MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY PROJECT

PRELIMINARY DESIGN OF THE TAILINGS STORAGE FACILITY TO ITS ULTIMATE ELEVATION (REF. NO. VA101-001/08-1)

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EXECUTIVE SUMMARY

The Mount Polley gold and copper mine is owned by Mount Polley Mining Corporation (MPMC). The mine has been managing the facilities for care and maintenance activities since October 2001 and is scheduled to start up again in the first quarter of 2005. This report provides supporting documentation to allow for MPMC to permit on-going staged expansion of the TSF embankments to an ultimate elevation of 965.0m. This corresponds to storage for approximately 85 million tonnes of tailings. Detailed design reports, construction drawings and technical specifications will be required for each stage of the TSF expansions.

The staged expansion of the TSF involves modified centreline construction methods for the Main, Perimeter and South Embankments. This requires that fill materials be placed and compacted on the tailings beach. To achieve this the tailings should be evenly discharged from around the entire facility to establish competent beaches. The tailings pipeline will require an extension to the South Embankment to achieve an effective tailings deposition plan.

The TSF embankment drainage provisions include upstream toe drains for the Main, Perimeter and South Embankments. Multiple toe drains will be added for each embankment to incorporate suitable redundancy. The toe drains are effective in lowering the phreatic surface, which increases embankment stability and seepage control.

Stability analyses were completed for static and seismic conditions and indicate that the TSF embankments are stable under static conditions and that there will be no deformations initiated by earthquake loading.

The mine site is operating with a water surplus with the excess water being stored in the TSF. To accommodate the staged development of the TSF, MPMC is seeking an effluent permit to discharge tailings supernatant to the environment.

The instrumentation requirements will be reviewed as part of the annual inspection and each design phase. The two existing slope inclinometers at the toe of the Main Embankment will be extended during development of the shell zone. Three additional inclinometers will be installed following the Stage 5 raise.

Stage 4 drawings (crest El. 948.0 m) are included to allow for this stage to be permitted in advance if required.

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The downstream shell zone will be constructed at its ultimate width. This will allow for the most efficient routing of haul trucks and also facilitates concurrent reclamation of the downstream slopes of the TSF embankments. The buttress at the Main Embankment is required for closure and can be constructed during any stage of the TSF expansion to accommodate the availability of shell zone material.

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SECTION 1.0 - INTRODUCTION

1.1 PROJECT DESCRIPTION

The Mount Polley gold and copper mine is owned by Mount Polley Mining Corporation (MPMC). It is located 56 kilometres northeast of Williams Lake, in central British Columbia. The project site is accessible by paved road from Williams Lake to Morehead Lake and then by gravel road for the final 12 km. The location of Mount Polley Mine is shown on Figure 1.1. Mount Polley Mine started production in 1997 and had milled approximately 27.5 million tonnes of ore prior to stopping production in October 2001. The mine has been managing the facilities for care and maintenance activities since then. The mine is scheduled to start up again in the first quarter of 2005. Consequently, MPMC is currently in the process of upgrading the mine facilities, which includes increasing the elevation of the Tailings Storage Facility Embankments to El. 945.0 m. This construction program (Stage 3C) is the final part of a tailings embankment raise previously permitted by the Ministry of Energy and Mines. An aerial photograph of Mount Polley Mine that was flown in the summer 2004 is shown on Figure 1.2.

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1.2 SCOPE OF REPORT

The Mount Polley Mine consists of four pits: the Cariboo Pit, Bell Pit, Wight Pit, and the Springer Pit. The scope of this report is to provide supporting documentation to allow for MPMC to permit on-going staged expansion the Tailings Storage Facility (TSF) embankments to an ultimate elevation of 965.0m. This elevation will provide sufficient storage in the TSF for approximately 85 million tonnes of tailings while maintaining the required water storage and freeboard requirements. The scope of this report also provides supporting information for the Stage 4 expansion of the TSF, which is planned for the spring of 2005, and can be permitted separately so that any delays in the overall permitting process do not delay the required expansion of the TSF in the Spring of 2005.

The drawings contained within this report are for permitting support and are all “Not For Construction”. Detailed design reports, construction drawings and technical specifications must be prepared by a suitably qualified Professional Engineer for each stage of the TSF expansions, from Stage 4 through to the ultimate height of the facility.

1.3 REFERENCES

This report references the following documents which provide key supplementary information:

Hallam Knight Piésold Report “The Mount Polley Mine Project Reclamation Plan, Ref. No. H1221, April 1996.”

MAJM Corporation Ltd., Report to Imperial Metals Corporation, “Geotechnical Review, Drainage Aspects Main Embankment Dam, Tailings Storage Facility Report,” March 1997.

Mount Polley Mining Corporation, Mount Polley Mine, “Report on Stage Ia/Ib Construction”, Ref. No. 10162/7-5, August 14, 1997.

