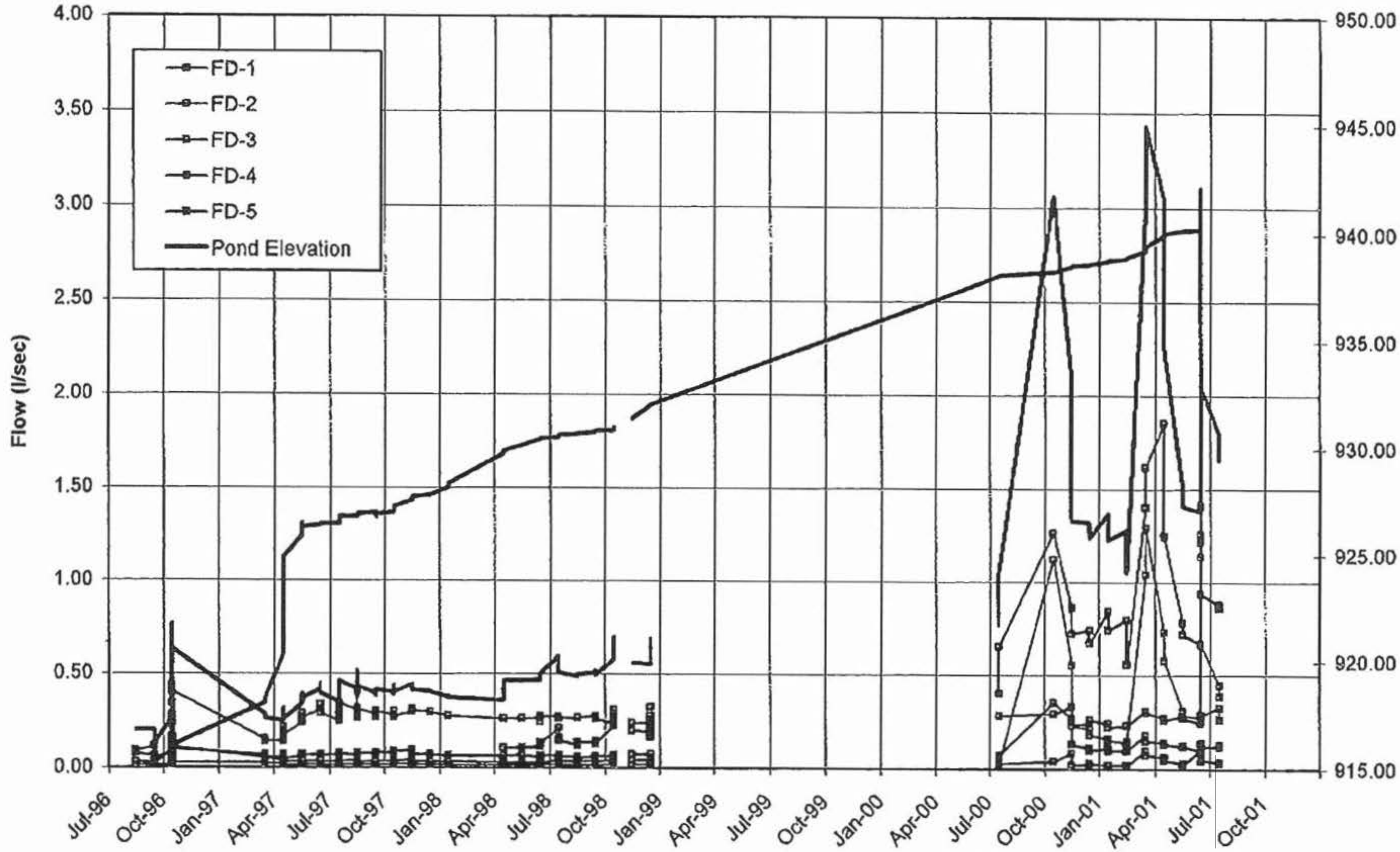
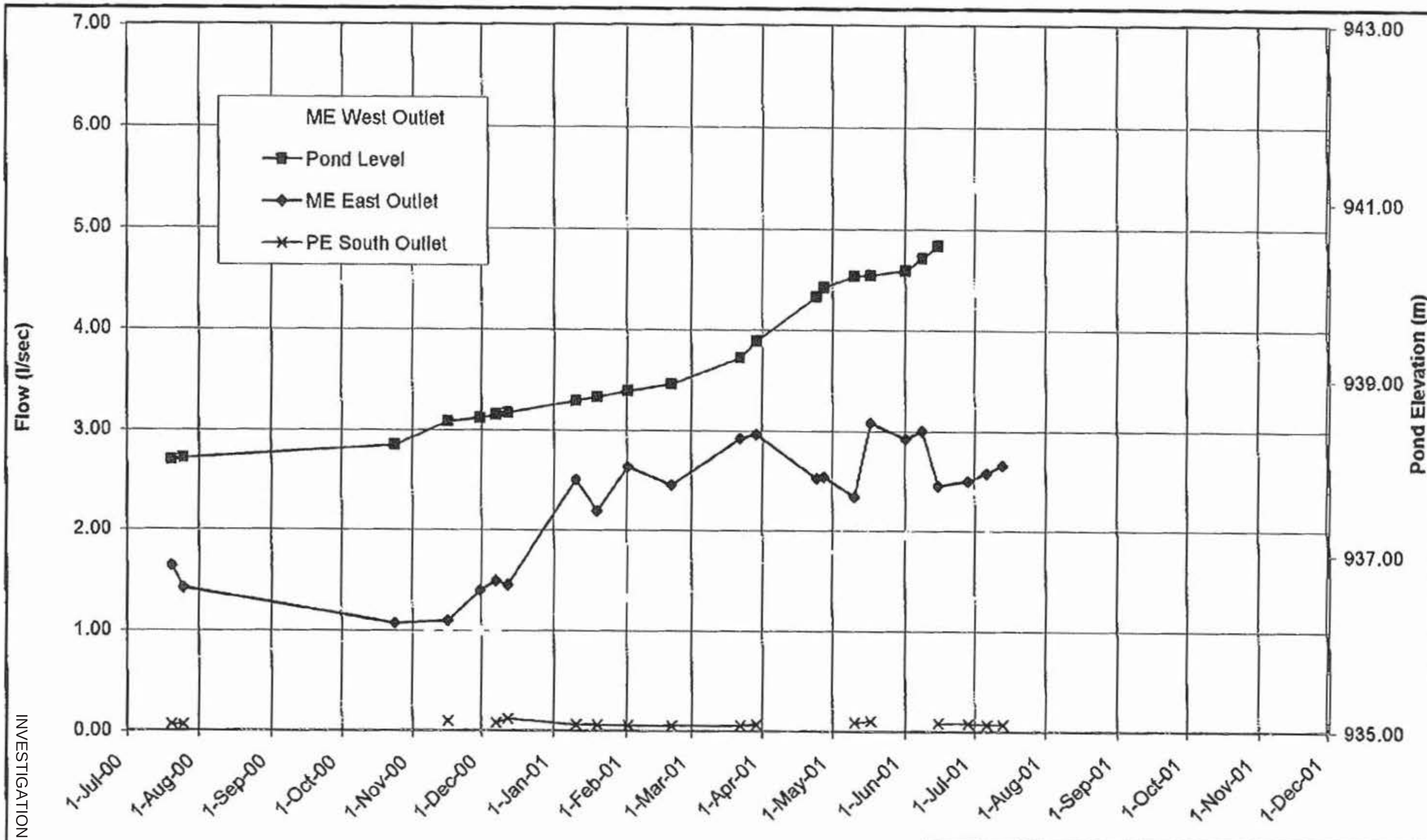


MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
MAIN EMBANKMENT
FOUNDATION DRAIN FLOWS

Knight Piésold CONSULTING	PROJECT NO. 11162/13	REF. NO.	REV.
	FIGURE 5.8		

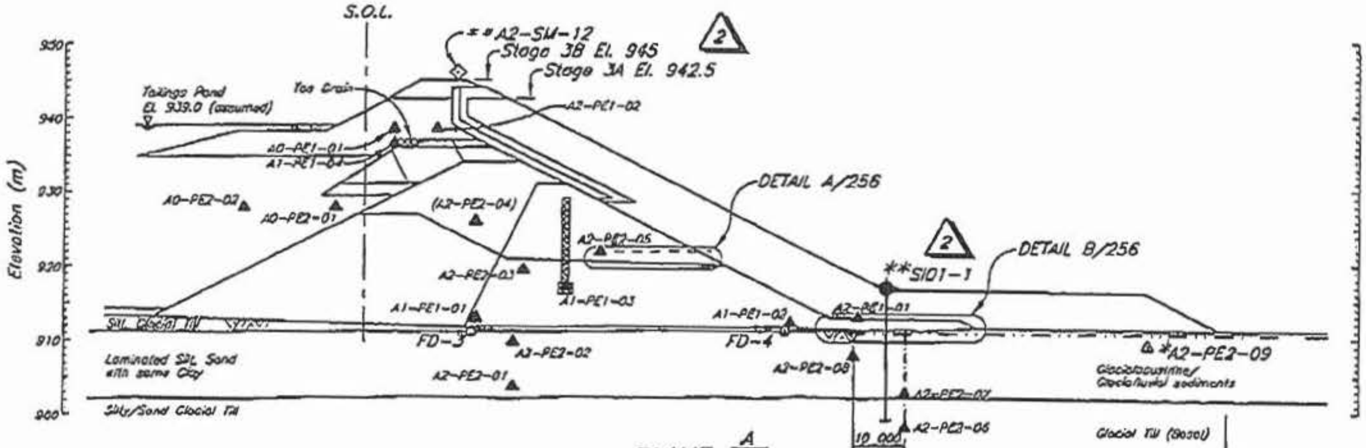


MOUNT POLLEY MINING CORPORATION

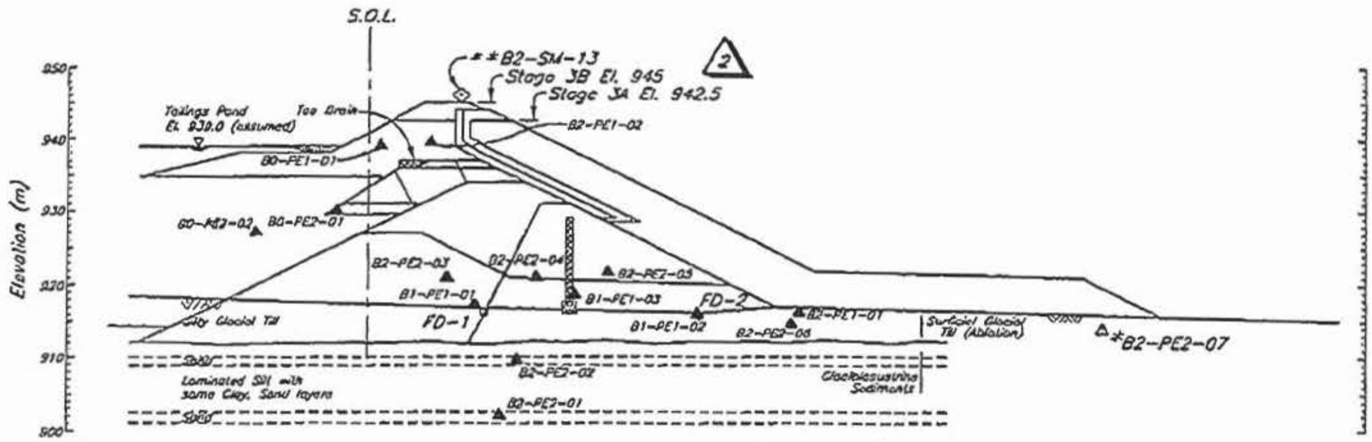
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
UPSTREAM TOE DRAIN FLOWS

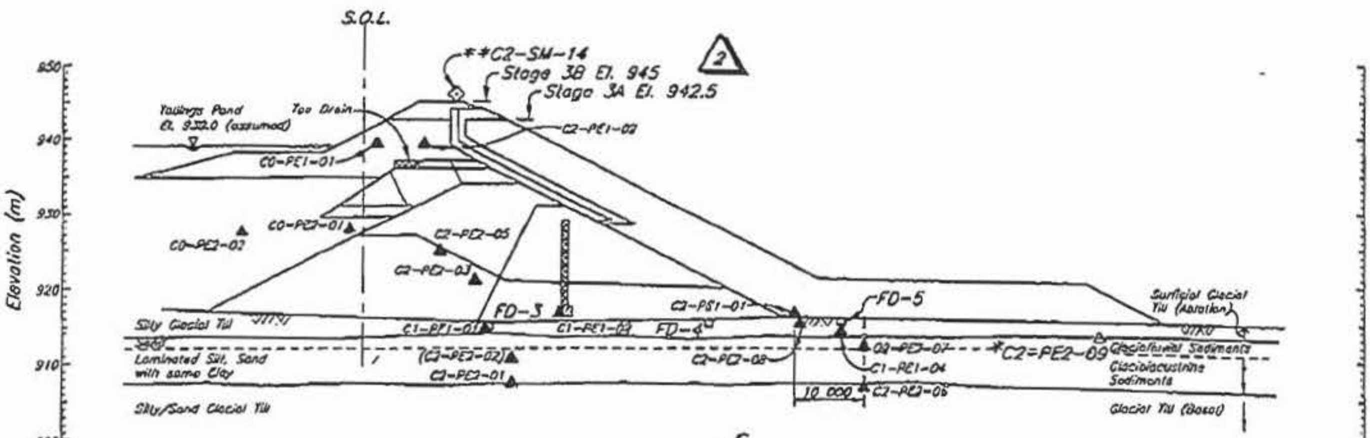
Knight Piésold CONSULTING	PROJECT NO. 11162/13	REF. NO.	REV.
	FIGURE 5.9		



PLANE $\frac{A}{250}$
CH. 20+00

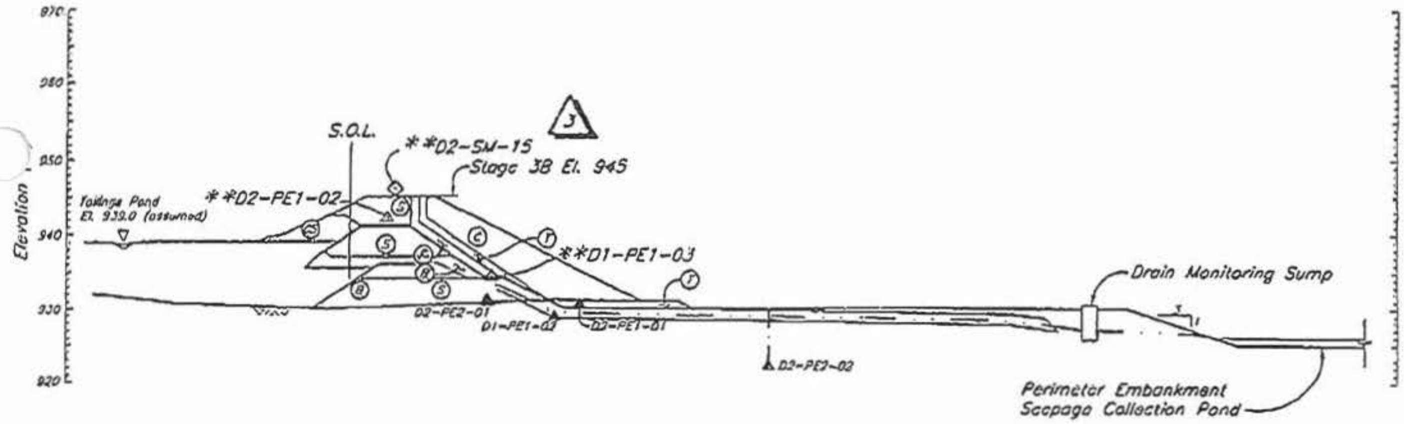


PLANE $\frac{B}{250}$
CH. 22+40

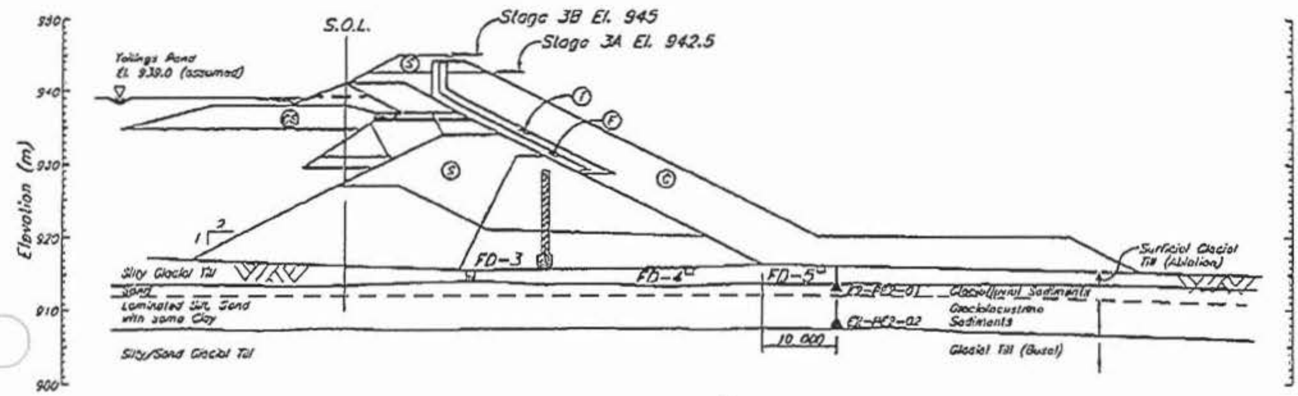


PLANE $\frac{C}{250}$
CH. 18+50

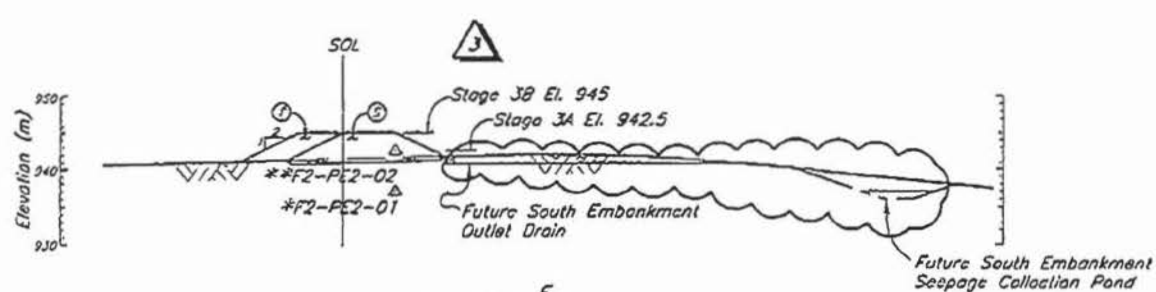
REFERENCE DRAWINGS			REVISIONS							
STAGE 3 TAILINGS EMBANKMENT – INSTRUMENTATION – SECTIONS 2 OF 2								2	08MAY'01	ISSUED F(
STAGE 3 TAILINGS EMBANKMENT – INSTRUMENTATION – SUMMARY OF INSTALLATION & TYP. DETAILS								1	26JAN'01	STAGE 3B
– STAGE 3 MAIN EMBANKMENT – INSTRUMENTATION – PLAN								0	2JUN'00	ISSUED F(
DESCRIPTION	REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D	REV.	DATE	



PLANE $\frac{D}{251}$
CH. 39+86

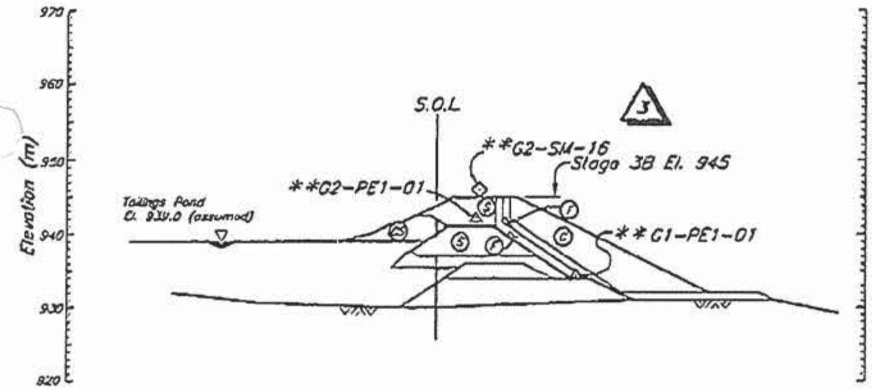


PLANE $\frac{E}{250}$
CH. 17+60

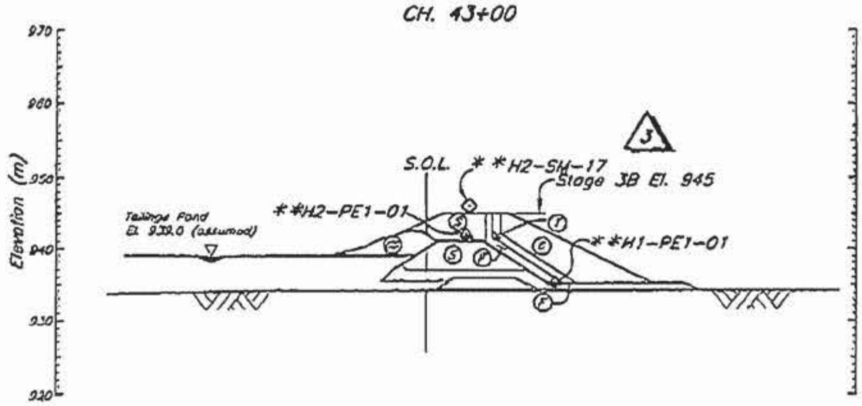


PLANE $\frac{F}{254}$
CH. 7+19

REFERENCE DRAWINGS	REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D	REV.	DATE	
[...] 3 TAILINGS EMBANKMENT – INSTRUMENTATION SUMMARY OF INSTALLATION & TYPICAL DETAILS								3	08MAY'01	ISSUED FO[...]
[...]GE 3 TAILINGS EMBANKMENT – SOUTH EMBANKMENT – INSTRUMENTATION PLAN								2	26JAN'01	STAGE 3B
STAGE 3 PERIMETER EMBANKMENT – INSTRUMENTATION PLAN								1	20OCT'00	PERIMETER
STAGE 3 TAILINGS EMBANKMENT – MAIN EMBANKMENT – INSTRUMENTATION PLAN								0	2JUN'00	ISSUED FO[...]
DESCRIPTION			REVISIONS							



PLANE $\frac{G}{251}$
CH. 43+00



PLANE $\frac{H}{251}$
CH. 36+00

NOTE

1. See Drg. No. 11162-13-256 for Summary of Instrumentation Installations, Typical Details, General Notes and Legend.
2. Instrumentation with one asterisk indicates placement during Stage 3A construction. Instrumentation with 2 asterisks indicate placement during Stage 3B construction.

Scale 10 0 10 20 30 40 50 m

STAGE 3B TENDER	CWM	DSR	JRK	
3B – CREST ELEVATION 945	JRK	AW	JMTW	KJB
TER EMBANKMENT SECTIONS ADDED	JRK	NSD	JMTW	KJB
FOR CONSTRUCTION	JRK	TAM	ABW	KJB
DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
REVISIONS				

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — C.W. MUIR

DESIGNED	CHECKED
JRK	ABW
DRAWN	APPROVED
DSR	KJB

MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
STAGE 3 TAILINGS EMBANKMENT
INSTRUMENTATION
SECTIONS – SHEET 2 OF 2

Knight Piésold CONSULTING

SCALE: AS SHOWN — REVISION: 3
DRAWING NO. 11162-13-259

M 745-40 / MTPO/01

Knight Piésold
CONSULTING

Mount Polley Site Office *Fax: (250) 790-2268*
www.knightpiésold.com

DATE:	July 10, 2001	**FILE NO.:**	11162/14.F01/.F02/ /.F04/.F05/.F08
TIME:		**REF NO.:**	01-21
OPERATOR:		**PAGES:**	1 of 19
SENDER:	s.22		

TO:	Ministry of Energy and Mines, Victoria B.C. **FAX:** 250-952-0481
ATTN:	Chris Carr
CC:	Ken Brouwer, KP Vancouver Don Parsons / Eric LeNeve, MPMC Site
SUBJECT:	Progress Report No. 13

Dear Mr. Carr,

Please find enclosed a copy of Progress Report No. 13 from July 2 to July 8, 2001. If you have any questions, please do not hesitate to contact me on site or Ken Brouwer in our Vancouver office.

Regards,

s.22

Knight Piésold Consulting

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CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - STAGE 3 CONSTRUCTION
PROGRESS REPORT NO. 13 – JULY 2 TO JULY 8, 2001

SECTION 1.0 - GENERAL

Mount Polley Mining Corporation (MPMC) continued Stage 3B construction activities. Knight Piésold Ltd. (KP) carried out QA/QC activities during the reporting period.

The scope of work includes placement of Zones S, F, T and C to El. 942.5 m on the Perimeter Embankment (Ch. 28+00 to 44+50). MPMC is carrying out this work with the exception of filter sand hauling between the millsite and the TSF, which is being completed by sub-contractors.

1.1 PERSONNEL

The following KP personnel were on site during the reporting period:

- s.22 Resident Engineer.

The following MPMC personnel were on site during the reporting period:

- Don Parsons Mine Superintendent
- Eric LeNeve Tailings Coordinator
- Charlie O'Hara General Foreman
- s.22 Site Foreman
- Site Foreman

1.2 CONTRACT DEVELOPMENTS

MPMC chose Lake Excavating Ltd., of Williams Lake, B.C., to place the latest crush pile of Zone F. Geotech Drilling Ltd., of Prince George, B.C. was selected to install two slope inclinometers at the downstream toe of the Main Embankment.

1.3 DESIGN DEVELOPMENTS

MPMC announced a shut down of mine operations for the end of September on Friday June 29, 2001. The mine will go on Care and Maintenance following the shut down. The water balance was reviewed following this announcement. As a result of this analysis, it was found that a final TSF elevation of 942.5 m at all embankments is adequate through the freshet of 2002. A spillway design will be completed by Knight Piésold in the coming weeks.

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The Main and South Embankments require no further work as a result of the planned shut down. A modified Perimeter Embankment construction to El. 942.5 m is currently being evaluated to minimize expenditures.

1.3 WEATHER

Conditions were generally sunny with cloudy periods during the reporting period. Maximum daytime highs reached about +21 °C and nightly lows sank to as low as +7 °C.

1.4 SAFETY

No safety incidents were reported over the reporting period.

SECTION 2.0 - TAILINGS FACILITY OPERATION AND MAINTENANCE

Tailings were spigotted along the Main Embankment crest during the reporting period at approximate Chainage 17+00. It is anticipated that tailings will form a substantial beach upstream of the ridge between the Main and South Embankments by discharging at this location.

The Tailings Pond remains a significant distance from the Perimeter Embankment.

SECTION 3.0 - CONSTRUCTION ACTIVITIES

3.1 EQUIPMENT

MPMC used the following equipment over the reporting period:

- Excavators: 1 Hitachi EX 270, 1 Caterpillar 235
- Haul Trucks: 3 Caterpillar 777 85T
- Loaders: 1 Caterpillar 992
- Dozers: 1 Caterpillar D7G, 1 Caterpillar D8R, 1 Caterpillar D6, 1 Caterpillar D8K
- Compactors: 1 Caterpillar CS 563 10T vibratory smooth drum
- Graders: 1 Caterpillar 14G
- Service and fuel trucks
- Lake Excavating: 4 highway dump trucks and Caterpillar 966 loader
- Geotech Drilling: 1 Mobile C59 ODEX truck mounted drill and service truck

MPMC carried out the following activities during the reporting period:

- Crushing of Zone F material at the millsite.
- Placement of Zone F fill, Perimeter Embankment: Ch. 39+00 to 40+00, El. 931 to 940 m and Ch. 34+00 to 37+00, El. 935 to 940 m.
- Placement of Zone T fill, Perimeter Embankment: Ch. 34+00 to 37+00, El. 936 to 940.5 m.
- Development of the Rock Borrow for Zones T and C materials.
- Drilling and installation of Slope Inclinometers SI-01-01 and 02

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Zones T and C were supplied from the Rock Borrow, while Zone F was delivered from the crushed stockpile at the millsite. Zone F was placed up the slope on top of the existing Zone S in a 1 metre thick lift, while Zone T was placed upon Zone F in a 1 metre thick lift.

SECTION 4.0 - KNIGHT PIÉSOLD ACTIVITIES

4.1 GENERAL

KP activities over the reporting period included the following:

- Monitoring and inspection of fill placement of Zones F and T.
- Submission of daily summaries of QA/QC and construction activities to MPMC.
- Control and Record sampling and testing of embankment fill materials.
- Ongoing discussions and correspondence with MPMC and KP Vancouver with regard to current and future design.
- Preparation of progress reports.
- Geotechnical logging of drill holes for slope inclinometers.

4.2 Laboratory Testing

The following samples were processed during the reporting period:

- C-ZF-37, 38, 39, 40 and 41

Control samples C-ZF-37, 38 and 39 from the latest filter sand crush failed the grain size specification. The pile was thoroughly mixed with a dozer following this testing. Subsequent control samples C-ZF-40 and 41 met the grain size specification and the pile was approved for fill placement.

All tests carried out during the reporting period are presented in the attached tables and figures.

SECTION 5.0 - MONITORING

5.1 GENERAL

Instrumentation was monitored during the reporting period. Data collected to date indicates that the TSF is performing well within design tolerances.

5.2 VIBRATING WIRE PIEZOMETERS

No new piezometers were installed over the reporting period.

Piezometer readings are taken on a weekly basis. The results from the monitoring are shown on Figures 5.1 to 5.7. Locations of the piezometers are presented on the attached Drawings.

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Foundation Piezometers

No substantial changes were noted in the remaining foundation piezometers.

Fill Piezometers

The majority of the Main Embankment glacial till piezometers responded to construction of the overlying Stage 3A fills with increasing pore pressures. These piezometers are now fully dissipated, as a constant, horizontal trend has been showing for some time now.

Two piezometers located within the Stage 1A glacial till fill have historically registered anomalous values, and warrant discussion.

Piezometer B2-PE2-03 reacted strongly to fill placement during initial construction. Pore pressures did not dissipate in the periods following fill placement, but remained constant. This is in direct contrast to other instruments located nearby. This trend changed in 1999, when B2-PE2-03 began to show dissipation at the completion of fill placement. This new trend has been repeated three times, with approximately the same dissipation rate after each stage of construction, with an increase in pore pressure between 50 and 100% of the increase in total stress. It appears that drainage paths were limited in the fill around this piezometer and pore pressures are still equilibrating.

Piezometer C2-PE2-05 is also located in the Stage 1A glacial till fill. This instrument historically showed little or no reaction to construction, but indicated a slow, steady increase in pore pressure over time. This suggests that pore pressures in the fill around C2-PE2-05 are reaching a steady state condition as the phreatic surface moves through the fill. It should be noted that the pressure head registered by this piezometer is approximately 10 m. This is similar to other piezometers located in comparable locations in the glacial till fill.

Drain Piezometers

All drain piezometers have remained static and at very low head indicating free draining conditions within the embankment drainage systems.

Tailings Piezometers

Water levels at the tailings piezometers continue to mimic the pond level, except at the Main Embankment, where the upstream toe drain has resulted in a depressed phreatic surface.

5.3 DRAIN FLOWS

Drains flows were recorded on July 6, 2001. The results from the foundation drains and upstream toe drain are shown on Figures 5.8 and 5.9.

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5.4 SLOPE INCLINOMETERS

As mentioned above, slope inclinometers SI-01-01 and 02 were installed during the reporting period. SI-01-01 was drilled to approximately 29 metres and the inclinometer was installed to an approximate depth of 28 metres. SI-01-02 was drilled to approximately 25 metres and the inclinometer was installed to an approximate depth of 24 metres. SPT testing was carried out and chips from the drill were examined to log the boreholes. Six inch steel casing was left in the upper 6 metres of each hole to protect the inclinometer casing from the settlement of coarse rockfill and to minimize the amount of grout required to anchor the inclinometer casing.

The equipment to monitor, record and evaluate the data from the slope inclinometers will be on site soon. Exact depths of the inclinometers will be determined and calibration measurements will be carried out at that time.

SECTION 6.0 - ONGOING ITEMS

The following items will be addressed during upcoming reporting periods:

- MPMC will continue to construct the Stage 3B Perimeter Embankment to El. 942.5 m.
- The slope inclinometers will be measured and calibrated.
- KP will continue to provide QA/QC and site supervision activities in accordance with the technical specifications.

Submitted by,

Knight Piésold Consulting.

Distribution: Eric LeNeve, Tailings Coordinator, MPMC Site
Don Parsons, Mine Superintendent, MPMC Site
Chris Carr, Ministry of Energy and Mines, Victoria, B.C.
Ken Brouwer, KP Vancouver

TABLE 4.1

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION
ZONE F CONTROL TEST SUMMARY SHEET

Knight Piésold CONSULTING

PROJECT:	MOUNT POLLEY - TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION
MATERIAL:	Zone F - Filter Sand
SHEET:	1 of 1
PERIOD:	July 2 to July 8, 2001
PROJECT NO.:	11162/14
AREA:	Zone F Stockpile

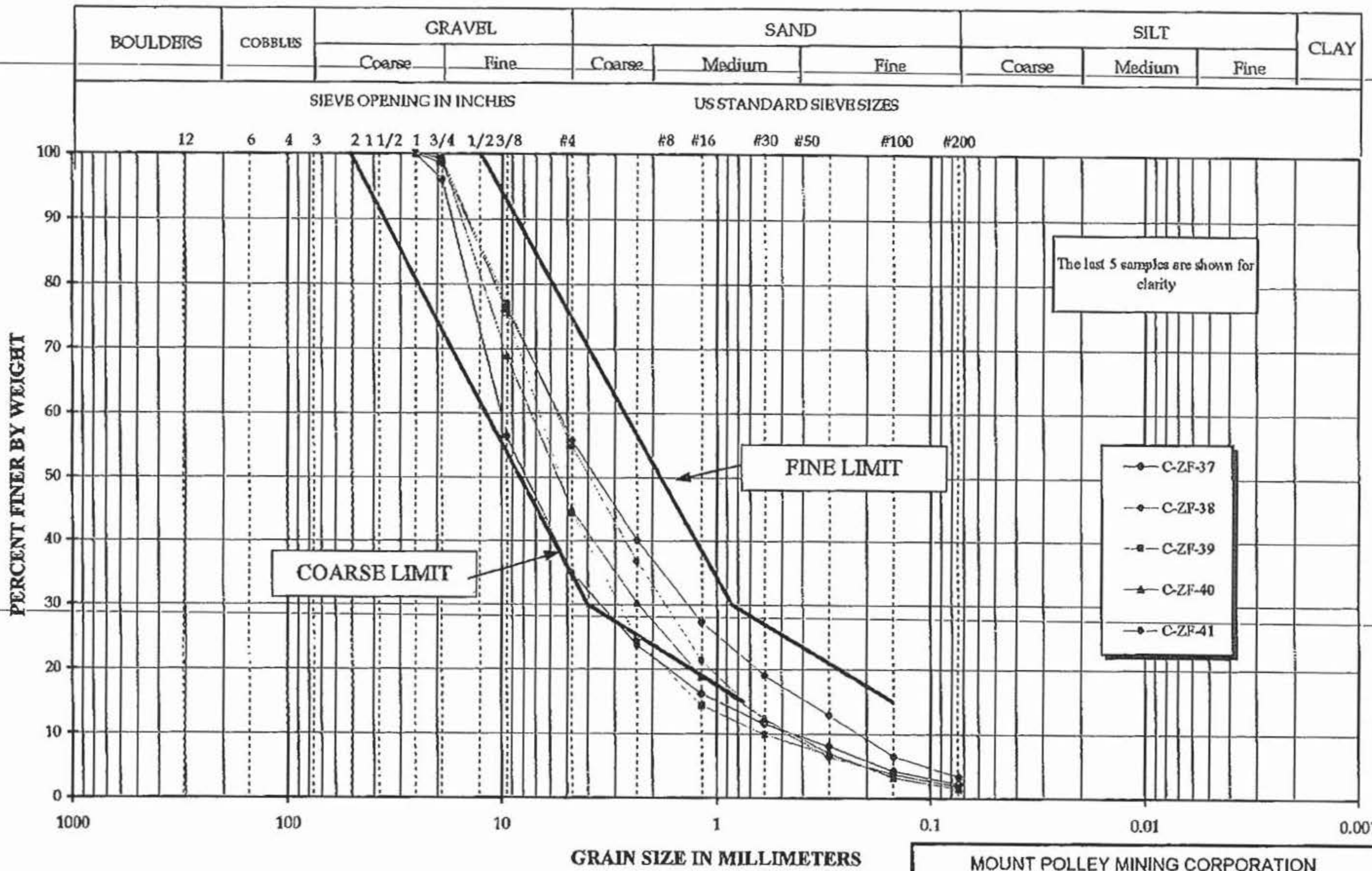
Sample No.	Date Sampled	Location	El. (m)	C1 Atterberg Limits PL %	LL %	PI %	C2 Field m/c %	LI %	C3 (Particle Size Distribution) 101.6 / 4 / 4	76.2 / 3 / 3	38.1 / 1.5 / 1 1/2	25.4 / 1 / 1	19.05 / 0.75 / 3/4	9.525 / 0.375 / 3/8	4.75 / 0.187 / #4	2.36 / 0.0937 / #8	1.18 / 0.0469 / #16	0.6 / 0.0234 / #30	0.3 / 0.0165 / #50	0.14986 / 0.0059 / #100	0.07366 / 0.0029 / #200	0.002 / Clay	C4 Standard Proctor Max Dry Density kg/m³	Optimum m/c %	C6 Specific Gravity
C-ZF-31	29-Mar-01	Zone F Stockpile	-	-	-	-	4.1	-	100.0	100.0	100.0	100.0	99.6	84.0	61.6	43.0	28.5	21.3	16.5	12.7	10.0	-	-	-	-
C-ZF-32	28-May-01	Zone F Stockpile	-	-	-	-	4.0	-	100.0	100.0	100.0	100.0	99.4	78.9	59.9	43.4	29.6	21.9	16.8	13.1	10.4	-	-	-	-
C-ZF-33	28-May-01	Zone F Stockpile	-	-	-	-	2.9	-	100.0	100.0	100.0	100.0	98.7	56.0	28.1	17.6	12.8	10.1	7.8	6.1	4.8	-	-	-	-
C-ZF-34	11-Jun-01	Zone F Stockpile	-	-	-	-	3.7	-	100.0	100.0	100.0	100.0	99.3	59.2	35.0	24.2	15.0	10.5	7.8	6.1	4.8	-	-	-	-
C-ZF-35	11-Jun-01	Zone F Stockpile	-	-	-	-	4.2	-	100.0	100.0	100.0	100.0	97.9	59.3	34.7	24.7	15.3	10.6	8.0	6.4	5.1	-	-	-	-
C-ZF-36	12-Jun-01	Zone F Stockpile	-	-	-	-	2.6	-	100.0	100.0	100.0	100.0	97.7	60.6	37.0	24.2	16.5	12.2	9.4	7.1	5.6	-	-	-	-
C-ZF-37	3-Jul-01	Zone F Stockpile	-	-	-	-	1.5	-	100.0	100.0	100.0	100.0	96.0	56.3	34.5	23.7	16.1	11.5	8.0	4.2	2.2	-	-	-	-
C-ZF-38	3-Jul-01	Zone F Stockpile	-	-	-	-	2.6	-	100.0	100.0	100.0	100.0	93.5	76.2	55.6	40.0	27.2	19.0	12.9	6.5	3.3	-	-	-	-
C-ZF-39	3-Jul-01	Zone F Stockpile	-	-	-	-	2.6	-	100.0	100.0	100.0	100.0	99.5	75.4	44.2	28.5	16.3	9.8	6.7	3.7	1.9	-	-	-	-
C-ZF-40	4-Jul-01	Zone F Stockpile	-	-	-	-	3.6	-	100.0	100.0	100.0	100.0	99.3	68.8	44.7	30.2	18.8	12.3	6.9	3.2	1.5	-	-	-	-
C-ZF-41	4-Jul-01	Zone F Stockpile	-	-	-	-	5.5	-	100.0	100.0	100.0	100.0	99.2	75.0	54.7	36.7	21.3	11.9	6.3	3.7	1.8	-	-	-	-
		MEAN		#DIV/0!	#DIV/0!	#DIV/0!	3.4	#DIV/0!	100.0	100.0	100.0	100.0	98.6	68.3	44.6	30.2	19.6	13.7	9.7	6.6	6.7	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
		MEDIAN		#NUM!	#NUM!	#NUM!	3.6	#NUM!	100.0	100.0	100.0	100.0	99.2	68.8	64.2	24.7	16.5	11.9	8.0	6.1	6.8	#NUM!	#NUM!	#NUM!	#NUM!
		MAXIMUM (*)		0.0	0.0	0.0	5.5	0.0	100.0	100.0	100.0	100.0	99.6	84.0	61.6	43.4	29.6	21.9	16.8	13.1	10.4	0.0	0.0	0.0	0.0
		MINIMUM (*)		0.0	0.0	0.0	1.5	0.0	100.0	100.0	100.0	100.0	96.0	56.0	28.1	17.6	12.8	9.8	6.3	3.2	1.5	0.0	0.0	0.0	0.0

Note : These are 100% limits.

Values for Standard Proctor maximum dry density and optimum moisture content include oversize correction.

IP - In progress

- C1 Atterberg Limits (ASTM D4318)
- C2 Moisture Content (ASTM D2216)
- C3 Particle Size Distribution (ASTM D422)
- C4 Laboratory Compaction (ASTM D1557)
- C6 Specific Gravity (ASTM D854)

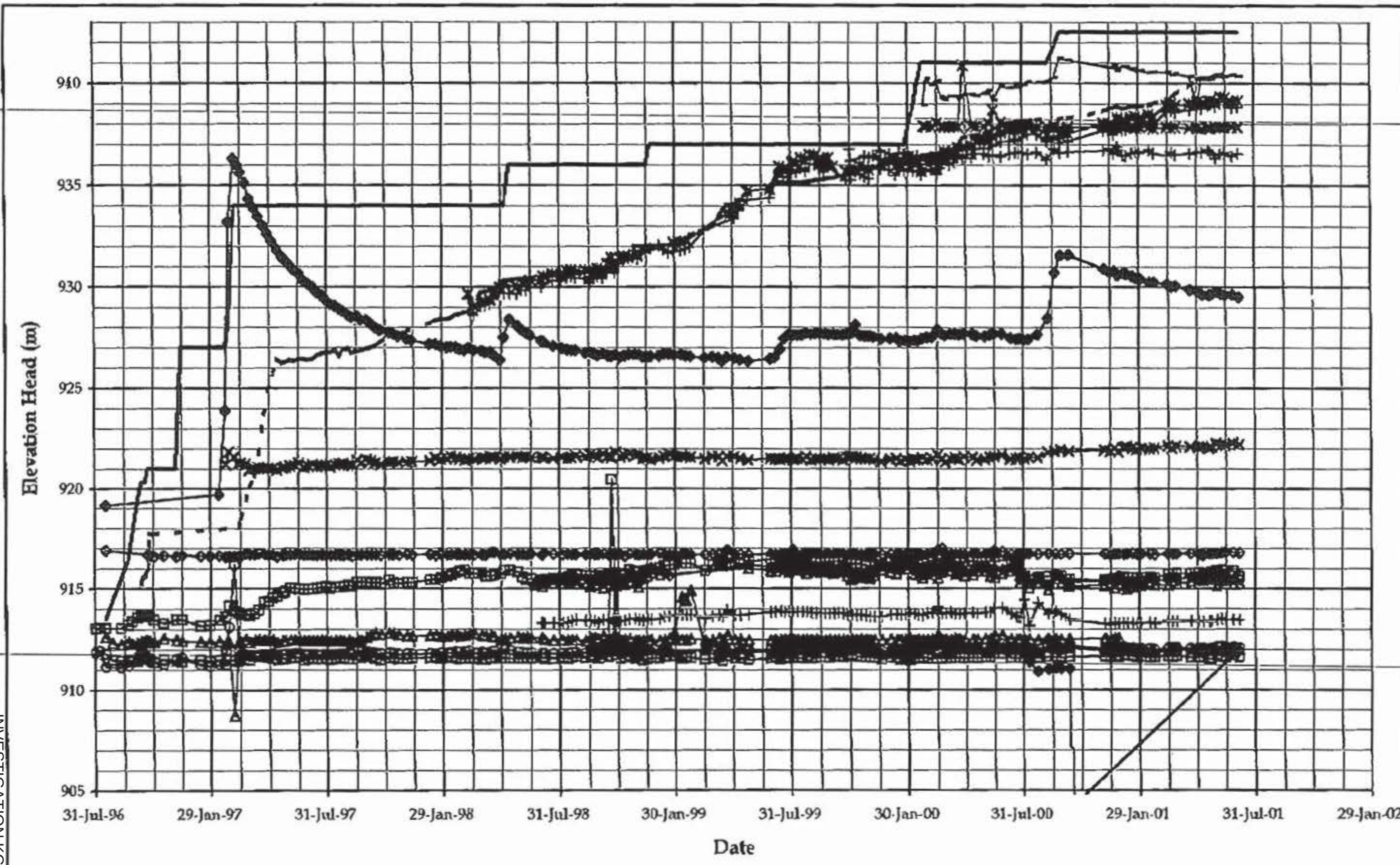


MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION - ZONE F CONTROL SAMPLES GRADATION CURVES

Knight Piésold CONSULTING	PROJECT NO. 11162/14	REF. NO.	REV.
	FIGURE 4.1		



Pond Level	Fill Elevation	A0-PE2-01	A0-PE2-02
A1-PE1-01	A1-PE1-02	A1-PE1-03	A2-PE1-01
A2-PE2-01	A2-PE2-02	A2-PE2-03	A2-PE2-05
A2-PE2-06	A2-PE2-07	A2-PE2-08	A1-PE1-04
A2-PE1-02	A0-PE1-01	A2-PE1-03	

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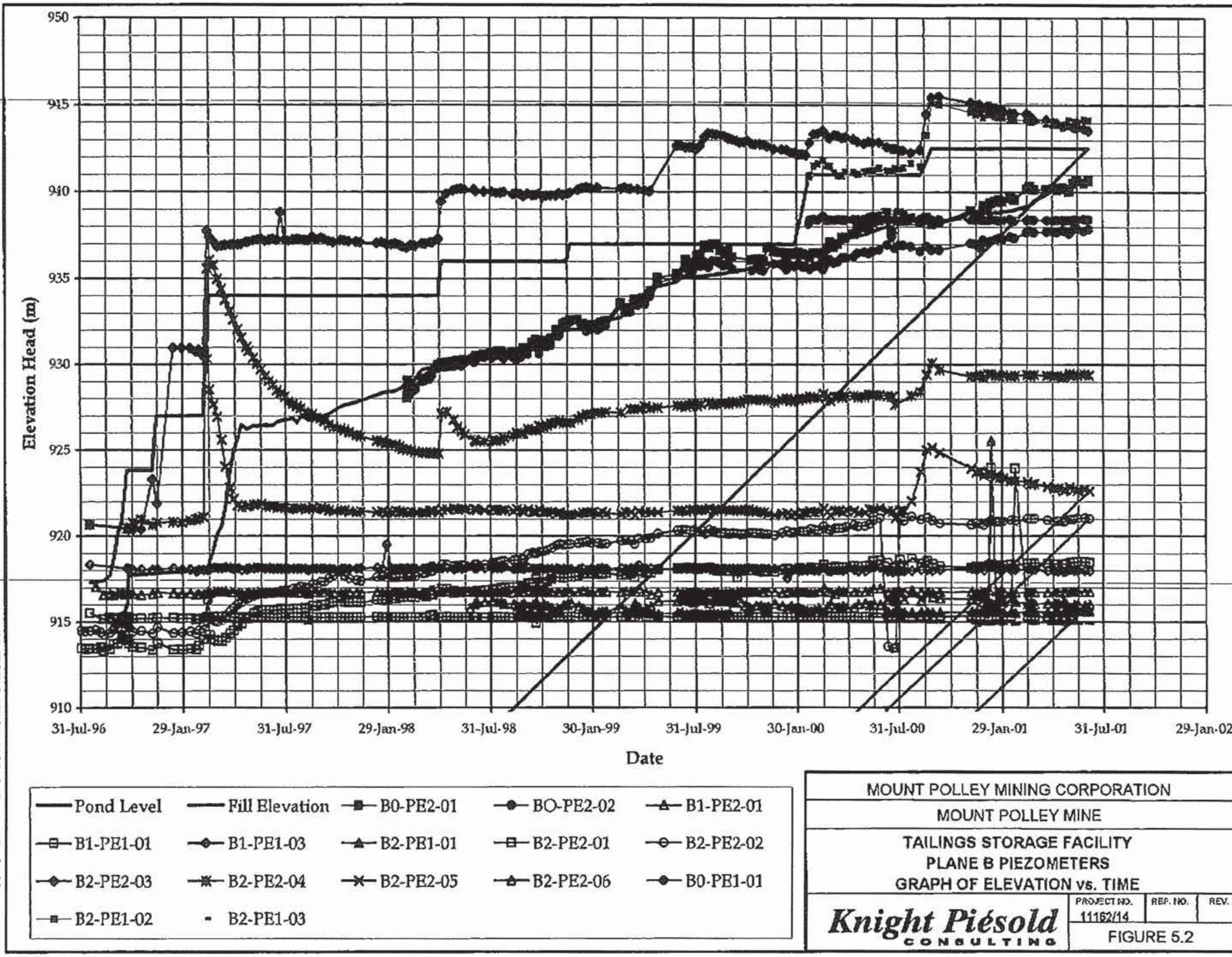
TAILINGS STORAGE FACILITY
PLANE A PIEZOMETERS
GRAPH OF ELEVATION vs. TIME

Knight Piésold CONSULTING

PROJECT NO.	REF. NO.	REV.
11162/14		

FIGURE 5.1



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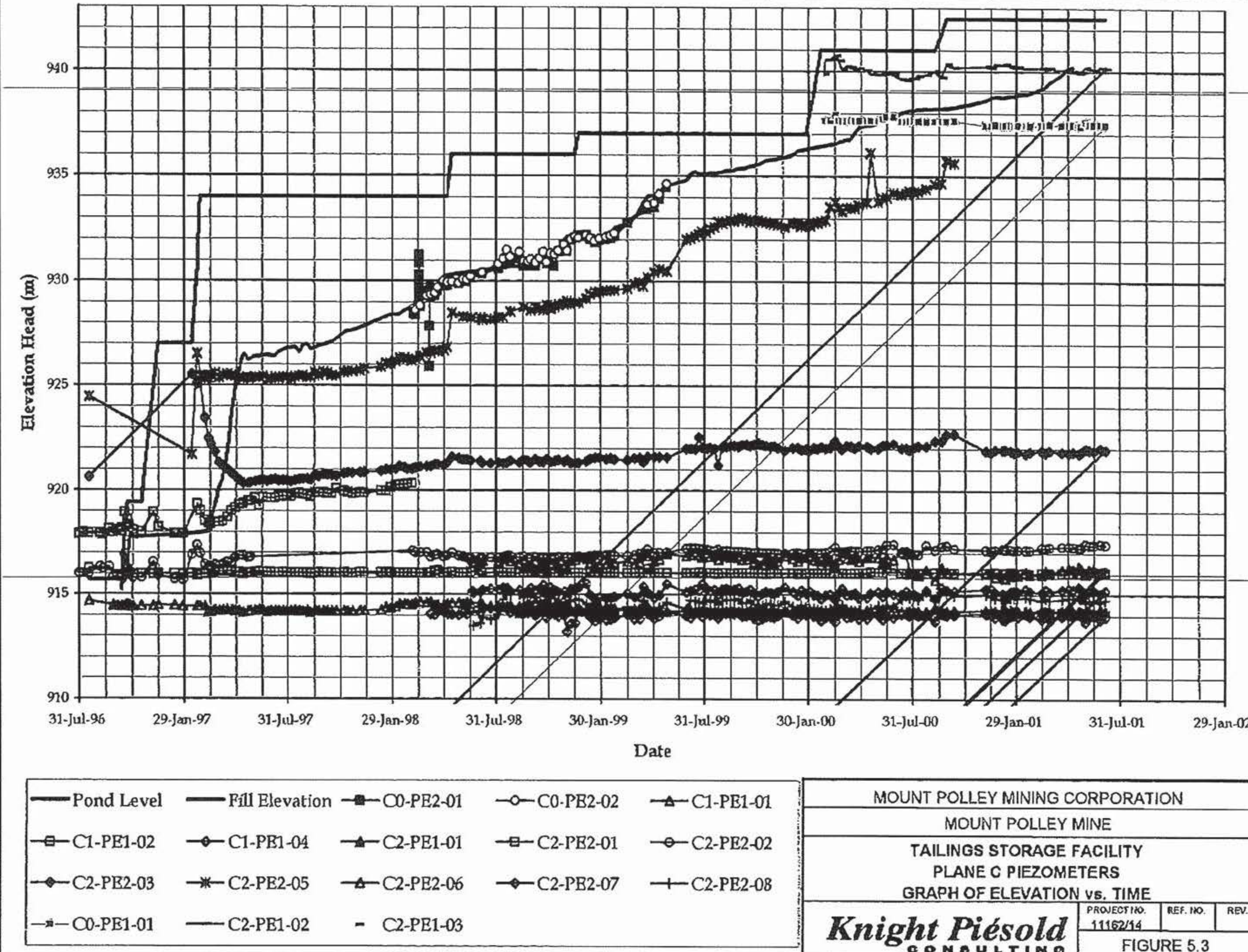
TAILINGS STORAGE FACILITY
PLANE B PIEZOMETERS
GRAPH OF ELEVATION vs. TIME

Knight Piésold CONSULTING	PROJECT NO. 11162/14	REF. NO.	REV.
	FIGURE 5.2		



MOUNT POLLEY MINING CORPORATION

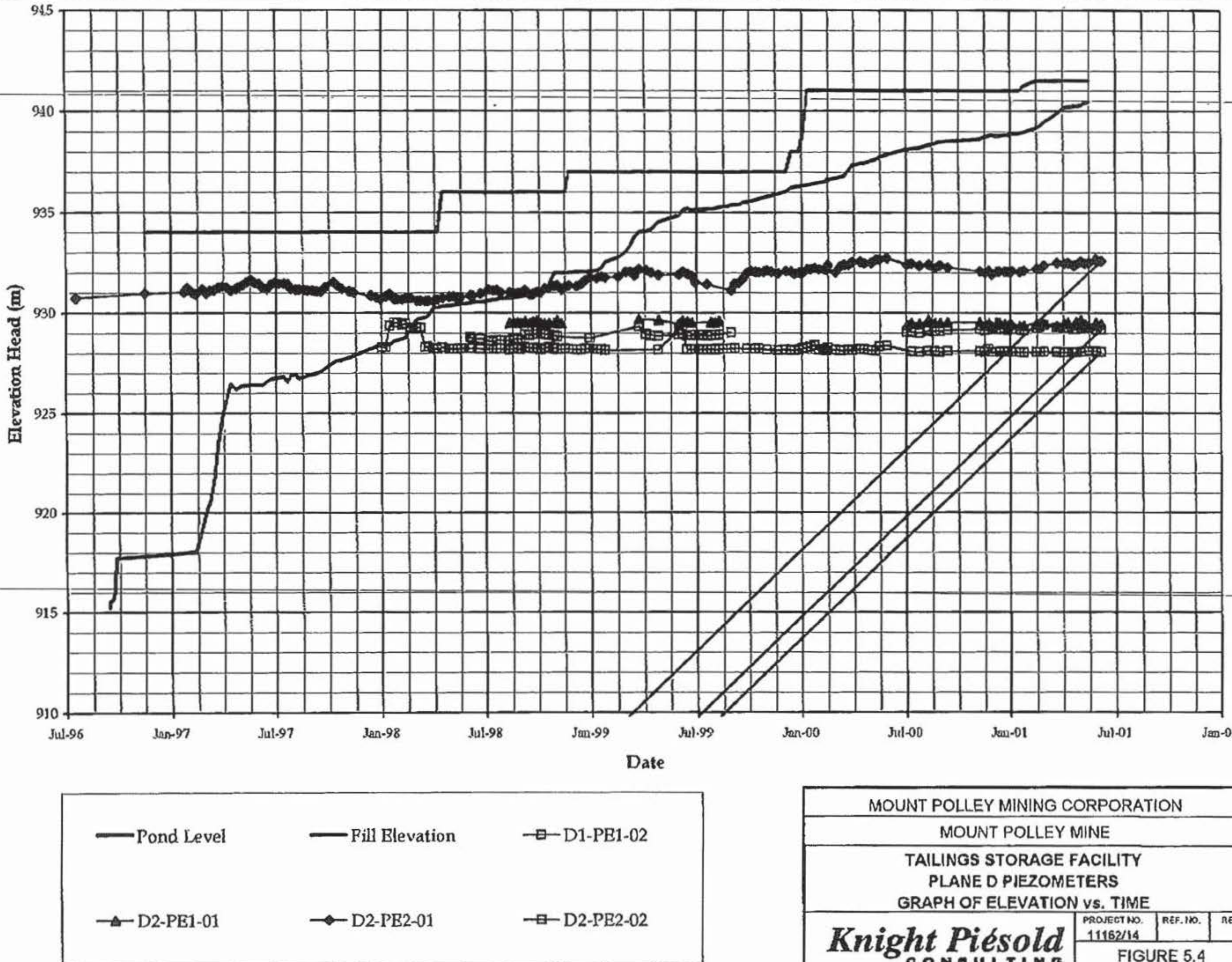
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
PLANE C PIEZOMETERS
GRAPH OF ELEVATION vs. TIME

Knight Piésold CONSULTING

PROJECT NO.	REF. NO.	REV.
11162/14		

FIGURE 5.3

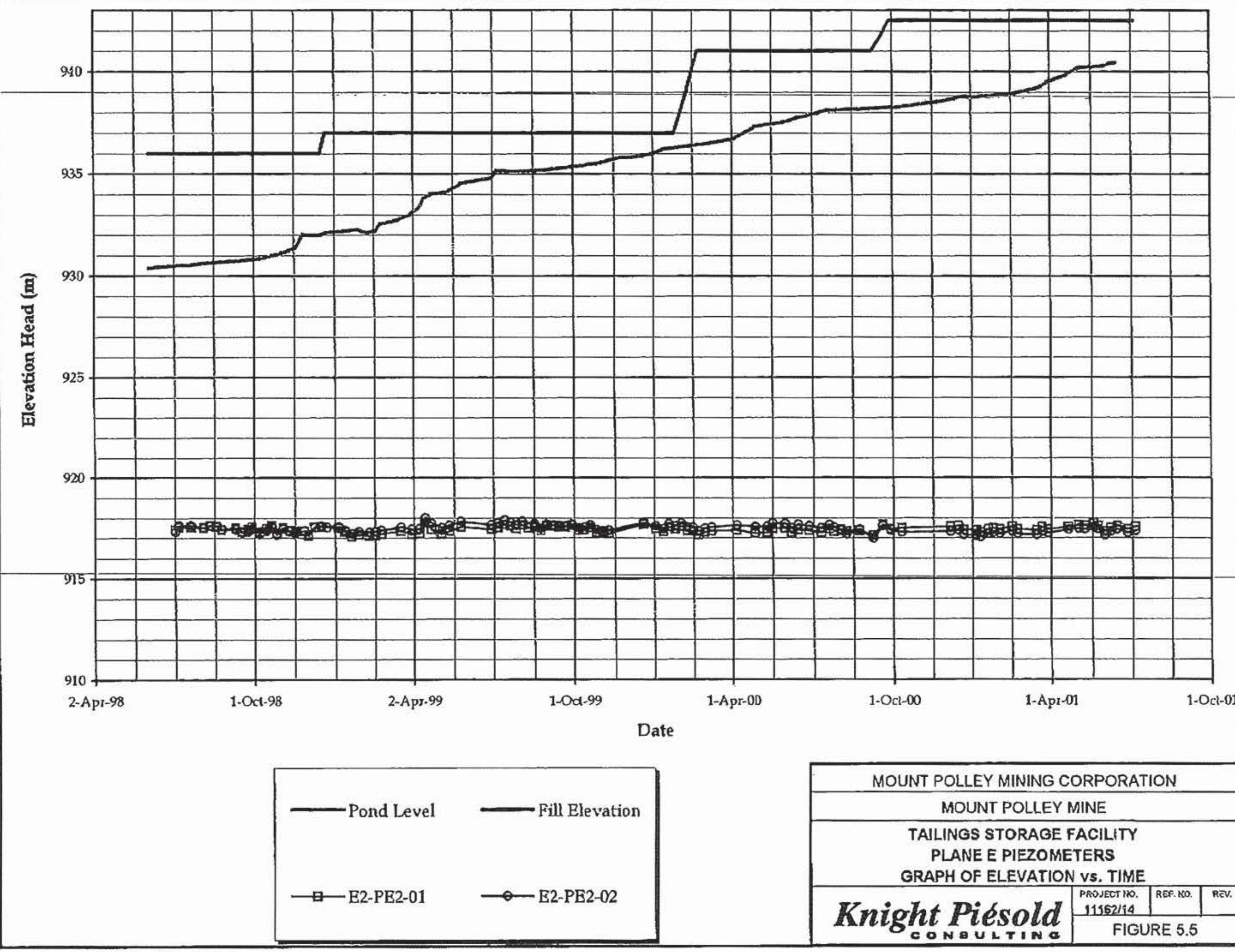


MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
PLANE D PIEZOMETERS
GRAPH OF ELEVATION vs. TIME

Knight Piésold CONSULTING	PROJECT NO. 11162/14	REF. NO.	REV.
	FIGURE 5.4		

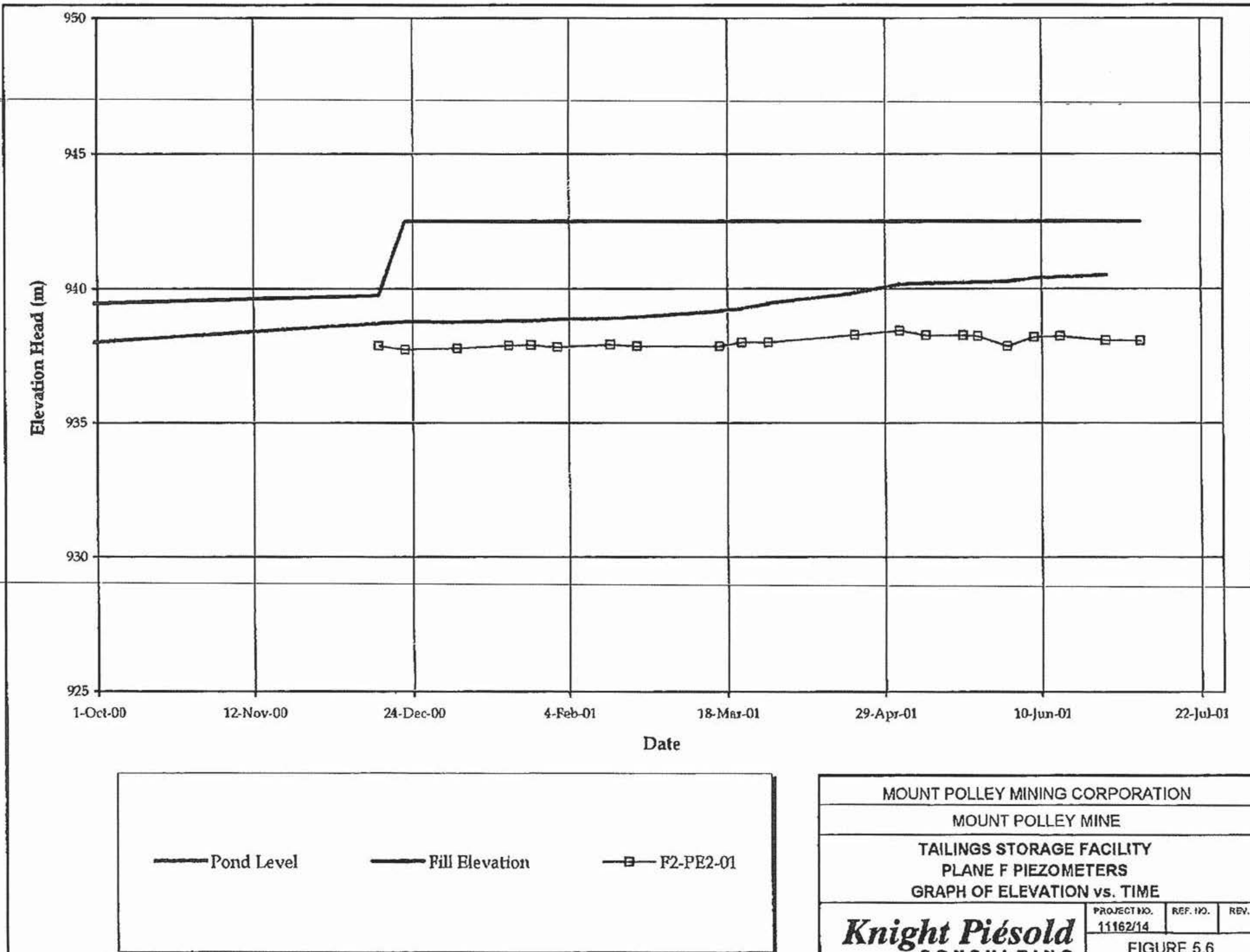


MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
PLANE E PIEZOMETERS
GRAPH OF ELEVATION vs. TIME

Knight Piésold CONSULTING	PROJECT NO. 11162/14	REF. NO.	REV.
	FIGURE 5.5		

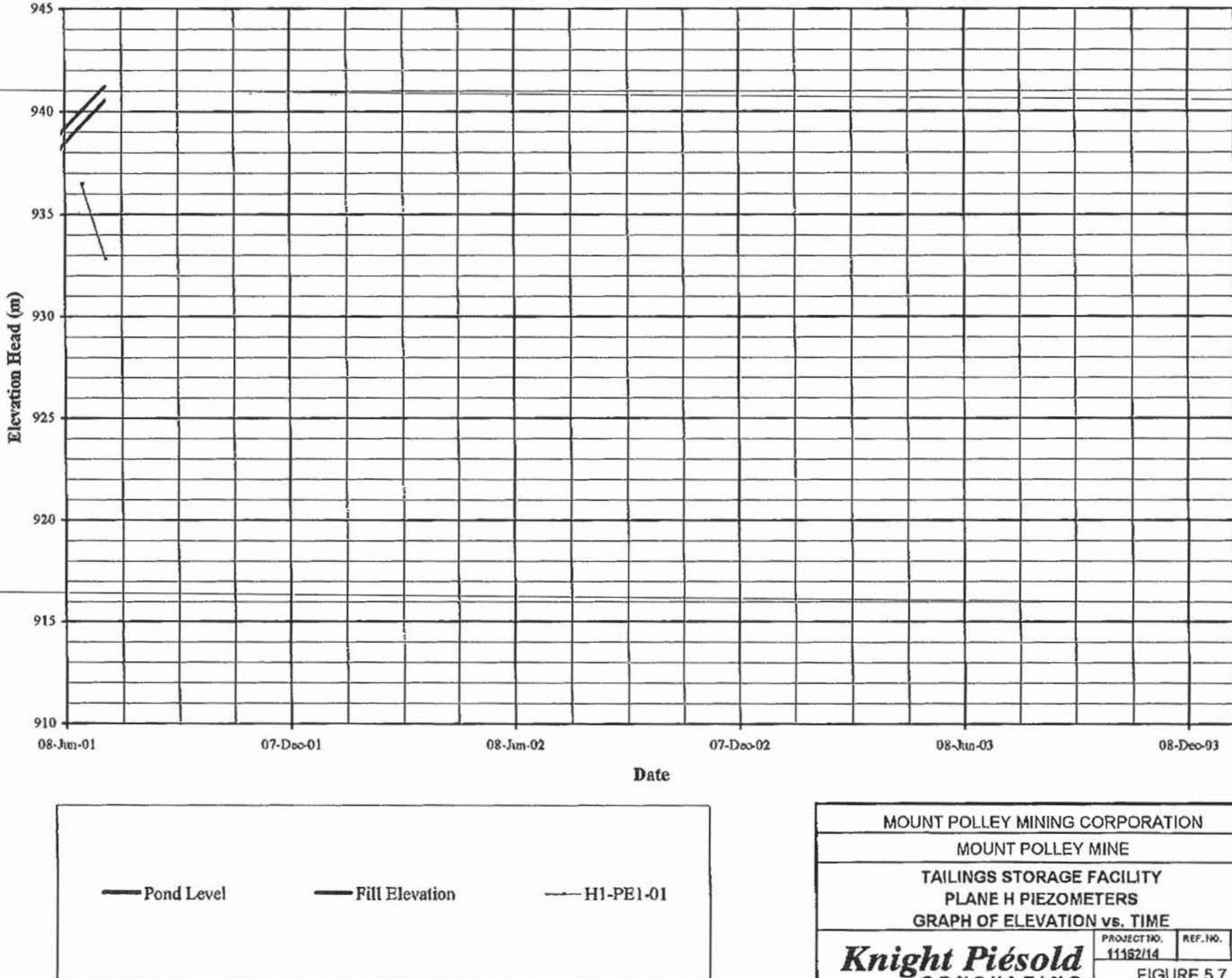


MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
PLANE F PIEZOMETERS
GRAPH OF ELEVATION vs. TIME

Knight Piésold CONSULTING	PROJECT NO. 11162/14	REF. NO.	REV.
	FIGURE 5.6		

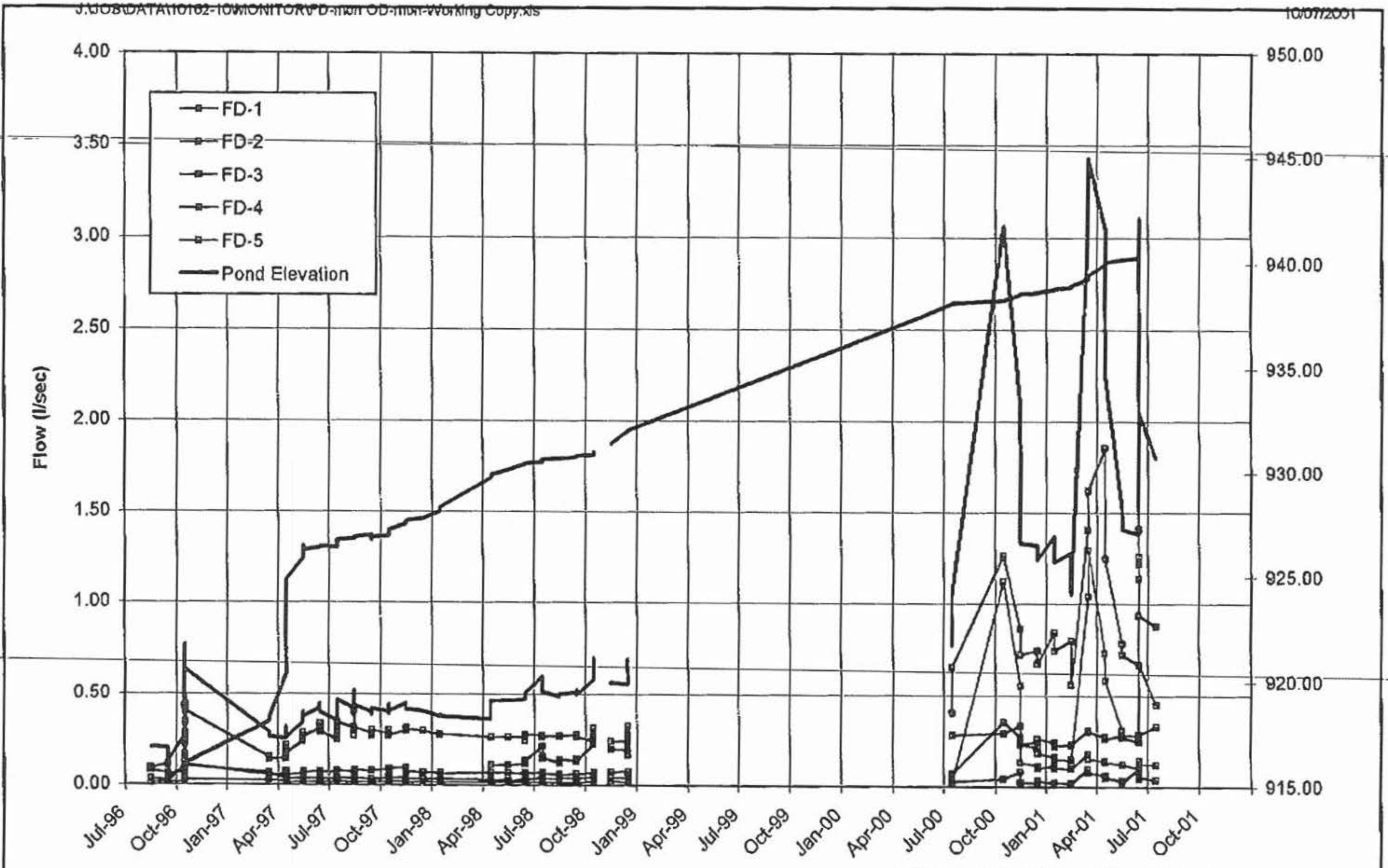


MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
PLANE H PIEZOMETERS
GRAPH OF ELEVATION vs. TIME

Knight Piésold CONSULTING	PROJECT NO. 11162/14	REF. NO.	REV.
	FIGURE 5.7		

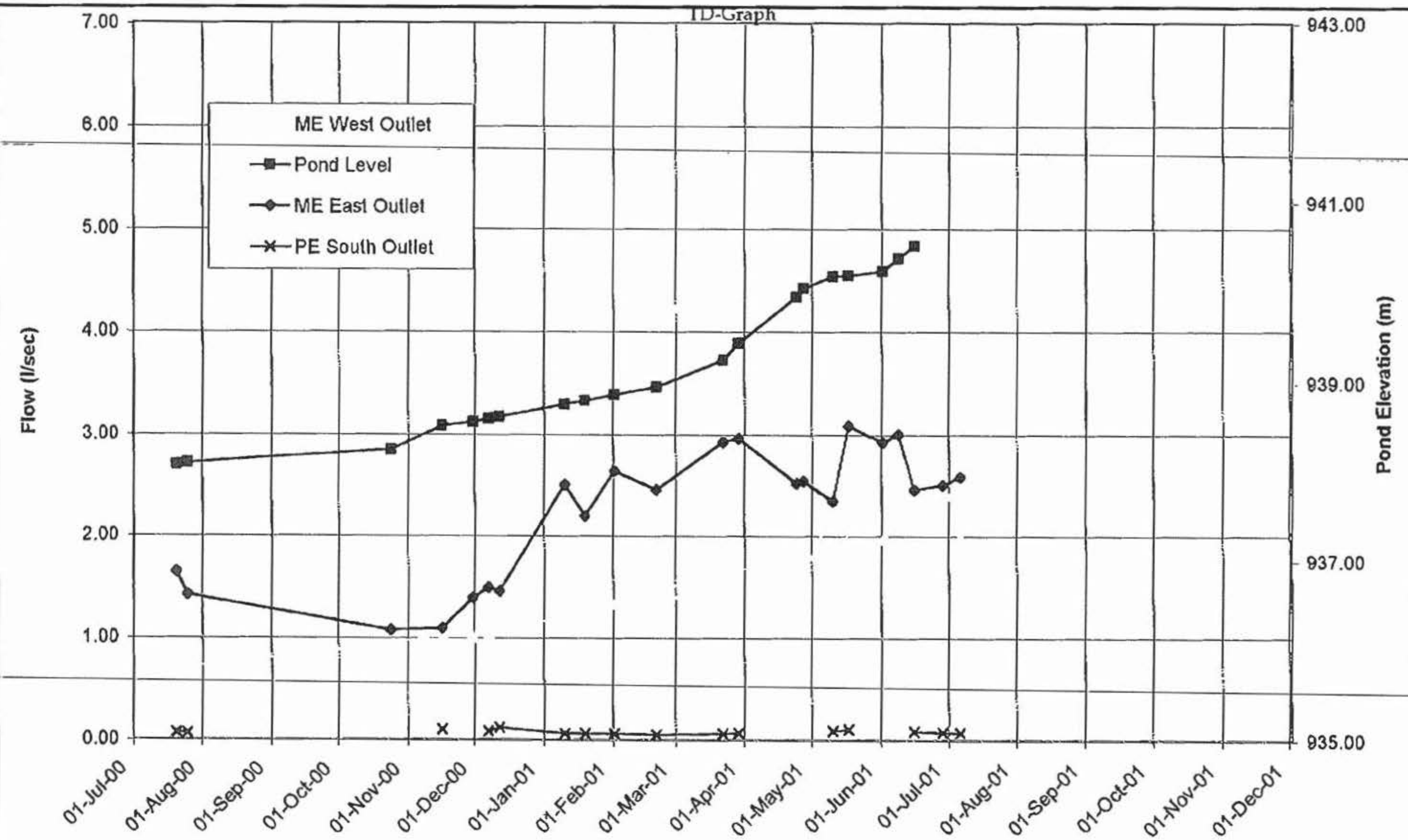


MOUNT POLLEY MINING CORPORATION

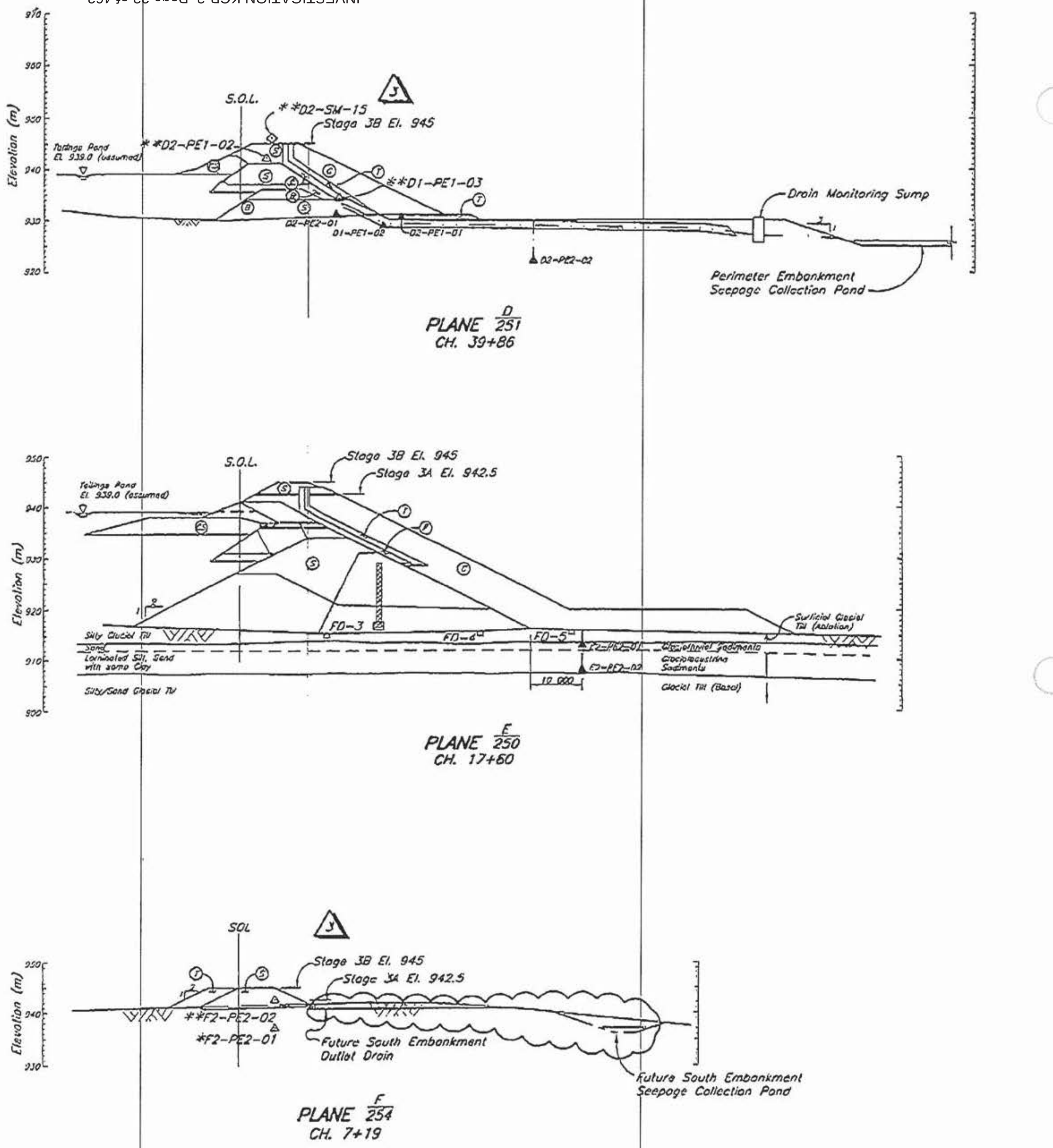
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
MAIN EMBANKMENT
FOUNDATION DRAIN FLOWS

Knight Piésold CONSULTING	PROJECT NO. 11162/13	REF. NO.	REV.
	FIGURE 5.8		



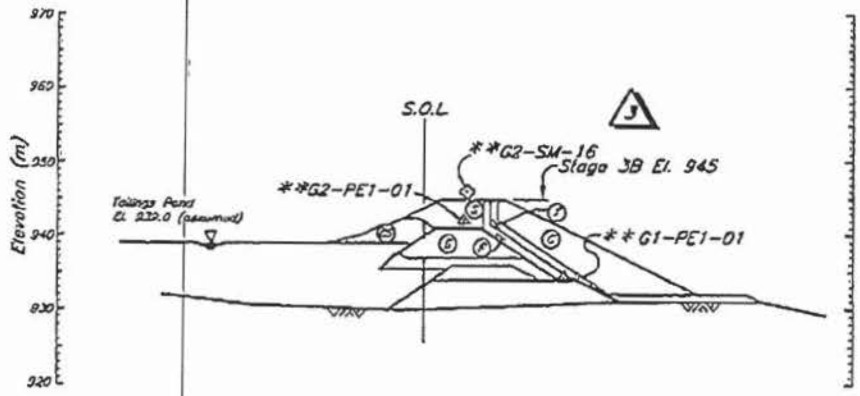
MOUNT POLLEY MINING CORPORATION			
MOUNT POLLEY MINE			
TAILINGS STORAGE FACILITY UPSTREAM TOE DRAIN FLOWS			
Knight Piésold CONSULTING	PROJECT NO. 11162/13	REF. NO.	REV.
	FIGURE 5.9		



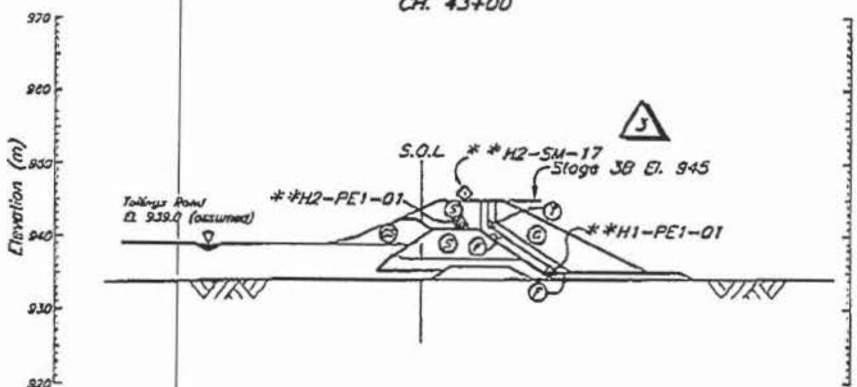
STAGE 3 TAILINGS EMBANKMENT - INSTRUMENTATION SUMMARY OF INSTALLATION & TYPICAL DETAILS	
STAGE 3 TAILINGS EMBANKMENT - SOUTH EMBANKMENT - INSTRUMENTATION PLAN	
STAGE 3 PERIMETER EMBANKMENT - INSTRUMENTATION PLAN	
STAGE 3 TAILINGS EMBANKMENT - MAIN EMBANKMENT - INSTRUMENTATION PLAN	
DESCRIPTION	
REFERENCE DRAWINGS	

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

REV.	DATE	
3	08MAY'01	ISSUE
2	26JAN'01	STAGE
1	20OCT'00	PEREMETER
0	2JUN'00	ISSUED FOR



PLANE $\frac{G}{251}$
CH. 43+00



PLANE $\frac{H}{251}$
CH. 36+00

NOTE

1. See Drg. No. 11162-13-256 for Summary of Instrumentation Installations, Typical Details, General Notes and Legend.

2. Instrumentation with one asterisk indicates placement during Stage 3A construction. Instrumentation with 2 asterisks indicate placement during Stage 3B construction.

Scale 10 0 10 20 30 40 50 m

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
C.W. MAHR

3	FOR STAGE 3B TENDER	CWM	DSR	JKK	KJB
	3B - CREST ELEVATION 945	JRK	AW	JMTW	KJB
	TER EMBANKMENT SECTIONS ADDED	JRK	NSD	JMTW	KJB
	FOR CONSTRUCTION	JRK	TAM	ABW	KJB
	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
	REVISIONS				

MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
STAGE 3 TAILINGS EMBANKMENT
INSTRUMENTATION
SECTIONS - SHEET 2 OF 2

DESIGNED JRK	CHECKED ABW
DRAWN DSR	APPROVED KJB

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SCALE AS SHOWN
REVISION 3
DRAWING NO. 11162-13-259

250 790 2268 PAGE.001 13/7/01 → File JUL 04 '01 12:58

Knight Piésold CONSULTING	**DATE:**	July 4, 2001	**FILE NO.:**	11162/14.F01/.F02/ /.F04/.F05/.F08
	TIME:		**REF NO.:**	01-19
Mount Polley Site Office *Fax: (250) 790-2268* www.knightpiésold.com	**OPERATOR:**		**PAGES:**	1 of 20
	SENDER:	s.22		

TO:	Ministry of Energy and Mines, Victoria B.C. **FAX:** 250-952-0481
ATTN:	Chris Carr
CC:	Ken Brouwer, KP Vancouver Don Parsons / Eric LeNeve, MPMC Site
SUBJECT:	Progress Report No. 12

Dear Mr. Carr,

Please find enclosed a copy of Progress Report No. 11 from June 18 to July 1, 2001. If you have any questions, please do not hesitate to contact me on site or Ken Brouwer in our Vancouver office.

Regards,

s.22

Knight Piésold Consulting

MINISTRY OF ENERGY AND MINES
REC'D JUL - 4 2001

The content of this communication is confidential. If you are not the intended recipient, please notify us immediately. Unauthorized use or disclosure of this communication or its content is unlawful.

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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - STAGE 3 CONSTRUCTION
PROGRESS REPORT NO. 12 – JUNE 18 TO JULY 1, 2001

SECTION 1.0 - GENERAL

Mount Polley Mining Corporation (MPMC) continued Stage 3B construction activities. Knight Piésold Ltd. (KP) carried out QA/QC activities during the reporting period.

The scope of work includes:

1. Placement of Zones F, T and C to approximate El. 941.5 m on the Perimeter Embankment (Ch. 32+00 to 44+50). MPMC is carrying out this work with the exception of filter sand hauling between the millsite and the TSF, which is being completed by sub-contractors.
2. Placement of Zones CBL, S, F, T and C on the Main, Perimeter and South Embankments to El. 945 m. This work will be carried out under contract. A Contractor for this work has yet to be determined.

1.1 PERSONNEL

The following KP personnel were on site during the reporting period:

- s.22 Resident Engineer.

The following MPMC personnel were on site during the reporting period:

- Don Parsons Mine Superintendent
- Eric LeNeve Tailings Coordinator
- Charlie O'Hara General Foreman
- s.22 Site Foreman
- Site Foreman

1.2 CONTRACT DEVELOPMENTS

On behalf of MPMC, Knight Piesold commenced writing of the Tender Documents for Stage 3B Construction.

1.3 DESIGN DEVELOPMENTS

A design change was submitted and approved by the KP design office. This design change takes the minimum Zone F thickness from 1000 mm to 500 mm over the downstream cycloned sand trial berm only. The area covered due to this change is Ch 39+00 to 40+00, El. 931 to 941.5 m.

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1.3 WEATHER

Conditions were unsettled during the reporting period. This included periods of cloud, rain and sunshine. Maximum daytime highs reached about +23 °C and nightly lows sank to as low as +5 °C.

1.4 SAFETY

No safety incidents were reported over the reporting period.

SECTION 2.0 - TAILINGS FACILITY OPERATION AND MAINTENANCE

Tailings were spigotted along the Main Embankment crest during the reporting period at approximate Chainage 17+00. It is anticipated that tailings will form a substantial beach upstream of the ridge between the Main and South Embankments by discharging at this location.

The Tailings Pond remains a significant distance from the Perimeter Embankment.

