $162,541. The remaining $341,667 is reserved for solid waste disposal, engineering fees and post-closure costs. Appendix B-3 has the summary worksheet as well as all detailed costing sheets for each of the disturbance categories for 2009, assuming that the five-year reclamation plan is fulfilled.

6. REFERENCES

Banner, A., W. MacKenzie, S. Haeussler, S. Thomson, J. Pojar and R. Trowbridge. 1993. A field guide to site identification and interpretation for the Prince Rupert Forest Region. Land Management Handbook No. 26. Research Branch, Ministry of Forests. Victoria, B.C. 2 Volumes.

Blashill, W. 1995a. Imperial Metals Corporation, Mount Polley Project, March 1995 soils map. Annotated air photo.

Blashill, W. 1995b. Final Reclamation Plan for the Proposed Mount Polley Mine – Soil Survey and Agricultural Capability. Manuscript report to Imperial Metals Corporation. 9 p.

Haeussler, S., D. Coates and J. Mather. 1990. Autecology of common plants in British Columbia; a literature review. Forestry Canada and British Columbia Ministry of Forests, Canada-British Columbian Economic and Regional Agreement – FRDA Report 158. Victoria, B.C. 272 p.

Hallam Knight Piésold Ltd. 1995. Wildlife and wildlife habitat of the Mount Polley Project Area. Manuscript report to Imperial Metals Corporation. 48 p + appendices and 4 maps at 1:10,000 scale. Vancouver, B.C. Revised December 1995.

Hallam Knight Piésold Ltd. April 1996. The Mount Polley Mine Project, Reclamation Plan. Manuscript report to Imperial Metals Corporation. Vancouver, B.C.

Knight Piésold Consulting Ltd. 2001. Mount Polley Mining Corporation, Mount Polley Mine, Tailings Storage Facility. Report on Stage 3 Construction (Reference No. 11162/14-3). Vancouver, B.C.

Knight Piésold Consulting Ltd. July 30, 2004. Mount Polley Mining Corporation, Mount Polley Mine, Mount Polley Water Balance (Reference No. VA101-1/6-A.01). Vancouver, B.C.

Lloyd, D., K. Angove, G. Hope and C. Thompson. 1990. A guide to site identification and interpretation for the Kamloops Forest Region. Land Management Handbook No. 23. Research Branch, B.C. Ministry of Forests. Victoria, B.C. 2 Vols. 399 p.

Morin, K. and N. Hutt. March 2001. Geochemical Update of the Mount Polley Humidity Cells. Vancouver, B.C.

Mount Polley Holding Company Limited. March 31, 1998. Annual Reclamation Report for 1997, Reclamation Permit M-200.

Mount Polley Holding Company Limited. March 31, 1999. Annual Reclamation Report for 1998, Reclamation Permit M-200.

Mount Polley Holding Company Limited. March 31, 2000. Annual Reclamation Report for 1999, Reclamation Permit M-200.

Mount Polley Mining Corporation. April 2001. Annual Environmental and Reclamation Report 2000, Permit M-200 and Permit PE 11678.

Mount Polley Mining Corporation. June 28, 2001. Springer Pit Material Characterization Review 2001.

Mount Polley Mining Corporation. June 2002. Annual Environmental and Reclamation Report 2001, Permit M-200 and Permit PE 11678.

Mount Polley Mining Corporation. July 2003. Annual Environmental and Reclamation Report 2002, Permit M-200 and Permit PE 11678.

Smyth, Greg and Mount Polley Mining Corporation. April 2004. 2001 ML/ARD Waste Characterization – Final Report.

Smyth, Greg and Mount Polley Mining Corporation. June 2004. Annual Environmental and Reclamation Report 2002, Permit M-200 and Permit PE 11678.

SRK Consulting Engineers and Scientists. July 2004. Mount Polley Northeast Zone Geochemical Characterization of Waste Rock (Project Reference No. 1Cl008.00). Vancouver, B.C.

Steen, O. 1989. A field guide to the identification and interpretation of ecosystems of the Cariboo Forest Region. Research Section, B.C. Ministry of Forests. Williams Lake, B.C. Draft Copy.

Steen, O. and A. Smith. 1991. Grass and legume seeding for vegetation control on blade scarified sites in the ICH and ESSF Zones in the central interior of British Columbia. FRDA Report No. 182. Canada-British Columbia Partnership Agreement of Forest Resource Development FRDA II. Queen's Printer. Victoria, B.C. 27 p.