



**MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE**

**TAILINGS STORAGE FACILITY
REPORT ON 2005 ANNUAL INSPECTION
(REF. NO. VA101-01/11-1)**

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EXECUTIVE SUMMARY

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. Mount Polley mine re-opened in the March 2005 after managing the facilities for Care and Maintenance activities since October 2001. The average throughput for 2005 was approximately 15,000 tpd. Approximately 8.7 million tonnes of tailings has been deposited in the TSF since the mine commenced operations again in 2005 (as of February 2006).

The Stage 4 construction program, which involved raising the TSF embankments to the currently permitted elevation of 948 m, was in process at the time of the inspection.

The TSF has a "HIGH" hazard classification (or consequence category).

The TSF is required to have sufficient live storage capacity for containment of runoff from the 24-hour PMP volume of 679,000 m³ at all times, plus 1 meter of freeboard for wave run-up. MPMC operated the tailings pond within these tolerances over the past year.

The water balance for the TSF is updated regularly by MPMC with periodic reviews by Knight Piésold. The water balance was updated in 2004 to reflect updated site hydrometeorological data.

No piezometer data had been collected from Sept 22, 2005 to April 30 2006 due to a malfunctioning readout box connector cable and the accidental destruction or burying of piezometer cables during the Stage 4 construction program. MPMC will update the piezometer records as the damaged cables are repaired and the piezometer data will be further reviewed as part of the Stage 4 Construction Report. There were no concerns with the piezometer collected prior to September 22, 2005.

The two slope inclinometers installed at the toe of the Main Embankment in July 2001 were read in March 2006. The results show that there have been no significant deviations in the inclinometers as compared to the installation readings of 2001 and the readings from October 2004.

The TSF embankments were observed to be in good condition. No seepage or slumping was observed. The Southeast Sediment Pond, Millsite Sump, and South Bootjack Dam were

observed to be in a good condition with no geotechnical issues outstanding. However the Millsite Sump spillway was showing signs of erosion and should be repaired.

No major unexpected or uncontrolled seepage was observed from the embankments. The small amount of seepage observed at the base of the Perimeter Embankment between chainages 29+00 to 32+00 is being routed to the Perimeter Embankment Seepage Collection Pond.

The Tailings Pond is adjacent to the Main Embankment (app. chainage 16+00 to 19+00). This was the result of prolonged discharge of tailings from the Perimeter Embankment and from the knife gate valve.

Flows from the five Foundation Drains and the Upstream Toe Drain at the Main Embankment were monitored in December 2005. The flows from the upstream toe have increased slightly due to the close proximity of the tailings pond at the Main Embankment. The flows from the drains were reported to be clear.

The Operations, Maintenance and Surveillance Manual (OMS Manual) and the Emergency Preparedness and Response Plan (EPP document) for the TSF were revised on December 22, 2004.

A Dam Safety Review is scheduled for the summer of 2006.

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TABLE OF CONTENTS

	PAGE
EXECUTIVE SUMMARY	i
TABLE OF CONTENTS	i
SECTION 1.0 - INTRODUCTION	1
1.1 PROJECT DESCRIPTION	1
1.2 SCOPE OF REPORT	1
SECTION 2.0 - TAILINGS STORAGE FACILITY AND ANCILLARY WORKS	3
2.1 GENERAL	3
2.2 TAILINGS STORAGE FACILITY	3
2.3 TSF CONSTRUCTION ACTIVITIES DURING PAST YEAR	4
2.4 ANCILLARY WORKS	4
SECTION 3.0 - 2005 ANNUAL INSPECTION	5
3.1 WATER MANAGEMENT	5
3.1.1 GENERAL	5
3.1.2 Water Balance Review	5
3.1.3 Surface Water Control	5
3.1.4 Impoundment Freeboard Requirements	6
3.1.5 Drain Flow Data	6
3.1.6 Seepage Collection Ponds	7
3.1.7 External Water	7
3.2 TAILINGS STORAGE FACILITY	7
3.3 ANCILLARY WORKS	8
3.3.1 Tailings and Reclaim Pipelines	8
3.3.2 Millsite Sump	9
3.3.3 Southeast Sediment Pond	9
3.3.4 South Bootjack Dam	10
SECTION 4.0 - INSTRUMENTATION	11
4.1 PIEZOMETER DATA	11
4.1.1 General	11
4.1.2 Tailings Piezometers	11
4.1.3 Embankment Foundation Piezometers	11
4.1.4 Embankment Fill Piezometers	12

4.1.5	Drain Piezometers	12
4.2	SLOPE INCLINOMETERS	12
4.3	SURVEY MONUMENT DATA	13
SECTION 5.0 - SUMMARY AND RECOMMENDATIONS		14
SECTION 6.0 - CERTIFICATION		17

TABLES

Table 3.1 Rev 0	Main Embankment Seepage Collection Pond - Summary Of Foundation Drain Flow Data
Table 3.2 Rev 0	Main Embankment Seepage Collection Pond - Summary Of Upstream Toe Drain Flow Data
Table 5.1 Rev 0	Maximum Artesian Head Values for Embankment Foundation Piezometers

FIGURES

Figure 1.1 Rev 0	Aerial Photograph of Mount Polley Mine – Looking Northwest
Figure 1.2 Rev 0	Aerial Photograph of Mount Polley Mine – Looking South
Figure 2.1 Rev 0	TSF General Arrangement

DRAWINGS

VA101-1/11-100 Rev 0	Stage 4 Embankment - Overall Site Plan
VA101-1/11-102 Rev 0	Stage 4 Embankment - General Arrangement
VA101-1/10-210 Rev 0	Stage 4 Main Embankment - Plan
VA101-1/10-215 Rev 0	Stage 4 Main Embankment – Sections and Details
VA101-1/10-220 Rev 0	Stage 4 Perimeter Embankment - Plan
VA101-1/10-225 Rev 0	Stage 4 Perimeter Embankment – Sections
VA101-1/10-230 Rev 0	Stage 4 South Embankment - Plan
VA101-1/10-235 Rev 0	Stage 4 South Embankment – Sections
VA101-1/8-236 Rev 0	Existing Instrumentation - Main Embankment – Plan
VA101-1/8-238 Rev 0	Existing Instrumentation - Perimeter Embankment – Plan
VA101-1/8-240 Rev 0	Existing Instrumentation - South Embankment – Plan
VA101-1/8-242 Rev 0	Existing Instrumentation - Planes A, B, and C
VA101-1/8-244 Rev 0	Existing Instrumentation - Planes D, E, F, G, and H

APPENDICES

APPENDIX A	Ministry of Energy and Mines – Guidelines for Annual Reports
APPENDIX B	Piezometer Records
APPENDIX C	Inclinometer Data
APPENDIX D	2005 Annual Inspection Photographs
APPENDIX E	DRAFT CDA Dam Safety Guidelines (October 2005)

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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. 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 mine re-opened in March 2005 after managing the facilities for Care and Maintenance activities since October 2001. MPMC is currently mining and milling ore from the Bell Pit and the Northeast Zone with the tailings material being deposited as slurry into the Tailings Storage Facility (TSF). Process water is collected and recycled back to the mill for recycle in the milling process. The average throughput for 2005 was approximately 15,000 tpd. Approximately 8.7 million tonnes of tailings have been deposited in the TSF since the mine commenced operations in 2005 (as of February 2006).

The Stage 4 construction program, which involved raising the TSF embankments to the currently permitted elevation of 948 m, was in process at the time of the inspection. Knight Piésold provided the design, technical specification, and QA/QC for the Stage 4 construction program of the TSF. Aerial photographs of Mount Polley Mine from October 2005 are shown on Figures 1.1 and 1.2. The overall site plan showing the Stage 4 design of the Tailings Storage Facility is shown on Drawing 101-1/11-100. The Stage 4 Embankment General Arrangement is shown on Drawing 101-1/11-102. Selected photographs taken during the site inspection are included in Appendix D.

1.2 SCOPE OF REPORT

Mount Polley Mining Corporation requested that Knight Piésold complete an annual inspection of the Tailings Storage Facility and prepare an Annual Inspection Report that meets the guidelines outlined by the Ministry of Energy and Mines (MEM). These guidelines are provided in Appendix A. Mr. Les Galbraith, P. Eng., conducted the 2005 annual inspection on September 21 and 22, 2005 in the company of Ron Martel of MPMC. This report presents the results of the annual inspection. The inspection involved making visual observations of the Tailings Storage Facility and includes a review of the TSF instrumentation records. This report also includes a review of the ancillary works, which includes the tailings and reclaim pipelines, the millsite sump, and the Southeast Sediment Pond.

Regular on-going inspections of the Tailings Storage Facility (TSF) and Ancillary Works have been completed by Knight Piésold to ensure the safety and security of the system and to meet the guidelines of the Ministry of Energy and Mines. Recent annual inspections of the TSF by Knight Piésold were completed in 2001 (KP Ref. 11162/14-2), 2002 (KP Ref. VA101-00001/3-1), and 2004 (KP Ref. VA101-00001/7-1).

A Dam Safety Review is scheduled for the summer of 2006. The Dam Safety Review will be carried out as per the Dam Safety Guidelines. The DRAFT Dam Safety Guidelines (October 2005) are included in Appendix E. The Dam Safety Review and subsequent report will be carried out by a third party Knight Piésold Professional Engineer, who has had no input into the design and operation requirements of the TSF, to ensure that the findings and recommendations are independent.

SECTION 2.0 - TAILINGS STORAGE FACILITY AND ANCILLARY WORKS

2.1 GENERAL

The mineral extraction process at Mount Polley Mine uses a selective flotation process to produce a copper-gold concentrate. Tailings material from the mill is piped and discharged as slurry into the Tailings Storage Facility (TSF), where the solids settled out of the slurry. Process water is collected and recycled back to the mill for recycle in the milling process.

2.2 TAILINGS STORAGE FACILITY

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 for effective reclamation of the tailings impoundment and associated disturbed areas at closure.

The TSF has a "HIGH" hazard classification (or consequence category). Therefore, 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 includes the Perimeter, Main, and South Embankments. The Stage 4 construction program involved raising the TSF embankments to an elevation of 948 m. The heights of the TSF embankments corresponding to a crest elevation of 948 m will be approximately 17 m, 35 m, and 7 m for the Perimeter Embankment, Main Embankment and the South Embankment respectively. The TSF Stage 4 plan and section drawings for the Main, Perimeter, and South Embankments are shown on the following drawings:

- VA101-1/10-210 rev 0 Stage 4 Main Embankment Plan.
- VA101-1/10-215 Rev 0 Stage 4 Main Embankment – Sections and Details.
- VA101-1/10-220 Rev 0 Stage 4 Perimeter Embankment – Plan.
- VA101-1/10-225 Rev 0 Stage 4 Perimeter Embankment – Sections.
- VA101-1/10-230 Rev 0 Stage 4 South Embankment – Plan.
- VA101-1/10-235 Rev 0 Stage 4 South Embankment – Sections.

An aerial photograph of the TSF that was flown in the summer 2004 is shown on Figure 2.1.

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 U – upstream shell – select fill 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.
- A low permeability basin liner (natural and constructed), which covers the base of the entire facility, with a nominal depth of at least 2 m.
- A foundation drain and pressure relief well system, located downstream of the Stage 1B Main Embankment. The foundation drain and pressure relief well system prevents the build-up of excess pore pressure in the foundation, and transfers 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. Water from the Seepage Collection Ponds is pumped back into the TSF during operations.
- Instrumentation in the tailings, earth fill embankments and embankment foundations. This includes vibrating wire piezometers, survey monuments, and slope inclinometers. The embankment drain flows are also monitored, along with the level of the tailings supernatant water pond.
- A system of groundwater quality monitoring wells installed around the TSF.

2.3 TSF CONSTRUCTION ACTIVITIES DURING PAST YEAR

The Stage 4 expansion of the Tailings Storage Facility involved placing an upstream cap on the embankments to an elevation of 948.0 m. This increase in the crest elevation will provide storage for tailings and water for approximately 1 year of operation. The Stage 4 cap consists of a Zone S core with a coarse aggregate material (Zone U) placed upstream of the core on the tailings beach. The placement of the downstream shell zone and filter materials has been deferred to Stage 5. Future expansion programs of the TSF will incorporate the Modified Centreline Construction method for the embankments.

2.4 ANCILLARY WORKS

Ancillary works that are key to the operation of the TSF include the following:

- Tailings Pipeline. The Tailings Pipeline conveys tailings slurry via gravity from the Millsite to the TSF. This pipeline consists of movable discharge sections with multiple spigots to distribute the tailings along the embankment crests.
- Millsite Sump. Runoff from the millsite is routed and stored in the millsite sump. Excess water from the sump is routed into the tailings line near the mill for storage in the TSF.
- Southeast Sediment Pond. Runoff from the Southeast Rock Disposal Site and the dewatering from the Northeast Zone and associated waste dumps is directed to the Southeast Sediment Pond. Water from the Southeast Sediment Pond is routed to the reclaim pipeline at the reclaim booster pump station.
- Reclaim Water System. The reclaim water system consists of a reclaim barge, a booster pump station, and associated pipeworks to allow for continuous recycle of process water and site runoff from the TSF to the mill processing circuit during operations.

SECTION 3.0 - 2005 ANNUAL INSPECTION

3.1 WATER MANAGEMENT

3.1.1 GENERAL

MPMC mine personnel complete on going surface water monitoring and water management activities to ensure compliance with the current mine permits. The Annual Inspection evaluated the physical aspects of the water management program at the TSF. Knight Piésold has not reviewed the geochemical characteristics of the water management operations. This report focuses on those aspects of the water management plan that are significant from a dam safety perspective.

3.1.2 Water Balance Review

The water balance for the TSF is updated regularly by MPMC with periodic reviews by Knight Piésold. The site climatic conditions were reviewed by Knight Piésold in 2004 and the water balance input parameters were adjusted accordingly to better reflect site conditions. The TSF is currently operating with a water budget surplus, as total inflows from precipitation and surface runoff exceed losses from evaporation and seepage removal. The Mount Polley Mine has undergone significant development in the last couple of years and it is very important that the Water Management Plan and site water balance be reviewed and updated as required to ensure that they stay current with the Mine Development Plan and that there is sufficient capacity in the TSF to store the increased site runoff associated with the expansion of the mine footprint. The water balance was reviewed by Knight Piésold in February 2006 and MPMC appears to be up to date with the Mine Development Plan.

3.1.3 Surface Water Control

Surface water control at the mine site comprises the interception of runoff from the disturbed (and some undisturbed) catchment areas for diversion into the TSF. Surface water control structures include the following:

- The Bell and Cariboo Pits, and the Mill Site Area - Surface water from the Bell and Cariboo Pits and Mill Site Area is routed into the mill-site sump where it is transferred to the TSF via the tailings pipeline.
- Southeast Rock Disposal Site - Surface water is intercepted by runoff collection ditches and transferred to the Southeast Sediment Pond for transfer to the mill via the reclaim water pipeline.
- North East Zone Pit and Waste Dumps – Surface and groundwater from the North East Zone and Waste Dumps is directed to the Southeast Sediment Pond via a series of pipelines and diversion ditches.
- Tailings Storage Facility Area - Clean surface water runoff from the undisturbed catchment area above the impoundment is currently routed around the TSF to reduce the accumulation of water within the impoundment. The diversion ditches were unobstructed and those that were flowing had clear water. This diversion

ditch on the west side of the TSF will need to be relocated to higher ground in the next year or two as the tailings pond expands.

3.1.4 Impoundment Freeboard Requirements

The TSF is required to have sufficient live storage capacity for containment of runoff from the 24-hour PMP volume of 679,000 m³ at all times, which would result in an incremental rise in the tailings pond level of approximately 0.39 m. The 24-hour PMP allowance is in addition to regular inflows from other precipitation runoff, including the spring freshet. The TSF design also incorporates an additional allowance of 1 meter of freeboard for wave run-up. MPMC operated the tailings pond within these tolerances over the past year. The supernatant pond was at elevation 942.30 m at the time of Mr. Galbraith's inspection on September 22, 2005. The current Stage 4 construction program will provide sufficient storage capacity to contain the 2006 freshet and the 24-hour PMP, while maintaining the 1-meter freeboard requirement.

The tailings pond water level is currently measured at the reclaim barge. The single point discharging of tailings from the knife gate valve located on the West side of the Perimeter Embankment results in a higher tailings beach at this location, which, if not managed properly, may result in tailings and runoff butting up against the dam inside the minimum freeboard requirement. The discharging of tailings from the knife gate should be monitored on a regular basis to ensure that the freeboard requirements are maintained at all locations in the TSF.

3.1.5 Drain Flow Data

Flows from the five Foundation Drains and the Upstream Toe Drain at the Main Embankment were monitored in December 2005. The flow rates for the Foundation Drains and Upstream Toe Drains are shown on Tables 3.1 and 3.2 respectively. The flow rates from the drains were not monitored during the Care and Maintenance Period as the drain outlets were submerged within the sump. This condition was anticipated during the Care and Maintenance Period, as flow monitoring is only possible during operations when the seepage pond level has been pumped down. The seepage pond was pumped down in December 2005 and flow measurements were taken. The monitored flows are consistent with the flows measured in 2000. The flows from the upstream toe drain have increased slightly due to the close proximity of the tailings pond at the Main Embankment. The monitoring of the Foundation Drains and Upstream Toe Drains should continue on a weekly basis during operations as outlined in the Operations and Maintenance Manual (KP Ref. No. VA101-00001/9-1). The flows from the drains were reported to be clear.

Samples from the Foundation Drains and the Upstream Toe Drain were also collected by MPMC for water quality testing. The results are available from MPMC and are reported in the Annual Environmental Reports.

3.1.6 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 seepage collection ponds were observed to be in good condition with no observed erosion activity.

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. MPMC are actively monitoring water quality and regularly report this information to the relevant regulatory authorities. MPMC is also developing Site Specific Water Quality Objectives, and are investigating options to release larger volumes of water from the overall site to reduce or prevent the accumulation of excess supernatant water in the TSF.

The South Embankment currently does not have a seepage collection and recycle system, as there is no seepage. An assessment on the requirement for the future South Embankment seepage recycle requirements will be undertaken as part of the annual construction and annual inspection reports. It is anticipated that the South Embankment will require at least a sump for the foundation, upstream toe, and filter drains. The installation of the sump at the South embankment is scheduled for the Stage 5 construction program in 2006.

3.1.7 External Water

MPMC staff carries out water quality monitoring of external water regularly. Monitoring includes surface water quality from ditches, streams, creeks and lakes, as well as groundwater quality from monitoring wells. The results of the site water quality monitoring are reported by Mount Polley in Annual Environmental and Reclamation Report. This report is submitted to the appropriate Agencies (Ministry of Water, Land and Air Protection and Ministry of Energy and Mines).

3.2 TAILINGS STORAGE FACILITY

Pertinent observations regarding the operating condition of the TSF were as follows:

- No signs of instability were observed in the embankment fill slopes.
- The Tailings Pond was against the west end of the Main Embankment (app. chainage 16+00 to 19+00). This was the result of prolonged discharge of tailings from the Perimeter Embankment and from the knife gate valve. The most efficient use of the TSF is made when tailings can be evenly distributed from around the perimeter of the facility. 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 knoll between the Main and South Embankment should be investigated to ensure that the thickness of the low permeability basin liner is sufficient in this area prior to it being inundated with tailings.
- No major unexpected or uncontrolled seepage was observed from the embankments, including fill slope and foundations. However, a small amount of seepage was observed at the base of the Perimeter Embankment between chainages 29+00 to 32+00. The seepage is likely coming from the internal embankment drain as it exits the TSF within this area. The seepage should be directed to a drainage ditch outside of the ultimate toe of the embankments and routed to the Perimeter Embankment Seepage Collection Pond. This was completed in February 2006.

The TSF was observed to be in a good condition with no geotechnical issues outstanding. Selected photographs of the TSF are presented in Appendix D. The Operations, Maintenance and Surveillance Manual (OMS Manual) and the Emergency Preparedness and Response Plan (EPP document) for the TSF were revised on December 22, 2004.

3.3 ANCILLARY WORKS

3.3.1 Tailings and Reclaim Pipelines

The tailings and reclaim pipelines comprise 7 km of HDPE pipe of varying diameters and pressure ratings to convey tailings from the mill site to the TSF and reclaim water in the reverse direction. The tailings pipeline was in operation at the time of the inspection with tailings being end dumped at the knife gate valve located at the West end of the Perimeter Embankment. Tailings material was also being used during the Stage 4 construction program as Zone U material, which is located upstream of the core zone on the tailings beaches. There have been no reported problems with the tailings pipeline other than the pressures being insufficient to route the tailings around the entire TSF. The design and condition of the entire tailings pipeline should be reviewed to ensure that the tailings pipeline has the required pressure rating to transport and discharge tailings around the entire TSF to optimize the development of tailings beaches.

The reclaim pipeline was recycling supernatant water back to the mill for use in the process. There have been no reported problems with the reclaim pipeline and the pipeline was observed to be in sound condition.

3.3.2 Millsite Sump

Surface water from the Bell and Cariboo Pits and Mill Site Area is routed into the mill-site sump where it is transferred to the TSF via the tailings pipeline. The embankments at the Millsite Sump were observed to be in good shape, and no cracks, seepage or slumping was noted. The emergency overflow culvert was clear of obstructions, however the spillway showed signs of erosion and should be repaired. The erosion occurred during an extensive clean-up program at the mill site in 2004 prior to start-up and is unlikely to happen again. The repair of the millsite spillway is an outstanding recommendation from the 2004 Annual Inspection Report.

Photos of the Mill Site Sump and the Millsite Sump spillway are included in Appendix D.

3.3.3 Southeast Sediment Pond

The Southeast Sediment Pond collects runoff from the Southeast Rock Disposal Site via the Southeast Rock Disposal Site runoff ditch. The Southeast Sediment Pond will also collect water from the dewatering of the Wight Pit and associated waste dumps as this area is developed. Water from the pond is routed to the reclaim water pipeline for transfer back to the mill process.

Observations made at the Southeast Sediment Pond and Southeast Rock Disposal Site runoff ditch are:

- No seepage was observed for the embankments.
- Water flowing in the ditch was clear.
- The overflow culvert for the pond was clear of obstructions.
- The embankment fill slopes (inside and outside) were in very good shape, with no signs of instability. No cracks were observed on the crest. No seepage or slumping of the slopes was observed.
- Grassy re-vegetation has become well established on the downstream embankment slopes.

MPMC staff conducts monthly inspections of the Southeast Sediment Pond. Observations are recorded on an inspection sheet. The pond is inspected weekly during the spring freshet or after heavy rainfall.

The design basis for the Southeast Sediment Pond should be reviewed to ensure that it has sufficient capacity to contain the increased surface and groundwater flows (including flows from the design storm event) associated with dewatering the North East Zone and associated waste dumps.

A photo of the Southeast Sediment Pond is included in Appendix D.

3.3.4 South Bootjack Dam

The South Bootjack Dam was observed to be in good condition at the time of the inspection. Observations include the following:

- The water level was low.
- Both upstream and downstream fill slopes were in good condition, with no evidence of seepage or slumping.
- No cracks were observed on the dam crest.
- The spillway contained some minor vegetation, but was generally unobstructed.

A photo of the South Bootjack Dam is included in Appendix D.

SECTION 4.0 - INSTRUMENTATION

4.1 PIEZOMETER DATA

4.1.1 General

A total of 57 vibrating wire piezometers have been installed at the TSF along eight planes designated as Monitoring Plans A to H. The monitoring planes for the Main Embankment, the Perimeter Embankment, and the South embankment are shown on Drawings VA 101-1/8-236, 238, and 240 respectively. The piezometer locations for the monitoring planes are shown in section on Drawings VA101-1/8 242, and 244. The piezometers are grouped into tailings, foundation, embankment fill and drain piezometers. The results from each group are discussed below. The timeline plots for the piezometers are included in Appendix B.

There is thirteen months of data missing, from July 30, 2003 to September 2, 2004, and no piezometer data has been collected from Sept 22, 2005 to April 30 2006. The current gap in missing piezometer data had been due to a malfunctioning readout box connector cable and the accidental destruction or burying of piezometer cables during the Stage 4 construction program. The connector cable has been replaced and MPMC is in the process of splicing the damaged piezometer cables and relocating the readout boxes downstream of the ultimate toe of the embankments. MPMC will update the piezometer records as the damaged cables are repaired. A further review of the piezometer data will be included in the Stage 4 Construction Report.

4.1.2 Tailings Piezometers

A total of nine piezometers have been installed in the tailings mass at the Main Embankment, seven of which remain in operation. Timeline plots of the tailings piezometer data are included in Appendix B1.

The pore pressures measured in the four tailings piezometers located below the elevation of the upstream toe drain show a slight increasing trend as the pond and tailings elevation increases; however the pore pressures are below the pond level in the TSF. The pore pressures measured in the three tailings piezometers located above the elevation of the upstream toe drain are negative, indicating that the upstream toe drain is effective in draining the sandy tailings adjacent to the embankment.

4.1.3 Embankment Foundation Piezometers

A total of 20 piezometers have been installed in the embankment foundations, 18 of which remain in operation. Artesian conditions are present in the 7 of the 16 foundation piezometers installed under the Main Embankment. The piezometers in this area are used to monitor the pore pressures and to confirm that they remain below the threshold level of 6 metres above ground level (KP Ref. No. 1162/7-2). No unexpected high pore

pressure increases were noted during the reporting period. The artesian head values (above ground surface level) measured in September 2005 are summarized in Table 5.1.

Artesian pressures have remained relatively constant in all the piezometers during the reporting period. Piezometers B2-PE2-01 and B2-PE2-02 are showing a slight increasing trend but are still well below the 6 metres above ground threshold level. No artesian conditions have been encountered at Plane E, where coarser glaciofluvial material is present.

Timeline plots of the embankment foundation piezometers are included in Appendix B2. There are no concerns with the embankment foundation piezometers.

4.1.4 Embankment Fill Piezometers

A total of 15 piezometers have been installed in the embankment fill materials, 13 of which remain in operation. Timeline plots of the embankment fill piezometer data are included in Appendix B3.

There have been no significant changes in the trends for most of the embankment fill piezometers. Five of the embankment fill piezometers located on the Main Embankment (A2-PE1-O2, A2-PE2-O3, B2-PE2-O3, B2-PE1-O2, C2-PE1-O2) are showing recent increases in pore pressures corresponding to the placement of fill during the Stage 4 construction program. These piezometers have shown similar increases during previous expansion programs of the TSF and it is anticipated that the elevated pore pressures will dissipate as they have previously following the construction programs. There are no concerns with the embankment fill piezometers, however, the embankment fill piezometers that have shown construction related increases in pore pressures should be monitored by MPMC to ensure that the pore pressures are dissipating following the Stage 4 construction program.

4.1.5 Drain Piezometers

A total of 13 piezometers have been installed in the embankment drains including foundation drains, chimney drain and outlet drains. Eleven of the drain piezometers were functioning at the time of inspection. Timeline plots for the drain piezometers are shown in Appendix B4.

All drain piezometers showed near-zero pore pressures, indicating that the drains are functioning as intended. There are no concerns with the drain piezometers.

4.2 SLOPE INCLINOMETERS

Two slope inclinometers were installed at the toe of the Main Embankment in July 2001 to measure potential deformation of the embankment materials. The inclinometers were read in

March 2006 and the data was compared to the initial readings taken in 2001 and the readings taken in October 2004. The results of the readings are shown in Appendix C.

The results show that there have been no significant deviations in the inclinometers as compared to the installation readings of 2001 and the readings from October 2004.

Regular monitoring should be undertaken in order to utilize this installation fully. Monitoring with the inclinometer probe should be undertaken on an annual basis with the results reported to Knight Piésold. The 'poor-boy' monitoring rod should be used monthly (twice a month during construction programs) to ensure that any soil movement associated with settlement or instability has not deformed the inclinometer casing. Should resistance or blockage be encountered it is imperative that the inclinometer probe be utilized at the earliest opportunity to confirm the magnitude of displacements and to assess any potential instability.

4.3 SURVEY MONUMENT DATA

The survey monuments installed on the Stage 3B embankment crest following the 2001 construction were removed during the Stage 3C construction program and have not been replaced as the Stage 3C construction program blended into the Stage 4 construction program. New survey monuments may be installed on the embankment crests during the Stage 4 construction program depending on its completion date, otherwise, survey monuments will be installed following the Stage 5 construction program, which is scheduled for the summer and fall of 2006.

SECTION 5.0 - SUMMARY AND RECOMMENDATIONS

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 mine re-opened in the March 2005 and is currently mining the Bell Pit and the Northeast Zone. The average throughput for 2005 was approximately 15,000 tpd. Approximately 8.7 million tonnes of tailings has been deposited in the TSF since the mine commenced operations again in 2005 (as of February 2006).