SECTION 3.0 - CONSTRUCTION ACTIVITIES

3.1 EQUIPMENT

MPMC used the following equipment over the reporting period:

- Excavators: 1 Hitachi EX 270
- Haul Trucks: 3 Caterpillar 777 85T
- Loaders: 1 Caterpillar 992
- Dozers: 1 Caterpillar D7G, 1 Caterpillar D8R, 1 Caterpillar D6
- Compactors: 1 Caterpillar CS 563 10T vibratory smooth drum
- Graders: 1 Caterpillar 14G
- Drills: 1 Svedala STK and 1 Driltec 25K
- Service and fuel trucks
- 153 Mile Contracting: 6 highway dump trucks and Caterpillar 966 loader

MPMC carried out the following activities during the reporting period:

- Placement of Zone F fill, Perimeter Embankment: Ch. 40+50 to 43+25, El. 933 to 937 m.
- Placement of Zone T fill, Perimeter Embankment: Ch. 32+00 to 39+00, El. 931 to 937 m and 40+50 to 45+50, El. 933 to 941.5 m.
- Placement of Zone C fill, Perimeter Embankment, Ch. 32+00 to 39+00, El. 931 to 937 m and Ch. 40+50 to 42+50, El 933 to 937 m.
- Development of the Rock Borrow for Zones T and C materials.

Zones T and C were supplied from the Rock Borrow, while Zone F was delivered from the crushed stockpile at the millsite. Zone F was placed up the slope on top of the existing Zone S in

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a 1 metre thick lift, while Zone T was placed upon Zone F in a 1 metre thick lift. Zone C was placed in 1 metre thick, horizontal lifts to the downstream toe of the Stage 3B Perimeter Embankment.

SECTION 4.0 - KNIGHT PIÉSOLD ACTIVITIES

4.1 GENERAL

KP activities over the reporting period included the following:

- Monitoring and inspection of fill placement of Zones F and T.
- Submission of daily summaries of QA/QC and construction activities to MPMC.
- Control and Record sampling and testing of embankment fill materials.
- Ongoing discussions and correspondence with MPMC and KP Vancouver with regard to current and future design.
- Preparation of progress reports.

Knight Piesold personnel were not on site during Zone C fill placement. This zone is considered to be a bulk fill that requires little supervision in order to achieve the specifications. The dates that KP personnel were away from site were June 25 to June 30, 2001.

4.2 Laboratory Testing

The following samples were processed during the reporting period:

- R-ZF-34 and 35
- R-ZT-13

Both Zone F record tests failed the grain size specification on the # 16 sieve only. This material was allowed to remain in place since this type of material maintains filter relationship criteria with the Zone S fills. The crushing of further waste rock will be adjusted to achieve the specification and a filter relationship with the cycloned sand.

The Zone T record test proved suitable for Zone T fill.

All tests carried out during the reporting period are presented in the attached tables and figures.

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SECTION 5.0 - MONITORING

5.1 GENERAL

Instrumentation was monitored during the reporting period. Data collected to date indicates that the TSF is performing well within design tolerances.

5.2 VIBRATING WIRE PIEZOMETERS

Piezometer H1-PE1-01 at Ch. 35+75 was installed over the reporting period. This piezometer is located in the Zone F material, as shown on the attached Drawings.

Piezometer readings are taken on a weekly basis. The results from the monitoring are shown on Figures 5.1 to 5.6. Locations of the piezometers are presented on the attached Drawings.

Foundation Piezometers

No substantial changes were noted in the remaining foundation piezometers.

Fill Piezometers

The majority of the Main Embankment glacial till piezometers responded to construction of the overlying Stage 3A fills with increasing pore pressures. These piezometers are now fully dissipated, as a constant, horizontal trend has been showing for some time now.

Two piezometers located within the Stage 1A glacial till fill have historically registered anomalous values, and warrant discussion.

Piezometer B2-PE2-03 reacted strongly to fill placement during initial construction. Pore pressures did not dissipate in the periods following fill placement, but remained constant. This is in direct contrast to other instruments located nearby. This trend changed in 1999, when B2-PE2-03 began to show dissipation at the completion of fill placement. This new trend has been repeated three times, with approximately the same dissipation rate after each stage of construction, with an increase in pore pressure between 50 and 100% of the increase in total stress. It appears that drainage paths were limited in the fill around this piezometer and pore pressures are still equilibrating.

Piezometer C2-PE2-05 is also located in the Stage 1A glacial till fill. This instrument historically showed little or no reaction to construction, but indicated a slow, steady increase in pore pressure over time. This suggests that pore pressures in the fill around C2-PE2-05 are reaching a steady state condition as the phreatic surface moves through the fill. It should be noted that the pressure head registered by this piezometer is approximately 10 m. This is similar to other piezometers located in comparable locations in the glacial till fill.

Drain Piezometers

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All drain piezometers have remained static and at very low head indicating free draining conditions within the embankment drainage systems.

Tailings Piezometers

Water levels at the tailings piezometers continue to mimic the pond level, except at the Main Embankment, where the upstream toe drain has resulted in a depressed phreatic surface.

5.3 DRAIN FLOWS

Drains flows were recorded on June 27, 2001. The results from the foundation drains and upstream toe drain are shown on Figures 5.7 and 5.8.

SECTION 5.0 - ONGOING ITEMS

The following items will be addressed during upcoming reporting periods:

- MPMC will continue to construct the Stage 3B Perimeter Embankment to El. 941.5 m.
- MPMC will select a Contractor to construct the embankments to El. 945 m.
- KP will continue to provide QA/QC and site supervision activities in accordance with the technical specifications.

Submitted by,

s.22

Knight Piésold Consulting

Distribution: Eric LeNeve, Tailings Coordinator, MPMC Site
Don Parsons, Mine Superintendent, MPMC Site
Chris Carr, Ministry of Energy and Mines, Victoria, B.C.
Ken Brouwer, KP Vancouver

TABLE 4.2

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION
ZONE F RECORD TEST SUMMARY SHEET

I:\NG\DATA\Engdocs\Geotechnical\Kpone\Stage 3B Construction\Record\[R-ZF-summ.xls]Data Sheet

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SHEET :	1 of 1
PERIOD :	June 18 to June 24, 2001
PROJECT NO. :	11162/14
AREA :	TSF

PROJECT: MOUNT POLLEY - TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION
MATERIAL: Zone F - Filter Sand

Sample No.	Date Sampled	Location	El (m)	C1 Atterberg Limits PL %	LL %	PI %	C2 Field m/c %	LI %	C3 (Particle Size Distribution) 101.6 / 4 / 4	76.2 / 3 / 3	38.1 / 1.5 / 1 1/2	25.4 / 1 / 1	19.05 / 0.75 / 3/4	9.525 / 0.375 / 3/8	4.75 / 0.187 / #4	2.36 / 0.0937 / #8	1.18 / 0.0469 / #16	0.6 / 0.0234 / #30	0.3 / 0.0165 / #50	0.14986 / 0.0059 / #100	0.07566 / 0.0029 / #200	0.002 mm / Clay	C4 Standard Proctor Max Dry Density kg/m³	Optimum m/c %	C6 Specific Gravity
R-ZF-31	28-Mar-01	29+00, 0.5 m D/S of Zone S	941.8	-	-	-	4.0	-	100.0	100.0	100.0	100.0	97.5	71.5	49.1	35.9	25.8	19.7	15.0	11.6	9.1	-	-	-	-
R-ZF-32	25-May-01	37+03, 0.5 m D/S of Zone S	936.0	-	-	-	4.1	-	100.0	100.0	100.0	100.0	98.7	68.4	44.0	31.9	22.5	16.9	12.8	9.9	7.7	-	-	-	-
R-ZF-33	17-Jun-01	42+00, 0.8 m D/S of Zone S	936.0	-	-	-	7.0	-	100.0	100.0	100.0	100.0	97.9	68.8	44.7	28.8	17.8	13.2	10.6	8.5	6.9	-	-	-	-
R-ZF-34	20-Jun-01	35+00, 0.8 m D/S of Zone S	935.6	-	-	-	3.6	-	100.0	100.0	100.0	100.0	99.2	61.5	37.8	27.0	18.3	14.0	11.0	8.6	6.8	-	-	-	-
R-ZF-35	20-Jun-01	43+00, 0.8 m D/S of Zone S	937.0		-	-	4.5	-	100.0	100.0	100.0	100.0	99.4	70.8	46.6	32.6	23.0	17.2	13.7	10.6	8.5	-	-	-	-
			MEAN	#DIV/0!	#DIV/0!	#DIV/0!	4.6	#DIV/0!	100.0	100.0	100.0	100.0	98.5	68.2	44.4	31.2	21.6	16.2	12.6	9.8	7.8	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
			MEDIAN	#NUM!	#NUM!	#NUM!	4.1	#NUM!	100.0	100.0	100.0	100.0	98.7	68.8	44.7	31.9	22.5	16.9	12.8	9.9	7.7	#NUM!	#NUM!	#NUM!	#NUM!
			MAXIMUM (*)	0.0	0.0	0.0	7.0	0.0	100.0	100.0	100.0	100.0	99.4	71.5	49.1	35.9	25.8	19.7	15.0	11.6	9.1	0.0	0.0	0.0	0.0
			MINIMUM (*)	0.0	0.0	0.0	3.6	0.0	100.0	100.0	100.0	100.0	97.5	61.5	37.8	27.0	17.8	13.2	10.6	8.5	6.8	0.0	0.0	0.0	0.0

Note: These are 100% limits.
Values for Standard Proctor maximum dry density and optimum moisture content include oversize correction.
IP - In progress
R1 Atterberg Limits (ASTM D4318)
R2 Moisture Content (ASTM D2216)
R3 Particle Size Distribution (ASTM D422)
R4 Laboratory Compaction (ASTM D1557)
R6 Specific Gravity (ASTM D854)

TABLE 4.4

MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION

ZONE T RECORD TEST SUMMARY SHEET

G:\DATA\Engdocs\Geotechnical\Kpsite\Stage 3B Construction\lab\records\[R-ZT-summ.xls]Data Sheet

Knight Piésold CONSULTING

SHEET :	1 of 1
PERIOD :	June 18 to June 24, 2001
PROJECT NO. :	11162/14
AREA :	TSF

MOUNT POLLEY TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION

MATERIAL: Zone T - Transition Zone

Sample No.	Date Sampled	Location	El. (m)	R1 Atterberg Limits PL %	R1 LL %	R1 PI %	R2 Field m/c %	LI %	R3 (Particle Size Distribution) 101.6 / 4 / 4	76.2 / 3 / 3	38.1 / 1.5 / 1 1/2	19.05 / 0.75 / 3/4	9.525 / 0.375 / 3/8	4.75 / 0.187 / #4	2.36 / 0.0937 / #8	1.18 / 0.0469 / #16	0.6 / 0.0234 / #30	0.3 / 0.0165 / #50	0.14986 / 0.0059 / #100	0.07365 / 0.0029 / #200	0.002 / Clay	R4 Standard Proctor Max. Dry Density kg/m³	R4 Optimum m/c %	R6 Specific Gravity
[illegible]	03-Jun-01	42+50, 18 m D/S of Zone S	933.5	-	-	-	4.4	-	-	80.0	45.4	32.3	22.0	14.9	10.8	7.6	5.6	4.2	3.2	2.5	-	-	-	-
[illegible]	23-Jun-01	32+50, 18 m D/S of Zone S	937.6	-	-	-	3.0	-	-	76.2	49.7	34.5	22.9	14.6	9.7	6.4	4.1	2.4	-	-	-	-	-	-
			MEAN	#DIV/0!	#DIV/0!	#DIV/0!	3.7	#DIV/0!	#DIV/0!	78.1	48.1	33.4	22.5	14.8	10.3	7.0	4.9	3.3	3.2	2.5	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
			MEDIAN	#NUM!	#NUM!	#NUM!	3.7	#NUM!	#NUM!	78.1	48.1	33.4	22.5	14.8	10.3	7.0	4.9	3.3	3.2	2.5	#NUM!	#NUM!	#NUM!	#NUM!
			MAXIMUM (*)	0.0	0.0	0.0	4.4	0.0	0.0	80.0	49.7	34.5	22.9	14.9	10.8	7.6	5.6	4.2	3.2	2.5	0.0	0.0	0.0	0.0
			MINIMUM (*)	0.0	0.0	0.0	3.0	0.0	0.0	76.2	46.4	32.3	22.0	14.6	9.7	6.4	4.1	2.4	3.2	2.5	0.0	0.0	0.0	0.0

Note : These are 100% limits.

Values for Standard Proctor maximum dry density and optimum moisture content include oversize correction.

IP - In progress

R1	Atterberg Limits (ASTM D4318)
R2	Moisture Content (ASTM D2216)
R3	Particle Size Distribution (ASTM D422)
R4	Laboratory Compaction (ASTM D1557)
R6	Specific Gravity (ASTM D854)

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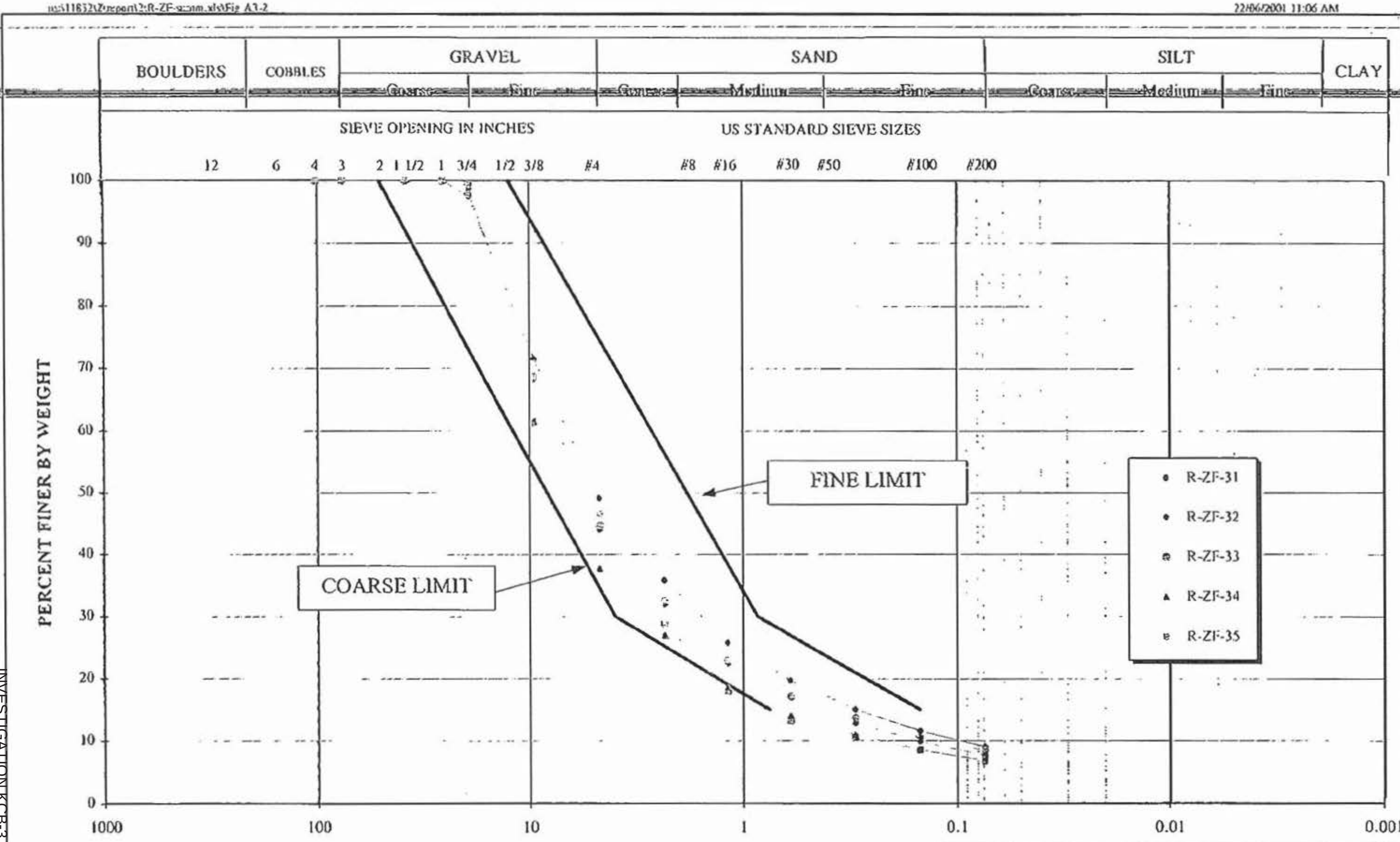
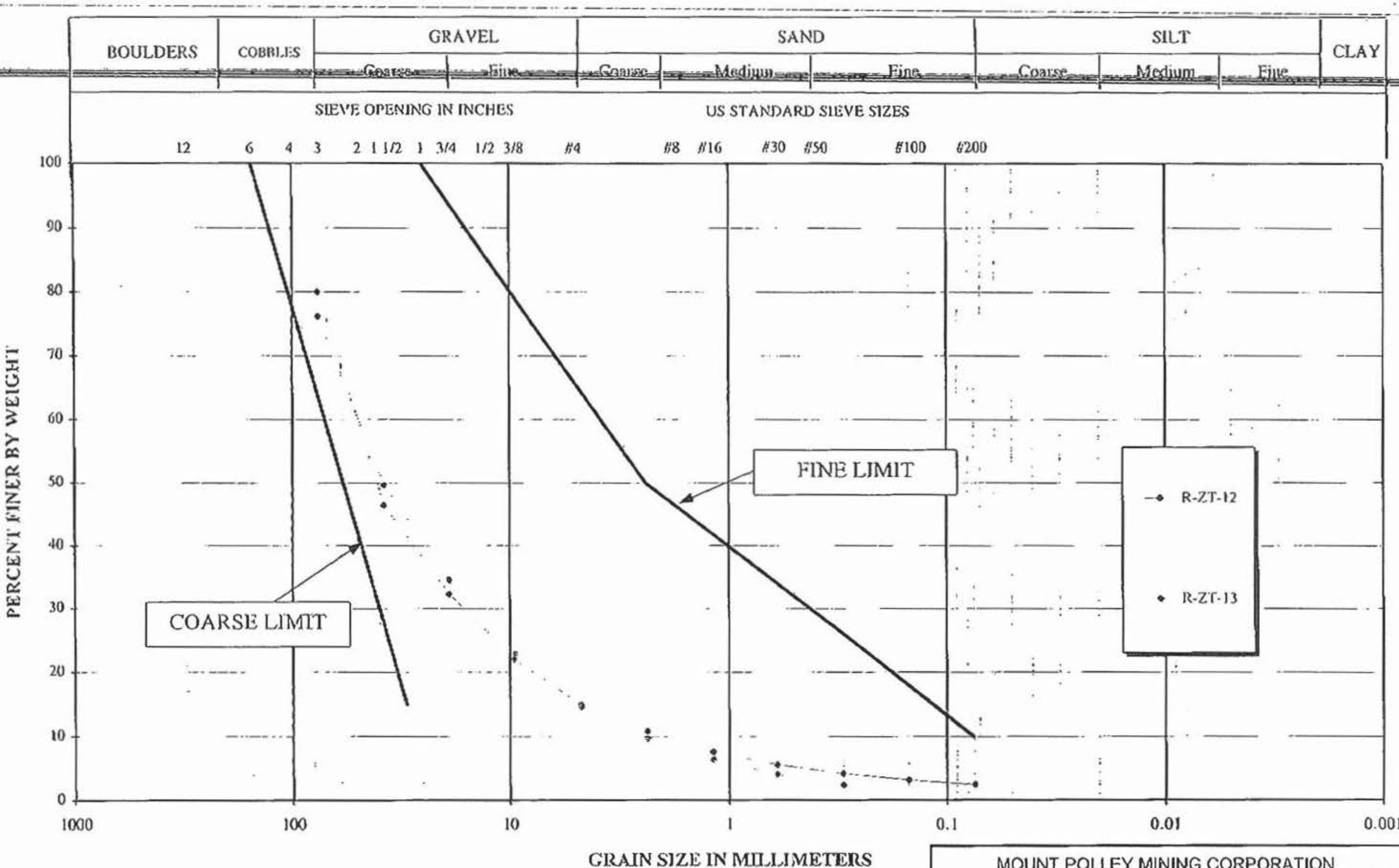
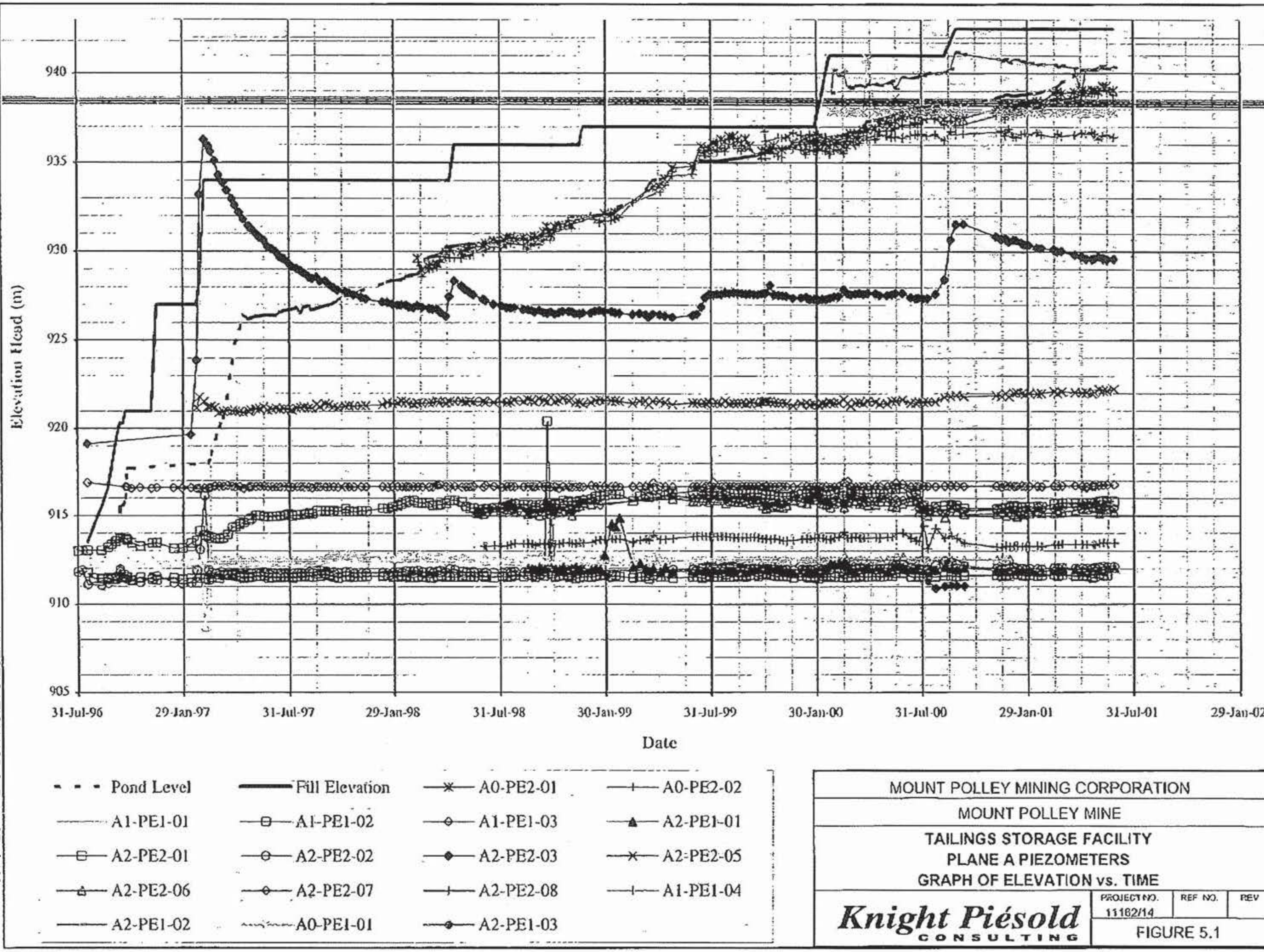


MOUNT POLLEY MINING CORPORATION			
MOUNT POLLEY MINE			
TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION - ZONE F RECORD SAMPLES GRADATION CURVES			
Knight Piésold CONSULTING	PROJECT NO. 11162/14	REF. NO.	REV
	FIGURE 4.2		



MOUNT POLLEY MINING CORPORATION		
MOUNT POLLEY MINE		
TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION - ZONE T RECORD SAMPLES GRADATION CURVES		
Knight Piésold CONSULTING	PROJECT NO. 11162/14	REF NO.	REV.
	FIGURE 4.4		



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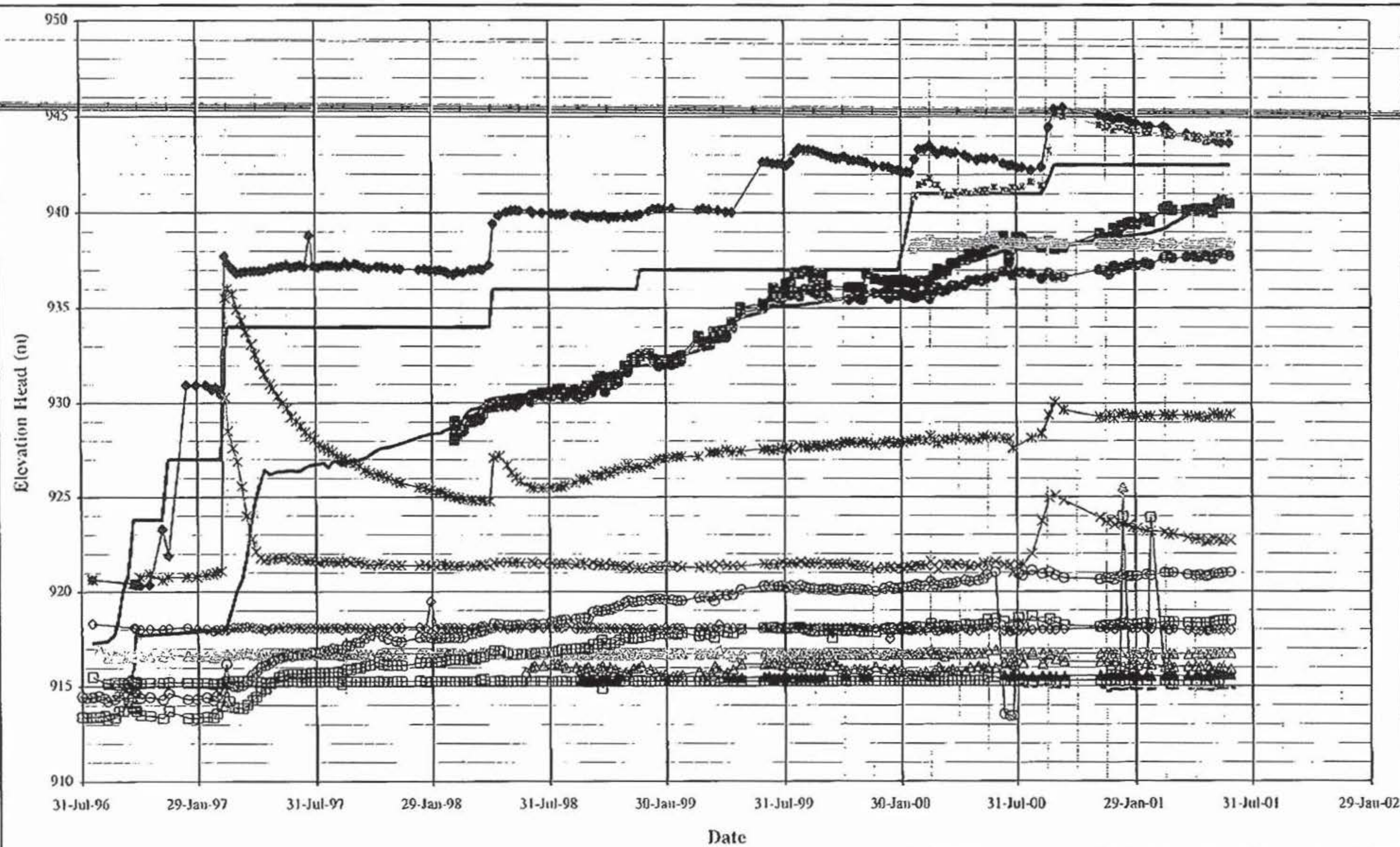
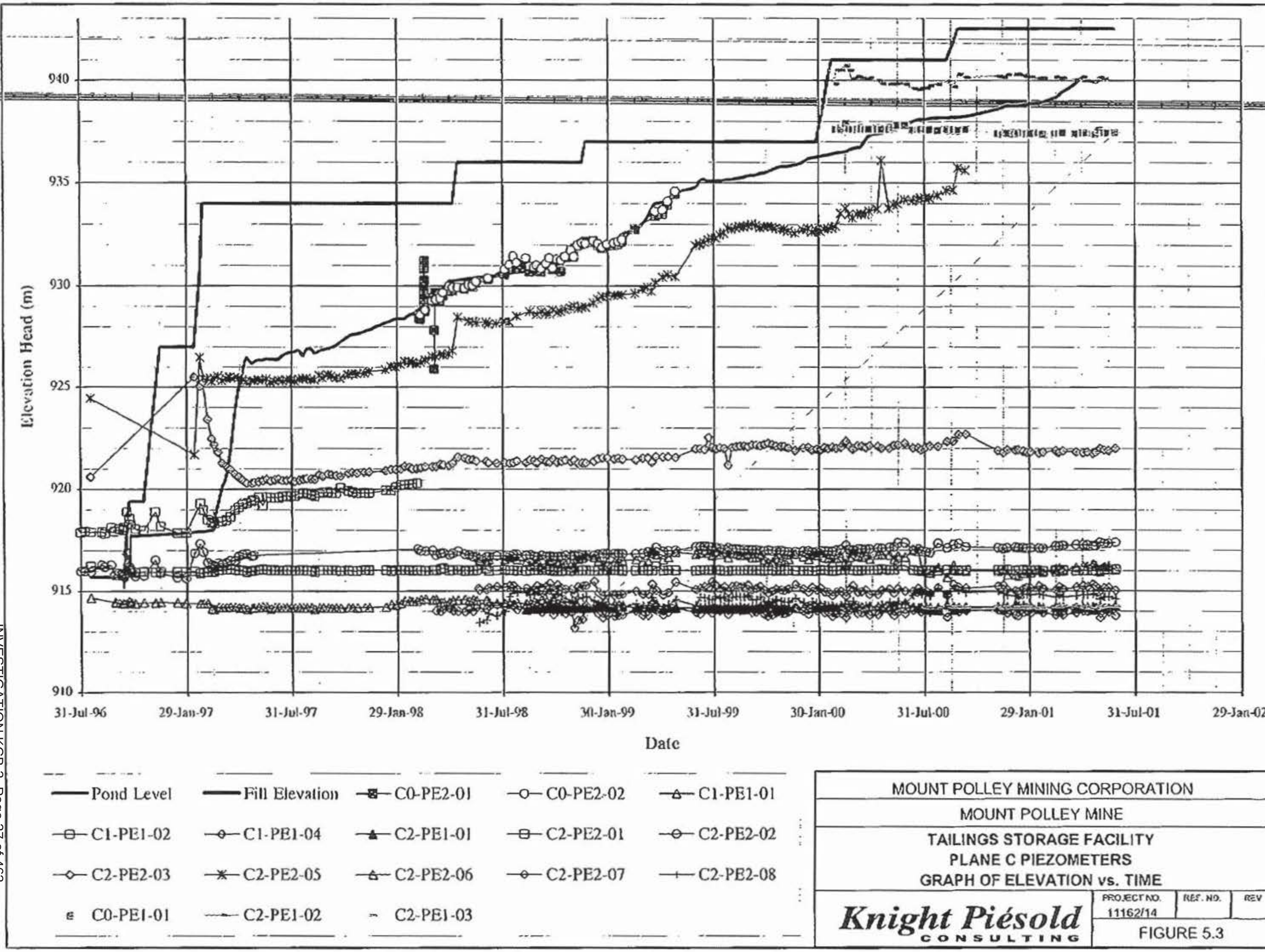
TAILINGS STORAGE FACILITY
PLANE A PIEZOMETERS
GRAPH OF ELEVATION vs. TIME

Knight Piésold CONSULTING	PROJECT NO. 11162/14	REF NO.	REV
	FIGURE 5.1		



MOUNT POLLEY MINING CORPORATION		
MOUNT POLLEY MINE		
TAILINGS STORAGE FACILITY PLANE B PIEZOMETERS GRAPH OF ELEVATION vs. TIME		
PROJECT NO. 11162/14	REF. NO.	REV
Knight Piésold CONSULTING	FIGURE 5.2	



MOUNT POLLEY MINING CORPORATION

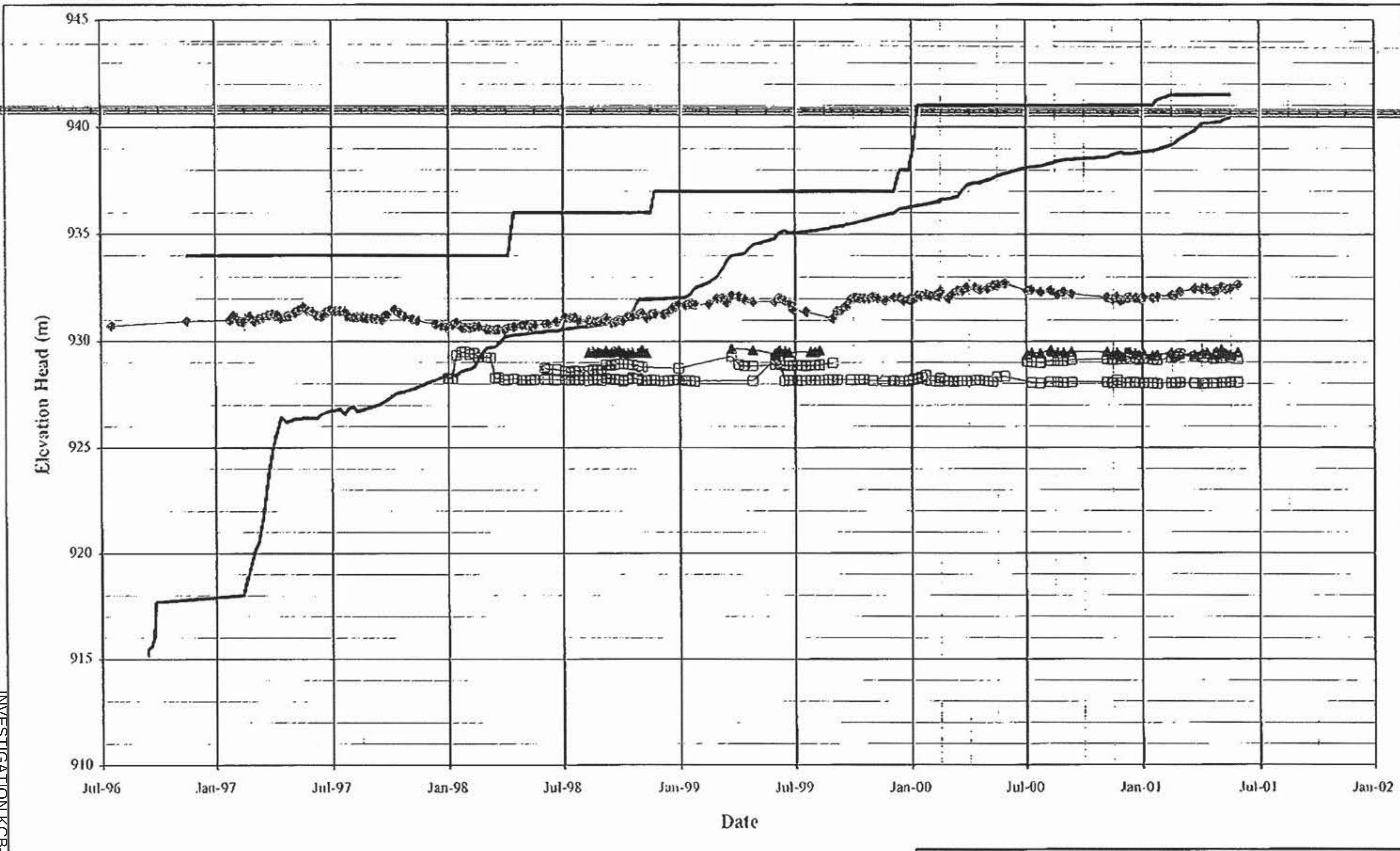
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
PLANE C PIEZOMETERS
GRAPH OF ELEVATION vs. TIME

Knight Piésold CONSULTING

PROJECT NO.	REF. NO.	REV
11162/14		

FIGURE 5.3



MOUNT POLLEY MINING CORPORATION

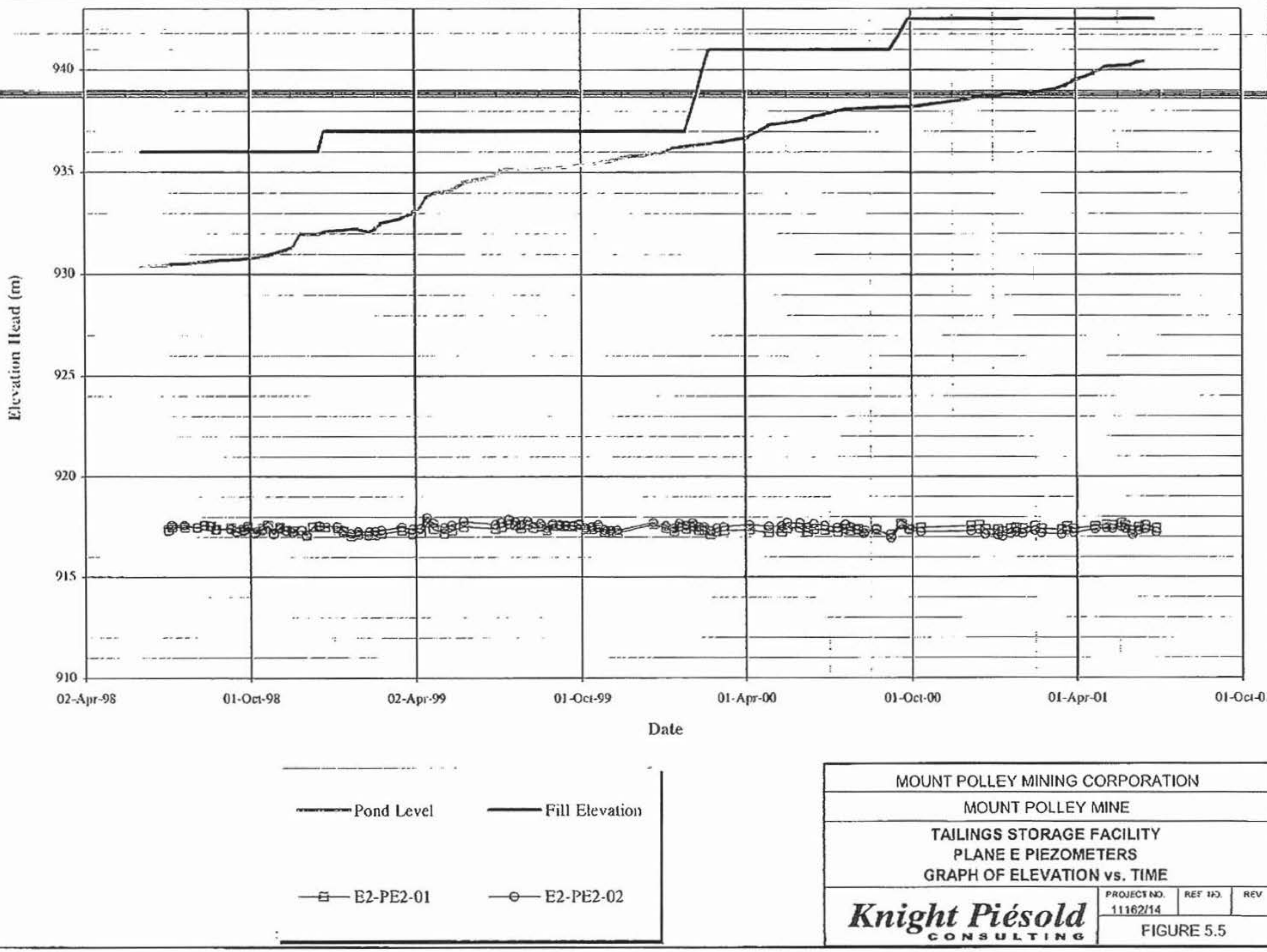
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
PLANE D PIEZOMETERS
GRAPH OF ELEVATION vs. TIME

Knight Piésold CONSULTING

PROJECT NO.	REF NO	REV
11162/14		

FIGURE 5.4

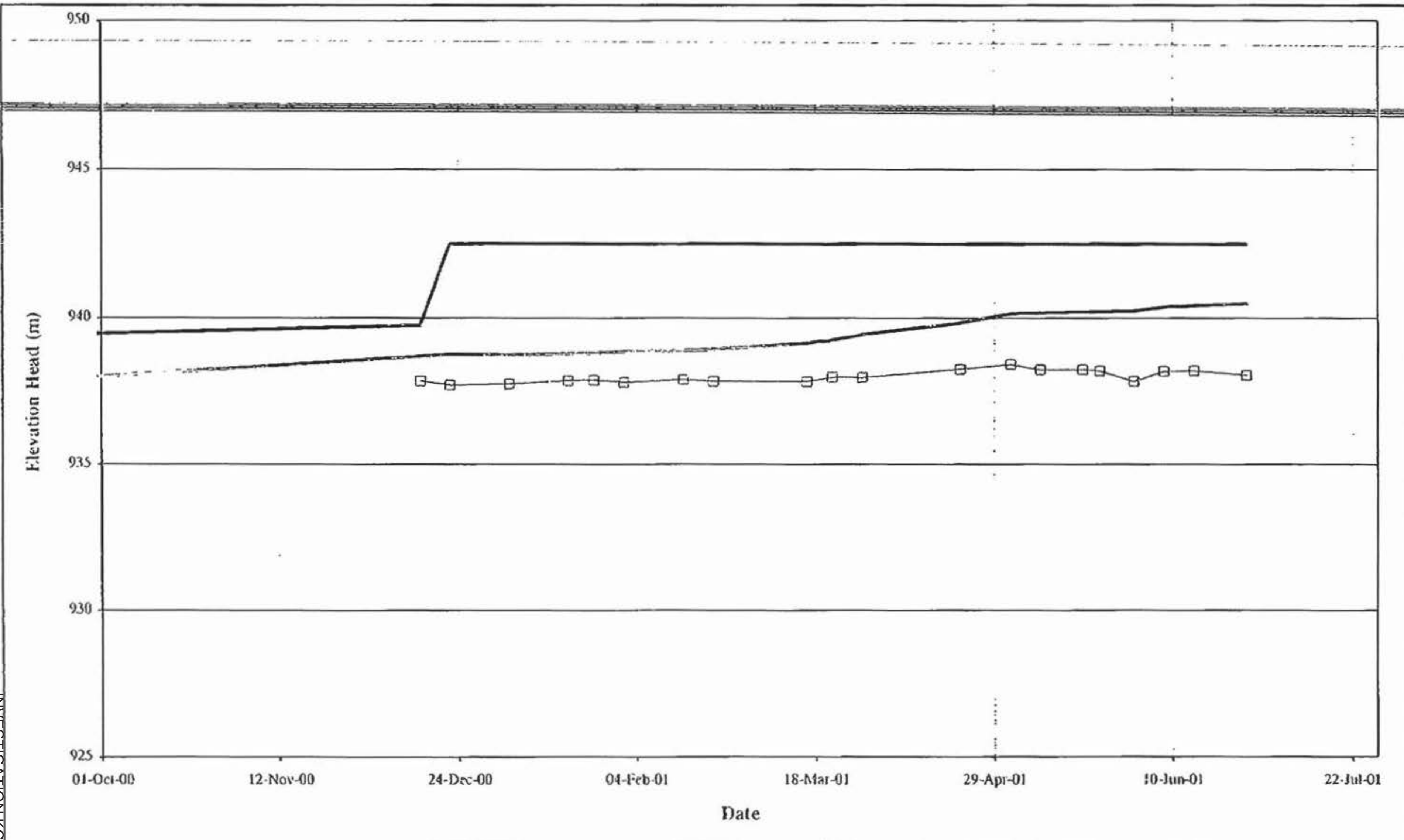


MOUNT POLLEY MINING CORPORATION

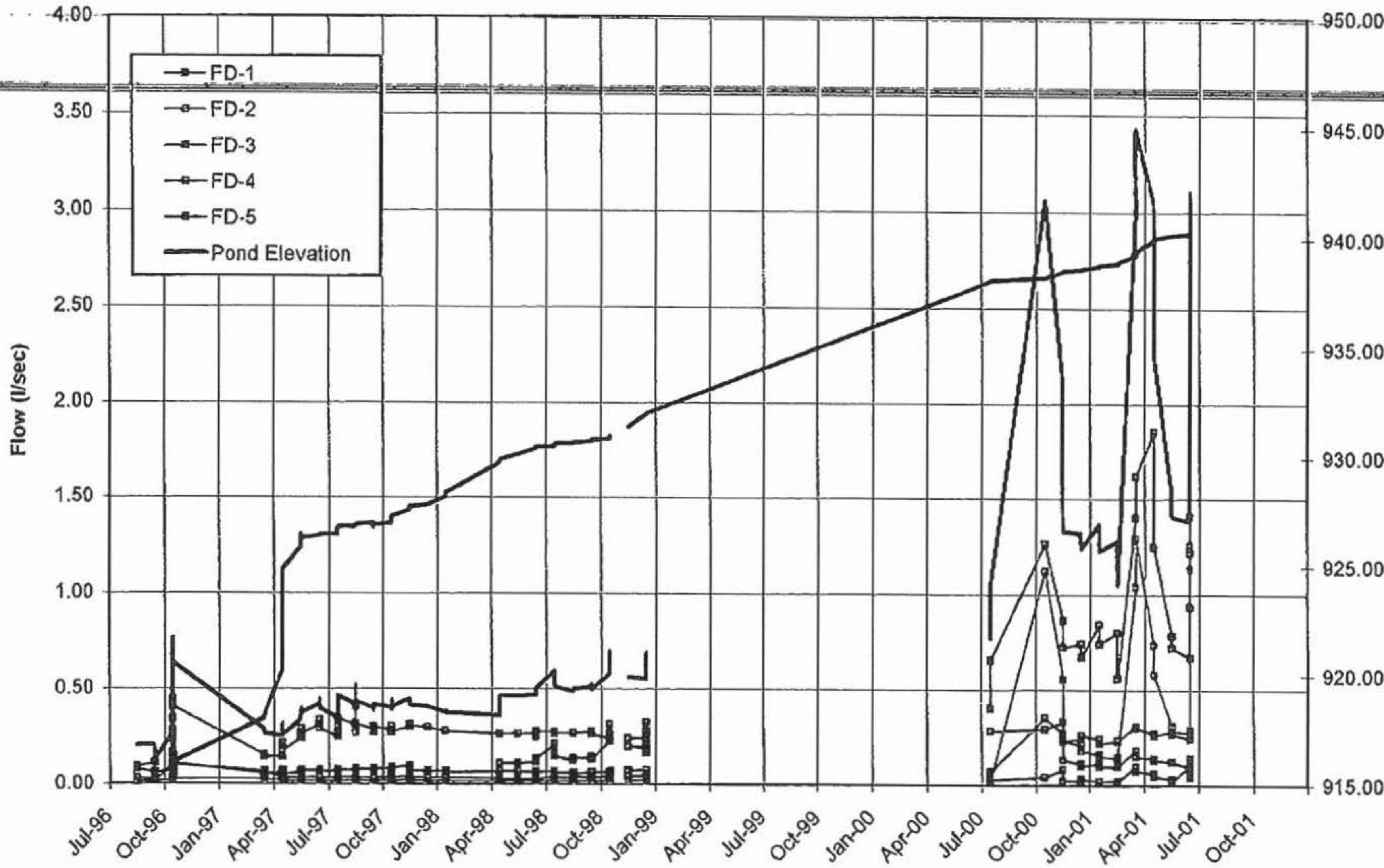
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
PLANE E PIEZOMETERS
GRAPH OF ELEVATION vs. TIME

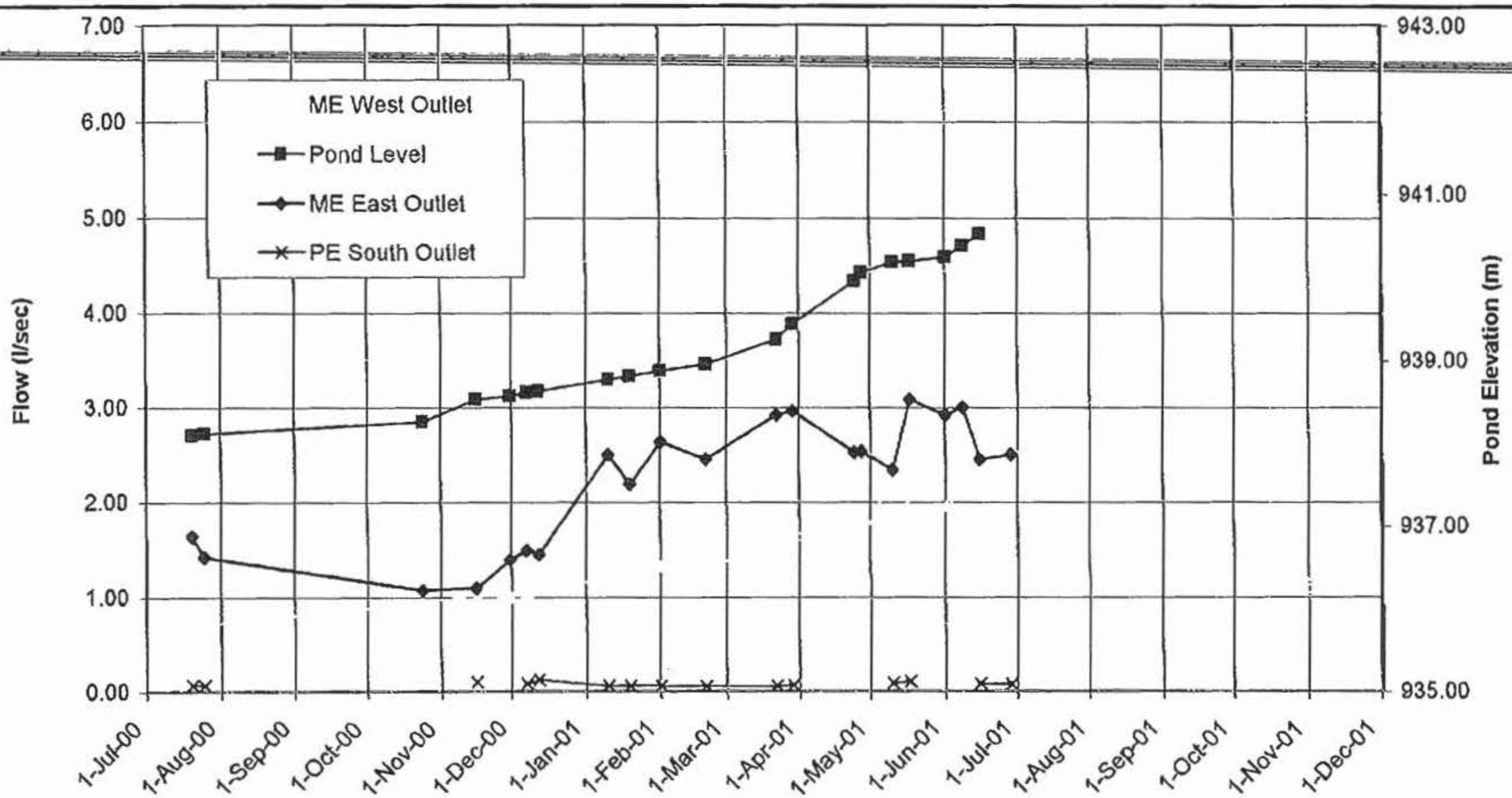
Knight Piésold CONSULTING	PROJECT NO. 11162/14	REF NO.	REV
	FIGURE 5.5		



MOUNT POLLEY MINING CORPORATION		
MOUNT POLLEY MINE		
TAILINGS STORAGE FACILITY PLANE F PIEZOMETERS GRAPH OF ELEVATION vs. TIME		
Knight Piésold CONSULTING	PROJECT NO. 11162/14	REF. NO.	REV.
	FIGURE 5.6	



MOUNT POLLEY MINING CORPORATION		
MOUNT POLLEY MINE		
TAILINGS STORAGE FACILITY MAIN EMBANKMENT FOUNDATION DRAIN FLOWS		
Knight Piésold CONSULTING	PROJECT NO. 11162/13	REF. NO.	REV.
	FIGURE 5.7		

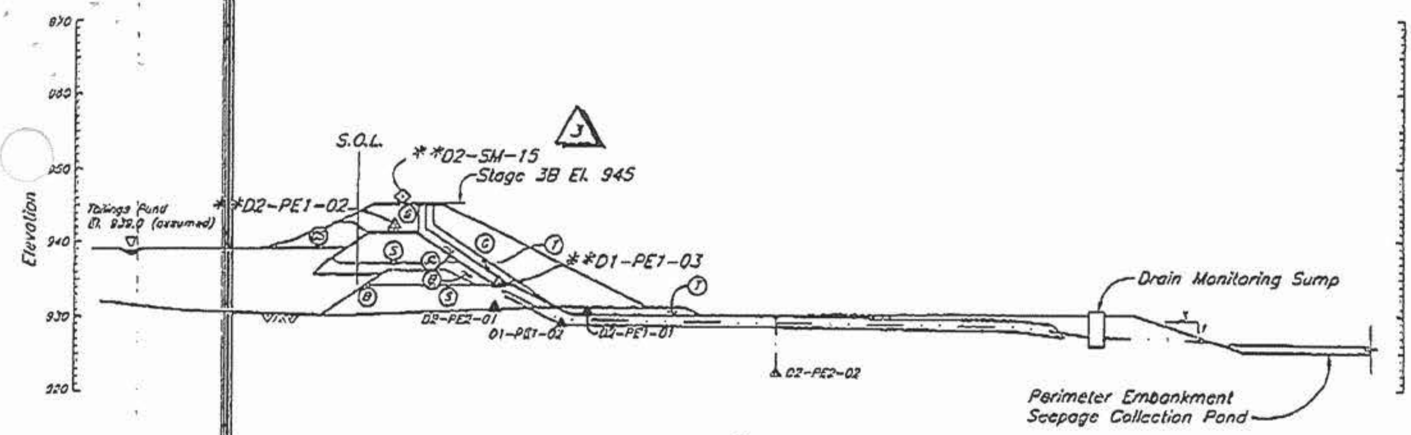


MOUNT POLLEY MINING CORPORATION

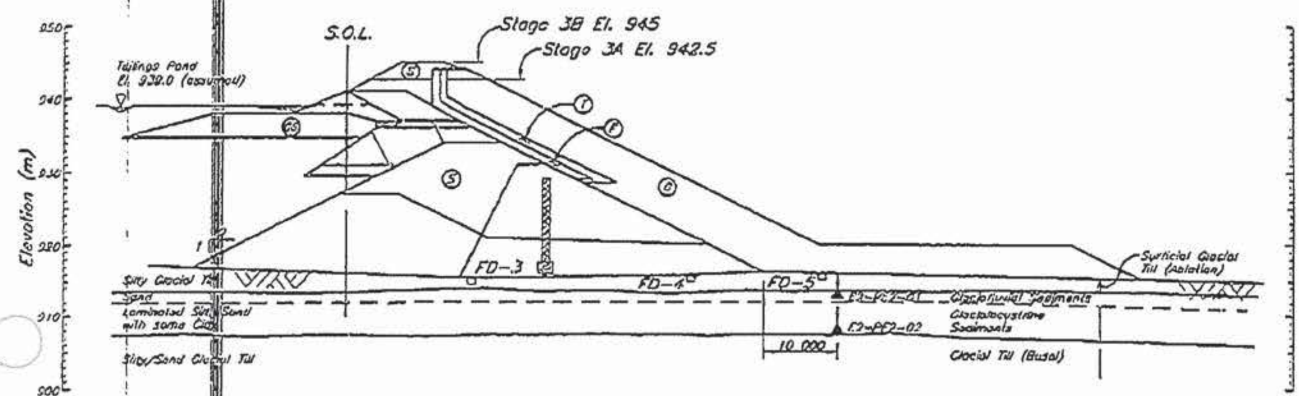
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
UPSTREAM TOE DRAIN FLOWS

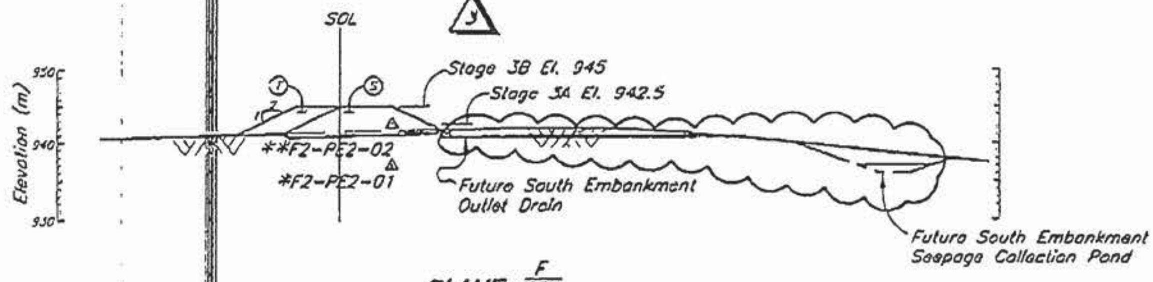
Knight Piésold CONSULTING	PROJECT NO. 11162/13	REF. NO.	REV.
	FIGURE 5.8		



PLANE $\frac{D}{251}$
CH. 39+86



PLANE $\frac{E}{250}$
CH. 17+60



PLANE $\frac{F}{254}$
CH. 7+19

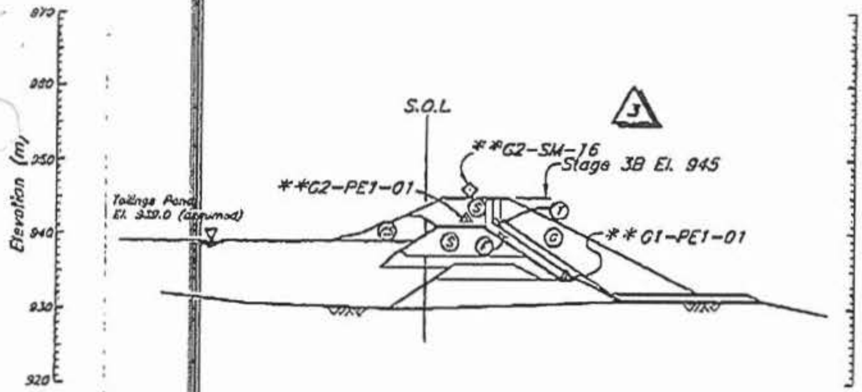
DESCRIPTION
... 3 TAILINGS EMBANKMENT – INSTRUMENTATION SUMMARY OF INSTALLATION & TYPICAL DETAILS
...GE 3 TAILINGS EMBANKMENT – SOUTH EMBANKMENT – INSTRUMENTATION PLAN
STAGE 3 PERIMETER EMBANKMENT – INSTRUMENTATION PLAN
STAGE 3 TAILINGS EMBANKMENT – MAIN EMBANKMENT – INSTRUMENTATION PLAN

REFERENCE DRAWINGS

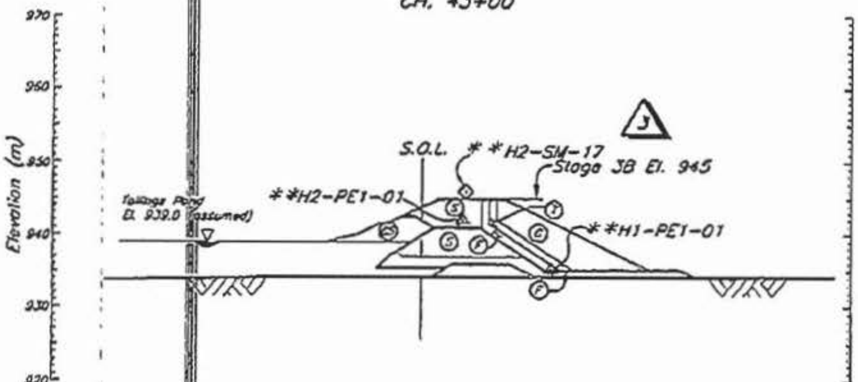
REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D

REV.	DATE	
3	08MAY'01	ISSUED FO
2	26JAN'01	STAGE 3B
1	20OCT'00	PERIMETER
0	2JUN'00	ISSUED FO

REVISIONS



PLANE $\frac{G}{251}$
CH. 43+00



PLANE $\frac{H}{251}$
CH. 36+00

NOTE

1. See Drg. No. 11162-13-256 for Summary of Instrumentation Installations, Typical Details, General Notes and Legend.
2. Instrumentation with one asterisk indicates placement during Stage 3A construction. Instrumentation with 2 asterisks indicate placement during Stage 3B construction.

Scale 10 0 10 20 30 40 50 m

STAGE 3B TENDER	CWM	DSR	JKR	KJB
3 - CREST ELEVATION 945	JRK	AW	JMTW	KJB
ER EMBANKMENT SECTIONS ADDED	JRK	NSO	JMTW	KJB
FOR CONSTRUCTION	JRK	TAM	ABW	KJB
DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
REVISIONS				

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — C.W. MAIR — May 9/01

DESIGNED JRK	CHECKED ABW
DRAWN DSR	APPROVED KJB

MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
STAGE 3 TAILINGS EMBANKMENT
INSTRUMENTATION
SECTIONS - SHEET 2 OF 2

Knight Piésold CONSULTING

SCALE AS SHOWN | REVISION 3

DRAWING NO. 11162-13-259

→File

Knight Piésold CONSULTING	**DATE:**	June 20, 2001	**FILE NO.:**	11162/14.F01/.F02/ /.F04/.F05/.F08
Mount Polley Site Office *Fax: (250) 790-2268* www.knightpiésold.com	**TIME:**		**REF NO.:**	01-12
	OPERATOR:		**PAGES:**	1 of 20
	SENDER:	s.22		

TO:	Ministry of Energy and Mines, Victoria B.C.	**FAX:**	250-952-0481
ATTN:	Chris Carr		
CC:	Ken Brouwer, KP Vancouver Don Parsons / Eric LeNeve, MPMC Site		
SUBJECT:	Progress Report No. 11		

Dear Mr. Carr,

Please find enclosed a copy of Progress Report No. 11 from June 11 to June 17, 2001. If you have any questions, please do not hesitate to contact me on site or Ken Brouwer in our Vancouver office.

Regards,

s.22

Knight Piésold Consulting

MINISTRY OF ENERGY AND MINES
REC'D JUN 20 2001

The content of this communication is confidential. If you are not the intended recipient, please notify us immediately. Unauthorized use or disclosure of this communication or its content is unlawful.

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CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - STAGE 3 CONSTRUCTION
PROGRESS REPORT NO. 11 – JUNE 11 TO JUNE 17, 2001

SECTION 1.0 - GENERAL

Mount Polley Mining Corporation (MPMC) continued Stage 3B construction activities. Knight Piésold Ltd. (KP) carried out QA/QC activities during the reporting period.

The scope of work includes:

1. Placement of Zones F, T and C to approximate El. 941.5 m on the Perimeter Embankment (Ch. 32+00 to 44+50). MPMC is carrying out this work with the exception of filter sand hauling between the millsite and the TSF, which is being completed by sub-contractors.
2. Placement of Zones CBL, S, F, T and C on the Main, Perimeter and South Embankments to El. 945 m. This work will be carried out under contract. A Contractor for this work has yet to be determined.

1.1 PERSONNEL

The following KP personnel were on site during the reporting period:

- s.22 Resident Engineer.

The following MPMC personnel were on site during the reporting period:

- Don Parsons Mine Superintendent
- Eric LeNeve Tailings Coordinator
- Charlie O'Hara General Foreman
- s.22 Site Foreman
- Site Foreman

1.2 CONTRACT DEVELOPMENTS

153 Mile Contracting won the contract for the filter sand haul between the millsite and the TSF. 153 Mile Contracting is responsible for loading, transporting and dumping material only. MPMC is responsible for crushing, placement and compaction. As mentioned above, a Contractor will be chosen to complete the Stage 3B embankment raise from approximate El. 941.5 m to 945 m.

MPMC has completed a preliminary construction schedule for the project. The target is to complete the required work by September 30, 2001. The schedule calls for MPMC to complete

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their portion of work by July 15, 2001. The Contractor is to begin work on July 15 and to finish on September 30, 2001. This schedule is subject to modification; however, the schedule will be ultimately governed by freeboard concerns at the TSF.

1.3 DESIGN DEVELOPMENTS

No new design developments have occurred over the reporting period.

1.3 WEATHER

Conditions were unsettled during the reporting period. This included periods of cloud, rain and sunshine. Maximum daytime highs reached about +20 °C and nightly lows sank to as low as +2 °C.

1.4 SAFETY

No safety incidents were reported over the reporting period.

SECTION 2.0 - TAILINGS FACILITY OPERATION AND MAINTENANCE

Tailings were spigotted along the Main Embankment crest during the reporting period at approximate Chainage 19+00 and 17+00. The 200 m extension of the pipeline was completed on June 16. Tailings were present upstream of the Main Embankment at all areas on June 14. It is anticipated that tailings will form a substantial beach upstream of the ridge between the Main and South Embankments by discharging at Ch. 17+00.

The Tailings Pond remains a significant distance from the Perimeter Embankment.

SECTION 3.0 - CONSTRUCTION ACTIVITIES

3.1 EQUIPMENT

MPMC used the following equipment over the reporting period:

- Excavators: 1 Hitachi EX 270
- Haul Trucks: 2 Caterpillar 777 85T
- Loaders: 1 Caterpillar 992
- Dozers: 1 Caterpillar D7G, 1 Caterpillar D8R
- Compactors: 1 Caterpillar CS 563 10T vibratory smooth drum
- Graders: 1 Caterpillar 14G, 1 Caterpillar 16G
- Drills: 1 Svedala STK
- Service and fuel trucks
- 153 Mile Contracting: 6 highway dump trucks and Caterpillar 980B and 966 loaders

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MPMC carried out the following activities during the reporting period:

- Removal of saturated fill from the downstream face of the Perimeter Embankment, Ch. 43+00 to 40+50, El. 937 to 940 m.
- Placement of Zone F fill on the Perimeter Embankment: Ch. 43+25 to 45+50, El. 936 to 941.5 m and Ch. 34+00 to 35+50, El. 934 to 937 m.
- Placement of Zone C fill on the Perimeter Embankment, Ch. 40+00 to 43+25, El. 932 to 934 m and Ch. 35+75 to 38+50, El 932.5 to 934 m.
- Development of the Rock Borrow for Zones T and C materials.

Zone C was supplied from the Rock Borrow, while Zone F was delivered from the crushed stockpile at the millsite. Zone C was placed in 1 metre thick, horizontal lifts to the downstream toe of the Stage 3B Perimeter Embankment. Zone F was placed up the slope on top of the existing Zone S.

SECTION 4.0 - KNIGHT PIÉSOLD ACTIVITIES

4.1 GENERAL

KP activities over the reporting period included the following:

- Monitoring and inspection of saturated material removal and fill placement of Zones C and F.
- Submission of daily summaries of QA/QC and construction activities to MPMC.
- Control and Record sampling and testing of embankment fill materials.
- Ongoing discussions and correspondence with MPMC and KP Vancouver with regard to current and future design.
- Preparation of progress reports.

4.2 Laboratory Testing

The following samples were processed during the reporting period:

- C-ZF-34, 35 and 36
- R-ZF-33

All three control samples carried out on Zone F failed the grain size specification on the #'s 8, 16 and 30 sieves. The curves were sent to the KP Vancouver office for filter relationship analyses. The results of the analyses show that the latest Zone F samples have a filter relationship with the Zone S that is present in the Perimeter Embankment but do not have a filter relationship with the cycloned sand. As a result, KP gave permission to MPMC to use this material against the Zone S.

The subsequent record test failed the grain size specification on the # 16 sieve only. Due to the above discussion, this material was allowed to remain in place.

All tests carried out during the reporting period are presented in the attached tables and figures.

SECTION 5.0 - MONITORING

5.1 GENERAL

Instrumentation was monitored during the reporting period. Data collected to date indicates that the TSF is performing well within design tolerances.

5.2 VIBRATING WIRE PIEZOMETERS

No new piezometers were installed over this period. Piezometer readings are taken on a weekly basis. The results from the monitoring are shown on Figures 5.1 to 5.6. Locations of the piezometers are presented on the attached Drawings.

Foundation Piezometers

No substantial changes were noted in the remaining foundation piezometers.

Fill Piezometers

The majority of the Main Embankment glacial till piezometers responded to construction of the overlying Stage 3A fills with increasing pore pressures. These piezometers are now fully dissipated, as a constant, horizontal trend has been showing for some time now.

Two piezometers located within the Stage 1A glacial till fill have historically registered anomalous values, and warrant discussion.

Piezometer B2-PE2-03 reacted strongly to fill placement during initial construction. Pore pressures did not dissipate in the periods following fill placement, but remained constant. This is in direct contrast to other instruments located nearby. This trend changed in 1999, when B2-PE2-03 began to show dissipation at the completion of fill placement. This new trend has been repeated three times, with approximately the same dissipation rate after each stage of construction, with an increase in pore pressure between 50 and 100% of the increase in total stress. It appears that drainage paths were limited in the fill around this piezometer and pore pressures are still equilibrating.

Piezometer C2-PE2-05 is also located in the Stage 1A glacial till fill. This instrument historically showed little or no reaction to construction, but indicated a slow, steady increase in pore pressure over time. This suggests that pore pressures in the fill around C2-PE2-05 are reaching a steady state condition as the phreatic surface moves through the fill. It should be noted that the pressure head registered by this piezometer is approximately 10 m. This is similar to other piezometers located in comparable locations in the glacial till fill.

Drain Piezometers

All drain piezometers have remained static and at very low head indicating free draining conditions within the embankment drainage systems.

Tailings Piezometers

Water levels at the tailings piezometers continue to mimic the pond level, except at the Main Embankment, where the upstream toe drain has resulted in a depressed phreatic surface.

5.3 DRAIN FLOWS

Drains flows were recorded on June 15, 2001. The results from the foundation drains and upstream toe drain are shown on Figures 5.7 and 5.8.

SECTION 5.0 - ONGOING ITEMS

The following items will be addressed during upcoming reporting periods:

- MPMC will continue to construct the Stage 3B Perimeter Embankment to El. 941.5 m.
- MPMC will select a Contractor to construct the embankments to El. 945 m.
- KP will continue to provide QA/QC and site supervision activities in accordance with the technical specifications.

Submitted by,

s.22

Knight Piésold Consulting.

Distribution: Eric LeNeve, Tailings Coordinator, MPMC Site
Don Parsons, Mine Superintendent, MPMC Site
Chris Carr, Ministry of Energy and Mines, Victoria, B.C.
Ken Brouwer, KP Vancouver

TABLE 4.1

MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION

ZONE F CONTROL TEST SUMMARY SHEET

P:\ENG DATA\Engdocs\Geotechnical\Knight\Stage 3B Construction\sheets\QC\[C-ZF-summ.xls]Data Sheet

Knight Piésold CONSULTING

PROJECT	MOUNT POLLEY - TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION	SHEET :	1 of 1
		PERIOD :	June 11 to June 17, 2001
		PROJECT NO. :	11162/14
MATERIAL	Zone F - Filter Sand	AREA :	Zone F Stockpile

Sample No.	Date Sampled	Location	El. (m)	C1 Atterberg Limits PL %	LL %	PI %	C2 Field m/c %	LI %	C3 (Particle Size Distribution) 101.6 / 4 / 4	76.2 / 3 / 3	38.1 / 1.5 / 1 1/2	25.4 / 1 / 1	19.05 / 0.75 / 3/4	9.525 / 0.375 / 3/8	4.75 / 0.187 / #4	2.36 / 0.0937 / #8	1.18 / 0.0469 / #16	0.6 / 0.0234 / #30	0.3 / 0.0165 / #50	0.14986 / 0.0059 / #100	0.07366 / 0.0029 / #200	0.002 / mm / Clay	C4 Standard Proctor Max Dry Density kg/m³	Optimum m/c %	C6 Specific Gravity
ZF-31	28-May-01	Zone F Stockpile	-	-		-	4.1	-	100.0	100.0	100.0	100.0	99.6	84.0	61.6	43.0	28.5	21.3	16.5	12.7	10.0	-	-	-	-
ZF-32	28-May-01	Zone F Stockpile	-	-	-	-	4.0	-	100.0	100.0	100.0	100.0	99.4	78.9	59.9	43.4	29.6	21.9	16.8	13.1	10.4	-	-	-	-
ZF-33	28-May-01	Zone F Stockpile	-	-	-	-	2.9	-	100.0	100.0	100.0	100.0	98.7	56.0	28.1	17.6	12.8	10.1	7.8	6.1	4.8	-	-	-	-
ZF-34	11-Jun-01	Zone F Stockpile	-	-	-	-	3.7	-	100.0	100.0	100.0	100.0	99.3	59.2	35.0	24.2	15.0	10.5	7.8	6.1	4.8	-	-	-	-
ZF-35	11-Jun-01	Zone F Stockpile	-	-	-	-	4.2	-	100.0	100.0	100.0	100.0	97.9	59.3	34.7	24.7	15.3	10.6	8.0	6.4	5.1	-	-	-	-
ZF-36	12-Jun-01	Zone F Stockpile	-	-	-	-	2.6	-	100.0	100.0	100.0	100.0	97.7	60.6	37.0	24.2	16.5	12.2	9.4	7.1	5.6	-	-	-	-
			MEAN	#DIV/0!	#DIV/0!	#DIV/0!	3.6	#DIV/0!	100.0	100.0	100.0	100.0	98.8	66.3	42.7	29.5	19.6	14.4	11.1	8.6	6.8	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
			MEDIAN	#NUM!	#NUM!	#NUM!	3.9	#NUM!	100.0	100.0	100.0	100.0	99.0	60.0	35.0	24.5	15.9	11.4	8.7	6.8	5.4	#NUM!	#NUM!	#NUM!	#NUM!
			MAXIMUM (*)	0.0	0.0	0.0	4.2	0.0	100.0	100.0	100.0	100.0	99.6	84.0	61.6	43.4	29.6	21.9	16.8	13.1	10.4	0.0	0.0	0.0	0.0
			MINIMUM (*)	0.0	0.0	0.0	2.6	0.0	100.0	100.0	100.0	100.0	97.7	56.0	28.1	17.6	12.8	10.1	7.8	6.1	4.8	0.0	0.0	0.0	0.0

Note: These are 100% limits.

Values for Standard Proctor maximum dry density and optimum moisture content include oversize correction.

IP - In progress

C1 Atterberg Limits (ASTM D4318)

C2 Moisture Content (ASTM D2216)

C3 Particle Size Distribution (ASTM D422)

C4 Laboratory Compaction (ASTM D1557)

C6 Specific Gravity (ASTM D854)

TABLE 4.2

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION
ZONE F RECORD TEST SUMMARY SHEET

I:\ENG DATA\Engdocs\Geotechnical\Spec\Stage 3B Construction\lab\record\[R-ZF-summ.xls]Data Sheet

Knight Piésold CONSULTING

SHEET :	1 of 1
PERIOD :	June 11 to June 17, 2001
PROJECT NO. :	11162/14
AREA :	TSF

PROJECT: MOUNT POLLEY - TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION

MATERIAL: Zone F - Filter Sand

Sample No	Date Sampled	Location	El (m)	C1 Atterberg Limits PL %	LL %	PI %	C2 Field m/c %	LI %	C3 (Particle Size Distribution) 101.6 / 4 / 4	76.2 / 3 / 3	38.1 / 1.5 / 1 1/2	25.4 / 1 / 1	19.05 / 0.75 / 3/4	9.525 / 0.375 / 3/8	4.75 / 0.187 / #4	2.36 / 0.0937 / #8	1.18 / 0.0469 / #16	0.6 / 0.0234 / #30	0.3 / 0.0165 / #50	0.14986 / 0.0059 / #100	0.07366 / 0.0029 / #200	0.002 / Clay	C4 Standard Proctor Max Dry Density kg/m³	Optimum m/c %	C6 Specific Gravity
[illegible]ZF-31	28-Mar-01	29+00, 0.5 m D/S of Zone S	-	-	-		4.0	-	100.0	100.0	100.0	100.0	97.5	71.5	49.1	35.9	25.8	19.7	15.0	11.6	9.1	-	-	-	-
[illegible]ZF-32	28-May-01	35+00, 0.5 m D/S of Zone S		-	-	-	4.1	-	100.0	100.0	100.0	100.0	98.7	63.4	44.0	31.9	22.5	16.9	12.8	9.9	7.7	-		-	-
[illegible]ZF-33	17-Jun-01	44+00, 0.5 m D/S of Zone S	-	-			7.0		100.0	100.0	100.0	100.0	97.9	68.8	44.7	28.8	17.8	13.2	10.6	8.5	6.9	-	-	-	-
		MEAN		#DIV/0!	#DIV/0!	#DIV/0!	5.0	#DIV/0!	100.0	100.0	100.0	100.0	98.0	69.6	45.9	32.2	22.0	16.6	12.8	10.0	7.9	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
		MEDIAN		#NUM!	#NUM!	#NUM!	4.1	#NUM!	100.0	100.0	100.0	100.0	97.9	68.8	44.7	31.9	22.5	16.9	12.8	9.9	7.7	#NUM!	#NUM!	#NUM!	#NUM!
		MAXIMUM (*)		0.0	0.0	0.0	7.0	0.0	100.0	100.0	100.0	100.0	98.7	71.5	49.1	35.9	25.8	19.7	15.0	11.6	9.1	0.0	0.0	0.0	0.0
		MINIMUM (*)		0.0	0.0	0.0	4.0	0.0	100.0	100.0	100.0	100.0	97.5	65.4	44.0	28.8	17.8	13.2	10.6	8.5	6.9	0.0	0.0	0.0	0.0

Note - These are 100% limits.

Values for Standard Proctor maximum dry density and optimum moisture content include oversize correction.