Mount Polley Mining Corporation, Mount Polley Mine, Tailings Storage Facility, “Report on 2004 Annual Inspection”, Ref. No. VA101-01/7-1, February 28, 2005.

Mount Polley Mining Corporation, Mount Polley Mine, Tailings Storage Facility "Report on 1995 Geotechnical Investigations for Mill Site and Tailings Storage Facility” (Knight Piésold Ref. No. 1623/1).

Mount Polley Mining Corporation, Mount Polley Mine, Tailings Storage Facility “Evaluation of Cycloned Tailings for Embankment Construction”, Ref. No. 11162/11-1, June 16, 1999.

Mount Polley Mining Corporation, Mount Polley Mine, Tailings Storage Facility, “Updated Design Report”, Ref. No. 1627/2, June 6, 1997.

Knight Piésold Ltd., “Modified Centreline Construction of Tailings Embankments”, J.P. Haile and K. J. Brouwer.

Mount Polley Mining Corporation, Mount Polley Project, “Polley Lake Pumping System”, Ref. No. 1628/5, February 19, 1997.

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SECTION 2.0 - TAILINGS STORAGE FACILITY DESIGN

2.1 TAILINGS STORAGE FACILITY DESIGN

2.1.1 General

The principal objectives of the TSF are to provide secure containment for tailings solids and to ensure that the regional groundwater and surface water flows are not adversely affected during or after mining operations. The design and operation of the TSF is integrated with the overall water management objectives for the entire mine development, in that surface runoff from disturbed catchment areas is controlled, collected and contained on site. An additional requirement for the TSF is to allow effective reclamation of the tailings impoundment and associated disturbed areas at closure top meet land use objevtives..

The main components of the TSF are as follows:

- The TSF embankments incorporate the following zones and materials:
    - Zone S - Core zone - fine grained glacial till.
    - Zone CS - Upstream shell - cycloned or spigotted tailings sand.
    - Zone B - Embankment shell zones - fine grained glacial till.
    - Zone F - Filter, drainage zones, and chimney drain - processed gravel and sand.
    - Zone T - Transition filter zone - select well-graded fine grained rockfill.
    - Zone C - Downstream shell zone – rockfill.
    - Zone U – Upstream shell zone – specifications??vary depending on material availability.
- A low permeability basin liner (natural and constructed), which covers the base of the entire facility, at a nominal depth of at least 2 m. The low permeability basin liner has proven to be effective in minimizing seepage from the TSF as there have been no indications of adverse water quality reporting to the groundwater monitoring wells.
- A foundation drain and pressure relief well system, located downstream of the Stage 1B Main Embankment. The foundation drain and pressure relief well system prevent the build-up of excess pore pressure in the foundation, and transfer groundwater and/or seepage to the collection ponds.
- Seepage collection ponds located downstream of the Main and Perimeter Embankments. These ponds were excavated in low permeability soils and store water collected from the embankment drains and from local runoff.
- Instrumentation in the tailings, earthfill embankments and embankment foundations. This includes vibrating wire piezometers, survey monuments, and slope inclinometers.
- A system of groundwater quality monitoring wells installed around the TSF.

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The TSF has been designed to contain approximately 85 million tonnes of tailings solids at an average dry density of 1.36 tonnes/m^3. It may be possible to expand the TSF should the ore reserves at the mine increase above 85 million tonnes. Embankment raises above the proposed final crest elevation of El. 965 metres would likely be constructed by incorporating a downstream extension of the shell zone material to ensure that the stability requirements of the TSF embankments is maintained.

The classification of the TSF has been assessed using the Canadian Dam Association and the British Columbia Dam Safety Regulation guidelines. These guidelines look at the consequences of failure and consider life safety, economic and social losses, and environmental and cultural losses. The life safety category looks at the potential for multiple loss of life and considers the degree of development within the inundation area. The economic and social loss category considers damage to infrastructure, public and commercial facilities that are in and beyond the inundation area. This includes damage to railways, highways, powerlines, residences etc. The environmental and cultural loss considers damage to fish habitat at the regional, provincial, and national level, wildlife habitat, including water quality, and unique landscapes or sites of cultural significance.

The assessment indicates that the TSF has a "HIGH" hazard classification (or consequence category) based on the economic and social loss category. The classification for the life safety and environmental and cultural loss categories is "LOW", as there is low potential for multiple loss of life, the inundation area is typically undeveloped, and there is unlikely to be loss or significant deterioration of provincially or nationally important fish habitat. However, the TSF embankments will be up to 55 m high, and the estimated costs associated with repairing the damage, loss of service to the mine, and the potential economic impact on Imperial Metals, could exceed $1,000,000, which places the TSF into the "HIGH" economic and social losses category under the British Columbia Dam Safety Regulation guidelines.