Les Galbraith, P. Eng., of Knight Piésold completed an annual inspection of the Tailings Storage Inspection and associated works on September 21 and 22 in the company of Ron Martel. Significant observations from the annual inspection are as follows:

- The TSF has a "HIGH" hazard classification (or consequence category). Therefore, 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 water balance for the TSF is updated regularly by MPMC. The water balance was reviewed by Knight Piésold in February 2006 and MPMC appears to be up-to-date with the Mine Development Plan.
- The two slope inclinometers installed at the toe of the Main Embankment in July 2001 were read in March 2006. The results show that there have been no significant deviations in the inclinometers as compared to the installation readings of 2001 and the readings from October 2004.
- No piezometer data had been collected from Sept 22, 2005 to April 30 2006 due to a malfunctioning readout box connector cable and the accidental destruction or burying of piezometer cables during the Stage 4 construction program. The connector cable has been replaced and MPMC is in the process of splicing the damaged piezometer cables and relocating the readout boxes downstream of the ultimate toe of the embankments. MPMC will update the piezometer records as the damaged cables are repaired and the piezometer data will be further reviewed as part of the Stage 4 Construction Report. There were no concerns with the piezometer collected prior to September 22, 2005.
- A Dam Safety Review is scheduled for the summer of 2006.
- The Operations, Maintenance and Surveillance Manual (OMS Manual) and the Emergency Preparedness and Response Plan (EPP document) for the TSF were revised on December 22, 2004.
- The Stage 4 construction program, which involved raising the TSF embankments to the currently permitted elevation of 948 m, was in process at the time of the inspection. The Stage 4 cap consists of a Zone S core with a coarse aggregate material (Zone U) placed upstream of the core on the tailings beach. Future expansion programs of the TSF will continue to incorporate the Modified Centreline Construction method for the embankments.
- The TSF embankments were observed to be in good condition. No seepage or slumping was observed and no signs of instability were observed in the embankment fill slopes.
- No major unexpected or uncontrolled seepage was observed from the embankments. The small amount of seepage observed at the base of the Perimeter Embankment

between chainages 29+00 to 32+00 is being routed to the Perimeter Embankment Seepage Collection Pond.

- The Tailings Pond was up against the west end of the Main Embankment (app. chainage 16+00 to 19+00). This was the result of prolonged discharge of tailings from the Perimeter Embankment and from the knife gate valve.
- The TSF is required to have sufficient live storage capacity for containment of runoff from the 24-hour PMP volume of 679,000 m³ at all times, plus 1 meter of freeboard for wave run-up. MPMC operated the tailings pond within these tolerances over the past year.
- Flows from the five Foundation Drains and the Upstream Toe Drain at the Main Embankment were monitored in December 2005. The flows from the upstream toe drain have increased slightly due to the close proximity of the tailings pond at the Main Embankment. The flows from the drains were reported to be clear.
- The Southeast Sediment Pond, Millsite Sump, and South Bootjack Dam were observed to be in a good condition with no geotechnical issues outstanding. However the Millsite Sump spillway was showing signs of erosion and should be repaired.

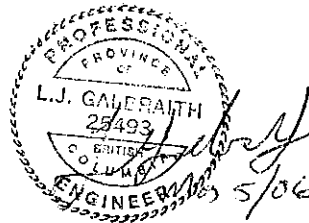
Recommendations for on-going operations of the TSF are summarized below:

- Ensure that the instrumentation is being monitored at the required frequency, as reported in the Operations, Maintenance and Surveillance Manual, (KP Ref. No. 101-1/9-1). This includes reading the piezometers and inclinometers. A 'poor-boy' monitoring rod should be used for the inclinometers during the construction programs as outlined in the OM&S Manual.
- Develop a tailings deposition plan that involves discharging tailings from the Perimeter, Main, and South Embankments. Discharging tailings from around the facility will facilitate the development of tailings beaches and help in the management and location of the tailings pond. The tailings pipeline should be extended to the South Embankment in 2006 to allow for beach development at the South Embankment.
- Repair the spillway at the Millsite Sump.
- Lower the water level in the Main Embankment Drain Monitoring Sump so that the flows from the Foundation and Upstream Toe Drains can be monitored at the required frequency. This has been completed and the flows read as of December 21, 2005.
- Repair the damaged piezometers.
- Relocate the piezometer readout boxes downstream of the ultimate toe and extend the existing piezometers to the new readout box location.
- Continue regular monitoring of the water quality and levels in the surrounding groundwater wells.
- Continue regular monitoring of the tailings pond elevation. 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 freeboard should also be measured at the West end of the Perimeter Embankment if the tailings is being discharged from the knife gate as the tailings beach development at this location will be higher than around the remainder of the TSF.

- Review the condition of the tailings pipeline. A complete design review of the tailings pipeline should be conducted and appropriate modifications completed to ensure that it will transport and discharge tailings around the entire TSF.
- Confirm the thickness of the in-situ low permeability basin liner between the Main Embankment and the South Embankment. This should be completed as soon as possible to confirm that there is the minimum required thickness of 2 m prior to this area being submerged with tailings or the supernatant pond. This was completed in April 2006.
- The seepage observed between chainages 29+00 to 32+00 should be directed to a drainage ditch outside of the ultimate toe of the embankments and routed to the Perimeter Embankment Seepage Collection Pond. This was completed in February 2006.
- The Southeast ditch located on the West side of the TSF will need to be relocated to higher ground.
- Review the Water Management Plan and site water balance on a regular basis to ensure they are current with the planned development of the mine site. The surface water control measures should also be reviewed to ensure that there is sufficient capacity to route and store the direct precipitation and runoff from a significant storm event.

SECTION 6.0 - CERTIFICATION

This report was prepared and approved by the undersigned.



Prepared by:

Les Galbraith, P.Eng.
Senior Engineer

Approved by:

A handwritten signature in cursive script, appearing to read "K. Brouwer".

Ken J. Brouwer, P.Eng.
Managing Director

This report was prepared by Knight Piésold Ltd. for the account of Mount Polley Mining Corporation. The material in it reflects Knight Piésold's best judgement in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, is the responsibility of such third parties. Knight Piésold Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions, based on this report. This numbered report is a controlled document. Any reproductions of this report are uncontrolled and may not be the most recent revision.

TABLE 3.1

**MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY**

MAIN EMBANKMENT SEEPAGE COLLECTION POND - SUMMARY OF FOUNDATION DRAIN FLOW DATA

M:\110\1000011\1A\Report\11\Tables\Table 3.1 and 3.2.xls\FD-Mon																				Revised:		25-Apr-06				
SAMPLING DATE	FD-1				FD-2				FD-3				FD-4				FD-5				Total Flow Rate				Pond EI (m)	GW96-9 (GW Well) Elev. Above Top of Casing of well 9 (m)
	Flow Rate				Flow Rate				Flow Rate				Flow Rate				Flow Rate				Flow Rate					
	FD1 (l/min)	(l/sec)	Comments		FD2 (l/min)	(l/sec)	Comments		FD3 (l/min)	(l/sec)	Comments		FD4 (l/min)	(l/sec)	Comments		FD5 (l/min)	(l/sec)	Comments		Tot (l/min)	(l/sec)	Comments	Pond Elev.		
2-Jan-98	3.81	0.06	Clear		0.74	0.01	Clear		16.30	0.27	Clear		1.73	0.03	Clear		-	-	-		22.58	0.38	pig out, pumped down	928.10	Frozen	
14-Jan-98	3.85	0.06	Clear		0.80	0.01	Clear		16.57	0.28	Clear		1.77	0.03	Clear		-	-	-		22.99	0.38	pig out, needs pumping	928.25	Frozen	
21-Jan-98	3.57	0.06	Clear		0.74	0.01	Clear		16.42	0.27	Clear		1.82	0.03	Clear		-	-	-		22.55	0.38	pig out, needs pumping	928.30	Frozen	
8-Apr-98	3.84	0.06	Clear		0.67	0.01	Clear		15.54	0.26	Clear		1.52	0.03	Clear		-	-	-		21.57	0.36	pig out, pond pumped down	929.70	-	
17-Apr-98	3.82	0.06	Clear		0.69	0.01	Clear		15.58	0.26	Clear		1.37	0.02	Clear		6.33	0.11	Clear		27.79	0.46	pig out, pond pumped down	929.85	-	
25-May-98	3.82	0.06	Clear		0.69	0.01	Clear		15.58	0.26	Clear		1.37	0.02	Clear		6.33	0.11	Clear		27.79	0.46	pig out, pond pumped down	930.10	-	
2-Jun-98	3.52	0.06	Clear		0.78	0.01	Clear		15.58	0.26	Clear		1.42	0.02	Clear		6.80	0.11	Clear		28.10	0.47	pig out, pond pumped down	930.36	-	
10-Jun-98	3.83	0.06	Clear		0.79	0.01	Clear		14.80	0.24	Clear		1.44	0.02	Clear		7.51	0.13	Clear		28.17	0.47	pig out, pond pumped down	930.39	-	
16-Jun-98	3.77	0.06	Clear		0.78	0.01	Clear		16.35	0.27	Clear		1.41	0.02	Clear		7.93	0.13	Clear		30.24	0.50	pig out, pond pumped down	930.42	-	
3-Jul-98	3.89	0.06	Clear		0.76	0.01	Clear		16.14	0.27	Clear		2.37	0.04	Clear		12.53	0.21	Clear		35.69	0.59	FD-5 is spilling onto FD-4 providing higher values than normal	930.45	-	
7-Jul-98	3.71	0.06	Clear		0.72	0.01	Clear		15.03	0.27	Clear		2.22	0.04	Clear		9.66	0.16	Clear		32.34	0.54	negative value is below top of casing	930.50	-0.135	
24-Jul-98	3.53	0.06	Clear		0.72	0.01	Clear		15.75	0.26	Clear		1.96	0.03	Clear		8.70	0.15	Clear		30.66	0.51	-	930.58	0.28	
12-Aug-98	3.46	0.06	Clear		0.62	0.01	Clear		15.96	0.27	Clear		1.90	0.03	Clear		7.30	0.12	Clear		29.24	0.49	-	930.61	0.33	
19-Aug-98	3.17	0.05	Clear		0.56	0.01	Clear		15.83	0.26	Clear		2.26	0.04	Clear		8.08	0.13	Clear		29.90	0.50	-	930.64	-	
10-Sep-98	3.60	0.06	Clear		0.57	0.01	Clear		16.35	0.27	Clear		2.03	0.03	Clear		8.02	0.13	Clear		30.57	0.51	-	930.70	-	
17-Sep-98	3.53	0.06	Clear		0.63	0.01	Clear		16.42	0.27	Clear		2.20	0.04	Clear		8.52	0.14	Clear		31.30	0.52	-	930.73	-	
24-Sep-98	3.62	0.06	Clear		0.64	0.01	Clear		15.64	0.26	Clear		2.06	0.03	Clear		7.77	0.13	Clear		29.73	0.50	-	930.77	-	
7-Oct-98	3.72	0.06	Clear		1.05	0.02	Clear		14.22	0.24	Clear		2.36	0.04	Clear		13.39	0.22	Clear		34.74	0.58	positive value is above top of casing	930.81	0.18	
15-Oct-98	3.82	0.06	Clear		1.10	0.02	Clear		14.53	0.24	Clear		2.56	0.04	Clear		15.83	0.26	Clear		37.84	0.63	-	930.87	-	
21-Oct-98	3.94	0.07	Clear		1.12	0.02	Clear		15.35	0.26	Clear		2.95	0.05	Clear		18.46	0.31	Clear		41.82	0.70	-	930.95	-	
17-Nov-98	4.21	0.07	Clear		1.01	0.02	Clear		14.28	0.24	Clear		2.35	0.04	Clear		11.76	0.20	Clear		33.82	0.56	Sump flooded, needs to be pumped	931.35	0.11	
27-Nov-98	4.35	0.07	Clear		0.92	0.02	Clear		14.16	0.24	Clear		2.37	0.04	Clear		11.46	0.19	Clear		33.26	0.55	-	931.97	-0.03	
2-Dec-98	4.31	0.07	Clear		0.79	0.01	Clear		16.56	0.28	Clear		2.01	0.03	Clear		9.78	0.16	Clear		33.49	0.56	Frozen	931.97	-	
9-Dec-98	4.34	0.07	Clear		0.97	0.02	Clear		13.92	0.23	Clear		2.83	0.05	Clear		19.32	0.32	Clear		41.37	0.69	Frozen	931.87	-	
16-Dec-98	4.33	0.07	Clear		-	-	Clear		-	-	-		-	-	-		-	-	-		-	-	Frozen	931.99	-	
22-Dec-98	-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	Frozen	-	-	
1-May-00	-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-	937.40	-	
11-May-00	-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-	938.08	-0.05	
18-Jul-00	3.60	0.06	Clear		0.60	0.01	Clear		16.80	0.28	Clear		1.20	0.02	Clear		24.00	0.40	Cloudy		46.20	0.77	FD-5 intercepting surface runoff	938.10	-	
25-Jul-00	4.20	0.07	Clear		1.44	0.02	Clear		16.80	0.28	Clear		1.50	0.03	Clear		39.00	0.65	Clear		62.94	1.05	Significant increase from FD-5	938.25	-	
24-Oct-00	21.00	0.35	Clear		67.20	1.12	Clear		17.40	0.29	Clear		2.40	0.04	Clear		75.60	1.26	Clear		183.60	3.06	-	-	-	
Dec-21-05	14.22	0.24	Clear		9.90	0.17	Clear		10.20	0.17	Clear		0.48	0.01	Clear		55.20	0.92	Clear		90.00	1.50	TSF water 942.64 m	-	-	

Note: The elevation for the top of the casing for Ground Water Well GW96-9 is approximately 916.78 m. The ground elevation is 916.18 m.

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE

MAIN EMBANKMENT SEEPAGE COLLECTION POND - SUMMARY OF UPSTREAM TOE DRAIN FLOW DATA

25-Apr-06

TABLE 5.1

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - 2005 ANNUAL INSPECTION
MAXIMUM ARTESIAN HEAD VALUES FOR EMBANKMENT FOUNDATION PIEZOMETERS

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Rev'd: April 19 2006

Piezometer	Piezometer Elevation (m)	Surface Elevation (m)	Sept 2005 Pressure Elevation (m)	Sept 2005 Artesian Pressure (m)
A2-PE2-01	903.68	912.67	915.73	3.06
A2-PE2-02	909.77	912.67	912.27	-0.40
A2-PE2-06	898.01	912.91	914.8	1.89
A2-PE2-07	902.81	912.91	914.96	2.05
A2-PE2-08	907.56	913.36	913.57	0.21
B2-PE1-03	914.05	915.55	915.36	-0.19
B2-PE2-01	901.98	916.98	918.61	1.63
B2-PE2-02	909.51	916.98	920.89	3.91
B2-PE2-06	914.59	916.89	915.37	-1.52
C2-PE1-03	912.59	-	-	-
C2-PE2-02	910.53	915.71	917.25	1.54
C2-PE2-06	906.84	915.99	915.46	-0.53
C2-PE2-07	912.29	915.99	914.8	-1.19
C2-PE2-08	914.03	915.99	914.33	-1.66
D2-PE2-02	927.32	930.92	929.2	-1.72
E2-PE2-01	914.21	918.81	916.99	-1.82
E2-PE2-02	909.66	918.81	916.91	-1.90

**Notes:**

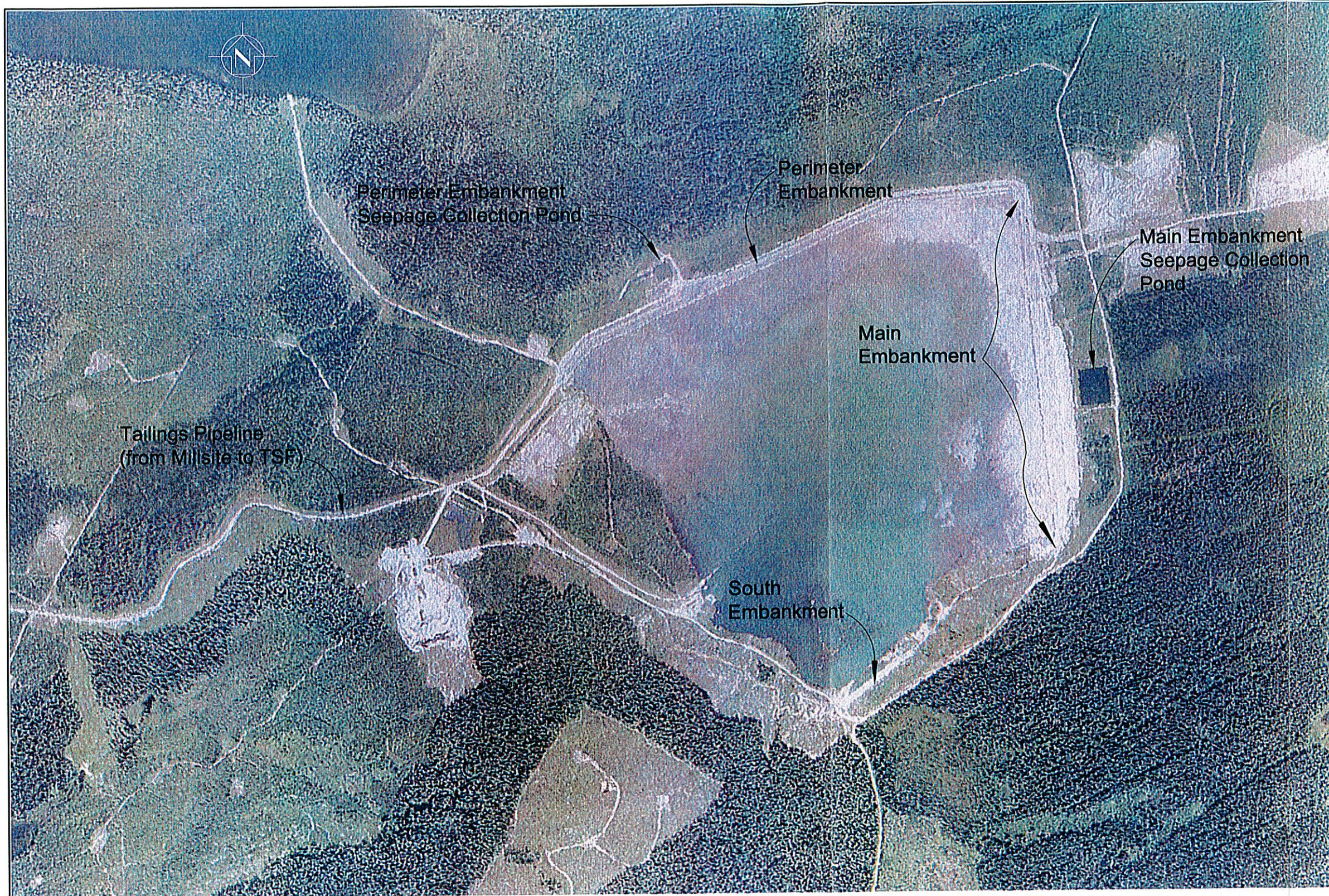
1) Photograph taken in October 2005

MOUNT POLLEY MINING CORPORATION		
MOUNT POLLEY MINE		
AERIAL PHOTOGRAPH OF MOUNT POLLEY MINE LOOKING NORTHWEST		
<i>Knight Piésold</i> CONSULTING	PROJECT / ASSIGNMENT NO. VA 101-1/11	REF NO. 1
	FIGURE 1.1	REV. 0

**Notes:**

- 1) Photograph taken in October 2005


MOUNT POLLEY MINING CORPORATION		
MOUNT POLLEY MINE		
AERIAL PHOTOGRAPH OF MOUNT POLLEY MINE LOOKING SOUTH		
<i>Knight Piésold</i> CONSULTING	PROJECT / ASSIGNMENT NO. VA 101-1/11	REF NO. 1
	FIGURE 1.2	REV. 0

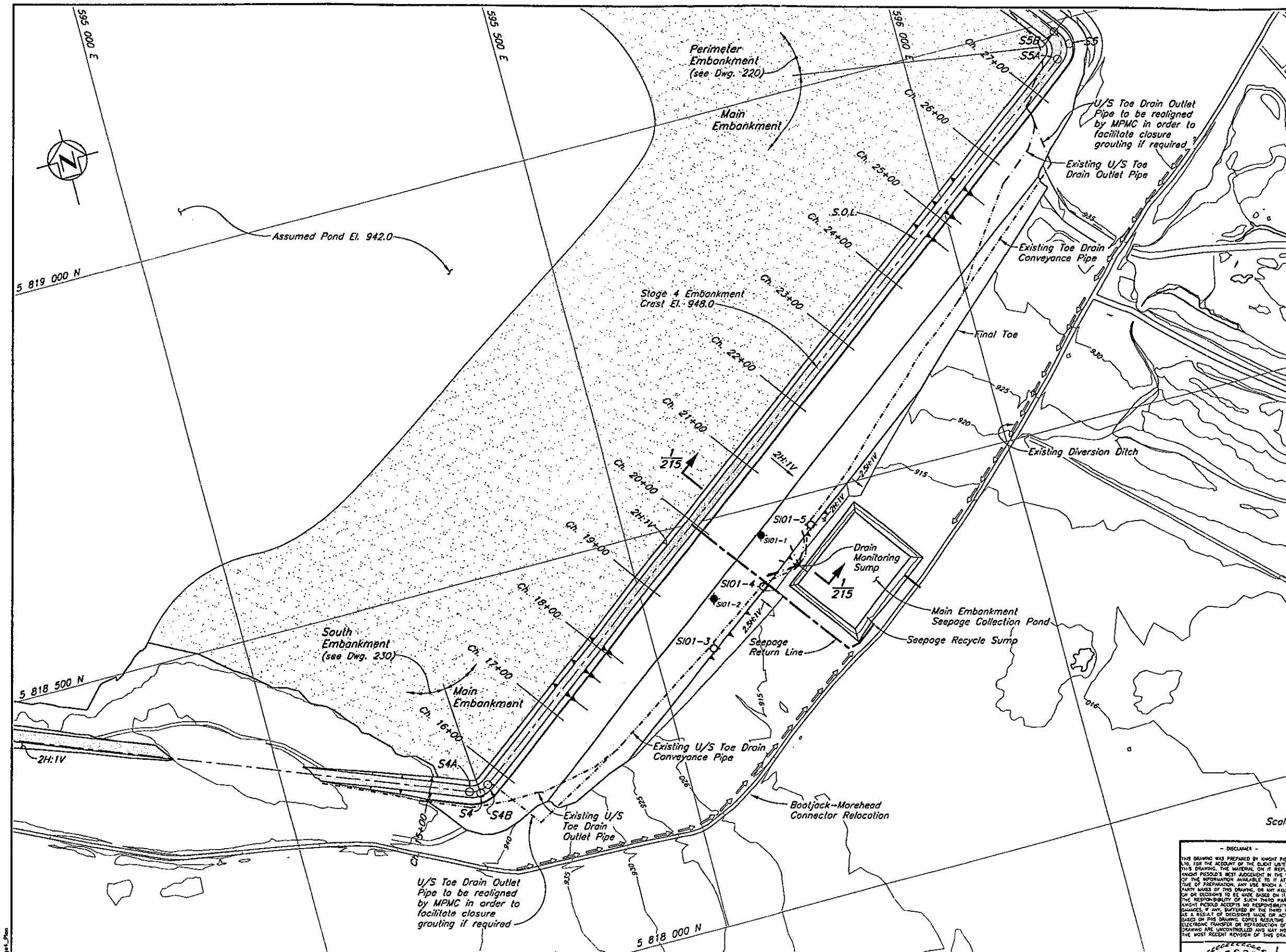


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MOUNT POLLEY MINING CORPORATION			
MOUNT POLLEY MINE			
TSF GENERAL ARRANGEMENT			
	PROJECT/ASSIGNMENT NO.	REF. NO.	REV.
	VA101-1/11	1	0
FIGURE 2.1			



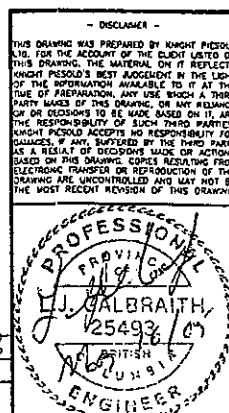
- LEGEND**
- Proposed Inclinator
 - Existing Inclinator
- NOTES**
- Topography from 2004 flyover
 - All dimensions in millimetres and elevations in metres, unless noted otherwise.
 - Stage 4 construction dimensions and volumes assume a Stage 3C crest elevation of El. 944 m.



230	STAGE 4 SOUTH EMBANKMENT - PLAN
220	STAGE 4 PERIMETER EMBANKMENT - PLAN
215	STAGE 4 MAIN EMBANKMENT - SECTIONS AND DETAILS
DRG. NO.	DESCRIPTION
REFERENCE DRAWINGS	

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
REVISIONS						

0	13MAY'05	ISSUED FOR STAGE 4 CONSTRUCTION	AT	NSD	E-J. RLB	
REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
REVISIONS						



Knight Piésold
CONSULTING

MOUNT POLLEY MINING CORPORATION

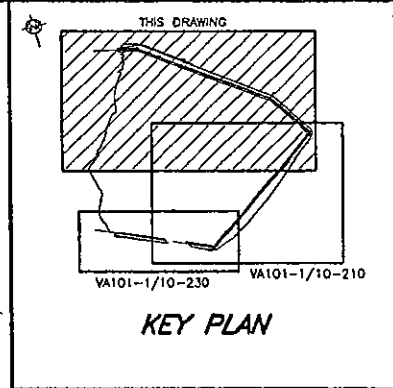
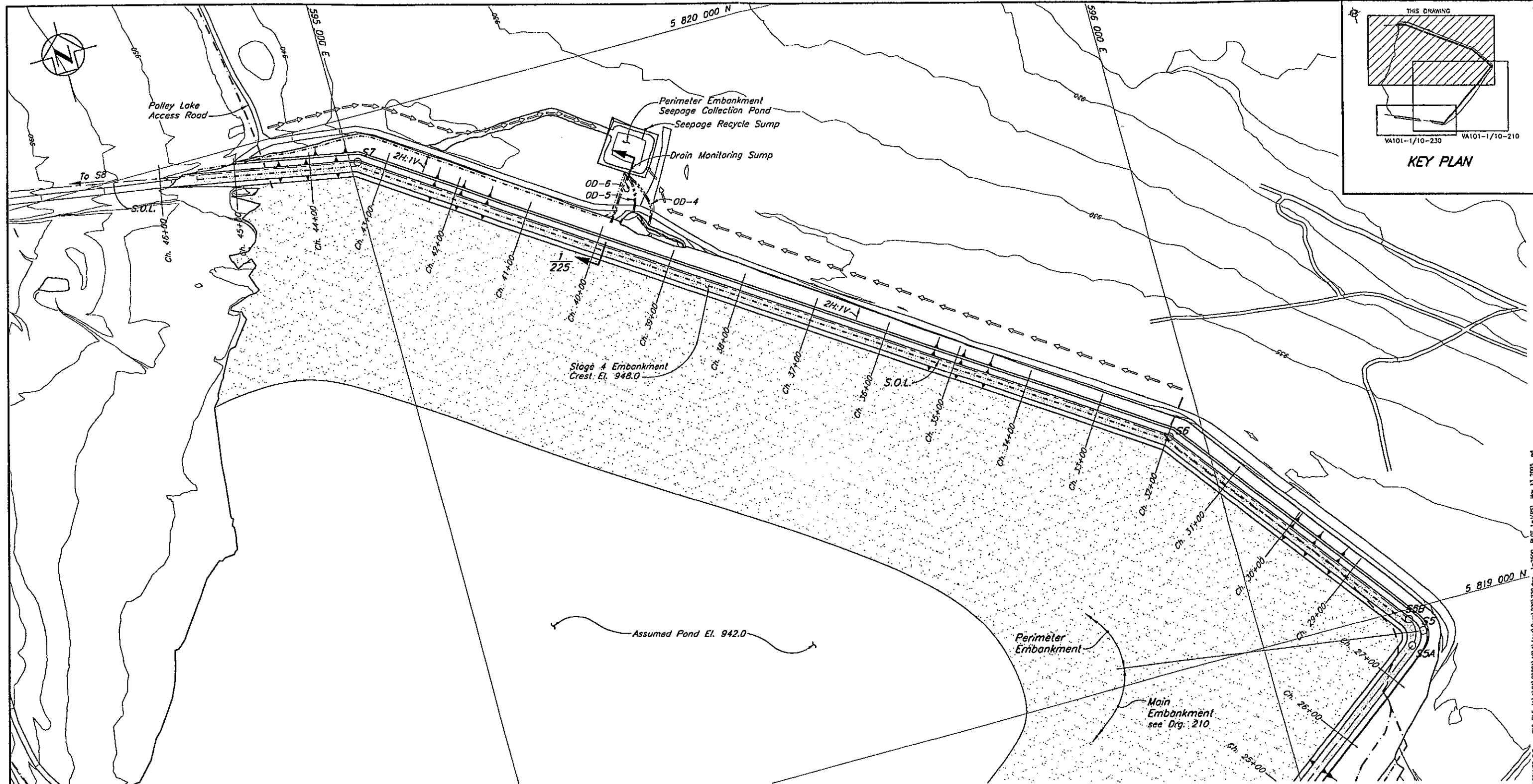
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
STAGE 4 MAIN EMBANKMENT
PLAN

PROJECT/ASSIGNMENT NO. VA101-1/10	DRAWING NO. 210	REVISION 0
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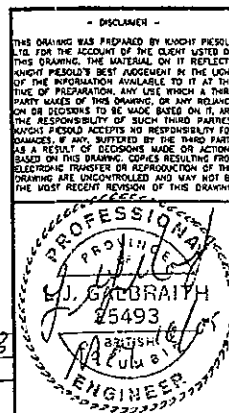
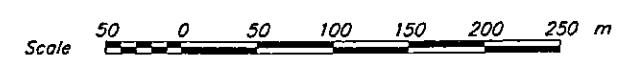
CAD FILE: M:\N\100001\10\VA101-1\10\VA101-1.dwg 1:2500 PLOT 1:1 (P) May 13 2005 and



EMBANKMENT SETTING OUT POINTS			
Point	Northing	Easting	Chainage
S1	5 818 626.163	594 249.555	5+00.00
S4A	5 818 243.621	595 227.361	15+49.97
S4B	5 818 246.923	595 251.497	15+77.87
S4	5 818 238.539	595 240.350	15+63.92
S5A	5 818 951.971	596 188.906	27+50.83
S5B	5 818 986.958	596 193.873	28+00.78
S5	5 818 966.983	596 208.866	27+75.80
S6	5 819 304.035	595 955.881	31+97.23
S7	5 819 939.748	595 010.249	43+36.69
S8	5 820 053.034	594 396.471	49+60.83

NOTES

1. Topography from 2004 flyover.
2. All dimensions in millimetres and elevations in metres, unless noted otherwise.
3. Stage 4 construction dimensions and volumes assume a Stage 3C crest elevation of El. 944 m.