IP - In progress

R1 Atterberg Limits (ASTM D4318)

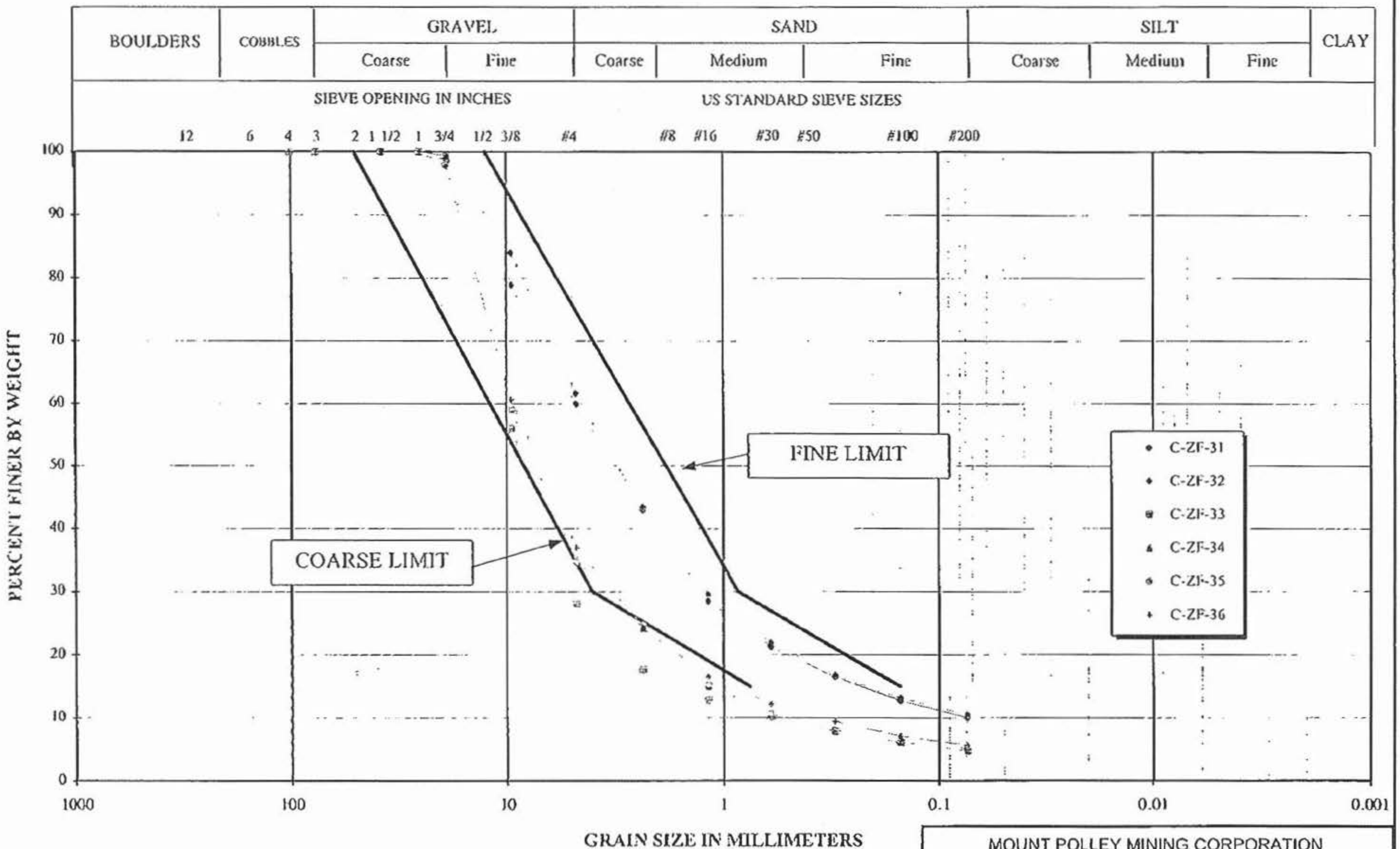
R2 Moisture Content (ASTM D2216)

R3 Particle Size Distribution (ASTM D422)

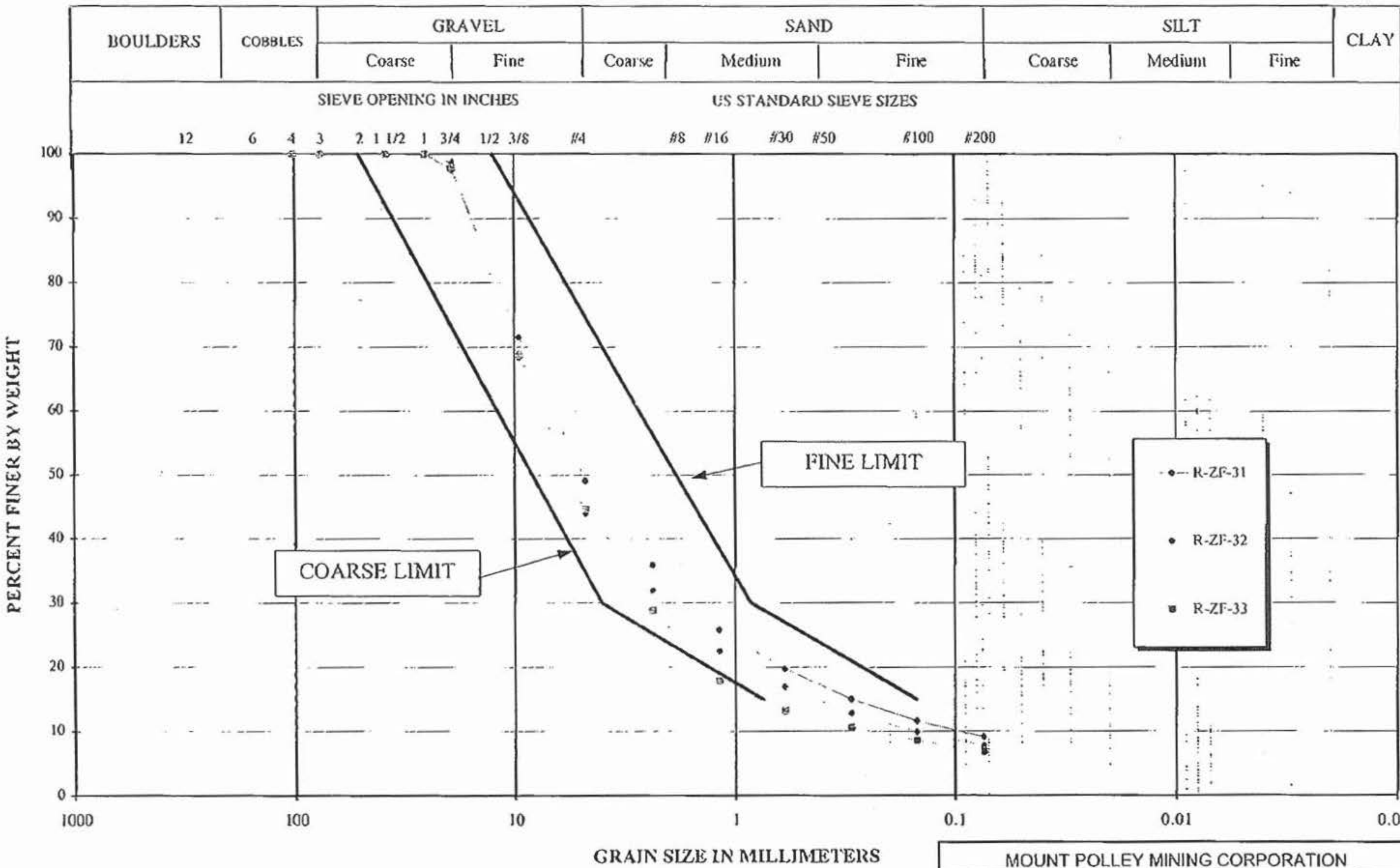
R4 Laboratory Compaction (ASTM D1557)

R6 Specific Gravity (ASTM D854)

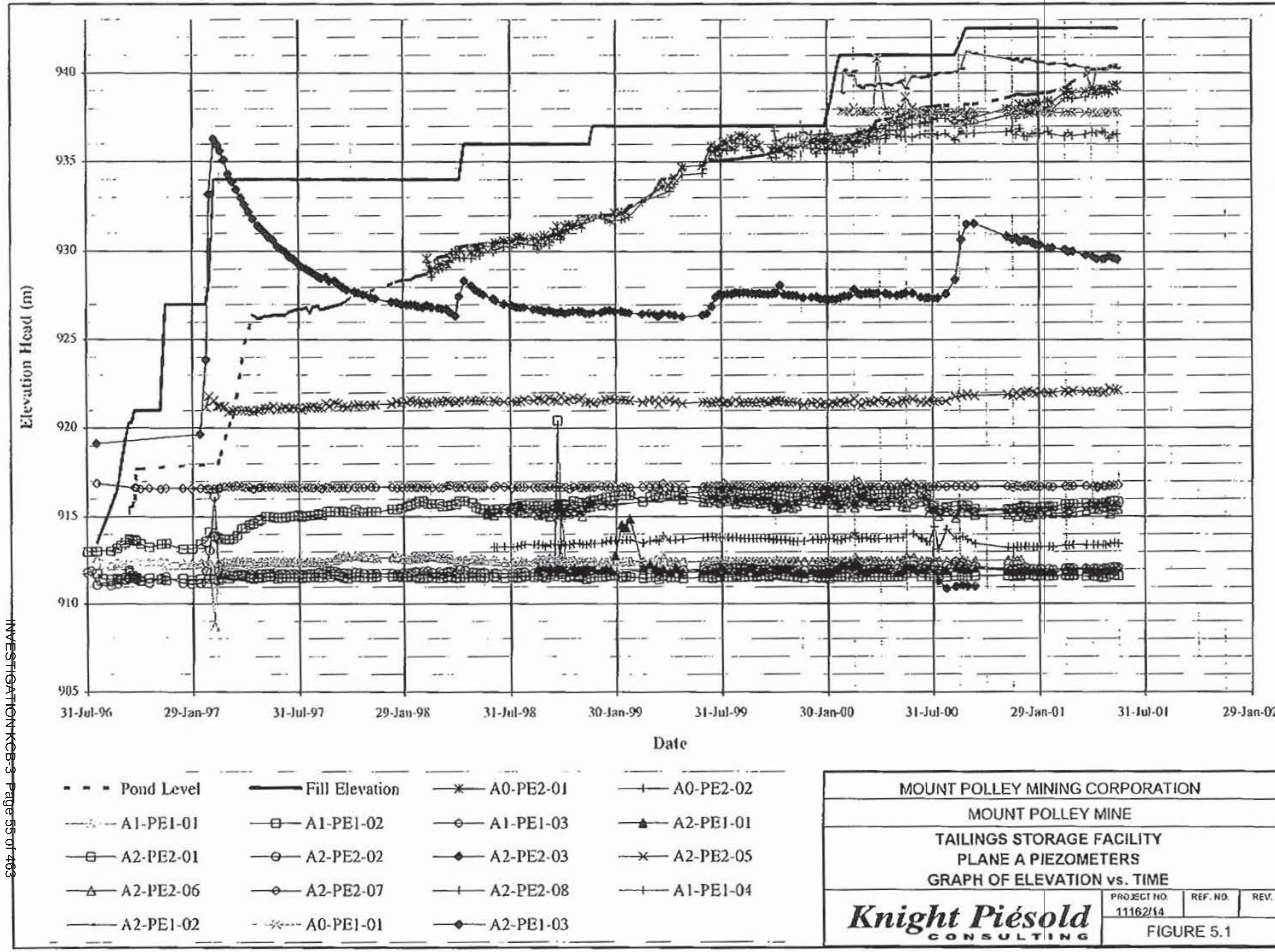
n:\11832\2\report\2\C-ZF-9_mm.xls\Fig A3-2 6/18/01 8:30 AM



MOUNT POLLEY MINING CORPORATION			
MOUNT POLLEY MINE			
TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION - ZONE F CONTROL SAMPLES GRADATION CURVES			
Knight Piésold CONSULTING	PROJECT NO 11162/14	REF NO.	REV.
	FIGURE 4.1		



MOUNT POLLEY MINING CORPORATION			
MOUNT POLLEY MINE			
TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION - ZONE F RECORD SAMPLES GRADATION CURVES			
Knight Piésold CONSULTING	PROJECT NO. 11162/14	REF. NO.	REV
	FIGURE 4.2		



MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
PLANE A PIEZOMETERS
GRAPH OF ELEVATION vs. TIME

PROJECT NO.	REF. NO.	REV.
11162/14		

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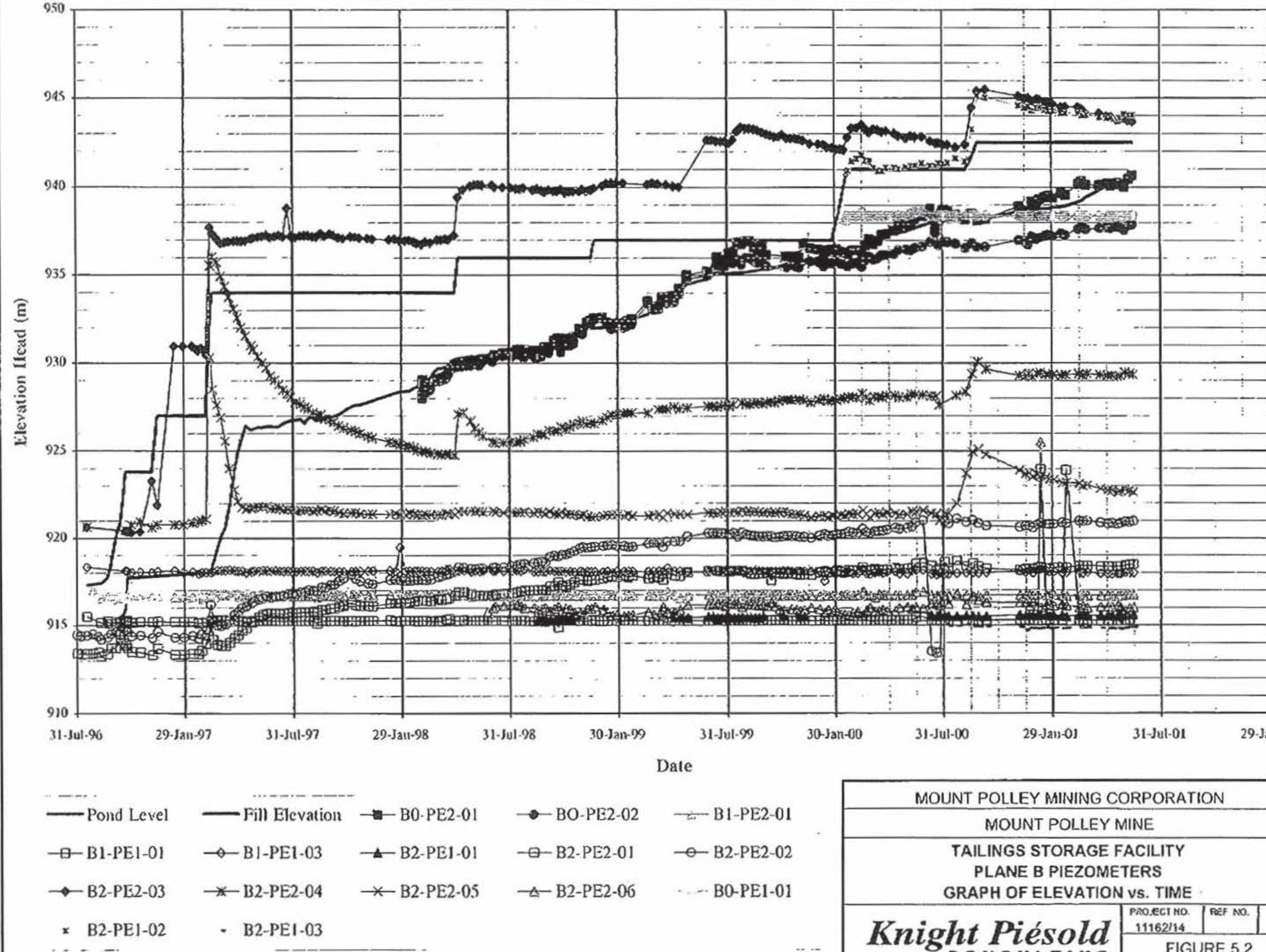
FIGURE 5.1



MOUNT POLLEY MINING CORPORATION

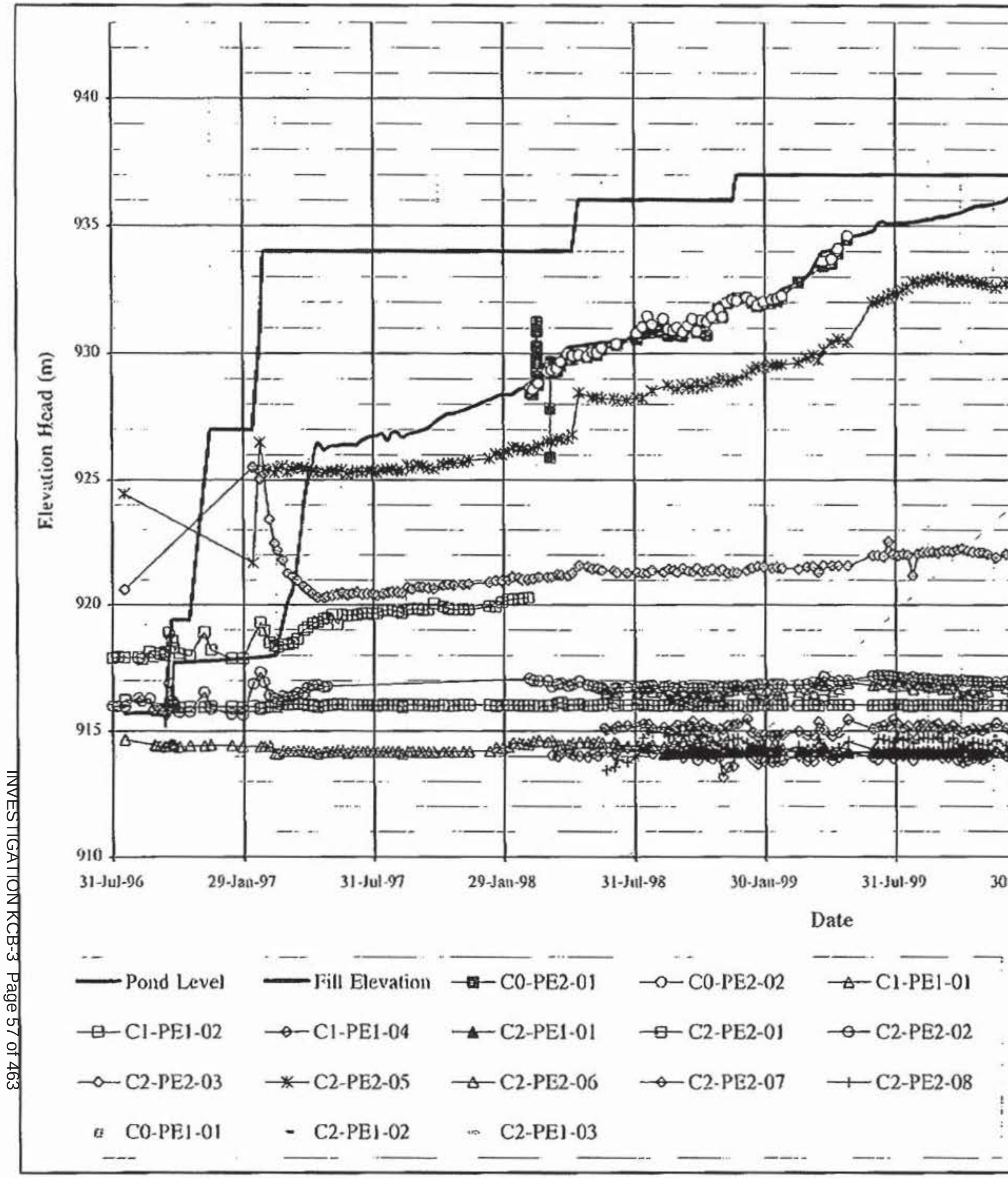
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
PLANE B PIEZOMETERS
GRAPH OF ELEVATION vs. TIME

Knight Piésold CONSULTING

PROJECT NO.	REF NO.	REV.
11162/14		

FIGURE 5.2



MOUNT POLLEY MINING CORPORATION

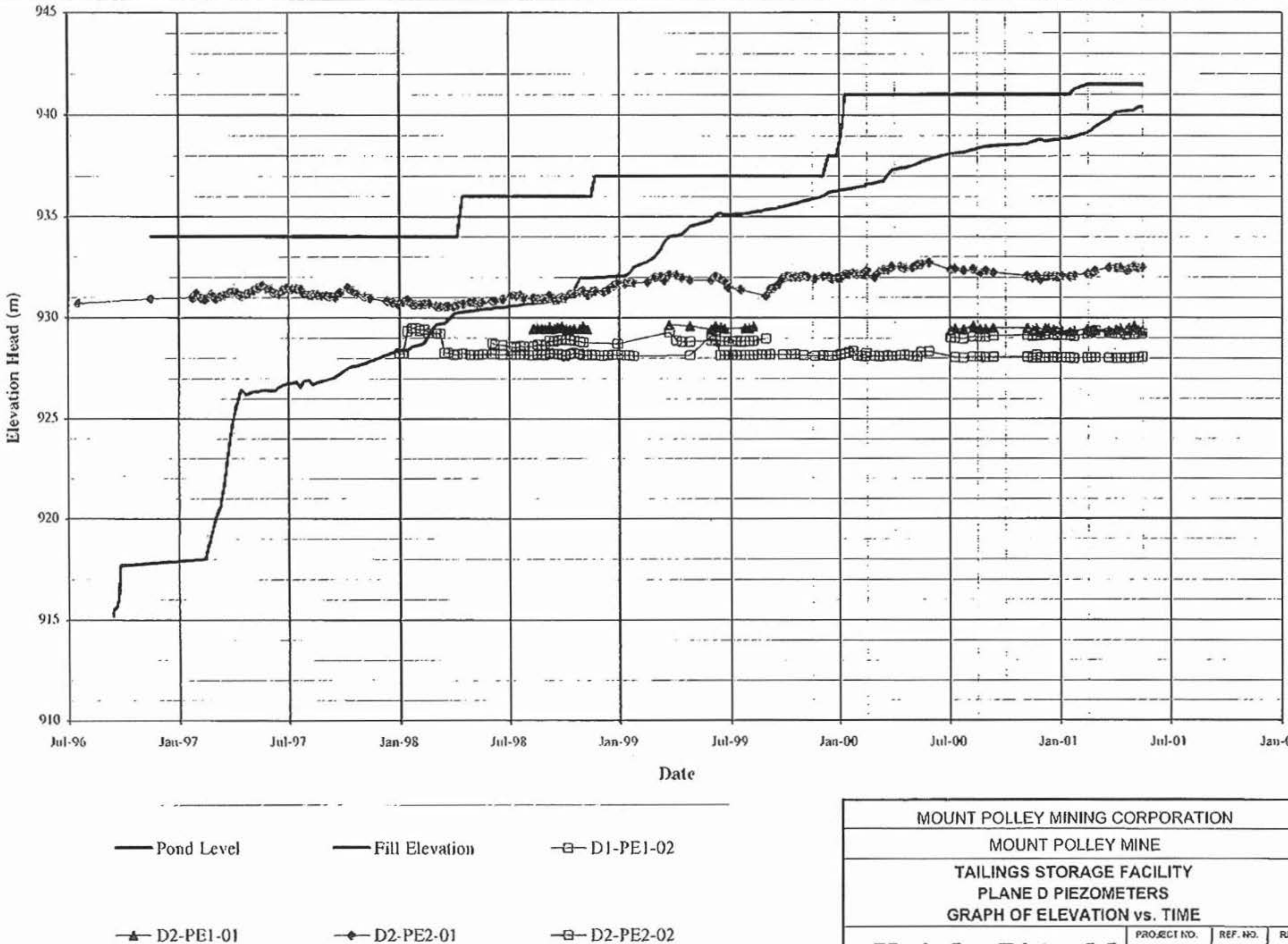
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
PLANE C PIEZOMETERS
GRAPH OF ELEVATION vs. TIME

Knight Piésold CONSULTING

PROJECT NO.	REF. NO	REV
11162/14		

FIGURE 5.3

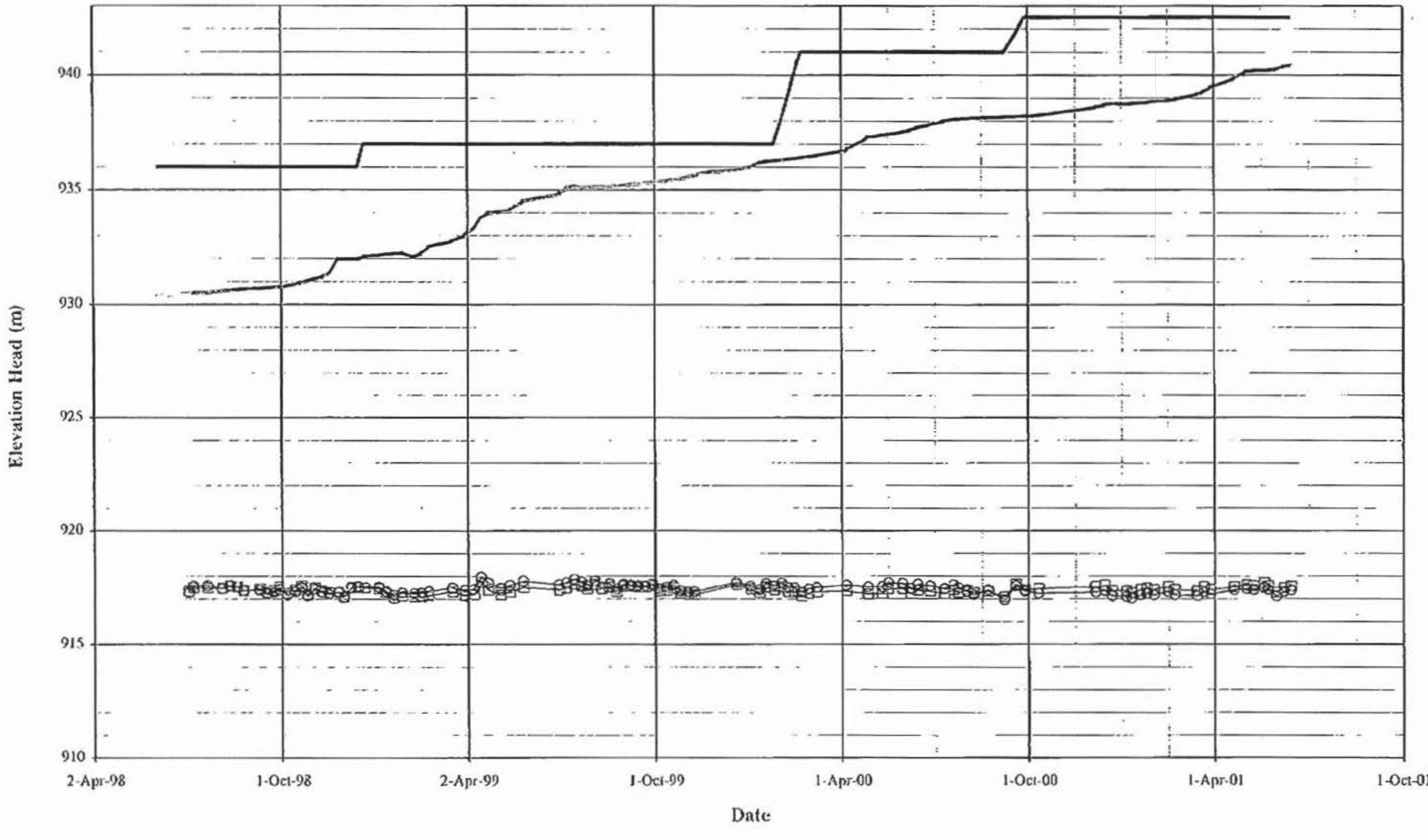


MOUNT POLLEY MINING CORPORATION

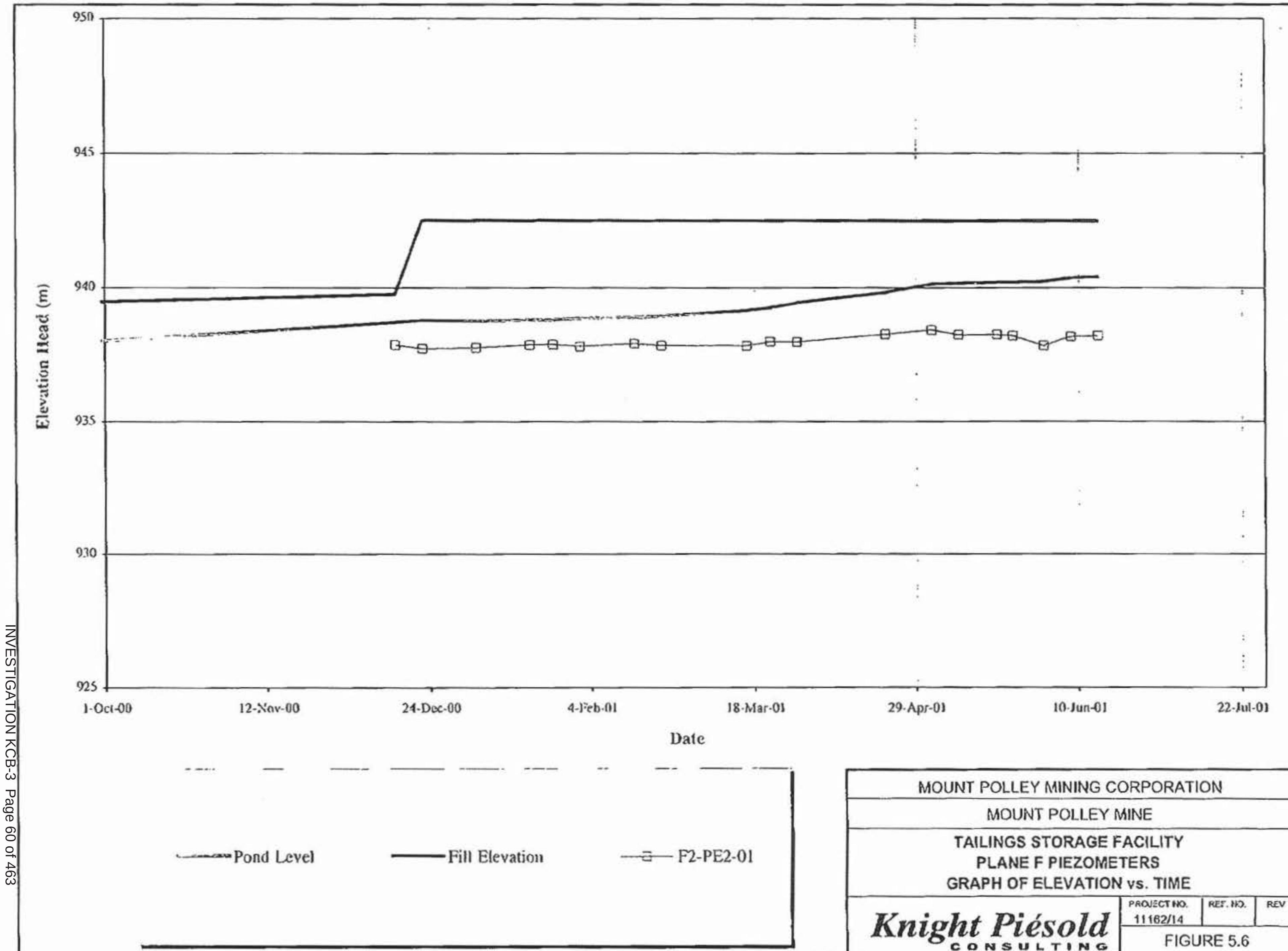
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
PLANE D PIEZOMETERS
GRAPH OF ELEVATION vs. TIME

Knight Piésold CONSULTING	PROJECT NO. 11162/14	REF. NO.	REV.
	FIGURE 5.4		



MOUNT POLLEY MINING CORPORATION		
MOUNT POLLEY MINE		
TAILINGS STORAGE FACILITY PLANE E PIEZOMETERS GRAPH OF ELEVATION vs. TIME		
Knight Piésold CONSULTING	PROJECT NO 11162/14	REF NO.	REV.
	FIGURE 5.5		

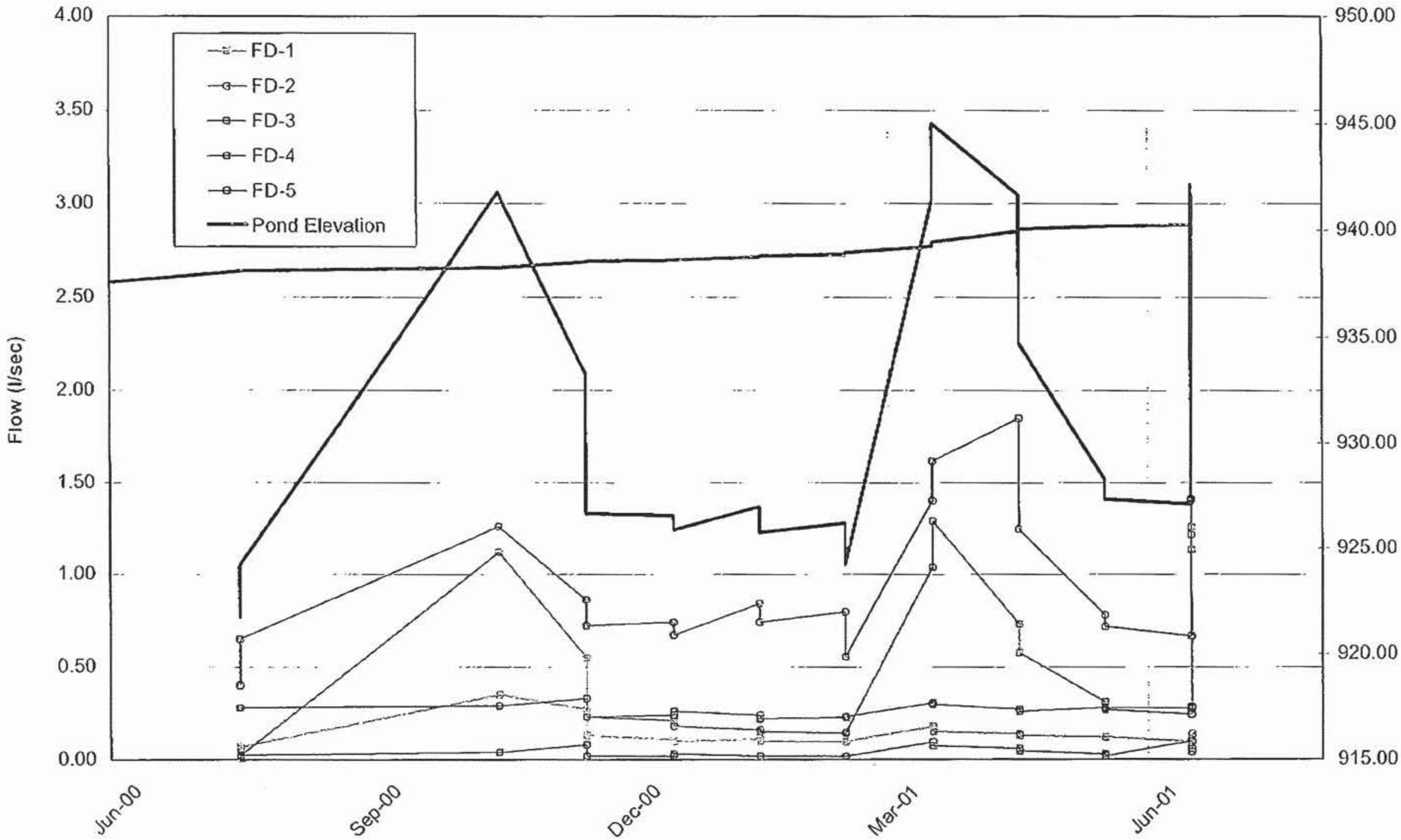


MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

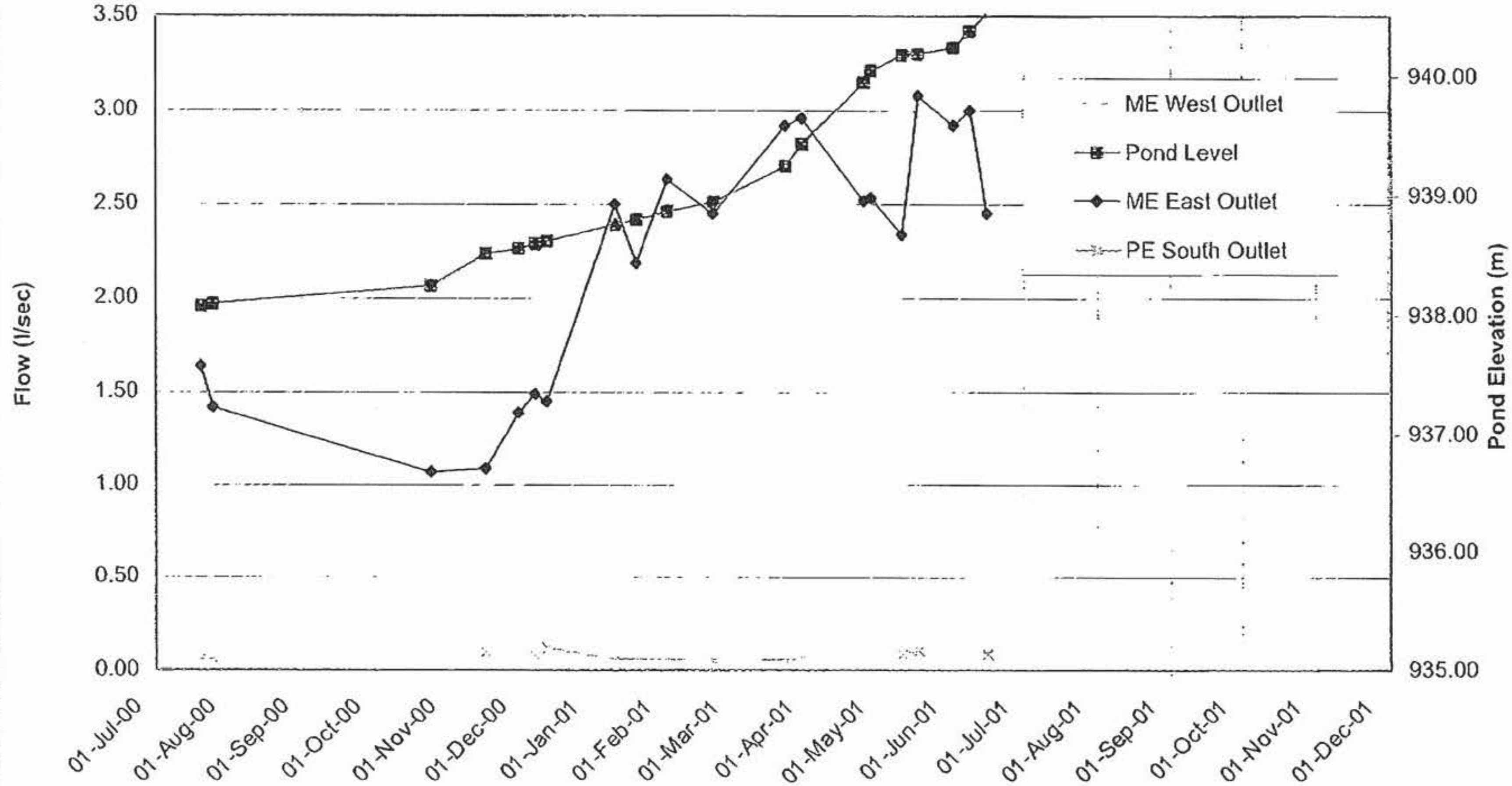
TAILINGS STORAGE FACILITY
PLANE F PIEZOMETERS
GRAPH OF ELEVATION vs. TIME

Knight Piésold CONSULTING	PROJECT NO. 11162/14	REF. NO.	REV
	FIGURE 5.6		



MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY MAIN EMBANKMENT FOUNDATION DRAIN FLOWS

Knight Piésold CONSULTING	PROJECT NO 11162/13	REF. NO.	REV
	FIGURE 5.7		

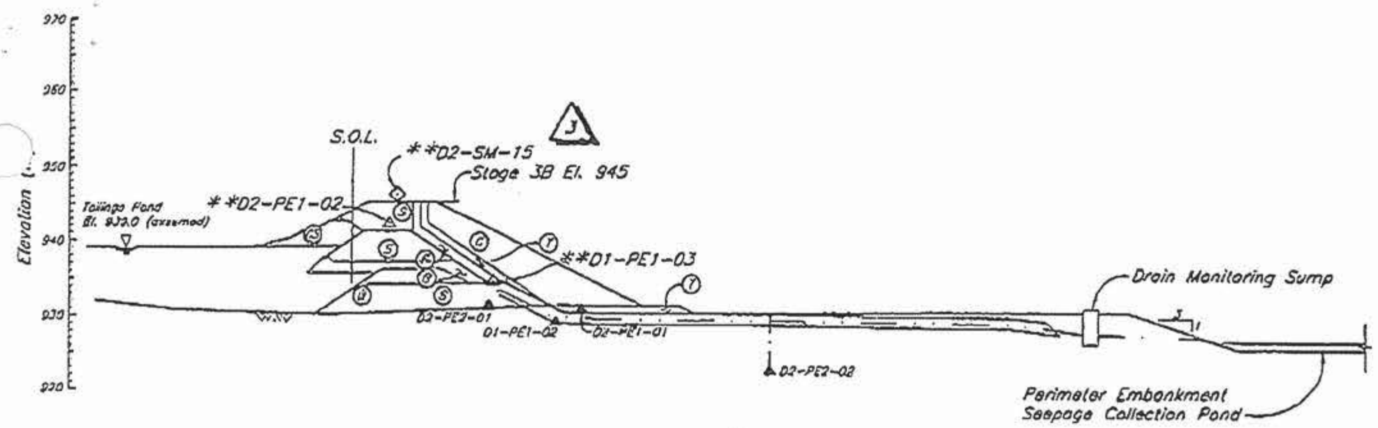


MOUNT POLLEY MINING CORPORATION

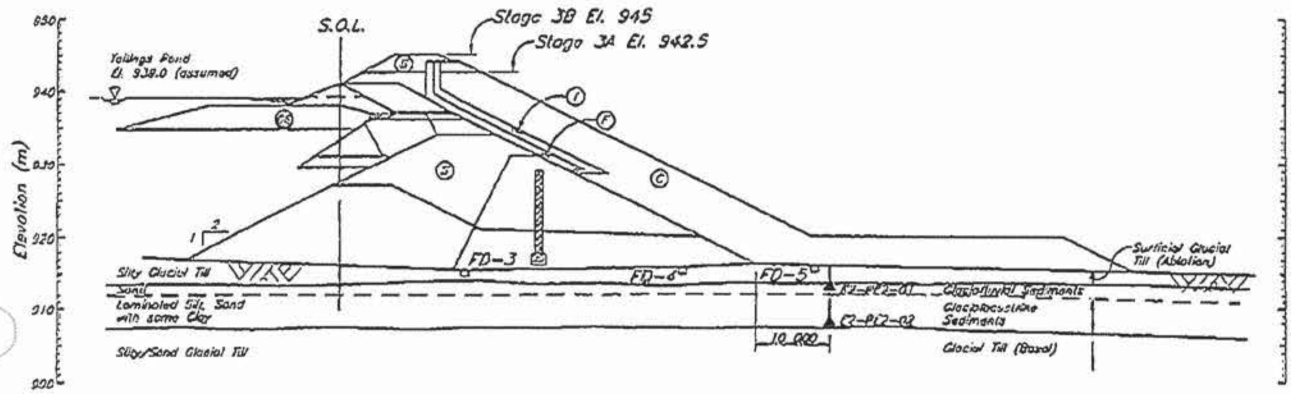
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
UPSTREAM TOE DRAIN FLOWS

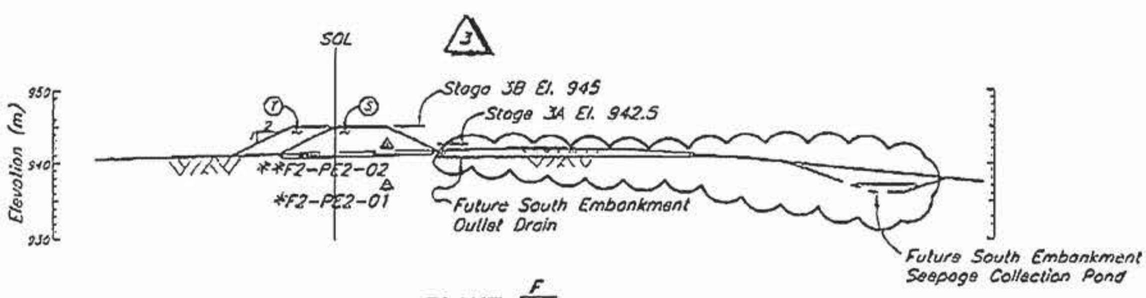
Knight Piésold CONSULTING	PROJECT NO 11162/13	REF. NO.	REV.
	FIGURE 5.8		



PLANE $\frac{D}{251}$
CH. 39+86

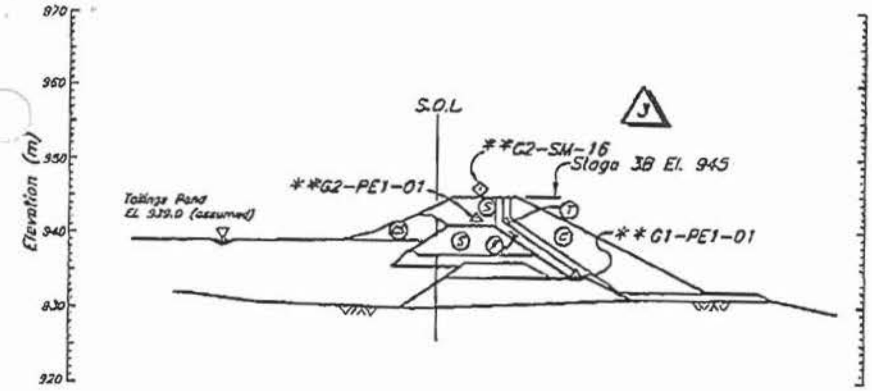


PLANE $\frac{E}{250}$
CH. 17+60

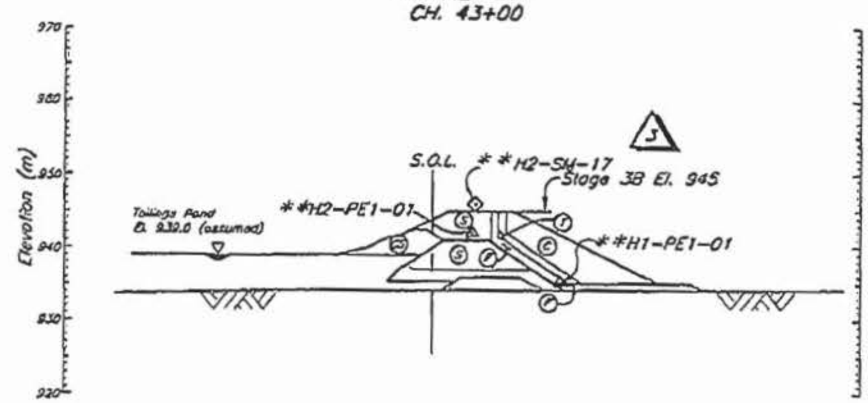


PLANE $\frac{F}{254}$
CH. 7+19

...GE 3 TAILINGS EMBANKMENT – INSTRUMENTATION SUMMARY OF INSTALLATION & TYPICAL DETAILS								3	08MAY'01	ISSUED FO...
STAGE 3 TAILINGS EMBANKMENT – SOUTH EMBANKMENT – INSTRUMENTATION PLAN								2	26JAN'01	STAGE 3B...
STAGE 3 PERIMETER EMBANKMENT – INSTRUMENTATION PLAN								1	20OCT'00	PERIMETER...
STAGE 3 TAILINGS EMBANKMENT – MAIN EMBANKMENT – INSTRUMENTATION PLAN								0	2JUN'00	ISSUED FO...
DESCRIPTION	REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D	REV.	DATE	
REFERENCE DRAWINGS	REVISIONS									



PLANE $\frac{G}{251}$
CH. 43+00



PLANE $\frac{H}{251}$
CH. 36+00

NOTE

1. See Drg. No. 11162-13-256 for Summary of Instrumentation Installations, Typical Details, General Notes and Legend.

2. Instrumentation with one asterisk indicates placement during Stage 3A construction. Instrumentation with 2 asterisks indicate placement during Stage 3B construction.

Scale 10 0 10 20 30 40 50 m

FOR STAGE 3B TENDER	CWM	DSR		
3B - CREST ELEVATION 945	JRK	AW	JMTW	KJB
...TER EMBANKMENT SECTIONS ADDED	JRK	NSO	JMTW	KJB
FOR CONSTRUCTION	JRK	TAM	ABW	KJB
DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
REVISIONS				

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — C.W. MAITR — May 9/01

DESIGNED	CHECKED
JRK	ABW
DRAWN	APPROVED
DSR	KJB

MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
STAGE 3 TAILINGS EMBANKMENT
INSTRUMENTATION
SECTIONS - SHEET 2 OF 2

Knight Piésold CONSULTING

SCALE: AS SHOWN — REVISION: 3 — DRAWING NO. 11162-13-259

→ File

Knight Piésold CONSULTING	DATE:	June 15, 2001	FILE NO.:	11162/14.F01/.F02/ /.F04/.F05/.F08
	TIME:		REF NO.:	01-09
Mount Polley Site Office Fax: (250) 790-2268 www.knightpiésold.com	OPERATOR:		PAGES:	1 of 20
	SENDER:	s.22		

TO:	Ministry of Energy and Mines, Victoria B.C. **FAX:** 250-952-0481
ATTN:	Chris Carr
CC:	Ken Brouwer, KP Vancouver Don Parsons / Eric LeNeve, MPMC Site
SUBJECT:	Progress Report No. 10

Dear Mr. Carr,

Please find enclosed a copy of Progress report No. 10 from June 3 to June 10, 2001. If you have any questions, please do not hesitate to contact me on site or Ken Brouwer in our Vancouver office.

Regards,

s.22

Knight Piésold Consulting

MINISTRY OF ENERGY AND MINES
REC'D JUN 15 2001

The content of this communication is confidential. If you are not the intended recipient, please notify us immediately. Unauthorized use or disclosure of this communication or its content is unlawful.

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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - STAGE 3 CONSTRUCTION
PROGRESS REPORT NO. 10 – JUNE 4 TO JUNE 10, 2001

SECTION 1.0 - GENERAL

Mount Polley Mining Corporation (MPMC) continued Stage 3B construction activities. Knight Piésold Ltd. (KP) carried out QA/QC activities during the reporting period.

The scope of work includes:

1. Placement of Zones F, T and C to approximate El. 941.5 m on the Perimeter Embankment (Ch. 32+00 to 44+50). MPMC will carry out this work.
2. Placement of Zones CBL, S, F, T and C on the Main, Perimeter and South Embankments to El. 945 m. This work will be carried out under contract. A Contractor for this work has yet to be determined.

1.1 PERSONNEL

The following KP personnel were on site during the reporting period:

- s.22 Resident Engineer.

The following MPMC personnel were on site during the reporting period:

- Don Parsons, Mine Superintendent
- Eric LeNeve, Tailings Coordinator
- Charlie O'Hara, General Foreman
- s.22 Site Foreman

1.2 CONTRACT DEVELOPMENTS

No new contract developments occurred during the reporting period. As mentioned above, a Contractor will be chosen to carry out a portion of the Stage 3B embankment raise.

MPMC has completed a construction schedule for the project. All work is to be complete by September 30, 2001. The schedule calls for MPMC to complete their portion of work by July 15, 2001. The Contractor is to begin work on July 15 and to finish on September 30, 2001. This schedule is subject to modification; however, the schedule will be ultimately governed by freeboard concerns at the TSF.

1.3 DESIGN DEVELOPMENTS

No new design developments have occurred over the reporting period.

1.3 WEATHER

Conditions were unsettled during the reporting period. This included periods of cloud, rain and sunshine. Maximum daytime highs reached about +20 °C and nightly lows sank to as low as 0 °C.

1.4 SAFETY

No safety incidents were reported over the reporting period.

SECTION 2.0 - TAILINGS FACILITY OPERATION AND MAINTENANCE

Tailings were spigotted along the Main Embankment crest during the reporting period at approximate Chainage 19+00. Beach development is being accelerated at the southwest corner of the impoundment in order to establish tailings beaches behind the Main and South Embankments. It is expected that the Main Embankment will have a continuous beach by June 17. Pipe fusing was carried out over the reporting period to extend the tailings line to Ch. 17+00.

The Tailings Pond remains a significant distance from the Perimeter Embankment.

SECTION 3.0 - CONSTRUCTION ACTIVITIES

3.1 EQUIPMENT

MPMC used the following equipment over the reporting period:

- Excavators: 1 Hitachi EX 400 and 1 Hitachi EX 270
- Haul Trucks: 2 Caterpillar 777 85T
- Loaders: 1 Caterpillar 992
- Dozers: 1 Caterpillar D9N, 1 Caterpillar D8R
- Compactors: 1 Caterpillar CS 563 10T vibratory smooth drum
- Service and fuel trucks

MPMC carried out the following activities during the reporting period:

- Removal of saturated fill from the downstream face of the Perimeter Embankment, Ch. 43+25 to 44+75, El. 937 to 941.5 m.
- Placement of Zone C fill on the Perimeter Embankment, Ch. 40+00 to 43+25, El. 930 to 932.5 m.

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- Development of the Rock Borrow for Zones T and C materials.
- Crushing of mine waste at the mill for Zone F material.

Zone C was supplied from the Rock Borrow. Zone C was placed in 1 metre thick, horizontal lifts to the downstream toe of the Stage 3B Perimeter Embankment.

SECTION 4.0 - KNIGHT PIÉSOLD ACTIVITIES

4.1 GENERAL

KP activities over the reporting period included the following:

- Monitoring and inspection of saturated material removal and fill placement of Zone C.
- Submission of daily summaries of QA/QC and construction activities to MPMC.
- Control and Record sampling and testing of embankment fill materials.
- Ongoing discussions and correspondence with MPMC and KP Vancouver with regard to current and future design.
- Preparation of progress reports.

4.2 Laboratory Testing

The following samples were processed during the reporting period:

- C-ZT-1
- R-ZT-12

All samples tested proved suitable for Zone T. All tests carried out during the reporting period are presented in the attached tables and figures.

SECTION 5.0 - MONITORING

5.1 GENERAL

Instrumentation was monitored during the reporting period. Data collected to date indicates that the TSF is performing well within design tolerances.

5.2 VIBRATING WIRE PIEZOMETERS

No new piezometers were installed over this period. Piezometer readings are taken on a weekly basis. The results from the monitoring are shown on Figures 5.1 to 5.6. Locations of the piezometers are presented on the attached Drawings.

Foundation Piezometers

A2-PE2-01, A2-PE2-02 and F2-Pe2-01 increased slightly. No substantial changes were noted in the remaining foundation piezometers.

Fill Piezometers

The majority of the Main Embankment glacial till piezometers responded to construction of the overlying Stage 3A fills with increasing pore pressures. The piezometers are beginning to show a constant trend following the stop in construction and subsequent dissipation.

Two piezometers located within the Stage 1A glacial till fill have historically registered anomalous values, and warrant discussion.

Piezometer B2-PE2-03 reacted strongly to fill placement during initial construction. Pore pressures did not dissipate in the periods following fill placement, but remained constant. This is in direct contrast to other instruments located nearby. This trend changed in 1999, when B2-PE2-03 began to show dissipation at the completion of fill placement. This new trend has been repeated three times, with approximately the same dissipation rate after each stage of construction, with an increase in pore pressure between 50 and 100% of the increase in total stress. It appears that drainage paths were limited in the fill around this piezometer and pore pressures are still equilibrating.

Piezometer C2-PE2-05 is also located in the Stage 1A glacial till fill. This instrument historically showed little or no reaction to construction, but indicated a slow, steady increase in pore pressure over time. This suggests that pore pressures in the fill around C2-PE2-05 are reaching a steady state condition as the phreatic surface moves through the fill. It should be noted that the pressure head registered by this piezometer is approximately 10 m. This is similar to other piezometers located in comparable locations in the glacial till fill.

Drain Piezometers

All drain piezometers have remained static and at very low head indicating free draining conditions within the embankment drainage systems.

Tailings Piezometers

Water levels at the tailings piezometers continue to mimic the pond level, except at the Main Embankment, where the upstream toe drain has resulted in a depressed phreatic surface.

5.3 DRAIN FLOWS

Drains flows were recorded on June 8, 2001. The results from the foundation drains and upstream toe drain are shown on Figures 5.7 and 5.8.

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SECTION 5.0 - ONGOING ITEMS

The following items will be addressed during upcoming reporting periods:

- MPMC will continue to construct the Stage 3B Perimeter Embankment to El. 941.5 m.
- MPMC will select a Contractor to construct the embankments to El. 945 m.
- KP will continue to provide QA/QC and site supervision activities in accordance with the technical specifications.

Submitted by,

s.22

Knight Piésold Consulting.

Distribution: Eric LeNeve, Tailings Coordinator, MPMC Site
Don Parsons, Mine Superintendent, MPMC Site
Chris Carr, Ministry of Energy and Mines, Victoria, B.C.
Ken Brouwer, KP Vancouver

TABLE 4.3

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION
ZONE T CONTROL TEST SUMMARY SHEET

[illegible] DATA Engineering Geotechnical\Quality\Stage 3B Construction\lab control\[C-ZT-[illegible].xls]Data Sheet

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SHEET :	1 of 1
PERIOD :	June 4 to June 10, 2001
PROJECT NO. :	11162/14
AREA :	Rock Borrow

PROJECT: MOUNT POLLEY - TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION

MATERIAL: Zone T - Transition Zone

Sample No.	Date Sampled	Location	El. (m)	C1 Atterberg Limits PL %	LL %	PI %	C2 Field m.c. %	LI %	C3 (Particle Size Distribution) 101.6 / 4 / 4	76.2 / 3 / 3	38.1 / 1.5 / 1 1/2	19.05 / 0.75 / 3/4	9.525 / 0.375 / 3/8	4.75 / 0.187 / #4	2.36 / 0.0937 / #8	1.18 / 0.0469 / #16	0.6 / 0.0234 / #30	0.3 / 0.0165 / #50	0.14986 / 0.0059 / #100	0.07366 / 0.0029 / #200	0.002 / mm / Clay	C4 Standard Proctor Max Dry Density kg/m³	Optimum m.c. %	C6 Specific Gravity
[illegible]	02-Jun-01	Rock Borrow	-	-	-	-	6.8	-	-	80.4	69.8	55.8	39.3	27.3	19.3	12.6	8.8	6.3	4.6	1.7	-	-	-	-
		MEAN		#DIV/0!	#DIV/0!	#DIV/0!	6.8	#DIV/0!	#DIV/0!	80.4	69.8	55.8	39.3	27.3	19.3	12.6	8.8	6.3	4.6	1.7	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
		MEDIAN		#NUM!	#NUM!	#NUM!	6.8	#NUM!	#NUM!	80.4	69.8	55.8	39.3	27.3	19.3	12.6	8.8	6.3	4.6	1.7	#NUM!	#NUM!	#NUM!	#NUM!
		MAXIMUM (*)		0.0	0.0	0.0	6.8	0.0	0.0	80.4	69.8	55.8	39.3	27.3	19.3	12.6	8.8	6.3	4.6	1.7	0.0	0.0	0.0	0.0
		MINIMUM (*)		0.0	0.0	0.0	6.8	0.0	0.0	80.4	69.8	55.8	39.3	27.3	19.3	12.6	8.8	6.3	4.6	1.7	0.0	0.0	0.0	0.0

Note: These are 100% limits.
Values for Standard Proctor maximum dry density and optimum moisture contents include oversize correction.
IP - In progress
C1 Atterberg Limits (ASTM D4318)
C2 Moisture Content (ASTM D2216)
C3 Particle Size Distribution (ASTM D422)
C4 Laboratory Compaction (ASTM D1557)
C6 Specific Gravity (ASTM D854)

TABLE 4.4

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION
ZONE T RECORD TEST SUMMARY SHEET

H:\KG-DATA\Engdocs\Geotechnical\Ipsite\Stage 3B Construction\lab\record\[R-ZT-summ.xls]Data Sheet 11/95/01

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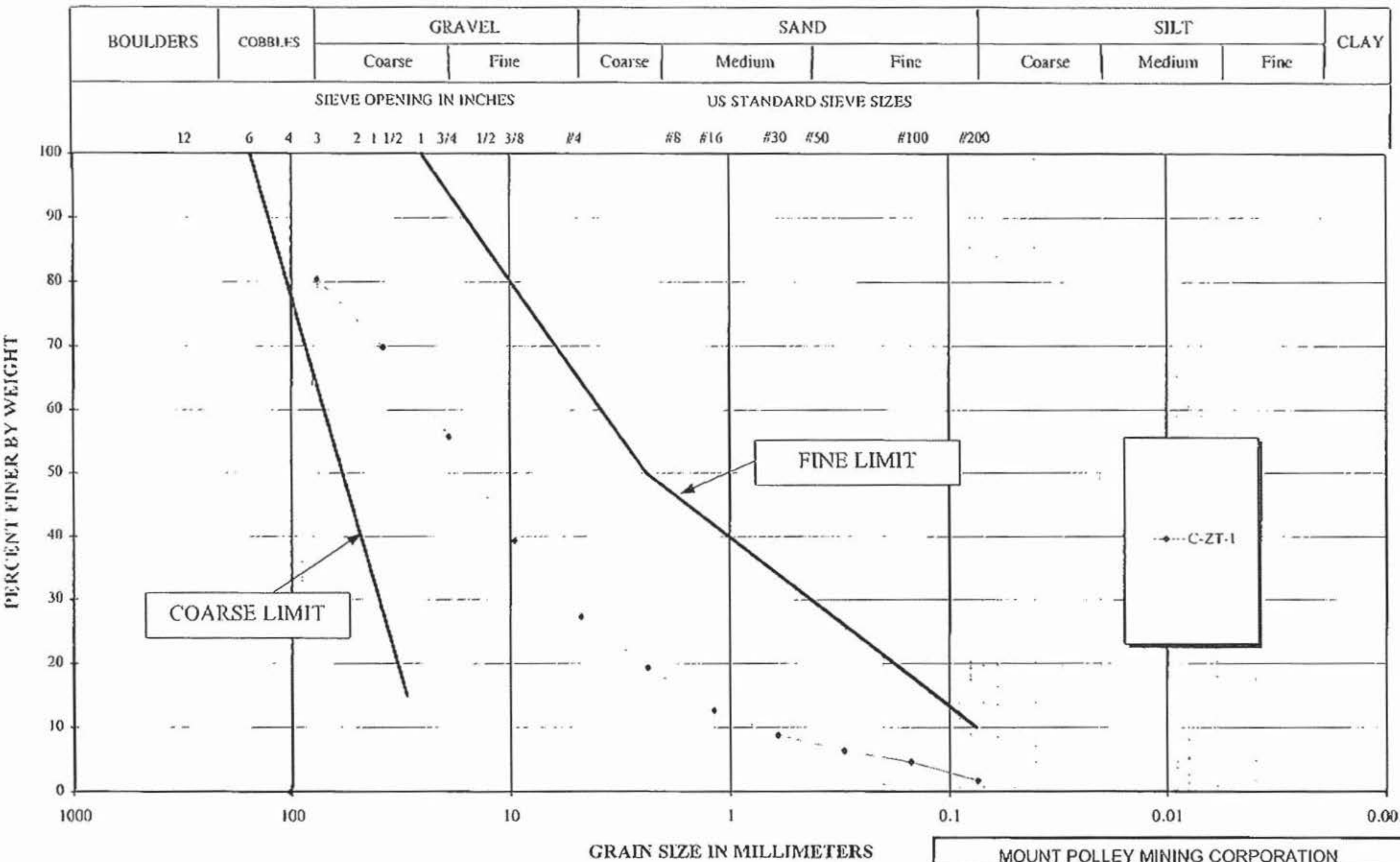
PROJECT: MOUNT POLLEY - TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION
MATERIAL: Zone T Transition Zone

SHEET: 1 of 1
PERIOD: June 4 to June 10, 2001
PROJECT NO.: 11162/14
AREA: TSF

Sample No.	Date Sampled	Location	El (m)	R1 Atterberg Limits PL %	R1 LL %	R1 PI %	R2 Field m.c. %	LI %	R3 (Particle Size Distribution) 101.6 mm / 4 in / 4	76.2 / 3 / 3	38.1 / 1.5 / 1 1/2	19.05 / 0.75 / 3/4	9.525 / 0.375 / 3/8	4.75 / 0.187 / #4	2.36 / 0.0937 / #8	1.18 / 0.0469 / #16	0.6 / 0.0234 / #30	0.3 / 0.0165 / #50	0.14986 / 0.0059 / #100	0.02366 / 0.0029 / #200	0.002 / mm / Clay	R4 Standard Proctor Max Dry Density kg/m³	R4 Optimum m.c. %	R6 Specific Gravity
T-12	03-Jun-01	Rock Borrow	-	-	-	-	4.4	-	-	50.0	46.4	32.3	22.0	14.9	10.8	7.6	5.6	4.2	3.2	2.5	-	-		-
			MEAN	#DIV/0!	#DIV/0!	#DIV/0!	4.4	#DIV/0!	#DIV/0!	50.0	46.4	32.3	22.0	14.9	10.8	7.6	5.6	4.2	3.2	2.5	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
			MEDIAN	#NUM!	#NUM!	#NUM!	4.4	#NUM!	#NUM!	50.0	46.4	32.3	22.0	14.9	10.8	7.6	5.6	4.2	3.2	2.5	#NUM!	#NUM!	#NUM!	#NUM!
			MAXIMUM (*)	0.0	0.0	0.0	4.4	0.0	0.0	50.0	46.4	32.3	22.0	14.9	10.8	7.6	5.6	4.2	3.2	2.5	0.0	0.0	0.0	0.0
			MINIMUM (*)	0.0	0.0	0.0	4.4	0.0	0.0	50.0	46.4	32.3	22.0	14.9	10.8	7.6	5.6	4.2	3.2	2.5	0.0	0.0	0.0	0.0

Note: These are 100% limits.
Values for Standard Proctor maximum dry density and optimum moisture content include oversize correction.
IP - In progress

R1 Atterberg Limits (ASTM D4318)
R2 Moisture Content (ASTM D2216)
R3 Particle Size Distribution (ASTM D422)
R4 Laboratory Compaction (ASTM D1557)
R6 Specific Gravity (ASTM D854)



MOUNT POLLEY MINING CORPORATION

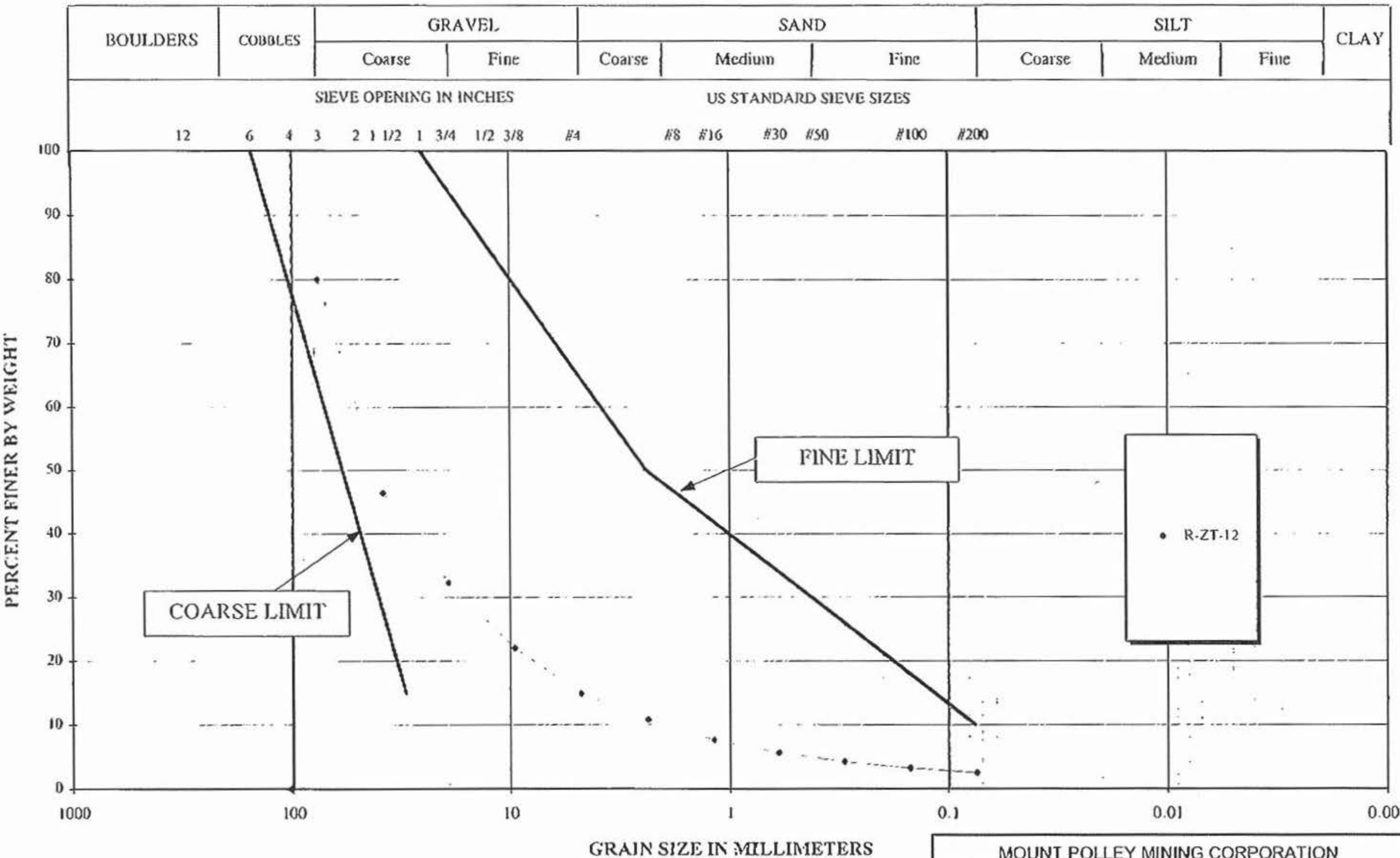
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - STAGE 3B
CONSTRUCTION - ZONE T CONTROL SAMPLES
GRADATION CURVES

Knight Piésold CONSULTING

PROJECT NO.	REF NO.	REV.
11162/14		

FIGURE 4.3



MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - STAGE 3B
CONSTRUCTION - ZONE T RECORD SAMPLES
GRADATION CURVES

Knight Piésold CONSULTING	PROJECT NO 11162/14	REF NO.	REV
	FIGURE 4.4		

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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE A PIEZOMETERS

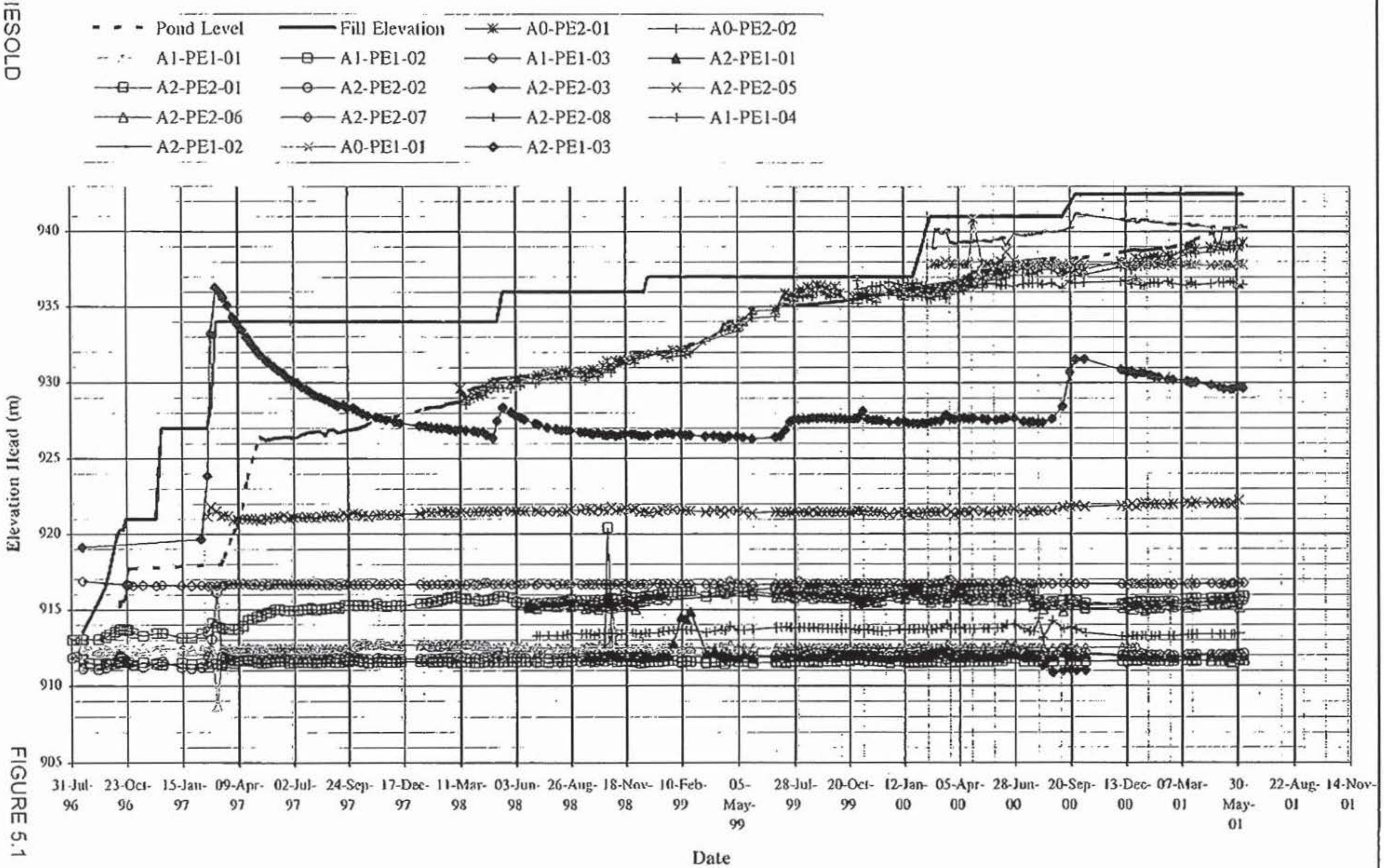

FIGURE 5.1

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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE B PIEZOMETERS

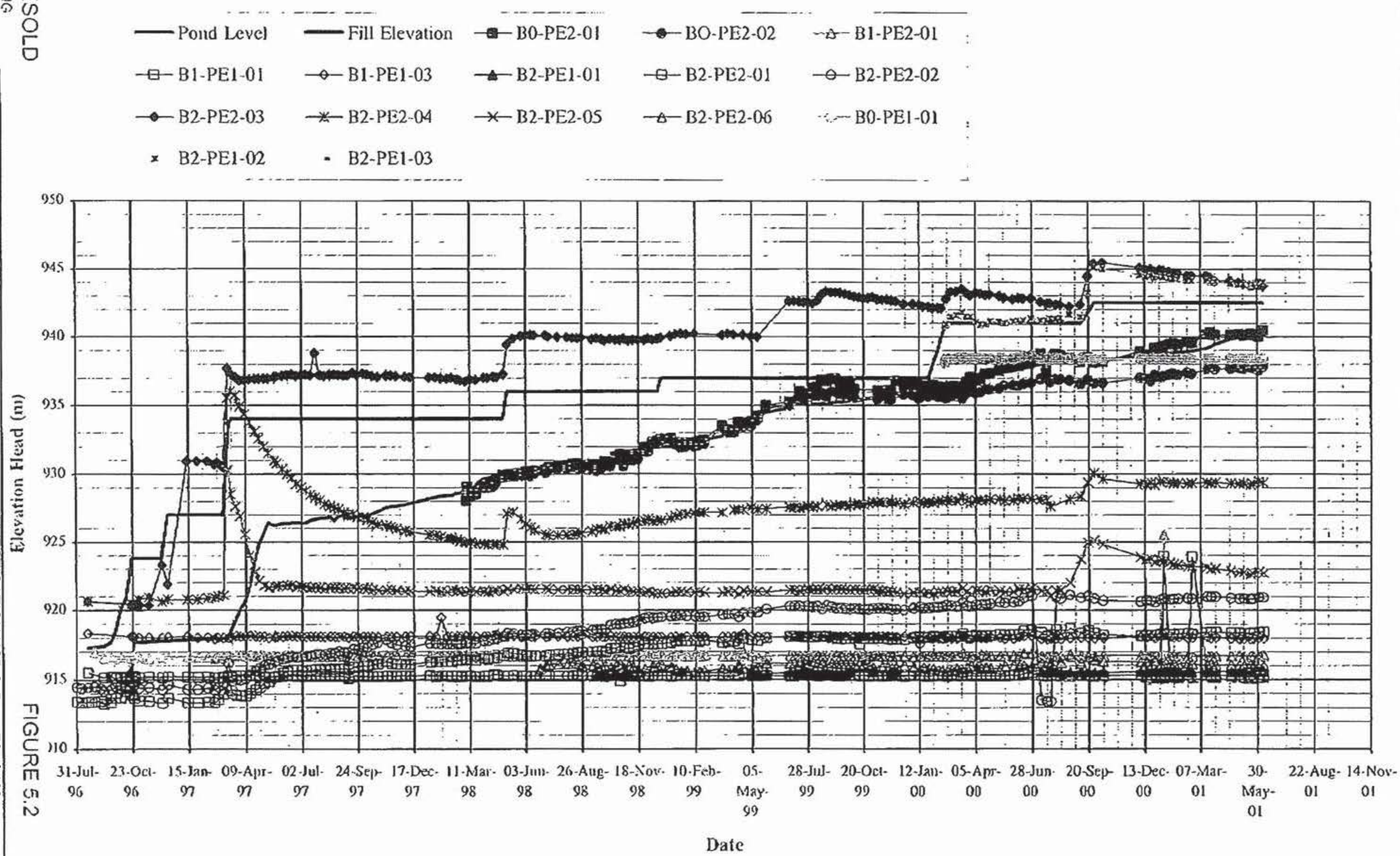

FIGURE 5.2

KNIGHT PIESOLD CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE C PIEZOMETERS

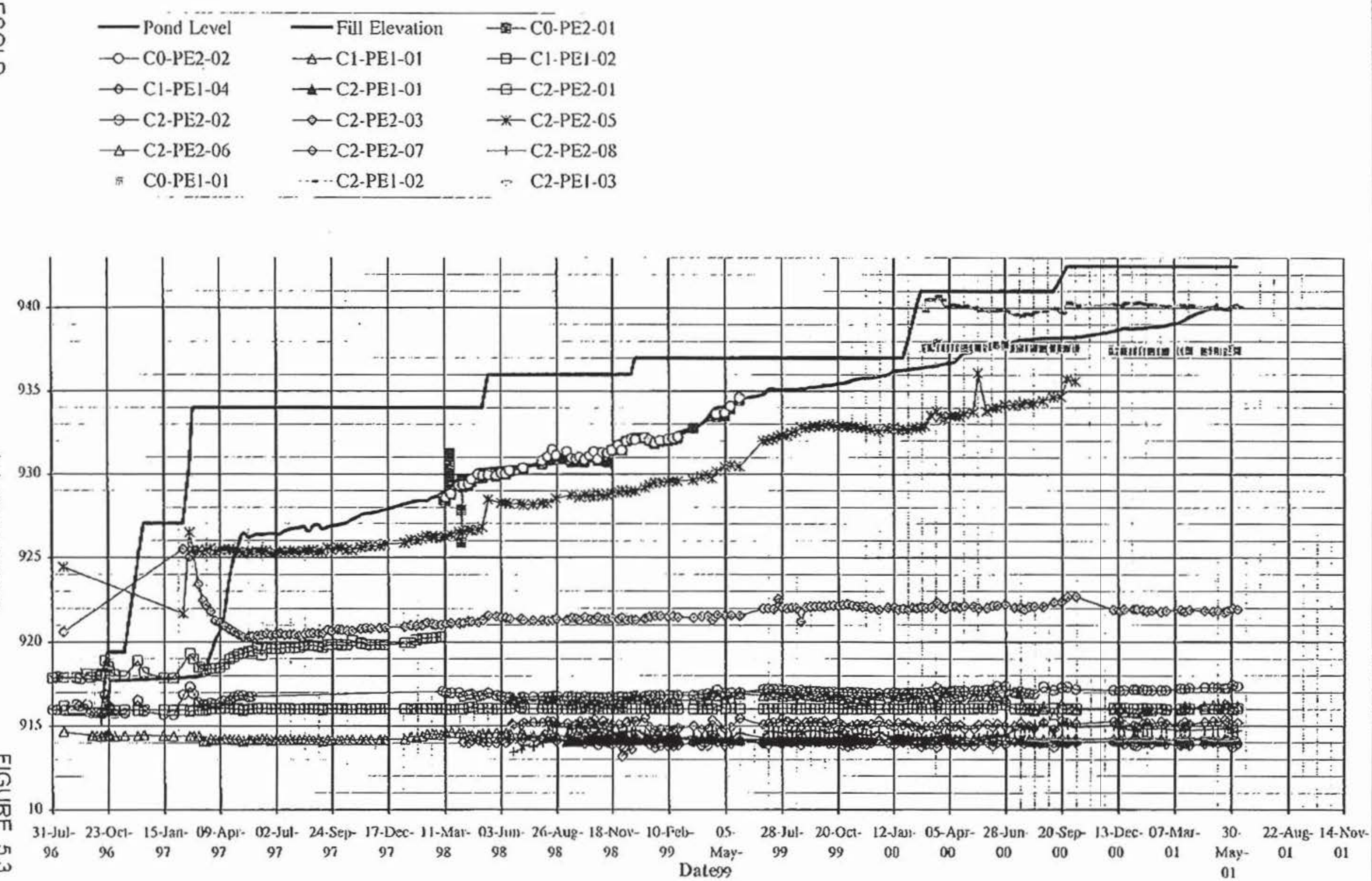

FIGURE 5.3

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE D PIEZOMETERS

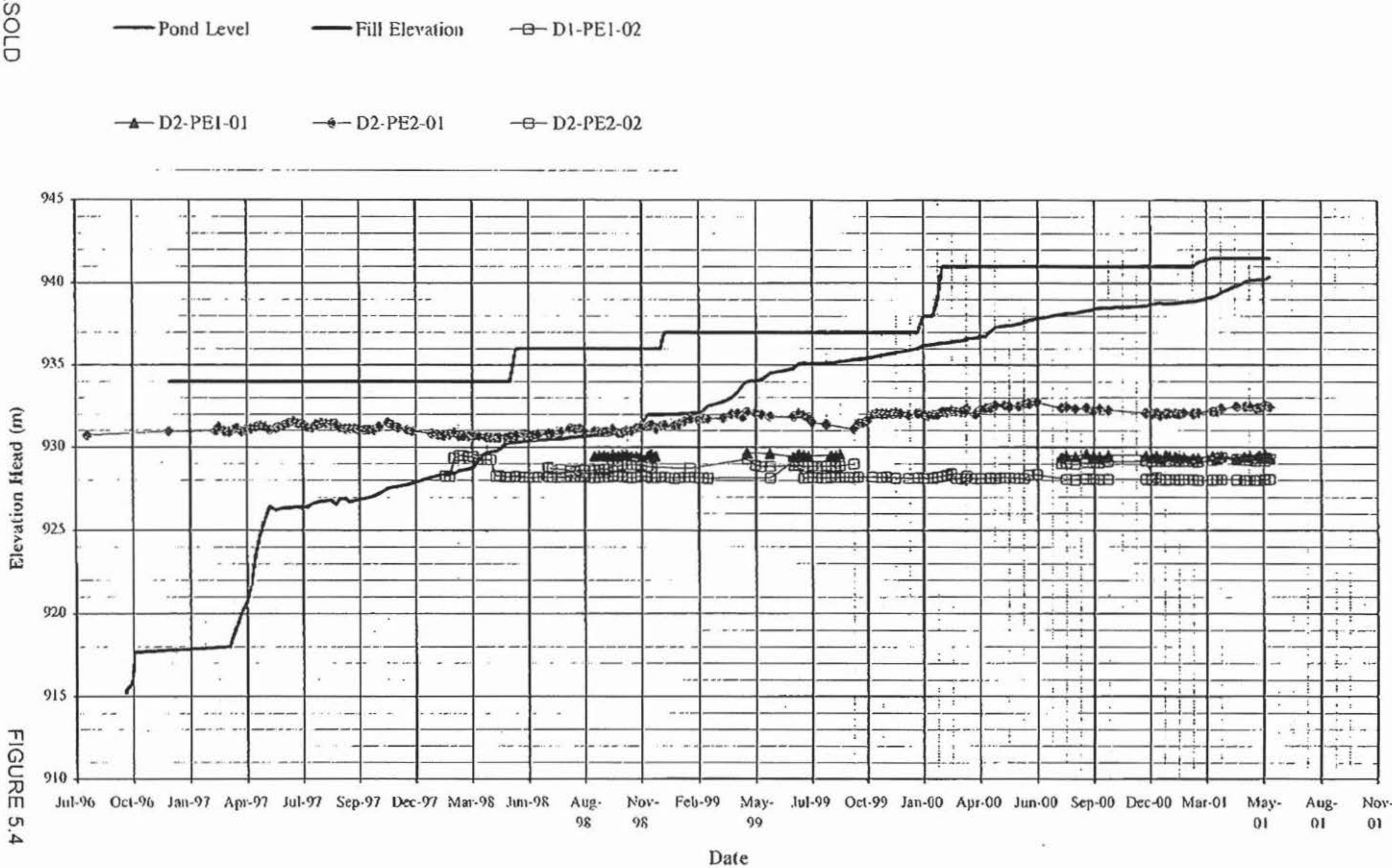

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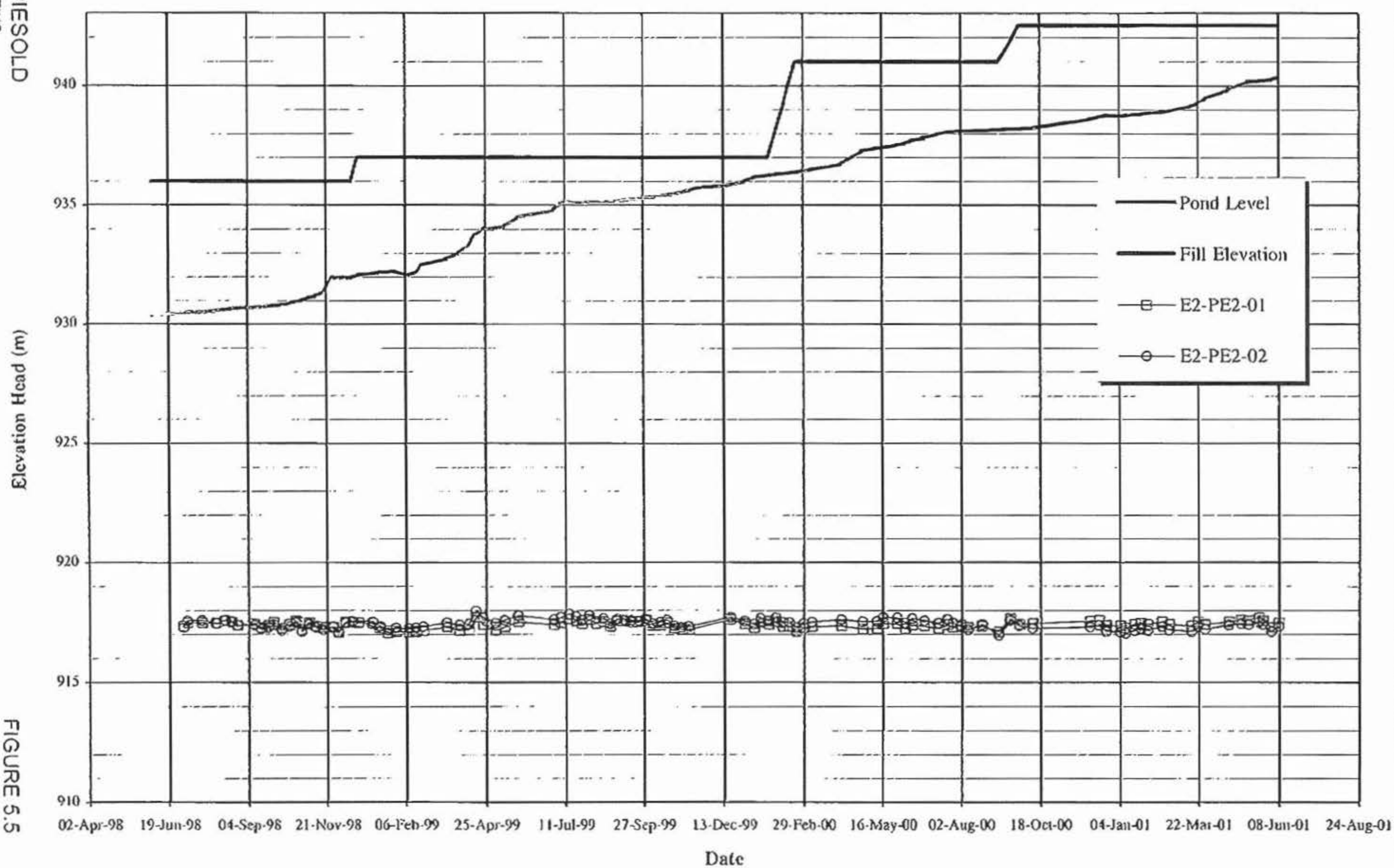
FIGURE 5.4

JUN 15 '01 15:36 250 790 2268 PAGE.014

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE E PIEZOMETERS



KNIGHT PIESOLD CONSULTING

FIGURE 5.5

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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE F PIEZOMETERS

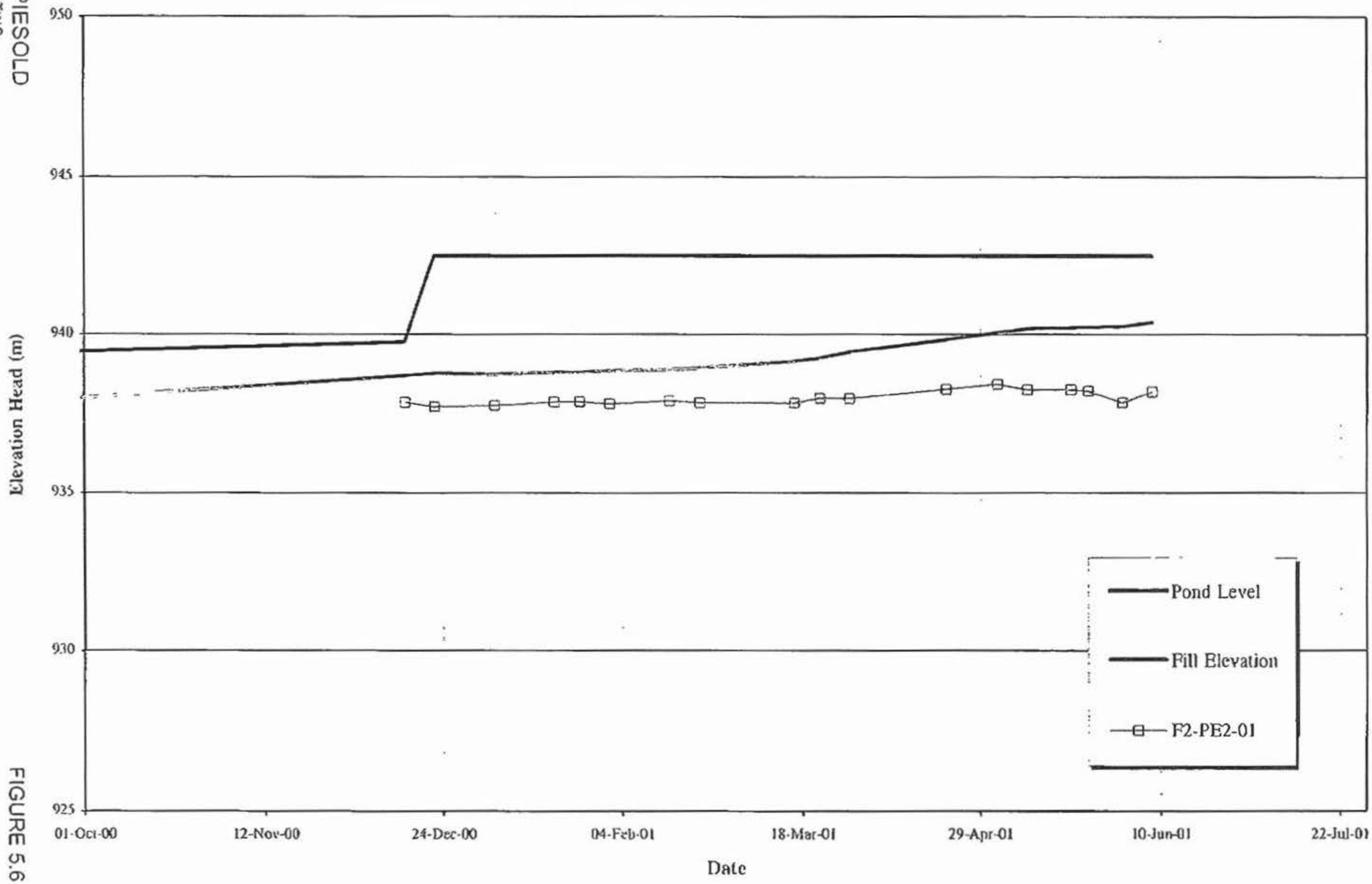
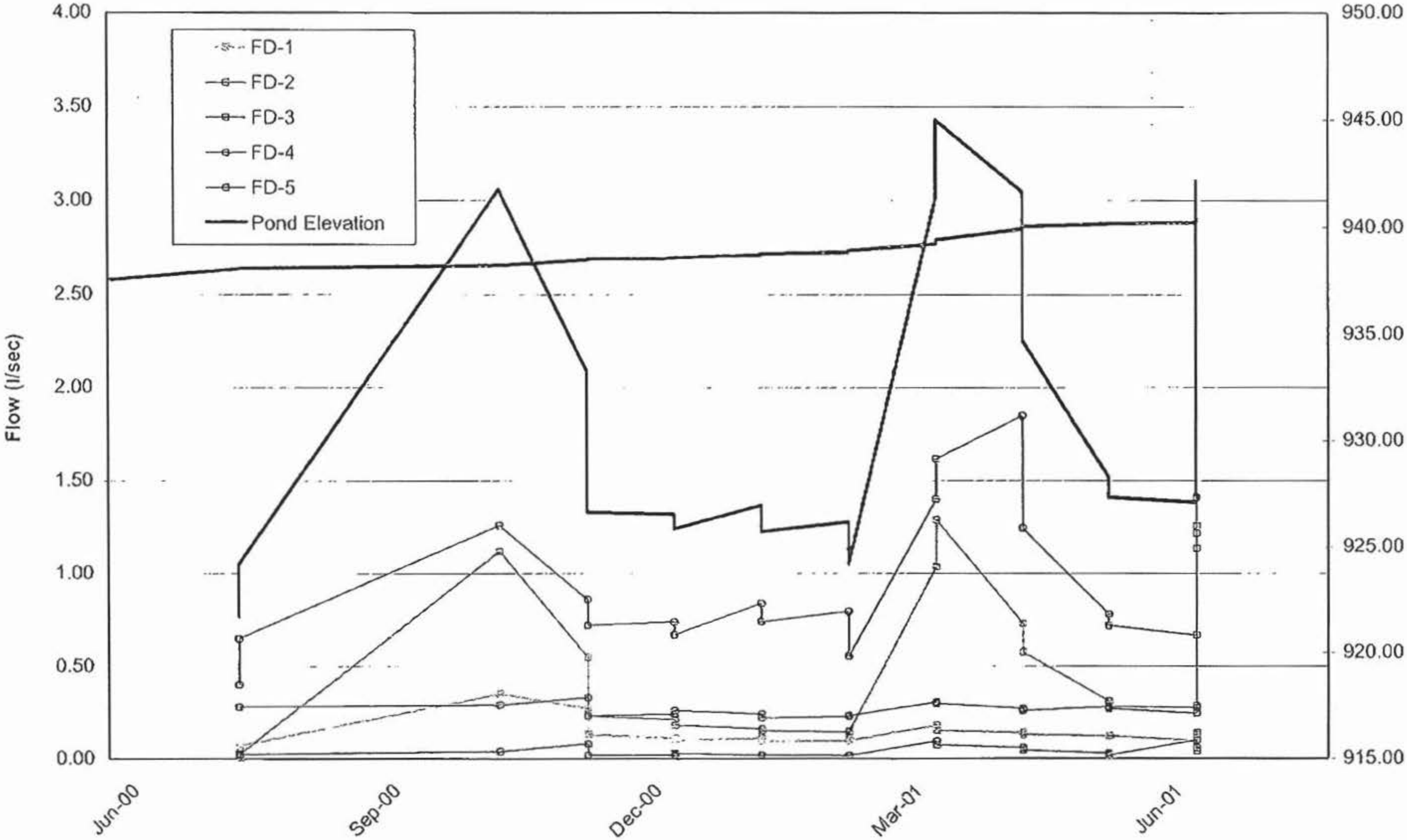
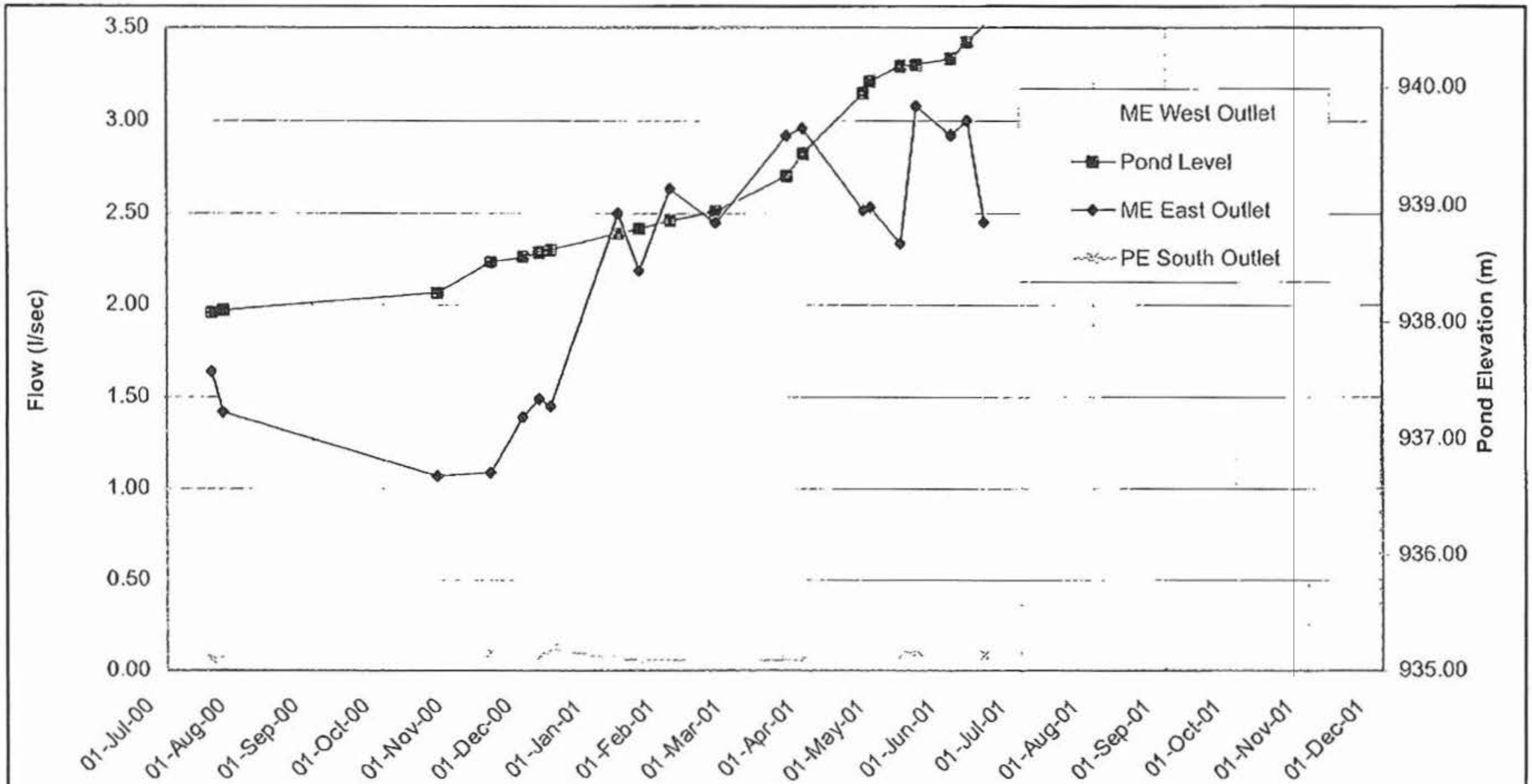


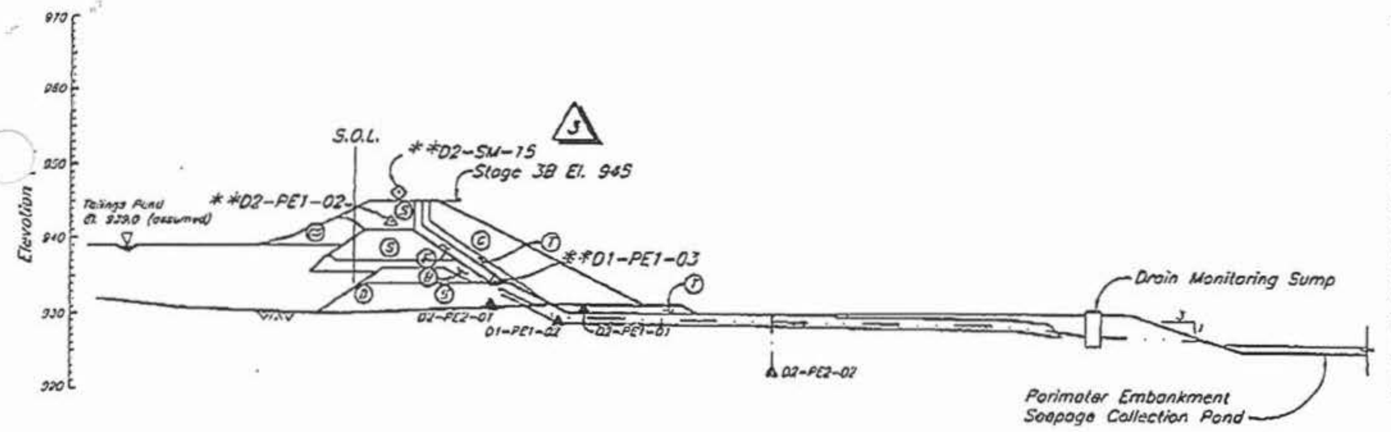
FIGURE 5.6



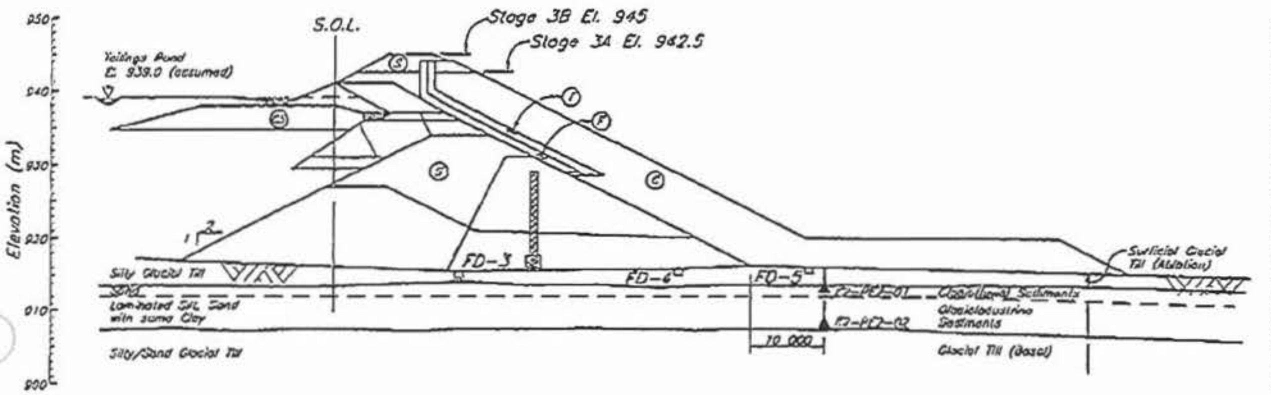
MOUNT POLLEY MINING CORPORATION		
MOUNT POLLEY MINE		
TAILINGS STORAGE FACILITY MAIN EMBANKMENT FOUNDATION DRAIN FLOWS		
PROJECT NO. 11162/13	REF NO.	REV
Knight Piésold CONSULTING	FIGURE 5.7	



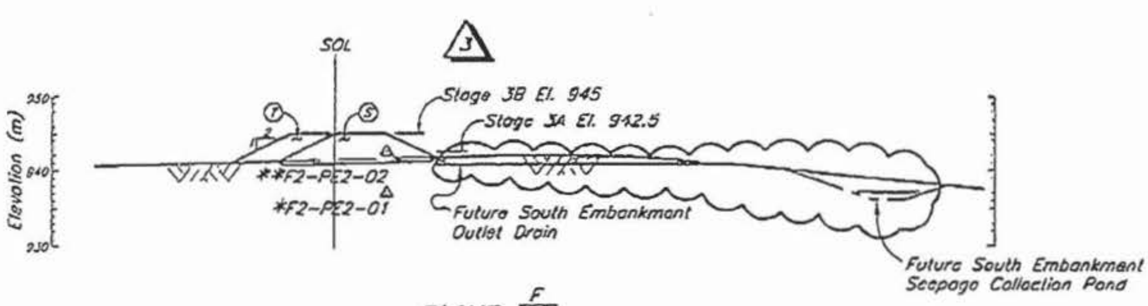
MOUNT POLLEY MINING CORPORATION			
MOUNT POLLEY MINE			
TAILINGS STORAGE FACILITY UPSTREAM TOE DRAIN FLOWS			
Knight Piésold CONSULTING	PROJECT NO. 11162/13	REF. NO.	REV
	FIGURE 5.8		



PLANE $\frac{D}{251}$
CH. 39+86

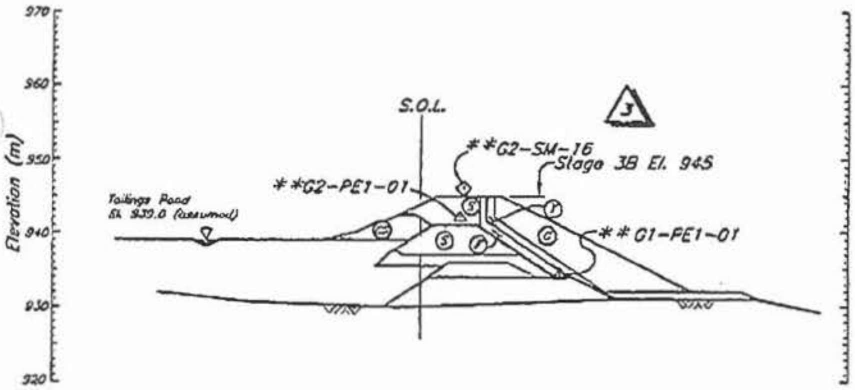


PLANE $\frac{E}{250}$
CH. 17+60

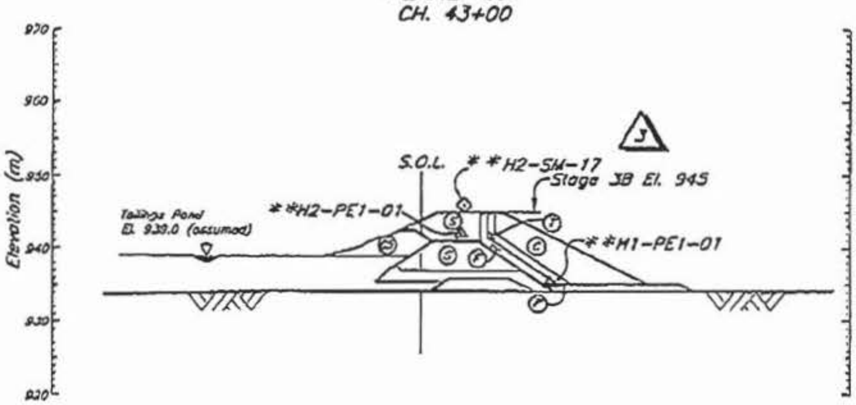


PLANE $\frac{F}{254}$
CH. 7+19

...E 3 TAILINGS EMBANKMENT – INSTRUMENTATION SUMMARY OF INSTALLATION & TYPICAL DETAILS								3	08MAY'01	ISSUED FO...
...AGE 3 TAILINGS EMBANKMENT – SOUTH EMBANKMENT – INSTRUMENTATION PLAN								2	25JAN'01	STAGE 3B
STAGE 3 PERIMETER EMBANKMENT – INSTRUMENTATION PLAN								1	20OCT'00	PERIMETER
STAGE 3 TAILINGS EMBANKMENT – MAIN EMBANKMENT – INSTRUMENTATION PLAN								0	2JUN'00	ISSUED FO...
DESCRIPTION	REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D	REV.	DATE	
REFERENCE DRAWINGS	REVISIONS									



PLANE $\frac{G}{251}$
CH. 43+00



PLANE $\frac{H}{251}$
CH. 36+00

NOTE

1. See Drg. No. 11162-13-256 for Summary of Instrumentation Installations, Typical Details, General Notes and Legend.
2. Instrumentation with one asterisk indicates placement during Stage 3A construction. Instrumentation with 2 asterisks indicate placement during Stage 3B construction.

