MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY

REPORT ON STAGE 3C CONSTRUCTION
(REF.NO. VA101-1/5-2)

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EXECUTIVE SUMMARY

The Mount Polley gold and copper mine is owned by Mount Polley Mining Corporation (MPMC). Mount Polley Mine started production in 1997 and had milled approximately 27.5 million tonnes of ore prior to stopping production in October 2001. Mount Polley Mining Corporation commenced upgrading the mine facilities in the second half of 2004, which included increasing the elevation of the Tailings Storage Facility embankments from an elevation of 942.5m to 944.0m. This construction program (Stage 3C) is the final part of a tailings embankment raise previously permitted by the Ministry of Energy and Mines. Stage 3C of the Mount Polley Mine Tailings Storage Facility was constructed between August 2004 and March 2005 and involved placing a 1.50 m cap on the existing crest of 942.5 m. This report documents the Stage 3C construction program for the TSF.

Knight Piésold was been involved with Mount Polley Mine since 1989 and has provided the detailed design, construction supervision, site investigation work, quality assurance/quality control (QA/QC), technical specifications, and contract documents for all stages of the Tailings Storage Facility construction programs. Knight Piésold also provided the design, technical specifications, construction supervision and the quality assurance/quality control (QA/QC) services for the Stage 3C construction program, which included a review of the instrumentation and monitoring records.

The results of the technical supervision and QA/QC testwork indicate that the fill materials placed and compacted on the tailings embankments were within the required material specifications and were in accordance with the modified Stage 3C design of the TSF. The results of the instrumentation monitoring show that no unexpected or anomalous pore pressures were observed in the vibrating wire piezometers and there have been no significant deviations in the inclinometer casings since their installation in 2001. No new instrumentation was installed during the Stage 3C construction program.

The monitoring frequency of the vibrating wire piezometers, inclinometers, and survey monuments following the Stage 3C construction program should be completed as outlined in the Operations and Maintenance Manual. The tailings pond elevation should also be monitored on a regular basis to ensure that the stormwater and freeboard requirements are not infringed upon during operations.

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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. Mount Polley Mine started production in 1997 and had milled approximately 27.5 million tonnes of ore prior to stopping production in October 2001. Mount Polley Mining Corporation commenced upgrading the mine facilities in the second half of 2004 and started production again in March 2005. The upgrading of the mine facilities included increasing the elevation of the Tailings Storage Facility (TSF) embankments from an elevation of 942.5m to 944.0m. An overall site plan of the Mount Polley Mine is shown on Drawing 100.

Knight Piésold Ltd. was originally engaged by Imperial Metals Corporation to provide engineering services for the design of the Tailings Storage Facility in 1989. Over the period since, Knight Piésold Ltd. has provided the following services:

- Detailed design of all stages of the Tailings Storage Facility and Ancillary Works completed to date.
- Preparation of contract documents and technical specifications for all stages of the Tailings Storage Facility construction to date.
- Construction supervision and quality assurance/quality control (QA/QC) for all stages of the Tailings Storage Facility 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 Tailings Storage Facility.

Knight Piésold Ltd. provided the design, technical specifications, construction supervision and the quality assurance/quality control (QA/QC) services for the Stage 3C construction program. Knight Piésold Ltd. also reviewed the instrumentation and monitoring records during the Stage 3C construction program.

1.2 SCOPE OF REPORT

This report documents the Stage 3C construction program for the TSF. The report includes a discussion of the construction methods used to complete the work, the results of quality

assurance tests, a review of the instrumentation monitoring results, and the results of the site investigation work completed during the construction program. The report also includes a set of "As -Built" drawings corresponding to Stage 3C construction program.

SECTION 2.0 - STAGE 3C CONSTRUCTION PROGRAM

2.1 GENERAL

The Stage 3C construction program at Mount Polley Mine commenced in August 2004 and was completed at the end of March 2005. This construction program was the final part of a tailings embankment raise previously permitted by the Ministry of Energy and Mines. The construction program initially involved raising the TSF embankments from elevation 942.5 m to 945 m, however, the design crest elevation was modified to elevation 944 m to reflect changes in the mill start-up date.