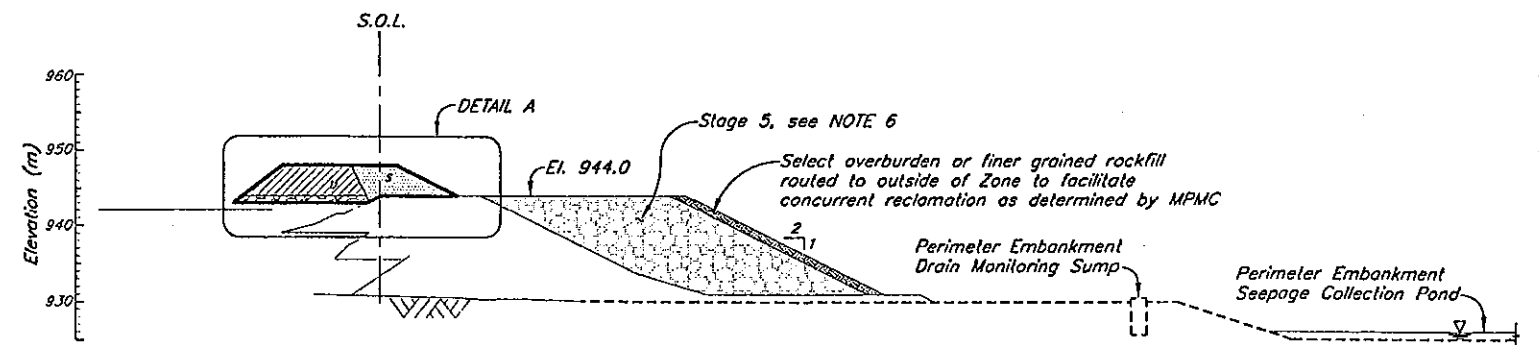
Knight Piésold CONSULTING		
MOUNT POLLEY MINING CORPORATION MOUNT POLLEY MINE		
TAILINGS STORAGE FACILITY STAGE 4 PERIMETER EMBANKMENT PLAN		
PROJECT/ASSIGNMENT NO. VA101-1/10	DRAWING NO. 220	REVISION 0

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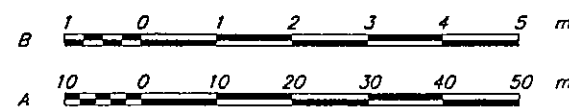
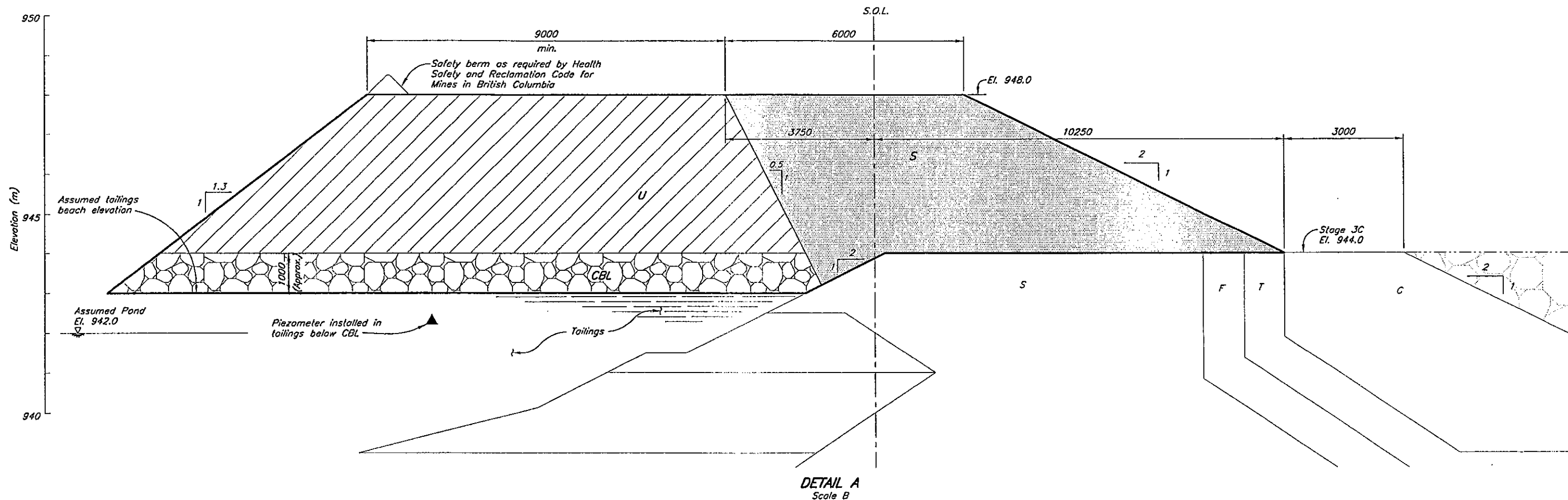
ORG. NO.	DESCRIPTION
230	STAGE 4 SOUTH EMBANKMENT - PLAN
225	STAGE 4 PERIMETER EMBANKMENT - SECTIONS
210	STAGE 4 MAIN EMBANKMENT - PLAN

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
0	13 MAY 05	ISSUED FOR STAGE 4 CONSTRUCTION				



SECTION $\frac{1}{220}$
Scale A

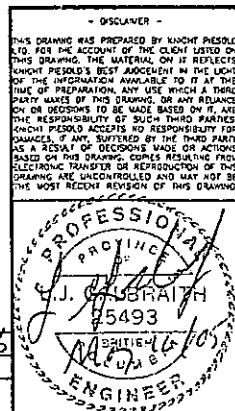


- NOTES**
1. For zone material specifications and legend see Drg. 104.
 2. All dimensions in millimetres and elevations in metres, unless noted otherwise.
 3. Zone S to be placed to minimum 6 m width at El. 948. Zone F and Zone T to be extended in future construction programs.
 4. Minimum lines and grades shown. Lines and grades may be extended upstream and downstream during Stage 4 construction.
 5. Stage 4 construction dimensions and volumes assume a Stage 3C crest elevation of EL 944.0m.
 6. Stage 5 Shell to be constructed during 2005-2006
 7. Appropriate filter relationships required between all embankment zones and materials as required by the Engineer.

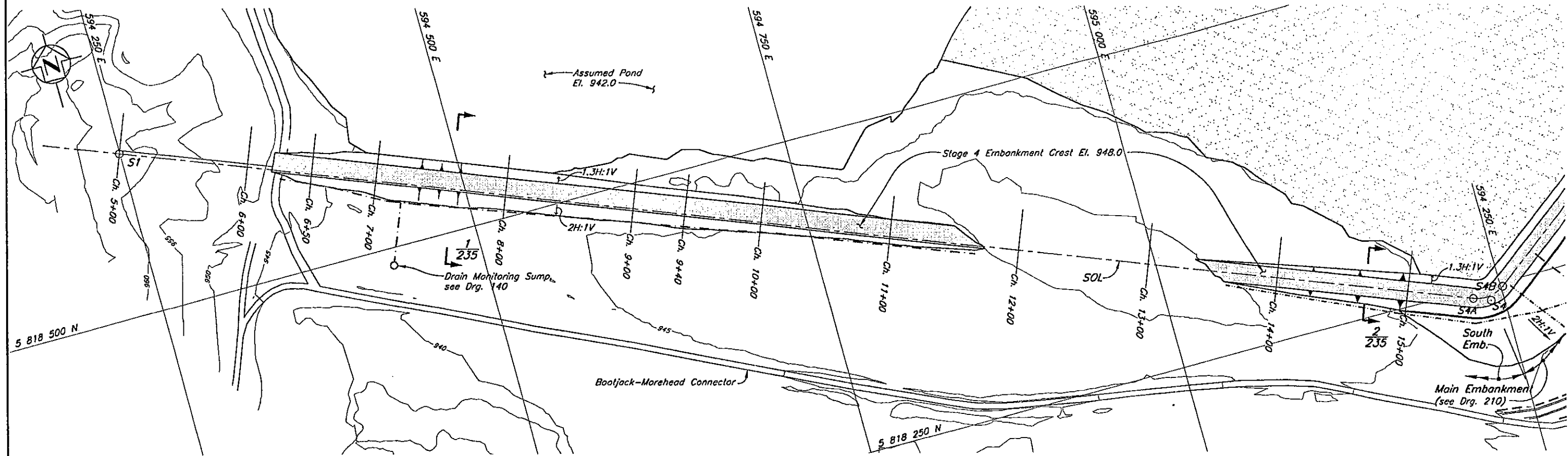
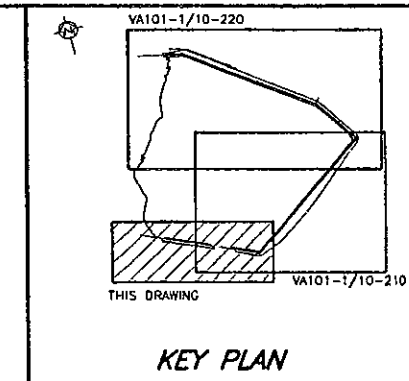
220	STAGE 4 - PERIMETER EMBANKMENT - PLAN
104	STAGE 4 - MATERIAL SPECIFICATIONS
DRG. NO.	DESCRIPTION
REFERENCE DRAWINGS	

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
REVISIONS						

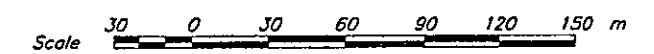
0	13MAY05	ISSUED FOR STAGE 4 CONSTRUCTION	AT	NSD	KEJ	RLS
REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
REVISIONS						



Knight Piésold CONSULTING		
MOUNT POLLEY MINING CORPORATION		
MOUNT POLLEY MINE		
TAILINGS STORAGE FACILITY STAGE 4 PERIMETER EMBANKMENT SECTIONS		
PROJECT/ASSIGNMENT NO.	DRAWING NO.	REVISION
VA101-1/10	225	0



PLAN



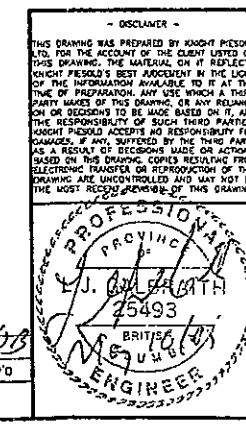
NOTES

1. Topography from 2004 flyover.
2. All dimensions in millimetres and elevations in metres, unless noted otherwise.
3. Stage 4 construction dimensions and volumes assume a Stage 3C crest elevation of El. 944 m.
4. Foundation drains need to be installed during Stage 4, before the downstream rockfill is placed.

235	STAGE 4 SOUTH EMBANKMENT - SECTIONS
220	STAGE 4 PERIMETER EMBANKMENT - PLAN
210	STAGE 4 MAIN EMBANKMENT - PLAN
104	ULTIMATE TAILINGS EMBANKMENT - MATERIAL SPECIFICATIONS
ORC. NO.	DESCRIPTION
REFERENCE DRAWINGS	

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
REVISIONS						

0	13MAY'05	ISSUED FOR STAGE 4 CONSTRUCTION	AT	NSD	6-5-2005	2005
REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
REVISIONS						



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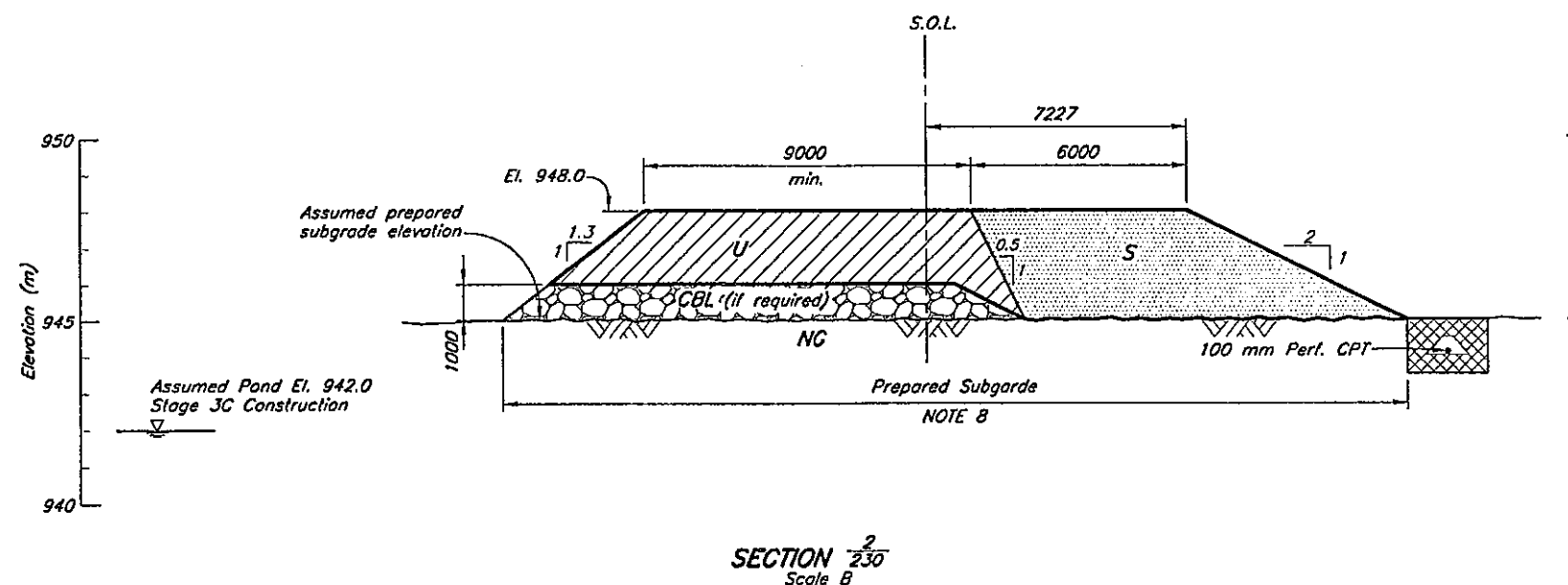
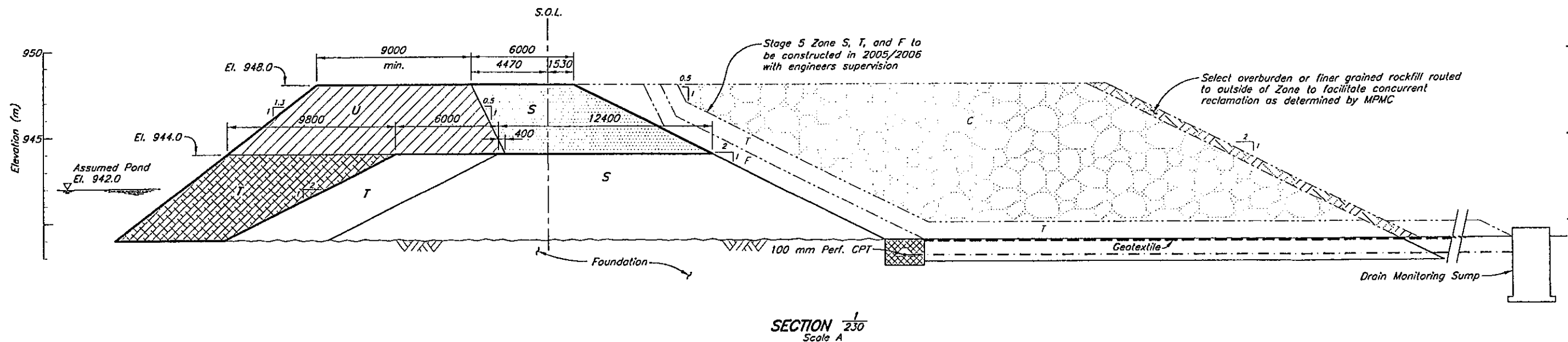
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
STAGE 4 SOUTH EMBANKMENT
PLAN

PROJECT/ASSIGNMENT NO.	DRAWING NO.	REVISION
VA101-1/10	230	0

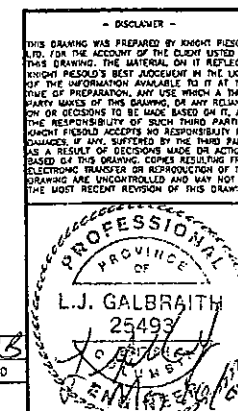
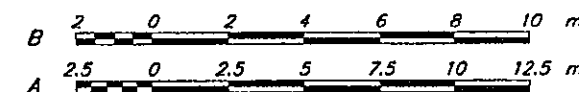
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DATE FILE: M:\101\00001\10\VA\Stage4\Topo\230\230.dwg 1=1500 PLOT: May 13 2005



NOTES

1. For zone material specifications and legend see Drg. 104.
2. All dimensions in millimetres and elevations in metres, unless noted otherwise.
3. Zone S to be placed to minimum 6 m width at El. 948. Zone F and Zone T to be extended in future construction programs.
4. Minimum lines and grades shown. Lines and grades may be extended upstream and downstream during Stage 4 construction.
5. Stage 4 construction dimensions and volumes assume a Stage 3C crest elevation of El. 944 m.
6. Stage 5 Shell to be constructed during 2005-2006.
7. Stage 5 Zone C Shell to be raised concurrently with Zone F and Zone T to be constructed with engineers supervision.
8. Subgrade preparation to comprise stripping of topsoil and organics, removing saturated materials and proof rolling to establish a competent, bearing surface for fill placement as directed by the Engineer.
9. Appropriate filter relationships required between all embankment zones and materials as required by the Engineer.



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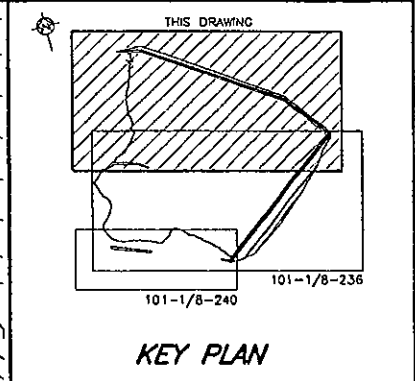
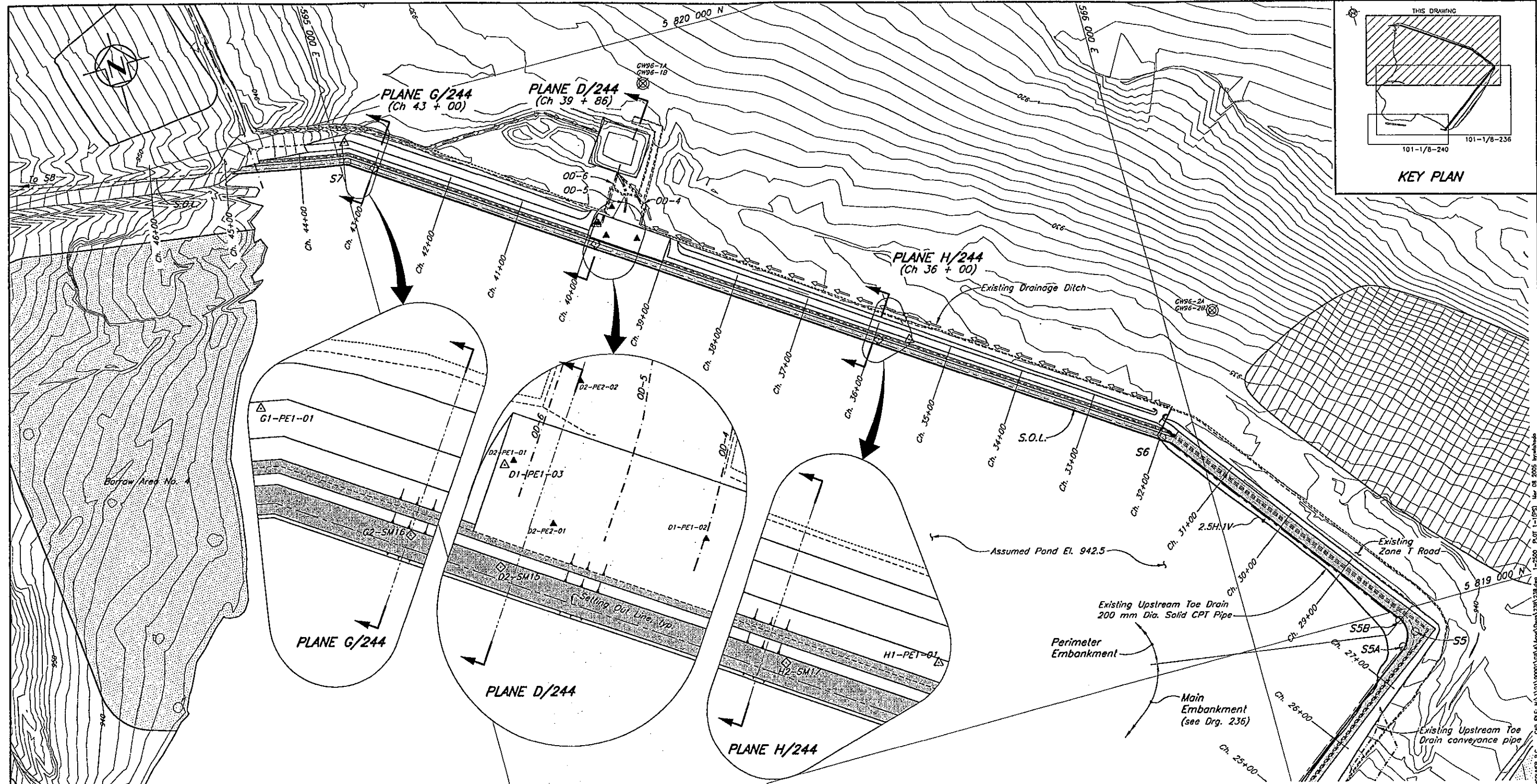
TAILINGS STORAGE FACILITY
STAGE 4 SOUTH EMBANKMENT
SECTIONS

230	STAGE 4 SOUTH EMBANKMENT - PLAN
104	ULTIMATE TAILINGS EMBANKMENT - MATERIAL SPECIFICATIONS
ORG. NO.	DESCRIPTION
REFERENCE DRAWINGS	

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
REVISIONS						

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REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
REVISIONS						

PROJECT/ASSIGNMENT NO.	DRAWING NO.	REVISION
VA101-1/10	235	0



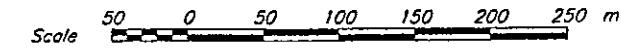
LEGEND

- GW96-9 Groundwater Monitoring Well
- ▲ A1-PE1-01 Previously installed Piezometer
- ▲ A2-PE2-06 New Stage 3 Piezometer
- ◆ A2-SM-01 New Embankment Survey Monument

NOTES

1. Chainage defined by Setting Out Point S1 at Ch. 5+00.
2. Topography generated from points and break lines provided by MPMC on July 20, 1999. Topography outside the TSF area is from 1997 flyover.
3. Piezometers are vibrating wire type, SINCA Model 52611030 and RST Model 45005-0100 with a pressure rating of 100 psi or equivalent, connected to a readout panel via standard non-vented direct burial cable.

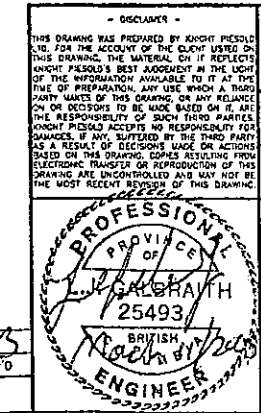
NOT FOR CONSTRUCTION



DRG. NO.	DESCRIPTION
244	EXISTING INSTRUMENTATION - PLANES D, E, F, G AND H
242	EXISTING INSTRUMENTATION - PLANES A, B AND C
240	EXISTING INSTRUMENTATION - SOUTH EMBANKMENT - PLAN
236	EXISTING INSTRUMENTATION - MAIN EMBANKMENT - PLAN

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
0	09MAR'05	ISSUED FOR REPORT				



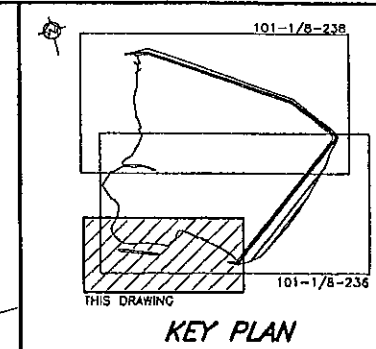
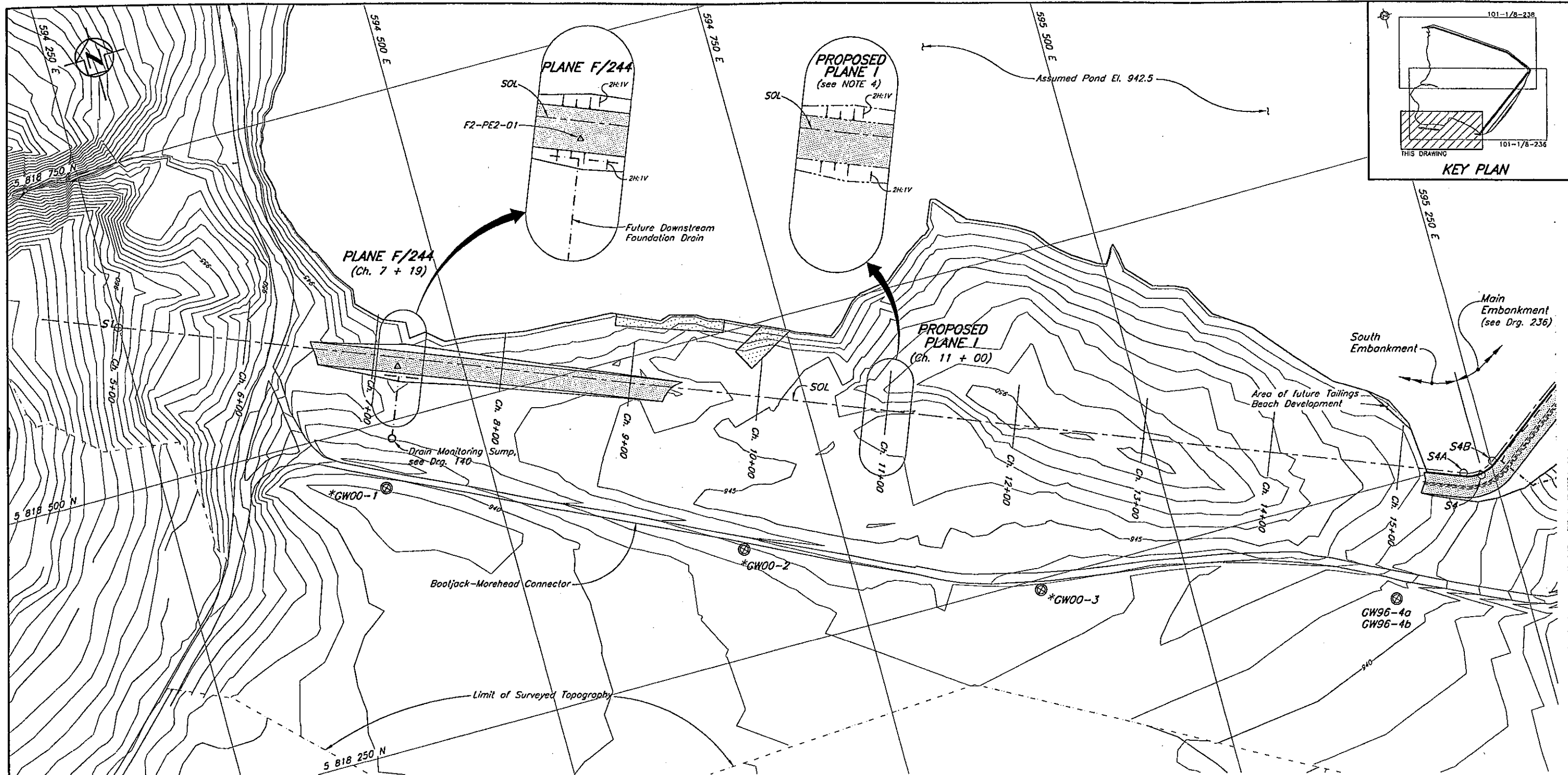
Knight Piésold
CONSULTING

MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
EXISTING INSTRUMENTATION
PERIMETER EMBANKMENT
PLAN

PROJECT/ASSIGNMENT NO.	DRAWING NO.	REVISION
VA101-1/8	238	0



NOTES

1. All dimensions in millimetres with elevations in metres, unless noted otherwise.
2. No work was completed at the South Embankment during Stage 3B construction.
3. Piezometers are vibrating wire type, SINCA Model 52611030 and RST Model 45005-0100 with a pressure rating of 100 psi or equivalent, connected to a readout panel via standard non-vented direct burial cable.
4. Proposed Plane I Instrumentation will be installed in Stage 5.