The classification of dams under the Canadian Dam Association and the British Columbia Dam Safety Regulation guidelines corresponds to consequences of failure and does not relate in any way to the likelihood of failure. The embankment has been designed to accommodate a maximum design earthquake (MDE) corresponding to 50% of the maximum credible earthquake (MCE) and the impoundment is sized to contain the probable maximum precipitation (PMP) storm event. The TSF at Mount Polley Mine is visually inspected daily by MPMC staff during operations, and the embankment instrumentation is monitored at regular intervals during operations with the frequency of monitoring increasing during the TSF expansion phases. The likelihood of dam failure is therefore extremely low. sounds good Les!

2.1.2 Foundation Conditions

The tailings basin is generally blanketed by naturally occurring well graded low permeability glacial till which functions as an in-situ soil liner and precludes seepage loss from the facility. However, a basin liner was constructed just upstream of the Main

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Embankment to ensure that the basin liner had a minimum thickness of 2 metres throughout the tailings basin. The constructed basin liner was tied into the Main Embankment core zone and the existing basin liner where the in-situ thickness exceeded 2 m.

The foundation conditions at the Main Embankment consist of low permeability glacial till material at surface underlain by fluvial and lacustrine silts up to 20 m thick. The foundation conditions at the Perimeter Embankment consist of low permeability glacial till throughout that is generally in excess of 5 m. The foundation conditions at the South Embankment consist of a relatively thin, low permeability glacial till material overlying bedrock. The glacial till is a few metres thick but its thickness is not consistent throughout the South Embankment foundation. It is important not to expose the fractured bedrock and to ensure that the glacial till cover is at least 2 m thick throughout the foundation and that is tied into the core zone. Details of the site geological investigations can be found in the Knight Piésold Report "Updated Design Report", Ref. No. 1627/2, June 6, 1997. The geological investigation and sections from the Updated Design Report are included in Appendix G.

Laboratory testwork on the foundation soils indicates that the materials have adequate shear strength to ensure foundation stability of the embankments. Artesian pressures exist at the base of the Main Embankment. Pressure relief wells trenches have been installed at this location to depressurize the underlying glaciofluvial deposits.

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2.1.3 Tailings Storage Facility Design

The Tailings Storage Embankments will be constructed to an ultimate crest elevation of 965.0 m. The Embankments are zoned earthfill structures with low permeability glacial till core zones, chimney drains, upstream drains and downstream rockfill zones. The design basis and operating criteria for the feasibility design of the TSF are presented on Table 2.1.

The tailings embankments have been designed for staged expansion during operations in order to minimize initial capital expenditures and to maintain an inherent flexibility to allow for variations in operation and production throughout the life of the mine. The Embankments are progressively raised using the modified centreline construction method. Further expansion of all of the embankments will involve till caps for the 2005 construction program followed by modified centreline raises for each year thereafter. A technical paper on the "Modified Centreline Construction of Tailings Embankments" is included in Appendix E. Future embankment raises allow for selected fill to be placed on tailings beaches. Consequently, a coarse bearing layer will be required on the tailings beach to establish a competent foundation. The on-going embankment raises will be re-evaluated during Annual Inspections carried out by the Design Engineer and as part of each expansion phase. The re-evaluation process will consider the performance of the embankments and the drainage systems, instrumentation records, mine throughput, storage capacity and freeboard requirements, and fill material availability.

The depth/area/capacity (DAC) curve has been updated using the updated topography from the 2004 flyover and the bathymetric survey of the tailings facility. The updated DAC curve is shown on Figure 2.1. The filling schedule and anticipated staged construction sequence of the TSF is shown on Figure 2.2. Each embankment raise will provide incremental storage capacity for approximately one year of production. The filling schedule incorporates sufficient live storage capacity for containment of runoff from the 24-hour PMP volume of 679,000 m^3 at all times, which would result in an incremental rise in the tailings pond level of approximately 0.39 m, with an additional allowance of 1 meter of freeboard for wave run-up.

The overall Mount Polley Mine site plan is shown on Drawing 100. The general arrangement of the TSF is shown on Drawing 102. The material specifications are shown on Drawing 104. The ultimate Main Embankment Plan and Sections and Details are shown on Drawings 110 and 115 respectively. The ultimate Perimeter Embankment Plan and Sections and Details are shown on Drawings 120 and 125 respectively. The ultimate South Embankment Plan and Sections and Details are shown on Drawings 130 and 135 respectively. The crest details will be revised to suit the final reclamation objectives and will likely include a suitable wearing course, topsoil cover and vegetation. The ultimate embankment heights for the Main, Perimeter and South Embankments will be 55 m, 35 m, and 20 m respectively. The downstream slope of the ultimate Main Embankment will incorporate a buttress to increase the stability of the embankment to satisfy the factor of safety requirements at closure.