Scale 10 0 10 20 30 40 50 m

DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
... STAGE 3B TENDER	CWM	OSR	JKK	KJB
3B – CREST ELEVATION 945	JRK	AW	JMTW	KJB
...TER EMBANKMENT SECTIONS ADDED	JRK	NSD	JMTW	KJB
FOR CONSTRUCTION	JRK	TAM	ABW	KJB

REVISIONS

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — C.W. MUIR — May 9/01

DESIGNED	CHECKED
JRK	ABW
DRAWN	APPROVED
DSR	KJB

MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
STAGE 3 TAILINGS EMBANKMENT
INSTRUMENTATION
SECTIONS -- SHEET 2 OF 2

Knight Piésold CONSULTING

SCALE: AS SHOWN | REVISION: 3 | DRAWING NO. 11162-13-259

Knight Piésold
CONSULTING

Mount Polley Site Office *Fax: (250) 790-2268*
www.knightpiésold.com

DATE:	June 6, 2001	**FILE NO.:**	11162/14.F01/.F02/ /.F04/.F05/.F08
TIME:		**REF NO.:**	01-04
OPERATOR:		**PAGES:**	1 of 20
SENDER:	s.22		

TO:	Ministry of Energy and Mines, Victoria B.C. **FAX:** 250-952-0481
ATTN:	Chris Carr
CC:	Ken Brouwer, KP Vancouver Don Parsons / Eric LeNeve, MPMC Site
SUBJECT:	Progress Report No. 9

Dear Mr. Carr,

Please find enclosed a copy of Progress report No. 9. If you have any questions, please do not hesitate to contact me on site or Ken Brouwer in our Vancouver office.

Regards,

s.22

Knight Piésold Consulting

MINISTRY OF
ENERGY AND MINES
REC'D JUN 0 6 2001

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CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - STAGE 3 CONSTRUCTION
PROGRESS REPORT NO. 9 - MAY 28 TO JUNE 3, 2001

SECTION 1.0 - GENERAL

Mount Polley Mining Corporation (MPMC) commenced Stage 3B construction activities. Knight Piésold Ltd. (KP) carried out QA/QC activities during the reporting period.

The scope of work includes:

1. Placement of Zones F, T and C to approximate El. 941.5 m on the Perimeter Embankment (Ch. 32+00 to 44+50). MPMC will carry out this work.
2. Placement of Zones CBL, S, F, T and C on the Main, Perimeter and South Embankments to El. 945 m. This work will be carried out under contract. A Contractor for this work has yet to be determined.

1.1 PERSONNEL

The following KP personnel were on site during the reporting period:

- s.22 Resident Engineer.

The following MPMC personnel were on site during the reporting period:

- Don Parsons, Mine Superintendent
- Eric LeNeve, Tailings Coordinator
- Charlie O'Hara, General Foreman
- s.22 Site Foreman

1.2 CONTRACT DEVELOPMENTS

No new contract developments occurred during the reporting period. As mentioned above, a Contractor will be chosen to carry out a portion of the Stage 3B embankment raise.

1.3 DESIGN DEVELOPMENTS

The permit to construct the embankments to El. 945 m has been approved by the Ministry of Energy and Mines. This elevation will provide tailings and storm water storage through August, 2002. The Perimeter Embankment will be constructed with a downstream rockfill shell zone, instead of cycloned sand.

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1.3 WEATHER

Conditions were unsettled during the reporting period. This included periods of cloud, rain and sunshine. Maximum daytime highs reached about +20 °C and nightly lows sank to as low as 0 °C.

1.4 SAFETY

No safety incidents were reported over the reporting period.

SECTION 2.0 - TAILINGS FACILITY OPERATION AND MAINTENANCE

Tailings were spigotted along the Main Embankment crest during the reporting period at approximate Chainage 19+00. Beach development is being accelerated at the southwest corner of the impoundment in order to establish tailings beaches behind the Main and South Embankments. The Tailings Pond remains a significant distance from the Perimeter Embankment.

SECTION 3.0 - CONSTRUCTION ACTIVITIES

3.1 EQUIPMENT

MPMC used the following equipment over the reporting period:

- Excavators: 1 Hitachi EX 400 and 1 Hitachi EX 270
- Haul Trucks: 2 Caterpillar 777 85T
- Loaders: 1 Caterpillar 992
- Dozers: 1 Caterpillar D9N, 1 Caterpillar D8R, 1 Caterpillar D7G and 1 Caterpillar D6H
- Compactors: 1 Caterpillar CS 563 10T vibratory smooth drum
- Drills: 1 Svedala STK
- Service and fuel trucks

MPMC carried out the following activities during the reporting period:

- Removal of saturated fill from the downstream face of the Perimeter Embankment.
- Placement of Zone F fill on the Perimeter Embankment, Ch. 40+00 to 44+50, El. 929 to 934 m, Ch. 35+00 to 39+00, El. 932 to 935 m.
- Placement of Zone T fill on the Perimeter Embankment, Ch. 40+00 to 44+50, El. 929 to 934 m.
- Placement of Zone C fill on the Perimeter Embankment, Ch. 40+00 to 44+50, El. 929 to 931 m.
- Development of the Rock Borrow for Zones T and C materials.

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Zones T and C were supplied from the Rock Borrow. Zone F was supplied from the processed filter sand pile at the millsite. Zones F and T were placed in 1 metre thick lifts, prior to compaction, directly on the downstream slope of the Perimeter Embankment. Segregation of the materials during placement was monitored and deemed to be minimal. Zone C was placed in 1 metre thick, horizontal lifts to the downstream toe of the Stage 3B Perimeter Embankment.

SECTION 4.0 - KNIGHT PIÉSOLD ACTIVITIES

4.1 GENERAL

KP activities over the reporting period included the following:

- Monitoring and inspection of saturated material removal and fill placement of Zones F, T and C.
- Submission of daily summaries of QA/QC and construction activities to MPMC.
- Control and Record sampling and testing of embankment fill materials.
- Ongoing discussions and correspondence with MPMC and KP Vancouver with regard to current and future design.
- Preparation of progress reports.

4.2 Laboratory Testing

The following samples were processed during the reporting period:

- C-ZF-31, 32 and 33
- R-ZF-31 and 32

All samples tested proved suitable for Zone F, with the exception of C-ZF-33. This sample was taken from a portion of the pile that was not mixed. MPMC was informed that the pile needed to be mixed prior to fill placement. All tests carried out during the reporting period are presented in the attached tables and figures.

SECTION 5.0 - MONITORING

5.1 GENERAL

Instrumentation was monitored during the reporting period. Data collected to date indicates that the TSF is performing well within design tolerances.

5.2 VIBRATING WIRE PIEZOMETERS

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No new piezometers were installed over this period. Piezometer readings are taken on a weekly basis. The results from the monitoring are shown on Figures 5.1 to 5.6. Locations of the piezometers are presented on the attached Drawings.

Foundation Piezometers

No substantial changes were noted in the foundation piezometers.

Fill Piezometers

The majority of the Main Embankment glacial till piezometers responded to construction of the overlying Stage 3A fills with increasing pore pressures. The piezometers continue to decrease following the stop in construction.

Two piezometers located within the Stage 1A glacial till fill have historically registered anomalous values, and warrant discussion.

Piezometer B2-PE2-03 reacted strongly to fill placement during initial construction. Pore pressures did not dissipate in the periods following fill placement, but remained constant. This is in direct contrast to other instruments located nearby. This trend changed in 1999, when B2-PE2-03 began to show dissipation at the completion of fill placement. This new trend has been repeated three times, with approximately the same dissipation rate after each stage of construction, with an increase in pore pressure between 50 and 100% of the increase in total stress. It appears that drainage paths were limited in the fill around this piezometer and pore pressures are still equilibrating.

Piezometer C2-PE2-05 is also located in the Stage 1A glacial till fill. This instrument historically showed little or no reaction to construction, but indicated a slow, steady increase in pore pressure over time. This suggests that pore pressures in the fill around C2-PE2-05 are reaching a steady state condition as the phreatic surface moves through the fill. It should be noted that the pressure head registered by this piezometer is approximately 10 m. This is similar to other piezometers located in comparable locations in the glacial till fill.

Drain Piezometers

All drain piezometers have remained static and at very low head indicating free draining conditions within the embankment drainage systems.

Tailings Piezometers

Water levels at the tailings piezometers continue to mimic the pond level, except at the Main Embankment, where the upstream toe drain has resulted in a depressed phreatic surface.

5.3 DRAIN FLOWS

Drains flows were recorded on June 1, 2001. The results from the foundation drains and upstream toe drain are shown on Figures 5.7 and 5.8.

SECTION 5.0 - ONGOING ITEMS

The following items will be addressed during upcoming reporting periods:

- MPMC will continue to construct the Stage 3B Perimeter Embankment to El. 941.5 m.
- MPMC will select a Contractor to construct the embankments to El. 945 m.
- KP will continue to provide QA/QC and site supervision activities in accordance with the technical specifications.

Submitted by,

s.22

Knight Piésold Consulting.

Distribution: Eric LeNeve, Tailings Coordinator, MPMC Site
Don Parsons, Mine Superintendent, MPMC Site
Chris Carr, Ministry of Energy and Mines, Victoria, B.C.
Ken Brouwer, KP Vancouver

TABLE 4.1

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION
ZONE F CONTROL TEST SUMMARY SHEET

DATA Engdocs Geotechnical Stage 3B Construction lab control [C-ZF-summ.xls] Data Sheet

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MOUNT POLLEY - TAILINGS STORAGE FACILITY STAGE 3B CONSTRUCTION		SHEET:	1 of 1
		PERIOD:	May 28 to June 3, 2001
		PROJECT NO.:	11162/14
MATERIAL	Zone F Filter Sand	AREA:	Zone F Stockpile

Sample No.	Date Sampled	Location	El. (m)	C1 Atterberg Limits PL %	LL %	PI %	C2 Field m.c. %	LI %	C3 (Particle Size Distribution) 101.6 / 4 / 4	76.2 / 3 / 3	38.1 / 1.5 / 11.2	25.4 / 1 / 1	19.05 / 0.75 / 3-4	9.525 / 0.375 / 3/8	4.75 / 0.187 / #4	2.36 / 0.0937 / #8	1.18 / 0.0460 / #16	0.6 / 0.0234 / #30	0.3 / 0.0165 / #50	0.14986 / 0.0059 / #100	0.07366 / 0.0029 / #200	0.002 / Clay	C4 Standard Proctor Max Dry Density kg/m³	Optimum m/c %	C6 Specific Gravity
[illegible]	28-May-01	Zone F Stockpile	-	-	-	-	4.1	-	100.0	100.0	100.0	100.0	99.6	84.0	61.6	43.0	28.5	21.3	16.5	12.7	10.0	-	-	-	
[illegible]	28-May-01	Zone F Stockpile	-	-	-	-	4.0	-	100.0	100.0	100.0	100.0	99.4	78.9	59.9	43.4	29.6	21.9	16.8	13.1	10.4	-	-	-	-
[illegible]	28-May-01	Zone F Stockpile		-		-	2.9	-	100.0	100.0	100.0	100.0	98.7	56.0	28.1	17.6	12.8	10.1	7.8	6.1	4.5	-	-	-	
		MEAN		#DIV/0!	#DIV/0!	#DIV/0!	3.7	#DIV/0!	100.0	100.0	100.0	100.0	99.2	73.0	49.9	34.7	23.6	17.8	13.7	10.6	8.4	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
		MEDIAN		#NUM!	#NUM!	#NUM!	4.0	#NUM!	100.0	100.0	100.0	100.0	99.4	78.9	59.9	43.0	28.5	21.3	16.5	12.7	10.0	#NUM!	#NUM!	#NUM!	#NUM!
		MAXIMUM (*)		0.0	0.0	0.0	4.1	0.0	100.0	100.0	100.0	100.0	99.6	84.0	61.6	43.4	29.6	21.9	16.8	13.1	10.4	0.0	0.0	0.0	0.0
		MINIMUM (*)		0.0	0.0	0.0	2.9	0.0	100.0	100.0	100.0	100.0	98.7	56.0	28.1	17.6	12.8	10.1	7.8	6.1	4.5	0.0	0.0	0.0	0.0

Note: These are 100% Results.

Values for Standard Proctor maximum dry density and optimum moisture content include oversize correction.

IP - In progress

- C1 Atterberg Limits (ASTM D4318)
- C2 Moisture Content (ASTM D2216)
- C3 Particle Size Distribution (ASTM D422)
- C4 Laboratory Compaction (ASTM D1557)
- C6 Specific Gravity (ASTM D854)

TABLE 4.2

MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION

ZONE F RECORD TEST SUMMARY SHEET

DATA Engineering Geotechnical Spec Stage 3B Construction/Sub record/JR-ZF-summ.xls/Data Sheet

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MOUNT POLLEY TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION

Zone F - Filter Sand

SHEET: 1 of 1
PERIOD: May 28 to June 3, 2001
PROJECT NO.: 11162/14
AREA: TSF

Test No.	Date Sampled	Location	EL (m)	C1 Atterberg Limits PL %	LL %	PI %	C2 Field m.c. %	LI %	C3 (Particle Size Distribution) 101.6 / 4 / 4	76.2 / 3 / 3	38.1 / 1.5 / 1.5	25.4 / 1 / 1	19.05 / 0.75 / 3/4	9.525 / 0.375 / 3/8	4.75 / 0.187 / #4	2.36 / 0.0937 / #8	1.18 / 0.0469 / #16	0.6 / 0.0234 / #30	0.3 / 0.0165 / #50	0.14986 / 0.0059 / #100	0.07366 / 0.0029 / #200	0.002 / Clay	C4 Standard Proctor Max Dry Density kg/m³	Optimum m.c. %	C6 Specific Gravity
[illegible]	25-Mar-01	29+00, 0.5 m D/S of Zone S	-	-		-	4.0	-	100.0	100.0	100.0	100.0	97.5	71.5	49.1	35.9	25.8	19.7	15.0	11.6	9.1	-	-	-	
[illegible]	28-May-01	25+00, 0.5 m D/S of Zone S	-	-		-	4.1	-	100.0	100.0	100.0	100.0	98.7	68.4	44.0	31.9	22.5	16.9	12.8	9.9	7.7	-	-	-	-
		MEAN		#DIV/0!	#DIV/0!	#DIV/0!	4.1	#DIV/0!	100.0	100.0	100.0	100.0	98.1	70.0	46.6	33.9	24.2	18.3	13.9	10.8	8.4	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
		MEDIAN		#NUM!	#NUM!	#NUM!	4.1	#NUM!	100.0	100.0	100.0	100.0	98.1	70.0	46.6	33.9	24.2	18.3	13.9	10.8	8.4	#NUM!	#NUM!	#NUM!	#NUM!
		MAXIMUM (*)		0.0	0.0	0.0	4.1	0.0	100.0	100.0	100.0	100.0	98.7	71.5	49.1	35.9	25.8	19.7	15.0	11.6	9.1	0.0	0.0	0.0	0.0
		MINIMUM (*)		0.0	0.0	0.0	4.0	0.0	100.0	100.0	100.0	100.0	97.5	68.4	44.0	31.9	22.5	16.9	12.8	9.9	7.7	0.0	0.0	0.0	0.0

Note - These are 100% limits.

Values for Standard Proctor maximum dry density and optimum moisture content include oversize correction.

IP - In progress

R1 Atterberg Limits (ASTM D4318)
R2 Moisture Content (ASTM D2216)
R3 Particle Size Distribution (ASTM D422)
R4 Laboratory Compaction (ASTM D1557)
R6 Specific Gravity (ASTM D854)

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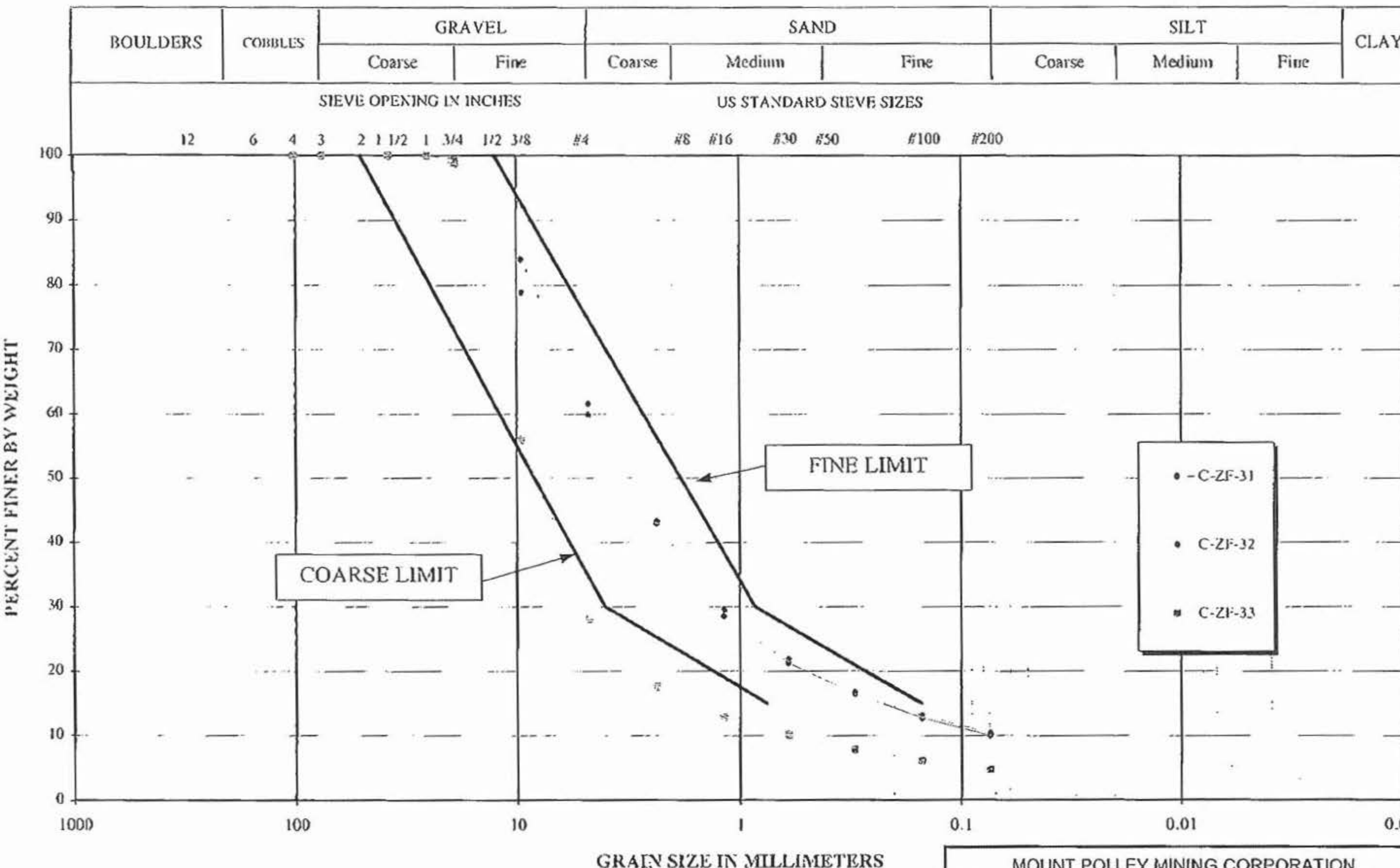

MOUNT POLLEY MINING CORPORATION		
MOUNT POLLEY MINE		
TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION - ZONE F CONTROL SAMPLES GRADATION CURVES		
Knight Piésold CONSULTING	PROJECT NO. 11162/14	REF. NO. / REV
	FIGURE 4.1	

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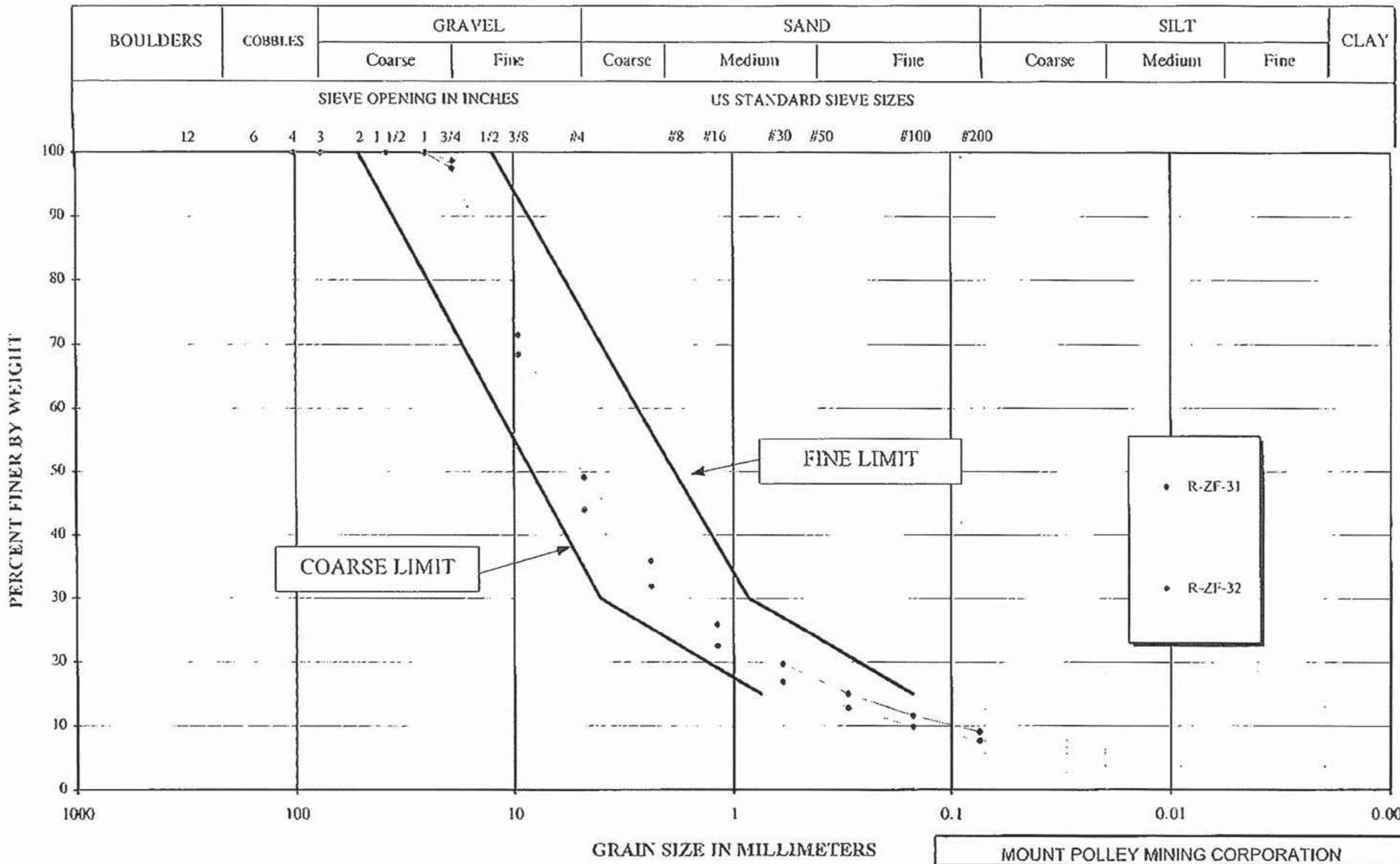

MOUNT POLLEY MINING CORPORATION		
MOUNT POLLEY MINE		
TAILINGS STORAGE FACILITY - STAGE 3B CONSTRUCTION - ZONE F RECORD SAMPLES GRADATION CURVES		
PROJECT NO 11162/14	REF NO.	REV
FIGURE 4.2		

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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE A PIEZOMETERS

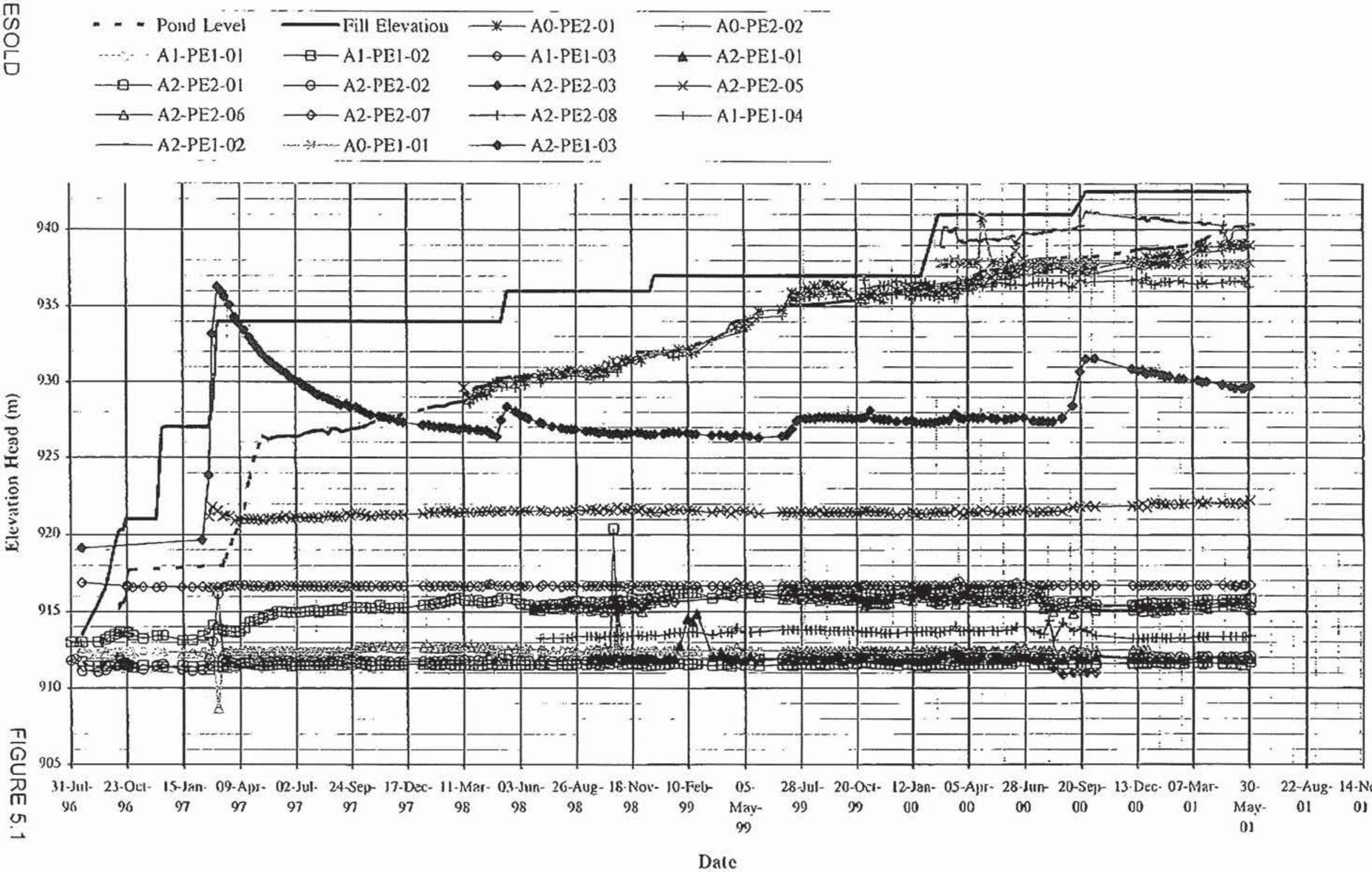

FIGURE 5.1

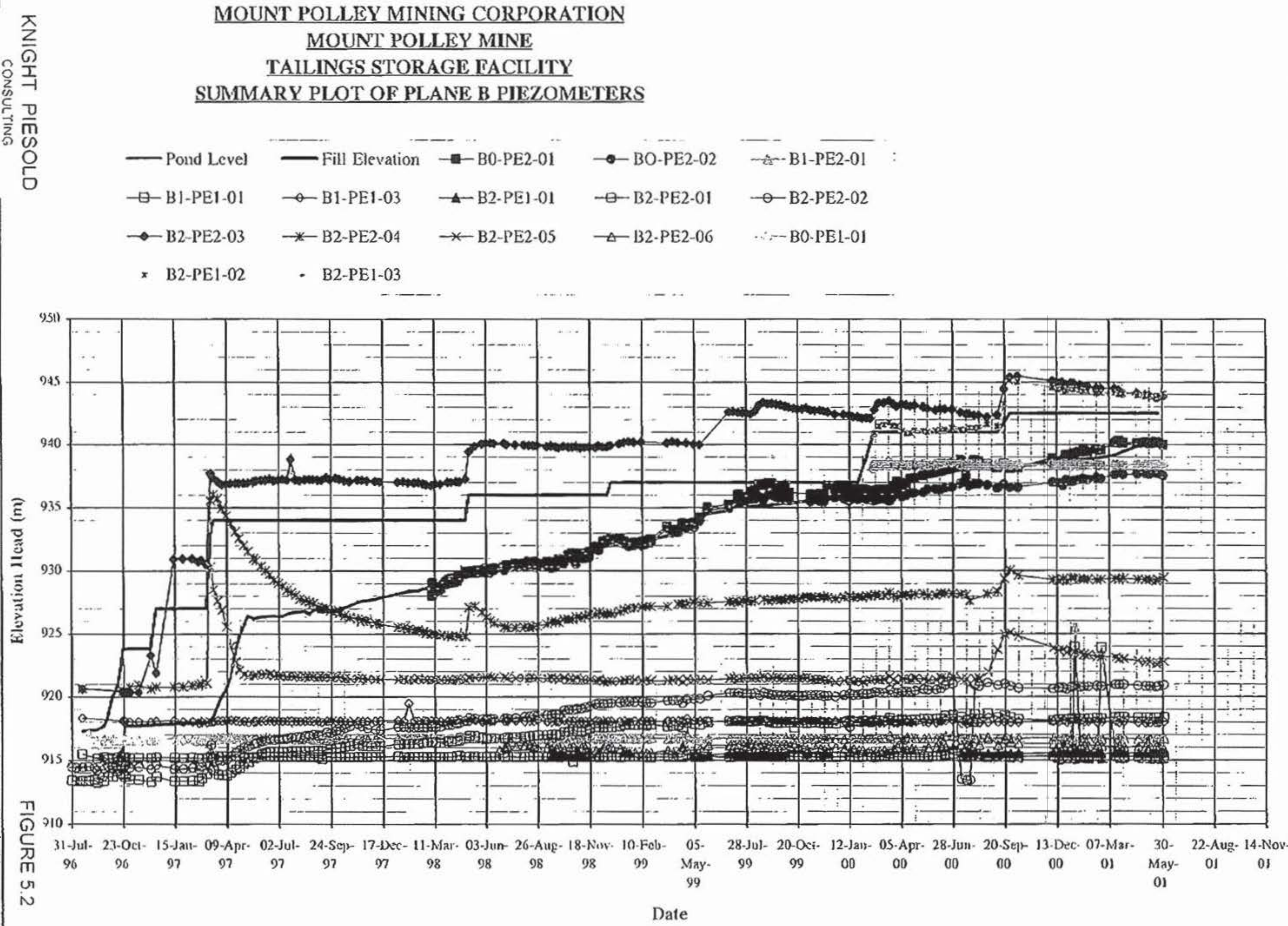

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FIGURE 5.2

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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE C PIEZOMETERS

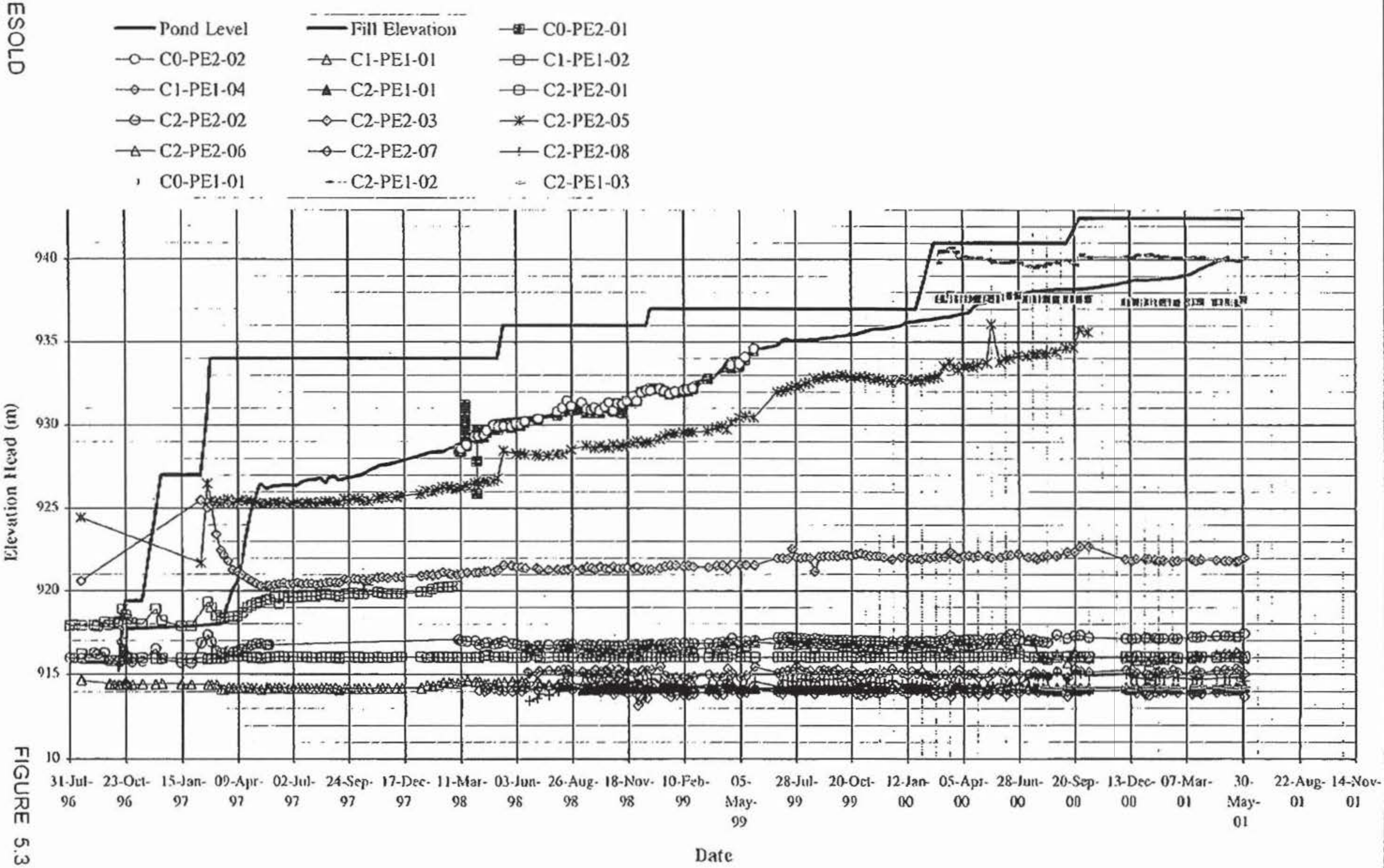

FIGURE 5.3

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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE D PIEZOMETERS

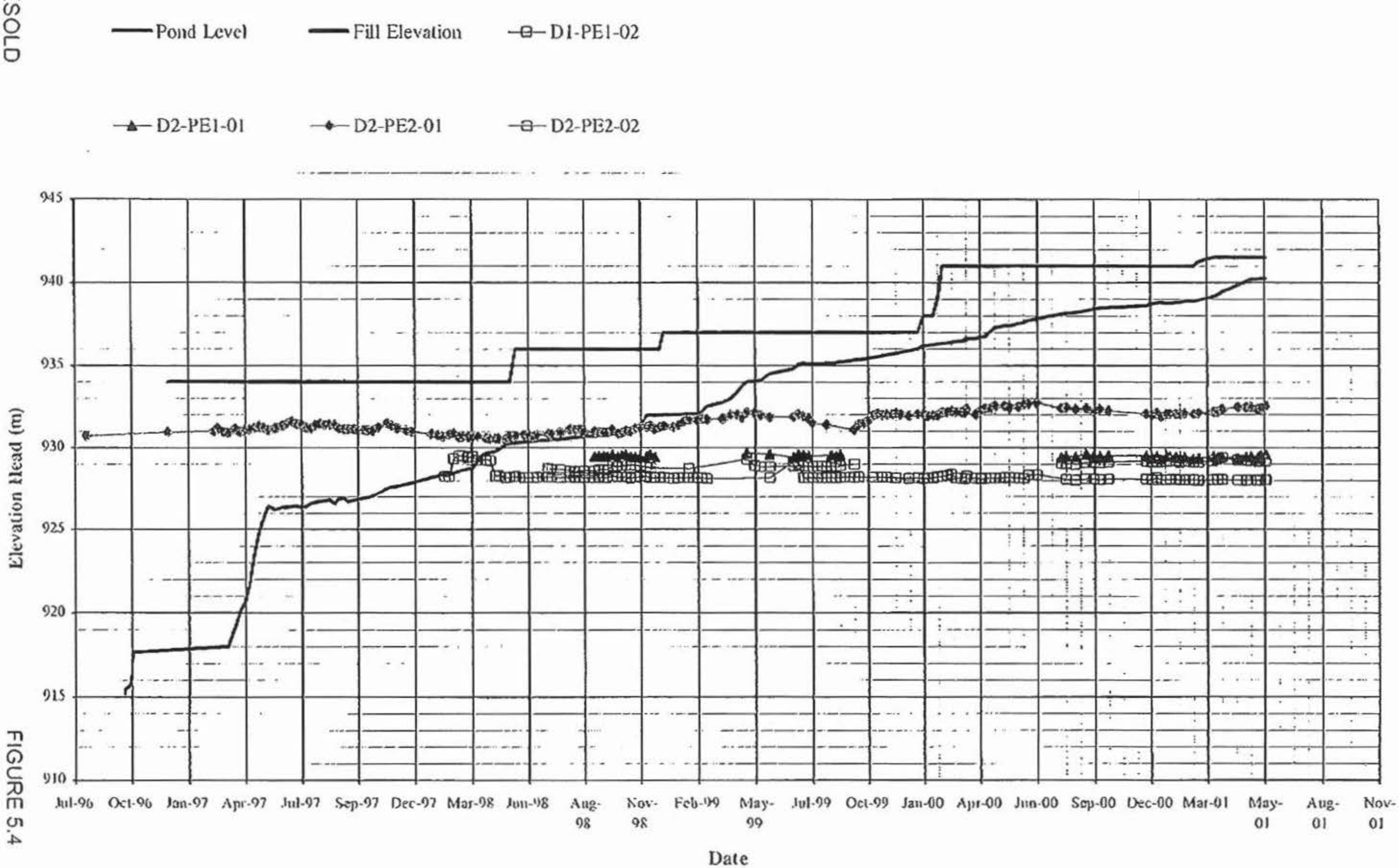

FIGURE 5.4

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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE E PIEZOMETERS

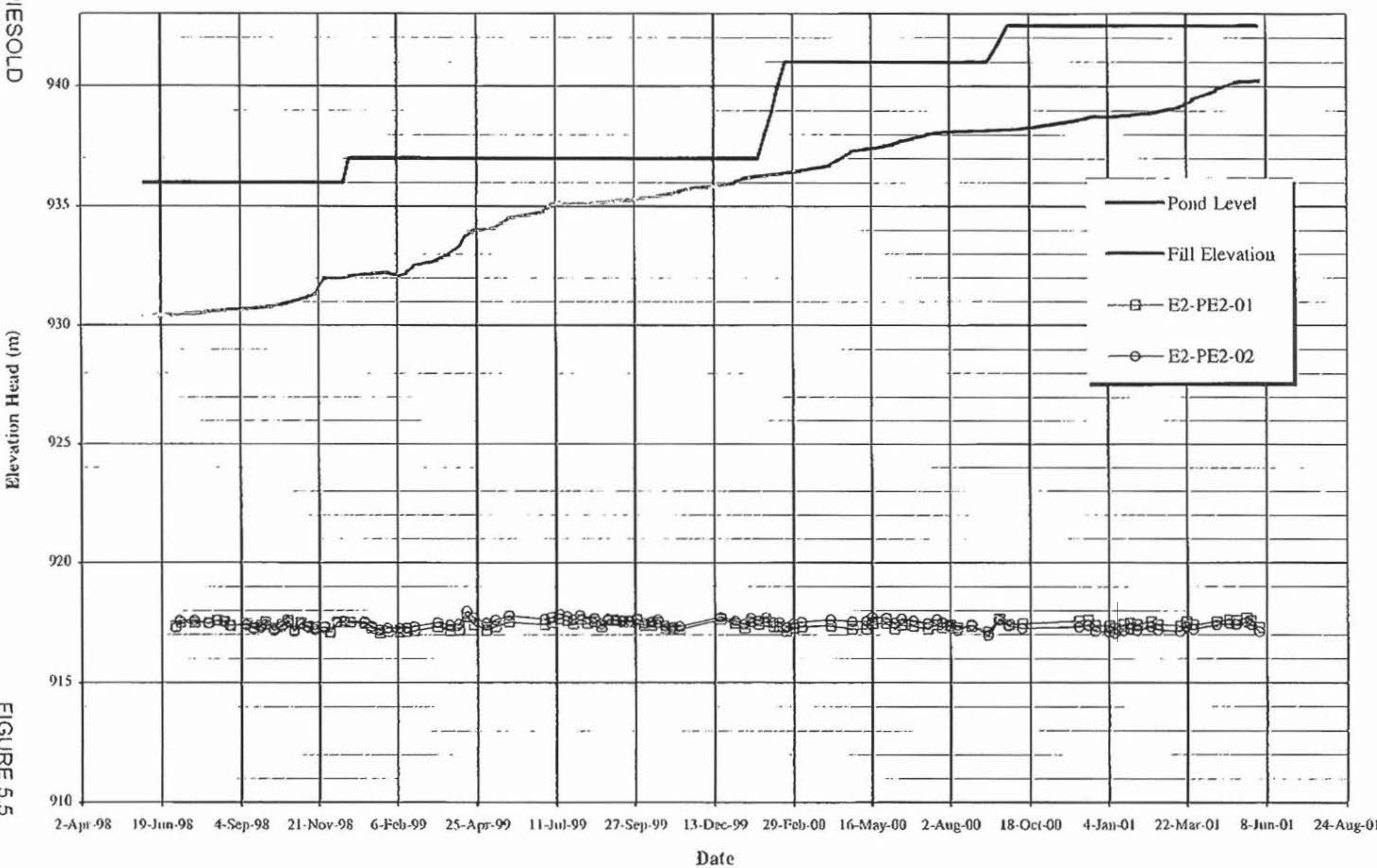

FIGURE 5.5

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE F PIEZOMETERS

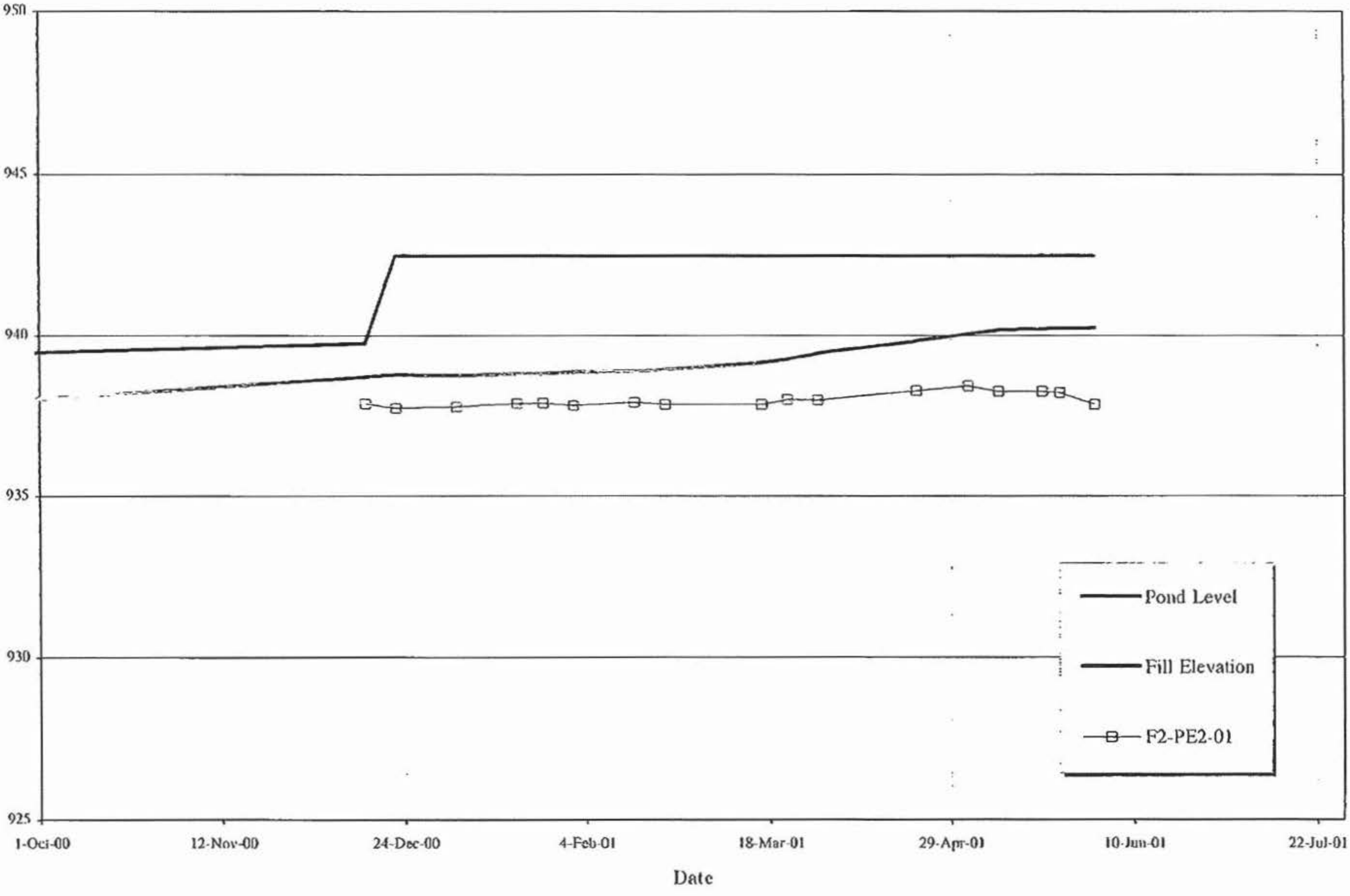

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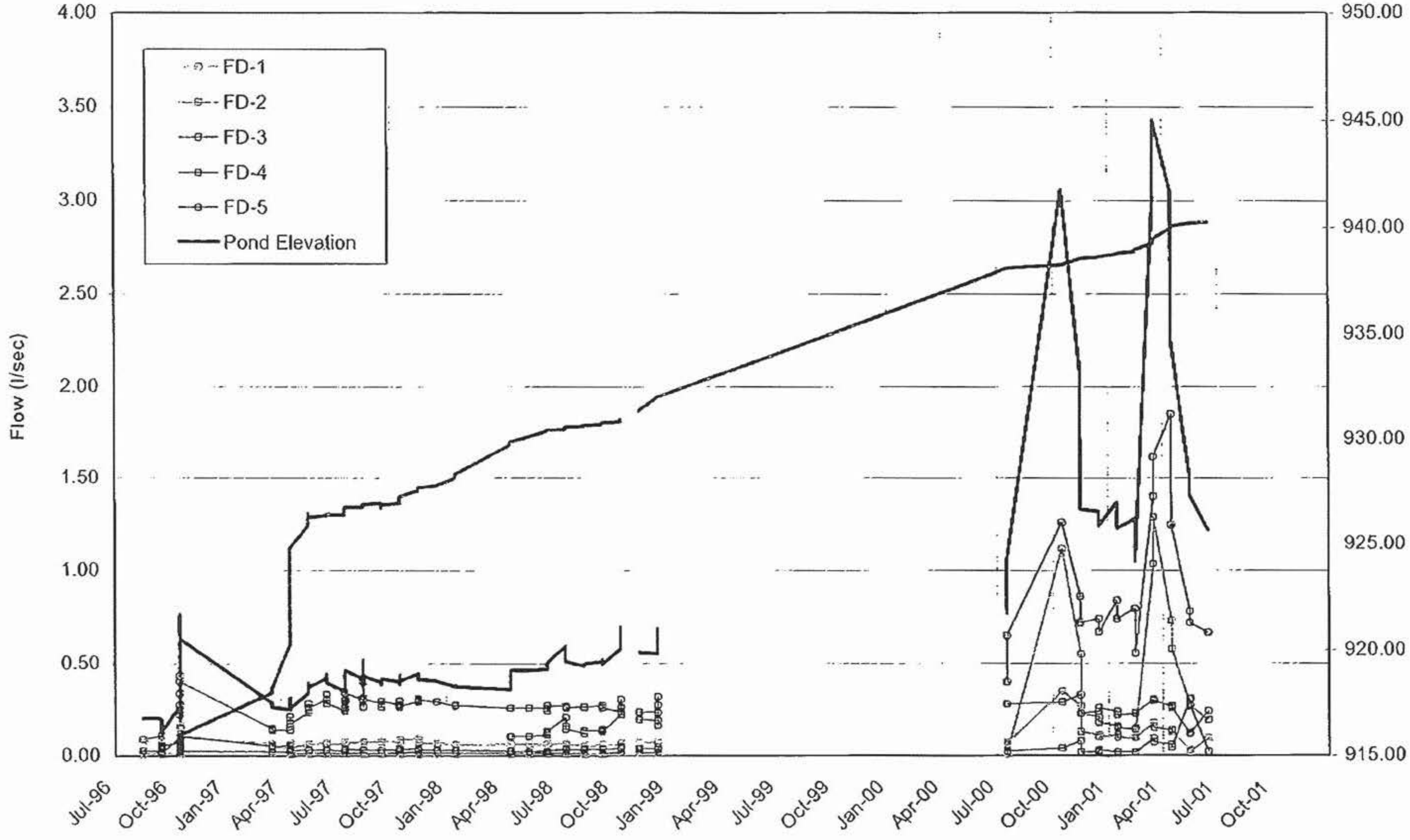
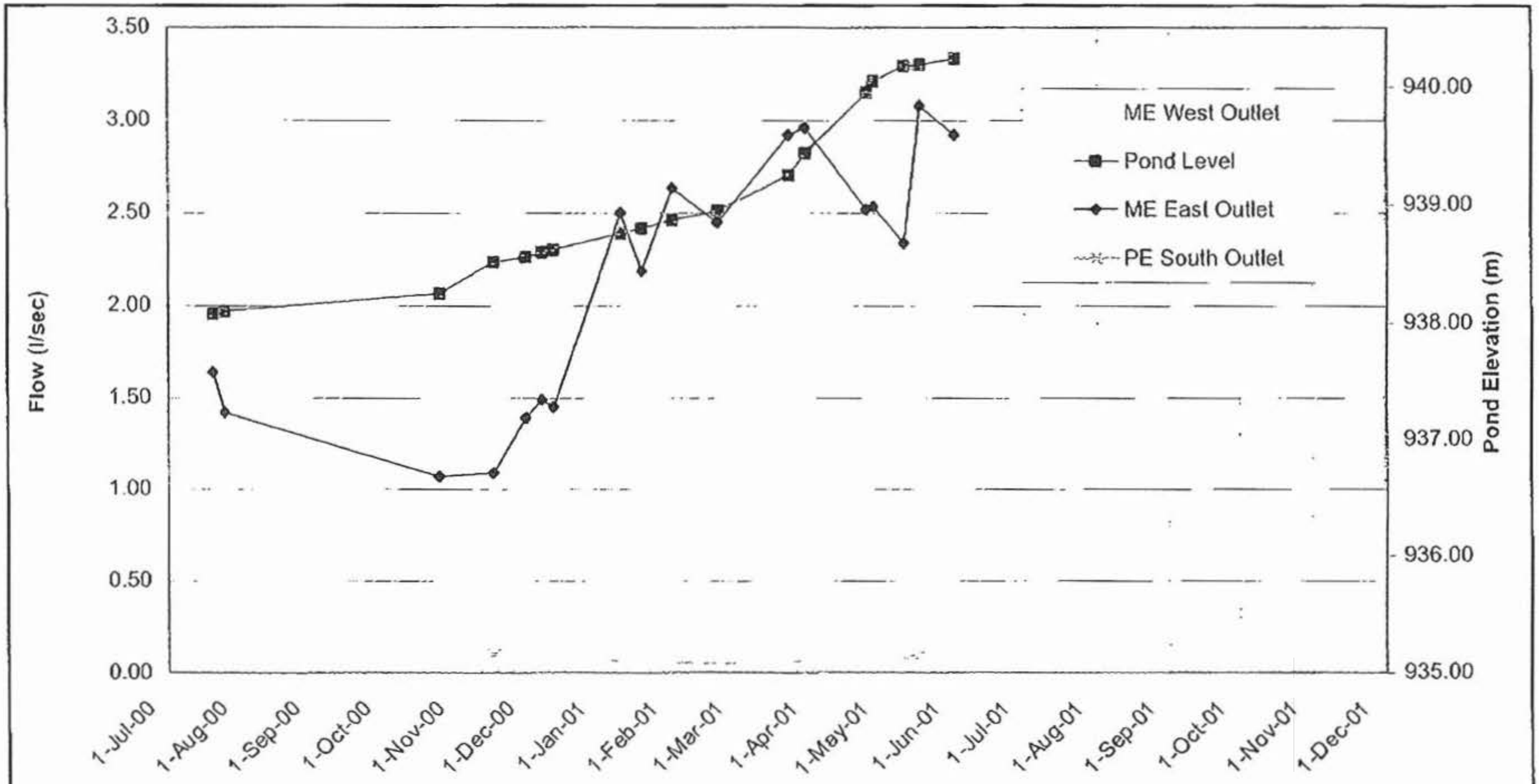
FIGURE 5.6



MOUNT POLLEY MINING CORPORATION			
MOUNT POLLEY MINE			
TAILINGS STORAGE FACILITY MAIN EMBANKMENT FOUNDATION DRAIN FLOWS			
Knight Piésold CONSULTING	PROJECT NO. 11162/13	REF NO.	REV.
	FIGURE 5.7		

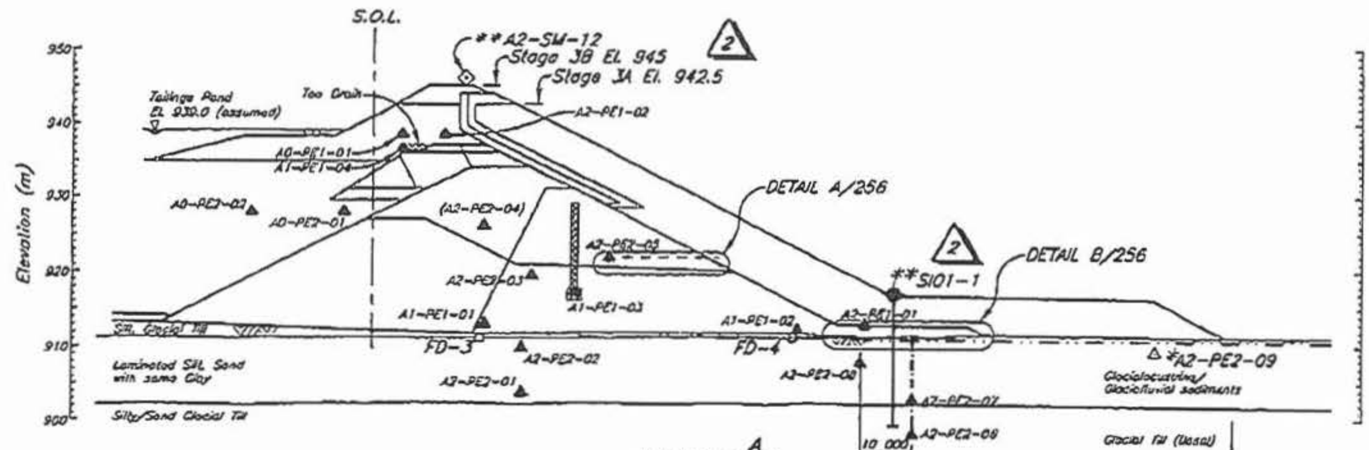


MOUNT POLLEY MINING CORPORATION

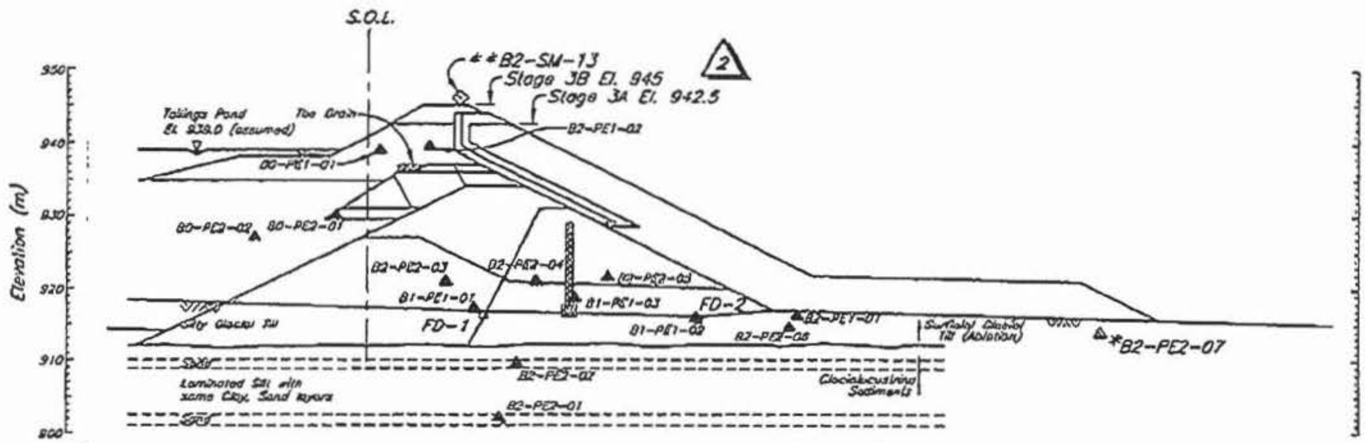
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
UPSTREAM TOE DRAIN FLOWS

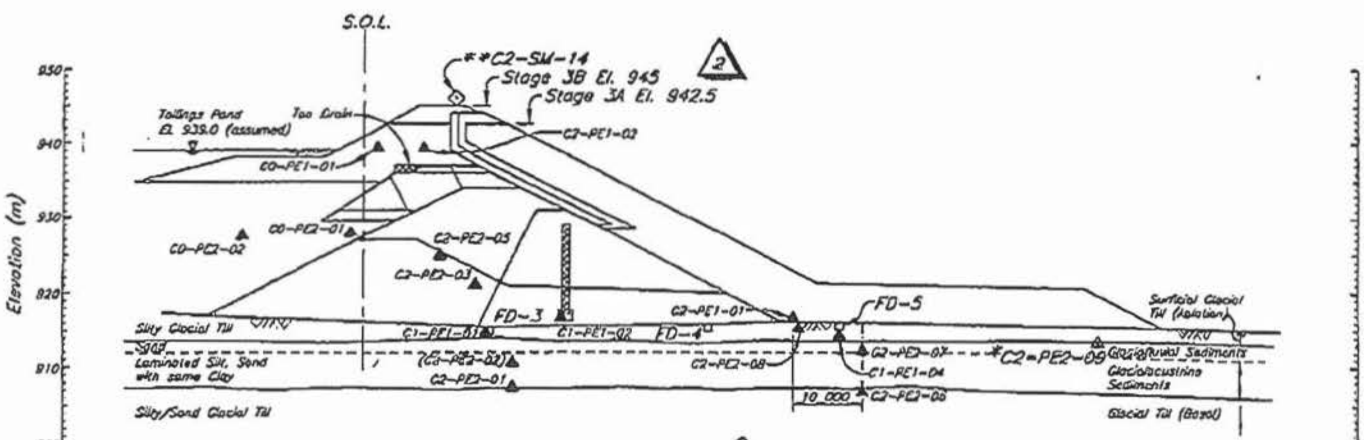
Knight Piésold CONSULTING	PROJECT NO 11162/13	REF. NO.	REV
	FIGURE 5.8		



PLANE $\frac{A}{250}$
CH. 20+00

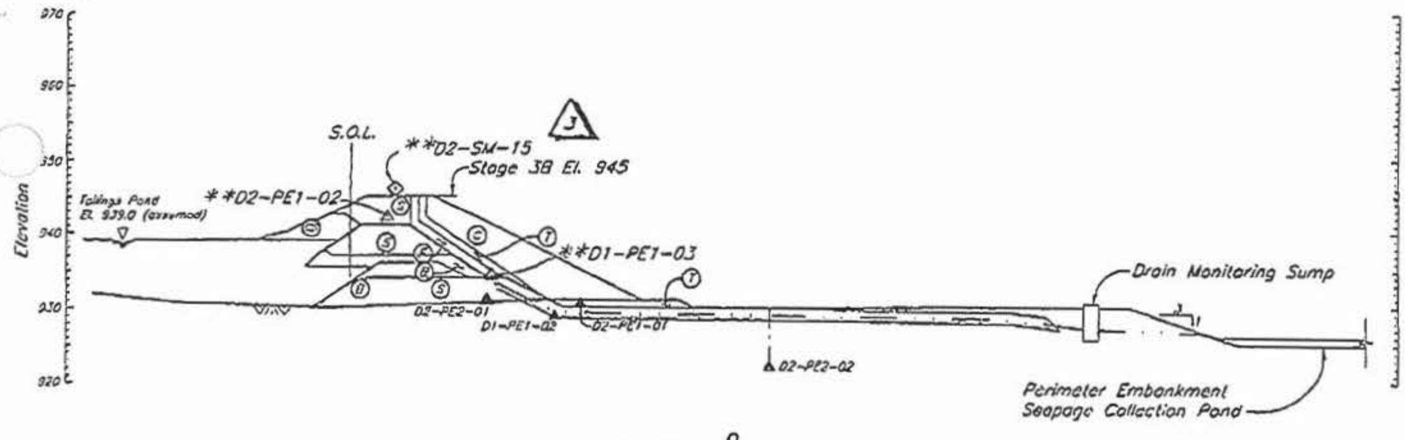


PLANE $\frac{B}{250}$
CH. 22+40



PLANE $\frac{C}{250}$
CH. 18+50

DESCRIPTION	REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D	REV.	DATE	
STAGE 3 TAILINGS EMBANKMENT – INSTRUMENTATION – SECTIONS 2 OF 2								2	08MAY'01	ISSUED FO
STAGE 3 TAILINGS EMBANKMENT – INSTRUMENTATION – SUMMARY OF INSTALLATION & TYP. DETAILS								1	26JAN'01	STAGE 3B
STAGE 3 MAIN EMBANKMENT – INSTRUMENTATION – PLAN								0	3JUN'00	ISSUED FO
REFERENCE DRAWINGS			REVISIONS							



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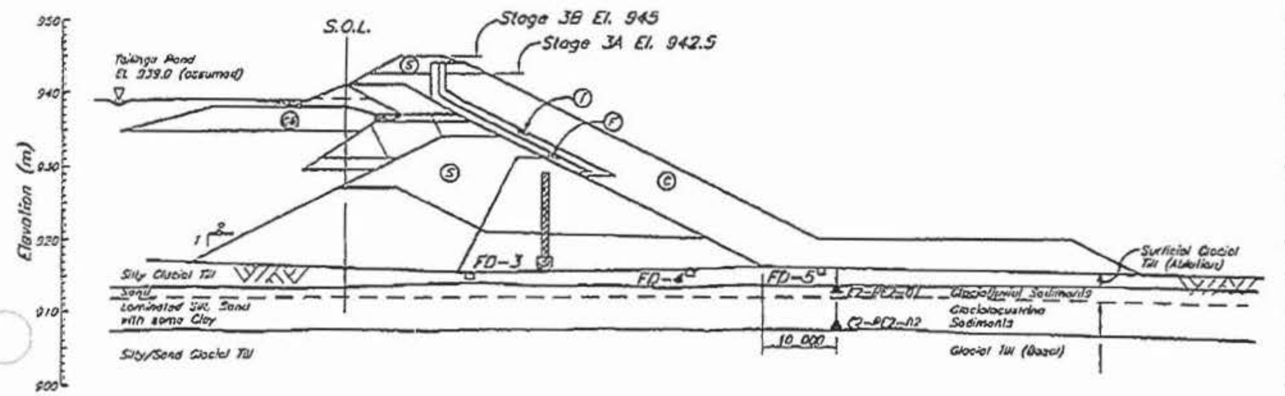
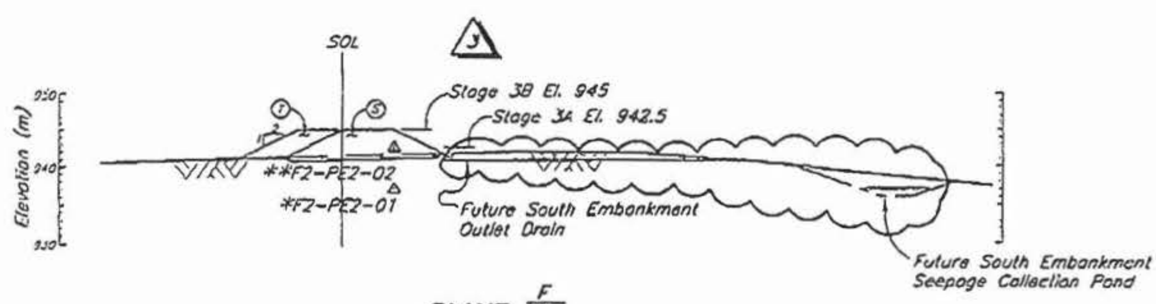
CH. 39+86



PLANE $\frac{E}{250}$
CH. 17+60



PLANE $\frac{F}{254}$
CH. 7+19

DESCRIPTION	REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D	REV.	DATE	
...GE 3 TAILINGS EMBANKMENT – INSTRUMENTATION SUMMARY OF INSTALLATION & TYPICAL DETAILS								3	08MAY'01	ISSUED FO...
...STAGE 3 TAILINGS EMBANKMENT – SOUTH EMBANKMENT – INSTRUMENTATION PLAN								2	26JAN'01	STAGE 3B
STAGE 3 PERIMETER EMBANKMENT – INSTRUMENTATION PLAN								1	20OCT'00	PEREMETER
STAGE 3 TAILINGS EMBANKMENT – MAIN EMBANKMENT – INSTRUMENTATION PLAN								0	3JUN'00	ISSUED FO...
REFERENCE DRAWINGS	REVISIONS									

Knight Piésold
CONSULTING

Knight Piésold Ltd.
1400 - 750 West Pender St
Vancouver, BC V6C 2T8
CANADA

Tel: +1 (604) 685-0543
Fax: +1 (604) 685-0147
Fax: +1 (604) 687-2203
www.knightpiésold.com

DATE:	February 5, 2001	**FILE NO.:**	11162/14.01
TIME:		**REF NO.:**	1/0386
OPERATOR:		**PAGES:**	1 of 23
SENDER:	s.22	**APPROVED:**	KJB.

TO:	MPMC	**FAX:**	(250) 790-2268
ATTN:	Eric LeNeve		
CC:	Chris Carr, MEMND (250) 952-0481		
SUBJECT:	Mount Polley TSF - Progress Report No. 8		

CAZ → [illegible] → File
12/2/01

MINISTRY OF
ENERGY AND MINES
REC'D FEB 0 6 2001

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
STAGE 3 CONSTRUCTION

PROGRESS REPORT NO. 8 – January 16 to January 29, 2001

SECTION 1.0 –GENERAL

Construction of the Stage 3a raise for the Tailings Storage Facility Perimeter Embankment, from Chainage 32+00 to 45+00, was resumed on January 16, 2001. The scope of work includes:

1. Removal of frozen Zone S with observed ice lenses and frozen cycloned sand that had accumulated on the Zone S crest during cycloning operations in the fall of 2000.

2. Placement of Zone S to Elevation 941.3 m. The excavated surface ranged from El. 940.2 to 940.8 m.

1.1 PERSONNEL

Mount Polley Mining Corporation (MPMC) management personnel overseeing the Stage 3 work are as follows:

Eric LeNeve, Tailings Coordinator
Don Parsons, Mine Superintendent
Charie O'Hara, General Foreman
s.22 Site Foreman

The following Knight Piesold Ltd. (KP) representatives were on site during the reporting period:

s.22
Site Engineer – Arrived on site January 15, left site January 29, 2001.
Senior Engineer – Arrived on site January 24, left site January 25, 2001.

1.2 WEATHER

Weather conditions over the period were variable, with a mix of sun and clouds and occasional periods of light snow. Temperatures ranged from about -10°C to +1°C during the day.

Work was stopped during the afternoon of January 28 until the end of the reporting period due to heavy snowfalls.

1.3 DESIGN DEVELOPMENTS

Recent review of the project water balance indicates that a core zone elevation of 941.0 m is sufficient to provide storage for tailings, supernatant water and the 24 hour PMP event until the end of May, 2001. An additional 1 m is required for wave run-up protection, and this may be achieved with cycloned sand or rockfill. Constructing the Zone S to 941.3 m will provide storage until the end of August. when

The filling schedule indicates that a crest elevation of 945 m is sufficient to meet storage and freeboard requirements through August 2002. This is 1 m higher than the currently permitted crest elevation of 944 m. Revisions to the construction drawings are currently in progress, and a request to revise the existing permit will be issued to MEMND upon completion.

A review of embankment stability is underway. Work to date comprised a review of pore water pressure data. The stability model will be revised to reflect updated conditions since the last comprehensive review during Stage 3 design in 1999. The goals of the review include:

- Verification that existing pore water pressures in the embankment fill and foundations are less than those incorporated into the stability model;
- Review of piezometer trigger levels. These were reviewed in 1999 and it was not necessary to revise them. The placement of rockfill in 2000 increased embankment stability, thus increasing the conservatism of the trigger levels.
- Assessment of the requirement for inclinometers or similar displacement monitoring instrumentation at the Main Embankment. Inclinometers were recommended in the Report on On-going Construction Requirements (10162/9-3, 1998) and the use of rockfill as opposed to cycloned sand in the downstream Stage 3 fill facilitates their installation and continued use. These instruments would typically be installed in

downstream embankment fill and extend into the overconsolidated glaciolacustrine foundation materials.

- Verification of the stability of the Stage 4 Tailings Embankments (El. 948 m).

The review of embankment stability is part of the Annual Inspection and the results will be presented in the 2000 Annual Inspection Report.

1.4 TAILINGS FACILITY OPERATION AND MAINTENANCE

s.22 KP Senior Engineer and Eric LeNeve, MPMC Tailings Coordinator, carried out a thorough inspection and evaluation of the tailings pipeline from January 24 to 25. It was discovered that a large quantity of pressurized air was in the pipeline, restricting tailings flow in the line. Manual air release valves were added to the existing gauge setups at 4 locations; immediately downstream of the T2 dropbox, immediately upstream of the Bootjack Creek crossing, between the two aforementioned locations, and at the M1A upper dump valve. This system allows for the release of pressurized air and permits the tailings within the pipeline to flow more efficiently. Flow velocity at the exit of the line (approximate Ch. 25+00) is observed to be more consistent and backups have been eliminated. It is believed that this improvement will allow MPMC to extend the pipeline towards the South Embankment and begin to release tailings in this area.

1.5 SAFETY

No safety incidents were reported for the period.

SECTION 2.0 – CONSTRUCTION ACTIVITIES

2.1 EQUIPMENT

MPMC used the following equipment over the reporting period:

- Excavators – 1 Hitachi EX 270, 1 Hitachi EX400 and 1 Cat 330RB
- Haul Trucks – 4 Moxy 30T articulated
- Dozers – 1 Cat D7, 1 Cat D8, 1 Cat D6, 1 Cat D10
- Compactors – 1 10T Cat CS563
- Sand truck, service trucks, fuel trucks

2.2 ACTIVITIES

The major construction activities for the reporting period are summarized below.

Perimeter Embankment

Removal of snow, ice, Zone S with observed ice lenses and frozen cycloned sand, Ch. 32+20 to 44+00, El. 940.2 to 941.0 m. Sections were cleaned with dozers and excavators.

Following cleaning and approval of the excavated surface, Zone S placement was carried out from Ch. 32+20 to 43+20, El. 940.2 to 941.3 m.

SECTION 3.0 – KNIGHT PIESOLD ACTIVITIES

3.1 GENERAL

KP site activities over the reporting period included the following:

- Inspection and documentation of construction activities.
- QA/QC collection and testing of Zone S record samples.
- Preparation of daily inspection reports.
- Review of embankment monitoring data provided by MPMC.
- Assistance to MPMC in the surveys carried out at the embankment.

3.2 LABORATORY TESTING

The following samples were collected and tested on site over the reporting period:

- Zone S record sample R/ZS-6

The results of the testing are provided on Table 3.1 and Figure 3.1.

The results show that the Zone S record sample meets the specifications for particle size distribution.

SECTION 4.0 – EMBANKMENT MONITORING

Monitoring of tailings embankment instrumentation over the reporting period indicates that the embankment is performing well within design tolerances.

4.1 VIBRATING WIRE PIEZOMETERS

Piezometer readings are obtained on a weekly basis. The results of the monitoring are shown on Figures 4.1 to 4.5, and are summarized below. Locations of the piezometers are shown on attached drawings.

Foundation Piezometers

The Main Embankment foundation piezometers have typically shown slight fluctuations in pore water pressure since December 6th. The largest increases have been about 0.9 m in Plane B.

No substantial changes were noted in the Perimeter Embankment (Plane D) or South Embankment (Plane F) foundation piezometers.

Fill Piezometers

Most of the Main Embankment glacial till piezometers responded to construction of the overlying Stage 3 fills with increasing pore pressures. Since the last set of readings the piezometers have shown either slight fluctuations, or a continuing decreasing trend.

Two piezometers located within Stage 1a glacial till fill have historically registered anomalous values, and warrant discussion. || *

Piezometer B2-PE2-03 reacted strongly to fill placement during initial construction. Pore water pressures did not dissipate in the periods following fill placement, but remained steady. This is in direct contrast to other similarly located instruments. This trend changed in 1999, when B2-PE2-03 began to show dissipation at the completion of fill placement. This new trend has been repeated three times, with approximately the same rate of dissipation after each stage of construction. In each case, the period of dissipation was interrupted by the next stage of construction, with an increase in pore water pressure between 100 and 50 percent of the increase in total stress. It appears that drainage paths were limited in the fill around B2-PE2-03 and pore water pressures are still equilibrating.

effect on stability
is it local?

Piezometer C2-PE2-05 is also located within Stage 1a glacial till fill. This instrument historically showed little or no reaction to construction, but rather indicated a slow, steady increase in pore water pressure over time. This suggests that pore water pressures in the fill around C2-PE2-05 are reaching a steady state condition as the phreatic surface moves through the fill. It should be noted that the pressure head registered by C2-PE2-05, approximately 10 m, is similar to other piezometers located in comparable positions within glacial till fill.

Plots of elevation head and r_u with time for B2-PE2-03 and C2-PE2-05 are presented in Figures 4.7 and 4.8.

<u>Drain Piezometers</u>

All drain piezometers have remained static and at a very low head indicating free draining conditions within the embankment drainage system.

<u>Tailings Piezometers</u>

Water levels at the tailings piezometers continue to mimic the pond level, except at the Main Embankment, where the upstream toe drain has resulted in a depressed phreatic surface.

4.2 DRAIN FLOWS

Results of foundation drain outlet monitoring are shown on Figure 4.9. Results of monitoring of the upstream toe drains outlets are shown on Figure 4.10.

The readings from January 19 indicate that the fill is draining and that the flow rates are normal.

The readings in all cases show a significant decrease from the anomalous high values observed on October 24, although some of the readings still remain slightly above the range of previously recorded values. There has been no visible sediment in the flows from the foundation drains.

Monitoring of the upstream toe drain shows slight fluctuations in flows, likely due to the increasing pond level as well as the changing tailings slurry discharge locations.

SECTION 5.0 – ONGOING ITEMS

The following items will be addressed during upcoming reporting periods:

- MPMC will continue to monitor the Perimeter Embankment at the completion of the current construction activities.
- MPMC and KP will continue to review the Perimeter Embankment construction scheduling.
- KP Personnel will visit the site as necessary for construction inspections.