LEGEND

- ⊗ GW96-9 Groundwater Monitoring Well
- ▲ A1-PE1-01 Previously installed Piezometer
- △ A2-PE2-05 New Stage 3 Piezometer
- ◇ A2-SM-01 New Embankment Survey Monument

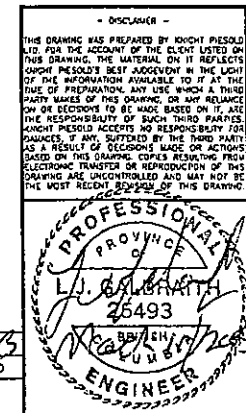
NOT FOR CONSTRUCTION

Scale 30 0 30 60 90 120 150 m

REF. NO.	DESCRIPTION
244	EXISTING INSTRUMENTATION - PLANES D, E, F, G AND H
242	EXISTING INSTRUMENTATION - PLANES A, B AND C
238	EXISTING INSTRUMENTATION - PERIMETER EMBANKMENT - PLAN
236	EXISTING INSTRUMENTATION - MAIN EMBANKMENT - PLAN

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
0	09MAR'05	ISSUED FOR REPORT	AT	WAL	CHK'D	APP'D



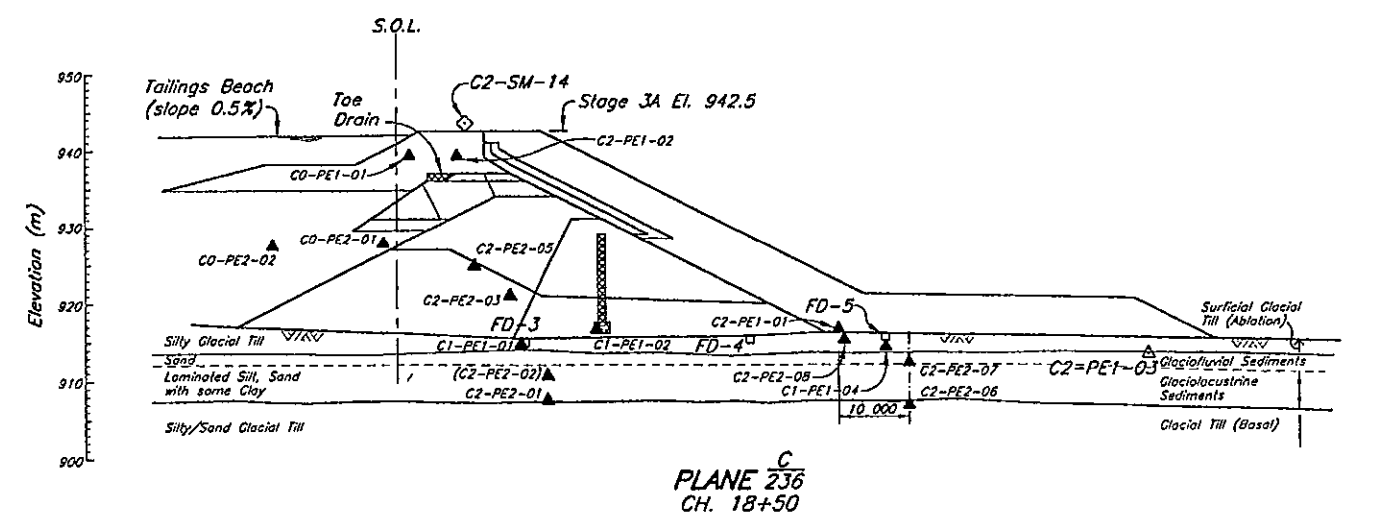
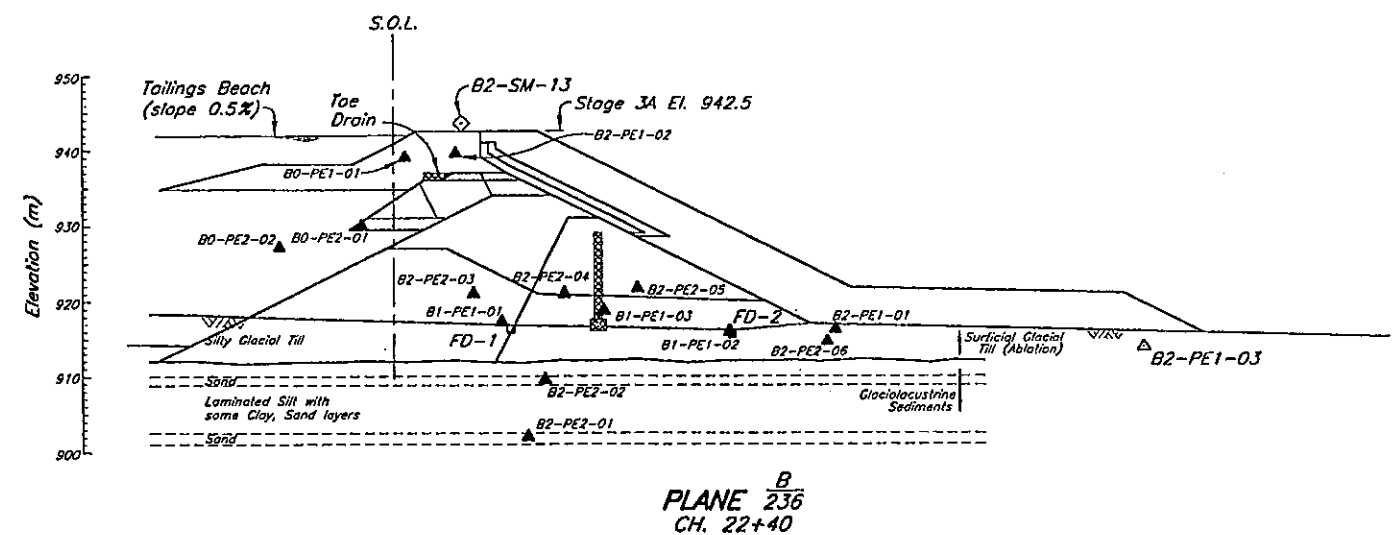
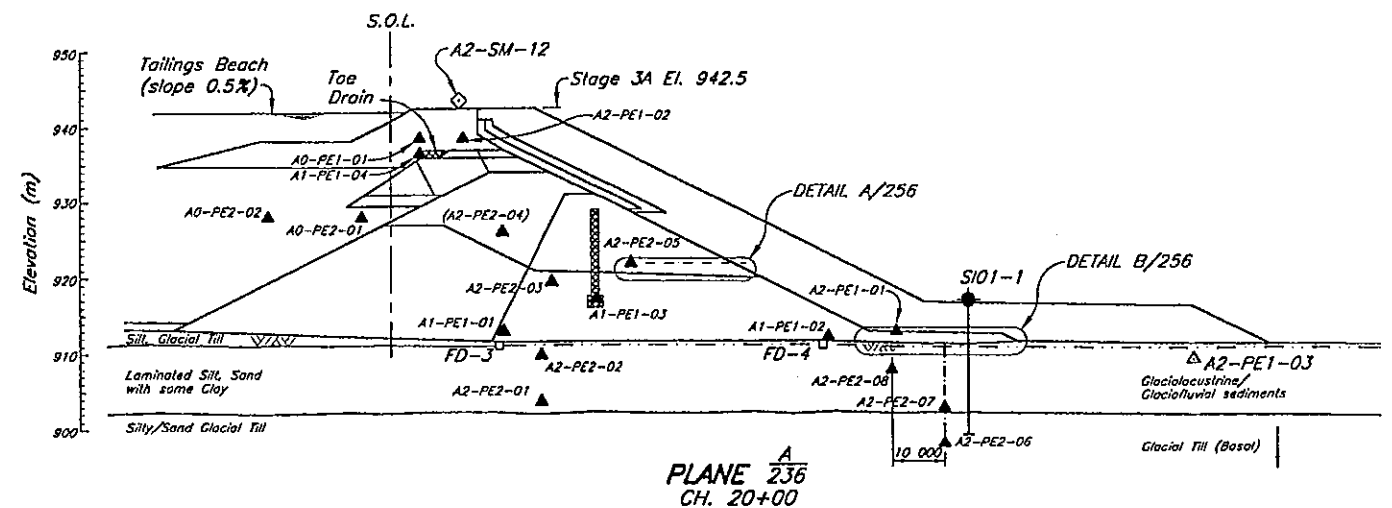
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MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
EXISTING INSTRUMENTATION
SOUTH EMBANKMENT
PLAN

PROJECT/ASSIGNMENT NO.	DRAWING NO.	REVISION
VA101-1/8	240	0



LEGEND

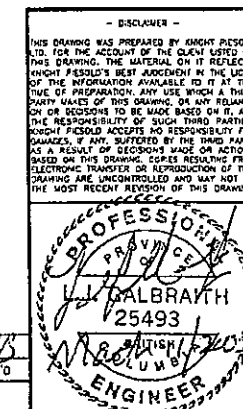
- ▲ A1-PE1-01 Previously installed Piezometer
- △ A2-PE2-06 New Stage 3 Piezometer
- ◇ A2-SM-01 New Embankment Survey Monument
- S101-1 Slope Inclinator

NOTES

- Piezometers are vibrating wire type, SINCA Model 52611030 and RST Model 45005-0100 with a pressure rating of 100 psi or equivalent, connected to a readout panel via standard non-vented direct burial cable.
- Zone fill materials and drain pipes not shown in drawing for clarity.

Scale 10 0 10 20 30 40 50 m

NOT FOR CONSTRUCTION



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MOUNT POLLEY MINE

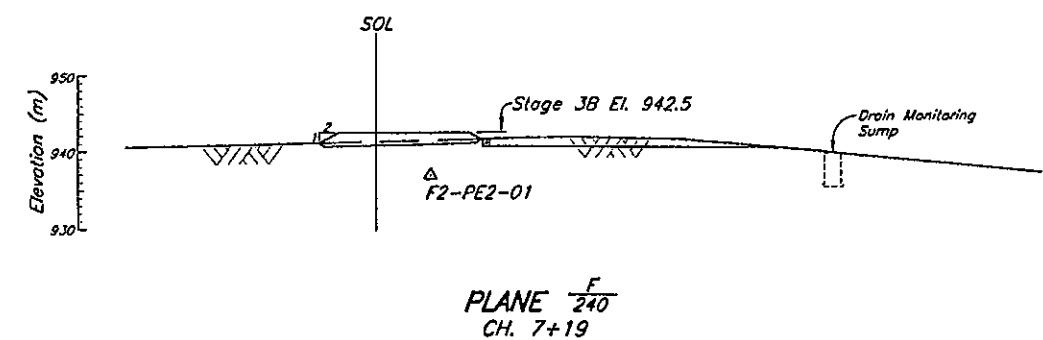
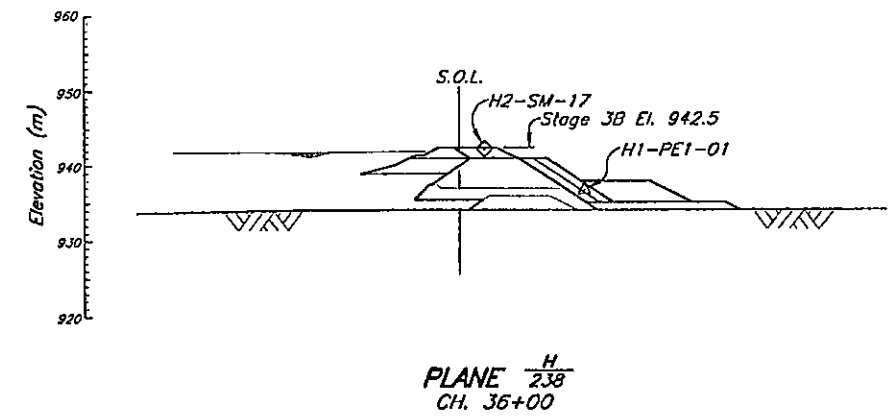
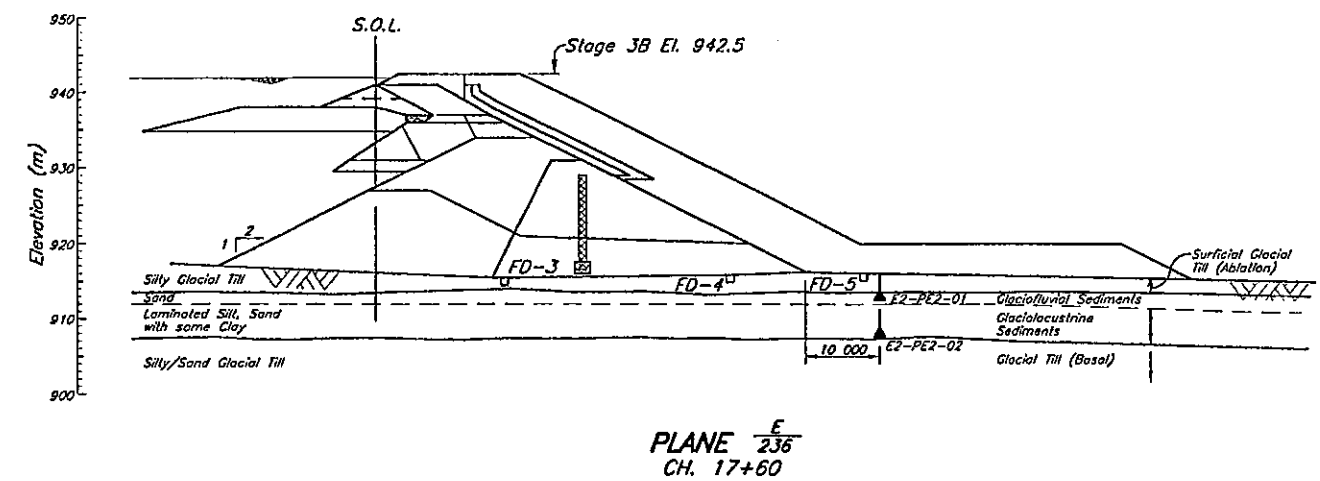
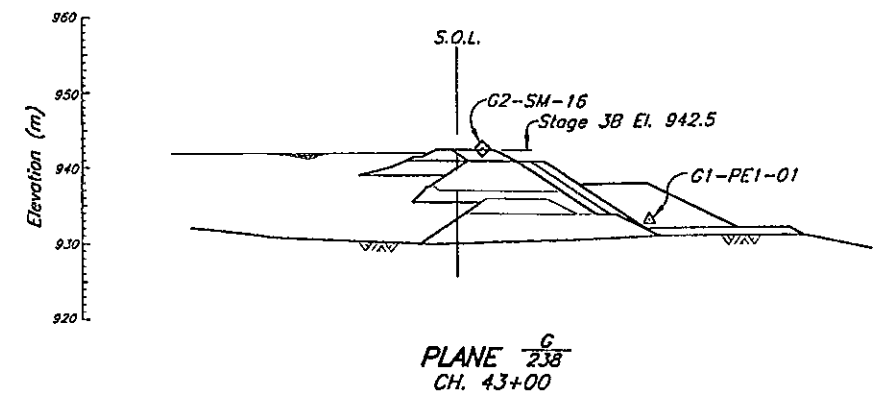
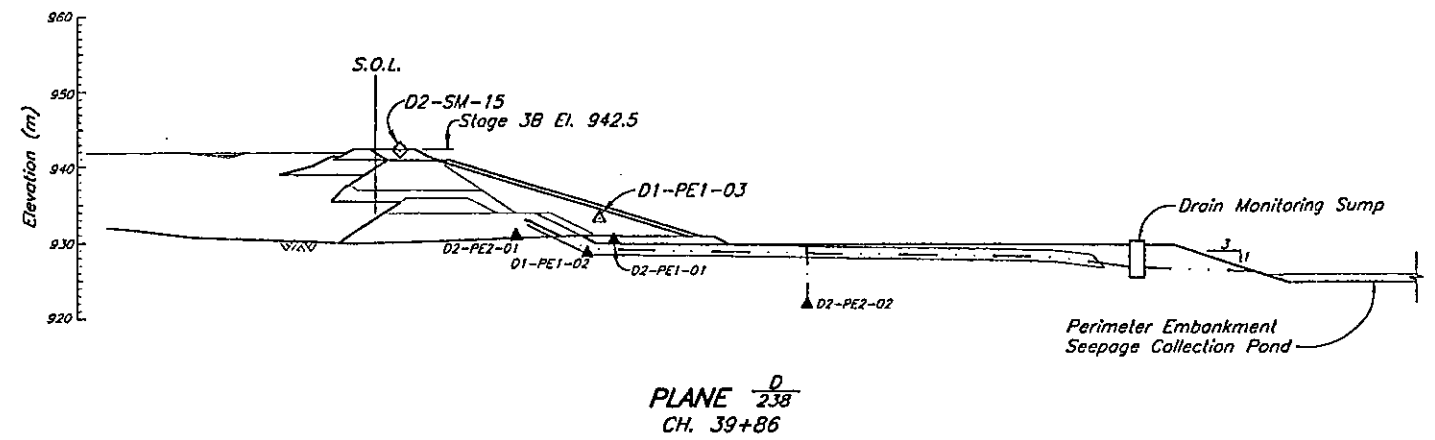
TAILINGS STORAGE FACILITY
EXISTING INSTRUMENTATION
PLANES A, B AND C

244	EXISTING INSTRUMENTATION - PLANES E, F, G AND H
236	EXISTING INSTRUMENTATION IN MAIN EMBANKMENT - PLAN
DRG. NO.	DESCRIPTION
REFERENCE DRAWINGS	

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
REVISIONS						

0	09MAR'05	ISSUED FOR REPORT	AT	NO	DESIGN	DRAWN	CHK'D	APP'D
REVISIONS								

PROJECT/ASSIGNMENT NO.	DRAWING NO.	REVISION
VA101-1/8	242	0



NOTES

1. Piezometers are vibrating wire type, SINCA Model 52611030 and RST Model 45005-0100 with a pressure rating of 100 psi or equivalent, connected to a readout panel via standard non-vented direct burial cable.
2. Zone fill materials and drain pipes not shown in drawing for clarity.

LEGEND

- ▲ A1-PE1-01 Previously installed Piezometer
- △ A2-PE2-06 New Stage 3 Piezometer
- ◇ A2-SM-01 New Embankment Survey Monument

Scale 10 0 10 20 30 40 50 m

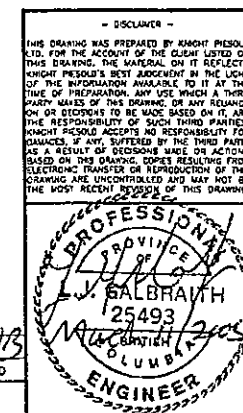
NOT FOR CONSTRUCTION

240	EXISTING INSTRUMENTATION - SOUTH EMBANKMENT - PLAN
238	EXISTING INSTRUMENTATION - PERIMETER EMBANKMENT - PLAN
236	EXISTING INSTRUMENTATION - MAIN EMBANKMENT - PLAN

DRG. NO.	DESCRIPTION	REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
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REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
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0	09MAR'05	ISSUED FOR REPORT	AT	ND	KIB
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MOUNT POLLEY MINING CORPORATION		
MOUNT POLLEY MINE		
TAILINGS STORAGE FACILITY EXISTING INSTRUMENTATION PLANES D, E, F, G AND H		
PROJECT/ASSIGNMENT NO.	DRAWING NO.	REVISION
VA101-1/8	244	0

APPENDIX A

MINISTRY OF ENERGY AND MINES – GUIDELINES FOR ANNUAL REPORTS

(Pages A-1 to A-2)

Ministry of Energy and Mines
GUIDELINES FOR ANNUAL REPORTS
Dam Safety Inspections

From Chris
Can

~~22~~
~~23~~
~~24~~
~~25~~
↓
File

Every operating and closed mine shall prepare and submit an annual report on the operation, maintenance and surveillance of tailings dams and related works.

The report shall provide information and engineering details as follows:

1. Summary Section including:
 - (a) Classification of the dam(s) in terms of Consequence of Failure (ref. Canadian Dam Association, Dam Safety Guidelines).
 - (b) Significant changes in instrumentation monitoring records.
 - (c) Significant changes to dam stability and/or surface water control.
 - (d) For major tailings impoundments, as described in Part 9.1.3 of the Health, Safety and Reclamation Code for Mines in British Columbia, all operating dams shall have a current Operation, Maintenance and Surveillance (OMS) Manual. The annual report shall indicate the latest revision date of the OMS manual.
 - (e) For tailings dams classified as High or Very High Consequence, an Emergency Preparedness Plan (EPP) is required. The annual report shall indicate the latest revision date of the EPP document.
 - (f) Scheduled date for formal Dam Safety Review (ref. Canadian Dam Association, Dam Safety Guidelines).
2. Summary of past years' construction with a description of any problems and stabilization.
3. Plan and representative cross sections.
4. Site photographs.
5. Climatic review.
6. Water balance review.

.. /2

A-1

7. Freeboard and storage availability (based on 200 year flood or the permitted design flood, whichever is more severe).
8. Water discharge system, volumes and quality.
9. Seepage occurrence and water quality.
10. Surface water control and surface erosion.
11. Instrumentation review including:
 - (a) Phreatic surfaces and piezometric data.
 - (b) Settlement.
 - (c) Lateral movement.

For major tailings impoundments as described in Part 9.1.3 of the Health, Safety and Reclamation Code for Mines in British Columbia, the report shall be submitted by a qualified geotechnical engineer registered as a Professional Engineer (P.Eng.) in British Columbia.

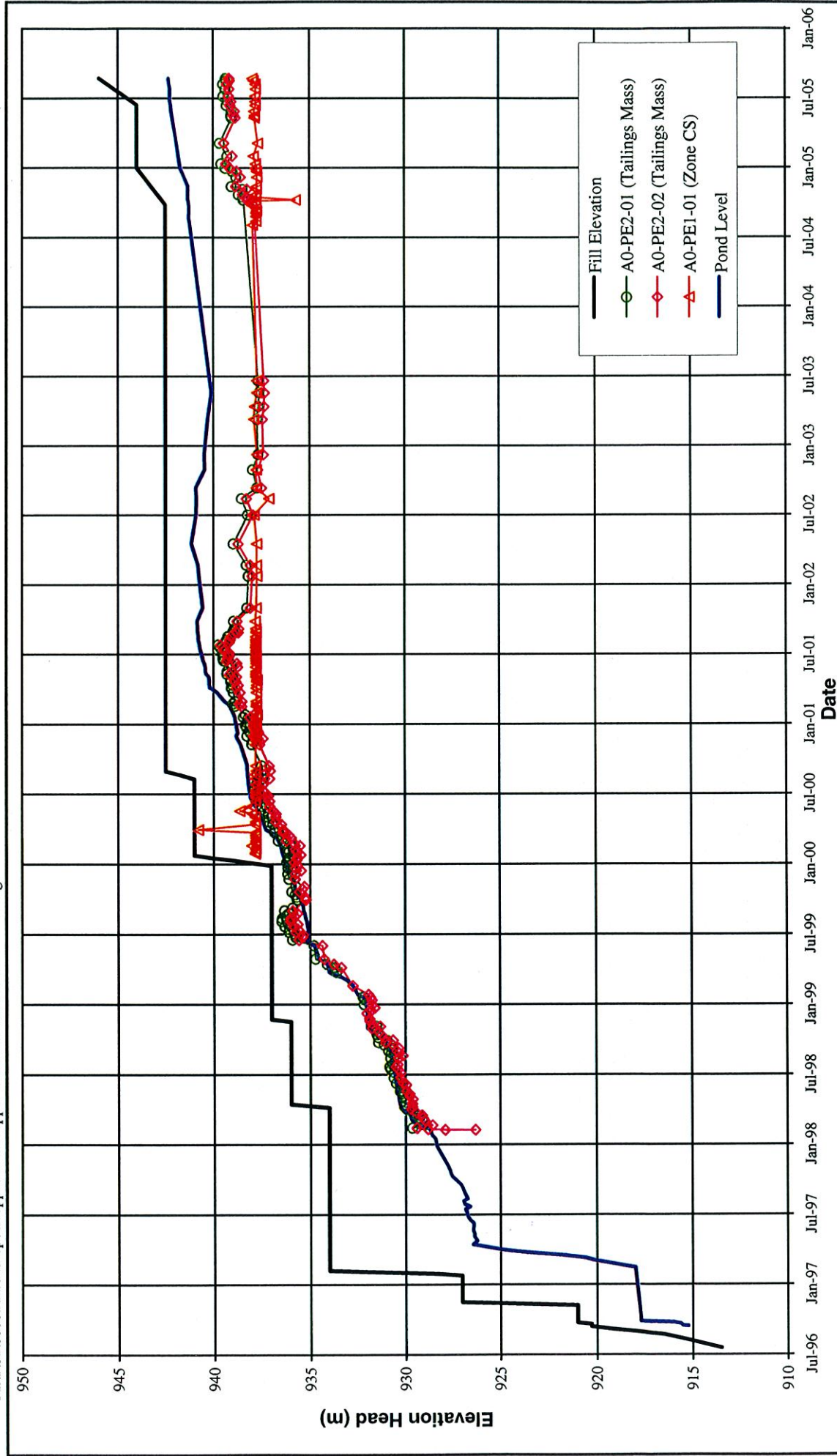
Chris Carr, P.Eng.
Manager, Geotechnical Engineering

February 14, 2002

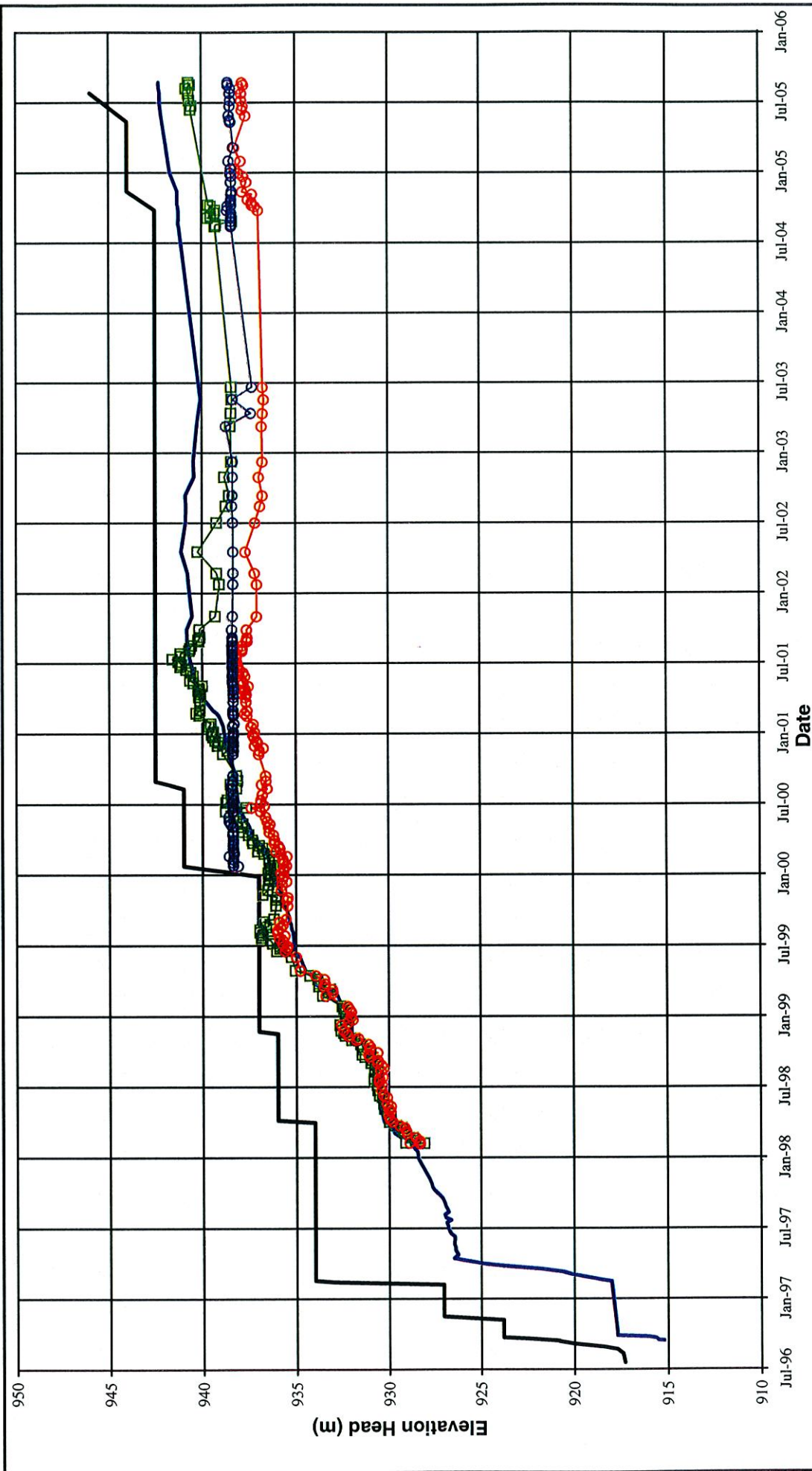
APPENDIX B

PIEZOMETER RECORDS

- Figures B1-1 to B1-3 Tailings Piezometers
- Figures B2-1 to B2-6 Foundation Piezometers
- Figures B3-1 to B3-4 Fill Piezometers
- Figures B4-1 to B4-6 Drain Piezometers



MOUNT POLLEY MINING CORPORATION	
MOUNT POLLEY MINE	
PLANE A TAILINGS PIEZOMETERS ELEVATION HEAD vs. TIME	
<i>Knight Piésold</i> CONSULTING	
PROJECT NO. VA101-1/11	REF. NO. 1
REV. 0	FIGURE B1-1



MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE

PLANE B TAILINGS PIEZOMETERS
ELEVATION HEAD vs. TIME

Knight Piésold
CONSULTING

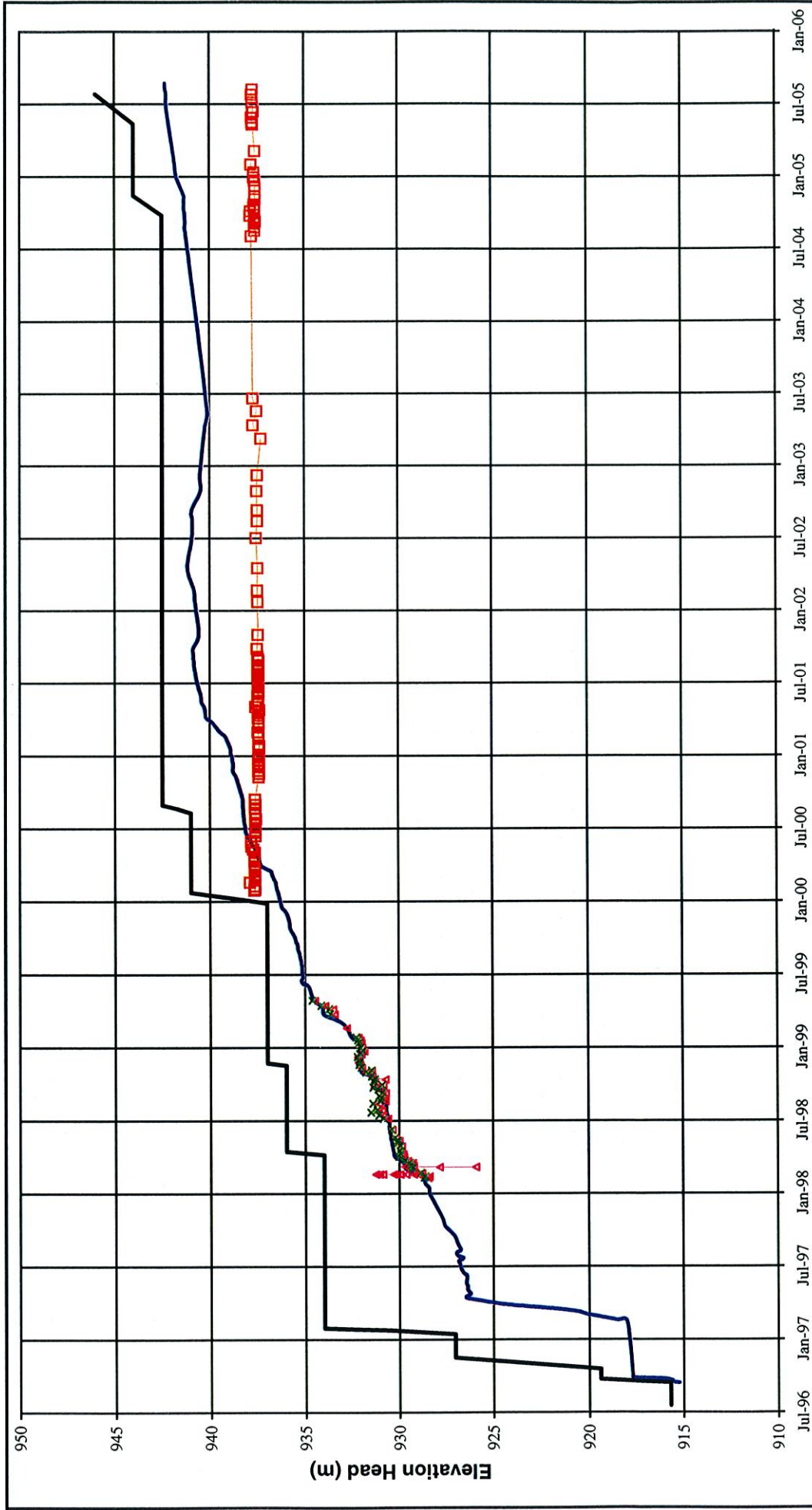
PROJECT NO.
VA 101-1/11

REF. NO.
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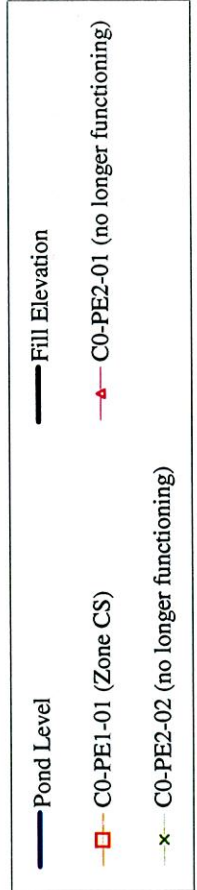
REV.
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FIGURE B1-2



Date



MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

PLANE C TAILINGS PIEZOMETERS
ELEVATION HEAD vs. TIME

Knight Piésold
CONSULTING

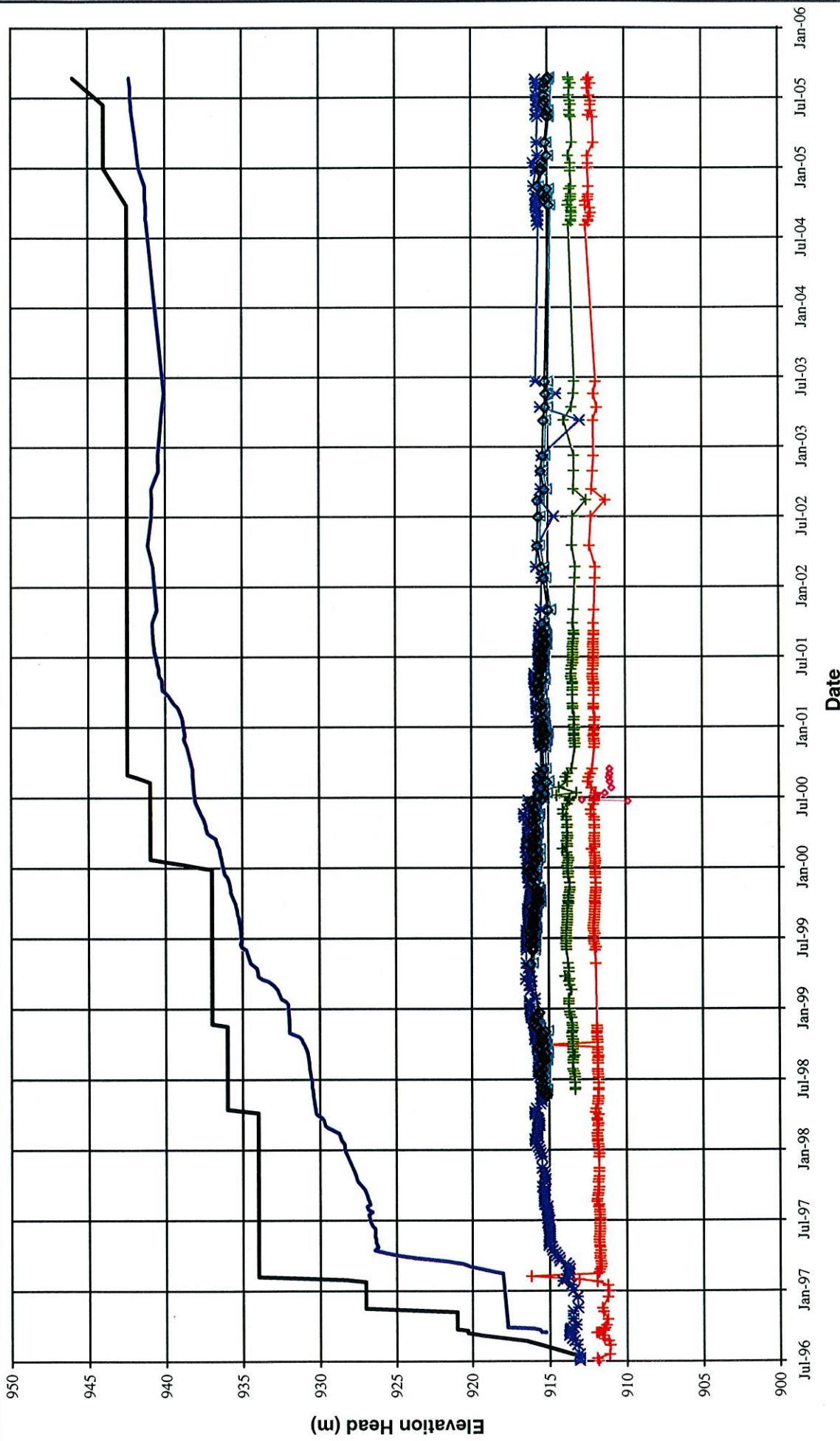
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VA 101-1/11

REF. NO.
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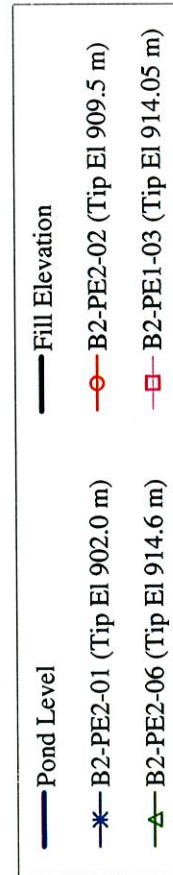
REV.
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Rev 0 - Issued for Annual Report

FIGURE B1-3



MOUNT POLLEY MINING CORPORATION			
MOUNT POLLEY MINE			
PLANE A FOUNDATION PIEZOMETERS ELEVATION HEAD vs. TIME			
Knight Piésold CONSULTING			
PROJECT NO.	REF. NO.	REV.	
VA101-1/11	1	0	
			FIGURE B2-1



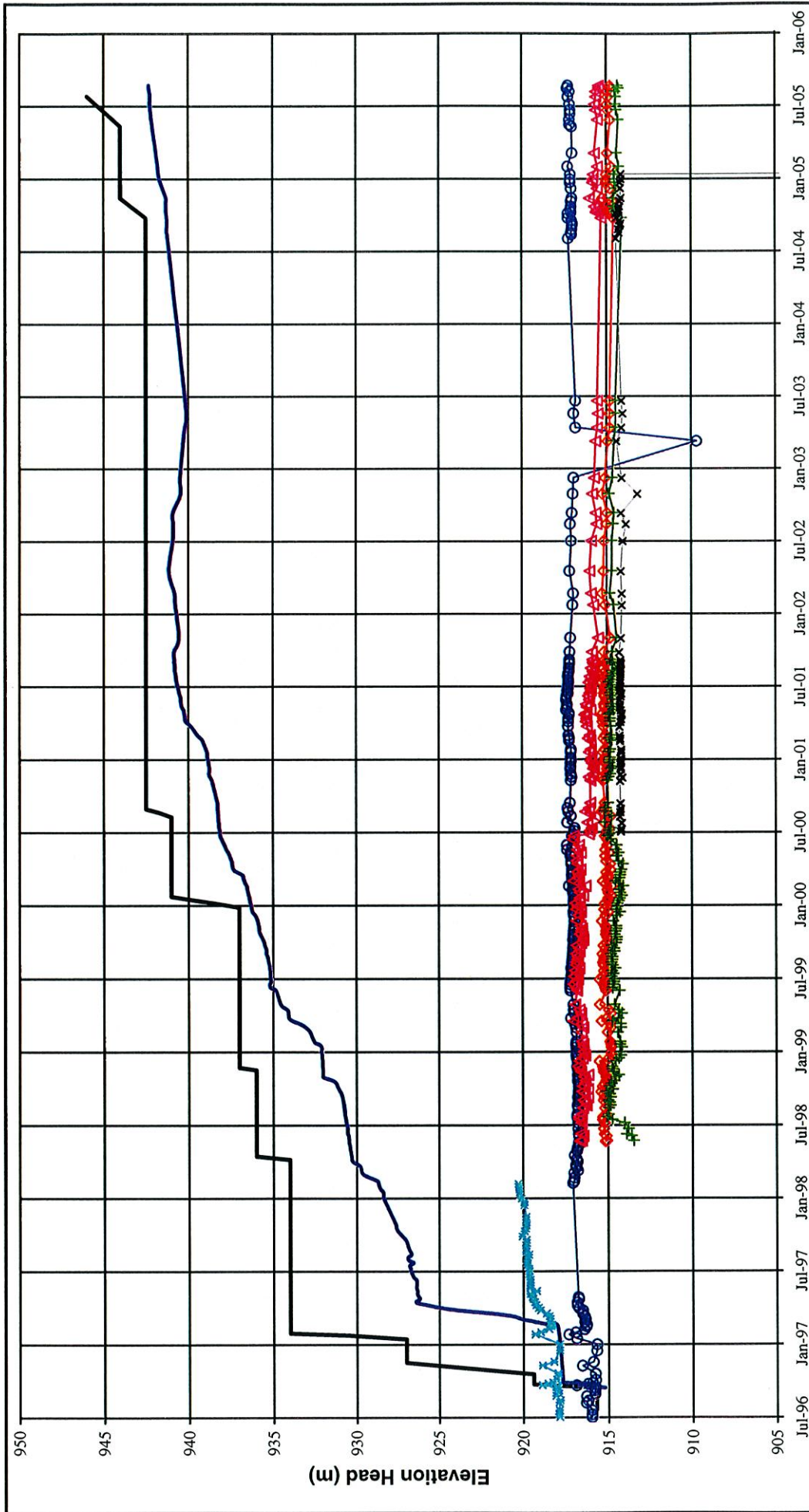
MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE

PLANE B FOUNDATION PIEZOMETERS

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Rev 0 - Issued for Annual Report

PROJECT NO.	REF. NO.	REV.
VA 101-1/11	1	0



Date

- Pond Level
- C2-PE2-02 (Tip El 910.5 m)
- C2-PE2-07 (Tip El 912.3 m)
- C2-PE1-03 (Tip El 912.59 m)
- Fill Elevation
- C2-PE2-06 (Tip El 906.8 m)
- C2-PE2-08 (Tip El 914.0 m)
- C2-PE2-01 (no longer functioning)

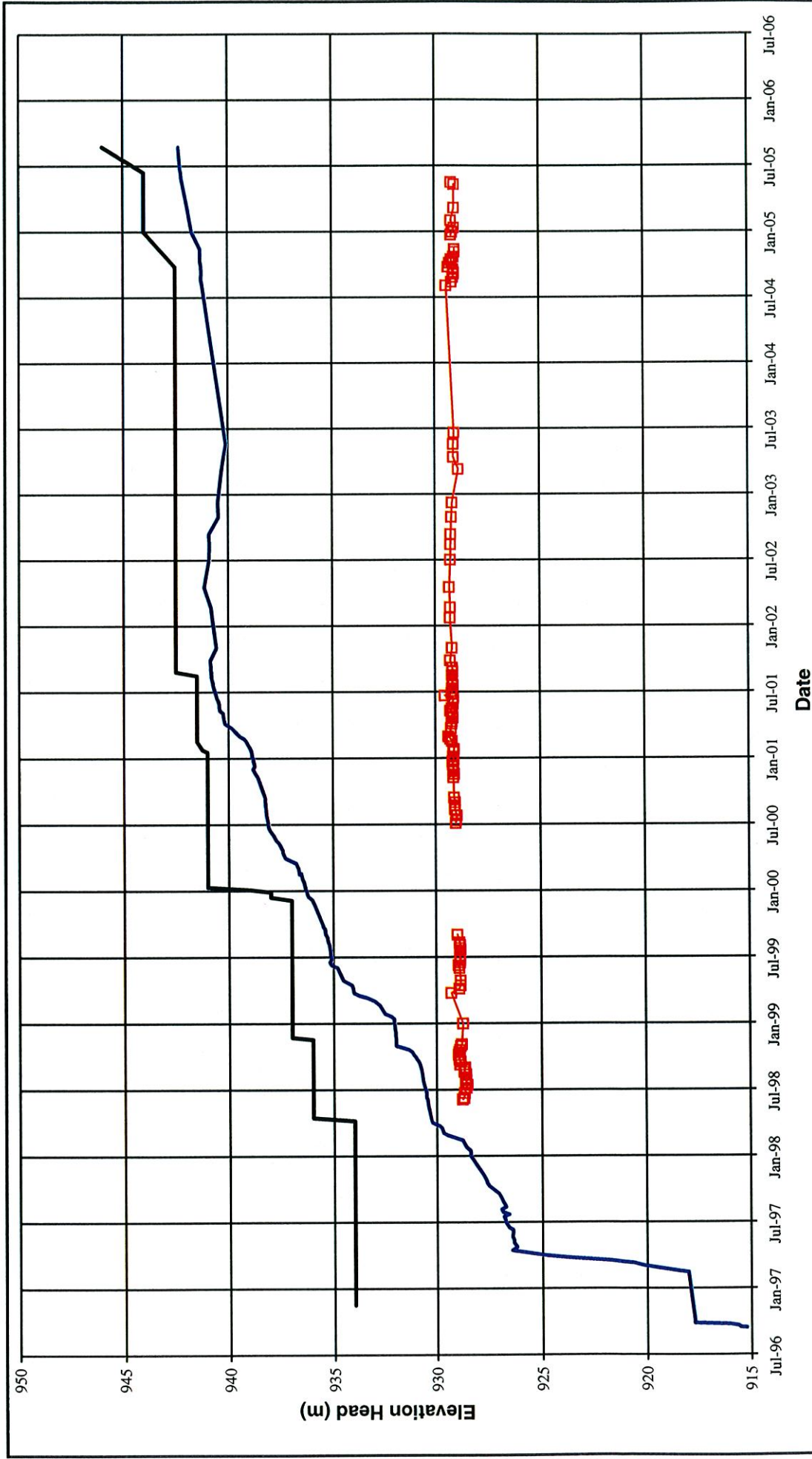
MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

PLANE C FOUNDATION PIEZOMETERS
ELEVATION HEAD vs. TIME

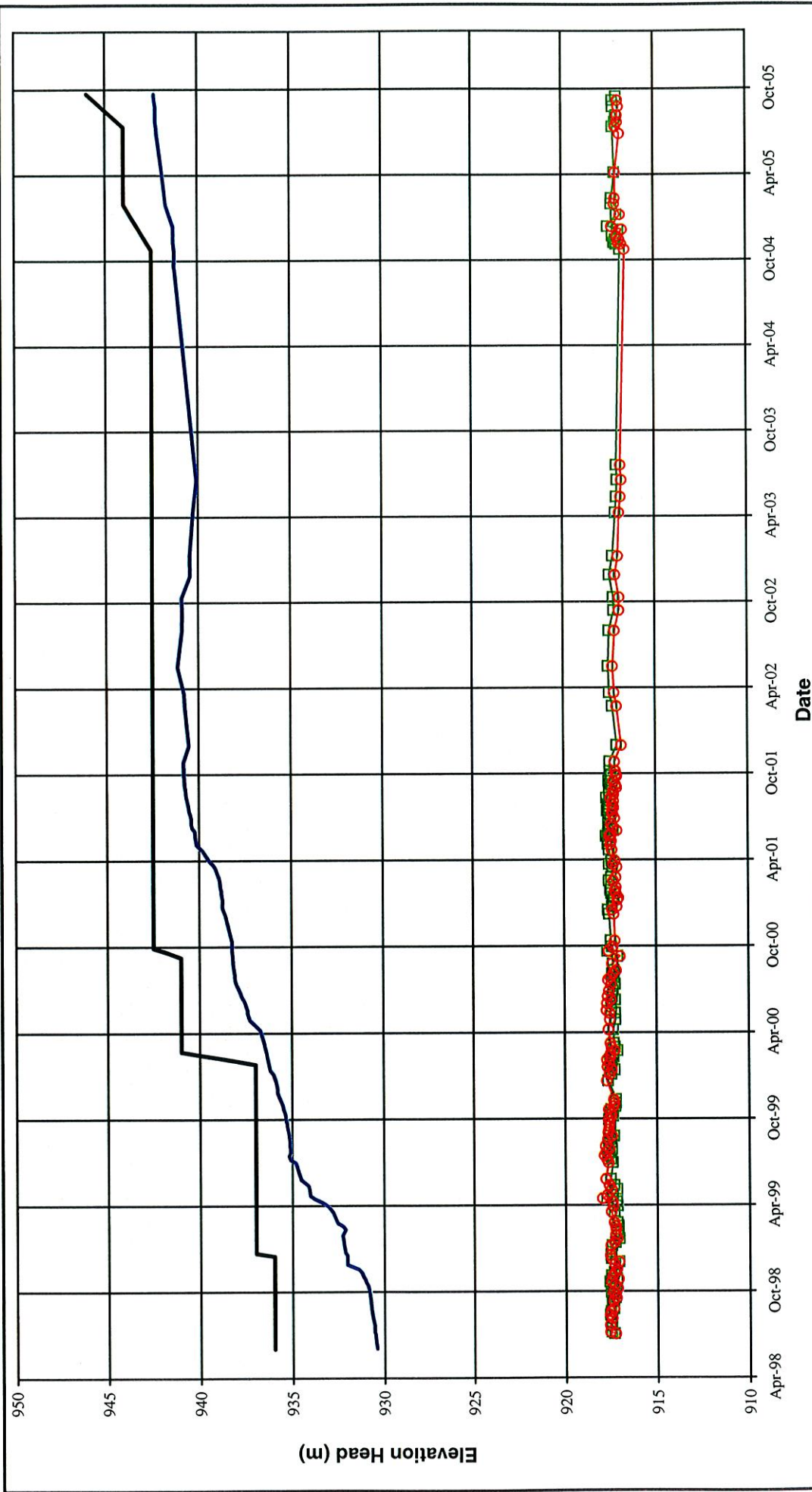
Knight Piésold
CONSULTING

PROJECT NO.	REF. NO.	REV.
VA 101-1/11	1	0



— Pond Level
— Fill Elevation
—□— D2-PE2-02 (Tip El 927.32 m)

MOUNT POLLEY MINING CORPORATION	
MOUNT POLLEY MINE	
PLANE D FOUNDATION PIEZOMETERS ELEVATION HEAD vs. TIME	
Knight Piésold CONSULTING	
PROJECT NO. VA.101-1/11	REF. NO. 1
REV. 0	FIGURE B2-4



— Pond Level
 — Fill Elevation
 — E2-PE2-01 (Tip El 914.21 m)
 — E2-PE2-02 (Tip El 909.66 m)

Date

MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

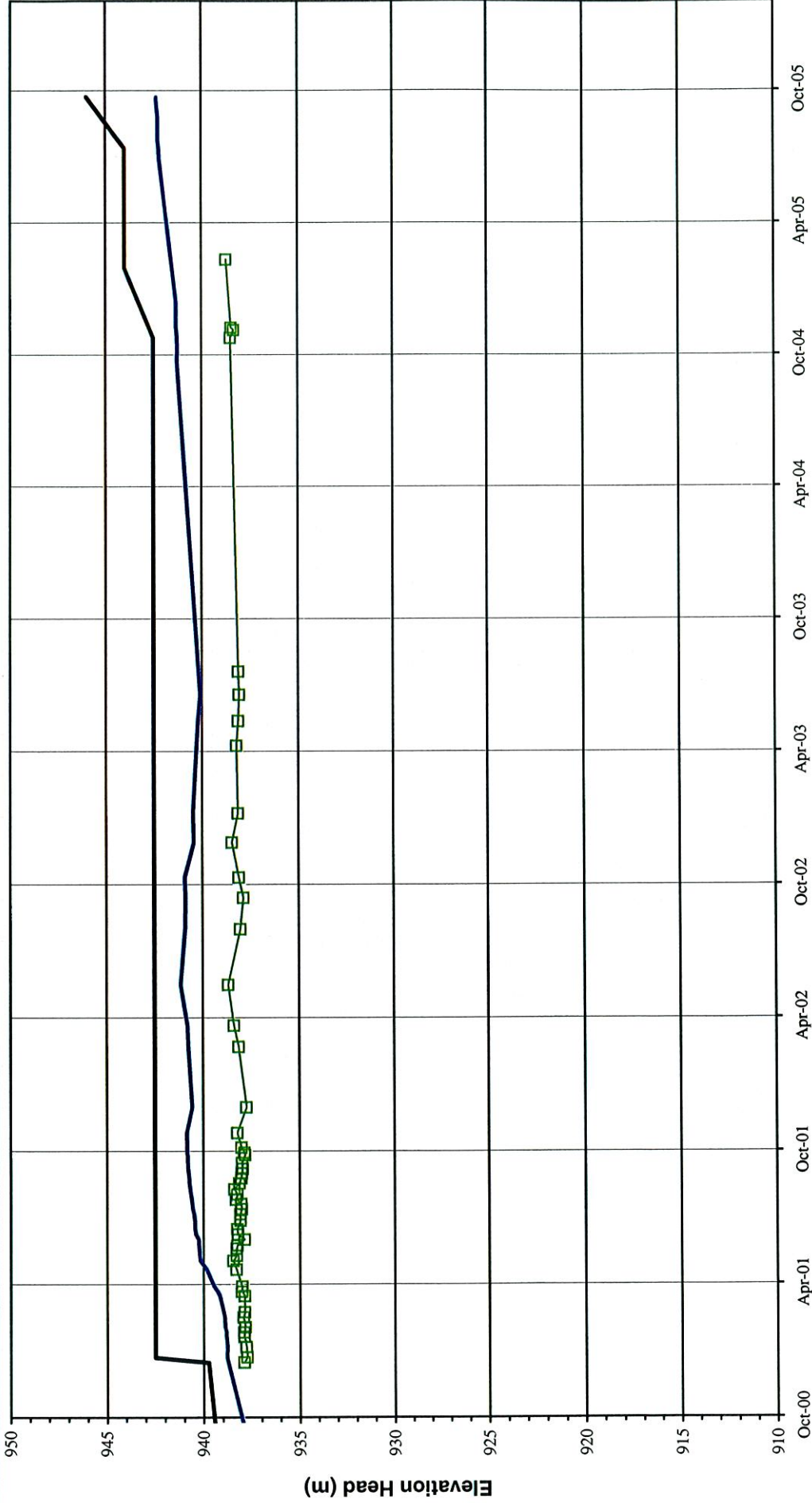
PLANE E FOUNDATION PIEZOMETERS
ELEVATION HEAD vs. TIME

Knight Piésold
CONSULTING

PROJECT NO. REF. NO. REV.
VA 101 - 1/11 1 0

Rev 0 - Issued for Annual Report

FIGURE B2-5



Date

— Pond Level

— Fill Elevation

— F2-PE2-01

MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

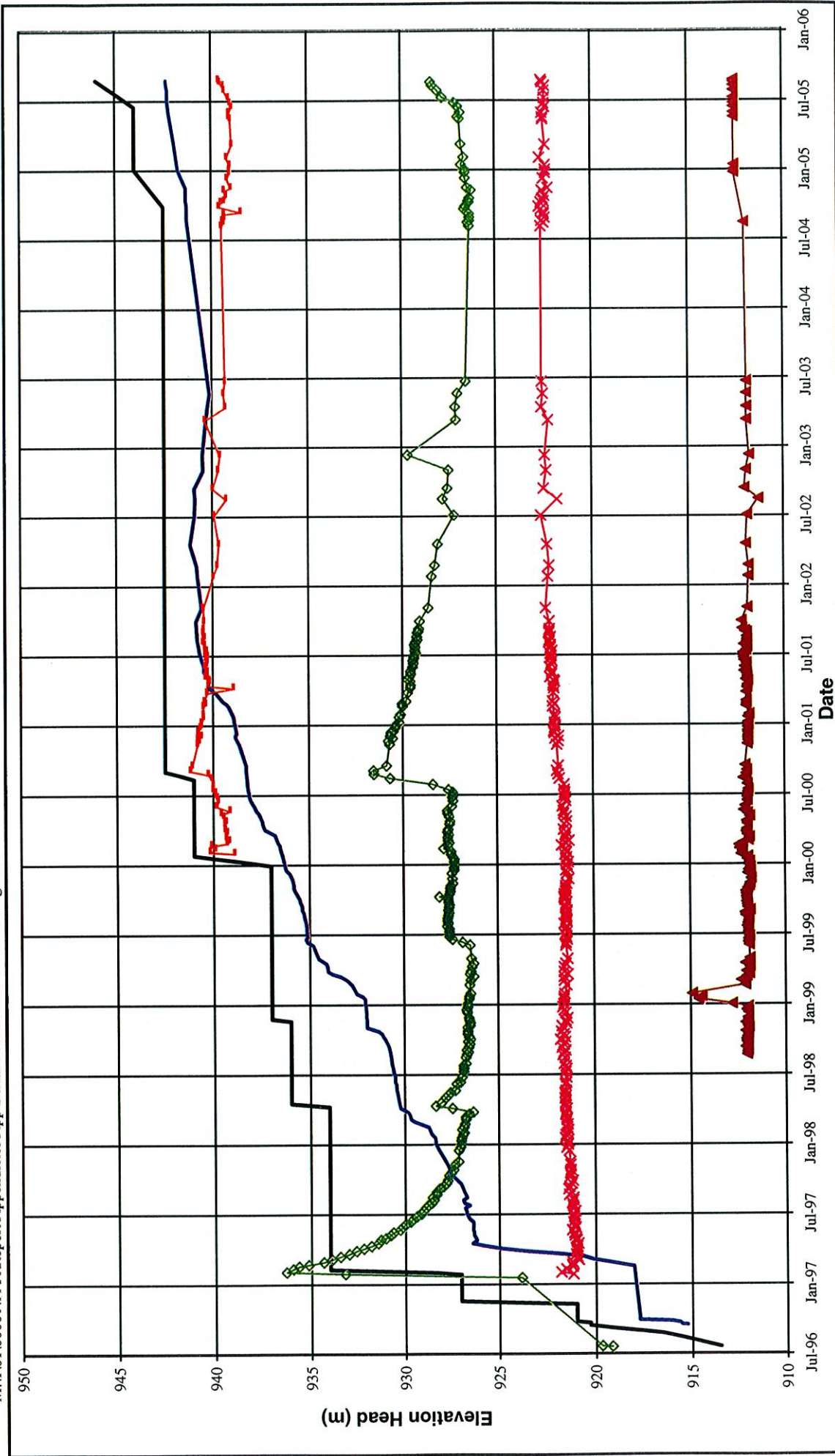
PLANE F FOUNDATION PIEZOMETERS
ELEVATION HEAD vs. TIME