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The design of the TSF to El. 965.0 m assumes that the tailings beaches are adjacent to the embankments. This can be achieved by implementing a tailings deposition plan which involves discharging tailings around the entire facility. The tailings beaches also enhance the stability of the embankments. The tailings beach development from Stage 5 though 10 is shown schematically on Figure 2.3. The pond is shown to be adjacent to the South Embankment for Stage 10 as the closure plan involves placing a spillway at this location.

The design of the TSF to El. 965.0 m is similar to the original design of the TSF. Changes to the design include the following:

- A buttress is required on the downstream slope of the Main Embankment to provide the required stability at closure.
- The South Embankment has been adjusted to allow for on-going expansion by the modified centreline method. The expansion of the Main and Perimeter Embankments will continue to be constructed by the modified centreline technique as per the original design.
- Slope inclinometers have been included at the toe of the Main Embankment to measure any potential deformation of the embankment and/or foundation materials.
- Upstream toe drains have been added to the South Embankment.

- The tailings pipeline will be extended to the South Embankment to facilitate tailings deposition and beach development.

2.1.4 Tailings and Reclaim Pipelines

The tailings pipeline comprises 7000 m of HDPE pipe of varying diameters and pressure ratings. It has a design flow of 20,000 tonnes/day at 35% solids by weight at the mill. Currently (early 2005), the tailings pipeline extends from the mill to the southern end of the facility along the main embankment, where a point discharge is used for discharge. Beach development will be monitored from time to time and operating parameters will be adjusted. The tailings pipeline previously installed along the crest of the Perimeter and Main Embankments was provided with a single relocateable discharge section, approximately 100 m long with flanges at either end, which included six, 150 mm offtakes. The line terminated with a 90-degree elbow, directed into the facility. Wherever it was installed, the movable discharge section allowed controlled deposition of tailings from an isolated section of the embankment. Relocation of the single discharge section was a labour intensive and costly activity.

The most efficient use of the TSF is made when tailings can be evenly distributed from around the perimeter of the facility and when the discharge location can be easily and systematically relocated. A system will be incorporated by MPMC to accommodate this objective. The existing pipeline could be progressively retrofitted over several years to spread out the costs.

Evenly discharging the tailings from around the facility optimizes the development of tailings beaches and keeps the supernatant pond clear of the embankments, thereby increasing seepage paths and limiting seepage loss from the facility. Beached tailings, when left to drain and consolidate, form the competent foundation needed for the modified centreline construction of embankment raises.

The expansion of the TSF assumes that tailings will be distributed evenly throughout the facility to establish tailings beaches at the Perimeter, Main and South Embankments. This requires extending the tailings pipeline to the South Embankment, which will involve adding a new tailings pipeline on the west side of the facility. The expansion of the tailings pipeline to the South Embankment will likely occur during the Stage 5 construction program. The tailings pipeline for the TSF with the new extension of the tailings pipeline is shown on Drawing 311.

The reclaim pipeline system returns water from the TSF to the millsite for re-use in the process. The system comprises a pump barge, a reclaim pipeline and a reclaim booster pump station. The reclaim pipeline remained operational during the care and maintenance period and was utilized to pump excess water from the TSF to the Cariboo Pit. Apart from general monitoring maintenance and overhaul and the installation of new works associated with on-going embankment raises, no major upgrades are currently envisaged for the existing reclaim system.

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The tailings pipeline, reclaim system, and tailings deposition within the TSF will be reviewed annually as part of the annual inspection and as part of each design phase for the expansion of the TSF. A review of the design of the tailings and reclaim pipelines will also be required should there be a significant increase in the mill throughput and make-up water requirements. The tailings and reclaim pipelines are discussed in detail in Appendix A. Details of the tailings and reclaim pipelines are shown on Drawings 310, 311, 312, 313 and 315.

2.1.5 Embankment Drainage Provisions

Embankment drainage provisions have been incorporated into the design of the TSF to facilitate drainage of the tailings mass, dewater the foundation soils, and to control the phreatic surface within the embankments. The components of the drainage systems consist of foundation drains, chimney drains, longitudinal drains, outlet drains, and upstream toe drains. The conveyance pipework for all of the drains terminates in the drain monitoring sumps at the Main and Perimeter Embankments where the drain flows and water quality are monitored. The embankment drainage systems will be extended during on-going embankment expansions as required. The drainage systems will be reviewed as part of the annual inspection and as part of each design phase for the expansion of the TSF. Details of the upstream toe drain are shown on Drawing 255. The drainage provisions for the TSF are as follows:

Foundation Drains - A system of foundation drains was installed in the Main and Perimeter Embankment foundations to improve the foundation conditions and enhance the dewatering of near surface soils. Pressure relief wells and pressure relief trenches connected to the foundation drains were included to depressurize the underlying glaciofluvial deposits to enhance the stability of the embankment.