Submitted by:

s.22

Mount Polley Site

Distribution:

Eric LeNeve, Don Parsons	Mount Polley Mining Corporation
Chris Carr	Ministry of Energy, Mines and Northern Development
Ken Brouwer	Knight Piesold Ltd., Vancouver

TABLE 3.1

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE S RECORD TEST SUMMARY SHEET

Revised: 05-Feb-01
Date Printed: 05-Feb-01

W:\...\Stage 3A Site Filed Lab Testing\Zone S\R-ZS-1CM.xls\Summary Table

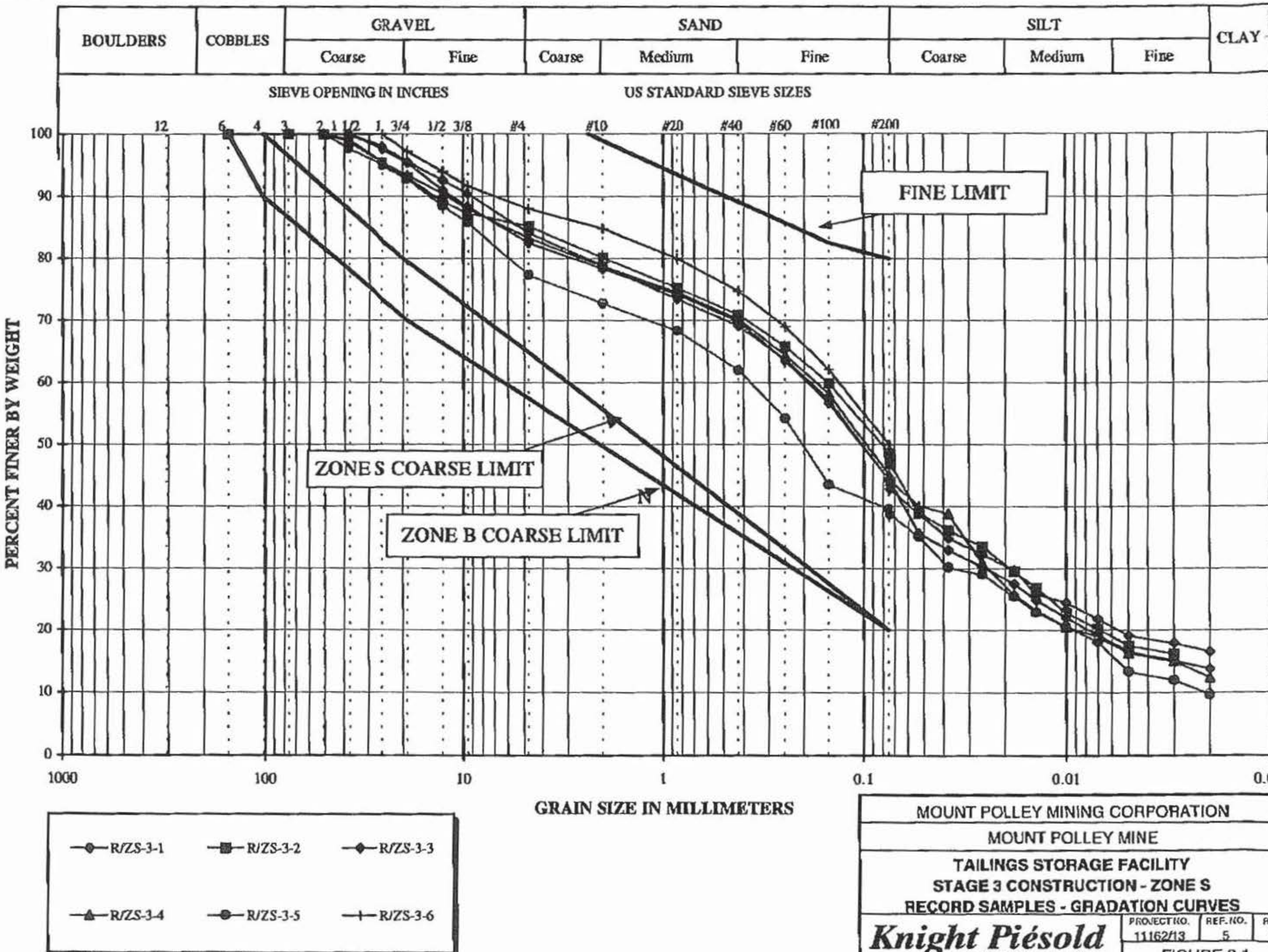
				R1			R2	R3 (Particle Size Distribution)															R4		R6	R7	
Date Sampled	Sample No.	Location	Elev. (m)	Atterberg Limits			Field	152.4	76.2	50.8	38.1	25.4	19.05	12.7	9.525	4.75	2	0.85	0.425	0.25	0.15	0.075	Standard Proctor		Specific	Field Density	
				PL	LL	PI	m/c	6	3	2	1.5	1.000	0.750	0.500	0.375	#4	#10	#20	#40	#60	#100	#200	Max Dry	Optimum	Gravity	Dry	Compaction
				%	%	%	%	6	3	2	1 1/2	1	3/4	1/2	3/8	#4	#10	#20	#40	#60	#100	Clay	Density kg/m³	m/c %		Density kg/m³	%
19-Sep-00	R-ZS-3-1	Ch. 27+00	941.2	13.9	24.5	10.6	9.8	100.0	100.0	100.0	100.0	98.0	95.6	93.6	90.5	84.1	78.8	73.4	69.1	63.7	57.2	44.3	2110	8.8	1.636	2108	99.9
21-Sep-00	R-ZS-3-2	Ch. 16+00	941.0	13.6	24.4	10.8	9.5	100.0	100.0	100.0	98.8	95.3	93.0	89.2	87.3	85.2	80.1	75.2	70.9	65.8	59.9	48.7	2018	9.6	2.623	2092	103.7
22-Sep-00	R-ZS-3-3	Ch. 22+60	941.6	13.7	24.4	10.7	9.9	100.0	100.0	100.0	100.0	97.6	95.4	91.0	88.4	82.5	78.3	74.2	69.8	63.5	56.7	44.3	2109	8.4	2.695	2142	101.6
23-Sep-00	R-ZS-3-4	Ch. 8+40	-	14.0	22.1	8.8	9.6	100.0	100.0	100.0	99.1	95.4	93.4	90.5	88.0	83.3	78.7	74.5	70.2	64.4	58.2	45.1	2141	7.8	2.673	2092	97.7
26-Sep-00	R-ZS-3-5	S.E. Zone S Fill	-	13.4	22.1	9.1	8.0	100.0	100.0	100.0	97.7	95.0	92.8	88.5	85.8	77.3	72.7	68.3	62.0	54.2	43.5	39.6	2140	7.2	2.674	2236	104.5
22-Jan-01	R-ZS-3-6	Ch. 33+00	941.3	-	-	-	10.5	100.0	100.0	100.0	100.0	100.0	97.2	94.0	91.7	88.0	84.8	80.0	74.7	69.0	62.1	50.0	2075	10.8	-	2064	99.5
			MEAN	14	24	10	9.6	100.0	100.0	100.0	99.3	96.9	94.6	91.0	88.6	83.4	78.9	74.3	69.5	63.4	56.3	45.3	2099	8.8	2.44	2122	101.1
			MEDIAN	14	24	11	9.7	100.0	100.0	100.0	99.6	96.5	94.4	90.8	88.2	83.7	78.8	74.4	70.0	64.1	57.7	44.7	2110	8.6	2.67	2100	100.7
			MAXIMUM	14	25	11	10.5	100.0	100.0	100.0	100.0	100.0	97.2	94.0	91.7	88.0	84.8	80.0	74.7	69.0	62.1	50.0	2141	10.8	2.67	2236	104.5
			MINIMUM	13	23	9	8.0	100.0	100.0	100.0	97.7	95.0	92.8	88.5	85.8	77.3	72.7	68.3	62.0	54.2	43.5	39.6	2018	7.2	1.64	2064	97.7

Notes:

1. Values for Standard Proctor maximum dry density and optimum moisture content include oversize correction.
2. R-ZS-3-6 tested in MPMC laboratory using 3", 11/2", 1", 3/4", 3/8", #4, #8, #16, #30, #50, #100, #200 sieves. Values in above table are interpolated where necessary.

R1	Atterberg Limits (ASTM D4318)	R4	Laboratory Compaction (ASTM D1557)
R2	Moisture Content (ASTM D2216)	R6	Bulk Specific Gravity (ASTM C127)
R3	Particle Size Distribution (ASTM D422)	R7	Field Density by Nuclear Methods (ASTM D2922)

Rev 0 - Issued for Progress Report



MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
STAGE 3 CONSTRUCTION - ZONE S
RECORD SAMPLES - GRADATION CURVES

Knight Piésold CONSULTING

PROJECT NO.	REF. NO.	REV.
11162/13	5	0

FIGURE 3.1

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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE A PIEZOMETERS

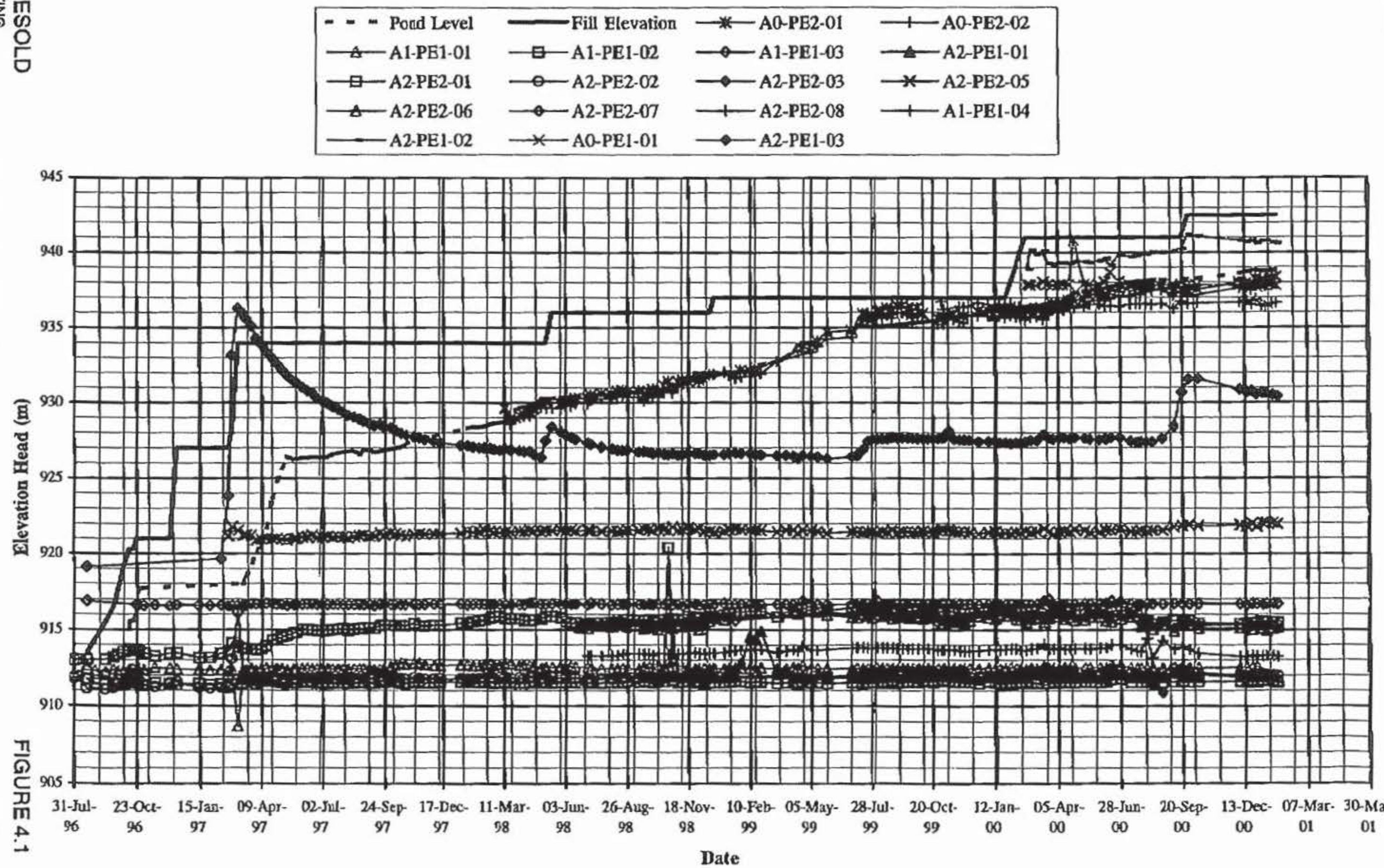

FIGURE 4.1

Plane B.xls All Piezos

-02-2001

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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE B PIEZOMETERS

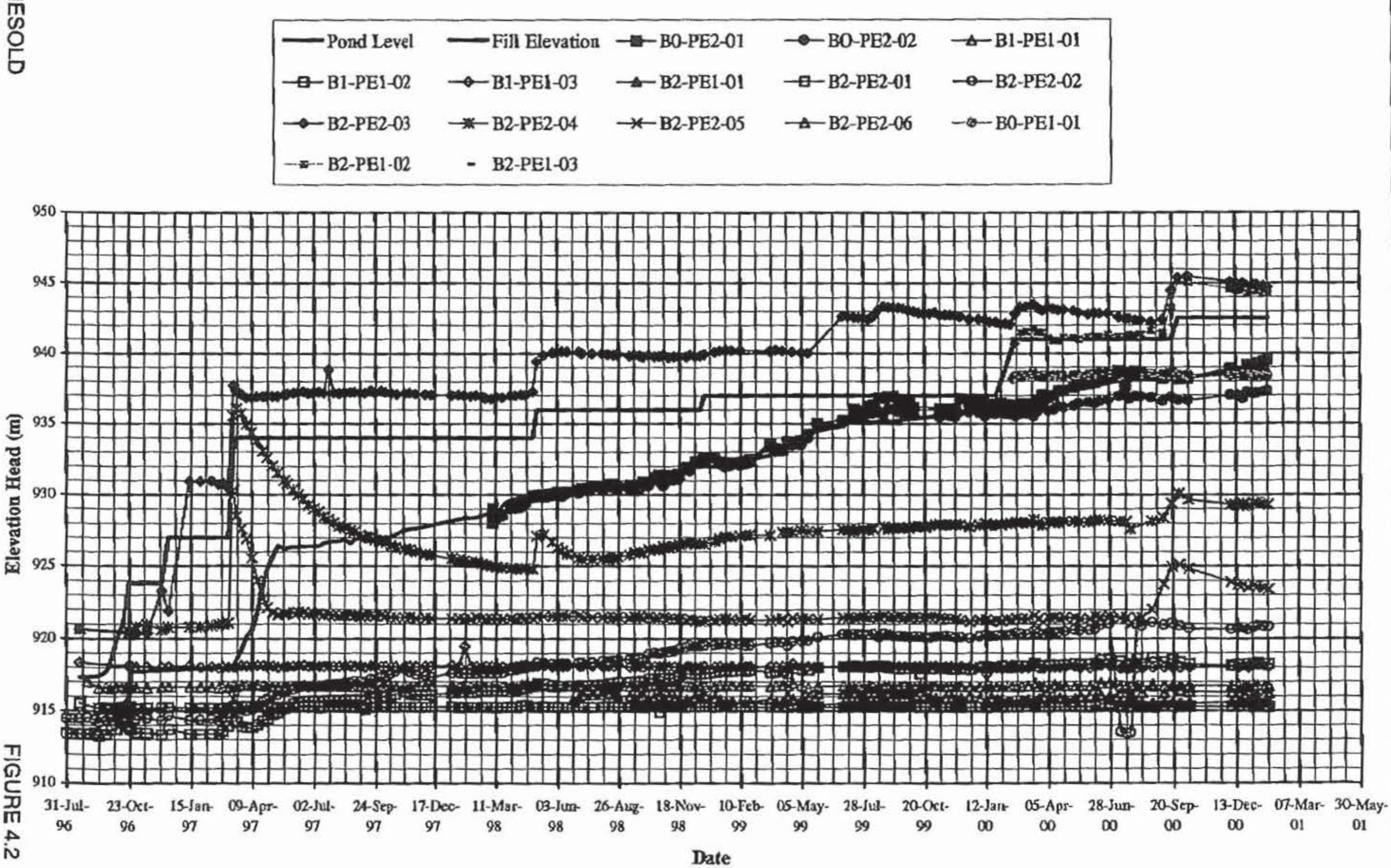

FIGURE 4.2

KNIGHT PIESOLD
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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE C PIEZOMETERS

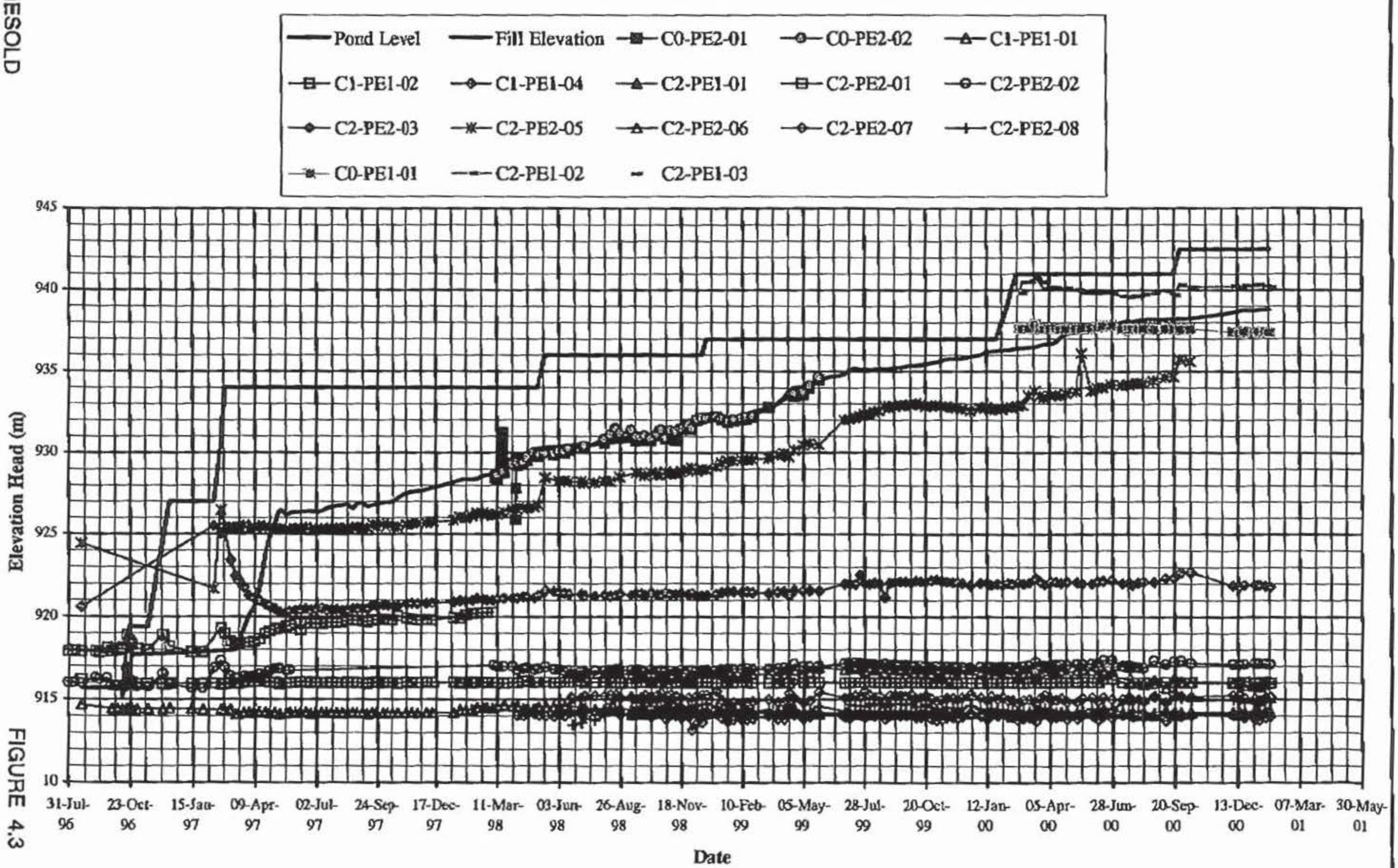

FIGURE 4.3

KNIGHT PIESOLD
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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE D PIEZOMETERS

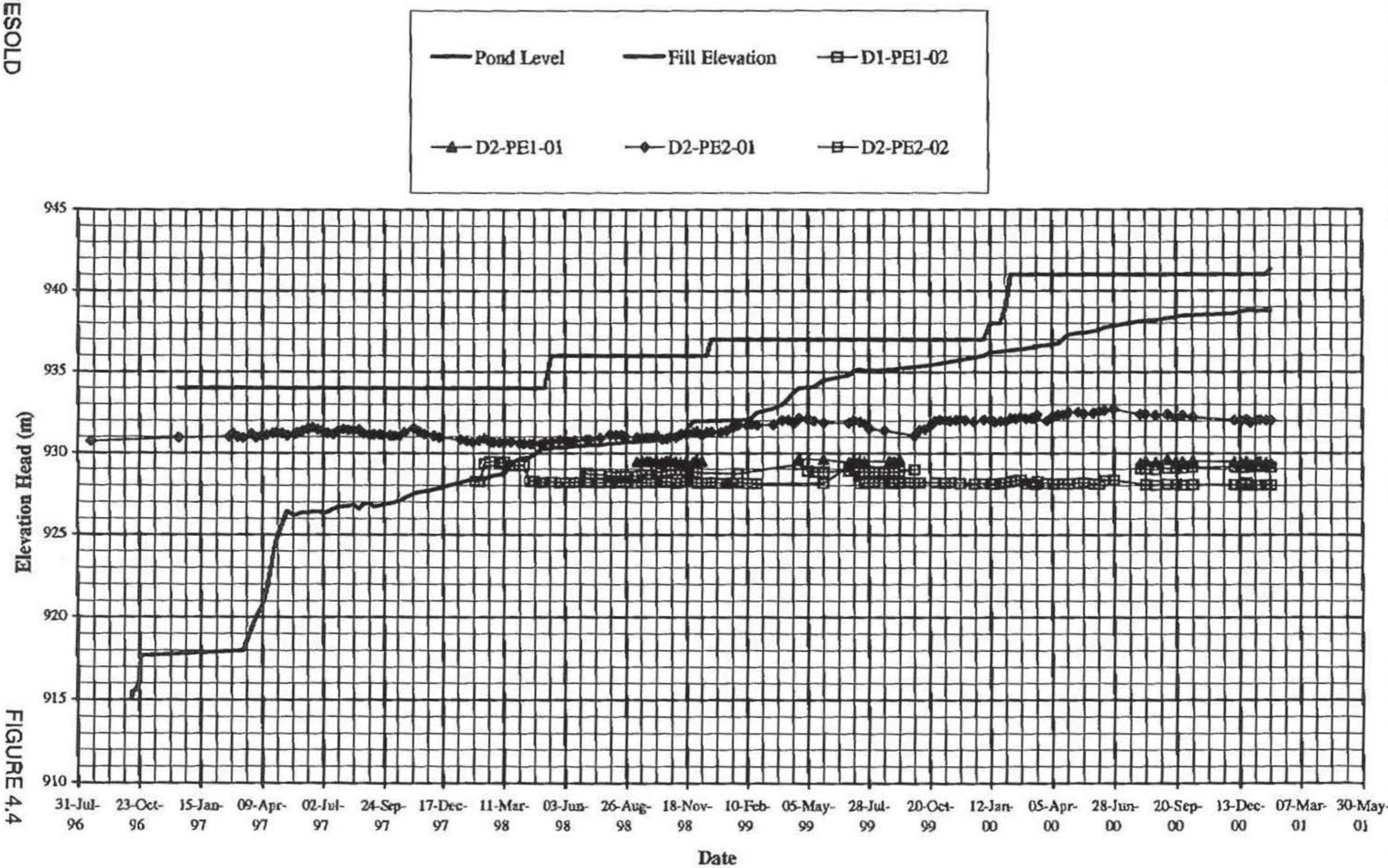

FIGURE 4.4

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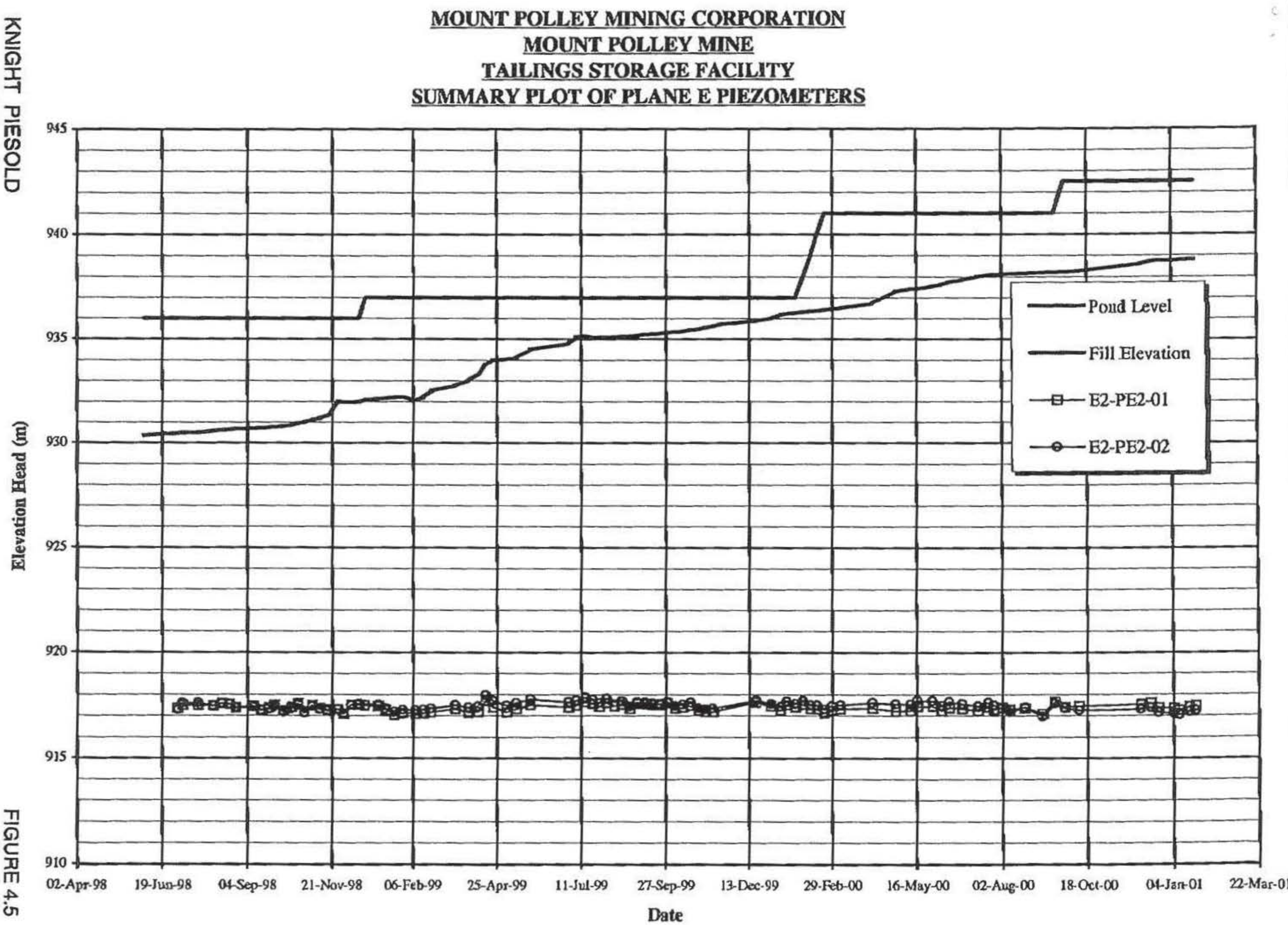

FIGURE 4.5

KNIGHT PIESOLD
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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE F PIEZOMETERS

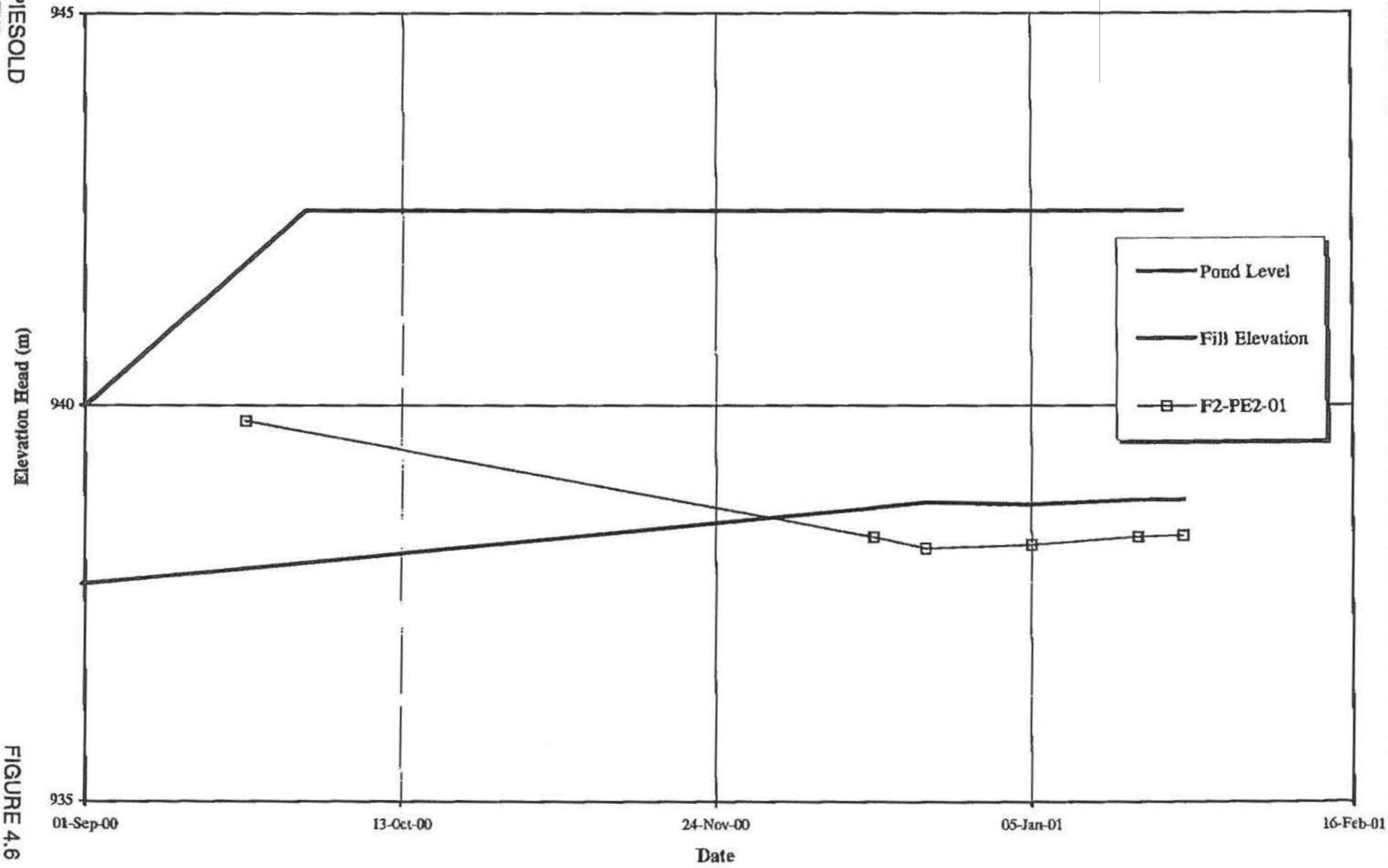

FIGURE 4.6

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY PROJECT
PIEZOMETER B2-PE2-03
(Glacial Till Fill El. 921.0 m)

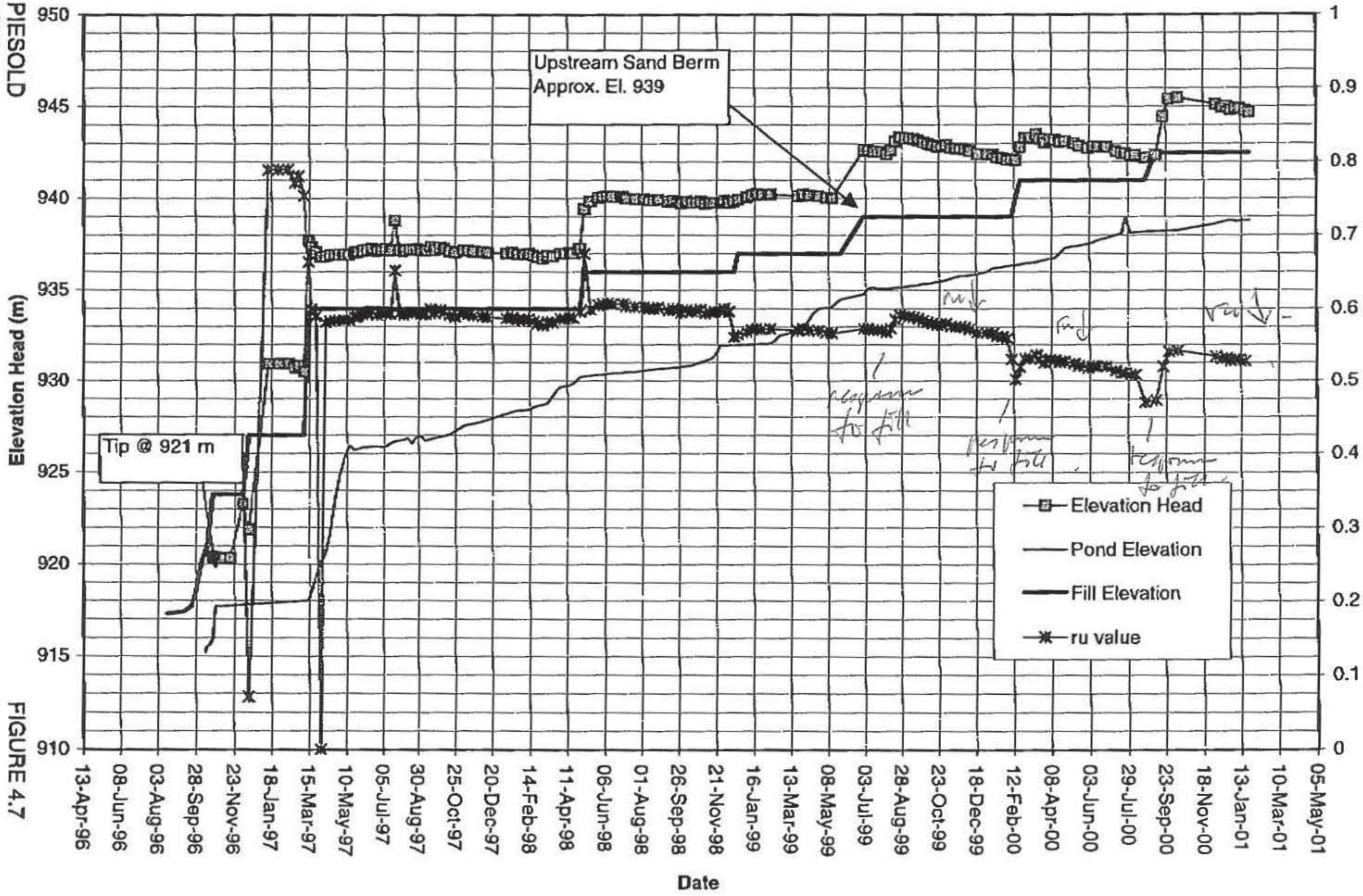

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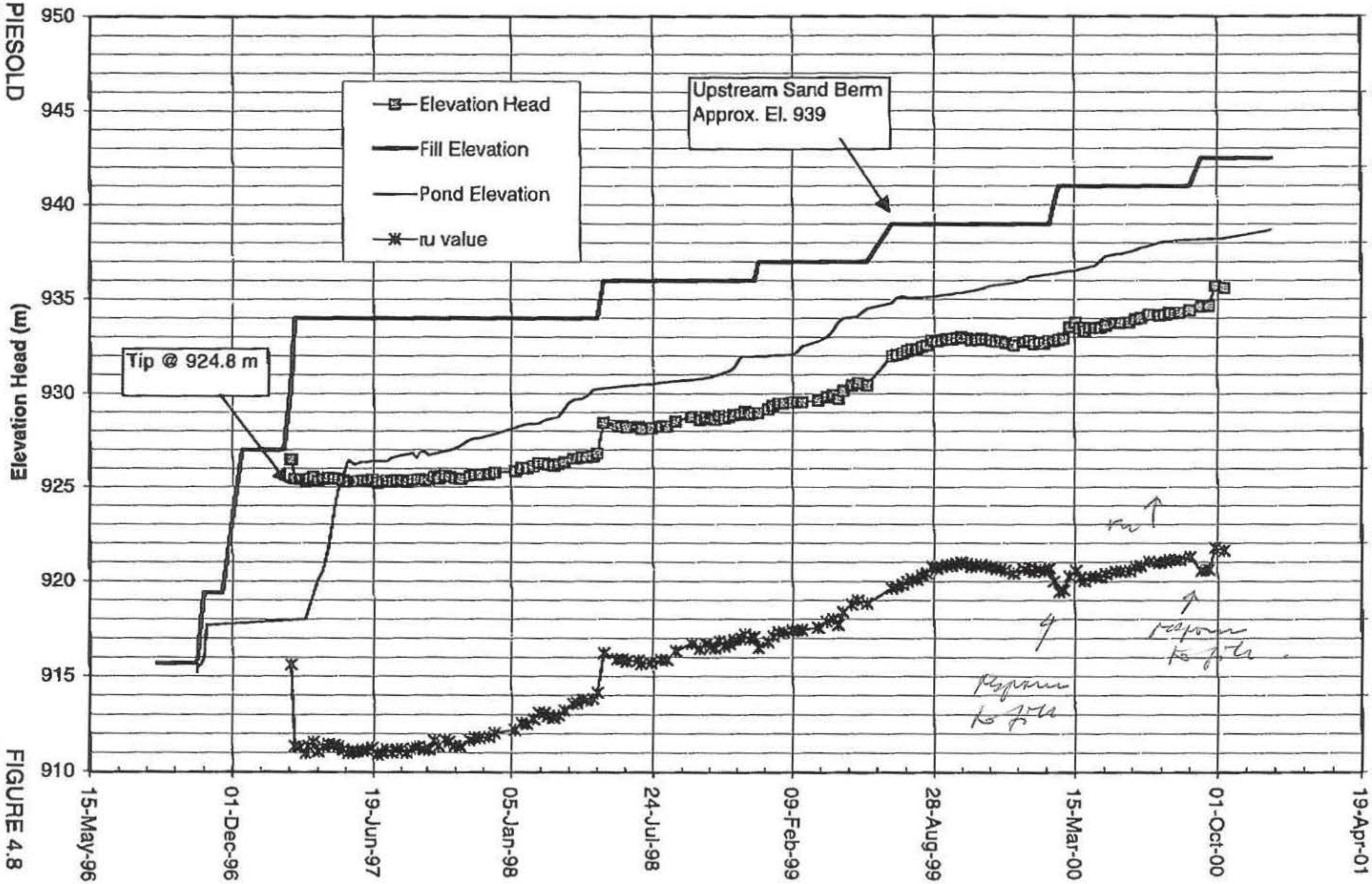
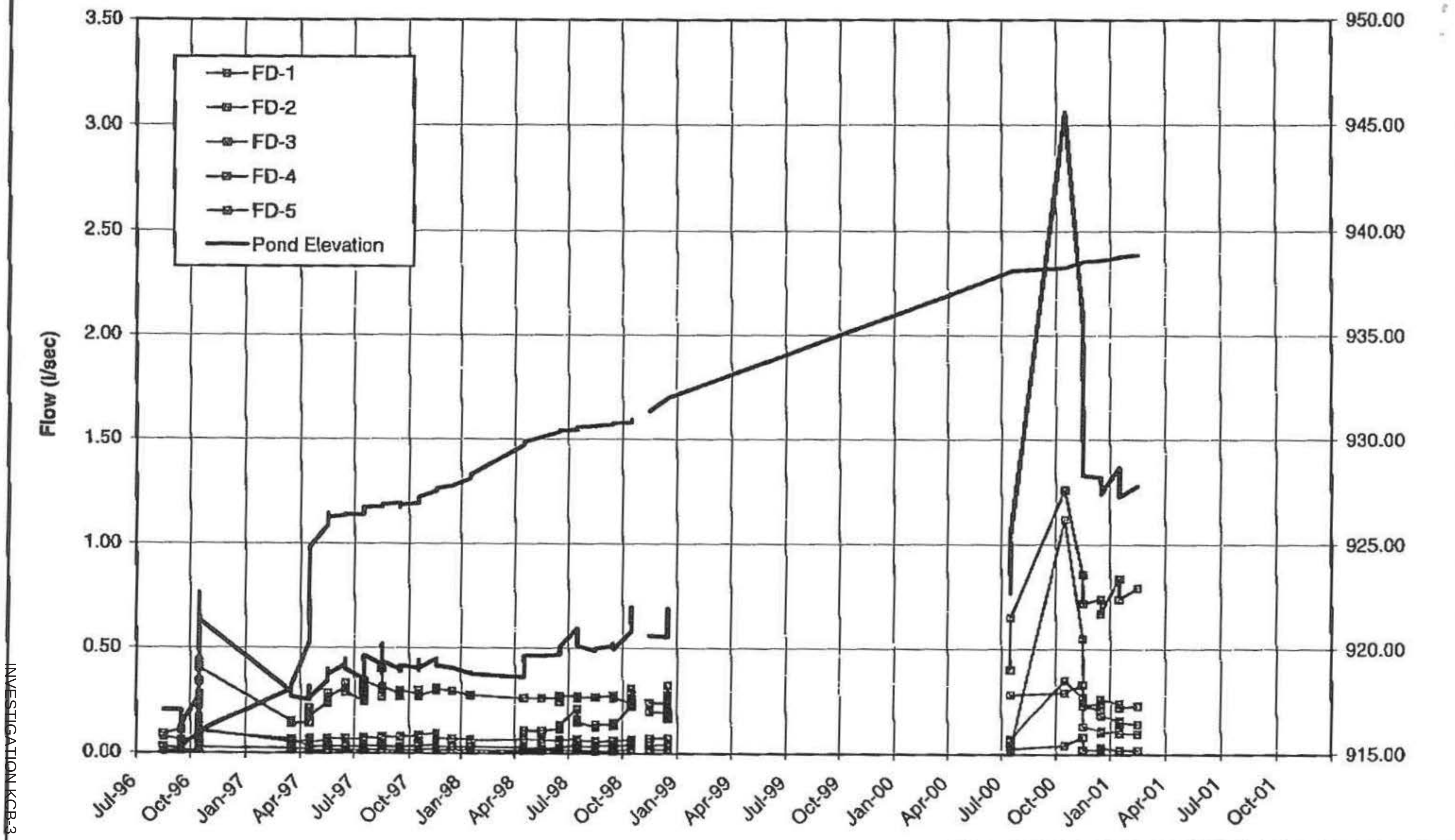
FIGURE 4.7

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY PROJECT
PIEZOMETER C2-PE2-05
(Glacial Till Fill El. 924.8 m)



KNIGHT PIESOLD CONSULTING

FIGURE 4.8

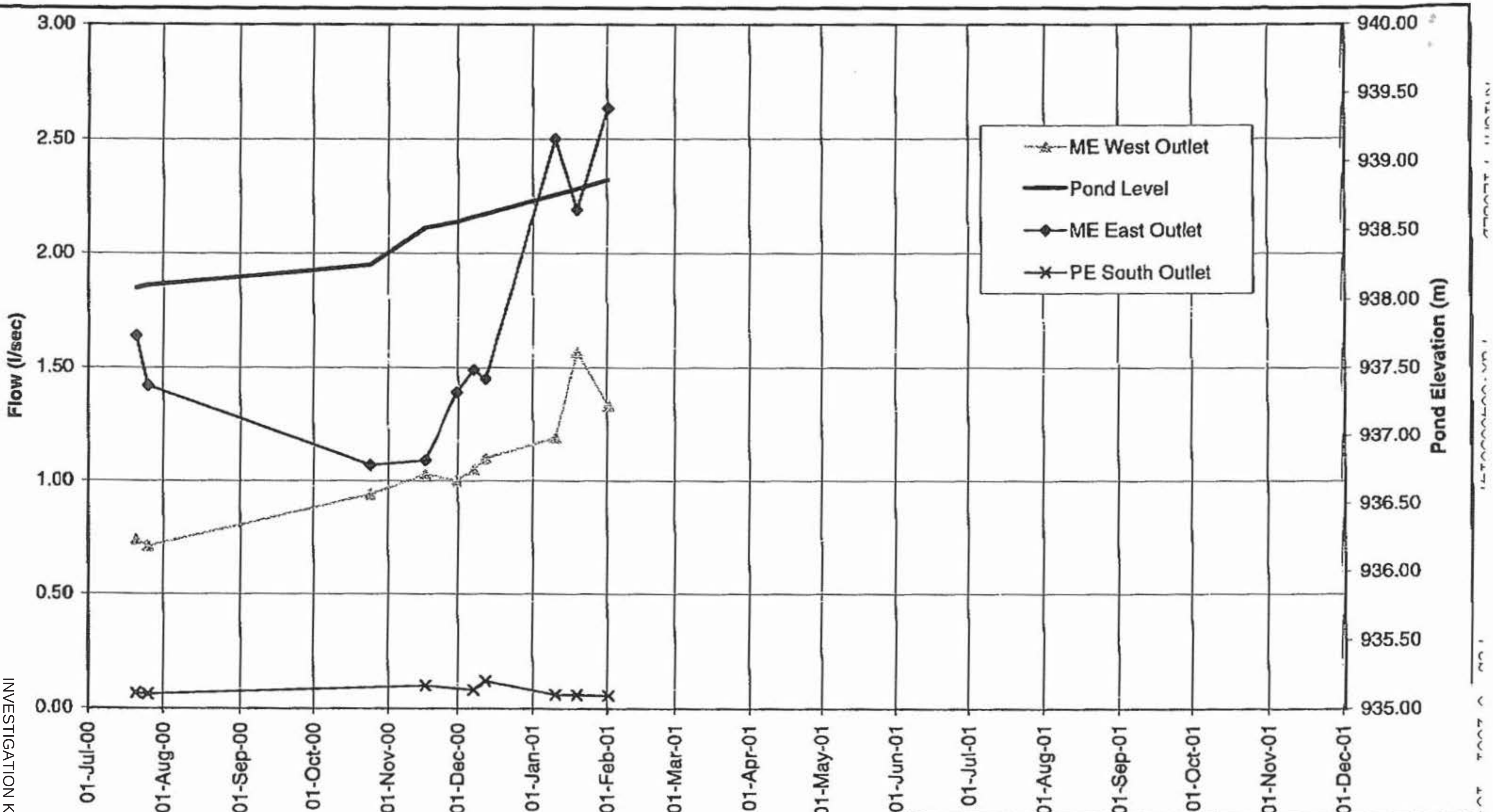


MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
MAIN EMBANKMENT
FOUNDATION DRAIN FLOWS

Knight Piésold CONSULTING	PROJECT NO.	REF. NO.	REV.
	11162/13		
	FIGURE 4.9		

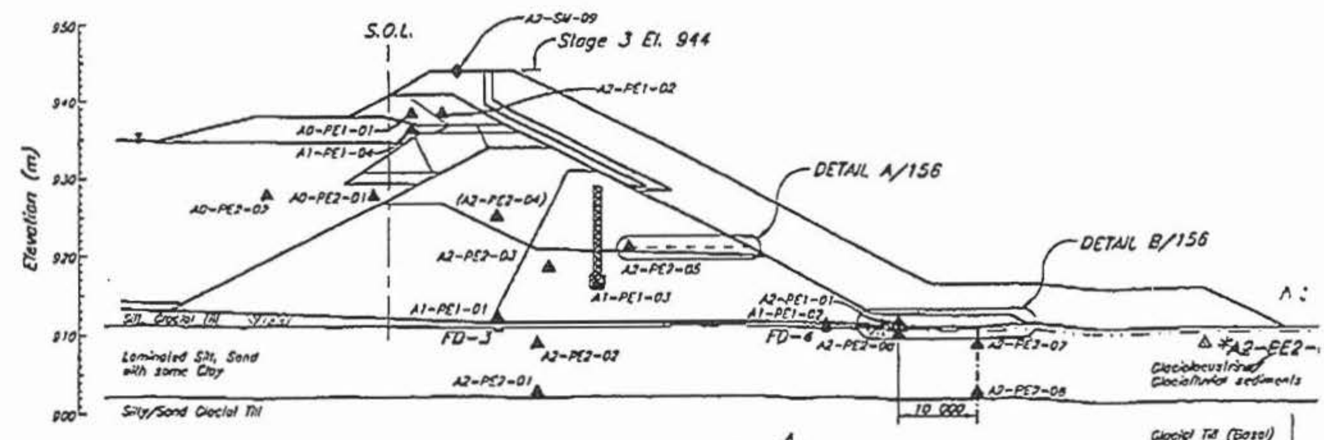


MOUNT POLLEY MINING CORPORATION

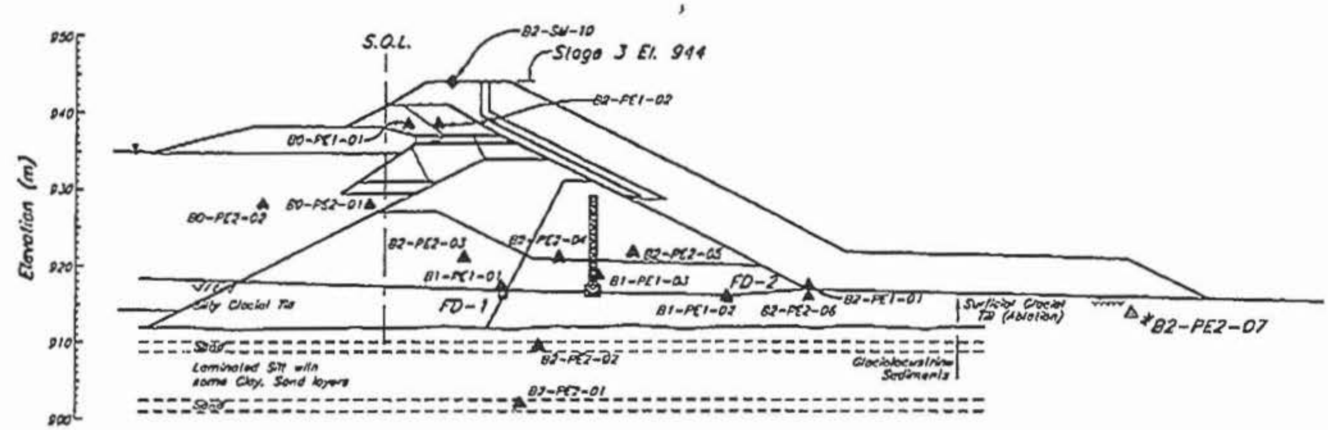
MOUNT POLLEY MINE

**TAILINGS STORAGE FACILITY
UPSTREAM TOE DRAIN FLOWS**

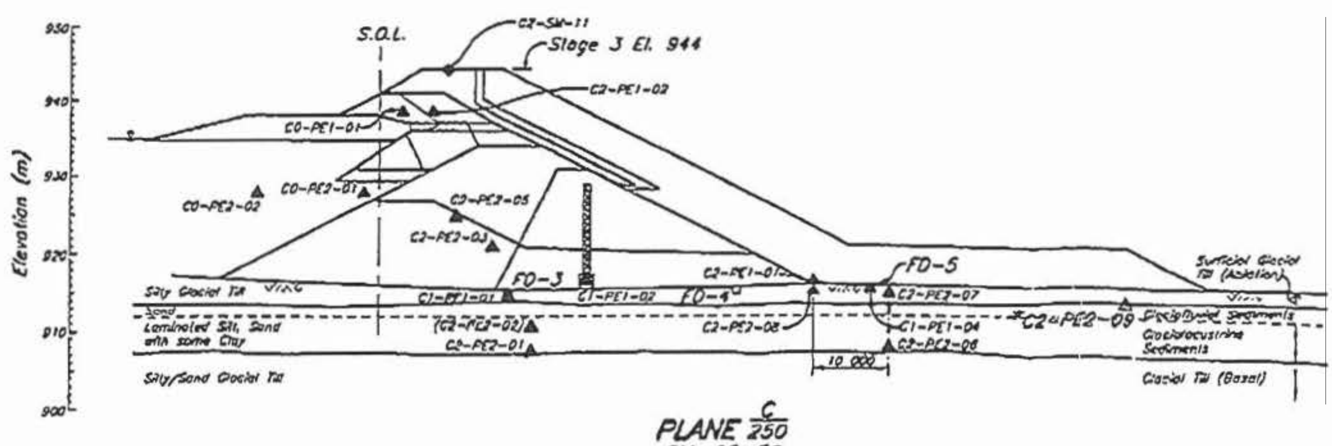
	PROJECT NO.	REF. NO.	REV.
Knight Piésold CONSULTING	11162/13		
	FIGURE 4.10		



PLANE $\frac{A}{250}$
CH. 20+00



PLANE $\frac{B}{250}$
CH. 22+40



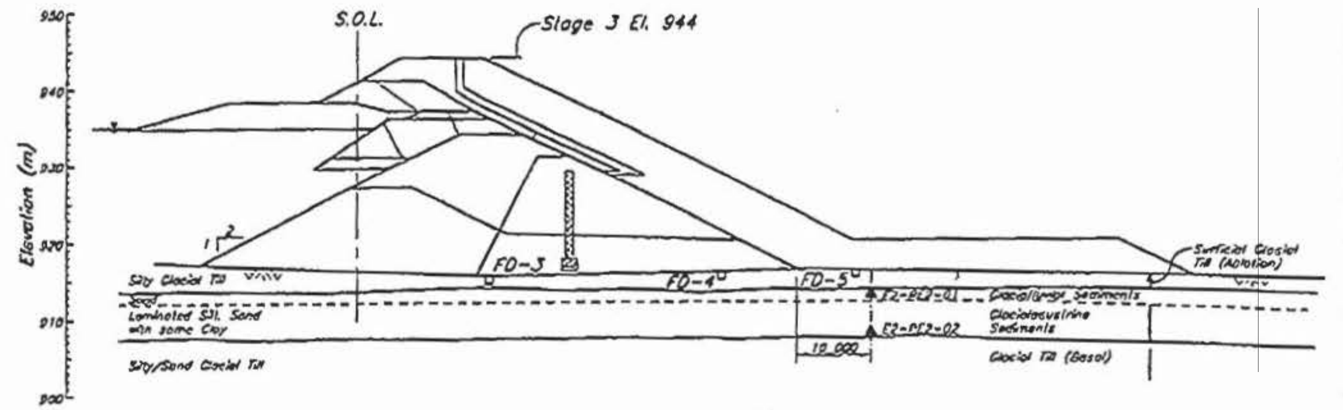
PLANE $\frac{C}{250}$
CH. 18+50

DESCRIPTION
..E 3 TAILINGS EMBANKMENT - INSTRUMENTATION - SECTIONS 2 OF 2
..E 3 TAILINGS EMBANKMENT - INSTRUMENTATION - SUMMARY OF INSTALLATION & TYP. DETAILS
..GE 3 MAIN EMBANKMENT - INSTRUMENTATION - PLAN

REFERENCE DRAWINGS

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D	REV.	DATE	
							0	23JUN'00	ISSUED FOR

REVISIONS



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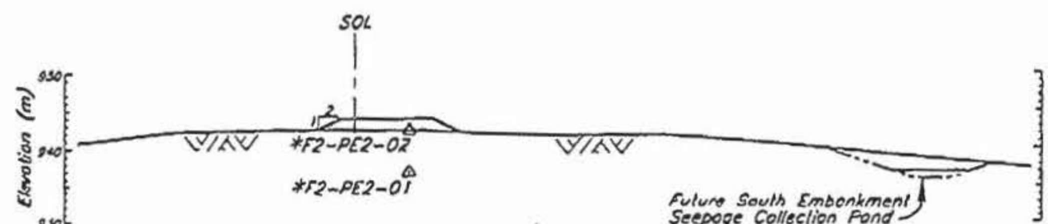
CH. 17+60



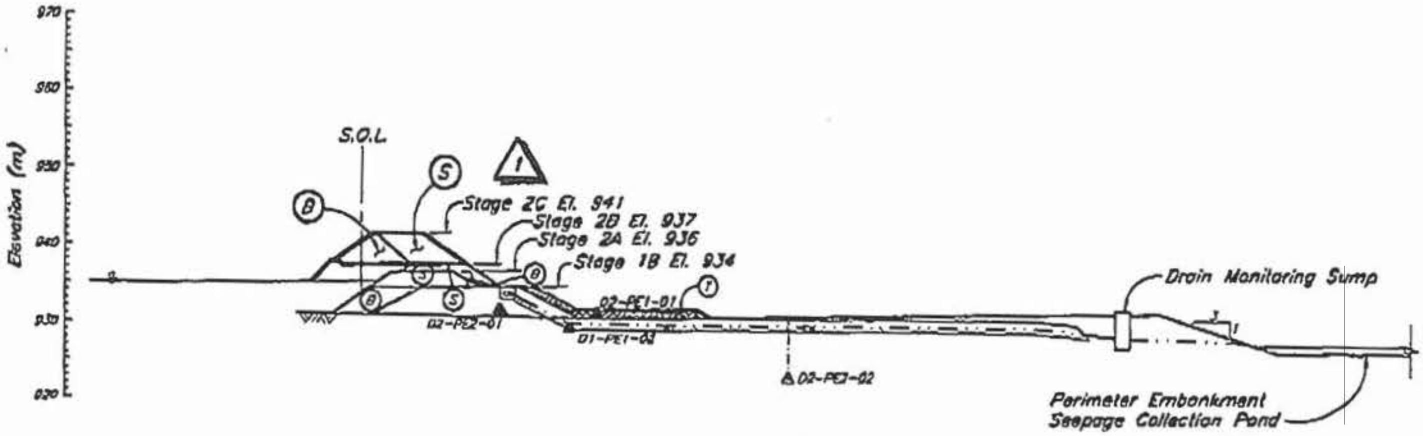
PLANE $\frac{F}{254}$
CH. 7+19

DWG. NO.	DESCRIPTION
258	TSF – STAGE 3 TAILINGS EMBANKMENT – INSTRUMENTATION SUMMARY OF INSTALLATION & TYPICAL DETAILS
254	TSF – STAGE 3 TAILINGS EMBANKMENT – SOUTH EMBANKMENT – INSTRUMENTATION PLAN
250	TSF – STAGE 3 TAILINGS EMBANKMENT – MAIN EMBANKMENT – INSTRUMENTATION PLAN
130	TSF – STAGE 3 SOUTH EMBANKMENT – PLAN AND SECTION
215	TSF – STAGE 3 MAIN EMBANKMENT – SECTIONS AND DETAILS

REFERENCE DRAWINGS

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CH

REVISIONS



PLANE $\frac{D}{151}$
CH. 39+86

DRG. NO.	DESCRIPTION
152	TSF - STAGE 2C EXPANSION - INSTRUMENTATION SECTIONS - SHEET 1 OF 2
151	TSF - STAGE 2C EXPANSION - PERIMETER EMBANKMENT INSTRUMENTATION - PLAN
150	TSF - STAGE 2C EXPANSION - MAIN EMBANKMENT INSTRUMENTATION - PLAN

REFERENCE DRAWINGS

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D

REVISIONS

CAZ 17/01/01 → File

Knight Piésold
CONSULTING

Knight Piésold Ltd.
1400 - 750 West Pender St
Vancouver, BC V6C 2T8
CANADA
Tel: +1 (604) 685-0543
Fax: +1 (604) 685 -0147
Fax: +1 (604) 687-2203
www.knightpiésold.com

DATE:	15 January, 2001	**FILE NO.:**	11162/14.01
TIME:		**REF NO.:**	1/0120
OPERATOR:		**PAGES:**	1 of 25
SENDER:	s.22	**APPROVED:**	KJB

TO:	MPMC	**FAX:**	(250) 790-2268
ATTN:	Don Parsons, Eric Leneve, Greg Smyth		
CC:	Chris Carr – MEMD 250-952-0481		
SUBJECT:	Mount Polley Stage 3A		

Please find following Progress Report No. 7 (Revised).

Regards,

s.22

MINISTRY OF
ENERGY AND MINES
REC'D JAN 16 2001

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY PROJECT

TAILINGS STORAGE FACILITY
STAGE 3 CONSTRUCTION

PROGRESS REPORT NO. 7 – November 24 to December 6, 2000

SECTION 1.0 –GENERAL

Construction of the Stage 3a raise for the Tailings Storage Facility Perimeter Embankment has been on-going since the last reporting period (October 24, 2000). MPMC continued construction of the upstream cycloned sand berm between Ch. 32+00 and Ch. 43+50 until late November when freezing conditions made further cycloning impractical.

Over this reporting period the downstream portion of the embankment was raised between Ch. 28+00 and 32+00 using filter sand and Zones T and C rockfill. The fill was completed to the target elevation of 942.5 m on December 6.

1.1 PERSONNEL

Mount Polley Mining Corporation (MPMC) management personnel overseeing the Stage 3 work are as follows:

Eric Leneve, Tailings Coordinator
Don Parsons, Mine Superintendent

The following Knight Piesold Ltd. (KP) representatives were on site during the reporting period:

s.22 Site Engineer – Arrived on site November 24, left site December 6.

1.2 WEATHER

Weather conditions over the period were variable, with a mix of sun and clouds and occasional periods of light snow. Temperatures ranged from about -10°C to +1°C.

Work was delayed November 24 and December 2 due to heavy snowfall.

1.3 DESIGN DEVELOPMENTS

Recent review of the project water balance indicates that a core zone elevation of 941.0 m is sufficient to provide storage for tailings, supernatant water and the 24 hour PMP event. An additional 1 m is required for wave run-up protection, and this may be achieved with cycloned sand or rockfill. Options for construction of the Perimeter Embankment were discussed in detail in Progress Report No. 6. freeboard?

Cycloned sand has been hydraulically placed between Ch. 32+00 and Ch. 43+50 (Setting Out Points S6 and S7). The sand will be mechanically shaped and compacted as required to form the approximate configuration shown on Figure 1.2. ? check compaction required.

MPMC has provided the required freeboard between Ch. 28+00 and Ch. 32+00 by downstream placement of rockfill and filter sand to the configuration shown on Figure 1.3.

A transition will be required between the upstream cyclone sand berm and downstream rock fill, and may consist of a temporary rock or sand berm constructed across the crest and between the fills to El. 942.5. The berm would be removed during the next stage of construction.

1.4 TAILINGS FACILITY OPERATION AND MAINTENANCE

ch28 ch32

Prior to construction between S5 and S6 on the Perimeter Embankment, the tailings were being discharged from the beach in this area. During construction, the tailings were discharged from the north end of the tailings facility. Work to relocate the pipeline and begin discharging near the south end of the facility was ongoing.

1.5 SAFETY

No safety incidents were reported for the period.

SECTION 2.0 – CONSTRUCTION ACTIVITIES

2.1 EQUIPMENT

MPMC used the following equipment over the reporting period:

- Loader - 1 Cat 992
- Excavator – 1 Hitachi EX 270
- Haul Trucks – 2 Cat 777's
- Dozers – 1 Cat D7, 1 Cat D8, 1 Cat D6
- Compactors – Cat CS583
- Sand truck, Grader, service trucks, fuel trucks

2.2 ACTIVITIES

The major construction activities for the reporting period are summarized below.

Perimeter Embankment

The Perimeter Embankment Zones T and C have been constructed to El. 942.5 m between Ch. 28+00 to Ch. 32+00, as shown on Figure 1.3. The Zone F chimney drain has been constructed to 941.0 m in this area, and will be extended as necessary during the next stage of construction.

SECTION 3.0 – KNIGHT PIESOLD ACTIVITIES

3.1 GENERAL

KP site activities over the reporting period included the following:

- Inspection and documentation of construction activities.
- QA/QC collection and testing of Zone F and T control and record samples.
- Preparation of daily inspection reports.
- Review of embankment monitoring data provided by MPMC.

3.2 LABORATORY TESTING

The following samples were collected and tested on site over the reporting period:

- Zone T record sample R/ZT-1
- Zone F control samples C/ZF-1 to 3
- Zone F record samples R/ZF-1 to 3

The results of the testing are provided on the summary Tables 3.1 to 3.3 and gradation plot Figures 3.1 to 3.3.

The results show that the Zone T record sample meets the specifications for particle size distribution.

The Zone F control sample results show that sample C/ZF-2 was too coarse to meet the gradation specifications. This sample was taken during initial crushing, however, before crushing materials were adjusted to produce a finer product. Sample C/ZF-2a was subsequently obtained, and meets the required specifications. All of the Zone F record samples meet the specifications.

3

SECTION 4.0 – EMBANKMENT MONITORING

Monitoring of tailings embankment instrumentation over the reporting period indicates that the embankment is performing well within design tolerances.

4.1 VIBRATING WIRE PIEZOMETERS

Piezometer readings were obtained on December 6. The results of the monitoring are shown on Figures 4.1 to 4.5, and are summarized below. Locations of the piezometers are shown on attached drawings.

Foundation Piezometers

The Main Embankment foundation piezometers have typically shown slight fluctuations or slight decreases in pore water pressure since the previously reported October 11th readings. The largest decreases have been about 0.9 m in Plane C.

No substantial changes were noted in the Perimeter Embankment (Plane D) foundation piezometers.

Fill Piezometers

Most of the Main Embankment glacial till piezometers responded to construction of the overlying Stage 3 fills with increasing pore pressures. Since the last set of readings the piezometers have shown either slight fluctuations, or a continuing decreasing trend with the largest decreases between 0.7 to 0.9m.

Drain Piezometers

All drain piezometers have remained static and at a very low head indicating that the drains are free-draining and functioning as designed.

Tailings Piezometers

Water levels at the tailings piezometers continue to mimic the pond level, except at the Main Embankment, where the upstream toe drain has resulted in a depressed phreatic surface.

4.2 DRAIN FLOWS

Results of foundation drain outlet monitoring are shown on Figure 4.6. Results of monitoring of the upstream toe drains outlets are shown on Figure 4.7.

As noted in Progress Report No. 6, drain flows recorded on October 24 showed anomalously high flow rates for several of the Foundation drains, possibly due to surface water inflows or to a high pond level in the Main Embankment Seepage Collection Pond (MESCP) which is believed to have caused water to back up and flood the drains and backfill. Four sets of readings have been obtained since, with the latest set taken

December 12. These latter readings indicate that the fill is draining and the rates are returning to previous low rates.

The readings in all cases show a significant decrease from the anomalous values, although some of the readings still remain slightly above the range of previously recorded values. There has been no visible sediment in the flows from the foundation drains.

Monitoring of the upstream toe drain shows slight fluctuations in flows, likely due to the increasing pond level as well as the changing tailings slurry discharge locations.

SECTION 5.0 – ONGOING ITEMS

The following items will be addressed during upcoming reporting periods:

- MPMC will continue to monitor the Perimeter Embankment for signs of instability
- MPMC and KP will continue to review the Perimeter Embankment construction scheduling.
- KP Personnel will visit the site as necessary for construction inspections.

Submitted by:

s.22

Knight Piesold Ltd.

Distribution: Eric Leneve, Don Parsons – MPMC
Chris Carr – MEMND
Ken Brouwer – KP Vancouver

TABLE 3.1

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE T RECORD TESTS - SUMMARY SHEET

Printed 12/15/00 16:15

#N/A   Rev'd 12-Dec-00

Date Sampled	Sample No.	Location	C3 (Particle Size Distribution) Cobbles % > 3 inch	Gravel % 3 inch to #4	Sand % #4 to #200	Silt/Clay % < #200
4-Dec-00	R/ZT-1	Zone T Fill, Chainage 31+20, Elevation 940.5	20.0	58.8	21.0	0.3
		MEAN	20.0	58.8	21.0	0.3
		MEDIAN	20.0	58.8	21.0	0.3
		MAXIMUM	20.0	58.8	21.0	0.3
		MINIMUM	20.0	58.8	21.0	0.3

Notes:
1) C3 (Particle Size Distribution) - ASTM D422

Rev 0 - Issued with Progress Report

TABLE 3.2

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE F CONTROL TESTS - SUMMARY SHEET

Date Printed 15-Dec-00

M:\11162\13\Data\Stage 3A Site Files\Stage 3A PE Site Files\Zone F\[Zone F Summary.xls]Record Summary

Rev'd: 14-Dec-00

Date Sampled	Sample No.	Location	C3 (Particle Size Distribution)			
			Cobbles % > 3 inch	Gravel % 3 inch to #4	Sand % #4 to #200	Silt/Clay % < #200
22-Nov-00	C/ZF-1	Stockpile, Right Face	0.0	49.2	48.7	2.1
29-Nov-00	C/ZF-2	Conveyor	0.0	71.3	26.5	2.3
29-Nov-00	C/ZF-2a	Conveyor	0.0	55.3	41.9	2.8
4-Dec-00	C/ZF-3	Stockpile	0.0	42.0	51.2	6.8
		MEAN	0.0	54.5	42.1	3.5
		MEDIAN	0.0	52.3	45.3	2.5
		MAXIMUM	0.0	71.3	51.2	6.8
		MINIMUM	0.0	42.0	26.5	2.1

Notes:

1) C3 (Particle Size Distribution) - ASTM D422

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TABLE 3.3

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE F RECORD TESTS - SUMMARY SHEET

Date Printed 15-Dec-00

M:\11162\13\Data\Stage 3A Site Files\Stage 3A PE Site Files\Zone F\[Zone F Summary.xls]Record Summary

Rev'd: 14-Dec-00

Date Sampled	Sample No.	Location	C3 (Particle Size Distribution)			
			Cobbles % > 3 inch	Gravel % 3 inch to #4	Sand % #4 to #200	Silt/Clay % < #200
28-Nov-00	R/ZF-1	Zone F Fill, Chainage 29+50, Elevation 940.5	0.0	50.0	45.3	4.7
4-Jan-00	R/ZF-2	Zone F Fill, Chainage: 30+60, Elevation 928.3	0.0	57.2	39.2	3.6
4-Dec-00	R/ZF-3	Zone F Fill, Chainage: 31+85, Elevation 940m	0.0	48.4	45.5	6.1
		MEAN	0.0	51.9	43.3	4.8
		MEDIAN	0.0	50.0	45.3	4.7
		MAXIMUM	0.0	57.2	45.5	6.1
		MINIMUM	0.0	48.4	39.2	3.6

Notes:

1) C3 (Particle Size Distribution) - ASTM D422

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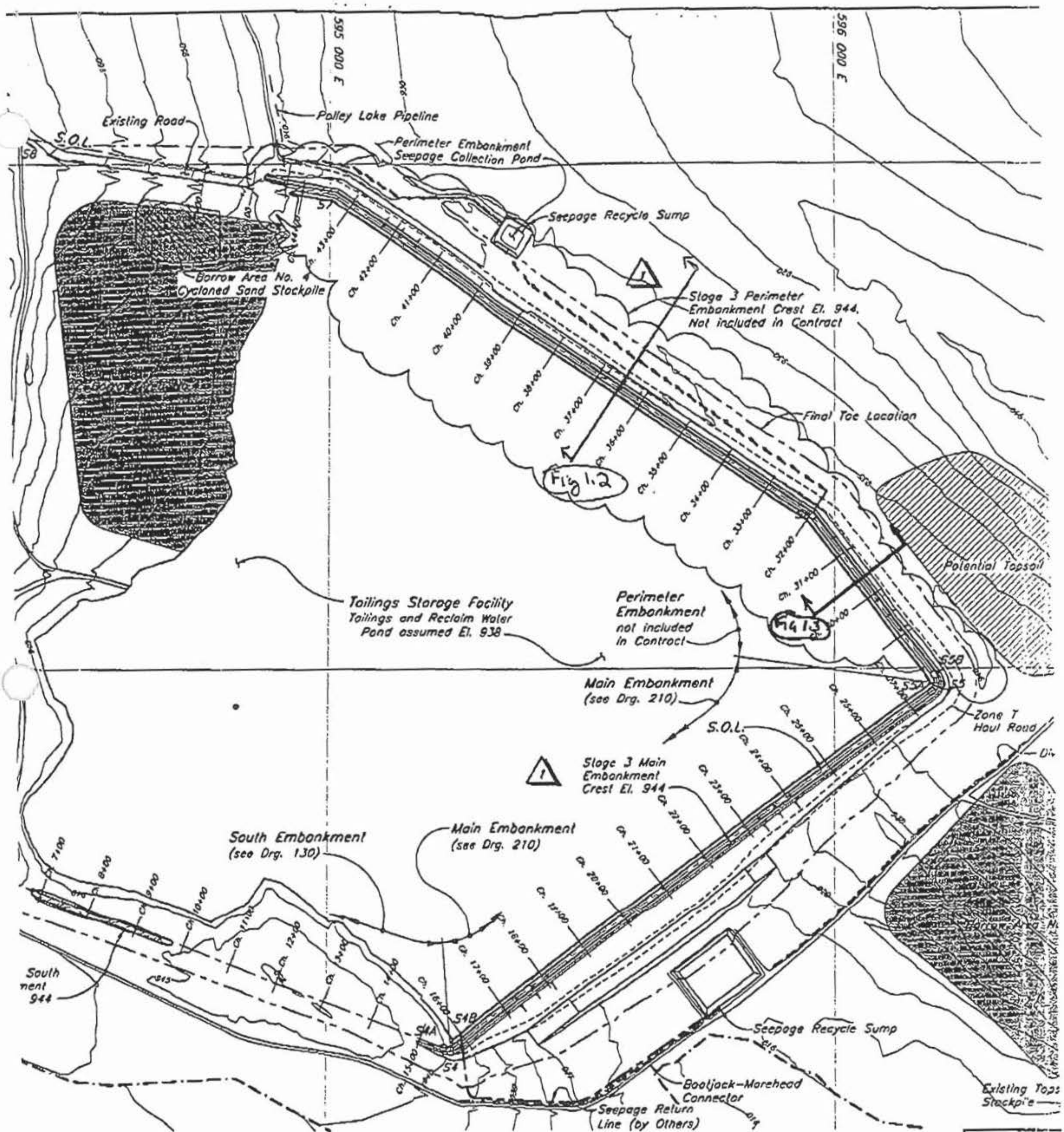


NOTES

1. Topography at TSF generated from points and break lines sent from MPMC in July 1999. The topography outside the TSF area is from 1997 flyover.
2. Current size and location of potential and existing Borrow Areas and Topsoil Stockpiles are to be confirmed.

Figure 1.1

Scale 100 0 100 200 300 400 500 m

K. J. BROUWER ENGINEER

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
1	2JUN'00	ISSUED FOR CONSTRUCTION	MDB	TAM		KJB
0	14APR'00	ISSUED FOR TENDER	MDB	NSD	JRK	KJB

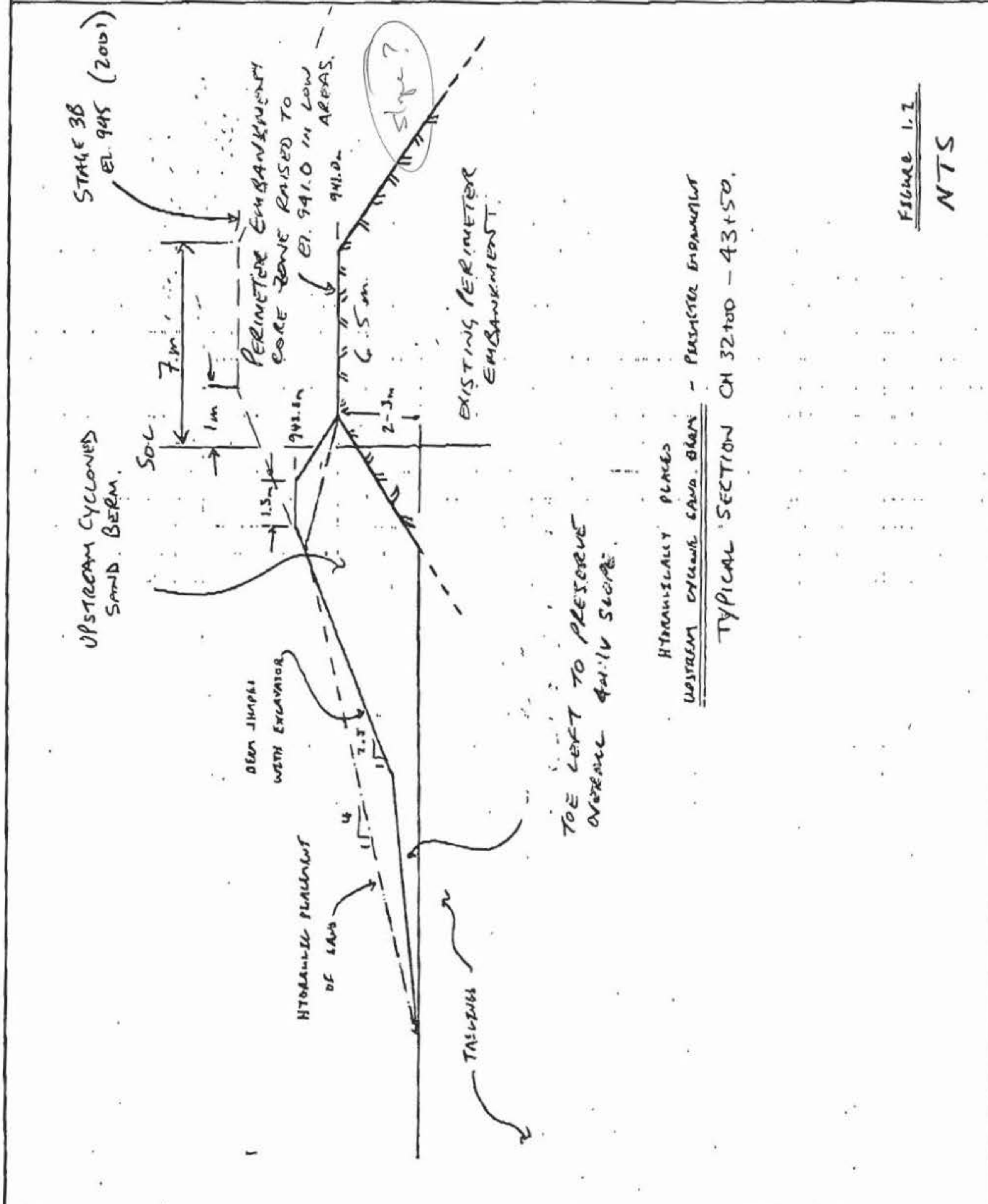
REVISIONS

DESIGNED MDB
DRAWN TAM

Knight Piésold Ltd.

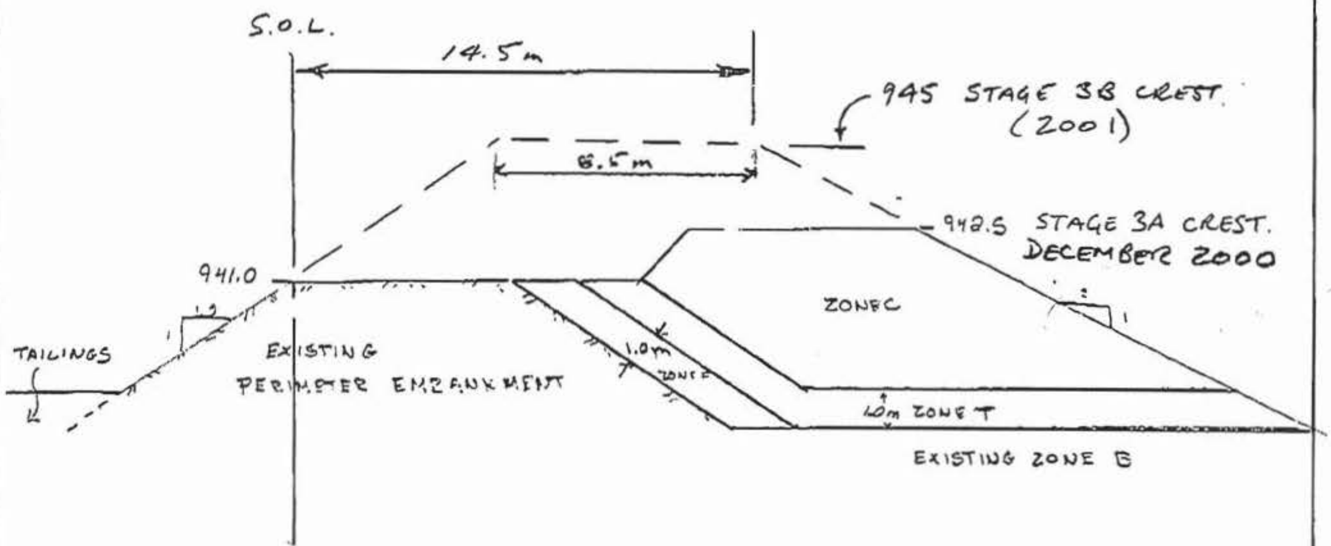
CONSULTING ENGINEERS

Project: MT. POLLEY - STAGE 3 CONSTRUCTION   Project No.: 1162/13
Calculations for: Date: OCT. 20/00
Calculations by: JDC   Sheet ___ of ___
Checked by: ___   Date: ___



Knight Piésold Ltd.
CONSULTING ENGINEERS

Project: MT POLLEY - STAGE 3A CONSTRUCTION	Project No.: 1162/13
Calculations for:	Date: Jan 5/01
Calculations by: SEL	Sheet ___ of ___
Checked by: ___ Date: ___	



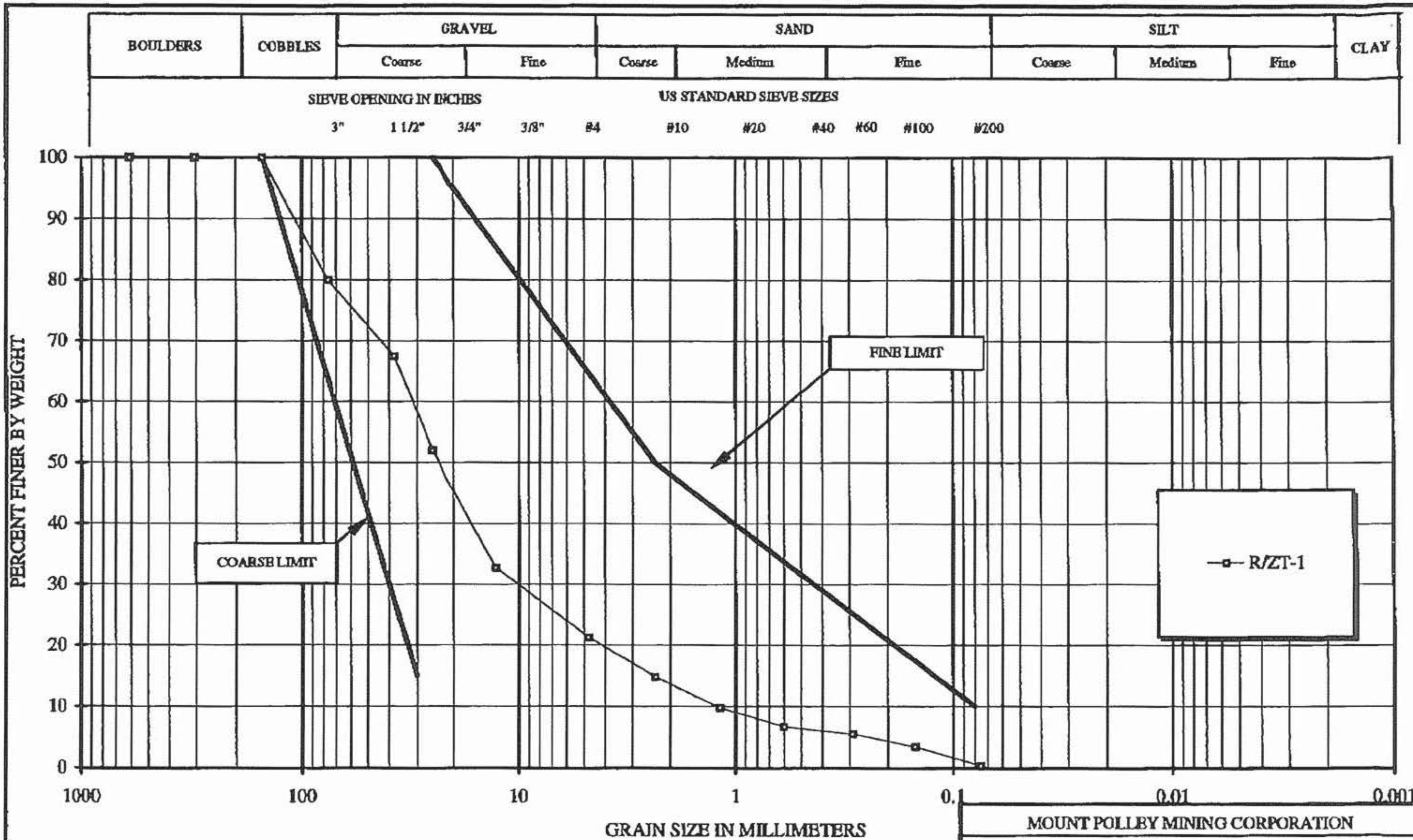
PERIMETER EMBANKMENT
BETWEEN 55 & 56
CH 28+00 - 32+00
TYPICAL SECTION

This is not as per design given in May 2000

FIGURE 1.3
N.T.S.