Knight Piésold
CONSULTING

PROJECT NO.
VA 101 - 1/11

REF. NO.
1

REV.
0



MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

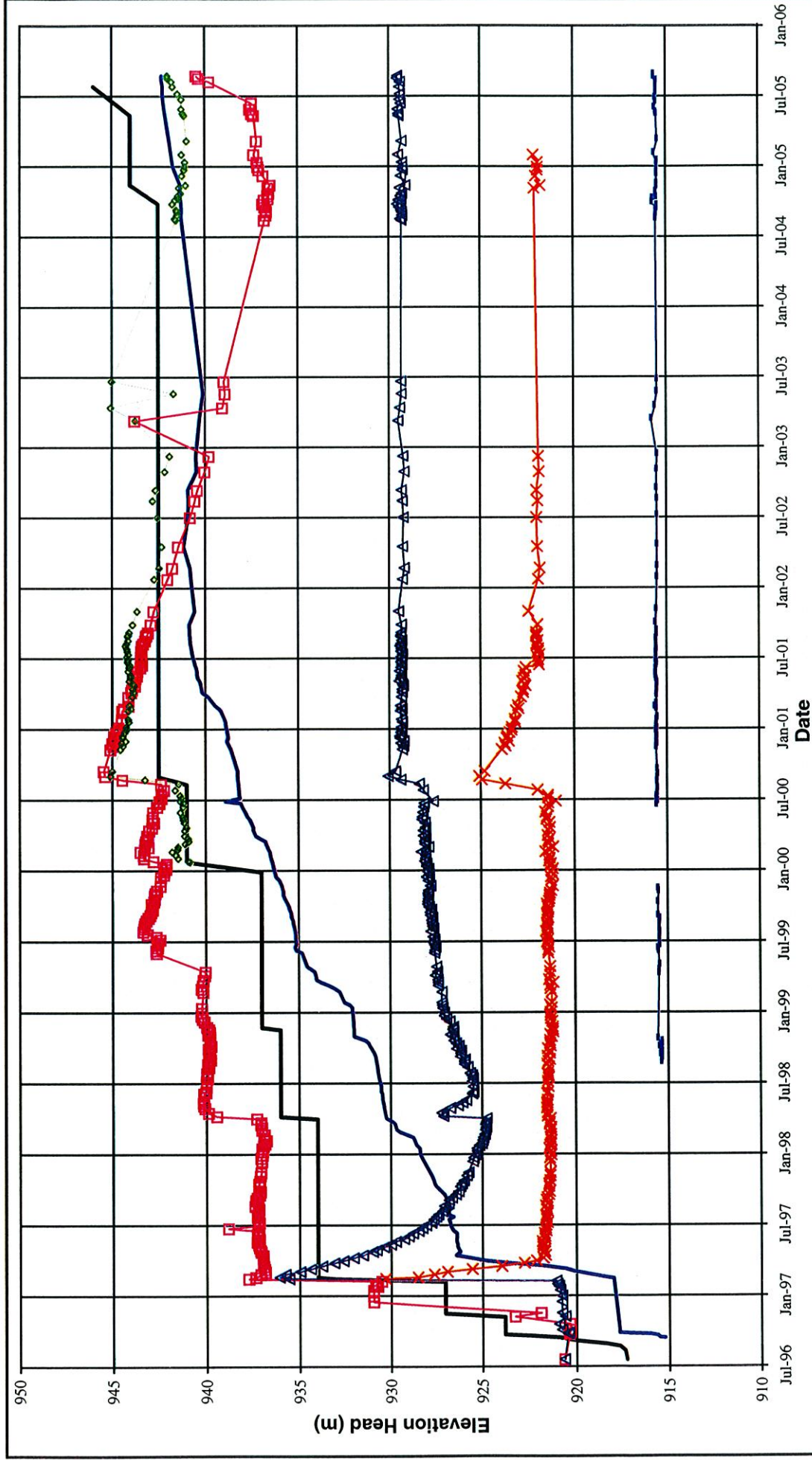
PLANE A FILL PIEZOMETERS ELEVATION HEAD vs. TIME

PROJECT NO.
VA101-1/11

PROJECT NO.
VA101-1/11

PROJECT NO.
VA101-1/11

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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE

PLANE B FILL PIEZOMETERS
ELEVATION HEAD vs. TIME

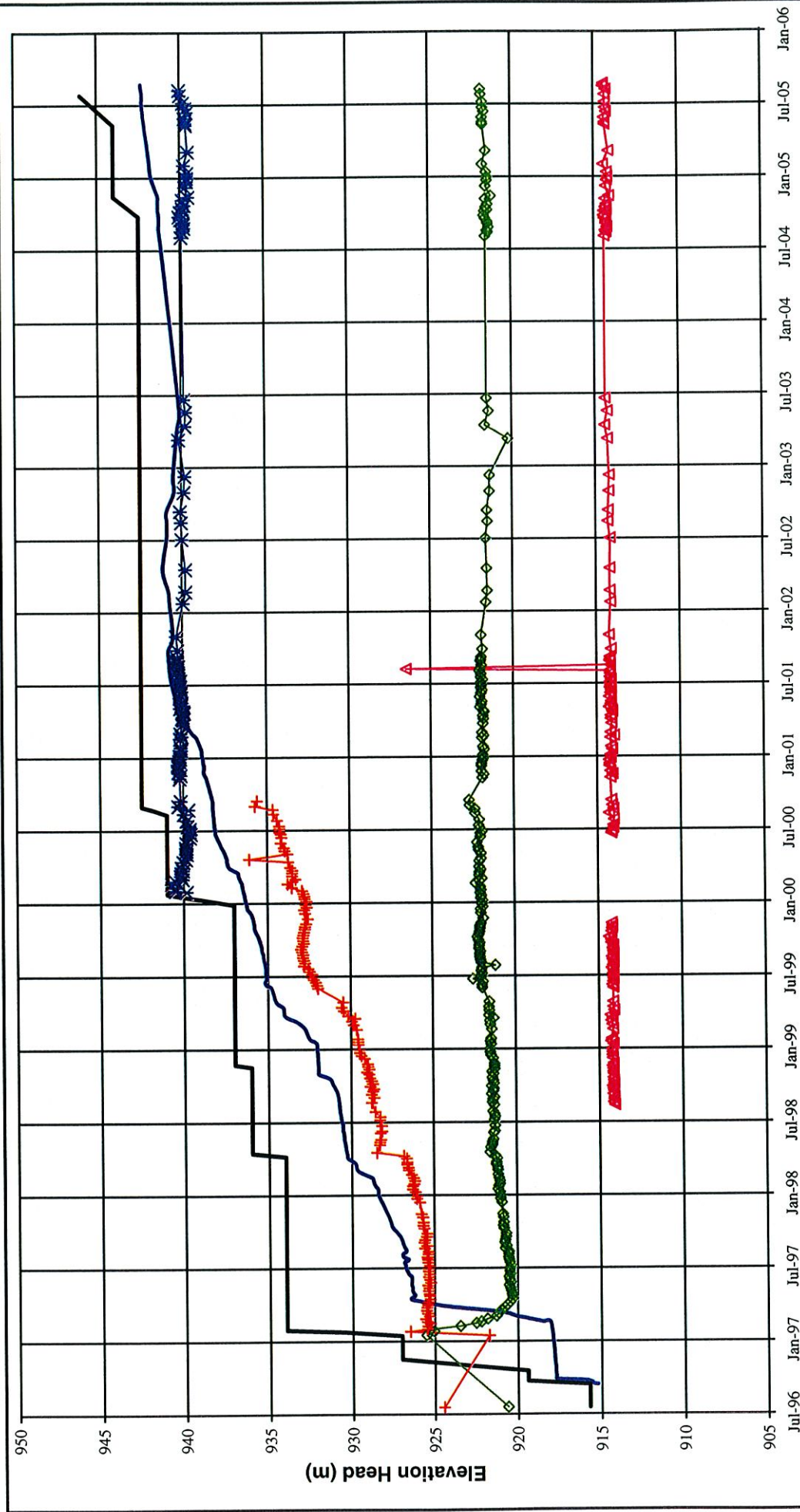
Knight Piésold
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VA 101-1/11

REF. NO.
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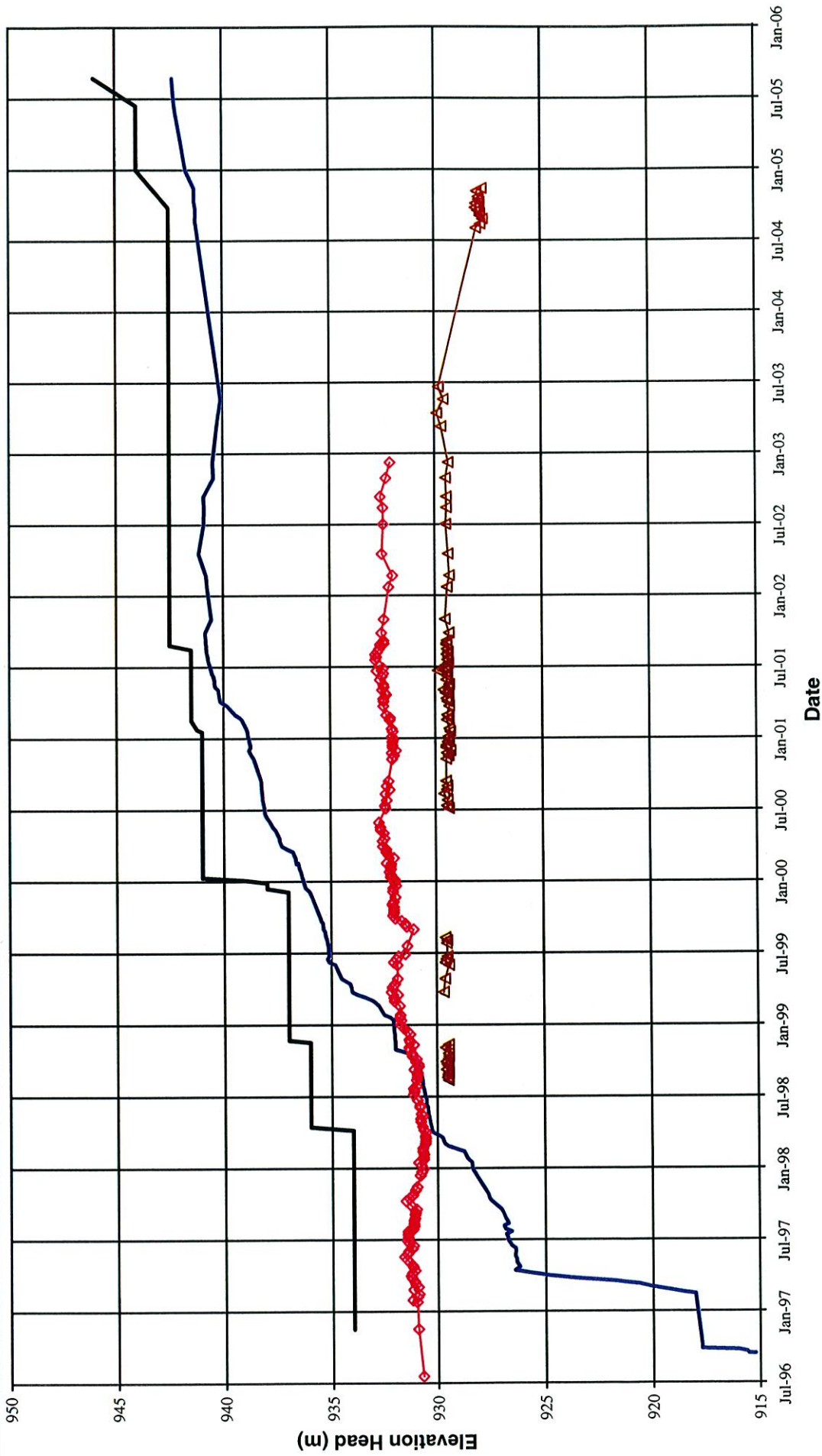
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FIGURE B3-2



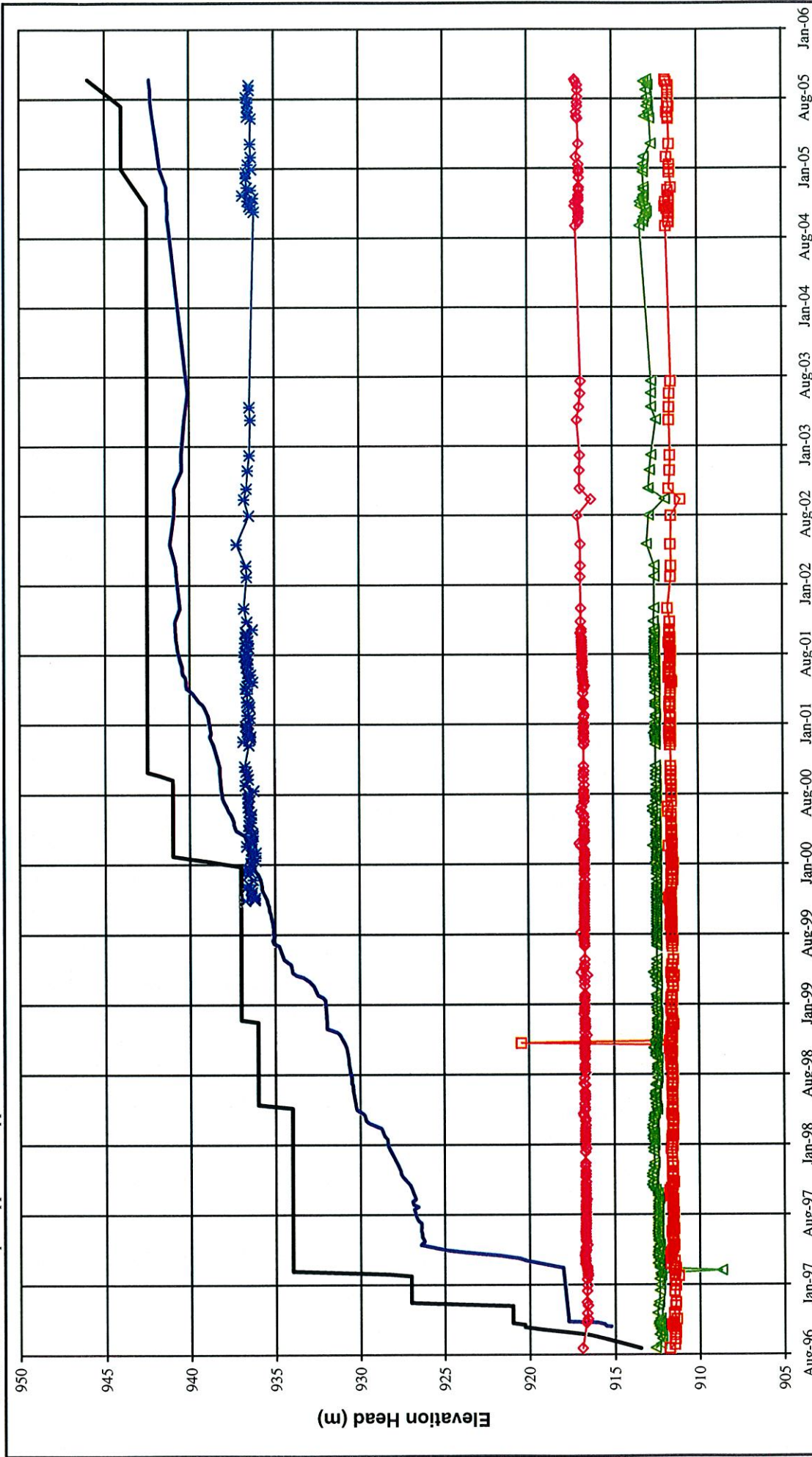
MOUNT POLLEY MINING CORPORATION			
MOUNT POLLEY MINE			
PLANE C FILL PIEZOMETERS ELEVATION HEAD vs. TIME			
PROJECT NO. VA 101-1/11	REF. NO. 1	REV. 0	FIGURE B3-3

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— Pond Level
 — Fill Elevation
 —△— D2-PE1-01 (Zone T)
 —◇— D2-PE2-01 (Glacial Till) no longer functioning

MOUNT POLLEY MINING CORPORATION			
MOUNT POLLEY MINE			
PLANE D FILL PIEZOMETERS ELEVATION HEAD vs. TIME			
PROJECT NO. VA 101-1/11		REF. NO. 1	REV. 0
Knight Piésold CONSULTING		FIGURE B3-4	



Date

- Pond Level
- ▲— A1-PE1-01 (Foundation Drain-3)
- A1-PE1-02 (Foundation Drain-4)
- *— A1-PE1-03 (Chimney Drain)
- ◇— A1-PE1-04 (Upstream Toe Drain)
- Fill Elevation

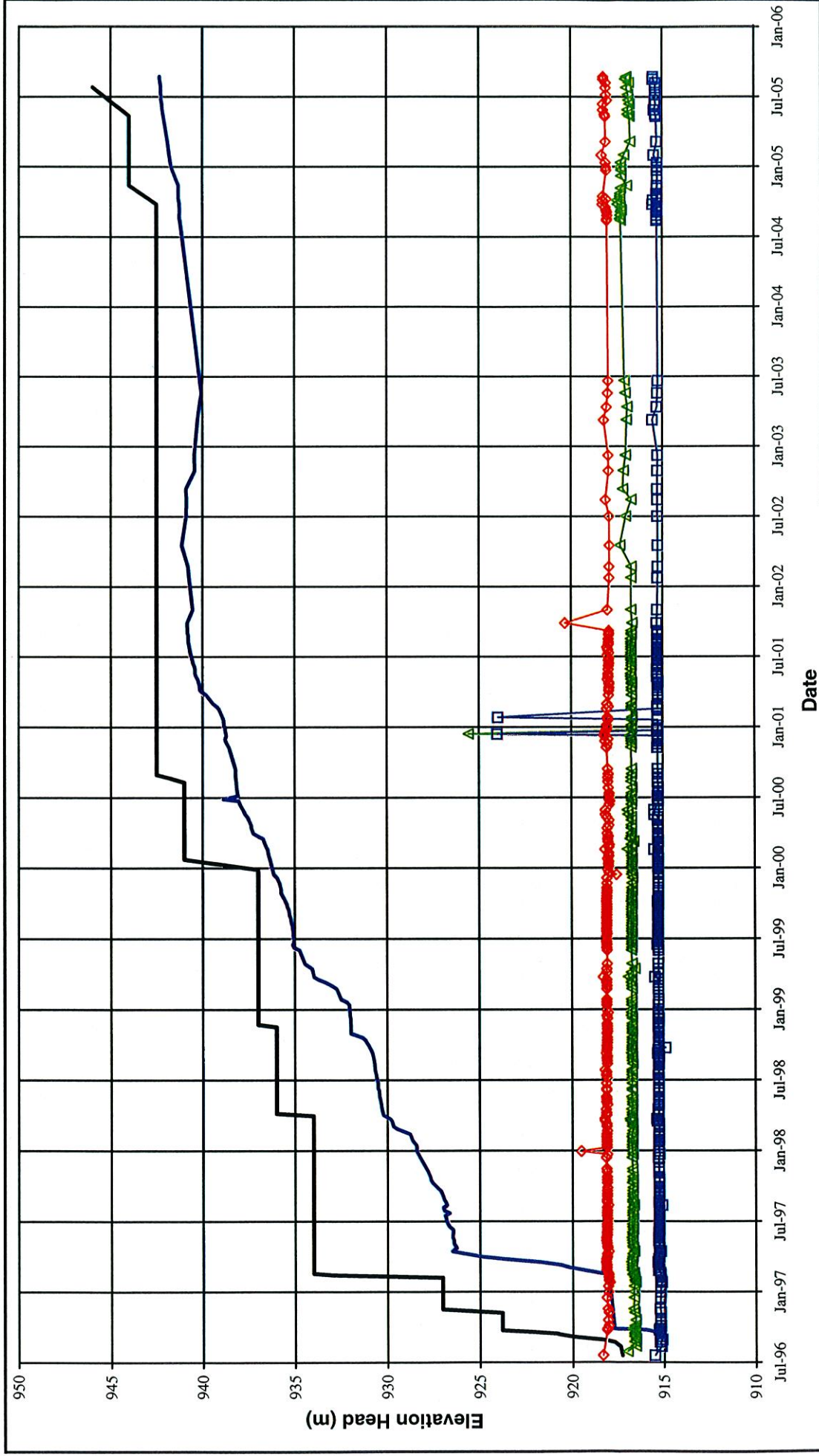
MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

PLANE A DRAIN PIEZOMETERS
ELEVATION HEAD vs. TIME

PROJECT NO.	REF. NO.	REV.
VA101-1/11	1	0

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Date

- Pond Level
- B1-PE1-01 (Foundation Drain-1)
- B1-PE1-02 (Foundation Drain-2)
- B1-PE1-03 (Chimney Drain)

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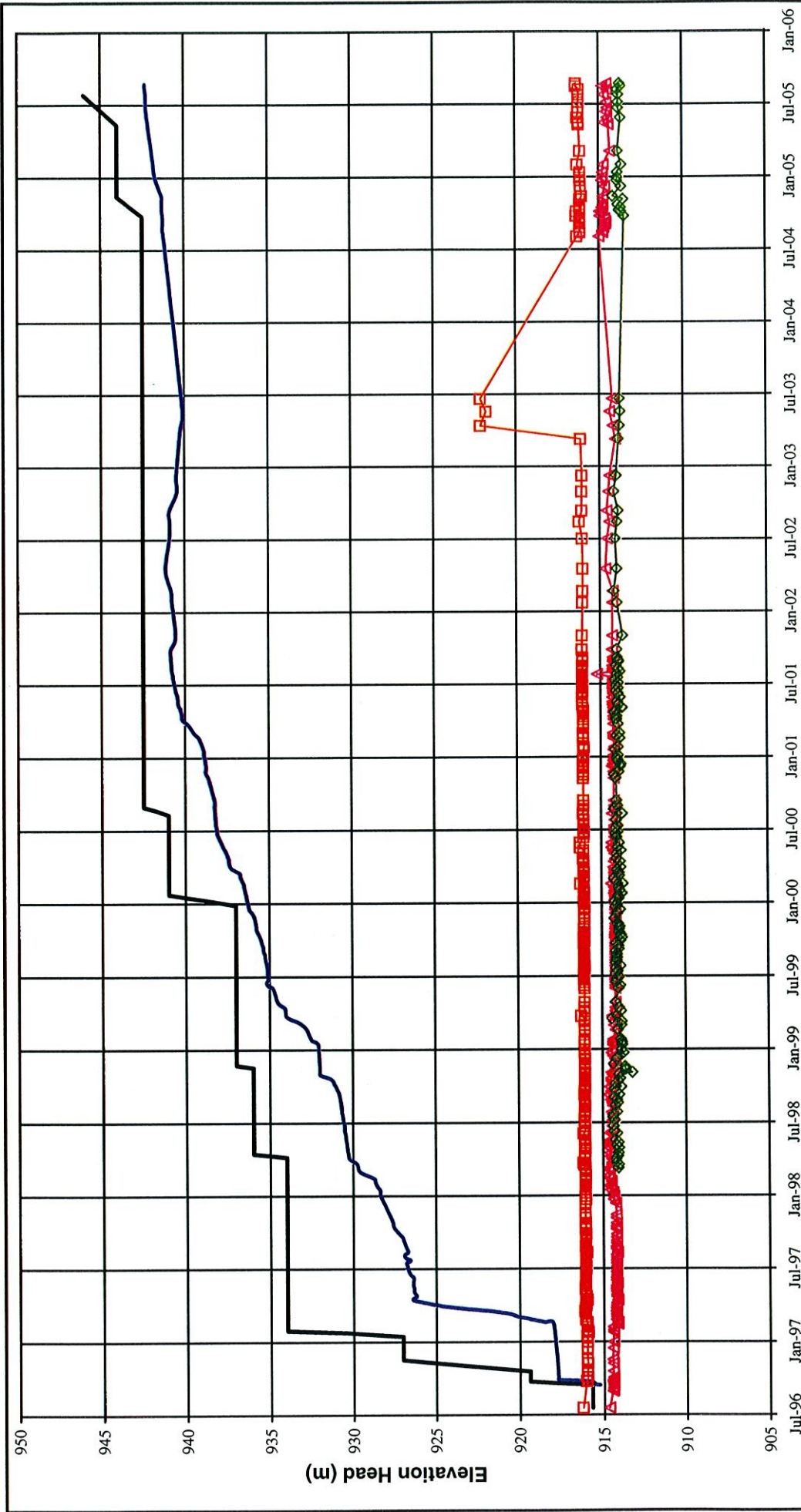
PLANE B DRAIN PIEZOMETERS
ELEVATION HEAD vs. TIME

Knight Piésold
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PROJECT NO.
VA 101-1/11

REF. NO.
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Date

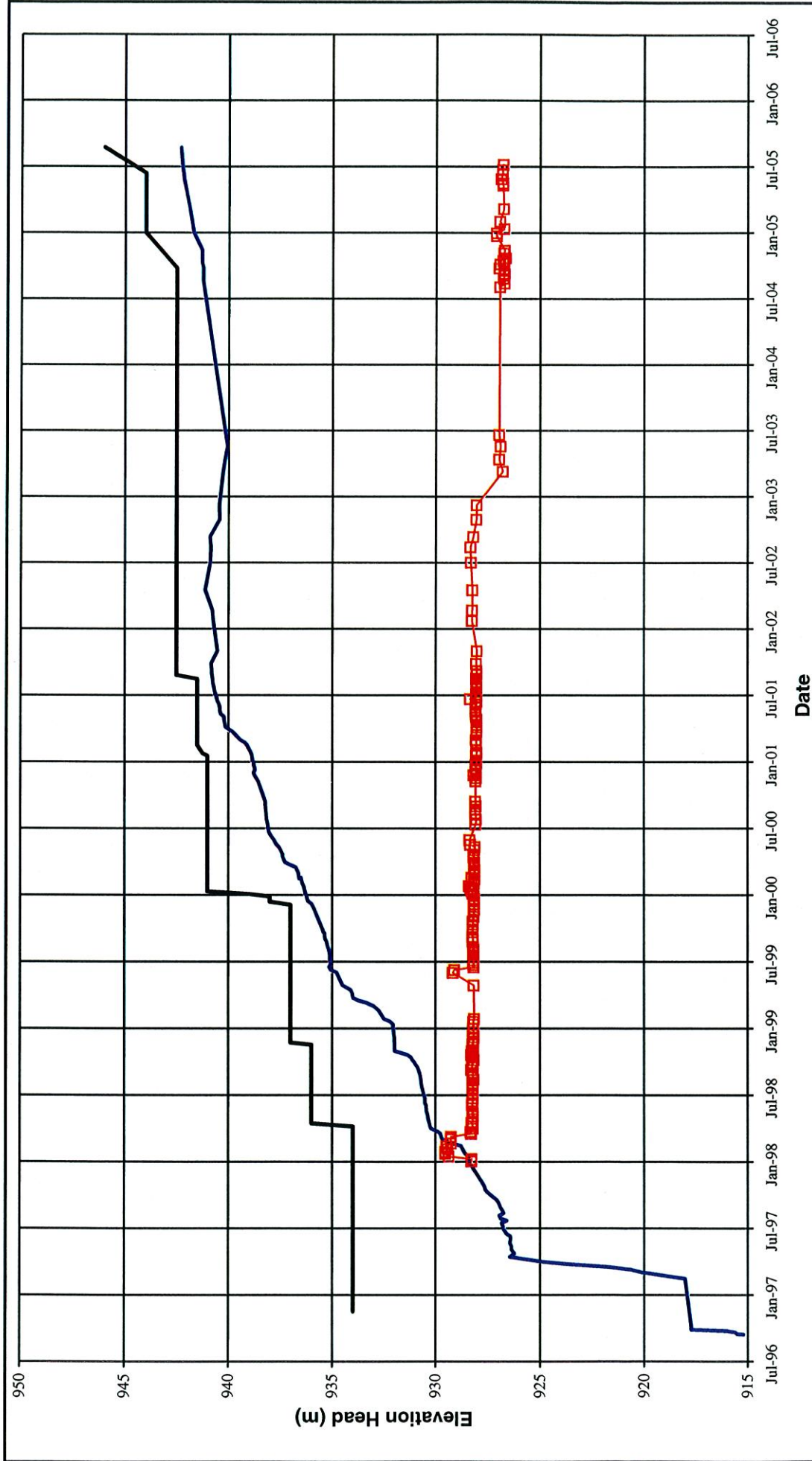
- Pond Level
- Fill Elevation
- ▲ C1-PE1-01 (Foundation Drain-1)
- C1-PE1-02 (Chimney Drain)
- ◆ C1-PE1-04 (Foundation Drain-5)