Chimney, Longitudinal and Outlet Drains - A Chimney drain has been included in the Main and Perimeter Embankments and is planned for the South Embankment. The chimney drains provide a contingency drainage measure for control of the phreatic surface in the embankment and will also function as a crack stopper downstream of the core zone. Water collected in the chimney drains is routed to the drain monitoring sumps via the longitudinal and outlet drains.

Upstream Toe Drains - Upstream toe drains have been installed in the Main Embankment and will be included in the Perimeter and South Embankments during the staged expansions of the TSF. The locations and elevations of the upstream toe drains will be reviewed during the design phase of the staged expansions. The purpose of the upstream toe drains is to drain and consolidate the tailings mass near the embankments. Piezometer records at the Main Embankment indicate that the upstream toe drain is effective in draining the sandy tailings adjacent to the embankment. The upstream toe drains also remove a certain amount of filtered water from the impoundment, and it may be possible to establish water discharge points below the seepage collection ponds if

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water quality objectives are met. Multiple toe drains will be added for each embankment to incorporate suitable redundancy, as recommended during an independent third party review conducted by Fred Matich of MATM in 1997 in a "Geotechnical Review, Drainage Aspects" for the Main Embankment.

2.1.6 Seepage Collection Ponds

The Main Embankment Seepage Collection Pond, located immediately downstream of the Main Embankment, was completed at the start of the Stage 1a construction program in 1997. The Perimeter Embankment Seepage Collection Pond was excavated during Stage 1b construction in 1997. These ponds were excavated in low permeability glacial till materials. The South Embankment currently does not have a seepage collection pond. An assessment on the requirement for the South Embankment seepage collection pond will be undertaken as part of the annual construction/annual inspection reports. However, the South Embankment will require at least a sump for the foundation, upstream toe, and filter drains.

The seepage collection ponds collect water from the embankment drain systems and from local runoff. Water from the Seepage Collection Ponds is of good quality and MPMC were permitted to discharge water during the care and maintenance period. Recently, the Ministry of Water, Lands, and Air Protection authorized the discharge from the main embankment from the main seepage collection pond. MPMC are actively monitoring water quality and discharge rates (during the care and maintenance period) and regularly report this information to the relevant regulatory authorities. MPMC is also actively seeking Site Specific Water Quality Objectives to release larger volumes of water from the TSF to the environment.

2.2 SEEPAGE AND STABILITY ANALYSES

2.2.1 Seepage Analyses

Seepage analyses were completed using SEEP/W to delineate the phreatic surface and pore pressures within the tailings mass and the embankment fill materials. The seepage analyses were also used to estimate seepage from the TSF drainage systems during operations and post-closure. The previous design for the TSF incorporated upstream toe drains for the Main and Perimeter Embankments to reduce pore pressures, minimize seepage losses and to enhance the stability of the modified centerline embankments. The seepage analyses will establish the requirement for toe drains within the South Embankment and the configuration of upstream toe drains within the Main and Perimeter Embankments. The seepage analyses are also used to estimate the seepage from the embankment drainage systems to the seepage collection ponds and also to estimate the unrecoverable seepage from the TSF. The results of the seepage analyses have also been used to provide appropriate pore pressure parameters for use in the stability analyses.

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The seepage analyses were performed with the TSF embankments at an elevation of 965.0 m. Piezometer records were used to calibrate the initial phreatic surface used in the analyses. A typical embankment section and material parameters used in the seepage analyses are included in Appendix B.

The seepage analyses indicate that upstream toe drains are effective in reducing the phreatic surface and pore pressures in the TSF embankment fill materials. The inclusion of upstream toe drains also provides seepage control within the embankment and reduces the likelihood of piping. The seepage analyses were also completed without upstream toe drains to determine the phreatic surface, seepage, and pore pressures in the event that the drains are deliberately plugged or cease to operate in the long term. The estimated seepage from the ultimate TSF is summarised on Table 2.2. The upstream toe drain intercepts the majority of the seepage through the embankment. The upstream toe drains allow for effective seepage control as the flows from these drains can be isolated and potentially discharged should the water quality be acceptable. Experience at the site has shown that the quality of water flowing from the toe drains is better than supernatant water quality for most parameters, largely because the suspended solids are effectively filtered before the water enters the drains.