M:\11162\13\Data\Stage 3A site Files\Stage 3A PE Site Files\Zone T SummaryRecord Monthly Plot

Printed: 12/15/00
Rev'd: 14 December, 2000



MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

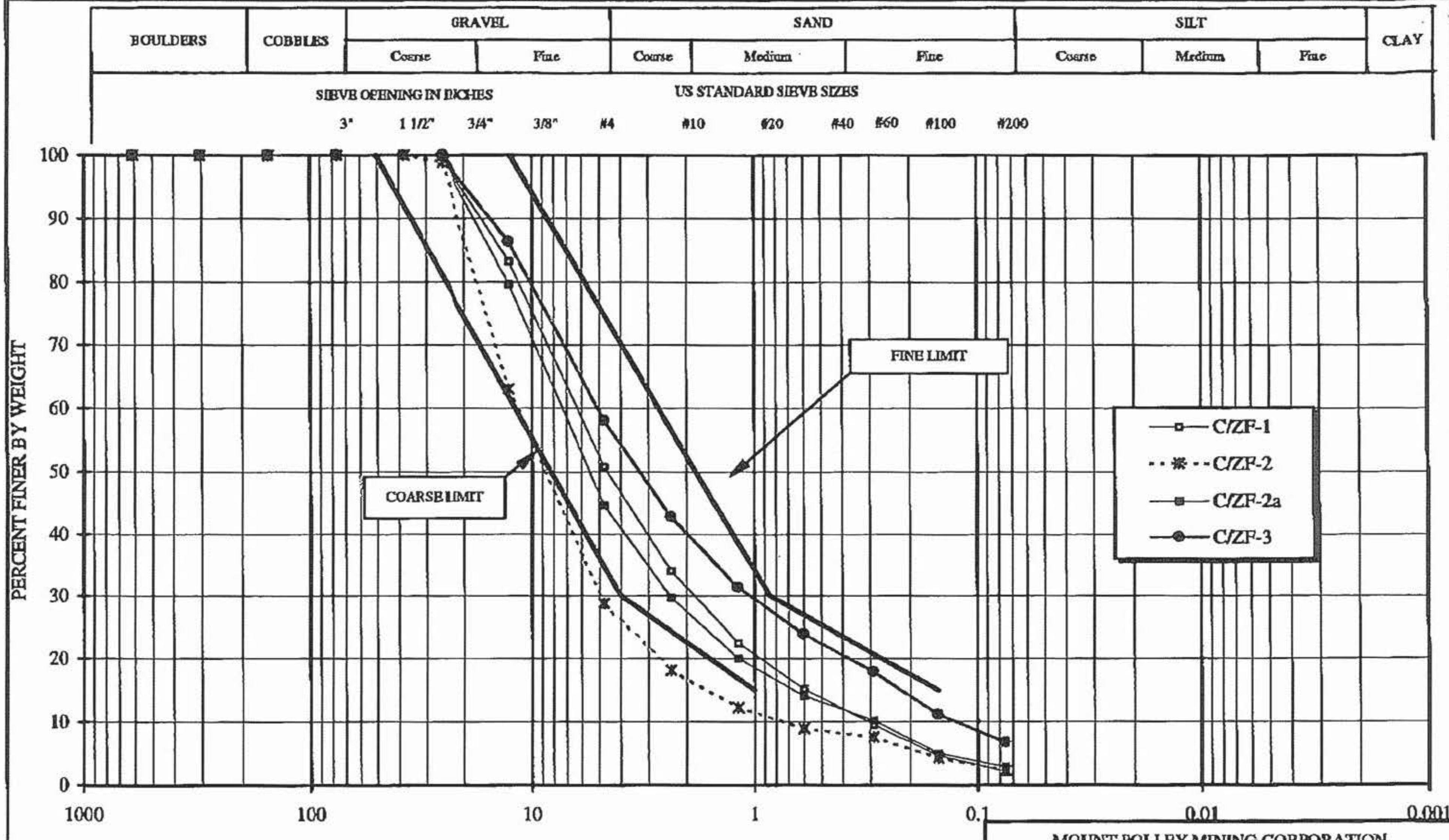
STAGE 3 CONSTRUCTION
ZONE T- RECORD SAMPLES
GRADATION SUMMARY

Knight Piésold CONSULTING	PROJECT NO. 11162/13	REF. NO.	REV. 0
	FIGURE 3.1		

Rev 0 - Issued with Progress Report

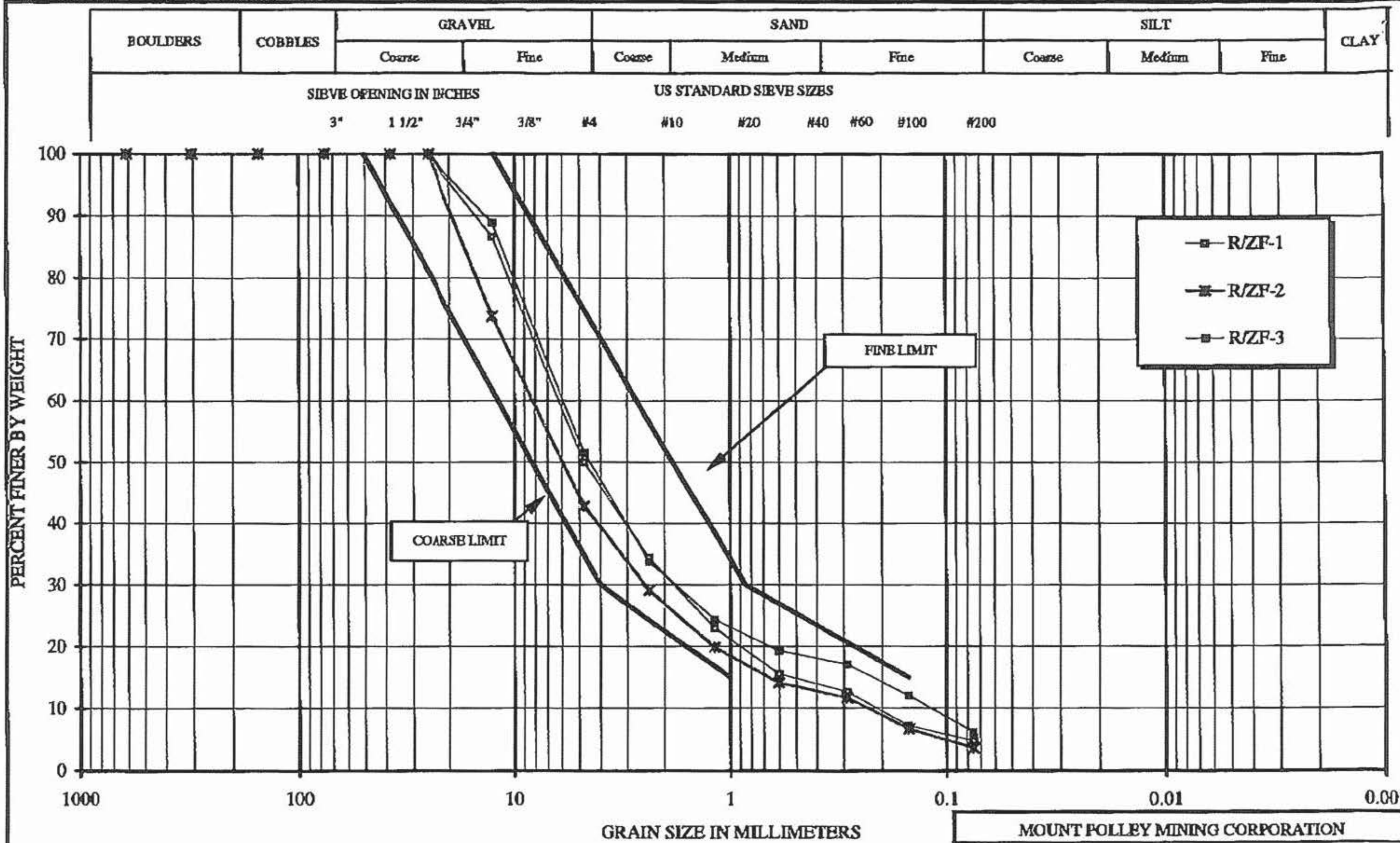
JAN 15 '01 14:07 - 6046850147 PAGE.014

Knight Piesold Fax:6046850147 Jan 15 2001 13:46 P.14



MOUNT POLLEY MINING CORPORATION	
MOUNT POLLEY MINE	
STAGE 3 CONSTRUCTION ZONE F-CONTROL SAMPLES GRADATION SUMMARY	
Knight Piésold CONSULTING	PROJECT NO. 11162/13 · REF. NO. · REV. 0
	FIGURE 3.2

Rev 0 - Issued with Progress Report



MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
STAGE 3 CONSTRUCTION ZONE F - RECORD SAMPLES GRADATION SUMMARY

Knight Piésold CONSULTING

PROJECT NO.	REF. NO.	REV.
11162/13		0
FIGURE 3.3		

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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE A PIEZOMETERS

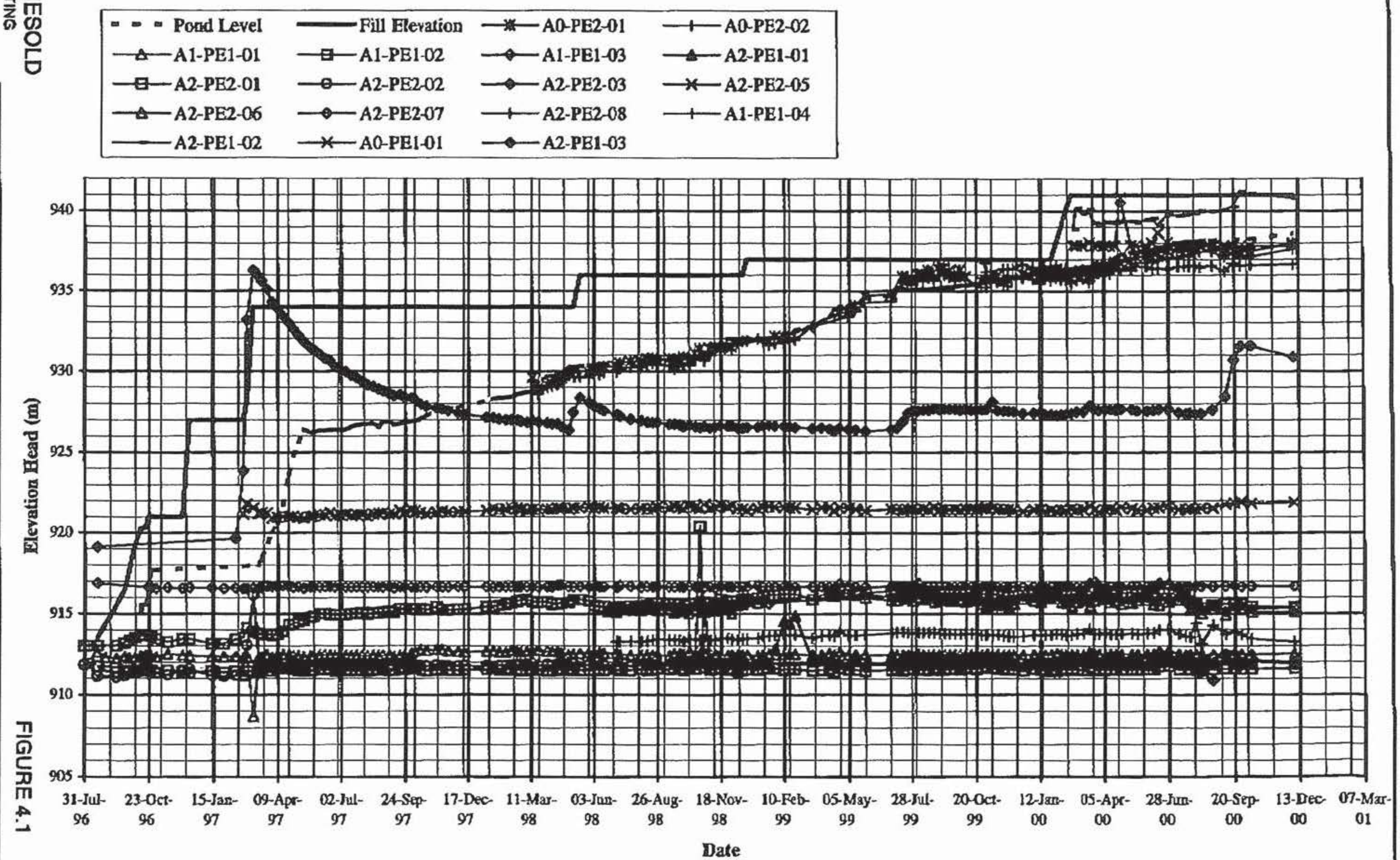


FIGURE 4.1

KNIGHT PIESOLD CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE B PIEZOMETERS

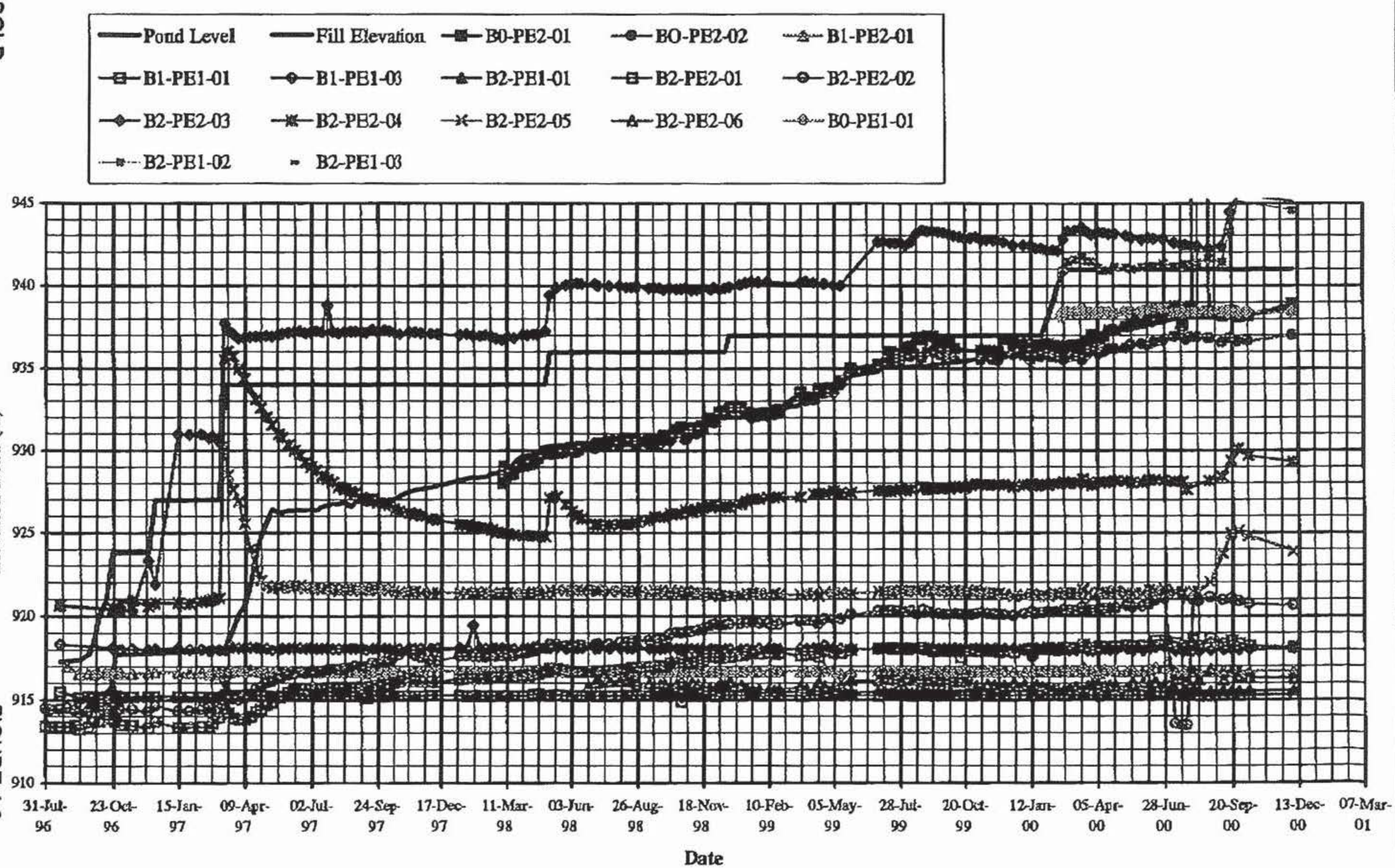


FIGURE 4.2

KNIGHT PIESOLD
CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE C PIEZOMETERS

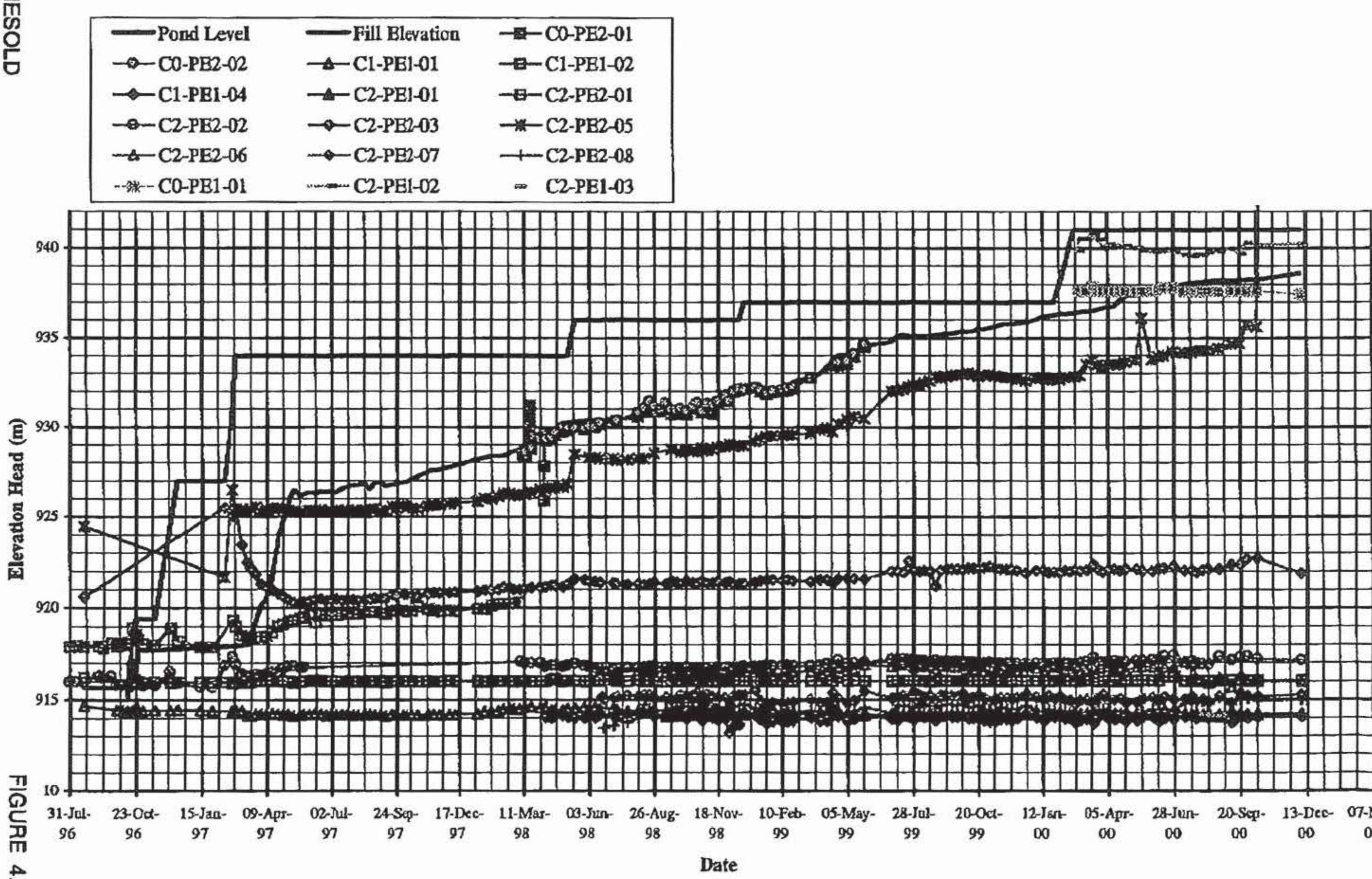


FIGURE 4.3

KNIGHT PIESOLD CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE D PIEZOMETERS

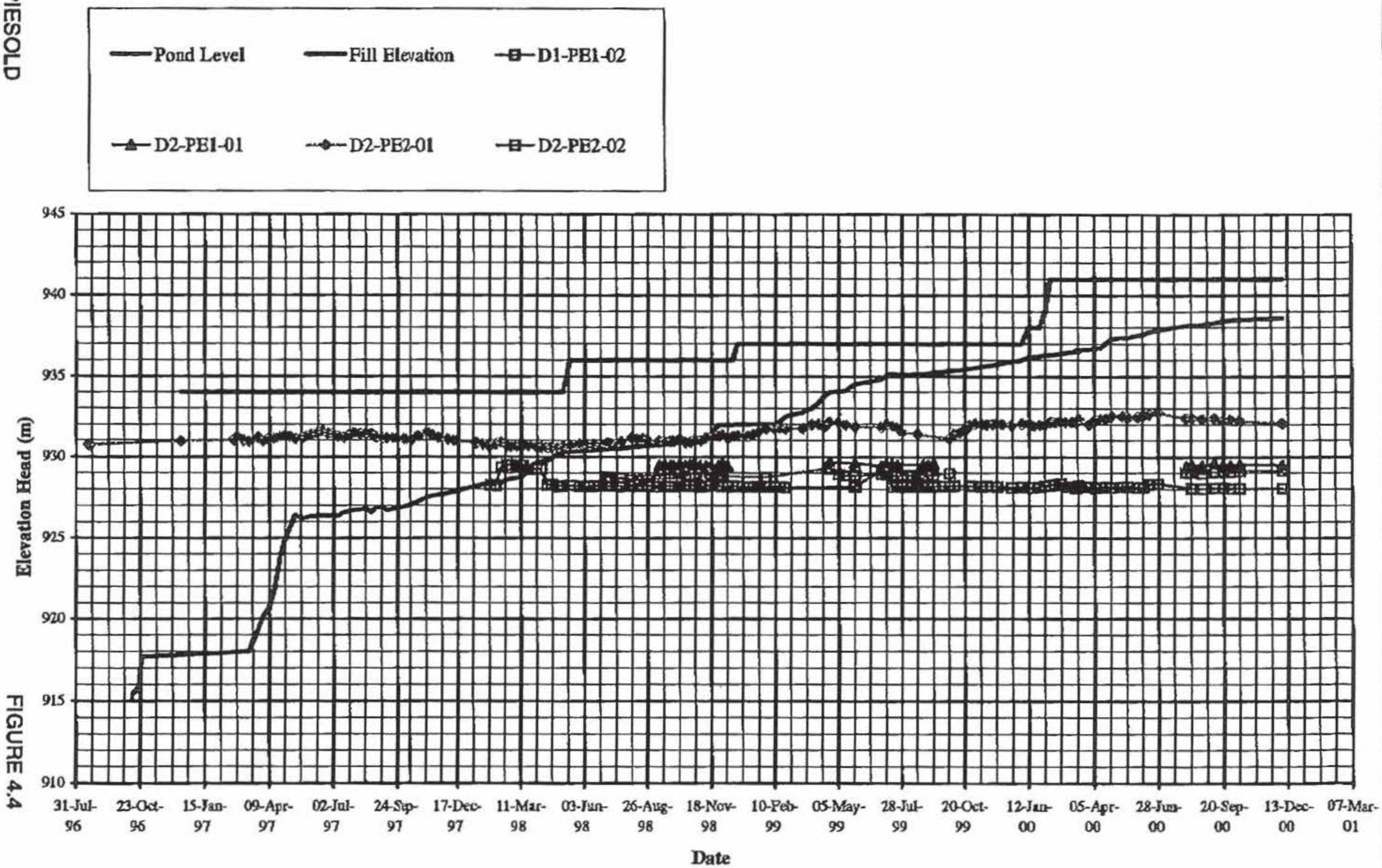
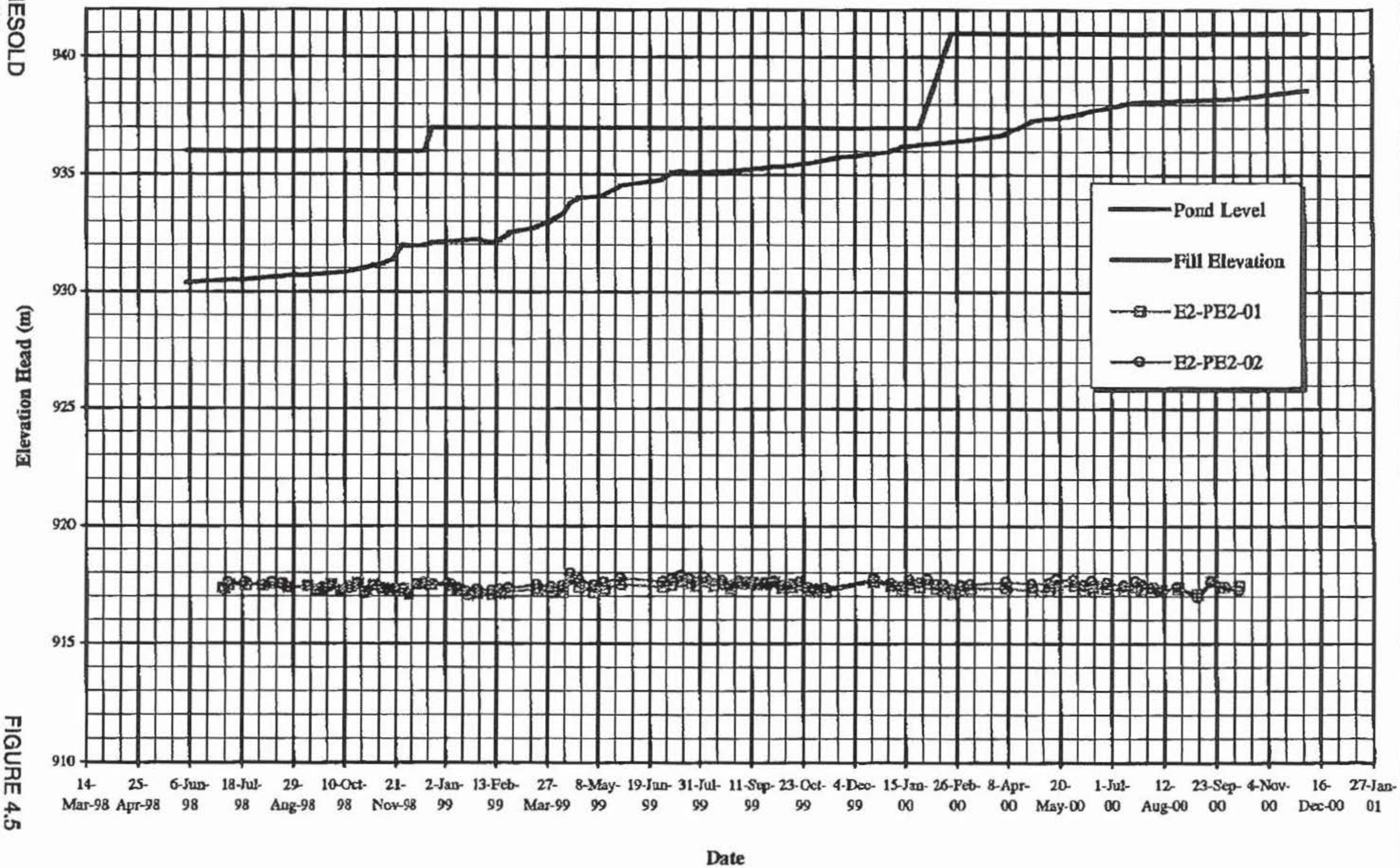


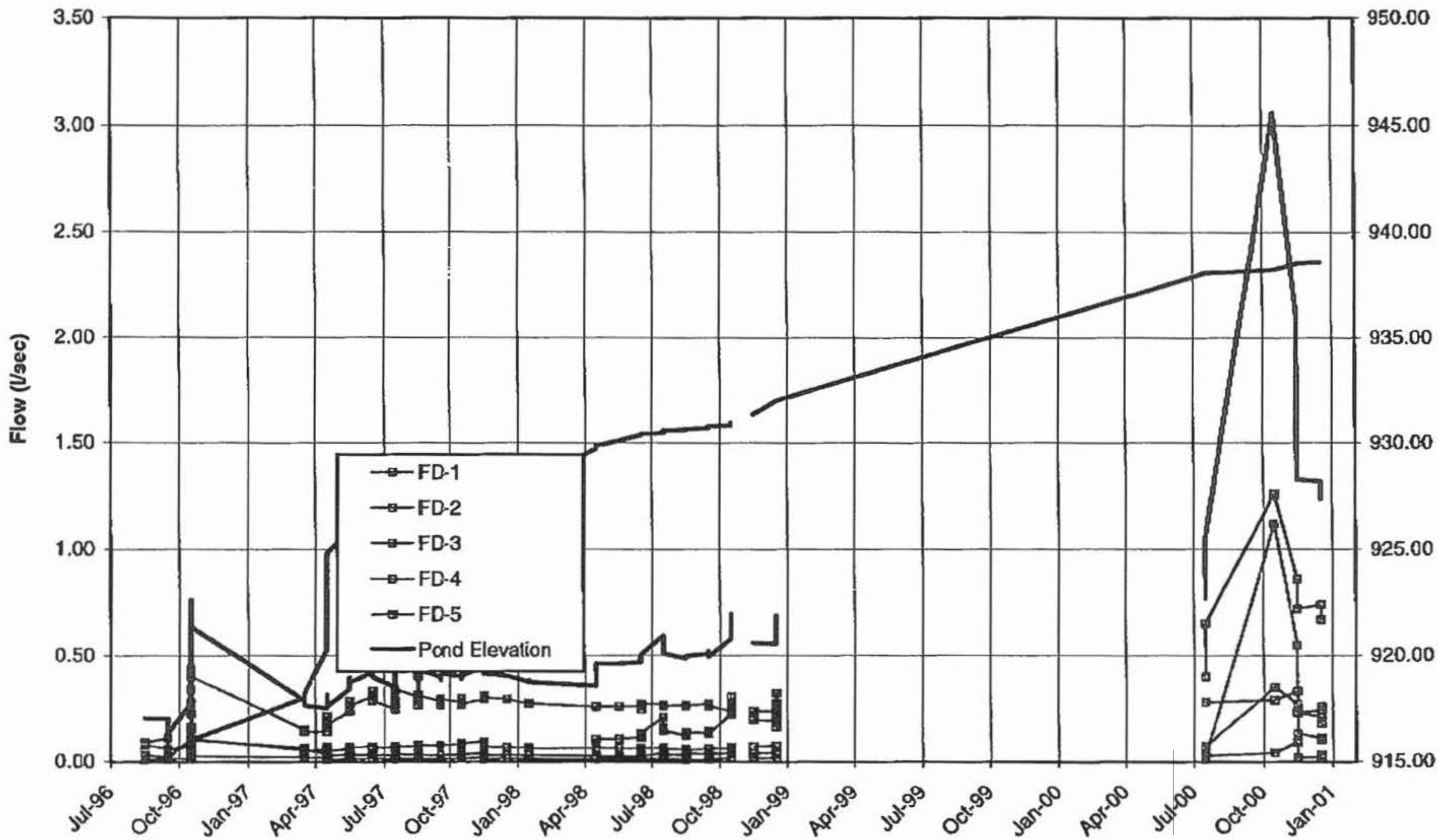
FIGURE 4.4

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE E PIEZOMETERS

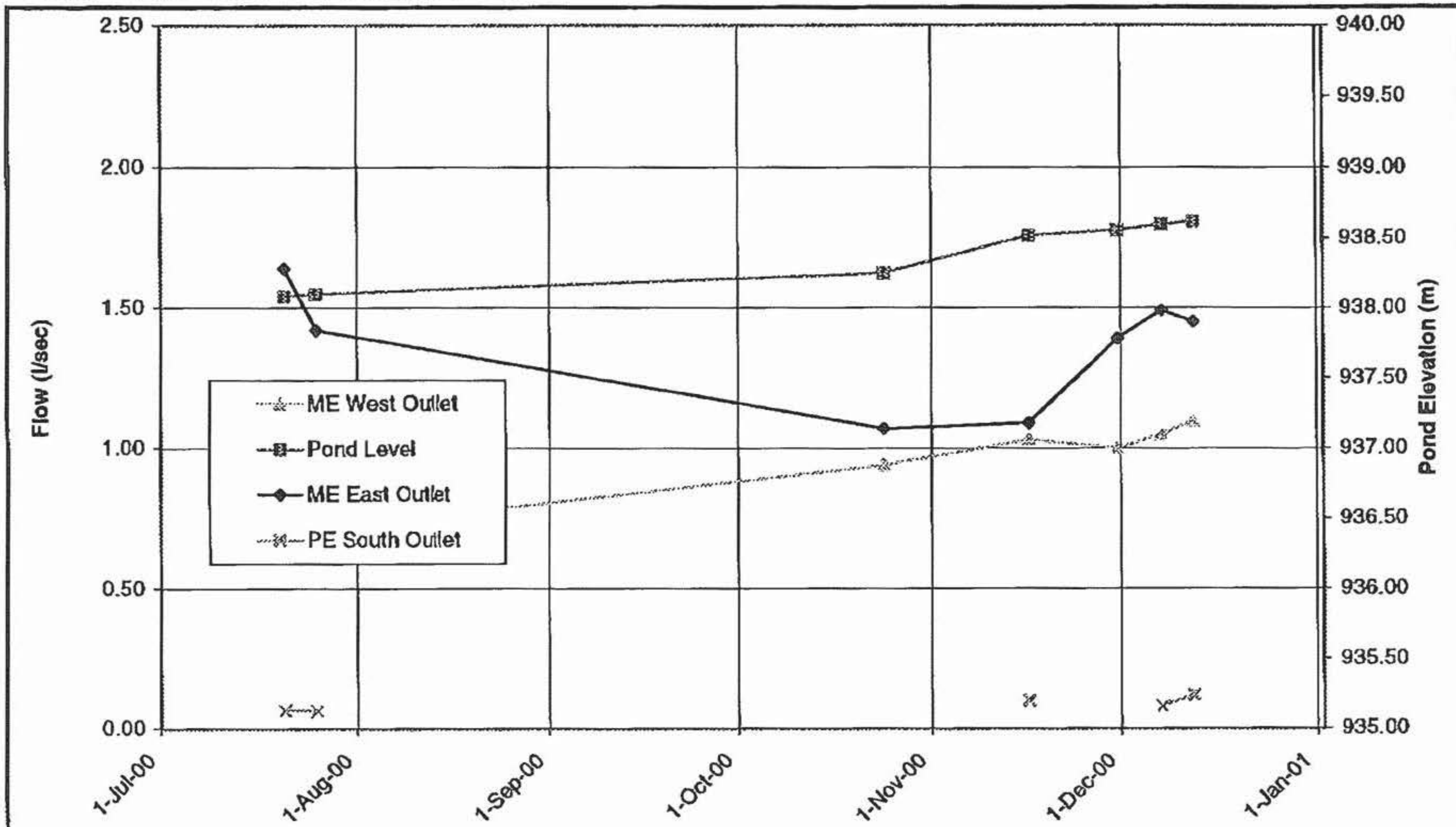


KNIGHT PIESOLD CONSULTING

FIGURE 4.5



MOUNT POLLEY MINING CORPORATION			
MOUNT POLLEY MINE			
TAILINGS STORAGE FACILITY MAIN EMBANKMENT FOUNDATION DRAIN FLOWS			
Knight Piésold CONSULTING	PROJECT NO. 11162/13	REF. NO. 0/2934	REV. 0
	FIGURE 4.6		



MOUNT POLLEY MINING CORPORATION

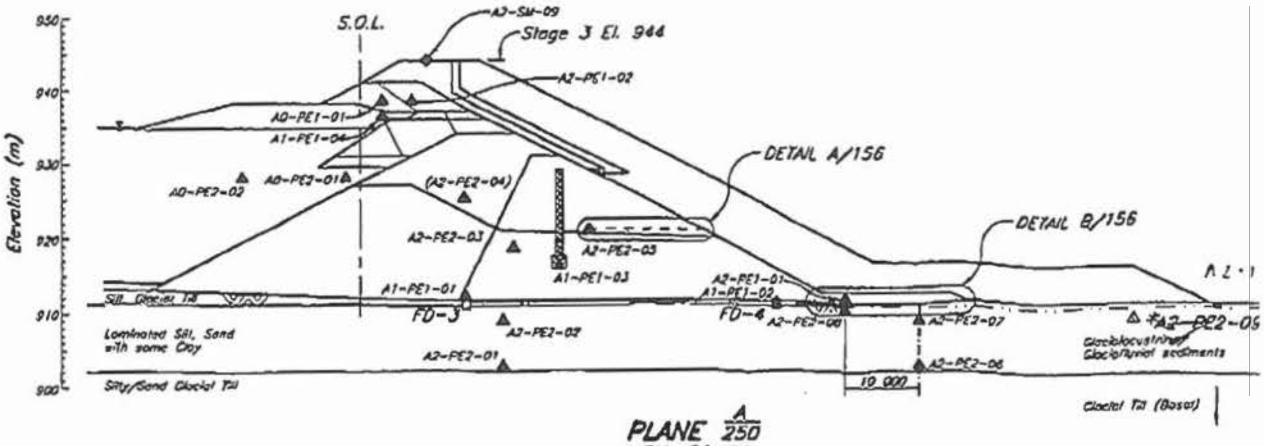
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
UPSTREAM TOE DRAIN FLOWS

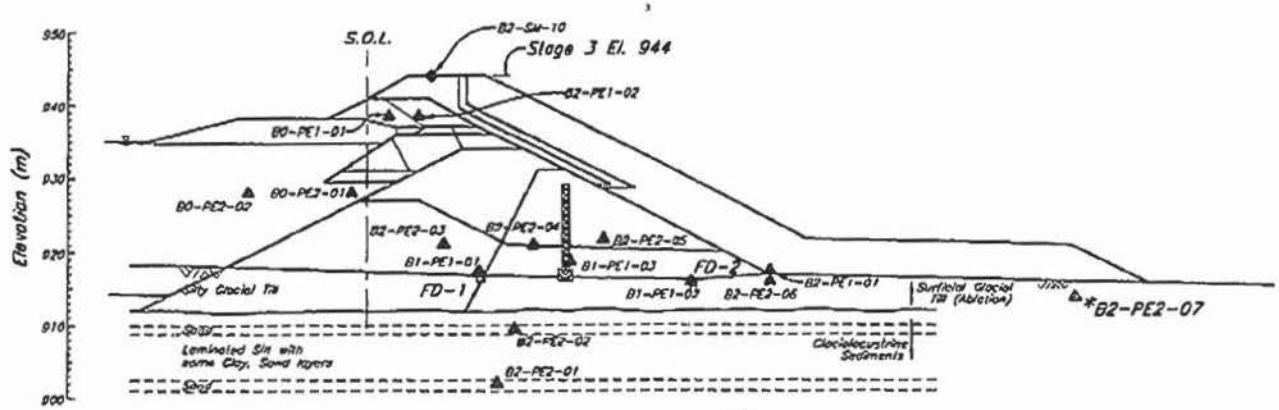
Knight Piésold
CONSULTING

PROJECT NO.	REF. NO.	REV.
11162/13	0/2934	0

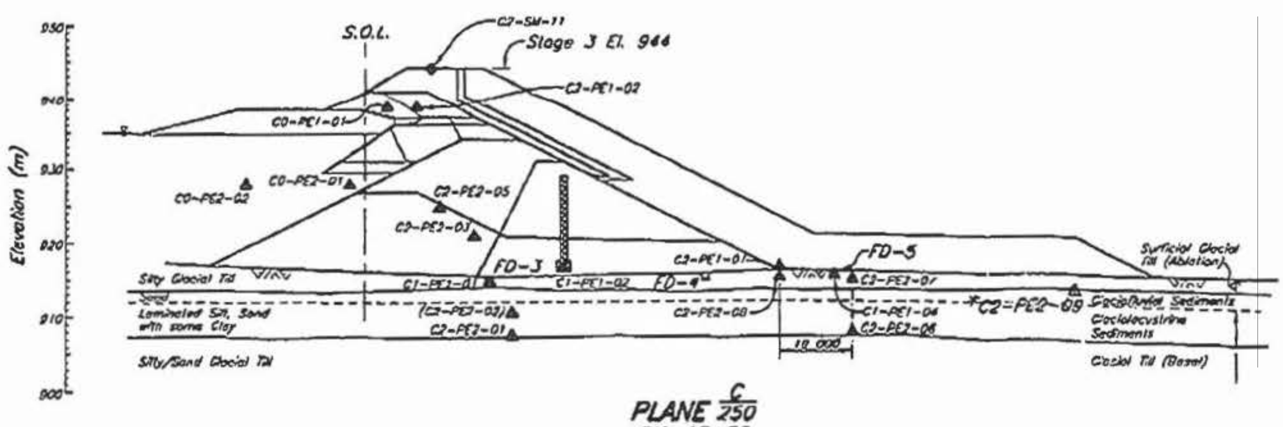
FIGURE 4.7



PLANE $\frac{A}{250}$
CH. 20+00



PLANE $\frac{B}{250}$
CH. 22+40

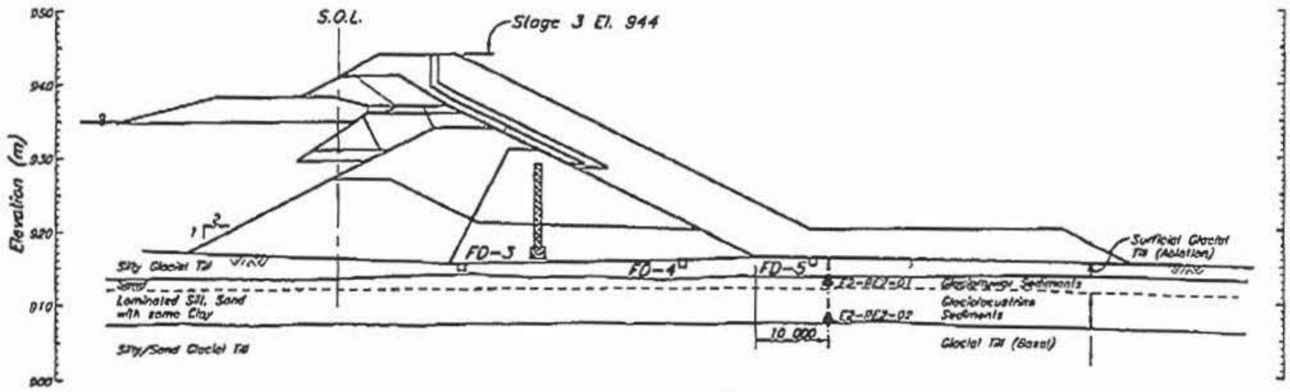


PLANE $\frac{C}{250}$
CH. 18+50

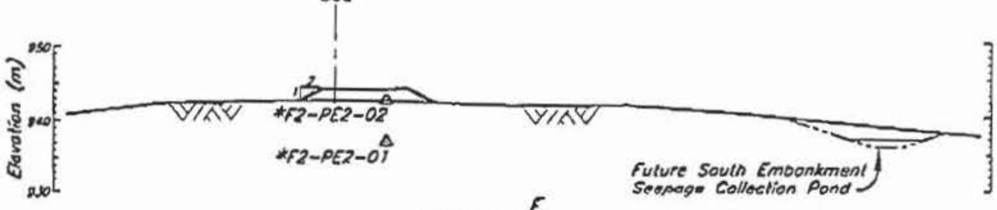
DESCRIPTION
3 TAILINGS EMBANKMENT – INSTRUMENTATION – SECTIONS 2 OF 2
3 TAILINGS EMBANKMENT – INSTRUMENTATION – SUMMARY OF INSTALLATION & TYP. DETAILS
3 MAIN EMBANKMENT – INSTRUMENTATION – PLAN
REFERENCE DRAWINGS

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

REV.	DATE	
0	3JUN'00	ISSUED FOR CO



PLANE $\frac{E}{250}$
CH. 17+60



PLANE $\frac{F}{254}$
CH. 7+19

DRG. NO.	DESCRIPTION
256	TSF - STAGE 3 TAILINGS EMBANKMENT - INSTRUMENTATION SUMMARY OF INSTALLATION & TYPICAL DETAILS
254	TSF - STAGE 3 TAILINGS EMBANKMENT - SOUTH EMBANKMENT - INSTRUMENTATION PLAN
250	TSF - STAGE 3 TAILINGS EMBANKMENT - MAIN EMBANKMENT - INSTRUMENTATION PLAN
130	TSF - STAGE 3 SOUTH EMBANKMENT - PLAN AND SECTION
215	TSF - STAGE 3 MAIN EMBANKMENT - SECTIONS AND DETAILS

REFERENCE DRAWINGS

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D

REVISIONS

Mount Polley. Stage 3A.
Progress Report No. 7.

① Setting Out points on plan
② Transition between u/s cyclone sand berm
+ downstream rock fill. INFO REQUIRED.
③ Why piezo levels for B2-PE2-03
C2-PE2-05
④ Continue to monitor for signs of instability
How?

Phone call from Eric Lenevre on Jan 11/01.
- progress report #7 to be reissued - mistakes present.
- call s.21 (Knight Piesold) re geot questions

CAZ 9/01/01 → File.

Knight Piésold CONSULTING		DATE:	05 January, 2001	FILE NO.:	11162/13.01
		TIME:		REF NO.:	0/2934
Knight Piésold Ltd. *1400 - 750 West Pender St* *Vancouver, BC V6C 2T8* *CANADA*	*Tel: +1 (604) 685-0543* *Fax: +1 (604) 685 -0147* *Fax: +1 (604) 687-2203* *www.knightpiésold.com*	OPERATOR:		PAGES:	1 of 24
		SENDER:	s.22	APPROVED:	RJB

TO:	MPMC	**FAX:**	(250) 790-2268
ATTN:	Don Parsons, Eric Leneve, Greg Smyth		
CC:	George Headley – MEMD 250-952-0481		
SUBJECT:	Mount Polley Stage 3A		

Please find following Progress Report No. 7.

Regards,

Phoned

s.22

s.22

9/01/01.

– will send info requested.

GRH 3417

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY PROJECT

TAILINGS STORAGE FACILITY
STAGE 3 CONSTRUCTION

PROGRESS REPORT NO. 7 – November 24 to December 6, 2000

SECTION 1.0 –GENERAL

Construction of the Stage 3a raise for the Tailings Storage Facility Perimeter Embankment has been on-going since the last reporting period (October 24, 2000). MPMC continued construction of the upstream cycloned sand berm along the north 800m of the embankment until late November when freezing conditions made further cycloning impractical.

Over this reporting period the downstream portion of the embankment was raised along the south 400m using filter sand and Zones T and C rockfill. The embankment was completed to the target elevation of 942.5 m on December 6.

1.1 PERSONNEL

Mount Polley Mining Corporation (MPMC) management personnel overseeing the Stage 3 work are as follows:

Eric Leneve, Tailings Coordinator
Don Parsons, Mine Superintendent

The following Knight Piesold Ltd. (KP) representatives were on site during the reporting period:

s.22 Site Engineer – Arrived on site November 24, left site December 6.

1.2 WEATHER

Weather conditions over the period were variable, with a mix of sun and clouds and occasional periods of light snow. Temperatures ranged from about -10°C to +1°C.

Work was delayed November 24 and December 2 due to heavy snowfall.

1.3 DESIGN DEVELOPMENTS

Options for construction of the Perimeter Embankment were discussed in detail in Progress Report No. 6.

Where are the Setting out pts on plan?

Cycloned sand has been hydraulically placed along the north 800m of the embankment between Setting Out Points S6 and S7. The sand will be mechanically shaped and compacted into the approximate configuration shown on Figure 1.1 to provide the necessary 1.0m freeboard for wave run-up.

Along the south 400m, between Setting Out Points S5 and S6, MPMC has provided the required freeboard by downstream placement of filter sand and rockfill to the configuration shown on Figure 1.2.

A transition will be required between the upstream cyclone sand berm and downstream rock fill, and may consist of a temporary rock or sand berm constructed across the crest and between the fills to El. 942.5. The berm would be removed during the next stage of construction.

~~[illegible]~~? More info required

MPMC is currently preparing for till placement to raise the low sections of the Perimeter Embankment core zone to the required El. 941.0m.

1.4 TAILINGS FACILITY OPERATION AND MAINTENANCE

Prior to construction between S5 and S6 on the Perimeter Embankment, the tailings were being discharged from the beach in this area. During construction, the tailings were discharged from the north end of the tailings facility. Work to relocate the pipeline and begin discharging near the south end of the facility was ongoing.

1.5 SAFETY

No safety incidents were reported for the period.

SECTION 2.0 – CONSTRUCTION ACTIVITIES

2.1 EQUIPMENT

MPMC used the following equipment over the reporting period:

- Excavator – 1 Hitachi EX 1200
- Haul Trucks – 2 Cat 777's
- Dozers – 1 Cat D7, 1 Cat D8, 1 Cat D6
- Compactors – Cat CS583
- Sand truck, Grader, service trucks, fuel trucks

2.2 ACTIVITIES

The major construction activities for the reporting period are summarized below.

Perimeter Embankment

The Perimeter Embankment Zones T and C have been constructed to El. 942.5 m between setting out points S5 and S6 as shown on Figure 1.2. The Zone F chimney drain has been constructed to 941.0 m in this area, and will be extended as necessary during the next stage of construction.

SECTION 3.0 – KNIGHT PIESOLD ACTIVITIES

3.1 GENERAL

KP site activities over the reporting period included the following:

- Inspection and documentation of construction activities.
- QA/QC collection and testing of Zone F and T control and record samples.
- Preparation of daily inspection reports.
- Review of embankment monitoring data provided by MPMC.

3.2 LABORATORY TESTING

The following samples were collected and tested on site over the reporting period:

- Zone T record sample R/ZT-1
- Zone F control samples C/ZF-1 to 3
- Zone F record samples R/ZF-1 to 3

The results of the testing are provided on the summary Tables 3.1 to 3.3 and gradation plot Figures 3.1 to 3.3.

The results show that the Zone T record sample meets the specifications for particle size distribution.

The Zone C control sample results show that sample C/ZF-2 was too coarse to meet the gradation specifications. This sample was taken during initial crushing, however, before crushing materials were adjusted to produce a finer product. Sample C/ZF-2a was subsequently obtained, and meets the required specifications. All of the Zone F record samples meet the specifications.

SECTION 4.0 – EMBANKMENT MONITORING

Monitoring of tailings embankment instrumentation over the reporting period indicates that the embankment is performing well within design tolerances.

4.1 VIBRATING WIRE PIEZOMETERS

Piezometer readings were obtained on December 6. The results of the monitoring are shown on Figures 4.1 to 4.5, and are summarized below. Locations of the piezometers are shown on attached drawings.

Foundation Piezometers

The Main Embankment foundation piezometers have typically shown slight fluctuations or slight decreases in pore water pressure since the previously reported October 11th readings. The largest decreases have been about 0.9 m in Plane C.

No substantial changes were noted in the Perimeter Embankment (Plane D) foundation piezometers.

Fill Piezometers

Most of the Main Embankment glacial till piezometers responded to construction of the overlying Stage 3 fills with increasing pore pressures. Since the last set of readings the piezometers have shown either slight fluctuations, or a continuing decreasing trend with the largest decreases between 0.7 to 0.9m.

check B2-PE2-03
C2-PE2-05

Drain Piezometers

All drain piezometers have remained static and at a very low head indicating that the drains are free-draining and functioning as designed.

Tailings Piezometers

Water levels at the tailings piezometers continue to mimic the pond level, except at the Main Embankment, where the upstream toe drain has resulted in a depressed phreatic surface.

4.2 DRAIN FLOWS

Results of foundation drain outlet monitoring are shown on Figure 4.6. Results of monitoring of the upstream toe drains outlets are shown on Figure 4.7.

As noted in Progress Report No. 6, drain flows recorded on October 24 showed anomalously high flow rates for several of the Foundation drains, possibly due to surface water inflows or to a high pond level in the Recycle Pond which is believed to have caused water to back up and flood the drains and backfill. Four sets of readings have been obtained since, with the latest set taken December 12. These latter readings indicate that the fill is draining and the rates are returning to previous low rates.

The readings in all cases show a significant decrease from the anomalous values, although some of the readings still remain slightly above the range of previously recorded values. There has been no visible sediment in the flows from the foundation drains.

Monitoring of the upstream toe drains shows slight fluctuations in flows, likely due to the increasing pond level as well as the changing tailings slurry discharge locations.

SECTION 5.0 – ONGOING ITEMS

The following items will be addressed during upcoming reporting periods:

- MPMC will continue to monitor the Perimeter Embankment for signs of instability. how.
- MPMC and KP will continue to review the Perimeter Embankment construction scheduling.
- KP Personnel will visit the site as necessary for construction inspections.

Submitted by:

s.22

Knight Piesold Ltd.

Distribution: Eric Leneve, Don Parsons – MPMC
George Headley – MEMND
Ken Brouwer – KP Vancouver

TABLE 3.1

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE T RECORD TESTS - SUMMARY SHEET

#N/A

Printed 12/15/00 16:15
Rev'd 12-Dec-00

Date Sampled	Sample No.	Location	C3 (Particle Size Distribution)			
			Cobbles % > 3 inch	Gravel % 3 inch to #4	Sand % #4 to #200	Silt/Clay % < #200
4-Dec-00	R/ZT-1	Zone T Fill, Chainage 31+20, Elevation 940.5	20.0	58.8	21.0	0.3
		MEAN	20.0	58.8	21.0	0.3
		MEDIAN	20.0	58.8	21.0	0.3
		MAXIMUM	20.0	58.8	21.0	0.3
		MINIMUM	20.0	58.8	21.0	0.3

Notes:
1) C3 (Particle Size Distribution) - ASTM D422

Rev 0 - Issued with Progress Report

TABLE 3.2

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE F CONTROL TESTS - SUMMARY SHEET

Date Printed 15-Dec-00

M:\11162\13\Data\Stage 3A Site Files\Stage 3A PE Site Files\Zone F\[Zone F Summary.xls]Record Summary

Rev'd: 14-Dec-00

Date Sampled	Sample No.	Location	C3 (Particle Size Distribution)			
			Cobbles % > 3 inch	Gravel % 3 inch to #4	Sand % #4 to #200	Silt/Clay % < #200
22-Nov-00	C/ZF-1	Stockpile, Right Face	0.0	49.2	48.7	2.1
29-Nov-00	C/ZF-2	Conveyor	0.0	71.3	26.5	2.3
29-Nov-00	C/ZF-2a	Conveyor	0.0	55.3	41.9	2.8
4-Dec-00	C/ZF-3	Stockpile	0.0	42.0	51.2	6.8
		MEAN	0.0	54.5	42.1	3.5
		MEDIAN	0.0	52.3	45.3	2.5
		MAXIMUM	0.0	71.3	51.2	6.8
		MINIMUM	0.0	42.0	26.5	2.1

Notes:
1) C3 (Particle Size Distribution) - ASTM D422

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TABLE 3.3

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE F RECORD TESTS - SUMMARY SHEET

Date Printed 15-Dec-00

M:\11162\13\Data\Stage 3A Site Files\Stage 3A PE Site Files\Zone F\[Zone F Summary.xls]Record Summary

Rev'd: 14-Dec-00

Date Sampled	Sample No.	Location	C3 (Particle Size Distribution) Cobbles % > 3 inch	Gravel % 3 inch to #4	Sand % #4 to #200	Silt/Clay % < #200
28-Nov-00	R/ZF-1	Zone F Fill, Chainage 29+50, Elevation 940.5	0.0	50.0	45.3	4.7
4-Jan-00	R/ZF-2	Zone F Fill, Chainage: 30+60, Elevation 928.3	0.0	57.2	39.2	3.6
4-Dec-00	R/ZF-3	Zone F Fill, Chainage: 31+85, Elevation 940m	0.0	48.4	45.5	6.1
		MEAN	0.0	51.9	43.3	4.8
		MEDIAN	0.0	50.0	45.3	4.7
		MAXIMUM	0.0	57.2	45.5	6.1
		MINIMUM	0.0	48.4	39.2	3.6

Notes:
1) C3 (Particle Size Distribution) - ASTM D422

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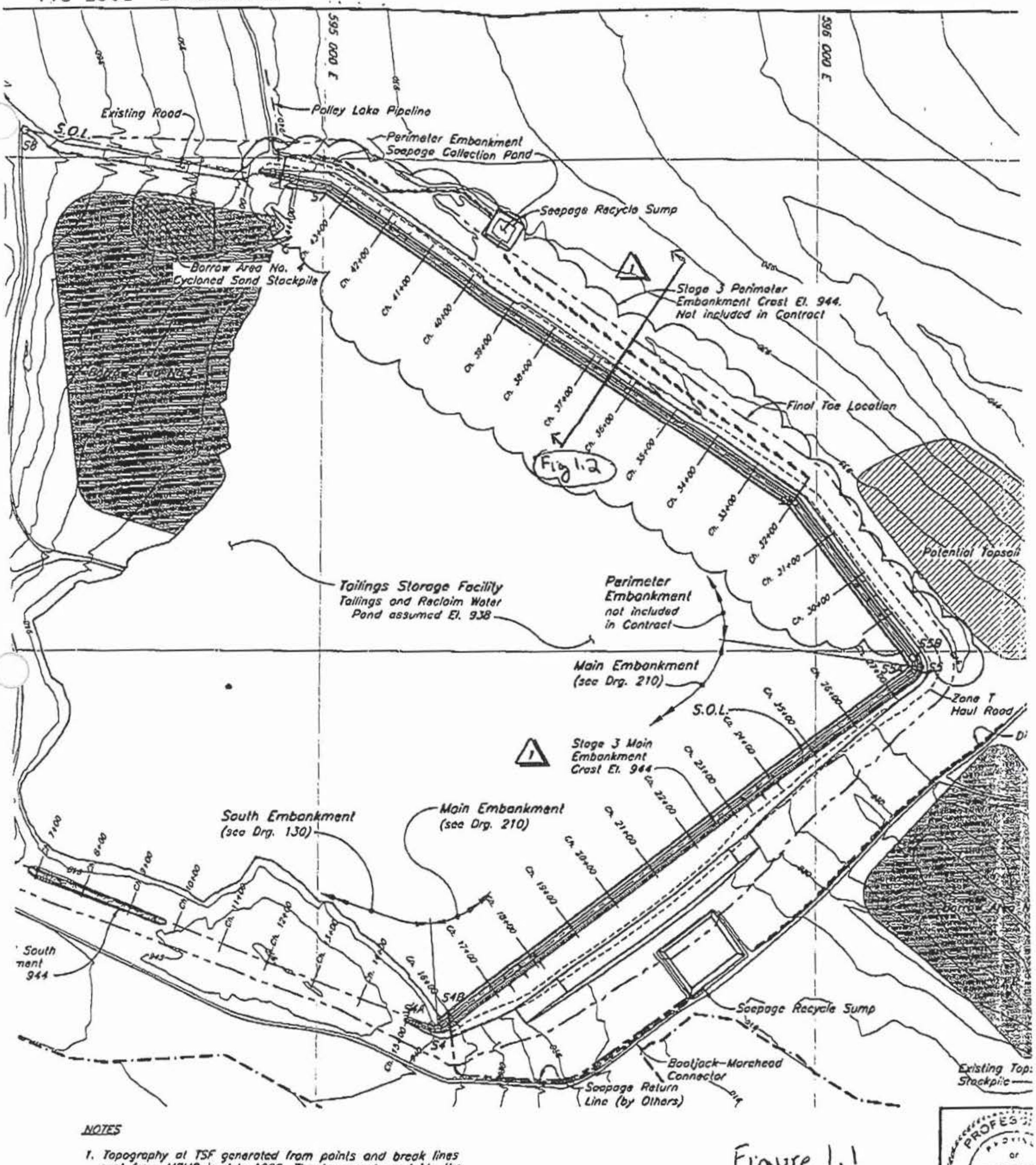


NOTES

1. Topography at TSF generated from points and break lines sent from MPMC in July 1999. The topography outside the TSF area is from 1997 flyover.

2. Current size and location of potential and existing Borrow Areas and Topsoil Stockpiles are to be confirmed.

Figure 1.1

Scale 100 0 100 200 300 400 500 m

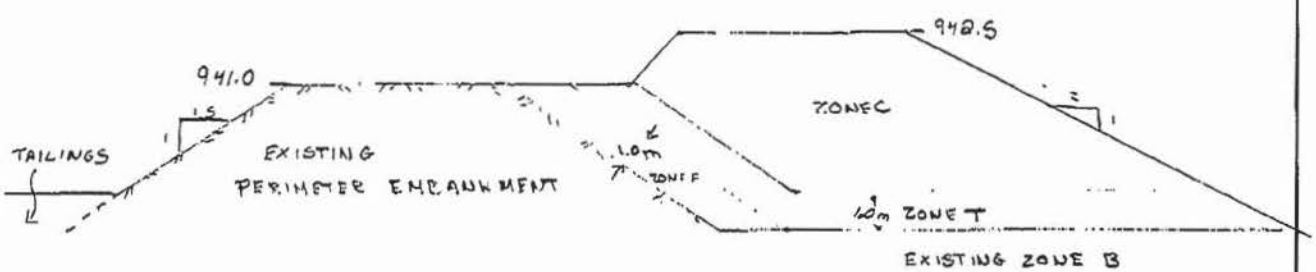
REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
1	2JUN'00	ISSUED FOR CONSTRUCTION	MOB	TAM		KJB
0	14APR'00	ISSUED FOR TENDER	MOB	NSD	JRK	KJB

REVISIONS

DESIGNED MOB
DRAWN TAM

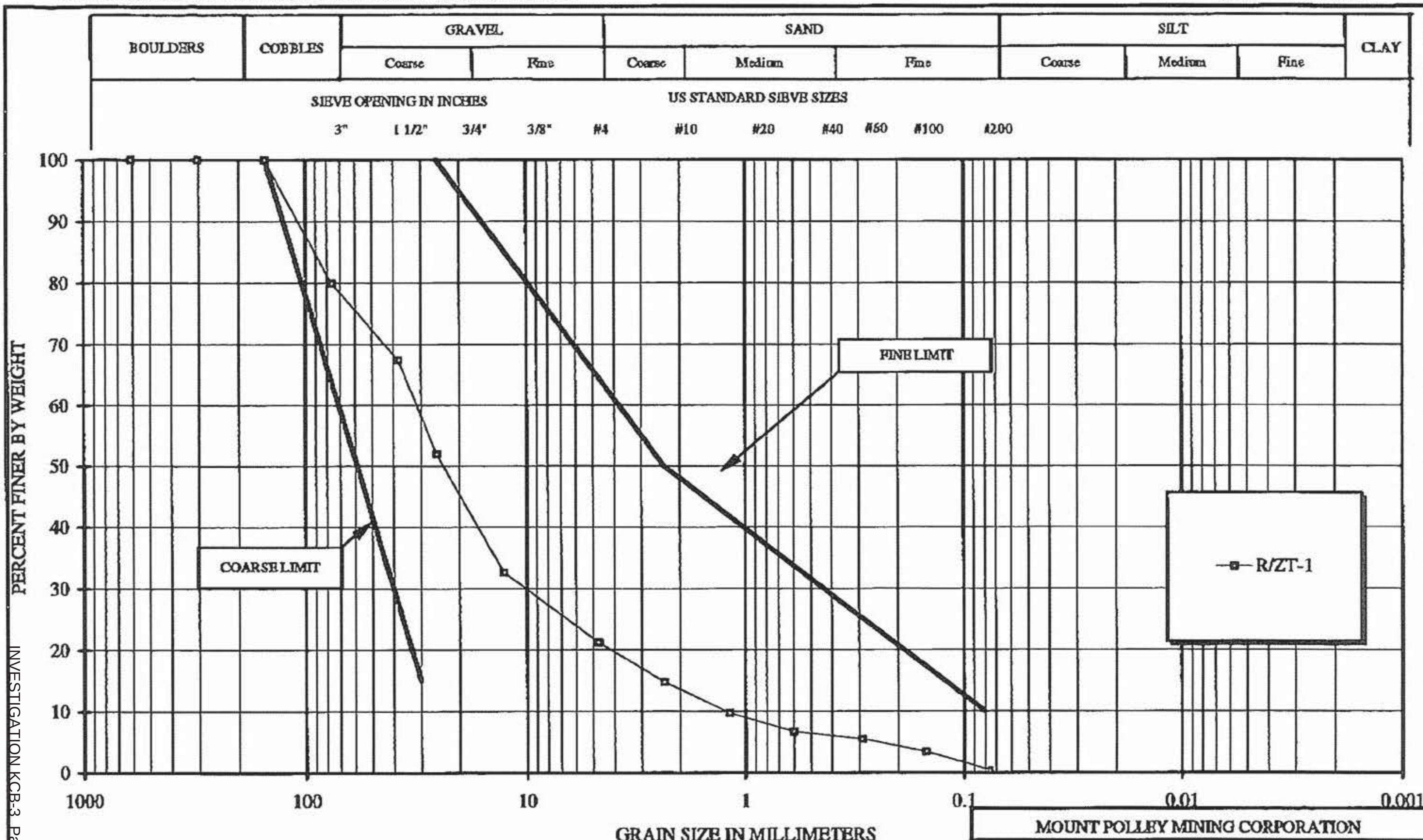
Knight Piésold Ltd.
CONSULTING ENGINEERS

Project: MT. POLLEY - STAGE 3A CONSTRUCTION
Project No.: 1162/13
Calculations for:
Date: Jan 5/01
Calculations by: SEG
Sheet ___ of ___
Checked by: ___ Date: ___



PERIMETER EMBANKMENT
BETWEEN 55 & 56

FIGURE 1.2



MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

STAGE 3 CONSTRUCTION
ZONE T- RECORD SAMPLES
GRADATION SUMMARY

Knight Piésold CONSULTING

PROJECT NO.	REF. NO.	REV.
11162/13		0

FIGURE 3.1

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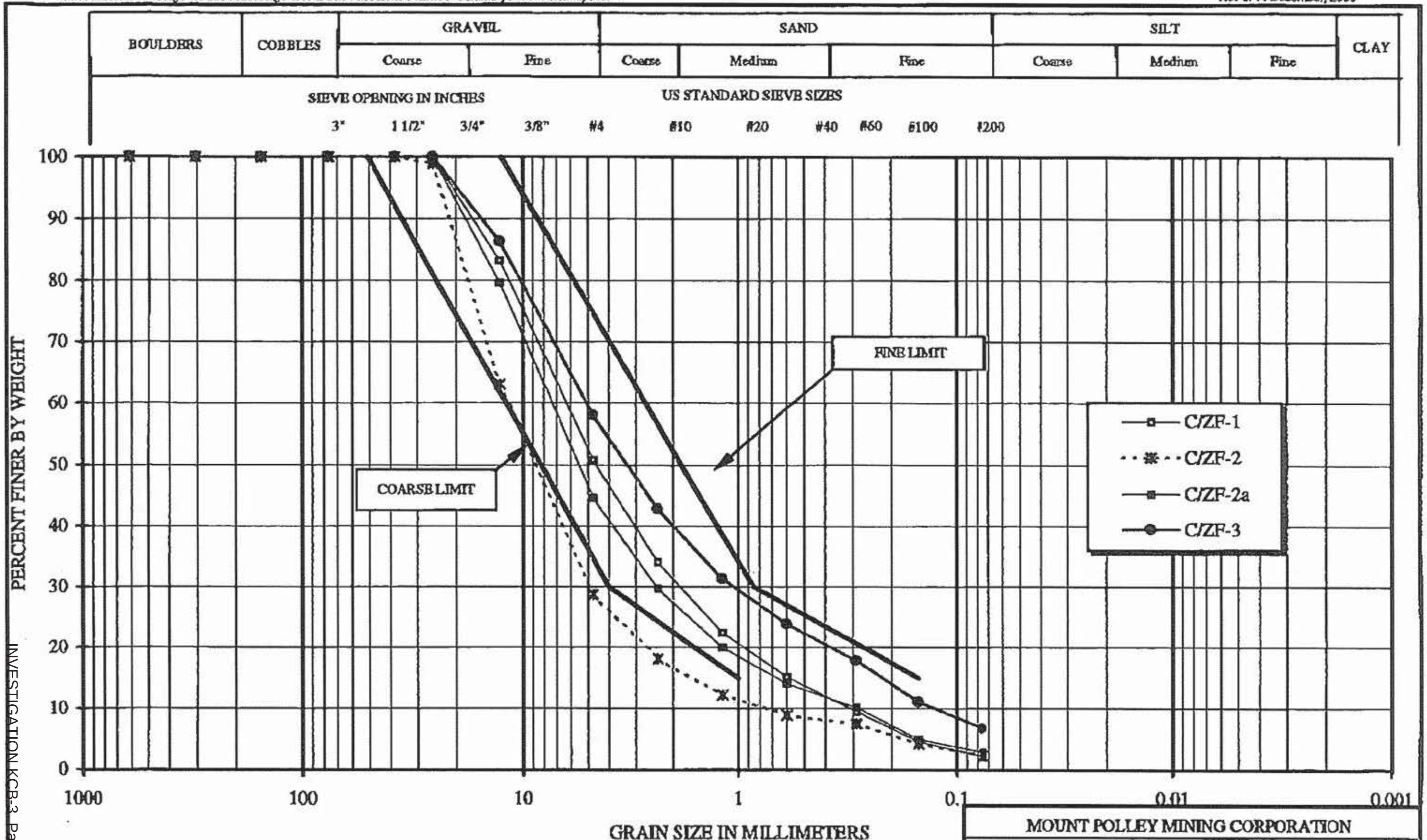
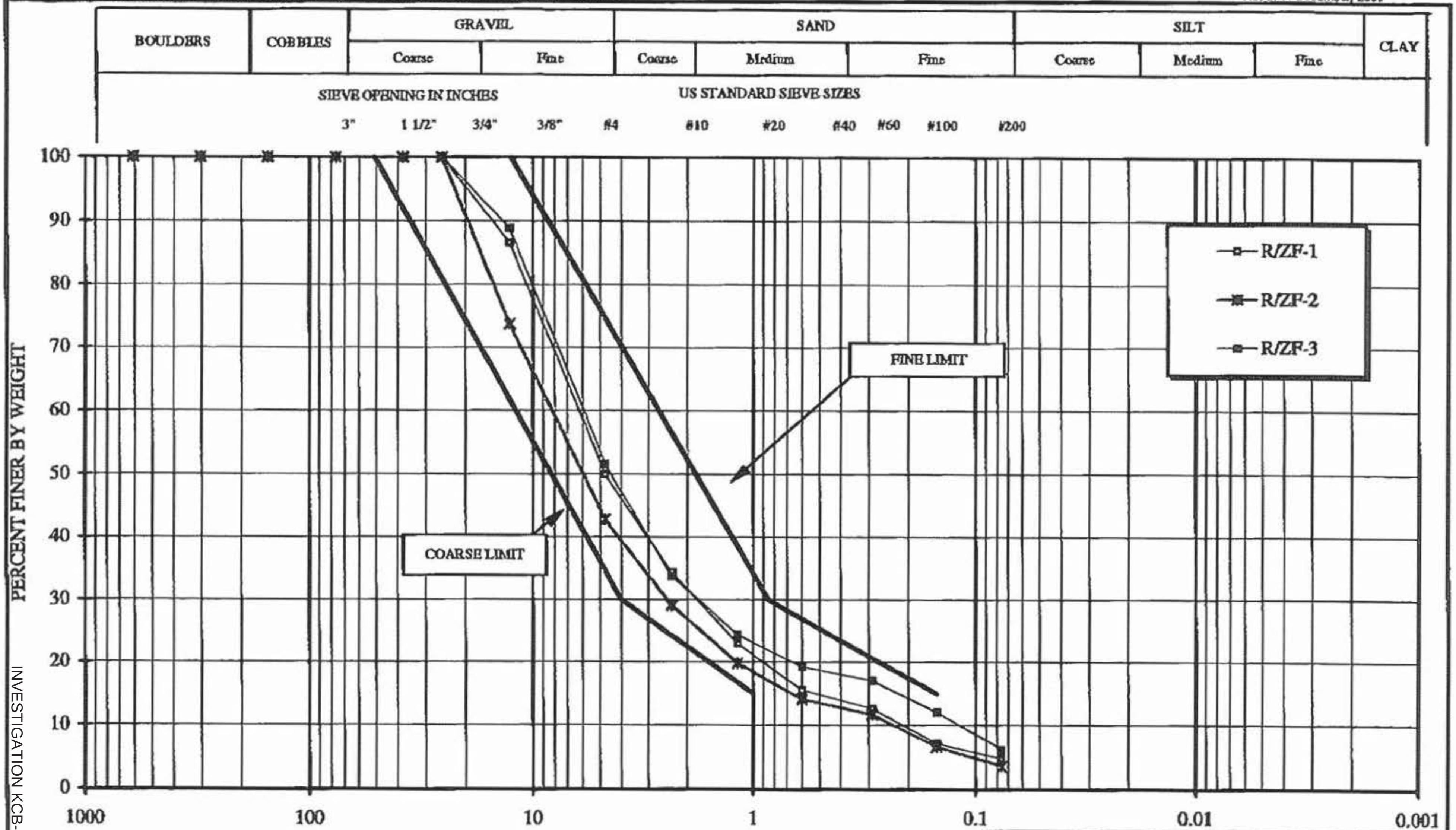


MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
STAGE 3 CONSTRUCTION ZONE F-CONTROL SAMPLES GRADATION SUMMARY

	PROJECT NO.	REF. NO.	REV.
Knight Piésold CONSULTING	11162/13		0
	FIGURE 3.2		

Rev 0 - Issued with Progress Report



MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

STAGE 3 CONSTRUCTION
ZONE F- RECORD SAMPLES
GRADATION SUMMARY

Knight Piésold CONSULTING

PROJECT NO.	REF. NO.	REV.
11162/13		0

FIGURE 3.3

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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE A PIEZOMETERS

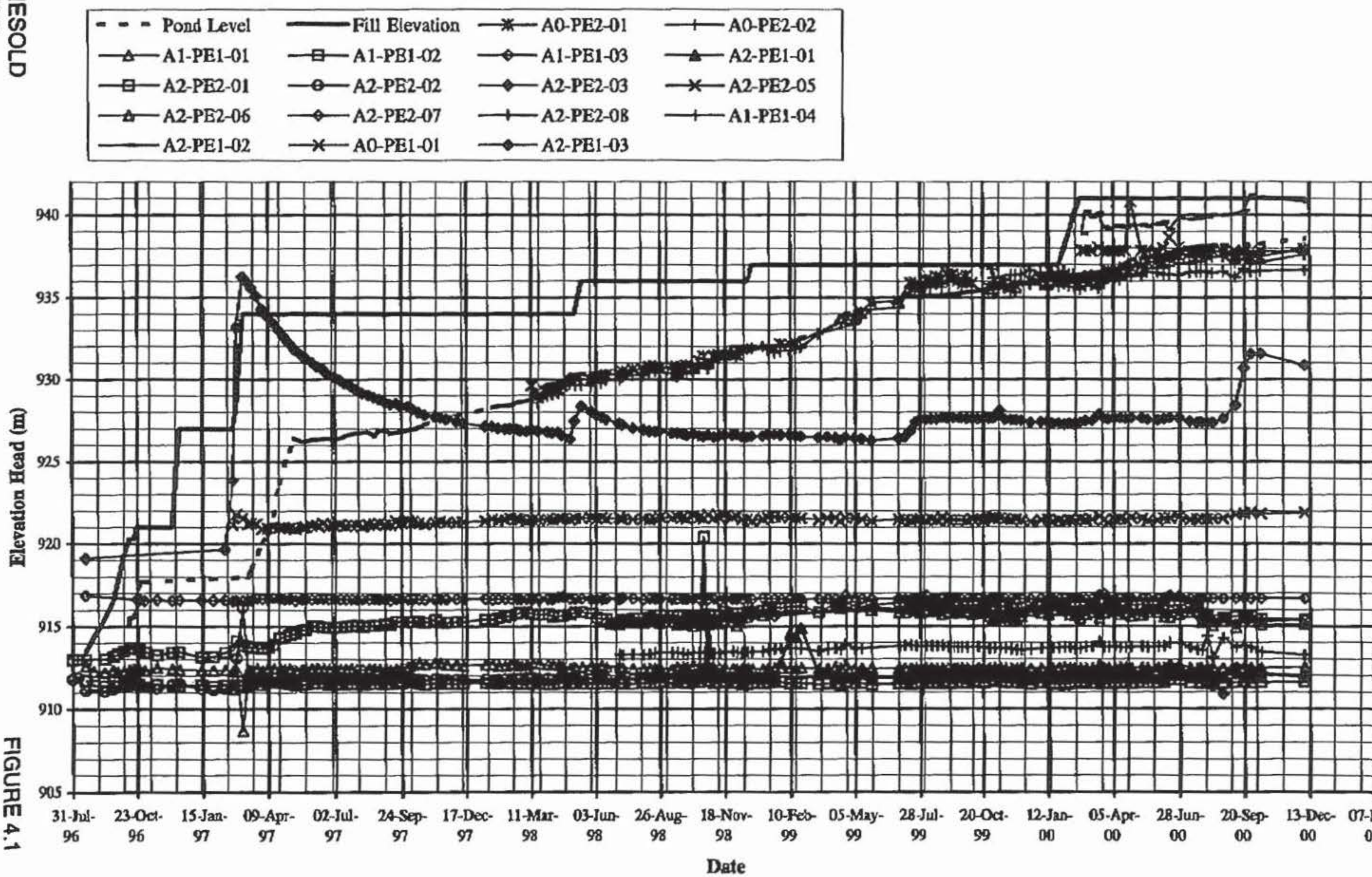

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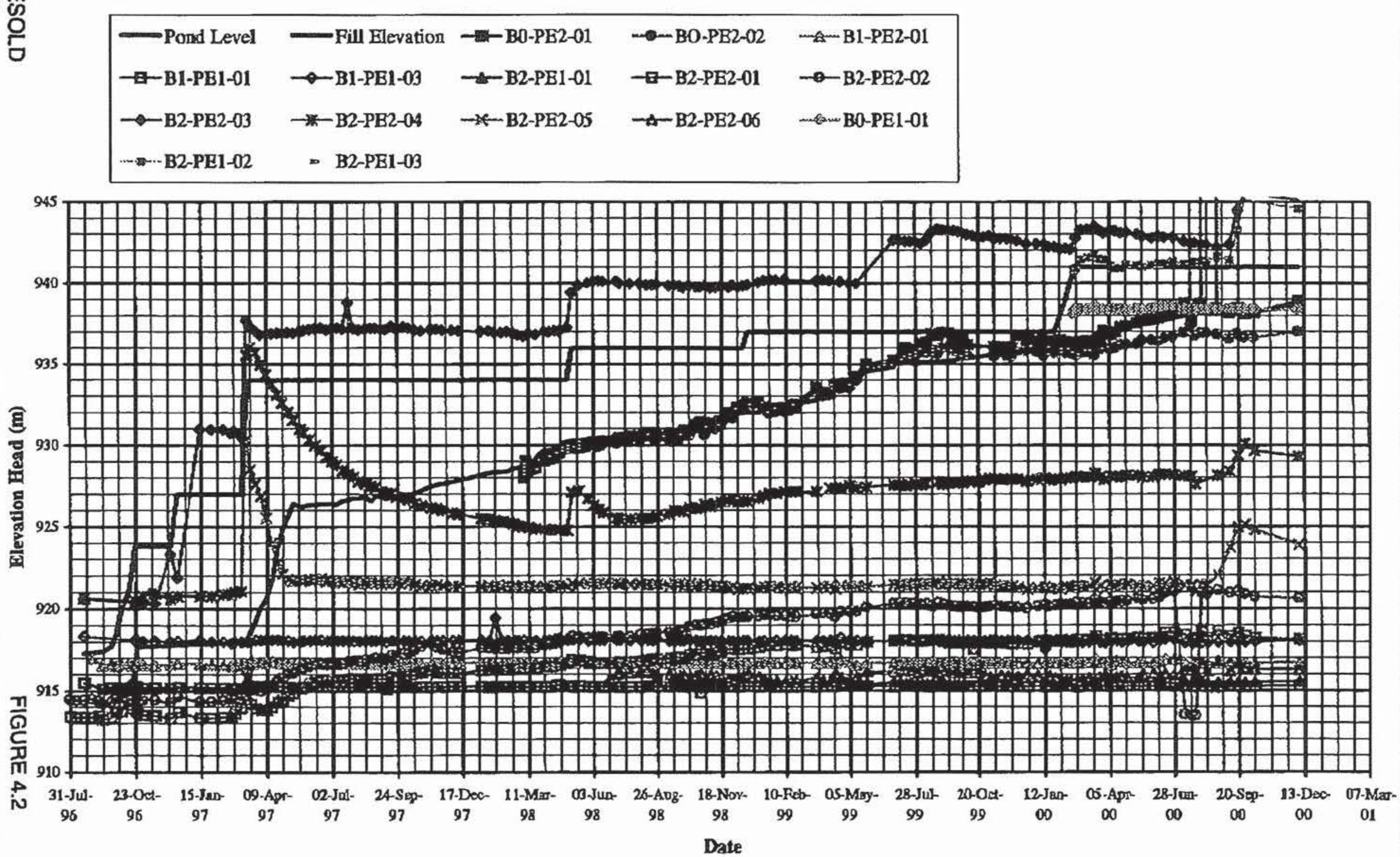
FIGURE 4.1

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE B PIEZOMETERS



KNIGHT PIESOLD CONSULTING

FIGURE 4.2

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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE C PIEZOMETERS

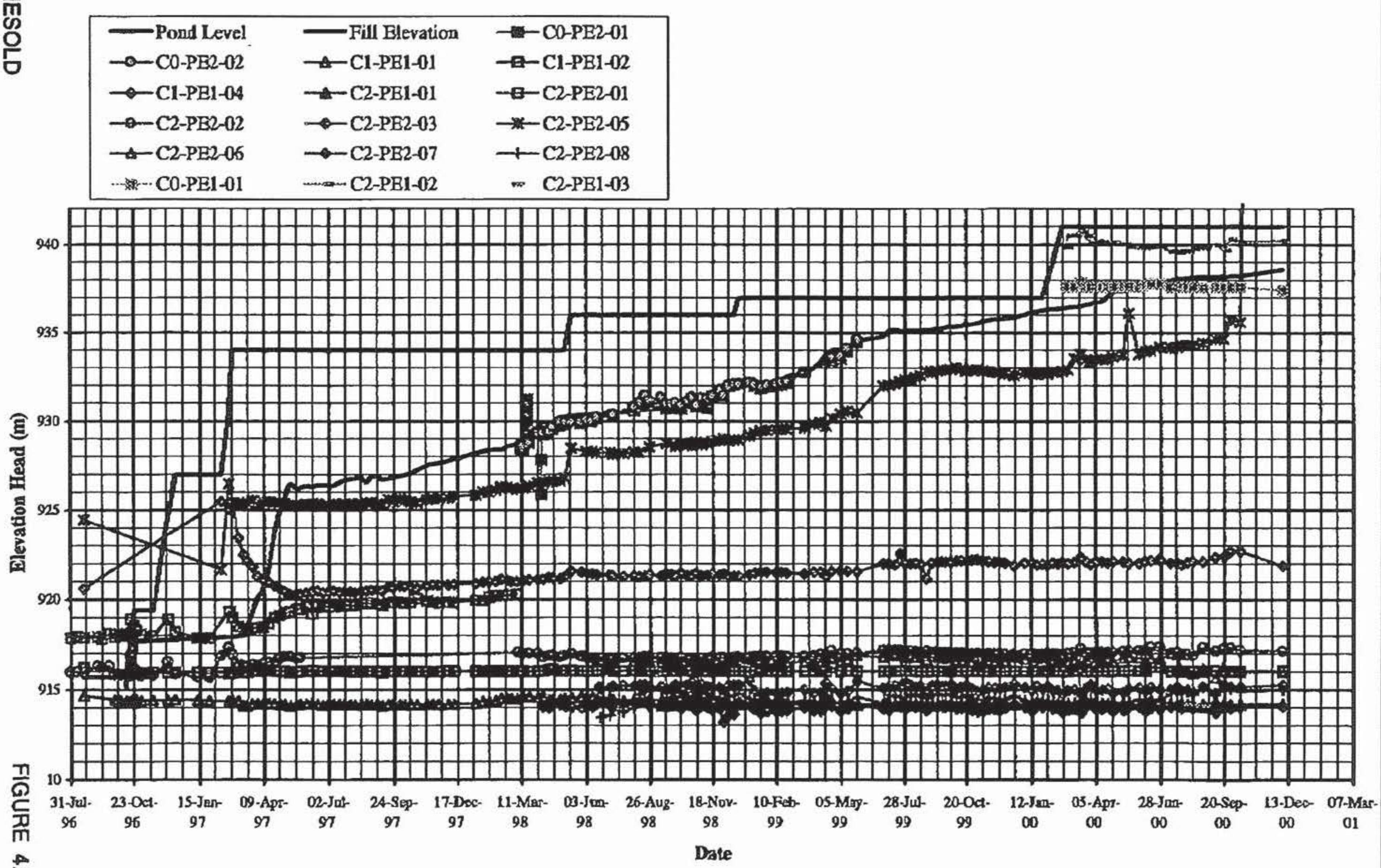

FIGURE 4.3

KNIGHT PIESOLD
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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE D PIEZOMETERS

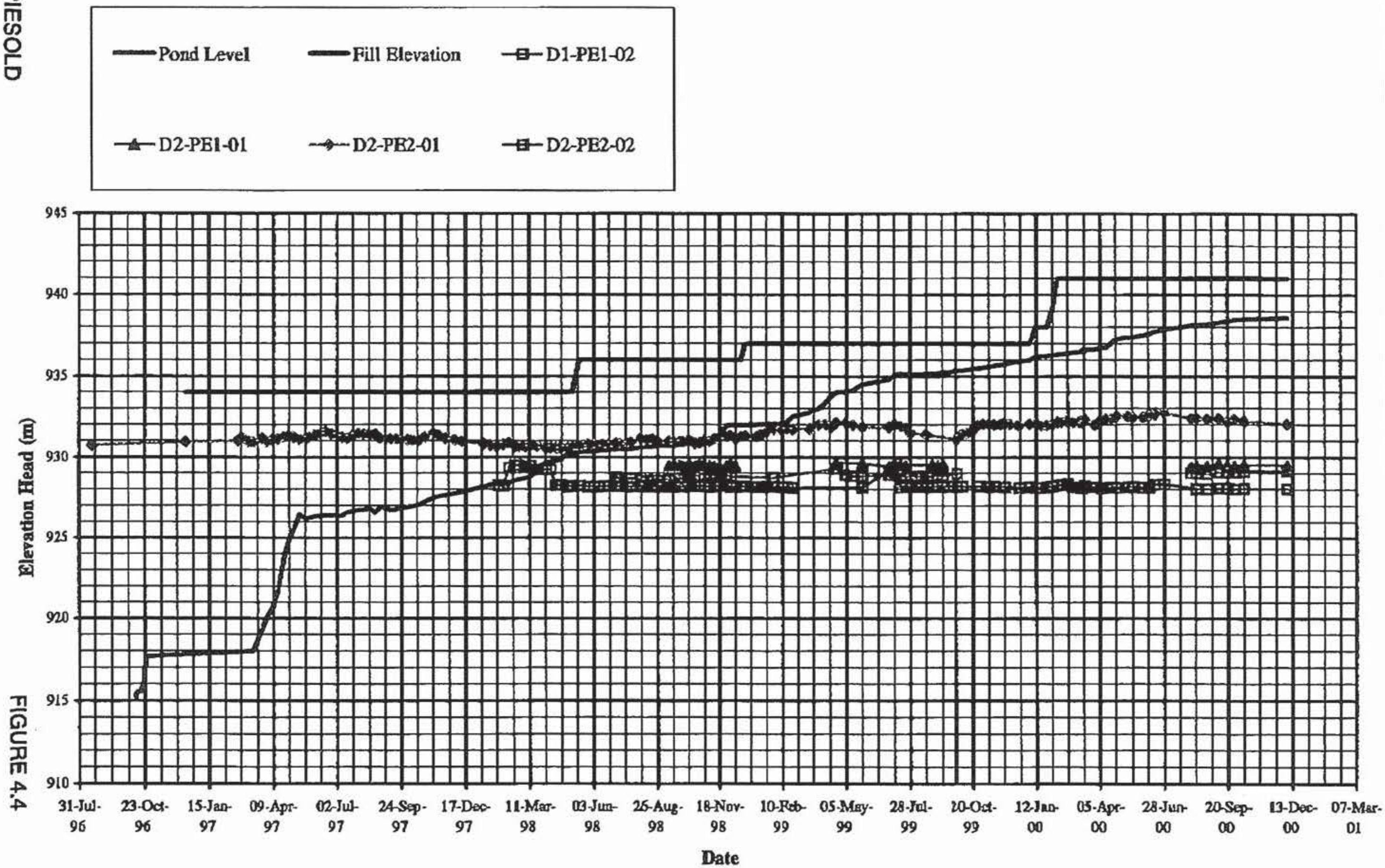


FIGURE 4.4

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE E PIEZOMETERS

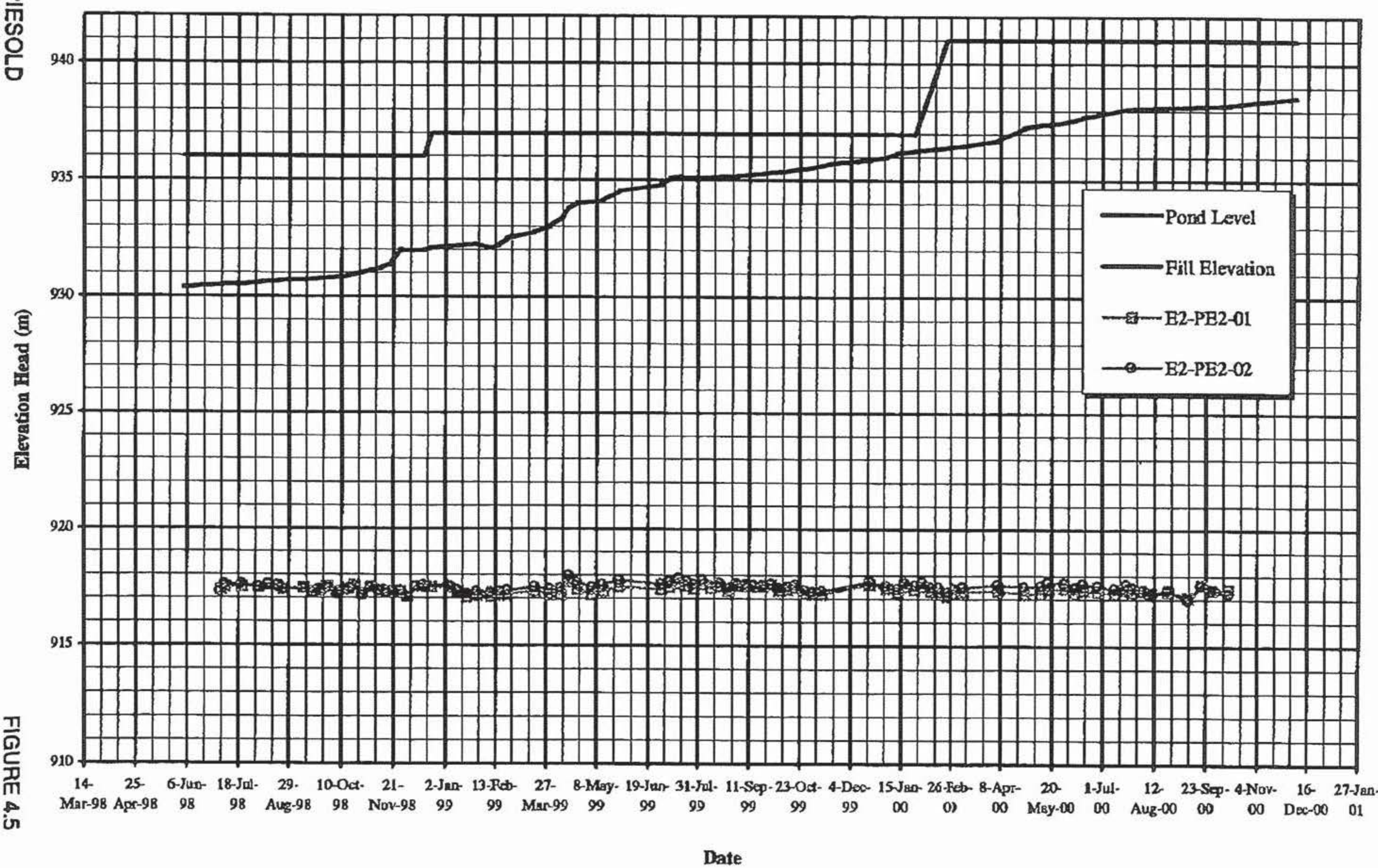
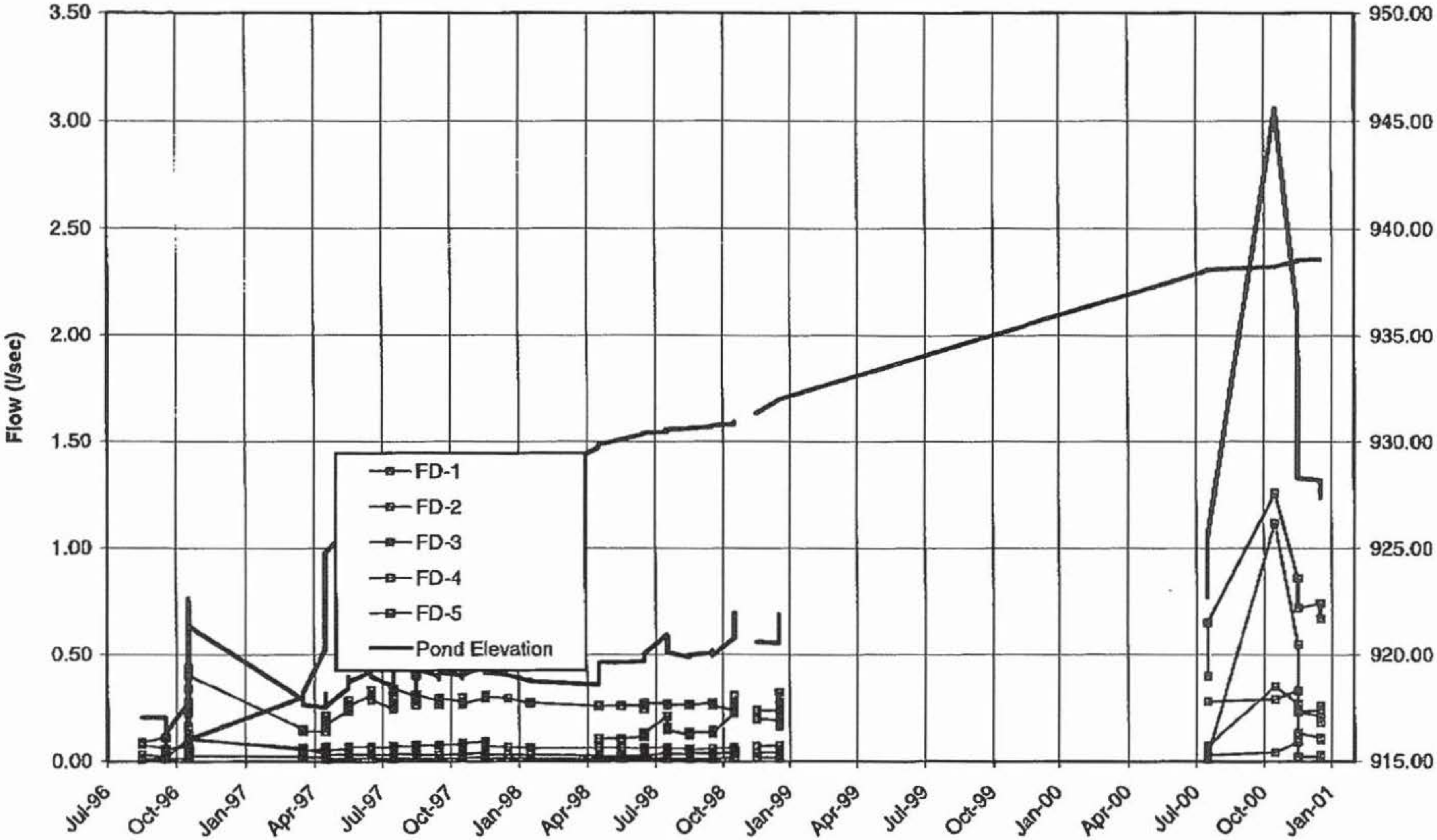