MOUNT POLLEY MINING CORPORATION

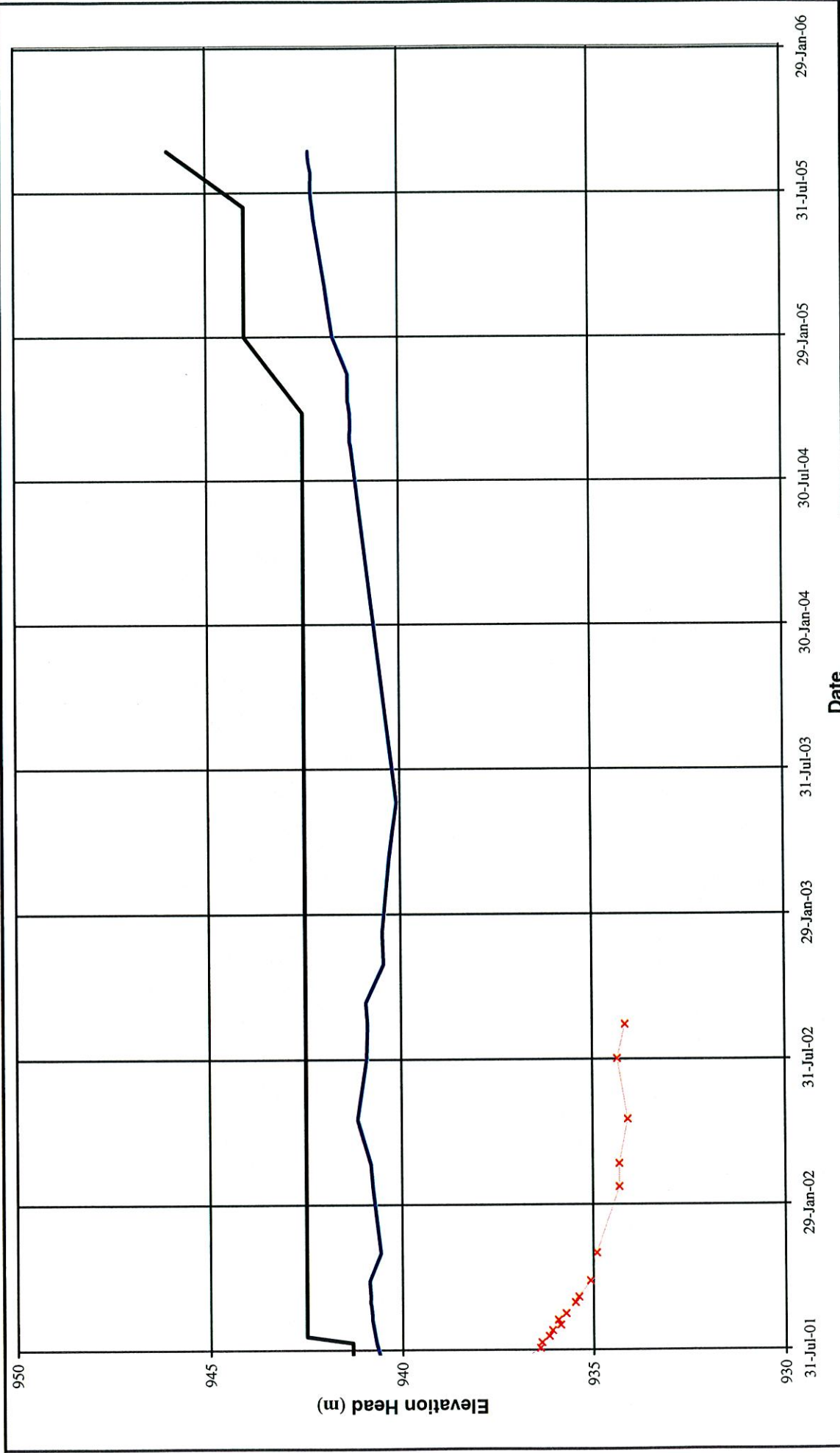
MOUNT POLLEY MINE

PLANE C DRAIN PIEZOMETERS
ELEVATION HEAD vs. TIME

Knight Piésold CONSULTING	PROJECT NO.	REF. NO.	REV.
	VA 101-1/11	1	0
FIGURE B4-3			



MOUNT POLLEY MINING CORPORATION			
MOUNT POLLEY MINE			
PLANE D DRAIN PIEZOMETERS ELEVATION HEAD vs. TIME			
Knight Piésold CONSULTING	PROJECT NO.	REF. NO.	REV.
	VA 101-1/11	1	0
FIGURE B4-4			



Mount Polley Mining Corporation

Mount Polley Mine

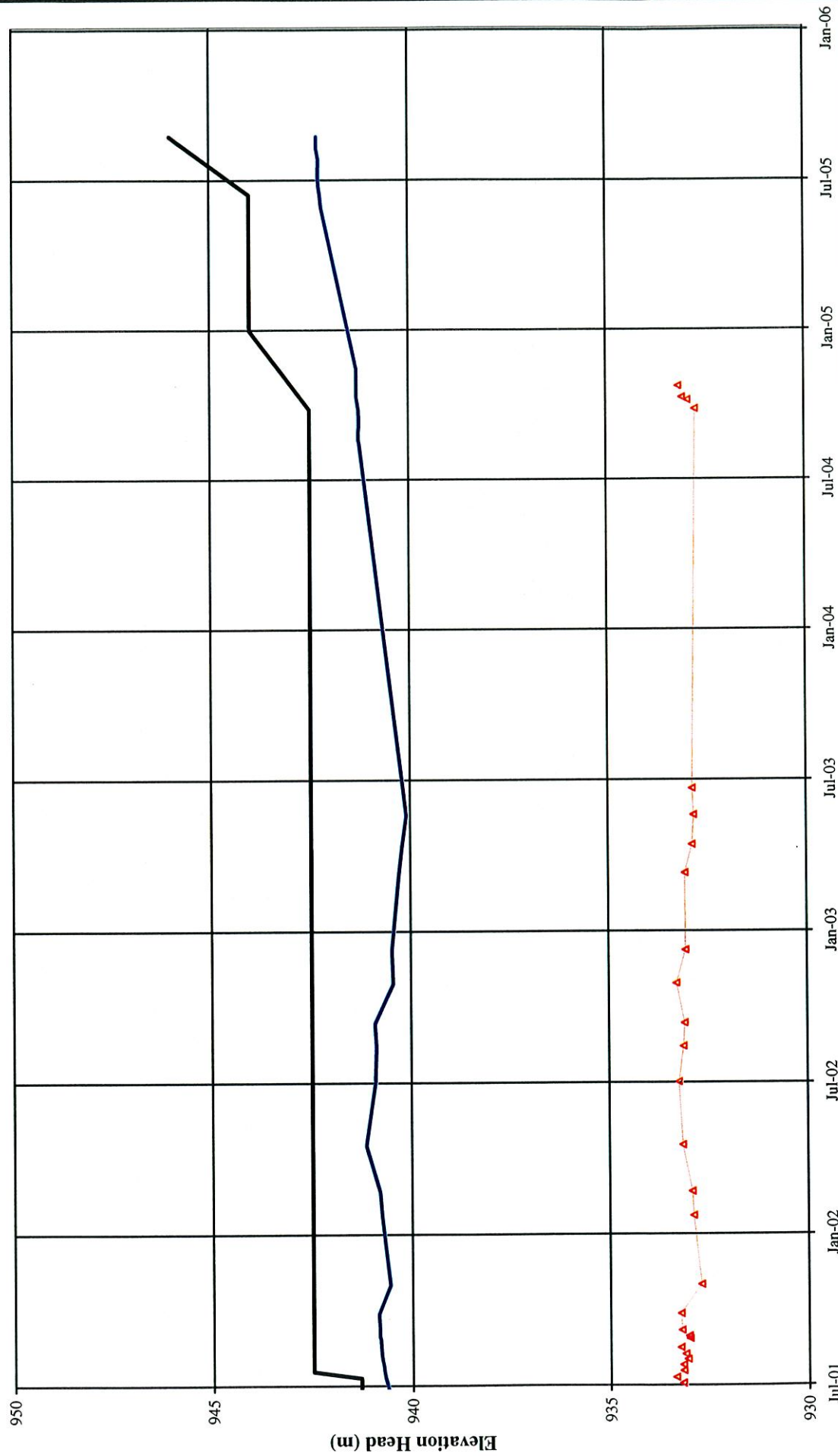
Plane G Drain Piezometers
Elevation Head vs. Time

Knight Piésold
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PROJECT NO.	REF. NO.	REV.
VA 101 - 1/11	1	0

FIGURE B4-5

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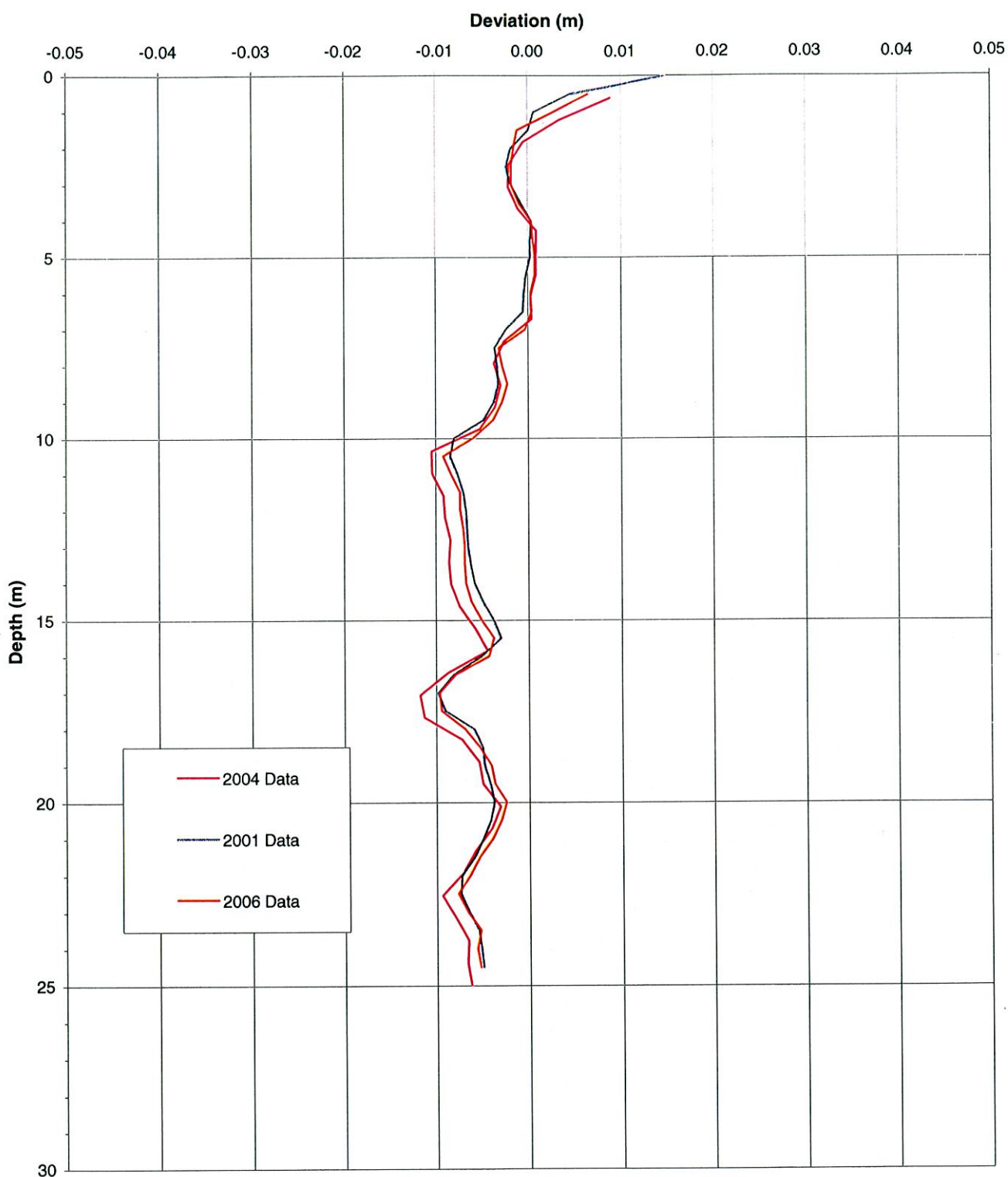


MOUNT POLLEY MINING CORPORATION		
MOUNT POLLEY MINE		
PLANE H DRAIN PIEZOMETERS ELEVATION HEAD vs. TIME		
PROJECT NO.	REF. NO.	REV.
VA 101 - 1/11	1	0
Knight Piesold CONSULTING		
FIGURE B4-6		

APPENDIX C

INCLINOMETER DATA

(Figures C-1 to C-4)



Note:
Hole 1 frozen for 2005 reading.

MOUNT POLLEY MINING CORPORATION

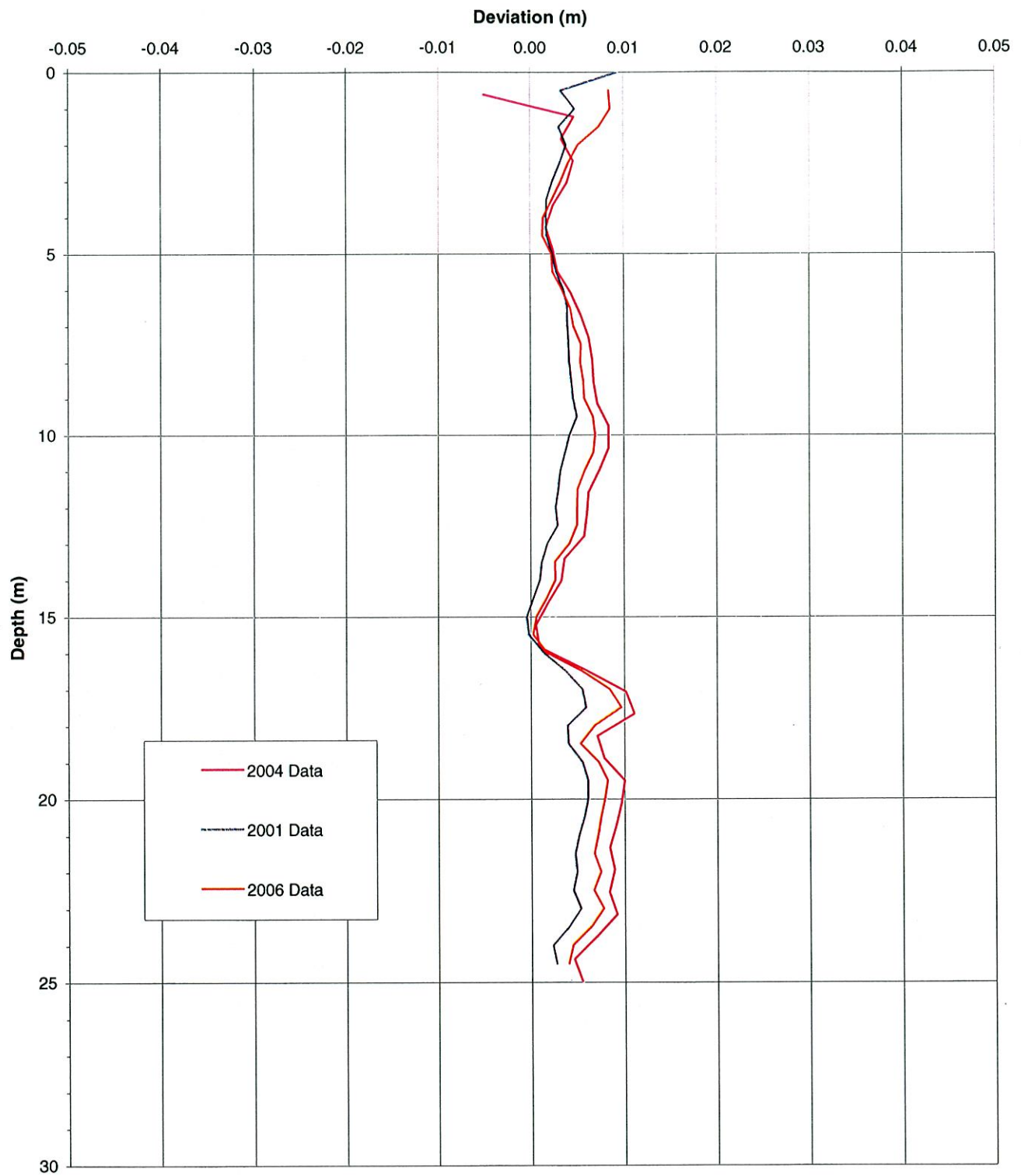
MOUNT POLLEY MINE

DOWN HOLE INCLINOMETER MEASUREMENT
HOLE 1 - PLANE A

Knight Piésold
CONSULTING

PROJECT / ASSIGNMENT VA101-1/11	REF. NO. 1	REV. 0
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FIGURE C-1



Note:
Hole 1 frozen for 2005 reading.

MOUNT POLLEY MINING CORPORATON

MOUNT POLLEY MINE

DOWN HOLE INCLINOMETER MEASUREMENT
HOLE 1 - PLANE B

Knight Piésold
CONSULTING

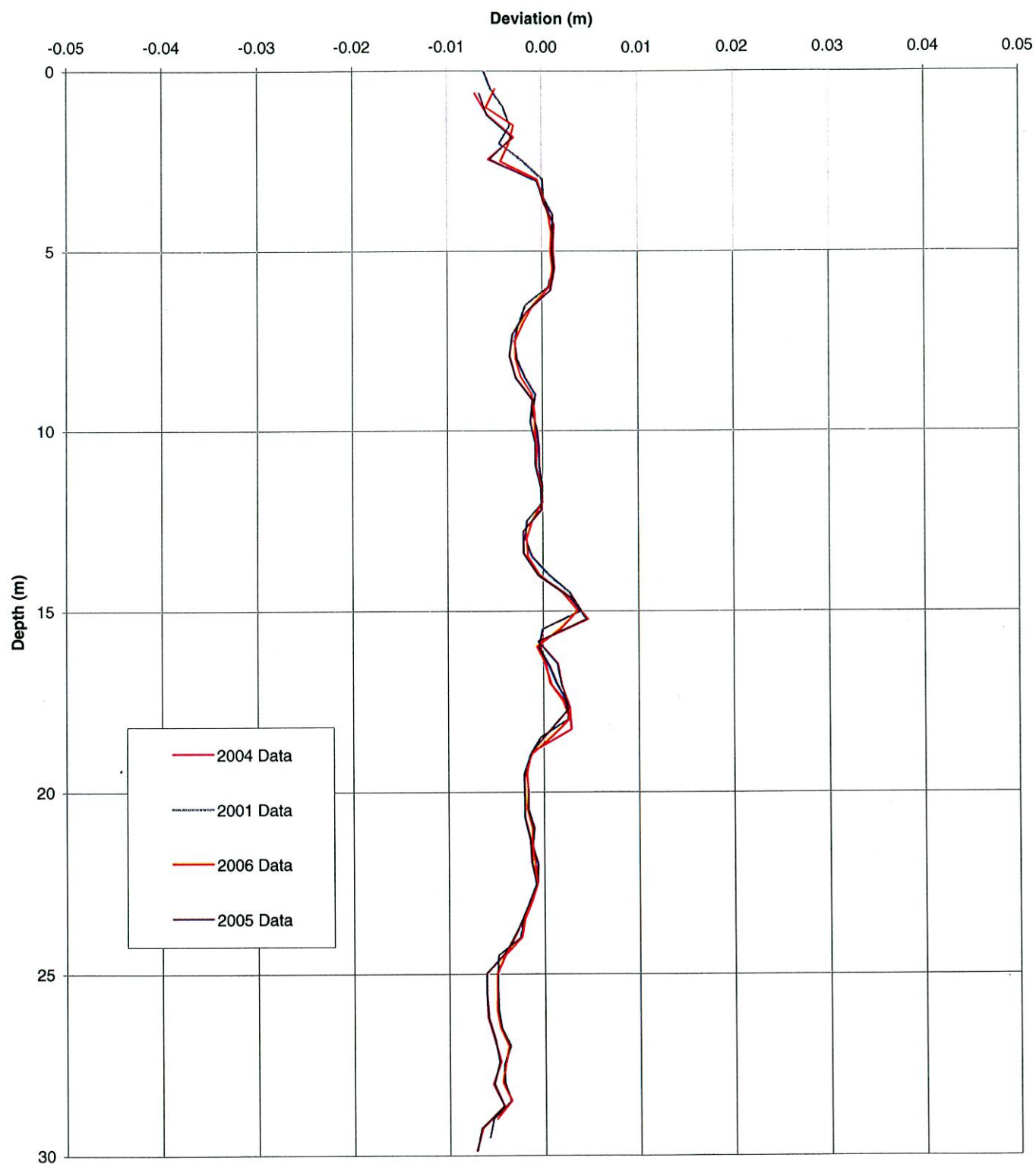
PROJECT / ASSIGNMENT
VA101-1/11

REF. NO.
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Rev 0 - Issued for Annual Report

FIGURE C-2

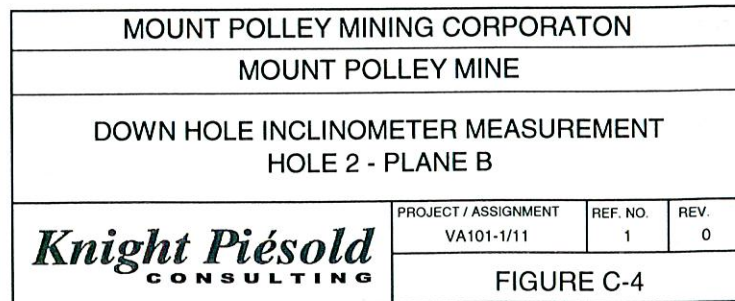


MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

DOWN HOLE INCLINOMETER MEASUREMENT
HOLE 2 - PLANE A**Knight Piésold**
CONSULTINGPROJECT / ASSIGNMENT
VA101-1/11REF. NO.
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FIGURE C-3



APPENDIX D

2005 ANNUAL INSPECTION PHOTOGRAPHS

(Pages D-1 to D-11)



PHOTO 1: Southeast Sediment Control Pond



PHOTO 2: Southeast Sediment Control Pond crest and downstream slope.

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PHOTO 3: Millsite Sump.



PHOTO 4: Millsite Sump Spillway showing signs of erosion

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PHOTO 5: Minor seep at the Perimeter Embankment. Seepage routed to the Perimeter Embankment Seepage Collection Pond.



PHOTO 6: Perimeter Embankment with the Perimeter Embankment Seepage Collection Pond in the foreground.

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PHOTO 7: Single point discharge into the TSF at the knife gate valve located at the west end of the Perimeter Embankment.



PHOTO 8: Perimeter Embankment. Construction of Zone U using the coarse tailings sand.

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PHOTO 9: Perimeter Embankment seepage collection pond.

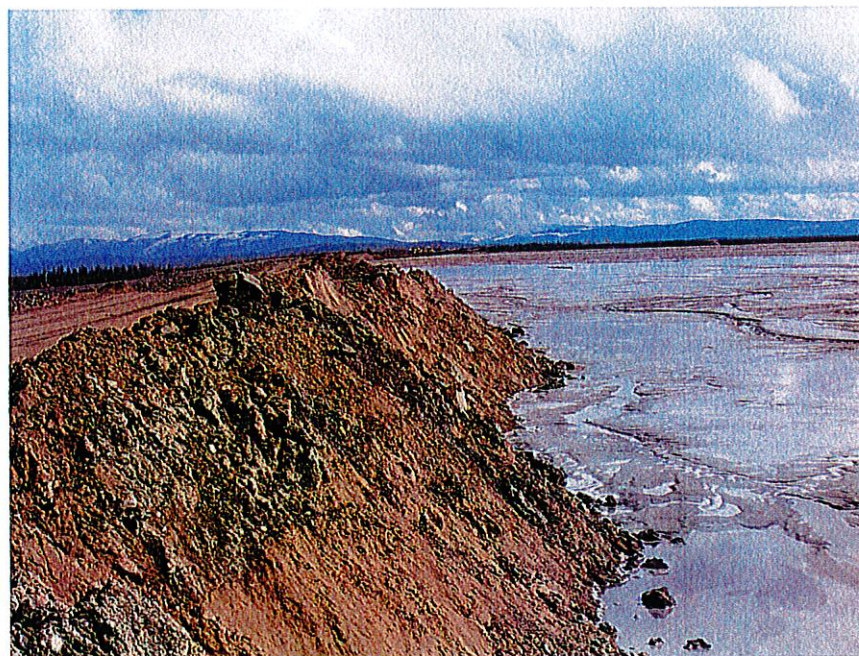


PHOTO 10: Perimeter Embankment. Confining berm used for the construction of the Zone U section using coarse tailings sand.

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PHOTO 11: Main Embankment downstream slope.



PHOTO 12: Main Embankment downstream toe.

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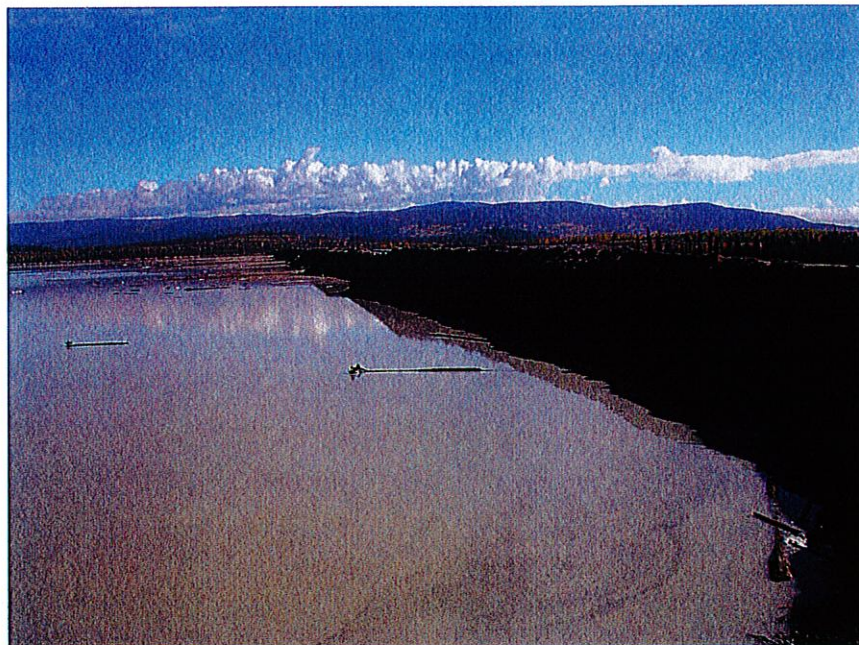


PHOTO 13: Main Embankment with the tailings pond up against the Zone U material.

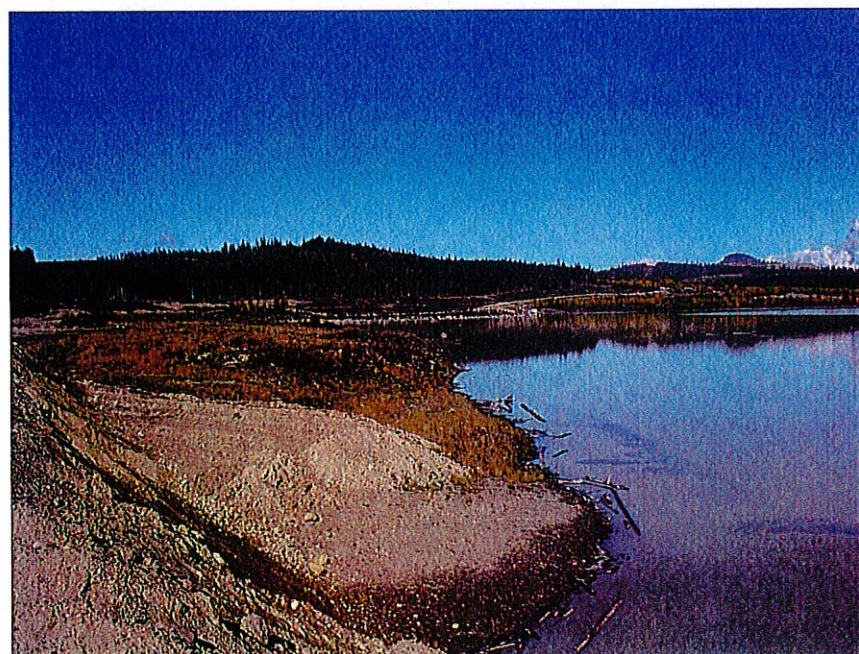


PHOTO 14: Knoll between the Main and South Embankments where the basin liner investigation was required.

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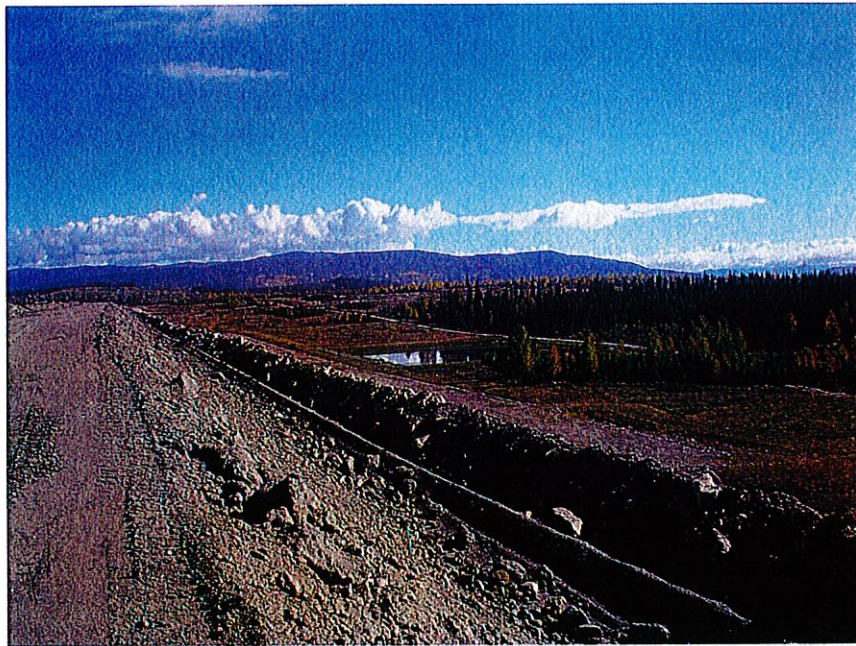


PHOTO 15: Main Embankment crest and the seepage collection pond.