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2.2.2 Stability Analysis

Stability analyses for each embankment were performed using the limit equilibrium computer program SLOPE/W. Static and seismic stability analyses were conducted to investigate the stability of the Main, Perimeter, and South Embankments during operations and post closure. Material parameters adopted for the tailings, foundation and earth embankment materials were based on testwork from the 1995 and 1997 geotechnical investigations, from the various quality control records obtained during construction of previous stages, and from experience with typical values for similar materials. The minimum acceptable factor of safety under static conditions is 1.3 during operations and 1.5 for closure. The minimum acceptable factor of safety under seismic conditions is 1.1 for the OBE and 1.0 for the MDE. The site seismic conditions and ground acceleration factors for the OBE and MDE are included in Appendix C. The stability analyses of the Main Embankment modelled the artesian pressures encountered in this area. The stability analyses were also completed to model upstream slip surfaces resulting from a partially consolidated upstream tailings mass. The upstream stability analyses conservatively modeled a high phreatic surface corresponding to a plugged toe drain.

Details of the SLOPE/W analyses including material parameters and typical embankment sections are included in Appendix C.

The results of the SLOPE/W stability analyses indicate that TSF embankments are stable during operations with and without upstream toe drains. However, a buttress is required at the Main Embankment to increase the factor of safety at closure to the required 1.5. The factor of safety for the TSF embankments for static conditions with upstream toe

drains ranged from 1.7 to 2.0. The factor of safety for the TSF embankments for static conditions without upstream toe drains ranged from 1.5 to 1.8. The factor of safety for the upstream stability analyses under static conditions was 4.1. The results of the static stability analyses indicate that the static factors of safety exceed the minimum requirements during operations and for closure.

The seismic analyses were completed using ground accelerations of 0.037g for the OBE and 0.065g for the MDE. The factor of safety for the TSF embankments for seismic conditions with upstream toe drains ranged from 1.5 to 1.8 for the OBE and 1.4 to 1.7 for the MDE. The factor of safety for the TSF embankments for seismic conditions without upstream toe drains ranged from 1.4 to 1.7 for the OBE and 1.3 to 1.6 for the MDE. The factor of safety for the upstream stability analyses under seismic conditions was 3.7 for the OBE and 2.7 for the MDE. These seismic stability results imply that the embankments are stable for seismic conditions and that there will be no deformations initiated by earthquake loading.

A post liquefaction study was completed to assess the stability of the TSF embankments with liquefied tailings material having very low residual strength. The factor of safety for the TSF embankments for post liquefaction conditions with upstream toe drains ranged from 1.6 to 1.9. The factor of safety for the TSF embankments for post liquefaction conditions without upstream toe drains ranged from 1.5 to 1.8. The factor of safety for the upstream stability analyses under post liquefaction conditions was 2.0.

The results of the stability analyses are summarised on Table 2.3. The results of the stability analyses indicate that the TSF embankments are stable under static, seismic, and post liquefaction conditions and that the embankments do not rely on the tailings mass for stability.

The stability of the ultimate Main Embankment was studied further using the finite difference modelling program FLAC/Slope (Version 4.0, Itasca Consulting Group Inc., 2002). Numerical analyses were performed to determine the factor of safety against failure and to define the critical failure surface which may be different from those that can be modelled using limit equilibrium methods. The factors-of-safety against failure were determined for the following scenarios:

- Long-term static stability;
- Static Post-liquefaction (flow-slide) stability.

The model geometry, groundwater conditions and material parameters used in FLAC/Slope were the same as the conditions modelled in SLOPE/W.

Results from the finite difference analyses indicate that acceptable factors of safety will be maintained for the ultimate Main Embankment for long-term static stability and post-liquefaction stability.

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The estimated factor of safety for long term static stability of the ultimate Main Embankment is 1.5. The factor of safety value is considered to be an acceptable value and agrees well with similar SLOPE/W limit equilibrium analyses.

The static post-liquefaction analysis was used to estimate the factor of safety against a flow slide failure following a MDE event. The factor of safety for post-liquefaction conditions was determined to be approximately 1.3.

Results of the analyses are plotted on Figure X and Y in Appendix C. The figures show the maximum shear strain rates through the Main Embankment, which delineate the potential failure surfaces. The velocity vectors plotted on the figures have been magnified to illustrate the relative movement of the failure surface. The potential failure for the long-term static analysis is estimated to be a composite failure with a rotational-type failure near the embankment crest which develops into a translational/slide failure at the toe through the weaker foundation till. The potential failure for the post-liquefaction static analysis is estimated to be a translational/slide failure along the weaker foundation till. The factors of safety against these critical failure modes are adequate.

2.3 WATER MANAGEMENT PLAN

A site water balance was created in July 2004 to aid in water management planning and to estimate water surplus or deficit volumes in the TSF following the resumption of operations. The results of the water balance, hydrometeorology conditions, and mine development plans were issued in a Letter to Imperial Metals Corporation on July 30, 2004 (KP. Ref. No. 4-0816). This letter, along with the water balance and supporting tables and figures, is included in Appendix D. The objectives of the water balance were to:

- Effectively manage the water to minimize the need for regulated discharges to surface water and prevent the need for water removal from Polley Lake.
- Capture and manage all water that has been affected by mine components.
- Divert runoff from undisturbed areas away from the mine site and tailings facility (TSF).
- Store some excess TSF water to be used to accelerate pit filling at closure. Let's discuss
- Drain the TSF at closure by routing the water into the open pits.