FIGURE 4.5



MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

**TAILINGS STORAGE FACILITY
MAIN EMBANKMENT
FOUNDATION DRAIN FLOWS**

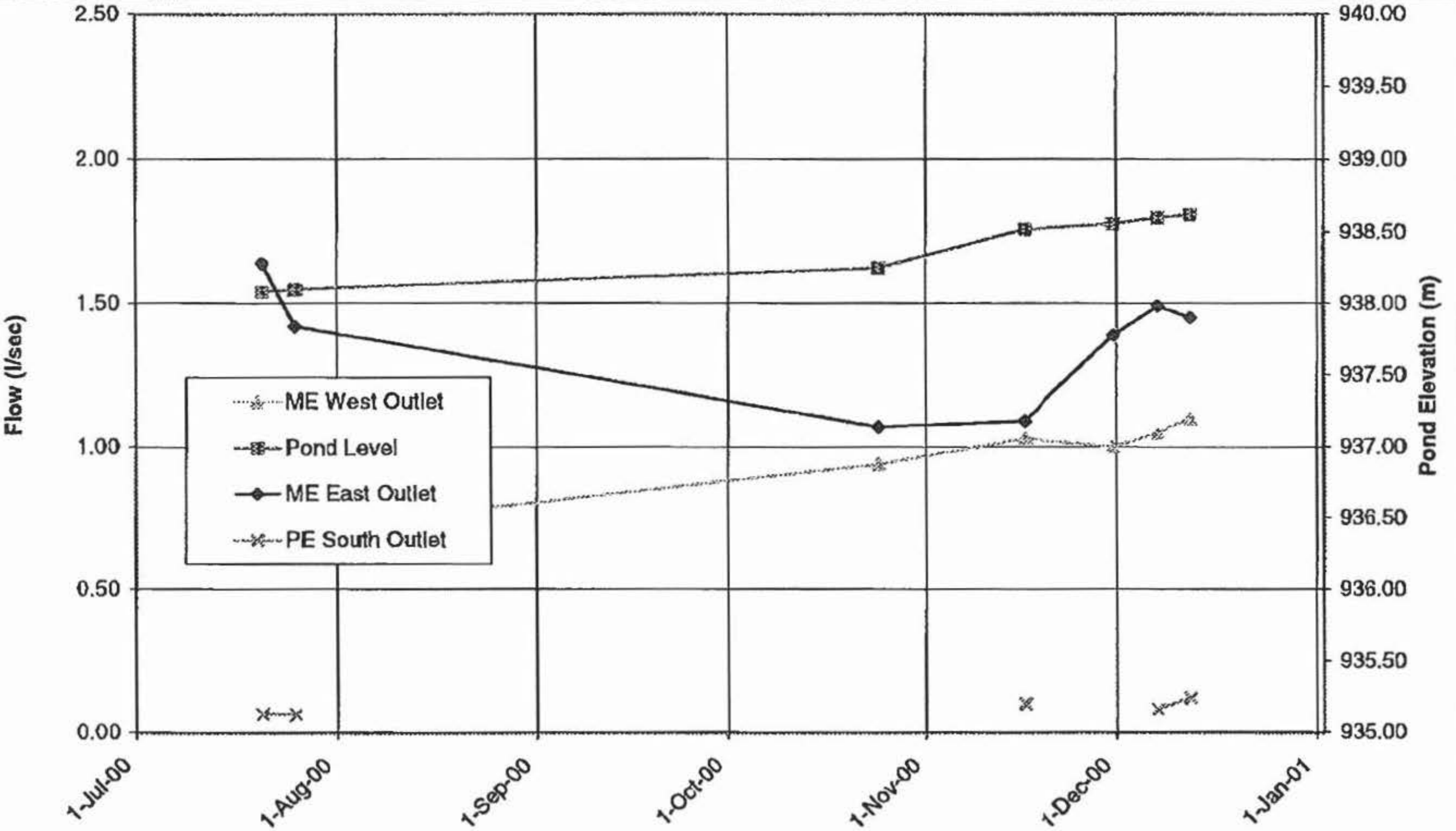
Knight Piésold
CONSULTING

PROJECT NO.	REF. NO.	REV.
11162/13	0/2934	0

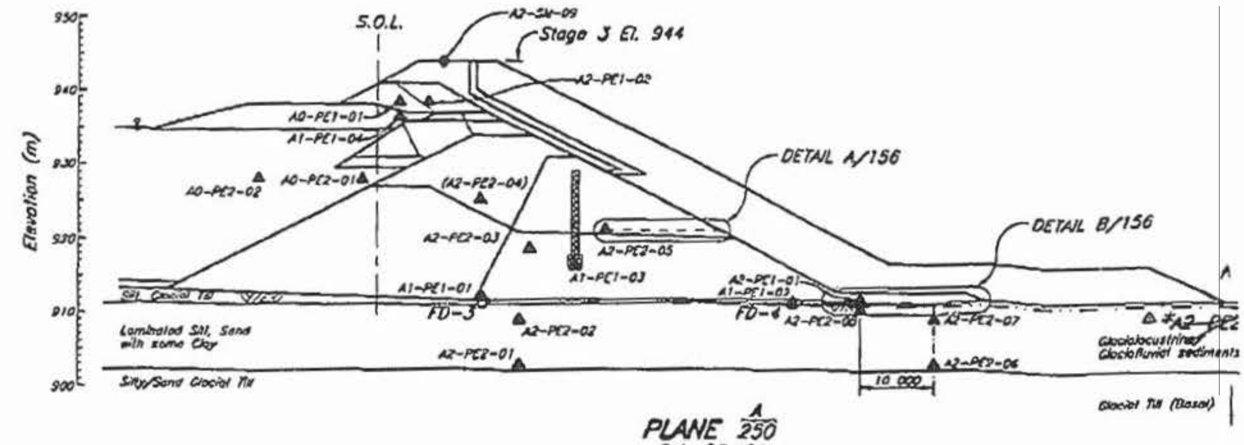
FIGURE 4.6

M:\11162\13\Data\Drain Flows\FD-mon OD-mon-Working Copy TD-Graph

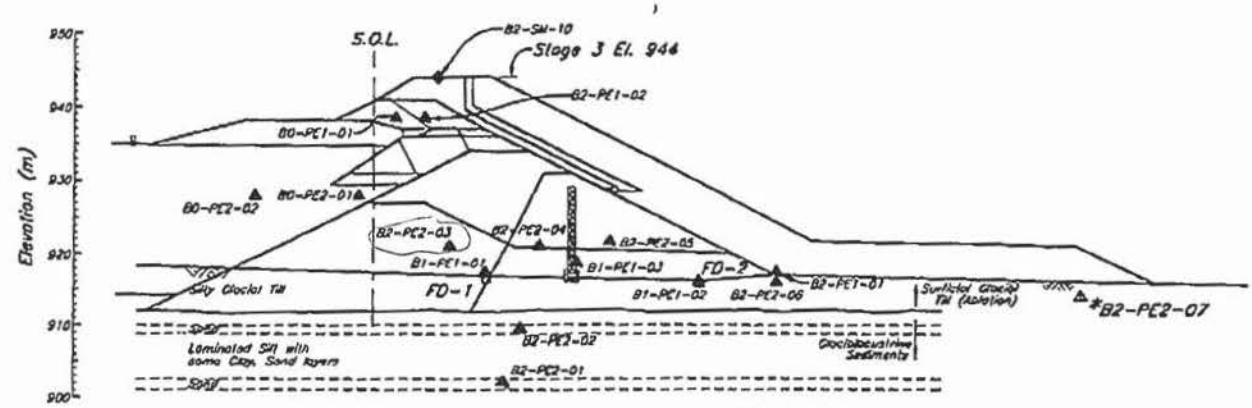
Printed: 1/3/01
Rev'd: Jan 03, 2001



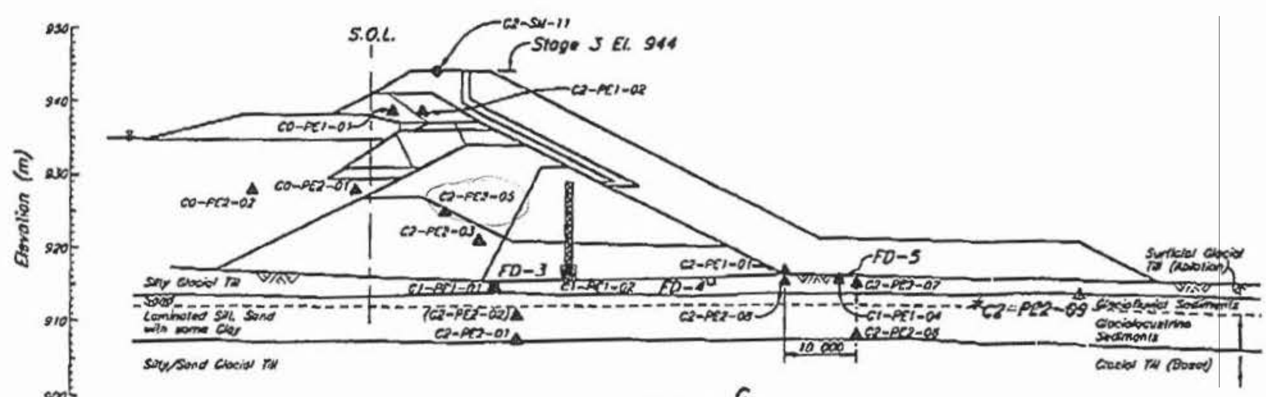
MOUNT POLLEY MINING CORPORATION		
MOUNT POLLEY MINE		
TAILINGS STORAGE FACILITY UPSTREAM TOE DRAIN FLOWS		
Knight Piésold CONSULTING	PROJECT NO. 11162/13	REF. NO. 0/2934	REV. 0
	FIGURE 4.7		



PLANE $\frac{A}{250}$
CH. 20+00

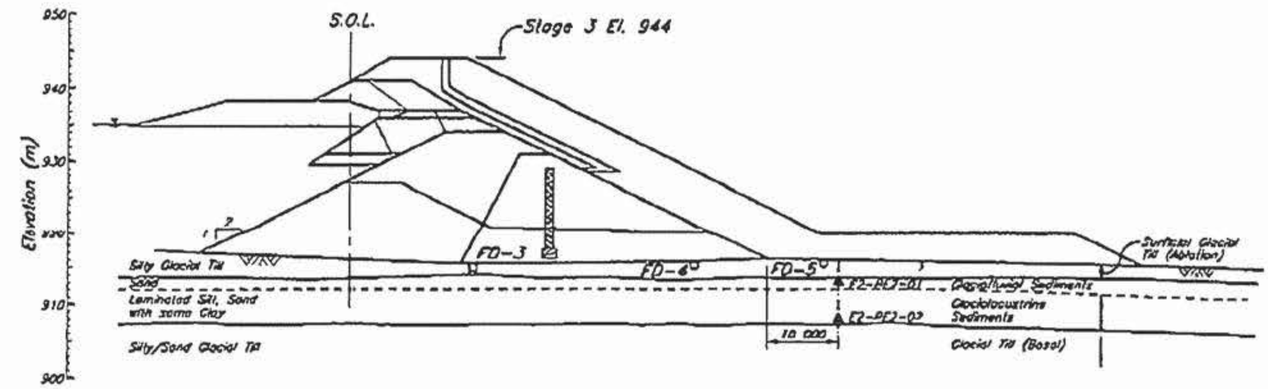


PLANE $\frac{B}{250}$
CH. 22+40

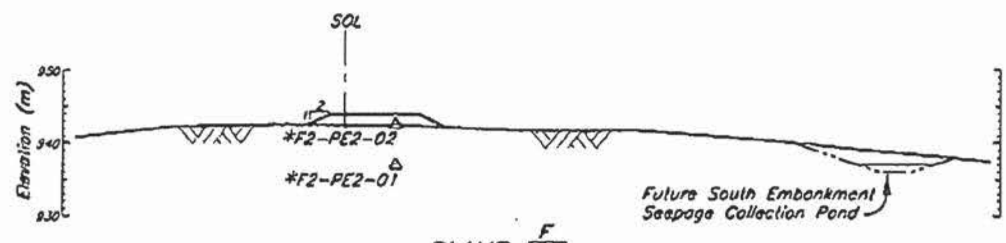


PLANE $\frac{C}{250}$
CH. 18+50

... 3 TAILINGS EMBANKMENT – INSTRUMENTATION – SECTIONS 2 OF 2									
...GE 3 TAILINGS EMBANKMENT – INSTRUMENTATION – SUMMARY OF INSTALLATION & TYP. DETAILS									
...AGE 3 MAIN EMBANKMENT – INSTRUMENTATION – PLAN							0	3JUN'00	ISSUED FOR
DESCRIPTION	REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D	REV.	DATE
REFERENCE DRAWINGS	REVISIONS								



PLANE $\frac{E}{250}$
CH. 17+60



PLANE $\frac{F}{254}$
CH. 7+19

DRG. NO.	DESCRIPTION
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254	TSF – STAGE 3 TAILINGS EMBANKMENT – SOUTH EMBANKMENT – INSTRUMENTATION PLAN
250	TSF – STAGE 3 TAILINGS EMBANKMENT – MAIN EMBANKMENT – INSTRUMENTATION PLAN
130	TSF – STAGE 3 SOUTH EMBANKMENT – PLAN AND SECTION
215	TSF – STAGE 3 MAIN EMBANKMENT – SECTIONS AND DETAILS

REFERENCE DRAWINGS

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK

REVISIONS

14 145-40/MTPO/01

s.22 Site Engineer (dayshift) – Left site on October 24.

s.22 Site Engineer (nightshift) – Left site on September 26 following the completion of nightshift operations.

s.22 was on site September 18 to 21 to substitute for s.22 and to discuss with MPMC construction sequencing for the Perimeter Embankment.

Knight Piésold CONSULTING *Knight Piésold* *P.O. Box 10* *34 Commerce Crescent* *North Bay, ON P1B 8G8* *CANADA* *Tel: +1 (705) 476-2165* *Fax: +1 (705) 474-8095* *Email: kpnb@onlink.net* *www.knightpiesold.com*	**DATE:**	**Nov. 3, 2000**	**FILE NO.**	**11162/13.01**
	TIME:		**REF. NO.**	
	OPERATOR:		**PAGES:**	**32**
	SENDER:	s.22	**APPROVED:**	

TO:	**MPMC**	**FAX NO.:**	**250 790-2268**
ATTENTION:	**Don Parsons, Eric Leneve, Greg Smyth**		
Cc:	**George Headley - MEMND 250-952-0481** **Ken Brouwer, Jeremy Kinch – KP Vancouver**		
SUBJECT:	**Mount Polley Stage 3A**		

Please find following Progress Report No. 6 (revised).

Regards,

s.22

Knight Piésold
CONSULTING

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11/3/00 7:52 AM

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY PROJECT

TAILINGS STORAGE FACILITY
STAGE 3 CONSTRUCTION

PROGRESS REPORT NO. 6 – September 17 to October 24, 2000

SECTION 1.0 –GENERAL

The Stage 3A construction of the Tailings Storage Facility Main and South Embankments was completed on September 28. The embankments have been raised to the target elevation of 942.5 m.

Construction of the raise for the Perimeter Embankment is ongoing. MPMC has intensified cycloning operations along the upstream face to complete this work prior to the onset of freezing conditions. MPMC and KP have been reviewing the construction sequencing and scheduling for the embankment, as discussed in detail in Section 1.3.

1.1 PERSONNEL

Mount Polley Mining Corporation (MPMC) management personnel overseeing the Stage 3 work are as follows:

Eric Leneve, Tailings Coordinator
Don Parsons, Mine Superintendent

The following Knight Piesold Ltd. (KP) representatives were on site during the reporting period:

s.22 ite Engineer (dayshift) – Left site on October 24.

The following Tercon Contractors Ltd. (TCL) representatives were on site during the reporting period:

Site Manager
s.22 Dayshift Foreman
s.22 Nightshift Foreman

The TCL crew left site on upon completion of the Main and South Embankments.

1.2 WEATHER

Weather conditions over the period have generally been sunny, with occasional periods of rainfall and sleet. Temperatures have been decreasing, with freezing conditions developing overnight. Current temperatures have been ranging from about -5°C to +10°C.

There have been no weather related work delays.

1.3 DESIGN AND CONTRACT DEVELOPMENTS

1.3.1 Contract

TCL has completed construction of the Main and South Embankments to the required elevation and to the contract specifications, and is currently working on as-built drawings and volume calculations for final payment.

MPMC will be providing TCL with a list of deficiencies to be addressed prior to completion of the contract. The deficiencies include implementing drainage in Borrow Area No. 2, repair of the toe drain conveyance pipe at the right abutment of the Main Embankment, and scaling of the rock borrow.

1.3.2 Design

MPMC and KP have continued to review the construction sequencing and scheduling required for the Perimeter Embankment. MPMC wishes to minimize the construction requirements and associated costs for the remainder of this stage.

MPMC's planned construction program is discussed below and shown on the attached Figures 1.1 to 1.4. The figures are based on the currently permitted embankment design.

Storage Requirement

The design storage requirement for the Tailings Facility is to provide sufficient capacity for tailings and supernatant water, as well as for the 24 hour PMP event.

MPMC has revisited the Tailings Facility water balance calculations, with the purpose of evaluating methods to maintain a lower pond volume and thereby reduce the required embankment core elevation. Based on this review, MPMC has determined that a core zone elevation of 941.0 m will serve to provide the design storage requirements through to the end of July 2001. The analysis is based on the following:

- Constructing diversion ditches to control upstream runoff (Area 4) and direct it into or away from the Tailings Facility as required. The ditches will be sized by MPMC to accommodate runoff from the PMP event.
- Deferring pumping from Polley Lake until after the next phase of construction in Summer 2001.
- Using groundwater wells for makeup water to the maximum extent possible.

MPMC also plans to conduct an on-going check of the water balance against actual conditions through the 2001 freshet to confirm that conditions are as expected.

A survey of the Perimeter Embankment carried out by MPMC shows that some sections of the crest are below El. 941.0 m. The lowest point is at about 940.5 m. MPMC plans to raise these sections to 941.0 m using Zone S glacial till.

Freeboard Requirement

1.0 m of freeboard is required for wave run-up. MPMC plans to provide the freeboard by construction of a cycloned sand berm upstream of the core zone. The berm will be constructed to El. 942.5 m., although the water balance calculations indicate that freeboard is only required to 942.0 m. The additional 0.5 m will provide freeboard in the event that Zone S must be raised to provide additional storage capacity.

It is planned that the cycloned sand berm will be constructed along the entire length of the embankment by hydraulic placement followed by mechanical shaping, as shown on Figure 1.2. Based on current rates of cycloning, MPMC expects to have construction of the berm complete by early November.

If, however, freezing conditions prevent cycloning and completion of the berm by this method, the section of the embankment between setting out points S5 and S6 will be constructed by one of the two methods shown on Figure 1.3. The first method (A) involves mechanical placement of the upstream sand berm, using a coarse bearing layer as necessary to support construction traffic. The second method (B) involves downstream construction of Zone F, T, and C fills, or cycloned sand, and may include raising of the embankment Zone S core against the downstream fill.

At the north abutment of the embankment, an approximately 75 m long section of the berm has been constructed from fine rockfill (Zone T material) to the approximate configuration shown on Figure 1.4. The reason for this is that the cyclones could not properly reach this area and were trapping water and slimes against the abutment.

Knight Piesold has carried out an upstream stability analysis to confirm the stability of the sand berm. The liquefaction potential of the tailings was assessed for the two design earthquakes, the Operational Basis Earthquake (OBE) and the Maximum Design Earthquake (MDE). The analyses indicate adequate Factors of Safety against loss of freeboard following the OBE.

Construction Sequence

The proposed construction sequence for raising of the Perimeter Embankment is as listed below. The work will be carried out in sections, such that construction can progress on each section as cycloning is completed.

- Move tailings line and prepare foundation at north abutment of embankment. Construct upstream rockfill berm to configuration shown on Figure 1.4.

- Construct ramps on downstream side of embankment as necessary to access embankment crest.

- Complete cycloning along designated embankment section. Remove cyclones from crest and smooth out top of hydraulically placed sand.
- Move tailings line onto sand.
- Prepare crest of existing embankment (grade off unsuitable material) in preparation for Zone S placement along low areas.
- Place Zone S till on crest as required to raise to 941.0 m.
- Shape upstream sand berm to configuration shown on Figure 1.2.
- If freezing conditions do not permit completion of hydraulically placed upstream berm, raise section between S6 and S5 using one of the methods shown on Figure 1.3.

Downstream Stability

KP has also carried out an analysis to evaluate the downstream stability of the embankment. The analysis indicates that the embankment has an overall Factor of Safety of 1.4 against large failures causing loss of freeboard. This meets the requirements for current operations (minimum required F.S. of 1.3), but does not meet the requirements for closure (minimum required F.S. of 1.5). However, the analysis also indicates that, due to the relatively steep 1.5H:1.0V downstream slope on the embankment, the Factor of Safety against shallow failures is only 1.1.

To mitigate this concern, KP recommended that a downstream cyclone sand or rockfill buttress be constructed to at least El. 935.5 m in fall 2000. The buttress would also serve to facilitate flattening of the oversteep slope to meet the closure stability requirements, when required.

Due to budget constraints, MPMC has indicated that the buttress will only be constructed this year if sufficiently warm weather conditions permit cycloning downstream after construction of the upstream berm. MPMC is instead planning on a rigorous inspection schedule to monitor for downstream instability, and to repair any surface sloughing as necessary. The inspections will involve visual inspections of the downstream face and crest, removing snow from the crest, as well as bi-weekly monitoring of survey monuments on the crest. Stockpiles of cyclone sand and Zone T rockfill will be made readily available for any required repair work.

1.4 TAILINGS FACILITY OPERATION AND MAINTENANCE

As noted, MPMC has intensified cycloning operations along the upstream face of the Perimeter Embankment. Twelve separators on six stands are currently in operation. The stands are moved along the embankment such that just enough material is placed at each location to construct the upstream berm. Fill is being placed along about 25 m of embankment per day.

During a scheduled mill shut-down on September 19, MPMC relocated the reclaim barge approximately 200 m up the barge channel. Repairs to the tailings line above the T2 dropbox were also completed.

Due to concerns of wear in the tailings line above the dropbox, MPMC has fused additional sections of pipeline together to repair any sections of the tailings line as necessary. The extra pipe sections are from reclaim barge moves.

The seepage recycle pipeline has been reinstated at the Main Embankment Seepage Collection Pond. The pond is being pumped down as necessary.

1.5 SAFETY

No safety incidents were reported for the period.

SECTION 2.0 – CONSTRUCTION ACTIVITIES

2.1 EQUIPMENT

TCL used the following equipment over the reporting period:

- Excavators – 1 Hitachi EX 1100, 1 Cat 375, 1 Cat 322B
- Haul Trucks – 5 Cat 773's
- Dozers – 1 Cat D8R, 1 Cat D8N (rental), 1 Cat D6D
- Graders – 1 Cat 16G

- Compactors – 1 Cat CS583, 1 Cat CS563 (rental), 1 Cat 825G
- Water truck, service trucks, fuel trucks, forklift

Since completion of TCL construction activities, most of the equipment has not yet been demobilized and remains on site.

2.2 ACTIVITIES

The major construction activities for the reporting period are summarized below. Dayshift and nightshift crews were in operation during the TCL activities.

Main Embankment (TCL)

The Main Embankment Zones C, T and S have been raised to El. 942.5 m. The Zone F chimney drain has been constructed to 941.0 m, and will be extended as necessary during the next stage of construction by excavating down to the top of the drain.

TCL constructed a haul road into the southeast portion of Borrow Area No. 2 to access drier glacial till for the Zone S placement. This material was used for construction of both the Main and South Embankments, as well as for basin liner.

Basin liner was placed within the impoundment at the right abutment of the Main Embankment to cover weathered bedrock exposed during previous site preparation work. The liner consisted of three 150 mm thick lifts placed and compacted with a smooth drum vibratory roller, followed by a 300 mm thick frost protection layer spread with a bulldozer.

South Embankment (TCL)

Foundation preparation was completed for the South Embankment. Soft, wet material was graded off down to competent glacial till. Sub-excavation was carried out in three small areas to remove softer material where rainwater had ponded. The material was replaced with compacted glacial till. The entire foundation area was rolled with a smooth drum vibratory compactor followed by the Cat 825G.

Excavation for installation of foundation piezometer F2-PE2-01 encountered weathered volcanic bedrock below the embankment at 1.3 m depth.

Between September 23 and 26, the embankment Zone S was raised to El. 942.5 using compacted glacial till.

Perimeter Embankment (MPMC)

Cycloning for the upstream sand berm along the Perimeter Embankment has been completed along roughly 50% of the section between the north abutment and setting out point S6.

Rock Borrow

MPMC has drilled and blasted an additional 40,000 m^3 of Zone T material in the rock borrow. The material will be additional inventory to be used in construction as necessary.

Miscellaneous

MPMC has removed the Polley Lake pipeline from within the Perimeter Embankment crest. The excavation was backfilled with compacted glacial till from Borrow Area No. 2.

MPMC excavated several test pits in the cyclone sand stockpile in Borrow Area No. 4 to confirm the suitability (moisture content) of the material for use in construction. The material was found to be suitable, extending in depth beyond the reach of the excavator.

During completion of the downstream rockfill at the right abutment of the Main Embankment, construction traffic broke and 'punched-up' a section of the upstream toe drain outlet / conveyance pipe. The damaged section was excavated and repaired.

SECTION 3.0 – KNIGHT PIESOLD ACTIVITIES

3.1 GENERAL

KP site activities over the reporting period have included the following:

- Inspection and documentation of construction activities.
- QA/QC collection and testing of Zone F, T, C, and S control and record samples.

- Field density testing of Zone S fills.
- Installation of Stage 3 piezometers, organizing piezometer leads.
- Ongoing discussions and correspondence with MPMC and KP Vancouver.
- Preparation of daily inspection reports and bi-weekly Progress Reports.
- Collection and review of embankment monitoring data.

3.2 LABORATORY TESTING

The following samples were collected and tested on site over the reporting period:

- Zone T record sample R/ZT-3-10
- Zone C record samples R/ZC-3-4 and 5
- Zone F control samples C/ZF-3-20 to 24
- Zone F record samples R/ZF-24 to 27

The results of the testing are provided on the summary Tables 3.1 to 3.4 and gradation plot Figures 3.1 to 3.4.

The results show that the Zone T and C record samples meet the specifications for particle size distribution.

The results for the Zone F control tests show that control samples C/ZF-3-20, 23, and 24 met the required gradation specifications, but that samples C/ZF-21 and 22 fell below the bottom of the coarse envelope. All of the record samples from this material meet the specifications, however. This may be due in part to the control samples being collected prior to the filter sand stockpile being blended with a bulldozer. MPMC also sourced and included a significant proportion of weathered material in the crush operations, and the record tests likely indicate some breakdown of the material during handling, placement and compaction.

Five record samples of Zone S material, R/ZS-3-1 to 5, were also collected over the reporting period. These samples have been sent to Materials Testing Services Ltd. in

Prince George, and are currently being analyzed for particle size distribution, laboratory compaction characteristics, moisture content, Atterberg Limits and Specific Gravity.

3.3 FIELD DENSITY TESTING

Field density tests with a nuclear gauge were carried out on the Zone S and basin liner fills placed at the Main and South Embankments. The purpose was to check that the fills met the required compaction specifications of 95% and 92% of Standard Proctor Maximum Dry Density for Zone S and basin liner, respectively. A total of approximately 200 tests were carried out and confirm that fill placement meets the design objectives.

SECTION 4.0 – EMBANKMENT MONITORING

Monitoring of tailings embankment instrumentation over the reporting period is discussed in the following sections.

4.1 VIBRATING WIRE PIEZOMETERS

Piezometer F2-PE2-01 was installed to 1.3 m depth in the foundation of the South Embankment. The trench for the piezometer lead was excavated to 1.0 m depth to the downstream toe of the embankment, and backfilled with compacted glacial till. Readings from the piezometer will be included in future monitoring records.

KP has worked on organizing the leads for the piezometers. The leads have been extended to more accessible locations and wired into panel boxes to make monitoring more efficient.

Piezometer readings were obtained on September 19 and 28, as well as on October 11. The results of the monitoring are shown on Figures 4.1 to 4.5, and are summarized below. Locations of the piezometers are shown on attached drawings.

Foundation Piezometers

The Main Embankment foundation piezometers have typically shown a slight decreasing trend in pore water pressure since the previously reported September 8 readings. The largest decreases have been about 0.4 m.

No substantial changes were noted in the Perimeter Embankment (Plane D) foundation piezometers.

Fill Piezometers

Most of the Main Embankment glacial till piezometers responded to construction of the overlying Stage 3 fills with increasing pore pressures. The largest total increase was 4.18 m at A2-PE2-03. Since completion of construction, most of these pore pressures have started to decrease again.

Piezometers installed in Zone T and Cyclone Sand zones of the embankment have shown no response to fill placement and remain at very low head, indicating free-draining conditions in these materials.

Drain Piezometers

All drain piezometers have remained static and at a very low head indicating that the drains are free-draining and functioning as designed.

Tailings Piezometers

Water levels at the tailings piezometers continue to mimic the pond level.

4.2 DRAIN FLOWS

MPMC has pumped down the Main Embankment Seepage Collection Pond and the drain outlets in the sump are exposed. A monitoring stand was installed in the sump.

Drain flows were measured on October 24. Several of the readings were higher than expected, possibly as a result of surface water inflows or due to the high pond level causing water to back into the drains and saturate the drain trench backfill (the drains may not have time to discharge the excess water before the readings were taken). Additional monitoring is being undertaken to clarify the cause of these results

4.3 SURVEY MONUMENTS

Survey monuments are to be installed by MPMC on the Main Embankment crest at Monitoring Planes A, B, and C. Surveys of the monuments will be included in the Tailings Facility monitoring program to measure any embankment movements.

Additional survey monuments will be installed at three locations along the downstream edge of the Perimeter Embankment crest. These monuments are to be surveyed once every two weeks to check for any surface sloughing, as discussed in Section 1.3.

SECTION 5.0 – ONGOING ITEMS

The following items will be addressed during upcoming reporting periods:

- MPMC and KP will continue to review the Perimeter Embankment construction scheduling.

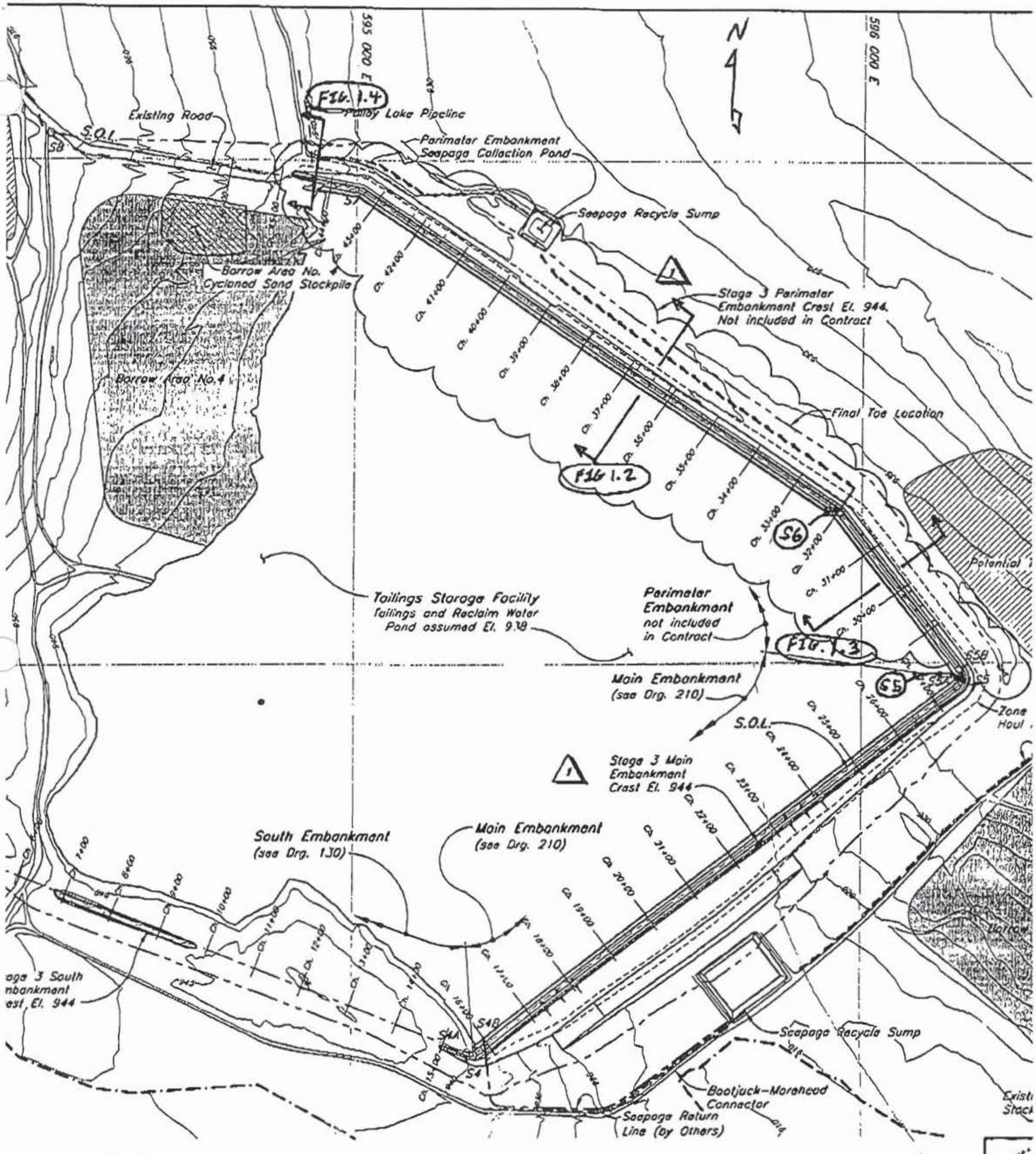
- KP personnel will visit the site as necessary for construction inspections.

Submitted by:

s.22

Distribution: Eric Leneve, Don Parsons – MPMC
George Headley – MEMND
Ken Brouwer – KP Vancouver

Knight Piesold Ltd.



NOTES

1. Topography at TSF generated from points and break lines sent from MPMC in July 1999. The topography outside the TSF area is from 1997 flyover.

2. Current size and location of potential and existing Borrow Areas and Topsoil Stockpiles are to be confirmed.

FIGURE 1.1

Scale 100 0 100 200 300 400 500 m

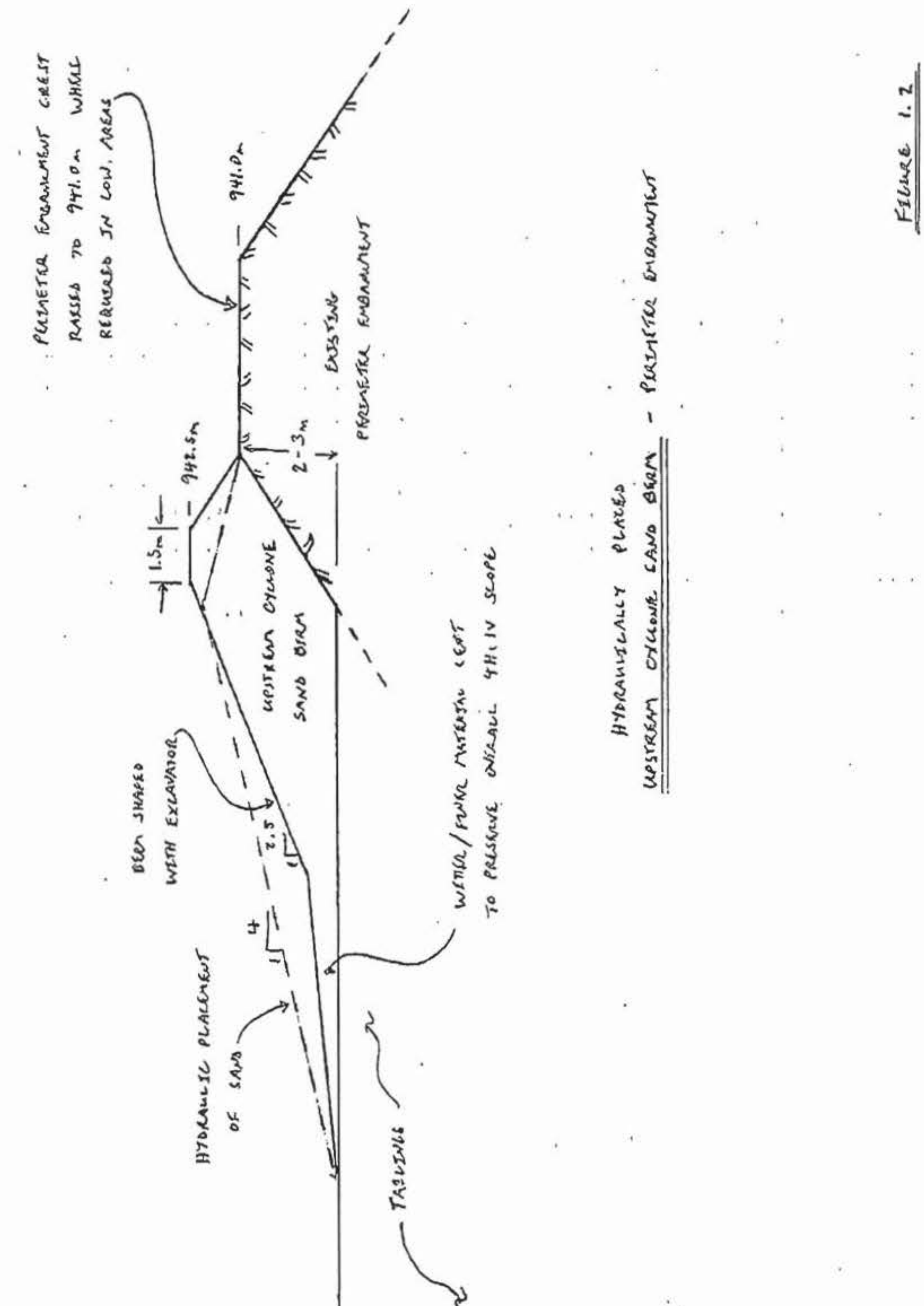
REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
1	2JUN'00	ISSUED FOR CONSTRUCTION	MDB	TAM		KJB
0	14APR'00	ISSUED FOR TENDER	MDB	NSD	JRK	KJB

REVISIONS

REVISIONS

Knight Piésold Ltd.
CONSULTING ENGINEERS

Project: MT. POLLEY - STAGE 3 CONSTRUCTION Project No.: 1162/13
Calculations for: Date: OCT. 20/00
Calculations by: JDC Sheet ____ of ____
Checked by: ____ Date: ____



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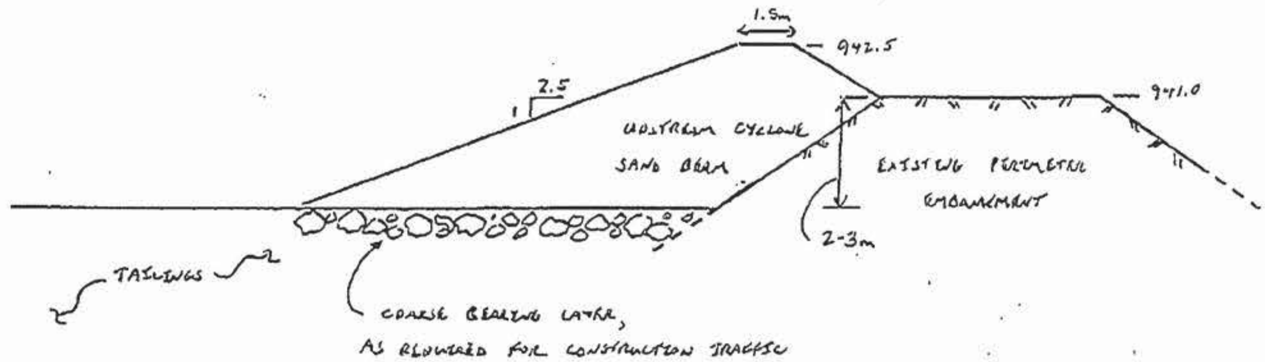
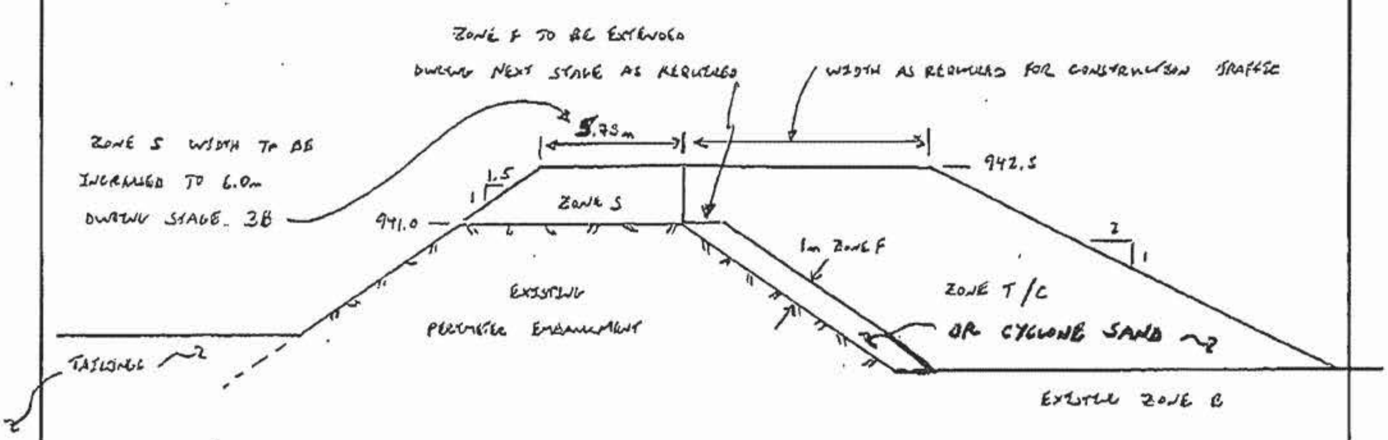
Project: MT. POLLEY - STAGE 3 CONSTRUCTION Project No.: 1162/13
Calculations for: Date: OCT. 20/00
Calculations by: JDC Sheet ___ of ___
Checked by: ___ Date: ___



A/ MECHANICALLY PLACED
UPSTREAM CYCLONE SAND BERM



B/ DOWNSTREAM ROCKFILL

ALTERNATIVE OPTIONS FOR RAISING
OF PERIMETER EMBANKMENT BETWEEN S5 + S6

FIGURE 1.3

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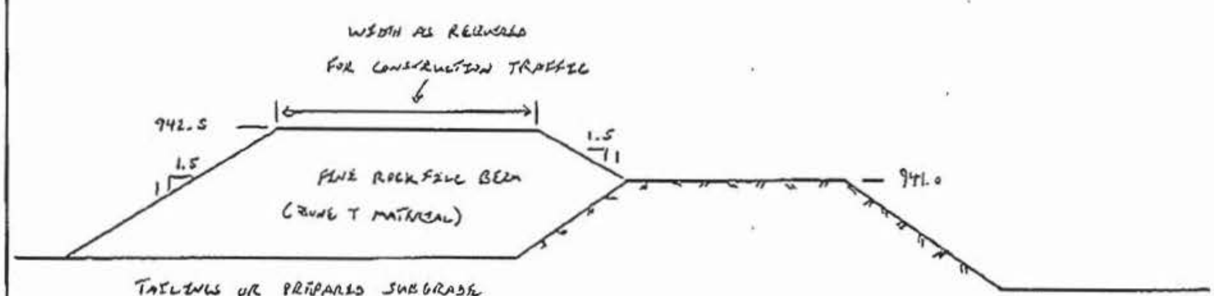
CONSULTING ENGINEERS

Project: MT. POLLEY - STAGE 3 CONSTRUCTION
Project No.: 1162/13
Calculations for:
Date: OCT. 20/00
Calculations by: TJC
Sheet ____ of ____
Checked by:
Date:



UPSTREAM ROCKFILL BERM AT
NORTH ABUTMENT PERIMETER EMBANKMENT

FIGURE 1.4

TABLE 3.1

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE T RECORD TESTS - SUMMARY SHEET

C:\Mt. Polley - Stage 3\Lab Testing\Zone T\[Zone T Summary.xls]Record Data Date Printed 13-Oct-00

Date Sampled	Sample No.	Location	C3 (Particle Size Distribution)			
			Cobbles % > 3 inch	Gravel % 3 inch to #4	Sand % #4 to #200	Silt/Clay % < #200
3-Jun-00	R/ZT-3-1	Zone T Fill	20.0	61.5	15.7	2.8
16-Jul-00	R/ZT-3-2	Zone T Fill	20.0	58.7	16.2	5.1
25-Jul-00	R/ZT-3-3	Zone T Fill	13.9	66.1	18.4	1.6
27-Jul-00	R/ZT-3-4	Zone T Fill	22.0	65.0	12.5	0.5
22-Aug-00	R/ZT-3-5	Zone T Fill , Chainage: 23+00, Elevation: 929 m	37.2	36.1	24.9	1.8
20-Aug-00	R/ZT-3-6	Zone T Fill, Chainage: 19+50, Elevation: 929 m	34.5	40.0	24.0	1.5
29-Aug-00	R/ZT-3-7	Zone T Fill, Chainage: 20+00, Elevation: 932 m	5.0	57.2	36.0	1.8
9-Sep-00	R/ZT-3-8	Zone T Fill, Chainage : 18+00, Elevation: 936 m	20.0	59.7	18.3	2.0
12-Sep-00	R/ZT-3-9	Zone T Fill, Chainage: 26+00, Elevation: 940 m	10.0	62.7	25.5	1.8
21-Sep-00	R/ZT-3-10	Zone T Fill, Chainage: 26+00, Elevation: 940 m	20.0	52.6	26.6	0.8
		MEAN	20.3	56.0	21.8	2.0
		MEDIAN	20.0	59.2	21.2	1.8
		MAXIMUM	37.2	66.1	36.0	5.1
		MINIMUM	5.0	36.1	12.5	0.5

Notes:
1) C3 (Particle Size Distribution) - ASTM D422

TABLE 3.2

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE C RECORD TESTS - SUMMARY SHEET

C:\Mt. Polley - Stage 3\Lab Testing\Zone C\[Zone C Summary.xls]Record Summary Date Printed 13-Oct-00

Date Sampled	Sample No.	Location	C3 (Particle Size Distribution)			
			Cobbles % > 3 inch	Gravel % 3 inch to #4	Sand % #4 to #200	Silt/Clay % < #200
2-Aug-00	R/ZC-3-1	Zone C Fill	56.4	34.7	8.4	0.5
21-Aug-00	R/ZC-3-2	Zone C Fill, Chainage: 22+55, Elevation 928.3	50.6	36.3	12.8	0.3
24-Aug-00	R/ZC-3-3	Zone C Fill, Chainage: 22+40, Elevation 929m	48.6	35.5	15.3	0.5
17-Sep-00	R/ZC-3-4	Zone C Fill, Chainage: 17+00, Elevation 938m	50.0	35.8	13.7	0.5
23-Sep-00	R/ZC-3-5	Zone C Fill, Chainage: 16+00, Elevation 941m	50.0	32.6	16.7	0.7
		MEAN	51.1	35.0	13.4	0.5
		MEDIAN	50.0	35.5	13.7	0.5
		MAXIMUM	56.4	36.3	16.7	0.7
		MINIMUM	48.6	32.6	8.4	0.3

Notes:
1) C3 (Particle Size Distribution) - ASTM D422

TABLE 3.4

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE F RECORD TESTS - SUMMARY SHEET

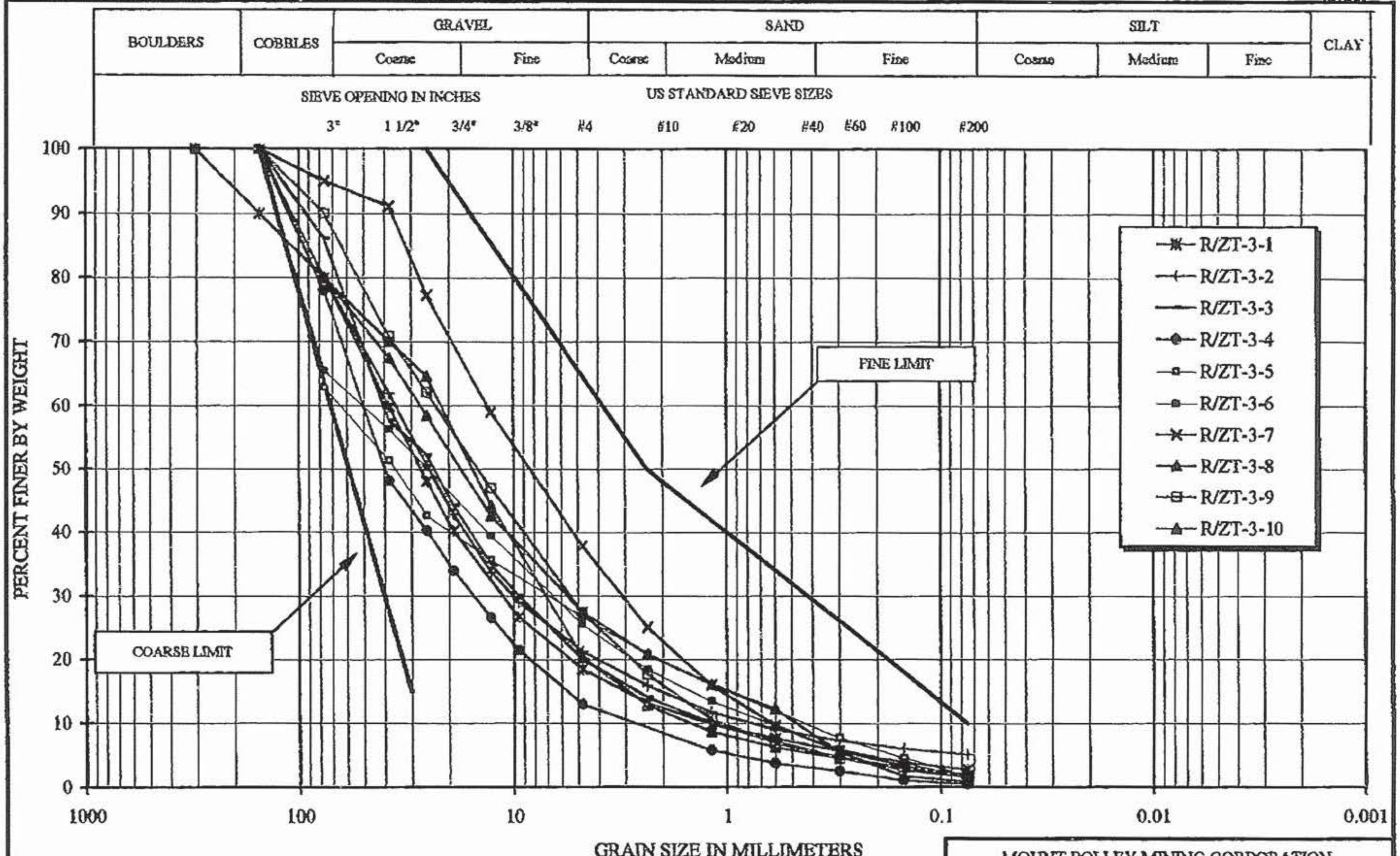
C:\Mt. Polley - Stage 3\Lab Testing\Zone F\[Zone F Summary.xls]Record Summary

Date Printed 13-Oct-00

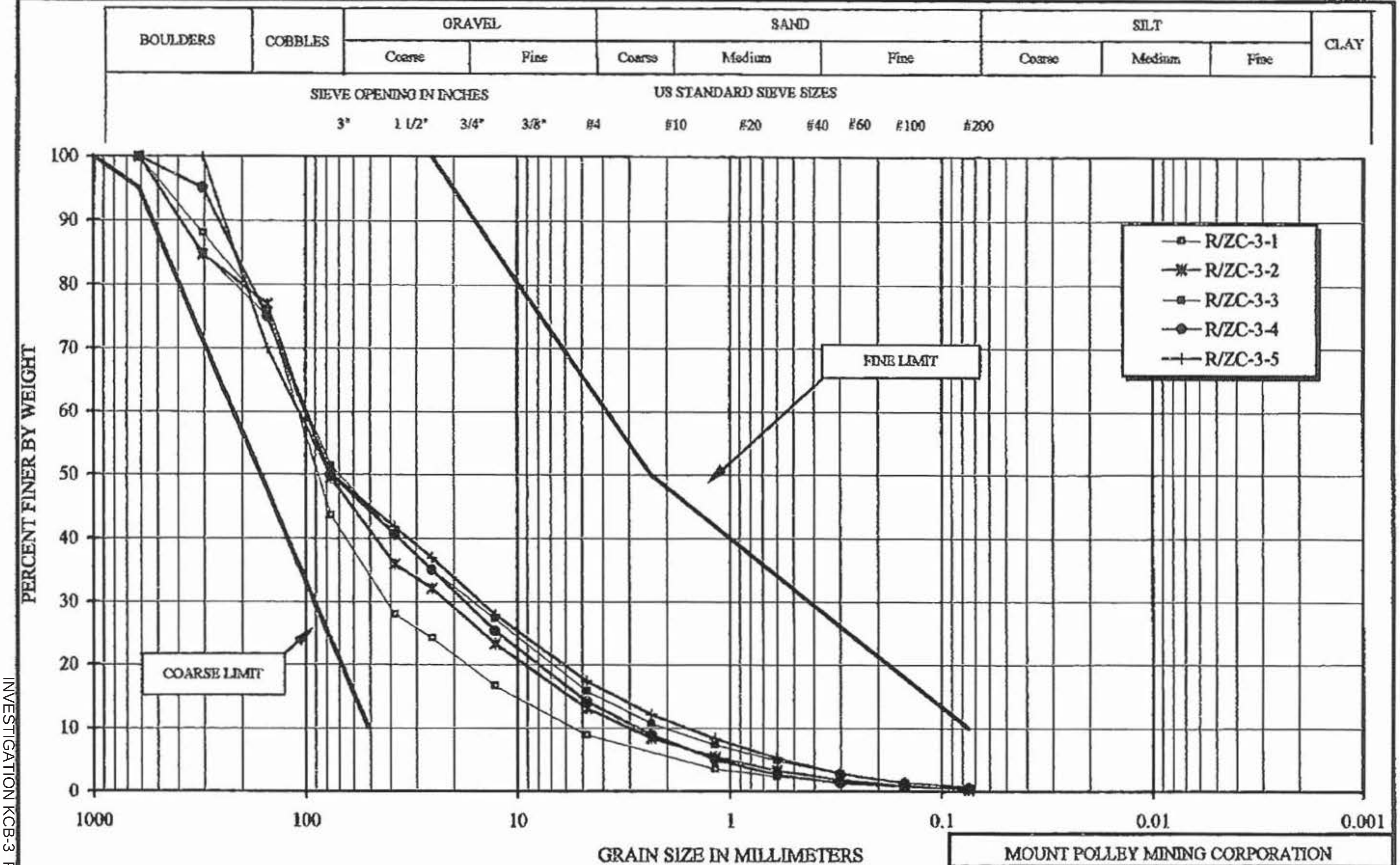
Date Sampled	Sample No.	Location	Chainage	Elevation	C3 (Particle Size Distribution)			
					Cobbles % > 3 inch	Gravel % 3 inch to #4	Sand % #4 to #200	Silt/Clay % < #200
19-Aug-00	R/ZF-3-1	Zone F Fill	26+10	935 m	0.0	48.2	48.7	3.1
20-Aug-00	R/ZF-3-2	Zone F Fill	17+10	935 m	0.0	50.0	45.8	4.2
21-Aug-00	R/ZF-3-3	Zone F Fill	20+00	933 m	0.0	53.4	43.6	3.0
23-Aug-00	R/ZF-3-4	Zone F Fill	20+05	935 m	0.0	46.3	50.4	3.3
24-Aug-00	R/ZF-3-5	Zone F Fill	25+50	935 m	0.0	57.9	39.0	3.1
26-Aug-00	R/ZF-3-6	Zone F Fill	19+00	935 m	0.0	52.2	44.1	3.7
26-Aug-00	R/ZF-3-7	Zone F Fill	21+60	935 m	0.0	53.6	45.7	0.7
27-Aug-00	R/ZF-3-8	Zone F Fill	22+00	935 m	0.0	58.0	39.6	2.4
28-Aug-00	R/ZF-3-9	Zone F Fill	24+50	937 m	0.0	54.5	41.7	3.8
29-Aug-00	R/ZF-3-10	Zone F Fill	23+40	936 m	0.0	61.7	35.6	2.7
30-Aug-00	R/ZF-3-11	Zone F Fill	21+80	937 m	0.0	51.3	45.1	3.6
6-Sep-00	R/ZF-3-12	Zone F Fill	16+20	940 m	0.0	61.0	36.9	2.1
7-Sep-00	R/ZF-3-13	Zone F Fill	21+30	940 m	0.0	62.1	35.5	2.3
8-Sep-00	R/ZF-3-14	Zone F Fill	16+40	939 m	0.0	56.8	41.0	2.1
8-Sep-00	R/ZF-3-15	Zone F Fill	17+50	937 m	0.0	60.3	37.4	2.3
8-Sep-00	R/ZF-3-16	Zone F Fill	18+50	937 m	0.0	68.5	29.1	2.4
9-Sep-00	R/ZF-3-17	Zone F Fill	21+40	937 m	0.0	53.4	43.1	3.4
9-Sep-00	R/ZF-3-18	Zone F Fill	22+20	937 m	0.0	54.7	42.9	2.4
10-Sep-00	R/ZF-3-19	Zone F Fill	25+50	938 m	0.0	55.4	40.9	3.7
10-Sep-00	R/ZF-3-20	Zone F Fill	22+80	937 m	0.0	56.4	41.4	2.2
12-Sep-00	R/ZF-3-21	Zone F Fill	22+00	939 m	0.0	48.5	49.1	2.4
14-Sep-00	R/ZF-3-22	Zone F Fill	19+00	939 m	0.0	46.3	50.4	3.3
14-Sep-00	R/ZF-3-23	Zone F Fill	17+50	939 m	0.0	50.3	46.9	2.8
19-Sep-00	R/ZF-3-24	Zone F Fill	26+20	941 m	0.0	51.7	46.1	2.1
20-Sep-00	R/ZF-3-25	Zone F Fill	20+60	941 m	0.0	45.8	52.5	1.7
21-Sep-00	R/ZF-3-26	Zone F Fill	21+20	941 m	0.0	55.9	39.3	4.8
23-Sep-00	R/ZF-3-27	Zone F Fill	18+80	941 m	0.0	56.5	41.1	2.3
				MEAN	0.0	54.5	42.7	2.8
				MEDIAN	0.0	54.5	42.9	2.7
				MAXIMUM	0.0	68.5	52.5	4.8
				MINIMUM	0.0	45.8	29.1	0.7

Notes:

1) C3 (Particle Size Distribution) - ASTM D422



MOUNT POLLEY MINING CORPORATION			
MOUNT POLLEY MINE			
STAGE 3 CONSTRUCTION ZONE T - RECORD SAMPLES GRADATION SUMMARY			
Knight Piésold CONSULTING	PROJECT NO. 11162/13	REF. NO.	REV. 0
	FIGURE 3.1		



MOUNT POLLEY MINING CORPORATION

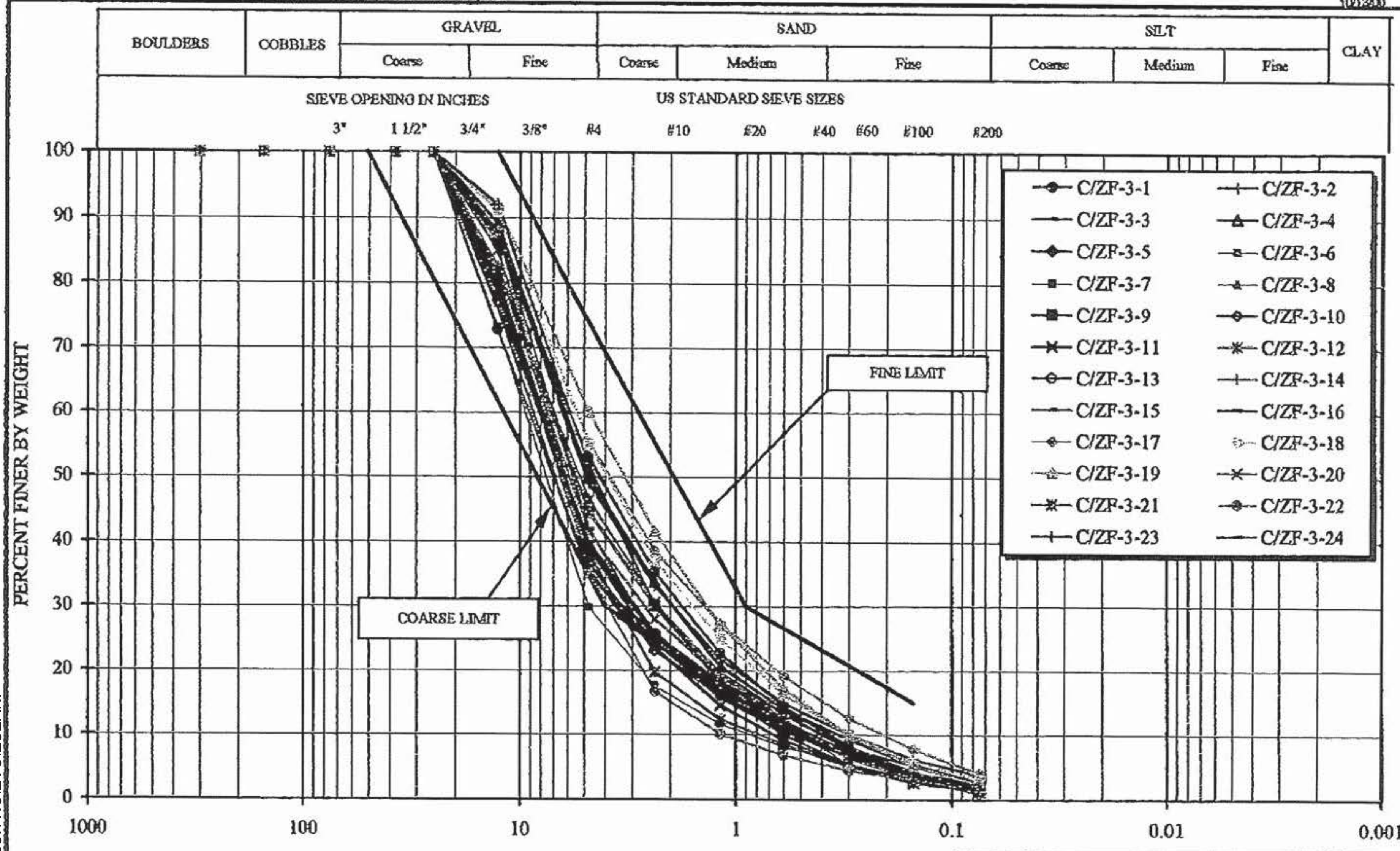
MOUNT POLLEY MINE

STAGE 3 CONSTRUCTION
ZONE C - RECORD SAMPLES
GRADATION SUMMARY

Knight Piésold CONSULTING

PROJECT NO.	REF. NO.	REV.
11162/13		0

FIGURE 3.2



MOUNT POLLEY MINING CORPORATION

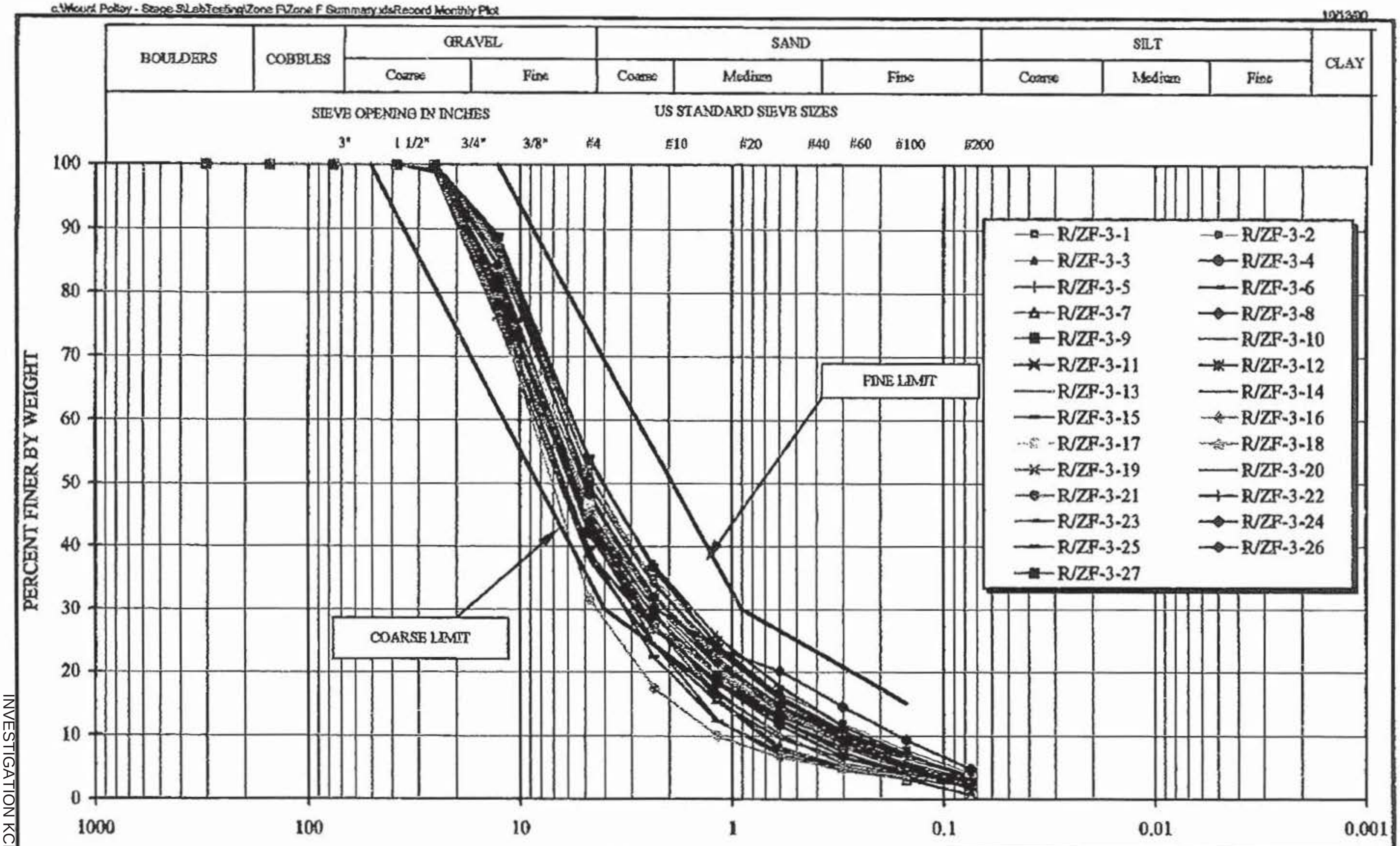
MOUNT POLLEY MINE

STAGE 3 CONSTRUCTION
ZONE F - CONTROL SAMPLES
GRADATION SUMMARY

Knight Piésold
CONSULTING

PROJECT NO.	REF. NO.	REV.
11162/13		0

FIGURE 3.3



MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

STAGE 3 CONSTRUCTION
ZONE F - RECORD SAMPLES
GRADATION SUMMARY

Knight Piésold CONSULTING

PROJECT NO.	REF. NO.	REV.
11162/13		0

FIGURE 3.4

KNIGHT PIESOLD
CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE A PIEZOMETERS

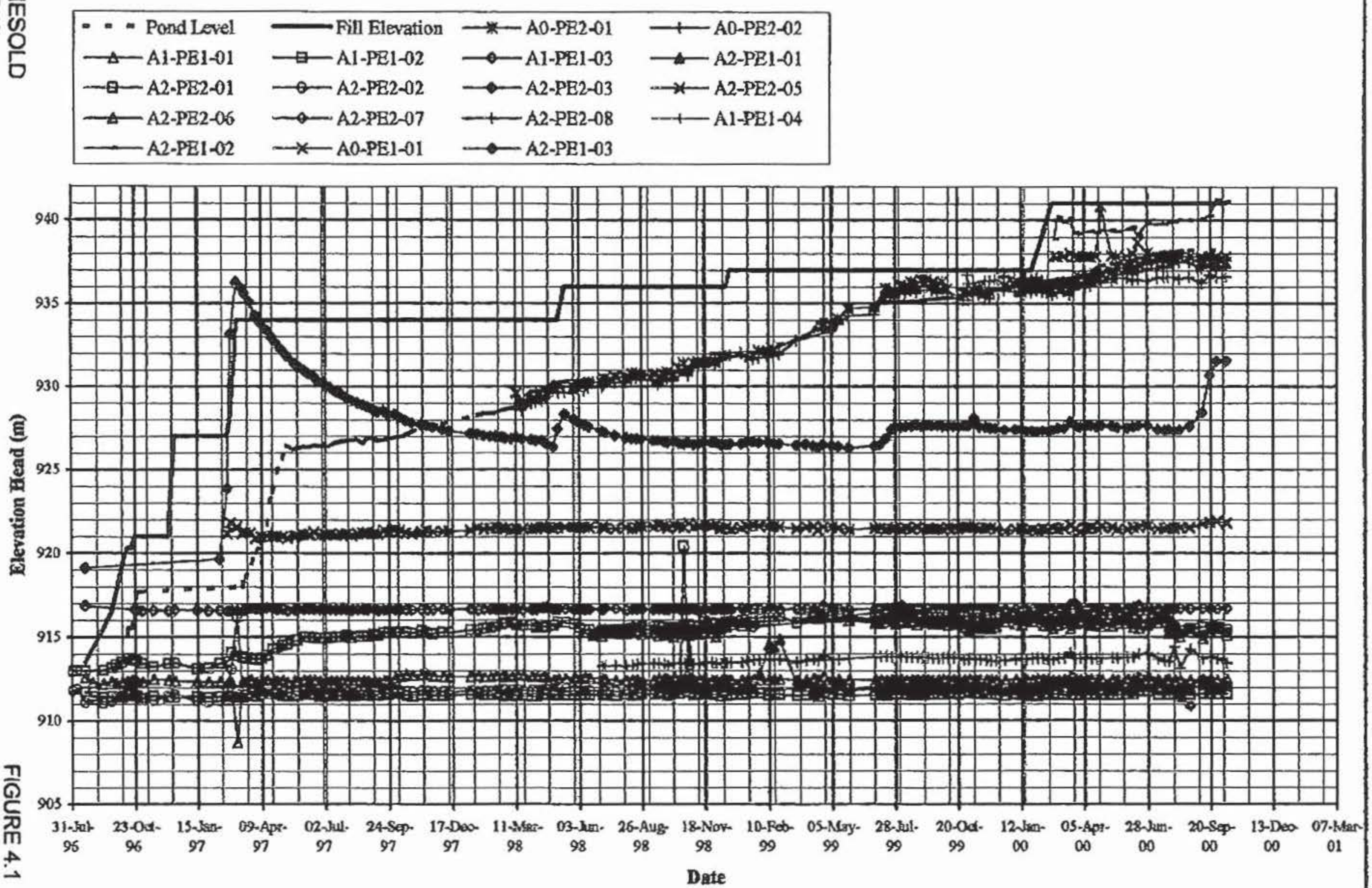


FIGURE 4.1

KNIGHT PIESOLD CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE B PIEZOMETERS

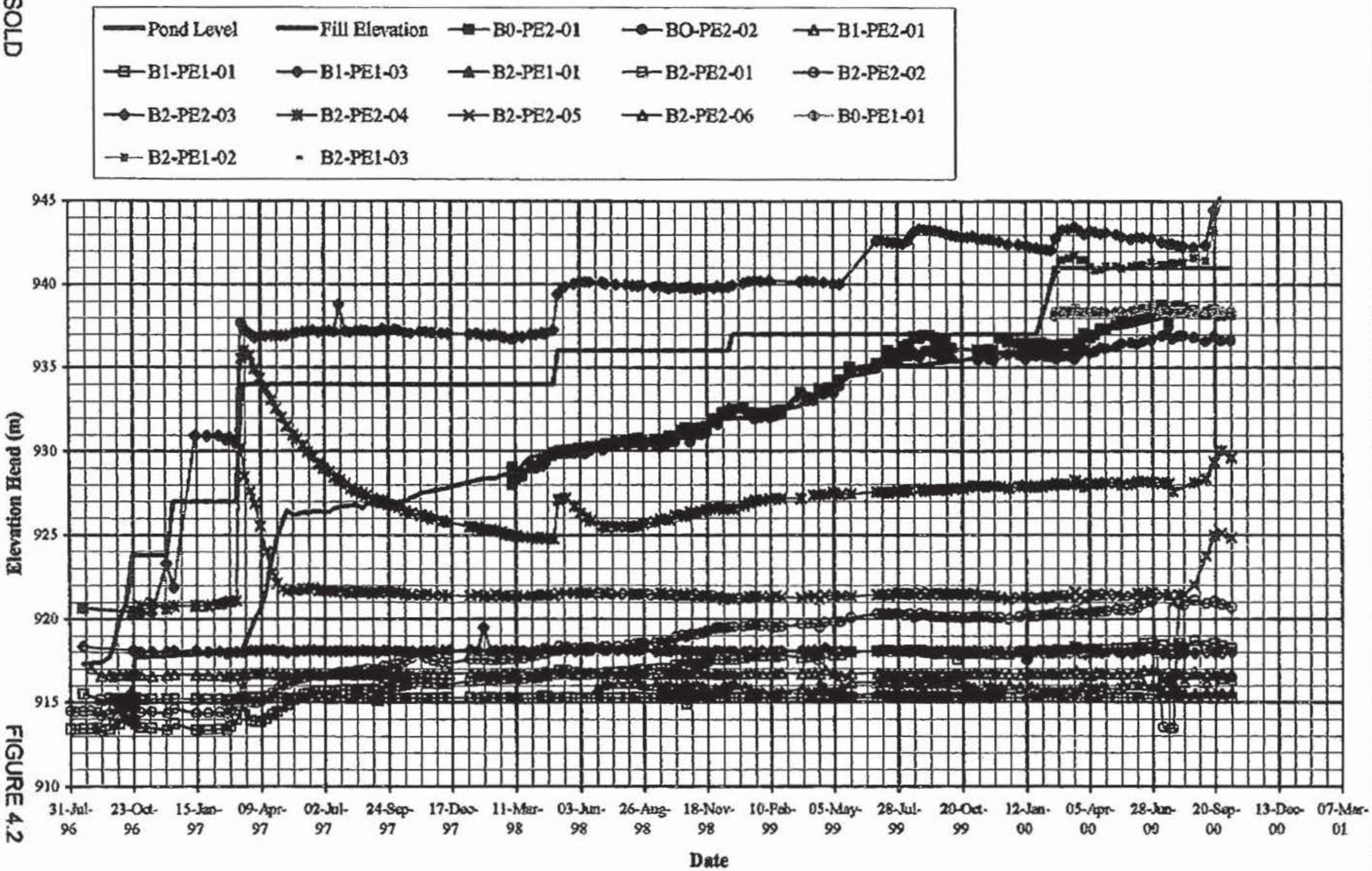


FIGURE 4.2

KNIGHT PIESOLD
CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE C PIEZOMETERS

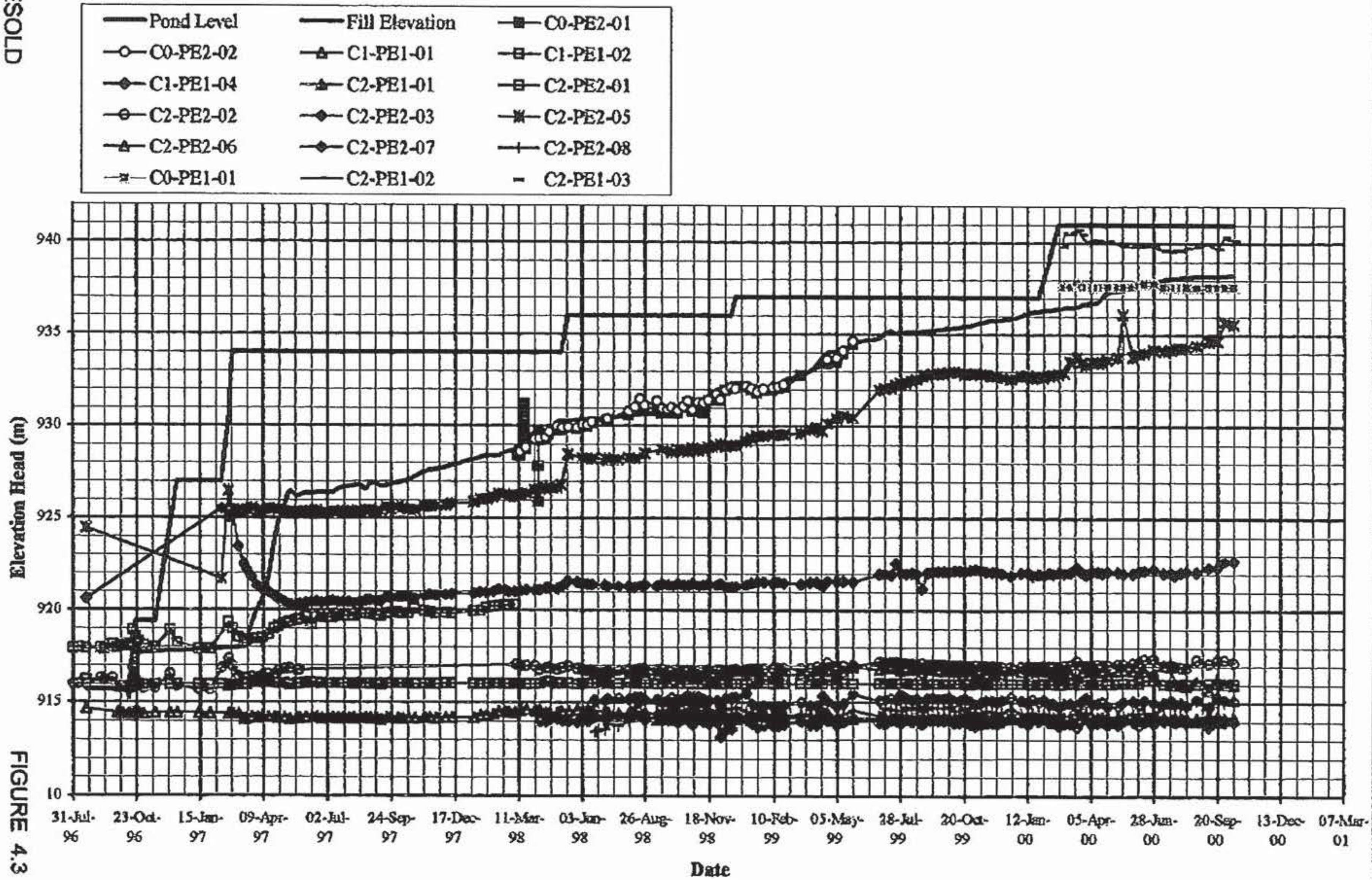


FIGURE 4.3

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE D PIEZOMETERS

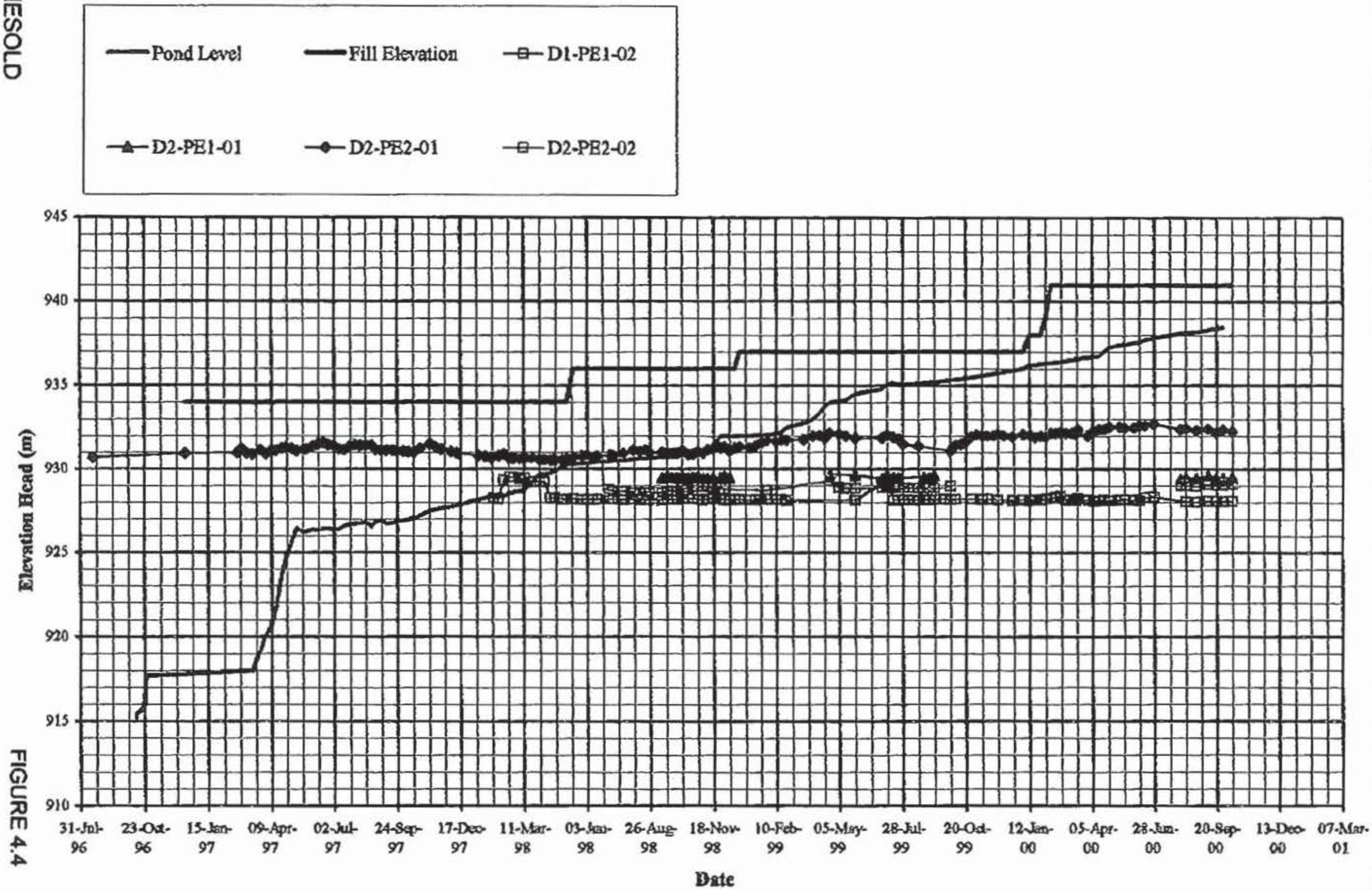


FIGURE 4.4

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE E PIEZOMETERS

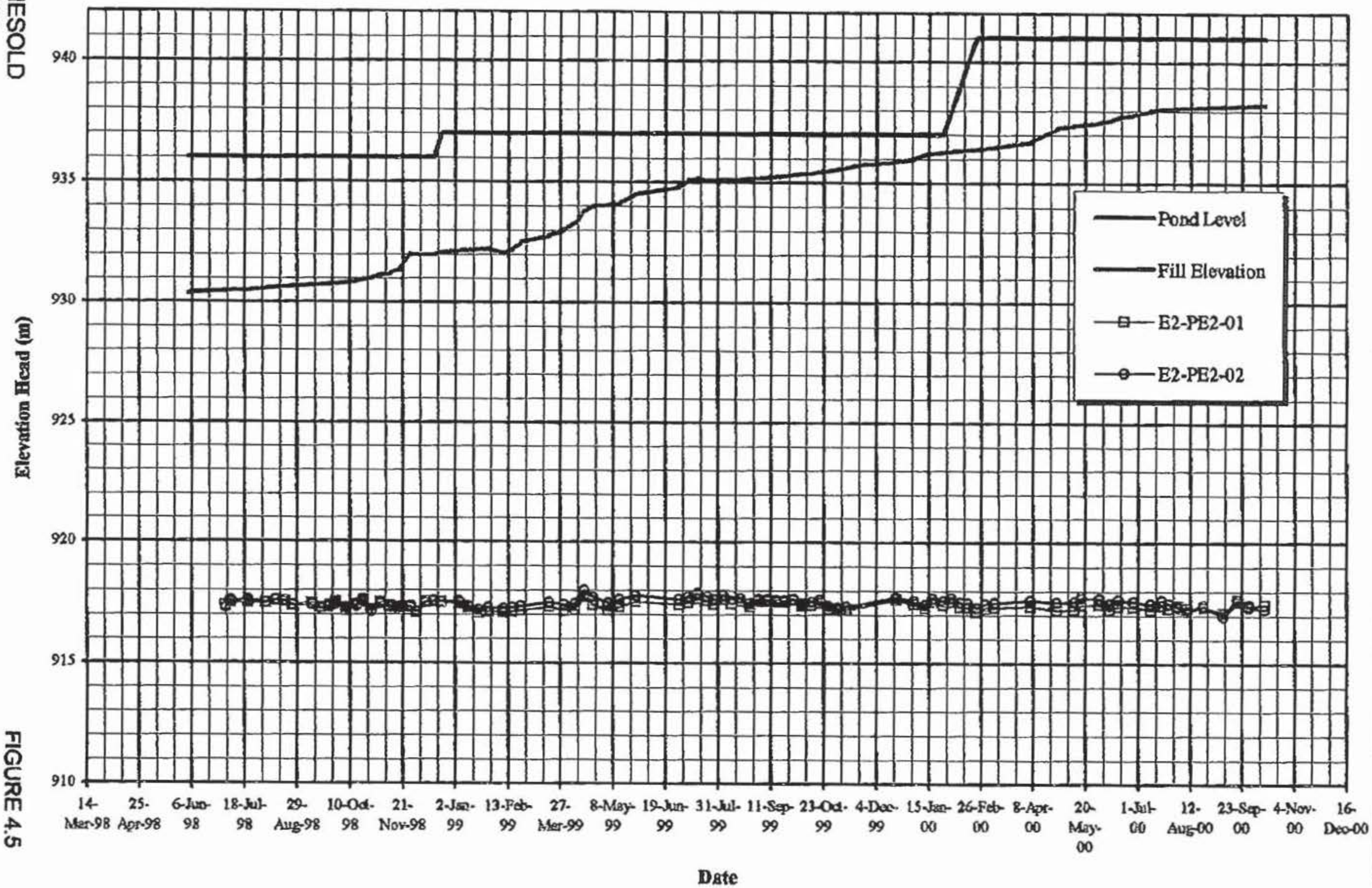
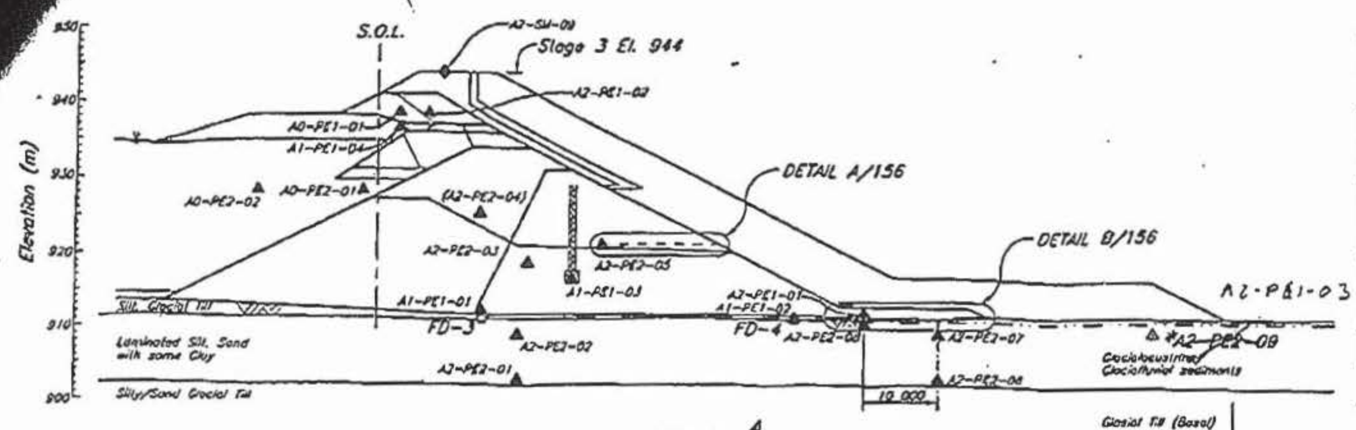
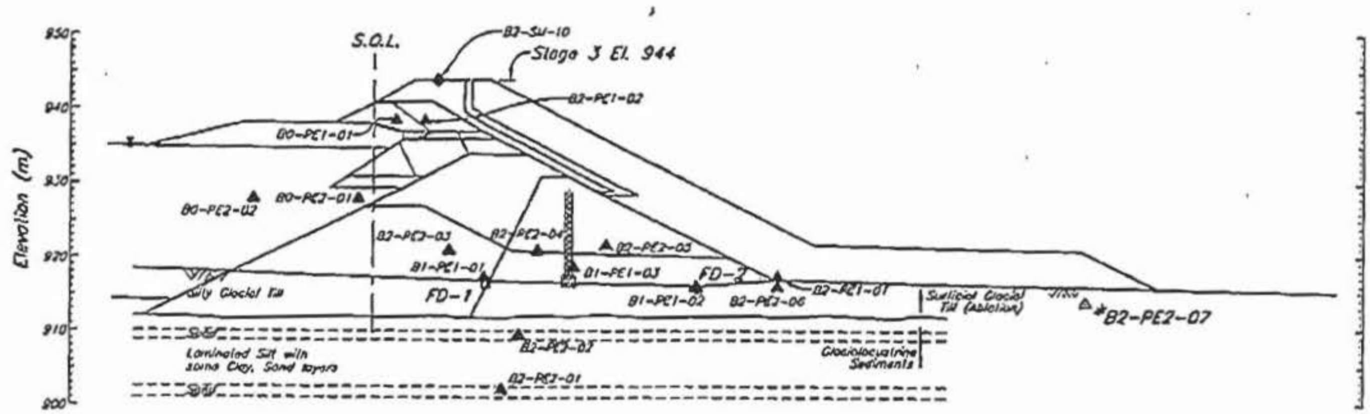


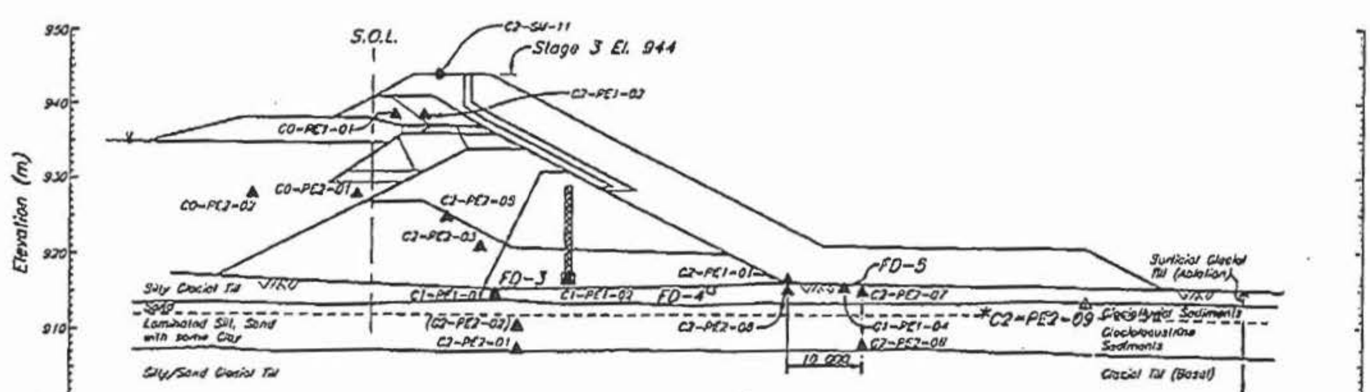
FIGURE 4.5



PLANE $\frac{A}{250}$
CH. 20+00



PLANE $\frac{B}{250}$
CH. 22+40

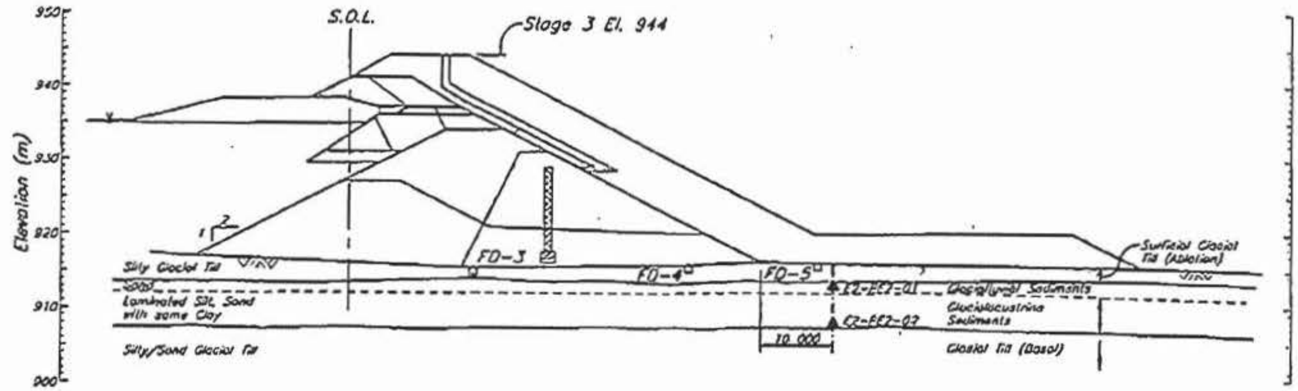


PLANE $\frac{C}{250}$
CH. 18+50

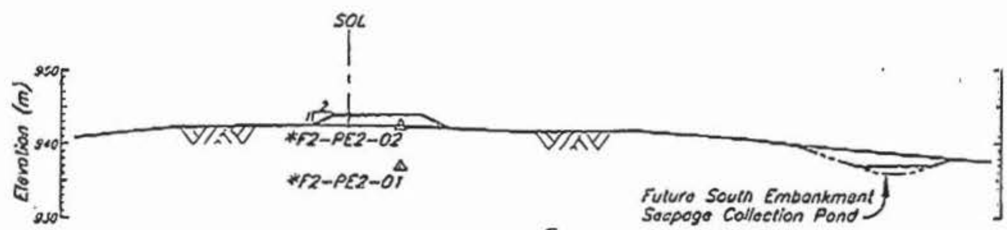
ISTRUMENTATION – SECTIONS 3 OF 3	
ISTRUMENTATION – SUMMARY OF INSTALLATION & TYP. DETAILS	
NSTRUMENTATION – PLAN	
DESCRIPTION	
DRAWINGS	

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

REV.	DATE	DESCRIPTION
0	2JUN'00	ISSUED FOR CONSTRUCTION
		REVISIONS



PLANE $\frac{E}{250}$
CH. 17+60



PLANE $\frac{F}{254}$
CH. 7+19

DWG. NO.	DESCRIPTION
258	TSF – STAGE 3 TAILINGS EMBANKMENT – INSTRUMENTATION SUMMARY OF INSTALLATION & TYPICAL DETAILS
254	TSF – STAGE 3 TAILINGS EMBANKMENT – SOUTH EMBANKMENT – INSTRUMENTATION PLAN
250	TSF – STAGE 3 TAILINGS EMBANKMENT – MAIN EMBANKMENT – INSTRUMENTATION PLAN
130	TSF – STAGE 3 SOUTH EMBANKMENT – PLAN AND SECTION
215	TSF – STAGE 3 MAIN EMBANKMENT – SECTIONS AND DETAILS

REFERENCE DRAWINGS

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D

REVISIONS

14-145-40/MTPO/01

Knight Piésold CONSULTING		**DATE:**	Sept. 21, 2000	**FILE NO.:**	11162/13.F01.F05
		TIME:		**REF NO.:**	00-036
Knight Piésold Ltd.	*Tel: +1 (604) 685-0543*	**OPERATOR:**		**PAGES:**	1 of 25
1400 - 750 West Pender St	*Fax: +1 (604) 685-0147*				
Vancouver, BC V6C 2T8	*Fax: +1 (604) 687-2203*				
CANADA	*www.knightpiesold.com*	**SENDER:**	s.22	**APPROVED:**	

TO:	KP Vancouver	**FAX:**	(604) 685-0147
ATTN:	Ken Brouwer / s.22		
cc:	George Headley, MEMND (250) 952-0481 Eric Leneve, Don Parsons, MPMC		
SUBJECT:	Mount Polley Stage 3 TSF Construction – Progress Report No. 5		

2/10/2000
→ G. Headley

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Form F-01

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY PROJECT

TAILINGS STORAGE FACILITY
STAGE 3 CONSTRUCTION

PROGRESS REPORT NO. 5 – September 1 to 16, 2000

SECTION 1.0 – GENERAL

Construction activities over the reporting period have steadily progressed towards completion of the Stage 3 contract for the Main Embankment. Major activities have included continued placement of Zone C, T and F fill zones, as well as the start of Zone S placement on the embankment crest.