The general arrangement of the TSF is shown on Drawing 102. The material specifications are shown on Drawing 104. The Stage 3C Main Embankment Plan and Sections and Details are shown on Drawings 210 and 215 respectively. The Stage 3C Perimeter Embankment Plan and Section and Detail are shown on Drawings 120 and 125 respectively. The Main and Perimeter Embankment transition zone is shown on Drawing 127. The Stage 3C South Embankment Plan and Sections and Details are shown on Drawing 130. Select photographs of the construction program are included in Appendix D.

The main components of the TSF are as follows:

- The TSF embankments, which 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 – parameters 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.
- Embankment drainage provisions which include foundation drains, upstream toe drains, and chimney, longitudinal and outlet drains. The embankments drains 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.
- 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.

The Stage 3C construction program was limited to raising the TSF embankments to an elevation of 944 m, which involved placing a 1.50 m cap on the existing crest of 942.5 m. The existing vibrating wire piezometers and inclinometers were monitored during the program but no new instrumentation was installed.

2.2 QUALITY ASSURANCE/QUALITY CONTROL

Knight Piésold provided the Stage 3C design for the Tailings Embankments, prepared the Technical Specifications, provided technical assistance and performed quality assurance/quality control (QA/QC) testing during the construction Program. Key items addressed by Knight Piésold Ltd. included:

- Foundation inspection and approval prior to fill placement.
- Assessment of borrow material suitability.
- Inspection of fill placement procedures.
- In-situ testing of placed and compacted fill for moisture content and density.
- Collection and testing of Control and Record samples.
- Instrumentation monitoring.

Knight Piésold worked under the overall management and administration of MPMC. Peterson Construction and MPMC completed the construction work. The QA/QC procedures were similar to previous construction programs at the TSF. Material samples collected for laboratory testing during the construction program included Control and Record samples. The Control tests were carried out on materials collected from the borrow areas or from source locations to determine their suitability for use in the work. Record tests were performed on materials after placement and compaction to document the level of workmanship achieved and to ensure that the design objectives were met. The Control and Record test results are presented in Appendix A.

The Stage 3C construction program extended through the winter months of 2004/2005. The portion of the construction program that was completed during freezing conditions was monitored carefully by Knight Piésold to ensure that the work was carried out in accordance with the Technical Specifications.

2.3 STAGE 3C EARTHWORKS

2.3.1 GENERAL

Earthworks for the Stage 3C Tailings Storage Facility construction program comprised the following zones and materials:

- Zone S - fine grained glacial till.
- Zone F - processed gravel and sand filter.
- Zone T - select rockfill transition zone.
- Zone C - rockfill zone.

The material specifications for the fill materials are shown on Drawing 104. The fill materials are discussed in the following sections.

2.3.2 ZONE S

Zone S forms the low permeability core and seal zones for the Main, Perimeter and South Embankments. The material used in Zone S was fine grained glacial till from Borrow Area No. 2, 4, and 5, which are located downstream of the left (East) abutment of the Main Embankment, at the north end of the TSF and at the west end of the TSF, respectively. The Control tests results for the Zone S material are presented in Appendix A and summarized on Table 2.1. The results of the Control tests particle size analyses on the Zone S material are shown on Figure 2.1.

The Specification for Zone S material required placement and compaction in maximum 300 mm thick horizontal lifts. The compaction specification was 95 percent of the Standard Proctor maximum dry density. Each lift of Zone S was tested and approved prior to the placement of the subsequent lift. Areas that failed to meet the compaction requirements were re-compacted until the minimum compaction requirements were met. Material that did not meet the compaction requirements was typically too wet for use as construction material and was pushed upstream of the crest onto the tailings beach.

Record tests on the compacted Zone S fill included the following:

- Moisture Content (ASTM D2216).
- Particle Size Distribution (ASTM D422).
- Laboratory Compaction (ASTM D698).
- Specific Gravity (ASTM D854).
- Atterberg Limits (ASTM D4318).
- Field Density by Nuclear Methods (ASTM D2922).
- Field Moisture Content by Nuclear Methods (ASTM D3017).