The site water balance has been updated to account for a March 2005 start-up date and projected throughput values received from MPMC. The updated water balance was completed for average precipitation conditions for the mine. The results of the water balance indicate that the mine site is currently moving from a deficit to a surplus condition and the water must be stored on site to meet the current effluent permits. It is anticipated that the majority of this water will require storage in the TSF during operations, unless the effluent permit can be amended to discharge tailings supernatant. The updated water balance for years one to seven (with year one starting in 2005) is included in Appendix D. The water balance for the TSF must be updated at least annually and must be reviewed by the Design Engineer.

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2.4 MATERIAL QUANTITIES

Embankment fill quantities have been estimated for each stage of the TSF expansion up to an elevation of 965.0 m. Quantities are presented for the Zone C, Zone S, Zone B, Zone T, Zone F, Zone U, and CBL materials. The material quantities are shown on Table 2.4. The material quantity requirements versus elevation are shown on Figure 2.4. The fill quantities assume that the downstream shell zone will be constructed to the ultimate toe of the TSF during the Stage 5 expansion program, with the exception of the buttress at the Main Embankment which can be postponed to a later stage.

A study has been completed in conjunction with MPMC that compares the costs between hauling rock from the Wight Pit to the TSF versus blasting and hauling the material from the current rock borrow. The study was completed using both 785C and 777 haul trucks. The results indicate that hauling rock from the Wight Pit to the TSF is more economical, depending on the type of truck, than that associated with blasting and hauling the material from the current rock borrow. Use of rock for embankment construction also will reduce the size of the mine rock storage areas and will reduce the size of disturbance associated with expansion of the rock borrow quarry at the TSF.

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2.5 INSTRUMENTATION

Piezometers

A total of 56 vibrating wire piezometers have been installed at the TSF to date. The piezometers are grouped into tailings, foundation, embankment fill and drain piezometers and have been installed along eight planes designated as Monitoring Planes A to H. An additional monitoring plane (Plane I) will be installed at the south Embankment. The piezometer locations are shown on Drawings 250, 251, 254, 256, 258 and 259. The piezometers are read monthly during operations and weekly during TSF construction programs as per the OM&S Manual. The piezometer data is reviewed annually as part of the annual inspection. The piezometer records for the TSF have recently been reported in Knight Piésold Report “2004 Annual Inspection”, (Ref. No. VA101-1/7-1, February 8, 2005).

Additional foundation, embankment fill and drain piezometers will be installed during the expansion of the TSF Embankments. The additional piezometers will be installed at the existing monitoring planes with an additional plane being located at the South Embankment. Approximately XXX new piezometers will be installed during the expansion phases of the TSF. The proposed locations of the new piezometers are shown on Drawings XX to XX.

Inclinometers

Two slope inclinometers were installed in July 2001 at the toe of the Main Embankment through the lacustrine silts to measure potential deformation of the embankment materials. There has been no significant deviation in the inclinometers since they were installed in 2001. The inclinometers will be extended as required prior to expansion of the Main Embankment. Regular

monitoring should be undertaken in order to utilize this installation fully. Monitoring with the inclinometer probe will be undertaken on an annual basis (twice a month during construction programs).

The existing inclinometers will need to be carefully extended through the shell zone material as it is raised. This can be achieved by placing and compacting granular fill around the inclinometers prior to raising the shell zone. The extension of the inclinometers is shown on Drawing 250. There will be three additional inclinometers installed along the buttress of the Main Embankment following the Stage 5 construction program. The proposed location of the three additional inclinometers is shown on Drawing XXX.

Survey Monuments

Survey monuments will be installed on the TSF Embankment crests as part of each expansion of the TSF. The proposed location of the survey monuments is shown on Drawings XXX to XXX for the Main, Perimeter, and South Embankments respectively. The survey monuments will be monitored on a quarterly basis as per the OM&S Manual.

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SECTION 3.0 - STAGE 4 EXPANSION

The Stage 4 expansion of the Tailings Storage Facility will consist of placing an upstream cap on the embankments to an elevation of 948.0 m. This corresponds to an increase in the crest elevation above the Stage 3C construction program of 3 m and will provide storage for tailings and water for approximately 1 year of operation. The Stage 4 expansion requires placing a coarse bearing layer of sandy gravel or rockfill on the tailings surface to provide a suitable bearing layer for the placement and compaction of the fill material. It is is there a better word/ that the tailings deposition within the TSF be managed appropriately to ensure that the pond is kept away from the embankments to ensure that there is a competent foundation for the coarse bearing layer. The Stage 4 cap will consist of a Zone S core with a coarse aggregate material (Zone U) to be placed upstream of the core on the coarse bearing layer. Instrumentation requirements for the Stage 4 expansion will consist of placing survey monuments on the 948.0 m crest once completed.