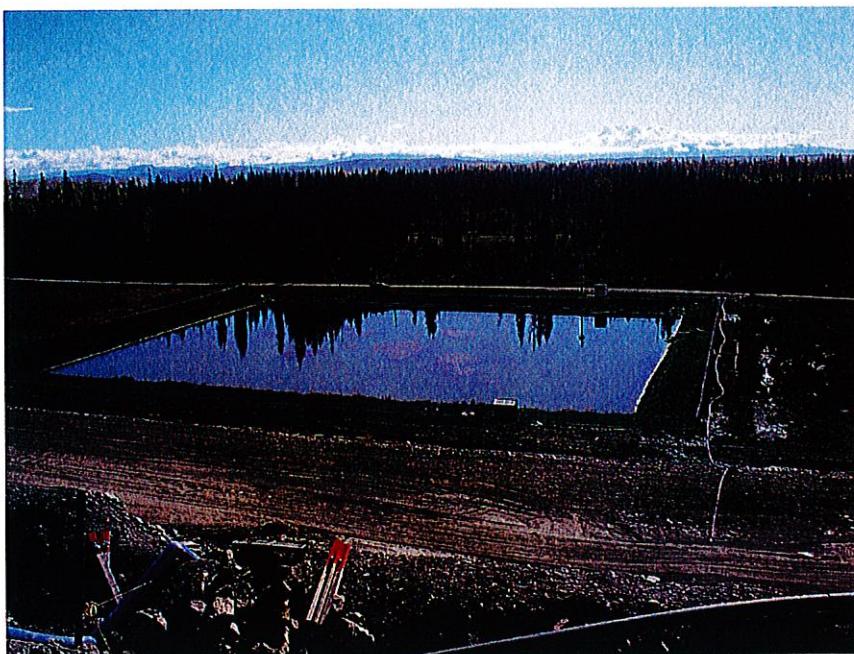


PHOTO 16: Main Embankment seepage collection pond.

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PHOTO 17: South Embankment crest and downstream area.

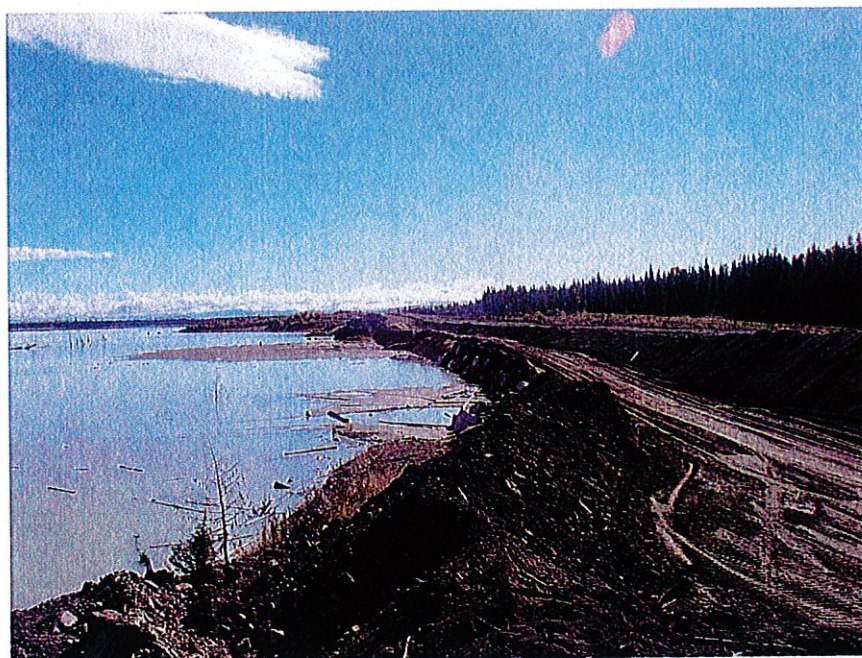


PHOTO 18: South Embankment showing pond up against the Zone U material.

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PHOTO 19: Damaged Piezometer cables at the Main Embankment.



PHOTO 20: Existing inclinometers at the Main Embankment. These are to be extended during the Stage 5 Construction program.

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PHOTO 21: South Bootjack Dam – Upstream slope.



PHOTO 22: South Bootjack Dam – Downstream slope.

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APPENDIX E

DRAFT CDA DAM SAFETY GUIDELINES (OCTOBER 2005)

(Pages E-1 to E-18)

DRAFT

Dam Safety Guidelines

2005 October 1, 2006

Preface

Ownership of dams in Canada includes various levels of government, utilities, mining companies, pulp and paper companies and private dam owners. Regulation of dam safety in Canada is primarily a provincial responsibility, with federal agencies having jurisdiction over some aspects related to international boundary waters covered by treaty with the United States. Some provinces have enacted specific dam safety regulations, while others use existing Acts or Regulations to authorize the design, construction, inspection, operation, rehabilitation, alteration or decommissioning of dams. In any case, legal regulations take precedence over guidelines produced by non-governmental organizations.

In 1995, after three years of effort by working groups across the country, the Canadian Dam Safety Association (CDSA) issued *Dam Safety Guidelines*. In 1997, the CDSA merged with the Canadian Committee on Large Dams (CANCOLD), to form the Canadian Dam Association (CDA). The Canadian Dam Association published a revised version of the *Dam Safety Guidelines* in 1999.

Since 1995, the Guidelines have been in widespread use in Canada and suggestions for improvement have been made. In 2003, the Dam Safety Committee embarked on an intensive process of soliciting input and suggestions for revisions and additions from the membership through the internet and workshops across the country. The Dam Safety Committee and working groups reviewed the comments and incorporated them as appropriate in this document.

Thus, the *Dam Safety Guidelines* are a product of the membership of the Canadian Dam Association. A large number of individuals have contributed to the Guidelines – the first issue in 1995, the revisions in 1999, and the current 2006 edition. The 2006 version of the *Dam Safety Guidelines* will consist of two parts:

- **Principles**, which are the fundamentals of dam safety, applicable to all dams.
- **Practices and Procedures**, which suggest methodologies and practices that may be used to meet the Principles.

The Principles apply to all dams – new, existing, and closed – within the definition of “dam” outlined in Section 1. The Practices and Procedures series will similarly cover all types of dams, although a particular document may address only a specific situation. A Glossary is provided to define terms that are used throughout the Dam Safety Guidelines. Additional definitions may be provided in the Practices and Procedures.

The *Dam Safety Guidelines* assume that the user is suitably experienced and knowledgeable in the relevant specialized fields. The Guidelines are not intended as a textbook nor as a substitute for the experience and judgement of a person familiar with the many complexities of dam safety practice.

It is the intention of the Canadian Dam Association to review and update the Guidelines as the need arises. While every reasonable effort has been made to ensure validity and accuracy of the information presented in the Guidelines, the Canadian Dam Association and its membership disclaim any legal responsibility for such validity or accuracy.

1 Dam Safety Management

A dam is defined as a barrier constructed to enable the storage or diversion of water, water containing any other substance, fluid waste or fluid tailings, providing that such barrier could impound 30,000 m³ or more and is 2.5 m or more in height. The height is measured vertically to the top of the barrier, as follows:

- From the natural bed of the stream or watercourse at the downstream toe of the barrier, in the case of a barrier across a stream or watercourse
- From the lowest elevation at the outside limit of the barrier, in the case of a barrier that is not across a stream or watercourse

In these *Dam Safety Guidelines*, "dam" includes works (appurtenances) and systems incidental to, necessary for, or in connection with, the barrier. The definition may be expanded to include "dams" under 2.5 m in height or which can impound less than 30,000 m³, if the consequences of operation or dam failure would be unacceptable to the public, such as: dams which create hydraulic conditions posing a danger to the public, dams with erodible foundations where breach could lower the reservoir more than 2.5 m, or dams retaining contaminated substances.

Principle 1.1 –

The public and the environment shall be protected from the consequences of dam failure as well as release of any or all of the stored volume of water and/or tailings behind a dam.

- Dam safety management is management of the risks associated with dams. Principles of risk management incorporate traditional standards-based methods as well as risk assessment techniques where suitable. Standards-based methods typically rely on classification of dams in terms of the consequences of failure.
- In the case of dams that retain contaminants of any sort, the protection to the public and the environment extends to seepage and other pathways not necessarily associated with catastrophic failure of the retaining structures. Thus, "failure" includes environmental non-compliance.
- Consequences of dam failure are the damages above and beyond those that would have occurred even if the dam had not failed. These "incremental consequences" may be less than the total damages caused by a natural flood.*
- The estimate of consequences should include:
 - Both downstream and upstream damages
 - Cascade effects where a series of dams exists in a given drainage basin
 - Release of contaminants to the environment

Principle 1.2 –

The standard of care to be exercised by the dam designer and owner shall be commensurate with the consequences of dam failure.

- Regulatory requirements in the applicable jurisdiction take precedence over other standards or guidelines unless they include lesser dam safety requirements than widely used standards and guidelines. The absence of specific regulation does not negate the owner's responsibility for safe dam management.

Principle 1.3 –

Due diligence shall be exercised at all stages of a dam's life cycle.

- The life cycle of a dam typically includes the stages of design, construction, operation, decommissioning and long-term closure.

* In these Guidelines, the term "consequences of failure" refers to "incremental consequences".

Principle 1.4 –

A dam safety management system shall be in place, incorporating responsibilities, policies, plans and procedures, documentation, training, review and correction of deficiencies and non-conformances.

- The dam owner should maintain an inventory of dams to which these Guidelines apply.
- Responsibility for all aspects of dam safety should be defined. The dam Owner is responsible for dam safety and regulatory compliance and any delegation of responsibility should be clearly defined by the Owner.
- Policies for dam safety should be developed and documented.
- Plans and procedures should be developed and implemented at all stages of a dam's life cycle for key dam safety activities including:
 - Operation, maintenance and surveillance (see Section 2)
 - Emergency preparedness (see Section 3)
 - Dam Safety Reviews (see Section 4)
 - Dam safety analysis (see Section 5)
- The dam safety management system should include a process for follow-up and correction of deficiencies and non-conformances in a reasonable time.
- Documentation should be maintained up-to-date so that a permanent record exists of the design, construction, operation and performance of the dam, and the management of its safety. Such documents should include: design documents, instrumentation readings, inspection and testing reports, Dam Safety Review reports, operational records, investigation studies, current closure plans and other technical data.
- All individuals with responsibilities for dam safety activities should be adequately qualified and trained. The content and frequency of the training programs should be appropriate to develop and maintain competency. Training records should be maintained.
- Deficiencies in dam performance, supporting infrastructure, operation, maintenance, surveillance, security procedures and the management system should be prioritized and addressed.
- The dam safety management system should be reviewed regularly and reported to senior management representatives of the dam owner.

2 Operation, Maintenance and Surveillance

Principle 2.1 –

Requirements for the safe operation, maintenance and surveillance of the dam, shall be suitably documented and contain sufficient information in accordance with the consequences of dam failure.

- Documentation (log book, records, reports, etc) should be maintained to show compliance with these requirements.

Principle 2.2 –

Documented operating procedures shall be followed for the dam and applicable discharge equipment to address normal, unusual and emergency conditions.

- Procedures should be in place to:
 - Address the impact of operations on the public, the environment and other stakeholders and licensed users of the water.
 - Provide notification of changing flows or conditions
 - Identify recreational use areas, restricted zones, and public awareness programs.
 - Ensure regulatory or other established limits on reservoir levels, tailings beach length and/or freeboard for tailings dams, rates of water rise or drawdown and discharge rates in both the upstream and downstream environs are identified.
 - Review the capabilities of all flow control equipment, including back-up supplies, to operate under all conditions.
 - Manage debris and ice to ensure operability of discharge facilities.
 - Address impact of unauthorized site entry or equipment operations.
 - Identify developing dam emergencies for activation of response plans
- Operating procedures should consider the availability of reliable data for dam operations, including:
 - Headwater and tailwater elevations
 - Tailings management issues including winter operations for tailings dams
 - Remote indications of flow control equipment operation
 - Flood forecasting information
 - Operations of other dam owners affecting inflows to the reservoir and the need for operations to discharge excess inflows

Principle 2.3 –

Documented maintenance procedures, including public safety and security measures, shall be followed to ensure that the dam remains in a safe and operational ready condition.

- Maintenance activities should be prioritized, carried out and documented with due consideration of dam safety implications.
- Maintenance of flow control equipment should be carried out to ensure it remains in a safe and operational ready state.
- Maintenance procedures for dams in a closure/decommissioned condition should take into account the availability of appropriate personnel to perform the maintenance activities.

Principle 2.4 –

Documented surveillance procedures shall be followed for the dam to provide early identification and timely mitigation of conditions which might affect dam safety.

- Surveillance activities should cover potential failure modes.
- The level of surveillance should be in accordance with the consequences of failure or known condition.
- Surveillance (inspection and instrumentation data) should consider previous observations, thresholds and identifies changes or trends impacting dam safety.
- Required actions should be established in the event abnormal performance or observations are identified.
- Special inspections may be required following unusual events such as floods or seismic activities.

Principle 2.5 –

Flow control equipment shall be tested and be capable of operating as required.

- Test procedures should take into consideration upstream and downstream effects including public safety and environmental concerns.
- Normal and standby power sources, as well as, both local and remote controls should be included in test procedures.
- Testing should be documented.

3 Emergency Preparedness

Principle 3.1 –

An effective emergency management process shall be in place for the dam.

- The level of detail required in any emergency preparedness/response plan should be commensurate with the consequences of failure.
- The absence of government regulations does not negate the owner's responsibility for emergency preparedness planning.

Principle 3.2 –

The emergency management process shall include internal emergency response procedures to guide the dam operator and site staff through the process of responding to an emergency situation at a dam.

- Internal roles and responsibilities for emergency response should be clearly defined and understood.
- Potential dam safety hazards (natural, structural and/or human actions) should be addressed; consistent with identified failure modes and consequences of failure.
- Any dam safety incidents and emergencies should be documented and investigated in order to improve dam safety and emergency preparedness.
- The following procedures should be included in an internal emergency response plan:
 - Surveillance response, mitigation and monitoring for developing emergencies
 - Notifications to site and owner's staff, downstream responders and persons at risk
 - Site access
 - Provision of emergency power equipment
 - Appropriate communication systems with upstream and downstream dams.
 - Inundation maps and critical flood information.

Principle 3.3 –

The emergency management process shall ensure that effective emergency preparedness procedures are in place for the use of external response agencies having responsibilities for public safety within the floodplain.

- The emergency management process should be documented, distributed, and clearly communicated in advance, to all response agencies having responsibility for public safety within the floodplain.
- Roles and responsibilities of the dam owner and the response agencies should be defined and accepted.

- Potential dam safety hazards (natural, structural and/or human actions) and corresponding notification procedures should be defined.
- Inundation maps and critical flood information should be available to downstream response agencies to assist them in identification of critical infrastructure that may be affected by large releases or the failure of a dam.
- Where no formal response agency exists downstream of a dam, the dam owner should have in place reasonable and practical measures to protect those at risk.

Principle 3.4 –

The emergency management process shall ensure that adequate staff training, and plan testing and updating is carried out.

- All persons with response roles should be appropriately trained.
- Internal and external emergency procedures should be tested and exercised regularly .
- Emergency plans should be updated regularly.

4 Dam Safety Review

Principle 4.1 –

A safety review of the dam ("Dam Safety Review") shall be carried out periodically.

- Activities of the Dam Safety Review should include a visual inspection of the dam, as well as review of:
 - Consequences of dam failure
 - Operation, maintenance and surveillance documentation and practices
 - Emergency preparedness plans and procedures
 - Previous Dam Safety Reviews
 - Up-to-date dam closure plan for tailings dam
 - Dam safety analyses including:
 - Failure modes (physical and geochemical)
 - Inflow design flood
 - Seismic loads
 - Other loads and load combinations
 - Stability and performance
 - Reliability and functionality of discharge facilities
 - Overall effectiveness of dam safety management at the dam
- The frequency required for the Dam Safety Review should be based on: consequences of failure, external hazards, failure modes, ongoing surveillance program and demonstrated dam performance.
- The level of detail may be modified on the basis of: previous assessments, complexity of the dam, continuity of surveillance and records, external and internal hazards, operating history, dam performance and age, and the need for public protection during operation.
- The Dam Safety Review should be documented in a formal report with conclusions and recommendations to permit the dam Owner to conform to accepted practices in dam safety and to comply with regulations.

Principle 4.2 –

A qualified registered professional engineer shall be responsible for the technical content, findings and recommendations of the Dam Safety Review and report.

- The Dam Safety Review findings and recommendations should be independent of conflict of interest.

5 Dam Safety Analysis

The purpose of dam safety analysis is to determine the capability of the dam and systems to retain the stored volume and to pass flows around and through the dam in a safe controlled manner and in the case of tailings dams, to maintain geochemical stability of the facility.

Dam safety analysis includes analysis of hazards, failure modes and effects, operating reliability, dam response (e.g. stability), human factors, and emergency scenarios. The design, construction and operation should be integrated to ensure that the design intent has been incorporated into the dam.

The analytical methods are typically deterministic, based on dam classification and standards; they may also be based on probabilistic risk assessment. In any case, the same principles apply.

Dam safety decisions are directed to: prevention of failure sequence initiation, control of a deteriorating situation, and mitigation of situations where the failure sequence cannot be stopped.

Dam safety analysis requires an interdisciplinary approach that encompasses engineering disciplines such as:

- Hydrotechnical
- Seismic
- Geotechnical
- Structural
- Geochemical (environmental)
- Flow control equipment (mechanical-electrical)

Principle 5.1 –

The dam system and components under analysis shall be defined.

- The dam system should include all water retaining and conveyance structures, tailings management system components, the reservoir and the downstream area, flow control equipment, and subsystems supporting safety (e.g. access roads and notification systems).
- The boundaries of the system should be identified.
- The data and information about the dam system should be adequate (sufficient quantity and quality) for reliable assessment of the safety status of the dam.

Principle 5.2 –

External and internal hazards to the proper functioning of the dam shall be defined.

- Hazards may change in nature and significance at different stages of a dam's life.
- External hazards, which are beyond the control of the dam owner, include:
 - Meteorological events such as floods, intense rain events, temperature extremes and the effects of ice, lightning strikes and wind storms.

- Seismic events such as natural seismic events as well as those caused by mining or reservoir-induced seismicity.
 - Reservoir environment hazards such as upstream dams and unstable slopes.
 - Human actions such as vandalism and sabotage.
- Internal hazards may arise from the ageing process or errors and omissions in:
 - Design
 - Construction
 - Maintenance
 - Operation
 - Plans and procedures

Principle 5.3 –

Failure modes, sequences and combinations shall be identified for the dam.

- Failure modes may change in nature and significance at different stages of a dam's life.
- Failure characteristics, including extent and rate of development, are determined to an appropriate level of detail.
- The analysis addresses the manner in which failure modes and failure sequences can be detected.

Principle 5.4 –

The dam shall safely retain the reservoir and any stored solids, and pass environmentally acceptable flows as required for all loading conditions ranging from normal to extreme loads, commensurate with the consequences of failure.

- The analysis of consequences should appropriately consider life safety, property and infrastructure damage, socioeconomic losses including heritage losses, and environmental and ecological degradation.
- The consequences of failure should be analyzed in conjunction with corresponding failure modes.
- Design loads and design criteria should be commensurate with the consequences of dam failure.

Hydrotechnical considerations:

- The maximum flood for which the structure is designed or evaluated (the Inflow Design Flood, IDF) should be selected, based on incremental consequences of failure.
- Statistical inflow floods should be determined using current practices. If required, the Probable Maximum Flood (PMF) is determined;

- The capacity of the hydraulic control structures should be verified and their capability to perform under extreme conditions is assessed. They should be capable of safely passing the IDF. Operating rules should be established for emergency conditions.
- The freeboard at all structures should be evaluated for normal and extreme conditions. It should exceed the minimum required freeboard established to minimize the probability of dam overtopping by waves.

Seismic considerations:

- The level of ground motion for which the structure is designed or evaluated (the Earthquake Design Ground Motion, EDGM), should be based on the consequences of dam failure.
- The EDGM should be based on a site-specific seismic hazard assessment by qualified specialists for a specified annual exceedance probability (AEP).
- The seismic hazard analysis should consider regional and local seismicity and seismotectonics, including any identified active seismogenic fault sources. Appropriate ground motion relations for the region need to be evaluated and applied for the assessment.
- The effects of local subsurface conditions should be taken into account either in developing the EDGM or in the analysis of the dam structure.

Geotechnical considerations:

- Design of new structures and assessment of existing structures should be carried out using normal and extreme loads consistent with the site conditions, applicable regulations, and current good practice in the industry.
- Adequacy of structures and foundations to resist all specified loading conditions should be assessed on the basis of appropriate acceptance criteria. These include all the criteria for safety regarding slope stability, bearing capacity, seepage conditions, freeboard, protection against erosion by waves, etc.
- The analysis method and level of detail should depend on the type and configuration of the structure as well as the consequences of failure.
- Acceptance criteria for assessment of stability should reflect the degree of uncertainty associated with the analysis and understanding of the imposed loads and material properties.

Structural considerations:

- Design of new structures and assessment of existing structures should be carried out using normal and extreme loads consistent with the site conditions, applicable regulations, and current good practice in the industry.
- Adequacy of structures and foundations to resist all specified loading conditions, including interactions with geotechnical interfaces, should be assessed on the

basis of appropriate performance indicators. These include the position of the resultant force, normal and shear stresses and calculated sliding and strength factors.

- The analysis method and level of detail should depend on the type and configuration of the structure as well as the consequences of failure.
- Acceptance criteria for assessment of stability should reflect the degree of uncertainty associated with the analysis and understanding of the imposed loads and material properties.

Geochemical (environmental) considerations:

- The potential environmental impacts of seepage and releases from the facility should be evaluated for all stages of the dam's life.
- For tailings dams that impound tailings with sulphide content, potential oxidation processes for both operating and closure periods should be appropriately evaluated.
- Acceptance criteria for environmental performance should be set by the appropriate compliance standards for each given facility.

Flow control equipment:

- Flow control equipment should be able to reliably handle the expected operating loads and site conditions, retaining or releasing water upon demand.
- The capability of equipment should be assessed with consideration of both normal and extreme conditions, based on the consequences of equipment failure.

Glossary

- Acceptable risk -** The level of risk (the combination of the probability and the consequence of a specified hazardous event) which the public are prepared to accept without further management. Acceptability of risk may be reflected in government regulations.
- Annual Exceedance Probability (AEP) -** Probability that an event of specified magnitude will be equalled or exceeded in any year.
- Abutment -** That part of the valley side or other supporting structure against which the dam is constructed.
- Appurtenances -** Structures and equipment on a project site, other than the dam itself. They include, but are not limited to, such facilities as intake towers, powerhouse structures, tunnels, canals, penstocks, low-level outlets, surge tanks and towers, gate hoist mechanisms and their supporting structures, and all critical water control and release facilities. Also included are mechanical and electrical control and standby power supply equipment located in the powerhouse or in remote control centres.
- Base of dam -** General foundation area of the lowest portion of the main body of a dam.
- Beach -** The exposed tailings above the pond water level in a tailings impoundment.
- Catchment -** Surface area which drains to a specific point, such as a reservoir; also known as the watershed or watershed area.
- Classification (dam) -** A system by which dams are assigned to categories usually based on consequences of failure, so that appropriate corresponding dam safety standards may be applied. Some classification systems go beyond the consequences and consider other dam characteristics such as vulnerability to various hazards.
- Consequences of dam failure -** Impacts in the downstream as well as upstream areas of a dam resulting from failure of the dam or its appurtenances. For purposes of these Guidelines, the term "consequences" refers to the damages above and beyond the damages that would have occurred, for the same natural event or conditions, even if the dam had not failed. These may also be called "incremental consequences" of failure.
- Dam -** Barrier which is constructed for the purpose of enabling the storage or diversion of water, water containing any other substance, fluid waste or fluid tailings, providing that such barrier could impound 30,000 m³ or more and is 2.5 m or more in height. The height is measured vertically to the top of the barrier, as follows:
- (i) from the natural bed of the stream or watercourse at the downstream toe of the barrier, in the case of a barrier across a stream or watercourse
 - (ii) from the lowest elevation at the outside limit of the barrier, in the case of a barrier that is not across a stream or watercourse

"Dam" is herein defined to include works (appurtenances) incidental to, necessary for, or in connection with, the barrier.

For purposes of these guidelines, this definition may be expanded to include "dams" under 2.5 m in height or which can impound less than 30,000 m³, if the consequences of failure would be unacceptable to the public, such as:

- Dams which create hydraulic conditions posing danger to the public.
- Dams with erodible foundations where a breach could lower the reservoir more than 2.5 m.
- Dams retaining contaminated substances.

Dam Safety Review - Comprehensive formal review carried out at regular time intervals to determine whether an existing dam is safe, and if it is not safe, to determine required safety improvements.

Decommissioned dam - Dam that has reached the stage in its life cycle when both dam construction and the intended use of the dam have been permanently terminated in accordance with a decommissioning plan.

Earthquake Design Ground Motion (EDGM) - The level of earthquake ground motion at the location of a dam for which a dam structure is designed or evaluated.

Emergency - In terms of dam operation, any condition which develops naturally or unexpectedly, endangers the integrity of the dam, upstream or downstream property or life, and requires immediate action.

Emergency plan - Document(s) that contain procedures for preparing for and responding to emergencies at the dam or its appurtenances, including communication directories and inundation maps.

Extreme event - Event which has a very low annual exceedance probability (AEP).

Extreme loads - The rare loadings imposed by extreme events such as large earthquakes, floods and landslides.

Failure (of dam) - In terms of structural integrity, the uncontrolled release of the contents of a reservoir through collapse of the dam or some part of it. In terms of geochemical integrity, the uncontrolled release of contaminants from the reservoir/tailings impoundment.

Failure mode - Mode in which element or component failures must occur to cause loss of the system function. At a general level, there are three dam failure modes: dam overtopping, dam collapse, and contaminated seepage. At a lower level, failure *effects* become the failure *modes* at the next higher level in the system.

Foundation - Rock and/or soil mass that forms a base for the structure, including its abutments.

Freeboard - Vertical distance between the water surface elevation and the lowest elevation of the top of the containment structure.

Hazard - A system state or set of conditions that together with other conditions in the system environment could lead to a partial or complete failure of the

system. Hazards may be external (originating outside the system) or internal (errors and omissions or deterioration within the system).

Incremental consequences of failure -

Incremental losses or damage which dam failure might inflict on upstream areas, downstream areas, or at the dam, over and above any losses which might have occurred for the same natural event or conditions, had the dam not failed.

Inflow Design Flood (IDF) -

Most severe inflow flood (volume, peak, shape, duration, timing) for which a dam and associated facilities are designed.

Inspection -

An inspection of the dam to observe its condition. Inspections are carried out much more frequently than Dam Safety Reviews.

Maximum Design Earthquake - See Earthquake Design Ground Motion (EDGM)

Maximum Normal Level (MNL) -

Maximum normal operating water surface level of a reservoir. Also called "full supply level".

OMS Manual -

Operation, Maintenance and Surveillance Manual, which documents procedures for safe operation, maintenance and surveillance of a dam.

Outlet works -

Combination of intake structure, conduits, tunnels, flow controls and energy dissipation devices to allow the release of water from a dam.

Owner -

Person or legal entity, including a company, organization, government unit, public utility, corporation or other entity which is responsible for the safety of the dam. The person or legal entity may either hold a government license to operate a dam or retain the legal property title on the dam site, dam and/or reservoir.

Probable Maximum Flood (PMF) -

Estimate of hypothetical flood (peak flow, volume and hydrograph shape) that is considered to be the most severe "reasonably possible" at a particular location and time of year, based on relatively comprehensive hydrometeorological analysis of critical runoff-producing precipitation (snowmelt if pertinent) and hydrologic factors favourable for maximum flood runoff.

Regulatory agency -

Usually a government ministry, department, office or other unit of the national or provincial government entrusted by law or administrative act with the responsibility for the general supervision of the safe design, construction and operation of dams and reservoirs, as well as any entity to which all or part of the executive or operational tasks and functions have been delegated by legal power.

Reservoir -

Body of water, fluid waste or fluid tailings which is impounded by one or more dams, inclusive of its shores and banks and of any facility or installation necessary for its operation.

Reservoir capacity -

Total or gross storage capacity of the reservoir at full supply level.

Return period -

Reciprocal of the annual exceedance probability (AEP).

Risk -

Measure of the probability and severity of an adverse effect to health, property, or the environment. Risk is estimated by the mathematical

expectation of the consequences of an adverse event occurring (i.e., the product of the probability of occurrence and the consequence").

Safe dam -	Dam which does not impose an unacceptable risk to people or property, and which meets safety criteria that are acceptable to the government, the engineering profession and the public.
Spillway -	Weir, channel, conduit, tunnel, chute, gate or other structure designed to permit discharges from the reservoir.
Spillway crest -	Uppermost portion of the spillway overflow section.
Tailings dam -	Dam, including foundations, water control structures and base of the impounding basin, which is constructed to retain tailings or other waste materials from mining operations.
Tailwater level -	Level of water in the discharge channel immediately downstream of a dam.
Toe of dam -	Junction of the downstream (or upstream) face of dam with the ground surface (foundation). Sometimes "heel" is used to define the upstream toe of a concrete gravity dam.
Top of dam -	Minimum elevation of the uppermost surface of a dam proper, not taking into account any camber allowed for settlement, curbs, parapets, guard rails or other structures that are not a part of the main water-retaining structure. This elevation may be a roadway, walkway or the non-overflow section of a dam.