A total of six Zone S Record samples were collected and tested during the Stage 3C construction program. The Record test results indicate that the Zone S material is typically silty sand with some gravel and some clay. The gradation curves of the Zone S Record Tests are shown on Figure 2.2. The moisture content of the Record Samples ranged from 11.2 to 15.9 percent, with an average of 12.6 percent. The Standard Proctor Maximum Dry Density ranged from 1,948 to 2,092 kg/m^3, with an average of 2,040 kg/m^3. The plastic limits ranged from 14.5 to 18 percent, with an average of 15.7 percent. The liquid limits ranged from 24 to 32 percent, with an average of 26 percent. The plasticity index ranged from 9.0 to 14 percent, with an average of 10.3 percent. The field density and moisture content tests for the Zone S Record tests are shown on Figures 2.3 and 2.4 respectively. Specific gravity tests were completed on five record samples. The median result was 2.62, which is consistent with values measured on similar materials during previous construction programs. All of the Zone S Record test results were within the specified limits for the material.

An additional 359 field density and moisture content tests were performed on the Zone S material using a nuclear densometer to assess the compacted density and moisture

content. The compacted dry density ranged from 1,674 to 2,191 kg/m^3, with an average of 2,029 kg/m^3, with the compacted moisture content ranging from 7.2 to 15.7%, with an average of 11.1%. The percent compaction as compared to the Standard Proctor maximum dry density ranged from 88.5 to 108.5%, with an average of 99.5%. Compacted material that failed to meet the compaction requirements were re-compacted until the minimum compaction requirements were met or the material was removed from the dam. The compacted dry density results are shown on Figure 2.5, with the percent compaction results shown on Figure 2.6. The compacted moisture content results are shown on Figure 2.7, with the deviation from the Standard Proctor optimum moisture content results shown on Figure 2.8. The nuclear densometer results are presented in Appendix C.

2.3.3 ZONE F

The Zone F material forms the filter zone immediately downstream of Zone S on the Main and Perimeter Embankments. The material used in Zone F was mine waste rock that was processed at the millsite using the primary crusher. The Zone F Control tests gradation curves are shown on Figure 2.9.

The Specification for Zone F called for placement and compaction in maximum 600 mm thick horizontal lifts. The Zone F fill placement was carefully monitored to ensure that segregation did not occur. Compaction was achieved with a hand-operated vibrating compactor or with tamping/compacting of the filter material with the excavators bucket at every intermediate lift. The third lift was compacted with a Bomag 10 tonne vibratory smooth drum compactor.

Record tests on Zone F consisted of Particle Size Distribution tests (ASTM D422). A total of sixteen (16) particle size distribution tests were completed on Zone F. These tests showed that Zone F consists of sand and gravel with less than 10% fines. Five of the Zone F test results fell outside of the specified coarse limit basically due to dry screen test method rather than the more accurate wet screen analysis. All the wet screen tests on sampled filter specimens fall between the required gradation limits as shown on Figure 2.10.

2.3.4 ZONE T

Zone T is a transition zone immediately downstream of Zone F in the Main and Perimeter Embankments and immediately downstream of Zone S at the South Embankment. The material used in Zone T was select rockfill quarried from the Rock Borrow. The Zone T Control tests gradation curves are shown on Figure 2.11.

The Specification for Zone T required placement and compaction in maximum 600 mm thick horizontal lifts. Fill placement was carefully monitored to ensure that segregation did not occur. Compaction was achieved with a 10 tonne vibratory smooth drum roller.

Record tests on Zone T consisted of Particle Size Distribution tests (ASTM D422). A total of eight (8) Zone T samples were tested for particle size distribution. These tests showed that Zone T consists of gravel with some sand and trace cobbles and fines. Gradation curves are shown on Figure 2.12. All of the Zone T record test results fell inside the specified limits.

2.3.5 ZONE C

Zone C is a rockfill zone immediately downstream of Zone T in the Main and Perimeter Embankments. The material used in Zone C was rockfill quarried from the Rock Borrow.

The Specification for Zone C called for placement and compaction in maximum 1000 mm thick horizontal lifts. This was followed and compaction was achieved with a 10 ton vibratory smooth drum roller.

Record tests on Zone C consisted of Particle Size Distribution tests (ASTM D422). A total of two (2) Record Tests were completed on Zone C. The results showed that Zone C is a cobbly gravel material with some boulders and sand. All of the test results were within the specified limits for Zone C. Gradation curves are shown on Figure 2.13.

2.4 INSTRUMENTATION MONITORING

2.4.1 GENERAL

Instrumentation planning and installation had been carried out during the earlier stages of construction and no further instrumentation was installed during Stage 3C construction program.