Additional work to be completed during the Stage 4 expansion includes the following:

- Install foundation drains at the South Embankment prior to placement of downstream shell zone material.
- Install sump and seepage recycle pumpback system at the South Embankment.
- Extend the slope inclinometers at the Main Embankment concurrently with the downstream shell zone.
- Extend the piezometer cables to readout boxes located beyond the ultimate toe of the embankments.
- Extend the toe drains to the seepage recycle sumps and ponds as required.

The Stage 4 Main Embankment Plan and Sections and Details are shown on Drawings 210 and 215 respectively. The Stage 4 Perimeter Embankment Plan and Sections and Details are shown on Drawings 220 and 225 respectively. The Stage 4 South Embankment Plan and Sections and Details are shown on Drawings 230 and 235 respectively. The Stage 4 detailed design drawings and technical specifications will be issued as part of the Stage 4 expansion. Typical technical specifications from Stage 3C are included in Appendix F.

The Stage 5 expansion will be competed in 2006 and will require increasing the downstream shell zone to the full height of the Stage 5 expansion, with the exception of the buttress at the Main Embankment. The shell zone will also extend to the ultimate downstream toe of the TSF. The material to be used to expand the downstream shell Zone will likely be waste rock from the development of the Wight Pit. The haulage and placement of this material can be done at any time prior to the Stage 5 expansion of the core and filter zones and will be completed by MPMC with mine equipment.

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SECTION 4.0 - CLOSURE AND RECLAMATION

In accordance with requirements under the B.C. Mines Act and Health, Safety and Reclamation Code for Mines in British Columbia, the primary objective of the proposed Reclamation Plan will be to "return all mine-disturbed areas to an equivalent level of capability to that which existed prior to mining on an average property basis, unless the owner, agent or manager can provide evidence which demonstrates to the satisfaction of the chief inspector the impracticality of doing so". The following goals are implicit in achieving this primary objective for the Tailings Storage Facility:

- Long-term preservation of water quality within and downstream of decommissioned operations.
- Long-term stability of the tailings impoundment.
- Removal of all access roads, ponds, ditches, pipelines, structures and equipment not required after the mine closes.
- Long-term stabilization of all exposed materials that are susceptible to erosion.
- Natural integration of disturbed lands into surrounding landscape, and restoration of the natural appearance of the area after mining ceases, to the greatest possible extent.
- Establishment of a self-sustaining vegetative cover consistent with existing forestry, grazing, wildlife and outdoor recreation needs.

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As an overall approach to achieving these objectives, the Reclamation Plan is sufficiently flexible to allow for future changes in the mine plan and to incorporate information obtained from ongoing reclamation research programs such as trial tailings re-vegetation plots.

The detailed Reclamation Plan for the Mount Polley Mine is presented in the Hallam Knight Piésold document "The Mount Polley Mine Project Reclamation Plan", Ref. No. H1221, April 1996.

The general concept is that the surface of the tailings impoundment will be decommissioned as a mixed forested/wetlands complex with a gradual transition towards a ponded area with an overflow spillway. The downstream face of the tailings embankments will be covered with selected overburden materials and revegetated progressively during operations to the greatest extent possible, once the final toe position and slope have been established.

At mine closure, surface facilities will be removed in stages, salvaged and sold. The tailings conveyance system will be dismantled and removed immediately following cessation of operations. The reclaim barge, pumps and pipeline will be utilized for supplementary flooding of the open pits and will then be dismantled and removed. The seepage collection ponds and recycle pumps will be retained for a period after closure until monitoring results indicate that tailings area seepage is of suitable quality for direct release to the environment. At that time, the seepage collection pond and recycle pumps will be removed. The groundwater monitoring wells and piezometers in the tailings embankment will be retained for long term monitoring.

The TSF will be re-vegetated to accommodate the end land use objective of forested land with a shallow marsh.

A spillway will be constructed to accommodate the Probable Maximum Flood (PMF) flows within the tailings basin. The spillway will be constructed in competent ground along the abutment of an Embankment and will discharge to the receiving environment. The elevation of this spillway and outflow channel will be designed to establish a set water elevation over the tailings surface (approximately 15% coverage).

Final seeding of the embankment slopes with grasses and legumes will provide a stable vegetation mat that resists erosion. Once the open pit flooding is complete, the surface water diversion system will be dismantled to allow for natural runoff to be routed through the tailings area.

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SECTION 5.0 - CERTIFICATION

This report was prepared and approved by the undersigned.

Prepared by:

Les Galbraith, P.Eng.
Senior Engineer

Approved by:

Ken J. Brouwer, P.Eng.
Managing Director

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