2.4.2 VIBRATING WIRE PIEZOMETERS

A total of 56 vibrating wire piezometers have been installed at the TSF along eight planes designated as Monitoring Plans A to H. The piezometer locations are shown on Drawings 250, 252, 254, 256, 258 and 259. The piezometers are grouped into tailings, foundation, embankment fill and drain piezometers. The piezometers were discussed in detail in the Knight Piésold Ltd. “Report on 2004 Annual Inspection, (Ref. No. VA101-01/7-1). The piezometers were measured on a weekly basis by MPMC during the Stage 3C construction program. No unexpected or anomalous pore pressures were observed while monitoring the vibrating wire piezometers during the construction program. The timeline plots for the piezometers are included in Appendix B.

2.4.3 SLOPE INCLINOMETERS

The two slope inclinometers installed at the toe of the Main Embankment in July 2001 were read during the construction program to monitor any movement in the Main Embankment and the underlying lacustrine unit. A ‘poor-boy’ monitoring rod was also constructed and used twice a month during the construction program to ensure that

casing deformation due to soil movement associated with settlement or instability could be identified.

The results of the inclinometer readings and 'poor-boy' measurements indicate that there have not been any significant deviations in the inclinometers since their installation in 2001, and there were no measurable impacts on the inclinometers resulting from the Stage 3C construction program. The results of the inclinometer readings are shown in Appendix B.

2.4.4 SURVEY MONUMENTS

Six survey monuments were installed on the Stage 3B embankment crest following the 2001 construction. MPMC has reported that the initial survey of the monuments in 2001 was not closed properly, resulting in inconsistent surveys since their installation. New survey monuments will be installed on the embankment crests during the Stage 4 construction program, scheduled for the spring of 2005.

2.4.5 DESIGN MODIFICATIONS

Knight Piésold Ltd. employs a strict procedure for making design modifications (changes or substitutions) in the field. All design change requests are submitted in writing by the Resident Engineer to the Knight Piésold Ltd. Vancouver Office for review and evaluation. If approved by the Project Principal, the design change request is forwarded to the Owner and Contractor in a formal, written decision.

The design modification implemented during the Stage 3C construction program involved reducing the design crest elevation from an elevation of 945 m to 944 m to reflect changes in the mill start-up date. The reduced elevation of the TSF embankments will not impact the stormwater storage and freeboard requirements.

SECTION 3.0 - SUMMARY AND RECOMENDATIONS

Stage 3C of the Mount Polley Mine Tailings Storage Facility was constructed between August 2004 and March 2005. The Stage 3C construction program was limited to raising the TSF embankments to an elevation of 944 m, which involved placing a 1.50 m cap on the existing crest of 942.5 m. The construction program initially involved raising the TSF embankments to elevation 945 m, however, the Stage 3C crest elevation was modified to elevation 944 m to reflect changes in the mill start-up date. No new instrumentation was installed during the Stage 3C construction program.

Technical supervision of the work included QA/QC testing and monitoring the existing vibrating wire piezometers and inclinometers. The QA/QC testing included collecting and testing Record samples of the placed and compacted material, and testing the compacted density and moisture content of the Zone S material using a nuclear densometer. The results of the QA/QC testwork indicate that the fill materials placed and compacted on the tailings embankments were within the required material specifications and were in accordance with the modified Stage 3C design of the TSF.

The piezometers were measured on a weekly basis by MPMC and the inclinometers were measured twice a month using a “poor boy” probe. The inclinometers were also read using a SINCO inclinometer probe to provide a more detailed assessment of any significant deviations in the inclinometer casing since their installation in 2001. The results of the instrumentation monitoring show that no unexpected or anomalous pore pressures were observed while monitoring the vibrating wire piezometers and there were no measurable impacts on the inclinometers during the construction program.

The vibrating wire piezometers, inclinometers, and survey monuments should be read continually throughout the year as outlined in the Operations and Maintenance Manual.

The TSF is required to have sufficient live storage capacity for containment of runoff from the 24-hour PMP, in addition to regular inflows from other precipitation runoff, including the spring freshet, while maintaining the minimum freeboard requirements. The tailings pond elevation should be monitored on a regular basis to ensure that the stormwater and freeboard requirements are not infringed upon during operations.

SECTION 4.0 - 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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