As part of the Stage 3 raise at the Perimeter Embankment, MPMC has commenced cycloning operations along the upstream face of the embankment.

1.1 PERSONNEL

Mount Polley Mining Corporation (MPMC) management personnel overseeing the Stage 3 contract are as follows:

Eric Leneve, Tailings Coordinator
Don Parsons, Mine Superintendent

The following Knight Piesold Ltd. (KP) representatives were on site during the reporting period:

s.22 Site Engineer (dayshift)
s.22 Site Engineer (nightshift)

The following Tercon Contractors Ltd. (TCL) representatives were on site during the reporting period:

s.22 Site Superintendent
s.22 Dayshift Foreman

s.22 Nightshift Foreman

1.2 WEATHER

Weather conditions over the period have been variable, with mixed sun, clouds and rain. There were no weather related delays in the work.

1.3 DESIGN AND CONTRACT DEVELOPMENTS

1.3.1 Contract

Following their brief shutdown, TCL resumed full production (dayshift and nightshift operations) on September 7. Filter sand was placed on September 5 and 6 to allow for advancement of the Zone F fill ahead of the Zone T and C rockfill.

A contract meeting was held on September 15. Construction progress indicates that the contract for the Main Embankment will be complete by the end of September. In terms of total quantities, as shown on Table 2.1, the contract is currently about 92% complete.

1.3.2 Design

MPMC and KP have re-reviewed the scheduling requirements for construction of the Stage 3 raise. The updated water balance and filling schedule indicate that construction of the embankment crests to elevation 942 5 m will provide sufficient freeboard through the 2001 freshet. MPMC therefore plans to construct to 942.5 m this year, and to defer construction above this level until summer 2001.

The change in the construction scheduling does not affect the overall embankment design. Reasons for the change in the filling schedule include a lower than anticipated throughput over the past year, as well as a slightly higher tailings dry density.

MPMC and KP are currently working on finalizing the construction sequence for the Perimeter Embankment.

1.4 TAILINGS FACILITY OPERATION AND MAINTENANCE

MPMC commenced cycloning upstream along the Perimeter Embankment on September 10. Six separators set up on three stands are currently installed in the tailings line, and MPMC are working on setting up and installing the remaining units. Discharge from the separators has so far been discontinuous. MPMC is planning operational trials to optimize use of the separators.

MPMC is planning a mill shutdown and reclaim barge move for September 19. Repairs to the tailings line above the T2 dropbox will also be carried out at this time.

The Main Embankment Seepage Collection Pond was pumped down during the TCL shutdown. The recent rainfall has caused a rising pond level again, however. MPMC has extended the depths of the pumps at the facility to further lower the pond during pumping. The recycle pipeline will be reinstated and the pond pumped down again once construction of the Main Embankment is complete.

1.5 SAFETY

No safety incidents were reported for the period.

SECTION 2.0 – CONSTRUCTION ACTIVITIES

2.1 EQUIPMENT

TCL is maintaining the following equipment on site:

- Excavators – 1 Hitachi EX1100, 1 Cat 375, 1 Cat 322B
- Haul trucks - 5 Cat 773's (1 rental)
- Dozers – 1 Cat D8R, 1 Cat D8N (rental), 1 Cat D6D
- Graders – 1 Cat 16G
- Compactors – 1 Cat CS583, 1 Cat CS563 (rental), 1 Cat 825G
- Water truck, service trucks, fuel trucks, forklift

The Cat 825G compactor was brought to site in preparation for placement of Zone S glacial till.

2.2 ACTIVITIES

The major construction activities for the reporting period are summarized below. Dayshift and nightshift crews have been in operation. A summary of the contract quantities completed over this period and to date is provided on Table 2.1.

Main Embankment (TCL)

The Zones F, T and C fill are being raised up the embankment face to the level at which the zones extend vertically upwards (above approx. El. 939m). Construction above this level has typically proceeded as follows:

- The downstream portion of the existing 2C embankment is cut down and out over the Zone F and Zone T (wide enough for the haul trucks) and compacted in two lifts. Glacial till is then placed to raise the Zone S back up to 941 m.
- The downstream slope of the glacial till is cut vertically using a dozer back to where the upstream edge of the Zone F fill will be located (11.5 m offset from the S.O.L.). The till is incorporated into the Zone C rockfill.
- Zone T and C rockfill is placed adjacent to the glacial till.

The Zone rockfill along the west half of the embankment has been raised to El. 940.5 m. Along the east half it is currently between 936 to 939 m. Construction of the vertical Zone F drain will start once the rockfill is raised to 941 m. The drain will be constructed by excavating down through the placed Zone S and Zone T fills to the top of the sloping portion of the drain, then by placing and compacting filter sand in the trench up to grade.

Placement of the Zone S glacial till began on September 15. The material is being excavated from the northwest portion of Borrow Area No. 2. The till from this area is slightly wet, however, and TCL's equipment is having difficulty travelling over the placed material. Test pits excavated in the southeast portion of the borrow indicate drier material, and TCL is planning to construct a haul road into this area.

South Embankment (TCL)

- No work was completed in this area over the reporting period.

Perimeter Embankment (MPMC)

- As noted previously, MPMC is currently cycloning upstream along the Perimeter Embankment. The cyclones are being moved periodically to discharge to new locations.

Rock Borrow

- TCL is carrying out ongoing drilling and blasting in the borrow.

Miscellaneous

- MPMC has received the results of the analyses on the water sample obtained from the bedrock seepage at the toe of the Main Embankment right abutment (Ch. 15+86). The results differ markedly from the supernatant pond water, and indicate that the seepage is not directly related to water from the pond. Natural seepage from the bedrock is commonly encountered in this area.

SECTION 3.0 – KNIGHT PIESOLD ACTIVITIES

3.1 GENERAL

KP site activities over the reporting period have included the following:

- Inspection and documentation of construction activities.
- QA/QC collection and testing of Zone F control samples, and Zone F, T and C record samples.
- Density testing of Zone S fill.
- Test pits and sample collection in borrow areas.
- Extension of piezometer leads through Stage 3 fill zones.
- Ongoing discussions and correspondence with MPMC and KP Vancouver.
- Preparation of daily inspection reports and bi-weekly Progress Reports.
- Collection and review of embankment monitoring data.

3.2 LABORATORY TESTING

The following samples were collected and tested over the reporting period:

- Zone T record samples R/ZT-3-7 to 9
- Zone F control samples C/ZF-3-9 to 19
- Zone F record samples R/ZF-10 to 23
- Glacial till moisture content samples from Borrow Area No. 2

The results of the testing are provided on the summary Tables 3.1 to 3.4 and gradation plots Figures 3.1 to 3.4.

The results show that the Zone T samples meet the specifications for particle size distribution.

The results for the Zone F record tests show that samples R/ZF-3-14 to 16 fell below the coarse limit of the specified gradation envelope by a maximum of about 6%. This was a result of a filter sand crush completed by MPMC on September 5, where more competent waste rock was incorporated in the crush. However, other control and record samples taken from this material fell within the envelope. The material was also typically included in only one of the two Zone F lifts along the sloping portion of the drain. MPMC has included a blend of more weathered material in subsequent filter sand crush operations, which has resulted in a finer product which falls closer to the centre of the gradation envelope.

SECTION 4.0 – EMBANKMENT MONITORING

Monitoring of tailings embankment instrumentation over the reporting period indicates that the embankment is performing well within design tolerances.

Groundwater monitoring wells GW00-1 to 3, installed between August 28 and September 1, were developed by Aqua Installations Inc. of Williams Lake. MPMC will obtain baseline water quality data from the wells and incorporate them into the groundwater monitoring program.

4.1 VIBRATING WIRE PIEZOMETERS

No new piezometers were installed over the reporting period. Piezometer leads have been extended as necessary through the advancing Stage 3 fills.

The most recent piezometer readings were obtained on September 8. The results of the monitoring are shown on Figures 4.1 to 4.5, and are summarized below. Locations of the piezometers are shown on the attached drawings.

Foundation Piezometers

Most of the Main Embankment foundation piezometers have shown slight decreases in pore water pressure following completion of the downstream buttress.

- Plane A: Largest decrease of 0.54 m at A2-PE2-08 (Below Zone C rockfill). A2-PE2-02 registered an increase of 0.23 m.
- Plane B: Largest decrease of 0.62 m at B2-PE2-06 (Below Zone C rockfill). All other piezometers show decreases of less than 0.5 m.
- Plane C: Largest decrease of 0.48 m at C2-PE2-06 (Below Zone C rockfill). All other piezometers show decreases of less than 0.4 m, except for C2-PE1-03, which registered an increase of 0.11 m.
- Plane E: Largest decrease of 0.44 m at E2-PE2-02.

No changes were noted in the Perimeter Embankment (Plane D) foundation piezometers.

Fill Piezometers

Fill piezometers generally remained static or showed slight increases (less than 0.3 m) in the glacial till. The exception was an increase of 1.73 m at B2-PE2-05 (in glacial till below the Stage 3 rockfill).

Drain Piezometers

All drain piezometers have remained static and at a very low head indicating that the drains are free-draining and functioning as designed.

Tailings Piezometers

Water levels at the tailings piezometers continue to mimic the pond level.

4.2 DRAIN FLOWS

Drain outlets in the Main Embankment Seepage Collection Pond drain sump have been submerged due to the rising water level in the pond. Monitoring of the flows will resume once MPMC pumps down the pond following completion of the Main Embankment.

SECTION 5.0 – ONGOING ITEMS

The following items will be addressed during upcoming reporting periods:

- MPMC is planning trials with the Linatex separators to optimize cycloning operations along the Perimeter Embankment.
- MPMC and KP are continuing to review the requirements and scheduling for construction of the Perimeter Embankment.
- MPMC is planning for removal of the Polley Lake Pipeline from within the Perimeter Embankment crest (at El. 940 m) as part of the Stage 3 work.

Submitted by:

s.22

Knight Piesold Ltd.

Distribution: Eric Leneve, Don Parsons – MPMC
George Headley – MEMND
Ken Brouwer – KP Vancouver

TABLE 2.1

MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
STAGE 3 CONSTRUCTION

SUMMARY OF CONTRACT QUANTITIES - To September 16, 2000

C:\Mt. Polley - Stage 3\Progress Reports\[Table 2.1 - Quantities.xls]Sheet1 17-Sep-00

Material / Item	Quantity Over Reporting Period		Quantity to Date		Contract Quantity		Percent Complete (%)
Removal of Topsoil /Unsuitable Foundation Material	0	m^3	46,528	m^3	49,500	m^3	100.0
Removal of Unsuitable from Embankment Slopes	14,820	m^3	20,020	m^3	11,000	m^3	100.0
Supply and Place Zone T and C	85,990	m^3	372,846	m^3	388,000	m^3	96.1
Supply and Place Zone F	8,000	m^3	21,500	m^3	24,500	m^3	87.8
Supply and Place Zone S	4,000	m^3	4,000	m^3	26,200	m^3	15.3
Totals			458,846	m^3	499,200	m^3	91.9

Notes:
1. Volumes are based on both survey information and load counts.
2. Volumes for Zone F are assumed based on an estimated placement rate of 1,000 m^3 per shift.
3. Volumes for contract quantities are for both the Main and South Embankments.
4. Volumes for contract quantities have been revised based on a crest elevation of 942.5 m.

TABLE 3.1

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE T RECORD TESTS - SUMMARY SHEET

#N/A Date Printed 17-Sep-00

Date Sampled	Sample No.	Location	C3 (Particle Size Distribution) Cobbles % > 3 inch	Gravel % 3 inch to #4	Sand % #4 to #200	Silt/Clay % < #200
3-Jun-00	R/ZT-3-1	Zone T Fill	20.0	61.5	15.7	2.8
16-Jul-00	R/ZT-3-2	Zone T Fill	20.0	58.7	16.2	5.1
25-Jul-00	R/ZT-3-3	Zone T Fill	13.9	66.1	18.4	1.6
27-Jul-00	R/ZT-3-4	Zone T Fill	22.0	65.0	12.5	0.5
22-Aug-00	R/ZT-3-5	Zone T Fill , Chainage: 23+00, Elevation: 929 m	37.2	36.1	24.9	1.8
20-Aug-00	R/ZT-3-6	Zone T Fill, Chainage: 19+50, Elevation: 929 m	34.5	40.0	24.0	1.5
29-Aug-00	R/ZT-3-7	Zone T Fill, Chainage: 20+00, Elevation: 932 m	5.0	57.2	36.0	1.8
9-Sep-00	R/ZT-3-8	Zone T Fill, Chainage : 18+00, Elevation: 936 m	20.0	59.7	18.3	2.0
12-Sep-00	R/ZT-3-9	Zone T Fill, Chainage: 26+00, Elevation: 940 m	10.0	62.7	25.5	1.8
		MEAN	20.3	56.3	21.3	2.1
		MEDIAN	20.0	59.7	18.4	1.8
		MAXIMUM	37.2	66.1	36.0	5.1
		MINIMUM	5.0	36.1	12.5	0.5

Notes:
1) C3 (Particle Size Distribution) - ASTM D422

TABLE 3.2

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE C RECORD TESTS - SUMMARY SHEET

C:\Mt. Polley - Stage 3\Lab Testing\Zone C\[Zone C Summary.xls]Record Summary Date Printed 17-Sep-00

Date Sampled	Sample No.	Location	C3 (Particle Size Distribution)			
			Cobbles % > 3 inch	Gravel % 3 inch to #4	Sand % #4 to #200	Silt/Clay % < #200
2-Aug-00	R/ZC-3-1	Zone C Fill	56.4	34.7	8.4	0.5
21-Aug-00	R/ZC-3-2	Zone C Fill, Chainage: 22+55, Elevation 928.3	50.6	36.3	12.8	0.3
24-Aug-00	R/ZC-3-3	Zone C Fill, Chainage: 22+40, Elevation 929m	48.6	35.5	15.3	0.5
		MEAN	51.9	35.5	12.2	0.4
		MEDIAN	50.6	35.5	12.8	0.5
		MAXIMUM	56.4	36.3	15.3	0.5
		MINIMUM	48.6	34.7	8.4	0.3

Notes:
1) C3 (Particle Size Distribution) - ASTM D422

TABLE 3.3

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE F CONTROL TESTS - SUMMARY SHEET

C:\Mt. Polley - Stage 3\Lab Testing\Zone F\[Zone F Summary.xls]Record Summary — Date Printed 17-Sep-00

Date Sampled	Sample No.	Location	C3 (Particle Size Distribution) Cobbles % > 3 inch	Gravel % 3 inch to #4	Sand % #4 to #200	Silt/Clay % < #200
17-Jul-00	C/ZF-3-1	Conveyor	0.0	64.2	32.9	2.9
19-Jul-00	C/ZF-3-2	Stockpile	0.0	50.9	45.4	3.7
19-Jul-00	C/ZF-3-3	Conveyor	0.0	61.4	36.2	2.4
20-Jul-00	C/ZF-3-4	Stockpile	0.0	49.9	47.0	3.1
1-Aug-00	C/ZF-3-5	Stockpile	0.0	61.0	38.0	1.0
25-Aug-00	C/ZF-3-6	Conveyor	0.0	60.5	38.0	1.5
25-Aug-00	C/ZF-3-7	Stockpile	0.0	70.2	27.7	2.1
25-Aug-00	C/ZF-3-8	Stockpile	0.0	46.7	51.0	2.3
6-Sep-00	C/ZF-3-9	Stockpile	0.0	55.4	42.8	1.8
6-Sep-00	C/ZF-3-10	Stockpile	0.0	63.4	35.5	1.1
8-Sep-00	C/ZF-3-11	Stockpile	0.0	60.7	37.9	1.3
9-Sep-00	C/ZF-3-12	Stockpile	0.0	53.5	45.3	1.2
9-Sep-00	C/ZF-3-13	Stockpile	0.0	47.1	51.2	1.7
9-Sep-00	C/ZF-3-14	Stockpile	0.0	55.5	43.4	1.1
12-Sep-00	C/ZF-3-15	Stockpile	0.0	65.5	31.9	2.6
12-Sep-00	C/ZF-3-16	Stockpile	0.0	60.1	38.3	1.6
13-Sep-00	C/ZF-3-17	Stockpile	0.0	44.7	51.2	4.0
13-Sep-00	C/ZF-3-18	Stockpile	0.0	45.0	51.9	3.0
14-Sep-00	C/ZF-3-19	Stockpile	0.0	39.9	57.8	2.2
		MEAN	0.0	55.6	42.3	2.2
		MEDIAN	0.0	55.5	42.8	2.1
		MAXIMUM	0.0	70.2	57.8	4.0
		MINIMUM	0.0	39.9	27.7	1.0

Notes:
1) C3 (Particle Size Distribution) - ASTM D422

TABLE 3.4

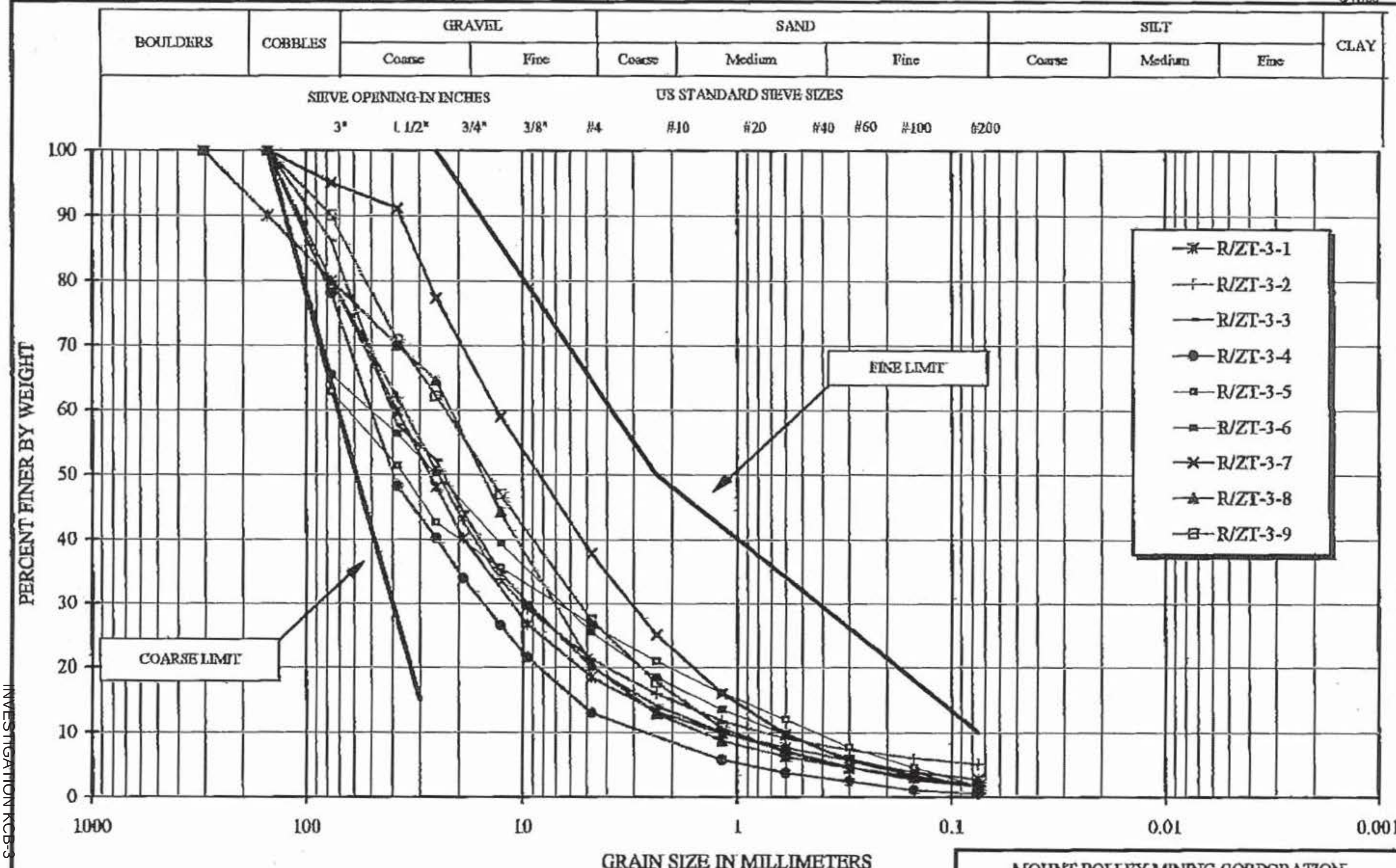
MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE F RECORD TESTS - SUMMARY SHEET

C:\Mt. Polley - Stage 3\Lab Testing\Zone F\[Zone F Summary.xls]Record Summary — Date Printed 17-Sep-00

Date Sampled	Sample No.	Location	Chainage	Elevation	C3 (Particle Size Distribution)			
					Cobbles % > 3 inch	Gravel % 3 inch to #4	Sand % #4 to #200	Silt/Clay % < #200
19-Aug-00	R/ZF-3-1	Zone F Fill	26+10	935 m	0.0	48.2	48.7	3.1
20-Aug-00	R/ZF-3-2	Zone F Fill	17+10	935 m	0.0	50.0	45.8	4.2
21-Aug-00	R/ZF-3-3	Zone F Fill	20+00	933 m	0.0	53.4	43.6	3.0
23-Aug-00	R/ZF-3-4	Zone F Fill	20+05	935 m	0.0	46.3	50.4	3.3
24-Aug-00	R/ZF-3-5	Zone F Fill	25+50	935 m	0.0	57.9	39.0	3.1
26-Aug-00	R/ZF-3-6	Zone F Fill	19+00	935 m	0.0	52.2	44.1	3.7
26-Aug-00	R/ZF-3-7	Zone F Fill	21+60	935 m	0.0	53.6	45.7	0.7
27-Aug-00	R/ZF-3-8	Zone F Fill	22+00	935 m	0.0	58.0	39.6	2.4
28-Aug-00	R/ZF-3-9	Zone F Fill	24+50	937 m	0.0	54.5	41.7	3.8
29-Aug-00	R/ZF-3-10	Zone F Fill	23+40	936 m	0.0	61.7	35.6	2.7
30-Aug-00	R/ZF-3-11	Zone F Fill	21+80	937 m	0.0	51.3	45.1	3.6
6-Sep-00	R/ZF-3-12	Zone F Fill	16+20	940 m	0.0	61.0	36.9	2.1
7-Sep-00	R/ZF-3-13	Zone F Fill	21+30	940 m	0.0	62 1	35.5	2.3
8-Sep-00	R/ZF-3-14	Zone F Fill	16+40	939 m	0.0	56.8	41.0	2.1
8-Sep-00	R/ZF-3-15	Zone F Fill	17+50	937 m	0.0	60.3	37.4	2.3
8-Sep-00	R/ZF-3-16	Zone F Fill	18+50	937 m	0.0	68.5	29.1	2.4
9-Sep-00	R/ZF-3-17	Zone F Fill	21+40	937 m	0.0	53.4	43.1	3.4
9-Sep-00	R/ZF-3-18	Zone F Fill	22+20	937 m	0.0	54.7	42.9	2.4
10-Sep-00	R/ZF-3-19	Zone F Fill	25+50	938 m	0.0	55.4	40.9	3.7
10-Sep-00	R/ZF-3-20	Zone F Fill	22+80	937 m	0.0	56.4	41.4	2.2
12-Sep-00	R/ZF-3-21	Zone F Fill	22+00	939 m	0.0	48.5	49.1	2.4
14-Sep-00	R/ZF-3-22	Zone F Fill	19+00	939 m	0.0	46.3	50.4	3.3
14-Sep-00	R/ZF-3-23	Zone F Fill	17+50	939 m	0.0	50.3	46.9	2.8
				MEAN	0.0	54.8	42 3	2.8
				MEDIAN	0.0	54.5	42.9	2.8
				MAXIMUM	0.0	68.5	50.4	4.2
				MINIMUM	0.0	46.3	29.1	0.7

Notes:
1) C3 (Particle Size Distribution) - ASTM D422



MOUNT POLLEY MINING CORPORATION

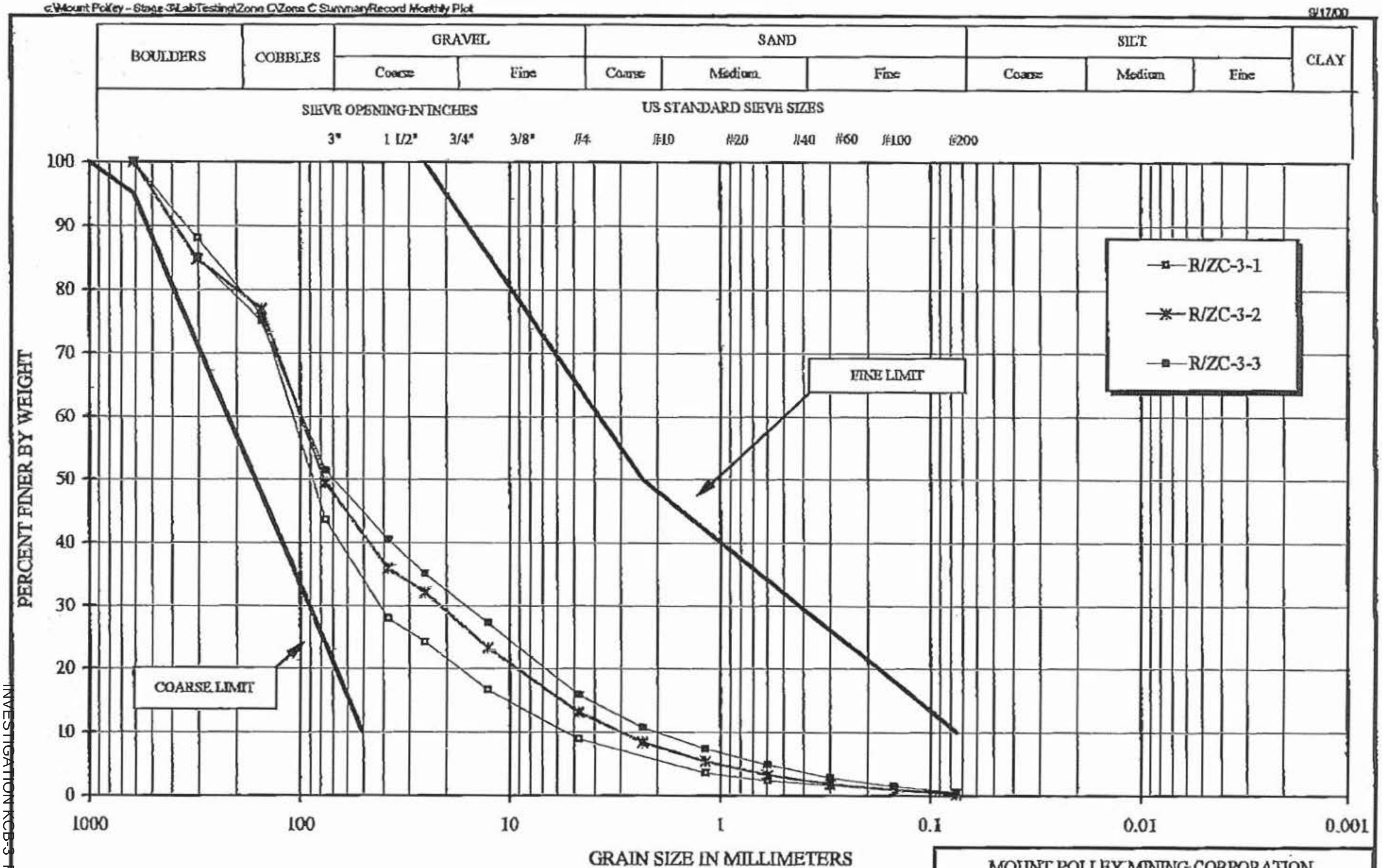
MOUNT POLLEY MINE

STAGE 3 CONSTRUCTION
ZONE T - RECORD SAMPLES
GRADATION SUMMARY

Knight Piésold
CONSULTING

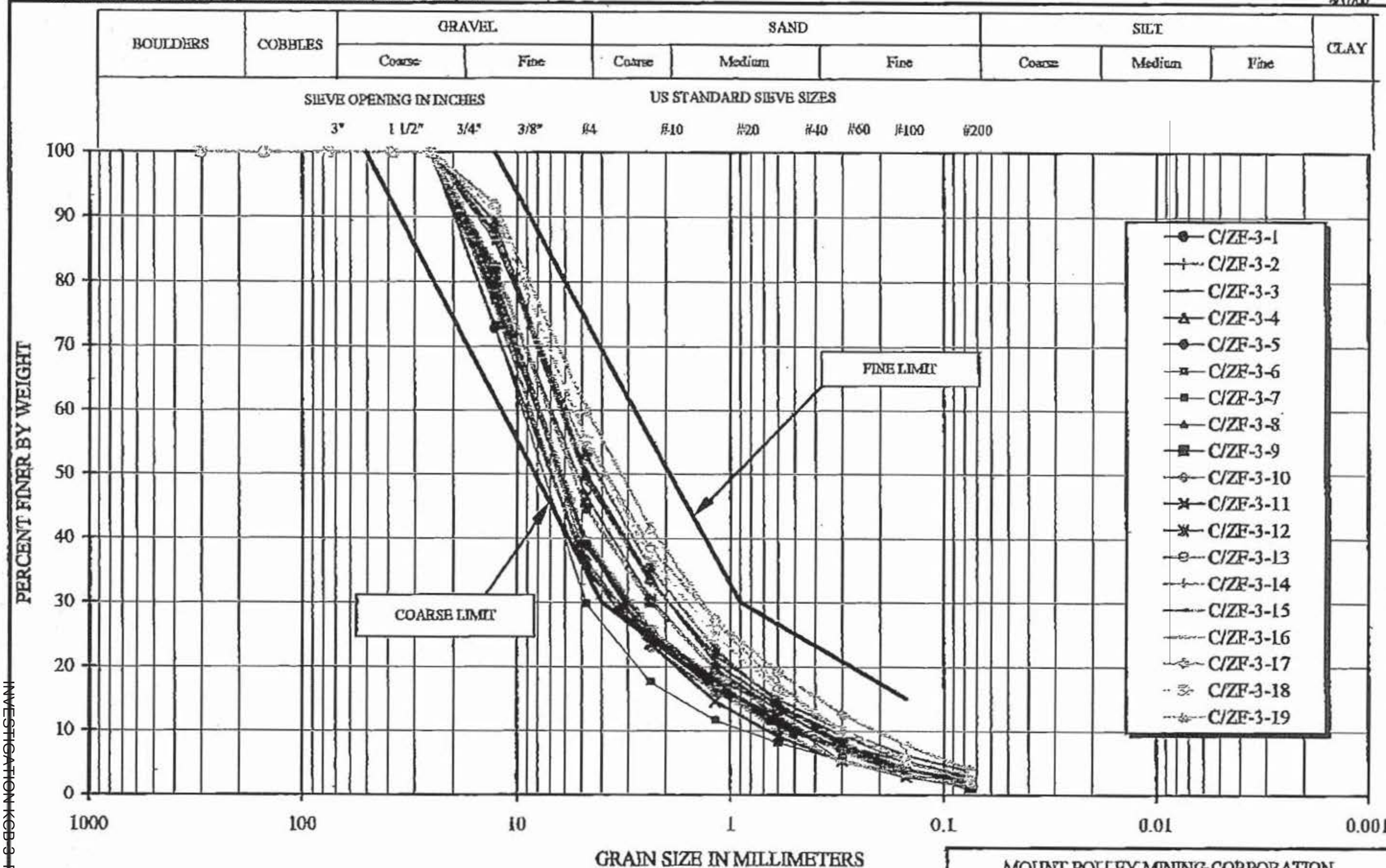
PROJECT NO.	REF. NO.	REV.
11162/13		0

FIGURE 3.1



MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
STAGE 3 CONSTRUCTION ZONE C - RECORD SAMPLES GRADATION SUMMARY

	PROJECT NO.	REF. NO.	REV.
Knight Piésold CONSULTING	11162/13		0
	FIGURE 3.2		



MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

STAGE 3 CONSTRUCTION
ZONE F - CONTROL SAMPLES
GRADATION SUMMARY

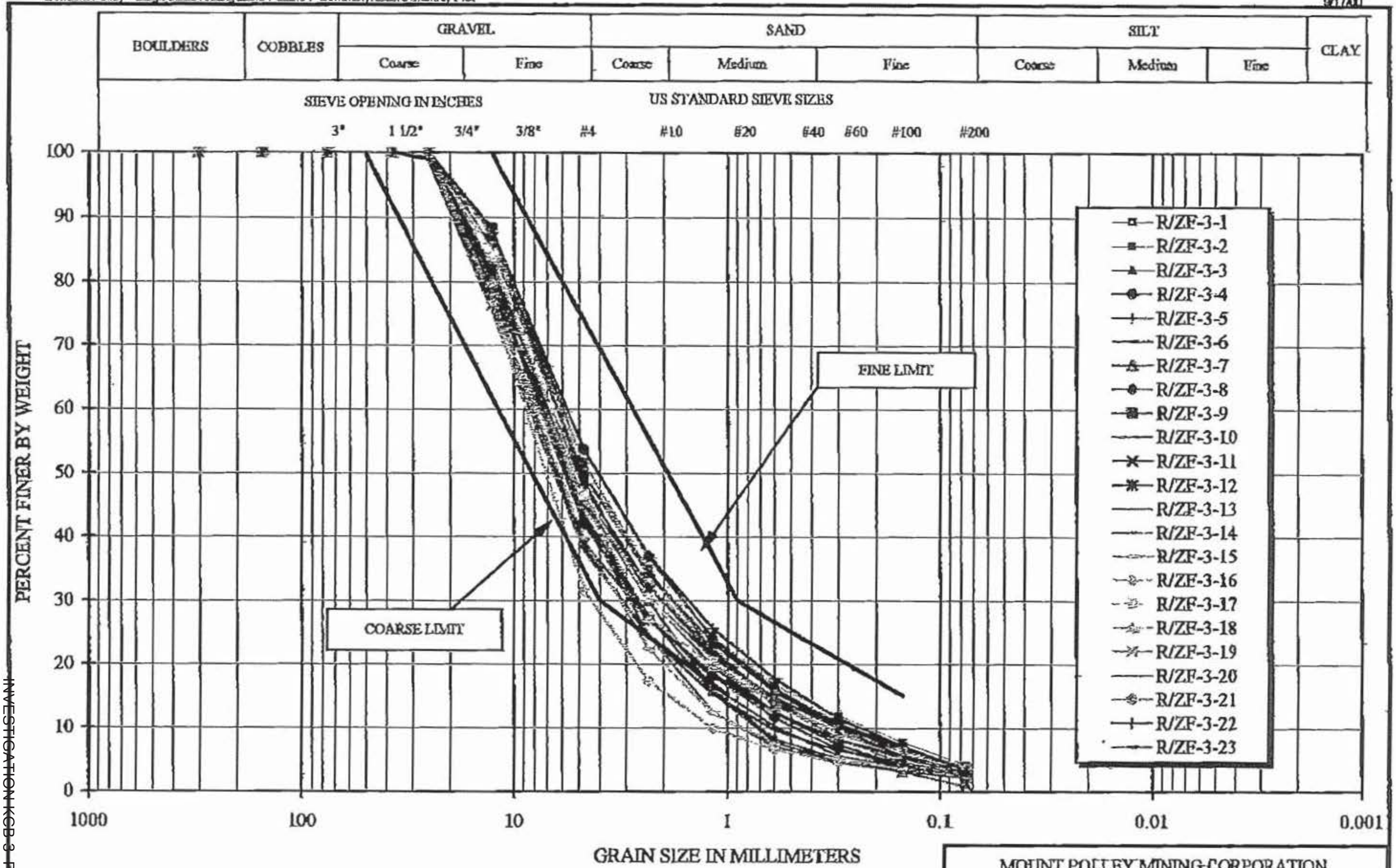
Knight Piésold CONSULTING

PROJECT NO.	REF. NO.	REV.
11162/13		0

FIGURE 3.3

c:\Mount Polley - Stage 3\LabTesting\Zone F\Zone F-SummaryRecord Monthly Plot

9/17/00



MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

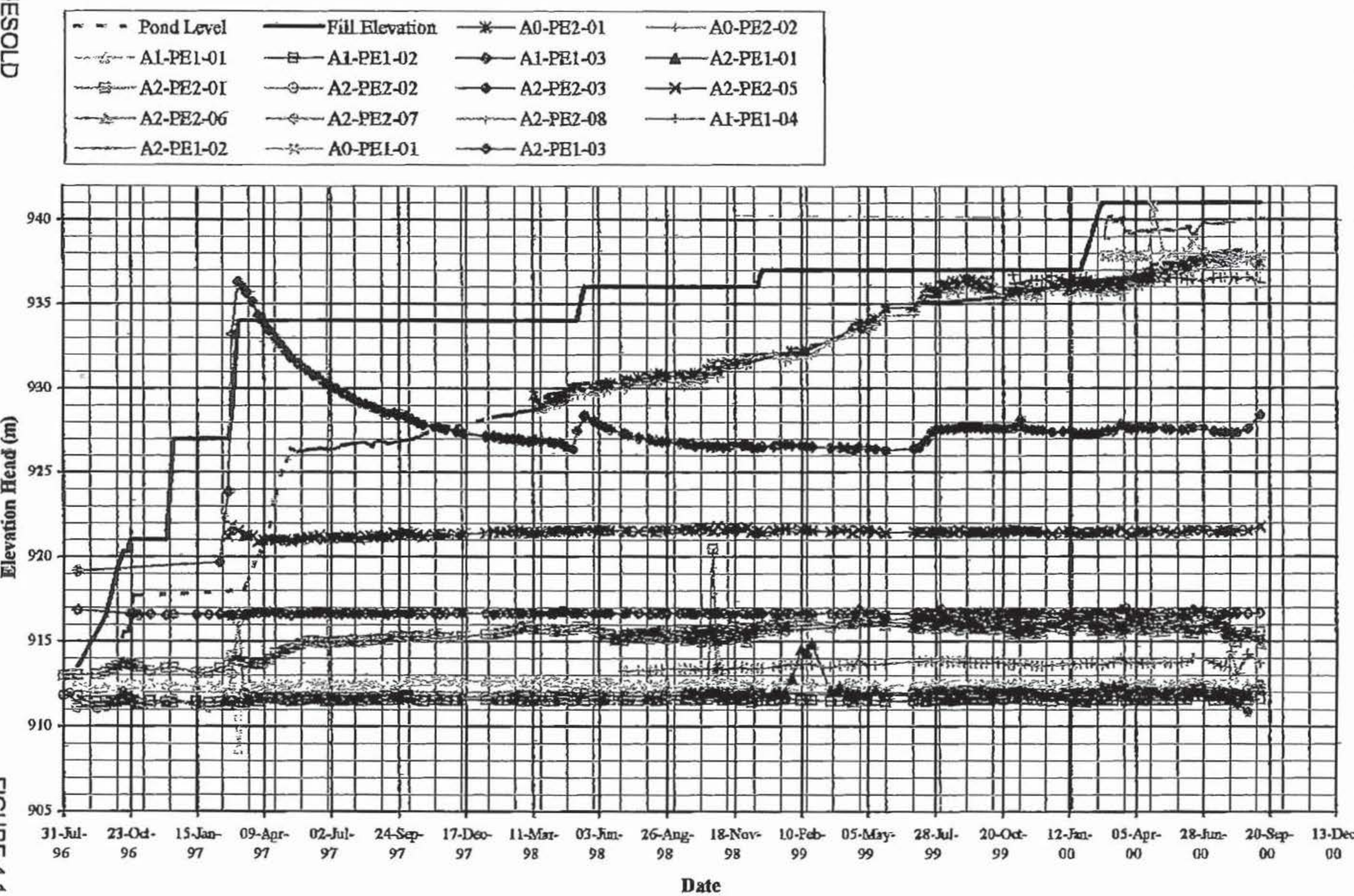
STAGE 3 CONSTRUCTION
ZONE F - RECORD SAMPLES
GRADATION SUMMARY

Knight Piésold
CONSULTING

PROJECT NO.	REF. NO.	REV.
11162/13		0

FIGURE 3.4

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE A PIEZOMETERS



KNIGHT PIESOLD CONSULTING

FIGURE 4.1

KNIGHT PIESOLD
CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE B PIEZOMETERS

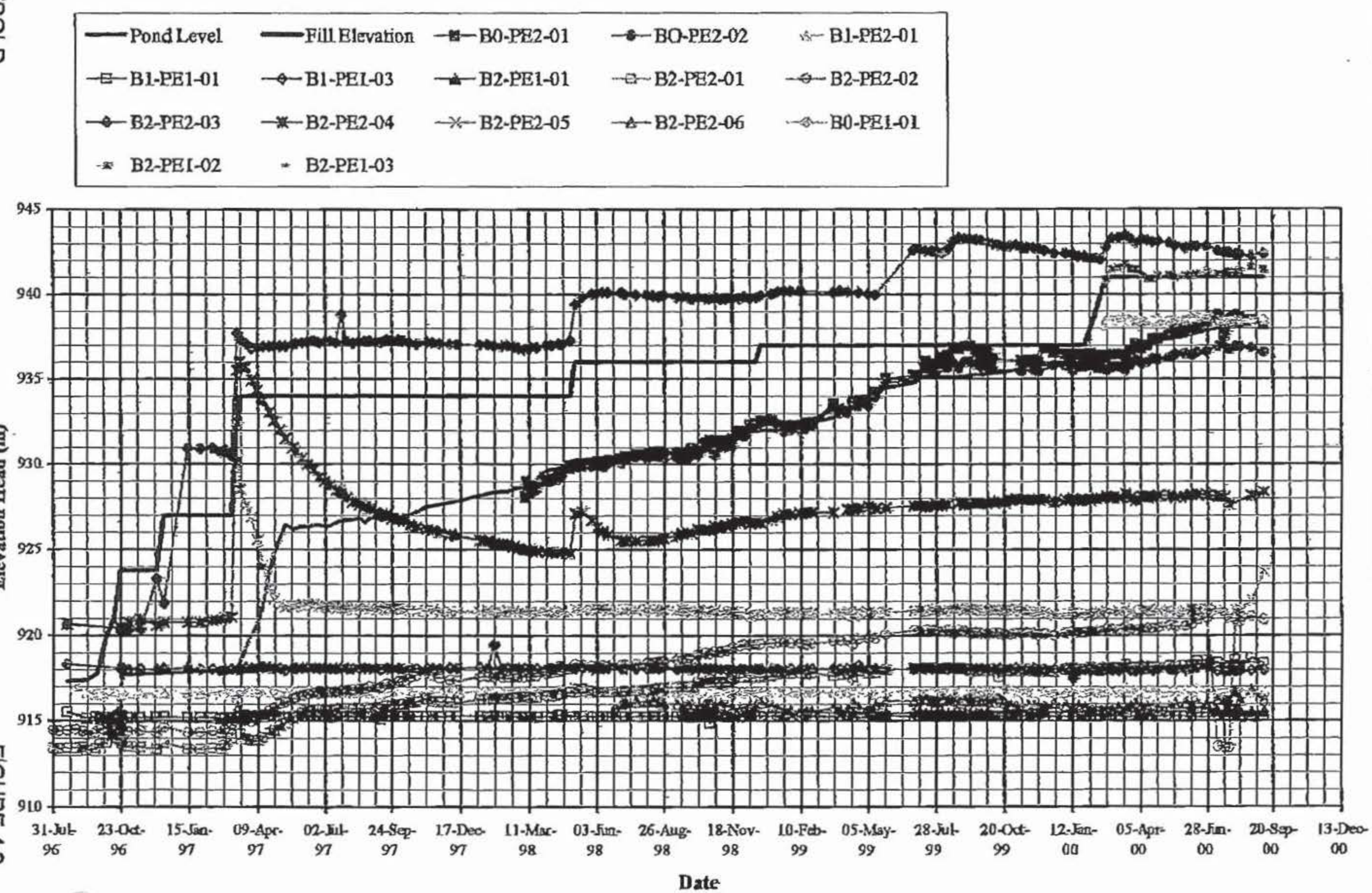


FIGURE 4.2

KNIGHT PIESOLD CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE C PIEZOMETERS

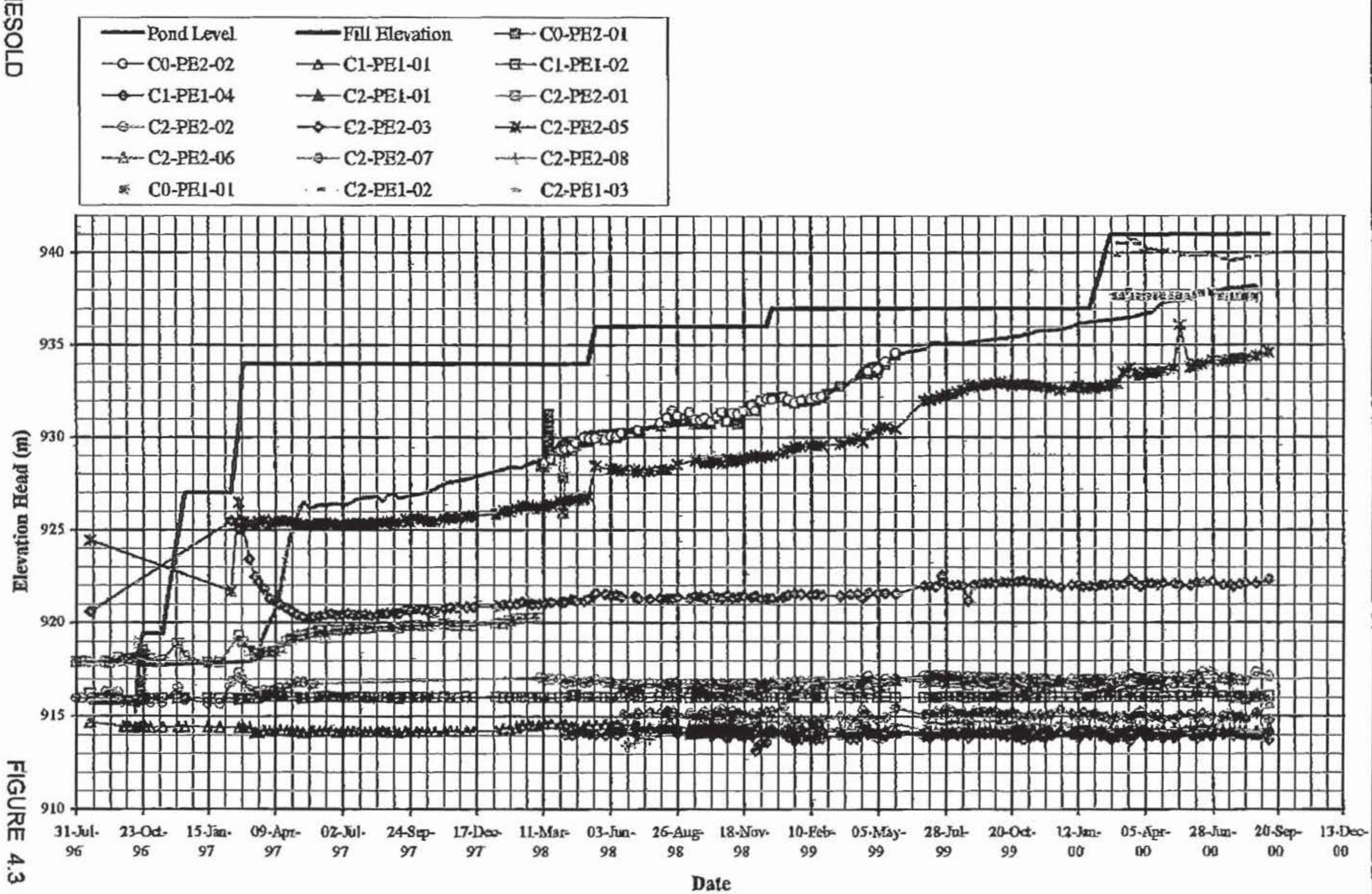


FIGURE 4.3

KNIGHT PIESOLD
CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE D PIEZOMETERS

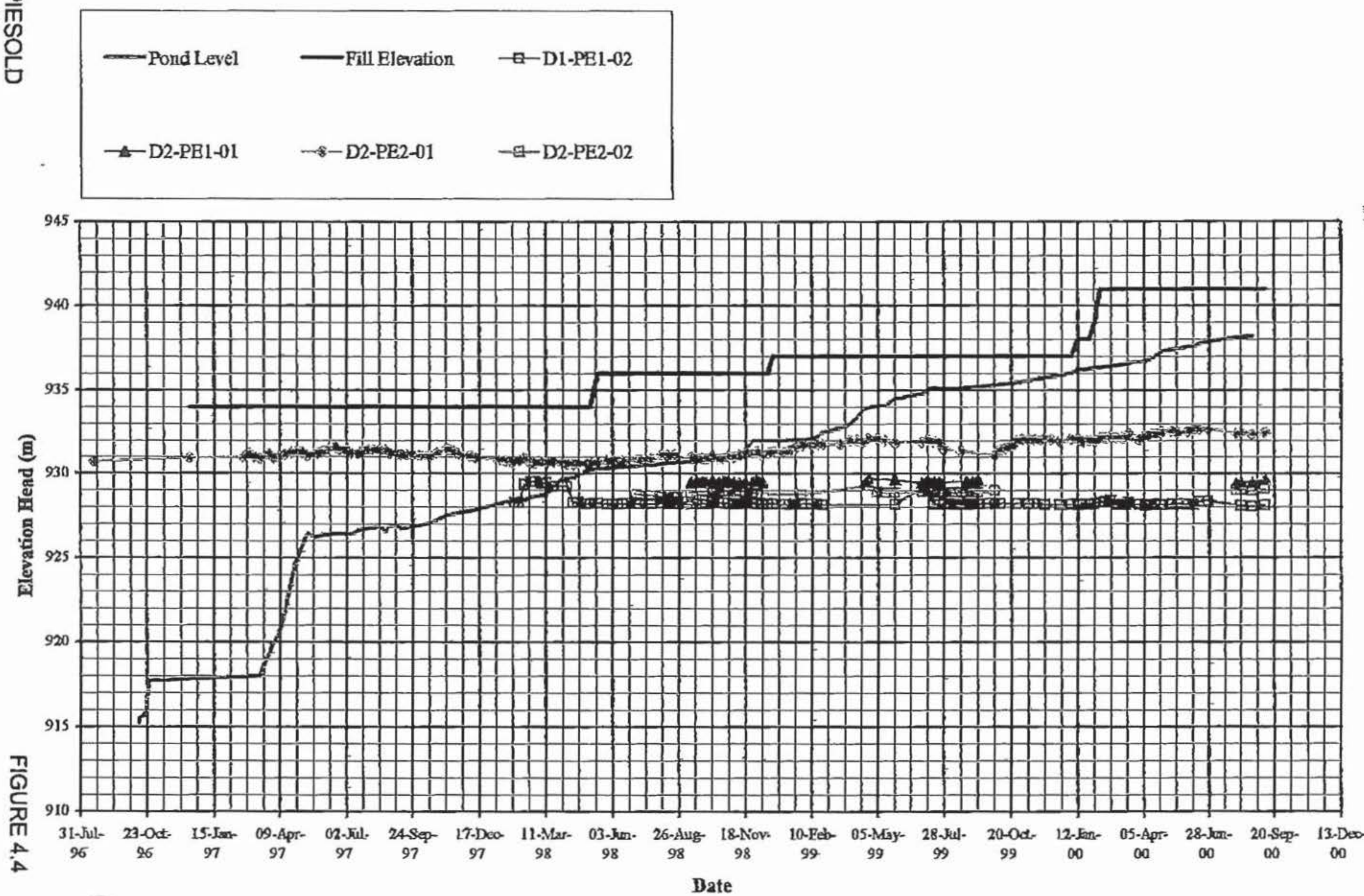


FIGURE 4.4

KNIGHT PIESOLD
CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE E PIEZOMETERS

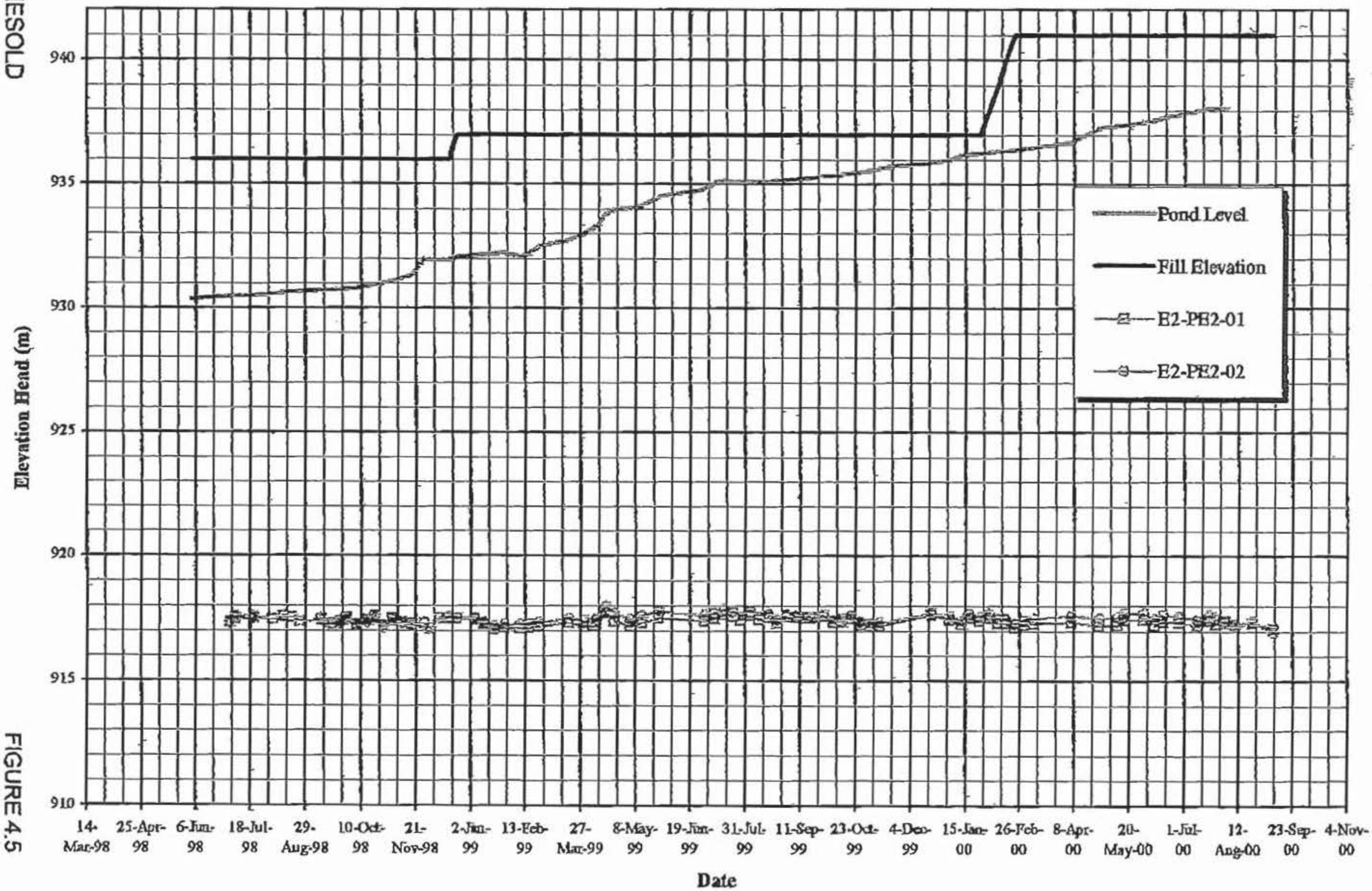
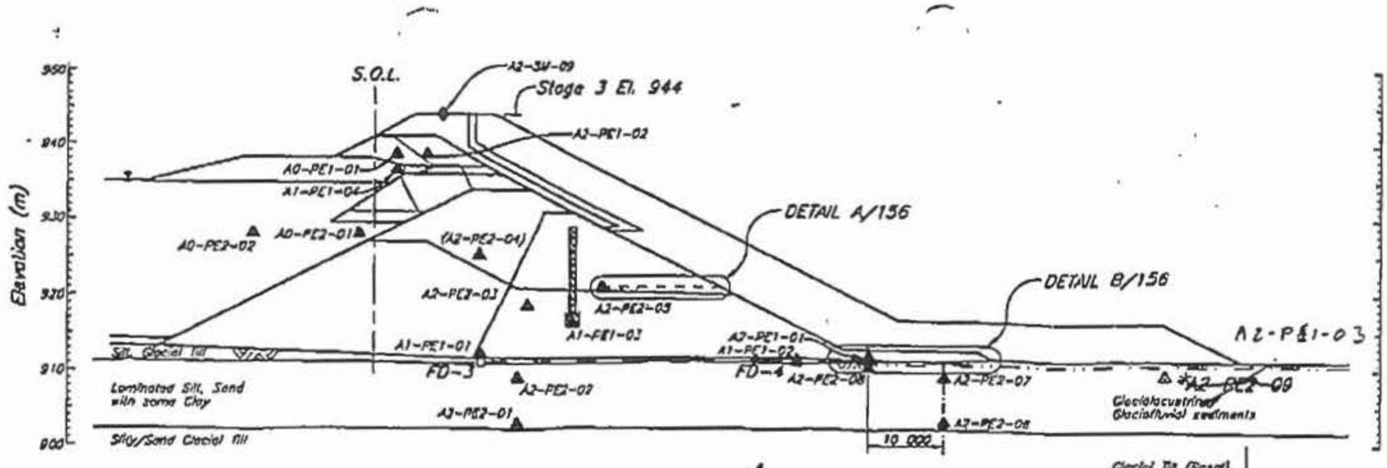
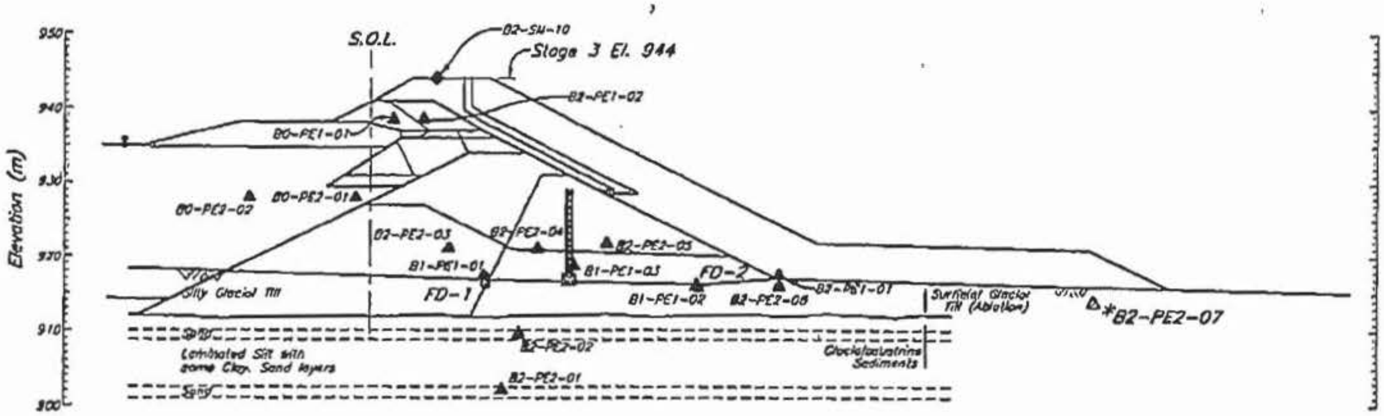


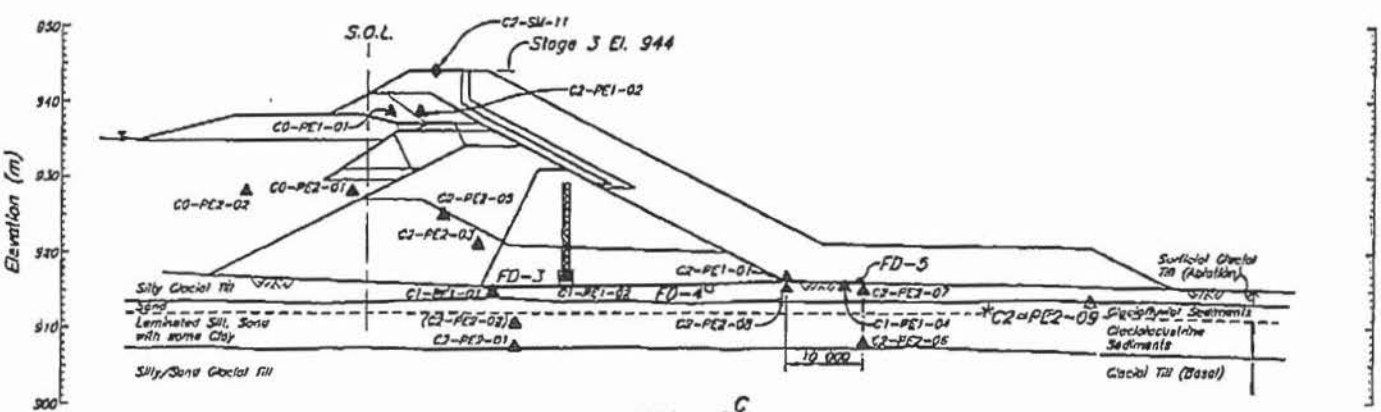
FIGURE 4.5



PLANE $\frac{A}{250}$
CH. 20+00

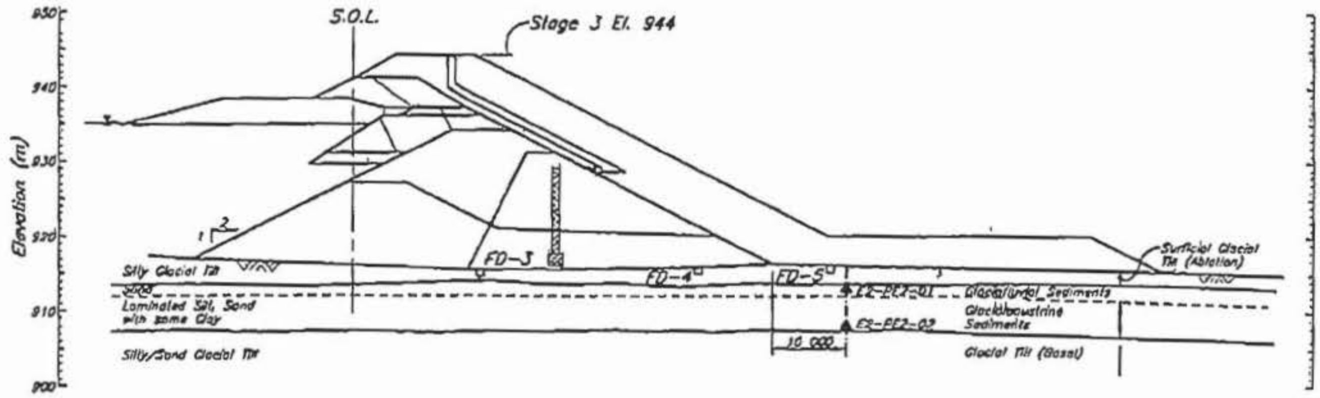


PLANE $\frac{B}{250}$
CH. 22+40

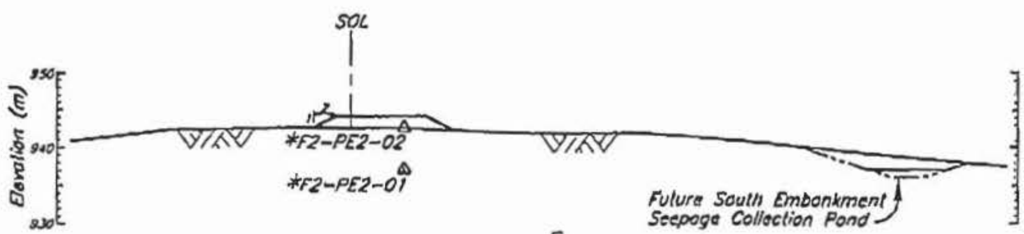


PLANE $\frac{C}{250}$
CH. 18+50

T - INSTRUMENTATION - SECTIONS 2 OF 2										
T - INSTRUMENTATION - SUMMARY OF INSTALLATION & TYP. DETAILS										
T - INSTRUMENTATION - PLAN								0	2JUN'00	ISSUED FOR CONSTRUCTION
DESCRIPTION	REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D	REV.	DATE	DESCRIPTION
RENCE DRAWINGS	REVISIONS							REVISIONS		



PLANE $\frac{E}{250}$
CH. 17+60



PLANE $\frac{F}{254}$
CH. 7+19

DRG. NO.	DESCRIPTION
256	TSF – STAGE 3 TAILINGS EMBANKMENT – INSTRUMENTATION SUMMARY OF INSTALLATION & TYPICAL DETAILS
254	TSF – STAGE 3 TAILINGS EMBANKMENT – SOUTH EMBANKMENT – INSTRUMENTATION PLAN
250	TSF – STAGE 3 TAILINGS EMBANKMENT – MAIN EMBANKMENT – INSTRUMENTATION PLAN
130	TSF – STAGE 3 SOUTH EMBANKMENT – PLAN AND SECTION
215	TSF – STAGE 3 MAIN EMBANKMENT – SECTIONS AND DETAILS

REFERENCE DRAWINGS

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D.

REVISIONS

Knight Piésold
CONSULTING

Knight Piésold Ltd.
1400 - 750 West Pender St
Vancouver, BC V6C 2T8
CANADA
Tel: +1 (604) 685-0543
Fax: +1 (604) 685-0147
Fax: +1 (604) 687-2203
www.knightpiésold.com

DATE:	Sept. 1, 2000	**FILE NO.:**	11162/13.F01.F05
TIME:		**REF NO.:**	00-034
OPERATOR:		**PAGES:**	1 of 26
SENDER:	s.22	**APPROVED:**	

TO:	KP Vancouver	**FAX :**	(604) 685-0147
ATTN:	Ken Brouwer s.22		
cc:	George Headley, MEMND (250) 952-0481 Eric Leneve, Don Parsons, MPMC		
SUBJECT:	Mount Polley Stage 3 TSF Construction – Progress Report No. 4		

Form F-01

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY PROJECT

TAILINGS STORAGE FACILITY
STAGE 3 CONSTRUCTION

PROGRESS REPORT NO. 4 – August 7 to September 1, 2000

SECTION 1.0 – GENERAL

Stage 3 construction has steadily progressed over the reporting period. Major activities have included placement of Zone C, T and F fill zones at the Main Embankment, and preparation work at the Perimeter and South Embankments.

1.1 PERSONNEL

Mount Polley Mining Corporation (MPMC) management personnel overseeing the Stage 3 contract are as follows:

Eric Leneve, Tailings Coordinator
Don Parsons, Mine Superintendent

The following Knight Piesold Ltd. (KP) representatives were on site during the reporting period:

s.22 Site Engineer – Left site August 14.
s.22 Site Engineer – Arrived August 14.
s.22 Site Engineer – Arrived August 19 to monitor nightshift construction.

The following Tercon Contractors Ltd. (TCL) representatives were on site during the reporting period:

s.22 Site Superintendent
s.22 Dayshift Foreman
s.22 Nightshift Foreman

Mr. George Headley of Ministry of Energy and Mines and Northern Development (MEMND) visited the site on August 17.

Mr. Ken Brouwer, Project Director for KP visited the site on August 31.

1.2 WEATHER

Weather conditions were generally sunny and warm up until August 17. Conditions have been variable since then, with mixed sun, clouds and rain. There were no weather related delays in the work.

1.3 DESIGN AND CONTRACT DEVELOPMENTS

1.3.1 Contract

TCL have indicated that the construction contract for the Main Embankment will be complete by about the end of September. In terms of total quantities, as shown on Table 2.1, the contract is currently about 70% complete.

TCL have requested payment for as-built quantities of Zone F material, on the basis that the irregular, stripped face of the embankment and difficulties with survey layout will lead to overbuild of this zone. They have also requested payment for foundation preparation on the embankment face. MPMC and KP have reviewed the contract information, and found that changes in payment for these items are not warranted.

TCL shut down nightshift rockfill placement on August 26. Dayshift rockfill placement shut down on August 30. Placement of the Zone T and C fills was proceeding at a faster rate than Zone F, which is being placed only on nightshift (the Zone F filter sand is being hauled from the mine by a subcontractor, Lake Excavating Ltd. of Williams Lake). The purpose of the shutdown is to allow for advancement of the Zone F fill ahead of the rockfill, as well as to provide a break for the TCL crew. TCL will maintain a skeleton crew on site for spreading and compacting the Zone F fill during the shutdown. Full production will resume again on September 7.

TCL has expressed concern over the haul route from the rock borrow (Zone T road) which will be affected by construction activities at the Perimeter Embankment. MPMC will inform

TCL of the scheduling for the Perimeter Embankment construction as it is finalized (see Below).

1.3.2 Design

MPMC and KP are currently re-reviewing the scheduling requirements for construction of the Perimeter Embankment. MPMC have updated the Tailings Facility water balance, and have provided the information to KP Vancouver for review in conjunction with the filling schedule.

During his visit to site, Mr. Headley inquired about placement of Zone C rockfill directly against the Main Embankment glacial till below elevation 928.5 m. His concern was related to filter relationships in this area. KP will issue a letter addressing this concern.

At the request of MPMC, KP have mapped exposed walls in the rock borrow and carried out a stability assessment and design. The results of this work have been provided in a letter report to MPMC dated August 22.

There were no design changes over this period.

1.4 TAILINGS FACILITY OPERATION AND MAINTENANCE

Tailings discharge into the facility continued from the Main Embankment until August 18, when MPMC moved discharge to the middle of the Perimeter Embankment due to the line sanding up. Tailings beach is currently exposed upstream all along the Perimeter Embankment and along the Main Embankment west to Ch. 18+50. From 18+50 to the right abutment the pond is against the embankment. The tailings line has subsequently been removed from the crest of the Main Embankment in preparation for construction.

MPMC is currently working on setting up the Linatex separators for installation and subsequent cycloning along the Perimeter Embankment.

The recent rainfall has caused rising water levels in the Seepage Collection Ponds below both embankments. MPMC is currently pumping from the Perimeter Embankment Collection Pond, and is planning to pump from the Main Embankment Pond during the TCL shutdown.

1.5 SAFETY

No safety incidents were reported for the period.

MPMC have completed construction of safety berms along haul routes.

In response to recommendations from the Mines Inspector, Tercon has installed single lane traffic signs on the access road from the rock borrow.

MPMC is working with an excavator to slope back the top of the rock borrow, and is planning on scaling the walls.

TCL have completed spindle checks on the three rental haul trucks. All of the trucks passed inspection.

SECTION 2.0 – CONSTRUCTION ACTIVITIES

2.1 EQUIPMENT

TCL has used the following equipment to carry out work over this period:

- Excavators – 1 Hitachi EX1100, 1 Cat 375, 1 Cat 322B
- Haul trucks - 7 Cat 773's (3 rentals)
- Dozers – 1 Cat D8R, 1 Cat D8N (rental), 1 Cat D6D
- Graders – 1 Cat 16G
- Compactors – 1 Cat CS583, 1 Cat CS563 (rental)
- Water truck, service trucks, fuel trucks, forklift

The Hitachi EX1100 was put into service in the rock borrow on August 12, replacing the Cat 375 and increasing rockfill production rates.

2.2 ACTIVITIES

The major construction activities for the reporting period are summarized below. Dayshift and nightshift crews have been in operation. A summary of the contract quantities completed over this period and to date are provided on Table 2.1.

Main Embankment (TCL)

- Zone C rockfill Placement – the Main Embankment downstream buttress was completed on August 10, and Zone C placement subsequently began up the embankment face. The elevation of the rockfill is currently between El. 930 to 935 m. Placement of the rockfill is typically at a rate of about 3,500 to 5,000 m^3 per shift.

- Stripping of Main Embankment Face – the downstream face was stripped above El. 929.0 m to remove unsuitable, loose material in preparation for Zone F placement. A total of about 20,000 m^3 was removed and hauled to the spoil area near Borrow No.2.

- Zone F filter sand placement – Zone F placement commenced on August 17. The material is being hauled down from the mill site on nightshift by a subcontractor, Lake Excavating Ltd. of Williams Lake, and stockpiled along the dam. TCL is placing the material by pushing it upslope as far as practicable in two 0.5 m lifts. Each lift is compacted by multiple passes of a vibratory compactor. Zone F is extended further upslope as the adjacent Zone T and C rockfills are raised. Approximately 1000 m^3 is being placed per shift.

- Zone T rockfill placement – Zone T is being placed adjacent to Zone F, and comprises the finer material from the rock borrow. It is typically being placed by pushing it upslope a short distance (6 m), and is compacted using the vibratory compactor and by routing the haul trucks over it as the adjacent Zone C is raised (Zone C is placed parallel to the dam axis).

South Embankment (TCL)

- Foundation Excavation – stripping of the embankment footprint continued until August 10. Some work is still required in this area.

Perimeter Embankment (MPMC)

- The entire downstream face of the embankment has been stripped to remove unsuitable, loose and wet material in preparation for construction. The material has been hauled to the waste dump adjacent to the Polley Lake Pipeline road.

Rock Borrow

- TCL is carrying out ongoing drilling and blasting in the borrow.
- MPMC have pulled back the tops of the slopes in the rock borrow. Scaling of the walls is still required.

Miscellaneous

- A wet area was noted in the Stage 2A Zone T haul road at the downstream toe of the Main Embankment right abutment (Ch. 15+86) near the Upstream Toe Drain Outlet Pipe. Upon excavation, it was found that the water is emerging from the volcanic bedrock foundation. To allow for collection and drainage of the water, Foundation Drain FD-5 was exposed and the drain was extended into this area. MPMC has obtained a sample of the seepage water for analysis.

SECTION 3.0 – KNIGHT PIESOLD ACTIVITIES

3.1 GENERAL

KP site activities over the reporting period have included the following:

- Inspection and documentation of construction activities.
- QA/QC collection and testing of Zone F control samples, and Zone F, T and C record samples.
- Structural mapping of rock borrow.
- Supervision of drilling and installation of groundwater monitoring wells.
- Extension of piezometer leads through Stage 3 fill zones.
- Ongoing discussions and correspondence with MPMC and KP Vancouver.
- Preparation of daily inspection reports and bi-weekly Progress Reports.
- Collection and review of embankment monitoring data.

3.2 LABORATORY TESTING

The following samples were collected and tested over the reporting period:

- Zone T record samples R/ZT-3-5 to 6
- Zone C record samples R/ZC-3-2 to 3
- Zone F control samples C/ZF-3-6 to 8
- Zone F record samples R/ZF-1 to 9

The results of the testing are provided on the summary Tables 3.1 to 3.4 and gradation plots Figures 3.1 to 3.4.

The results show that all of the Zone C and Zone T samples meet the specifications for particle size distribution.

Results for some of the Zone F control samples have fallen marginally below the bottom of the specified coarse limit. The Zone F record samples fit within the gradation envelope, however, indicating some breaking down of the material during handling, placement and compaction such that it meets the desired specifications. The exception is sample R/ZF-3-7. A re-check of this sample will be carried out.

SECTION 4.0 – EMBANKMENT MONITORING

Monitoring of tailings embankment instrumentation over the reporting period indicates that the embankment is performing well within design tolerances.

Groundwater monitoring wells GW00-1 to 3 were installed between August 28 and September 1. The drill contractor was Geotech Drilling Ltd. of Prince George. Two wells were installed at each location; a shallow well in the overburden deposits and a deeper well extending 30 to 40 ft into the underlying volcanic bedrock. The deep wells extend to between 70 and 80 ft depth, and the shallow wells to between 35 and 40 ft depth. The wells consist of 2" PVC pipe. MPMC will obtain baseline water quality data from the wells and incorporate them into the groundwater monitoring program.

4.1 VIBRATING WIRE PIEZOMETERS

No new piezometers were installed over the reporting period. Piezometer leads have been extended as necessary through the advancing Stage 3 fills.

The most recent piezometer readings were obtained on August 23. The results of the monitoring are shown on Figures 4.1 to 4.5, and are summarized below. Locations of the piezometers are shown on the attached drawings.

Foundation Piezometers

Most of the Main Embankment foundation piezometers have shown slight increases in pore water pressure as a result of fill placement.

- Plane A: Largest increase of 1.13 m at A2-PE2-08 (Below Zone C rockfill) All other piezometers show increases of less than 0.3 m.
- Plane B: Largest increase of 0.60 m at B2-PE2-06 (Below Zone C rockfill). All other piezometers show increases of less than 0.5 m.
- Plane C: Largest increase of 0.44 m at C2-PE2-02 (Below Stage 1 embankment). All other piezometers show increases of less than 0.4 m.
- Plane E: Largest increase of 0.22 m at E2-PE2-02.

No changes were noted in the Perimeter Embankment (Plane D) foundation piezometers.

Fill Piezometers

Fill piezometers generally remained static or showed slight increases (less than 0.3 m) in the glacial till. The exception was an increase of 0.56 m at B2-PE2-05 (in glacial till below the Stage 3 rockfill).

Drain Piezometers

All drain piezometers have remained static and at a very low head indicating that the drains are free-draining and functioning as designed.

Tailings Piezometers

Water levels at the tailings piezometers continue to mimic the pond level.

4.2 DRAIN FLOWS

Drain outlets in the Main Embankment Seepage Collection Pond drain sump have been submerged due to the rising water level in the pond. Monitoring of the flows will resume once MPMC pumps down the pond during the TCL shutdown.

SECTION 5.0 – ONGOING ITEMS

The following items will be addressed during upcoming reporting periods:

- MPMC continues to focus on difficulties with the tailings discharge line in terms of depositing along the west portion of the Main Embankment. Repairs to the line above the T2 dropbox are scheduled and may help eliminate this problem.
- MPMC is planning for removal of the Polley Lake Pipeline from within the Perimeter Embankment crest (at El. 940 m) as part of the Stage 3 work.

Submitted by:

s.22

Knight Piesold Ltd.

Distribution: Eric Leneve, Don Parsons – MPMC
George Headley – MEMND
Ken Brouwer – KP Vancouver

TABLE 2.1

MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
STAGE 3 CONSTRUCTION

SUMMARY OF CONTRACT QUANTITIES - To August 27, 2000

C:\M. Polley - Stage 3\Progress Reports\[Table 2.1 - Quantities.xls]Sheet1 — 1-Sep-00

Material / Item	Quantity Over Reporting Period		Quantity to Date		Contract Quantity		Percent Complete (%)
Removal of Topsoil /Unsuitable Foundation Material	0	m^3	46,528	m^3	45,000	m^3	100.0
Removal of Unsuitable from Embankment Slopes	14,820	m^3	20,020	m^3	11,000	m^3	100.0
Supply and Place Zone T and C	148,706	m^3	272,090	m^3	399,000	m^3	68.2
Supply and Place Zone F	13,500	m^3	13,500	m^3	27000	m^3	50.0
Supply and Place Zone S	0	m^3	0	m^3	37000	m^3	0.0
Totals			352,138	m^3	519,000	m^3	67.8

Notes:

1. Volumes are based on both survey information and load counts.
2. Volumes for Zone F are assumed based on an estimated placement rate of 1,000 m^3 per shift.

TABLE 3.1

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE T RECORD TESTS - SUMMARY SHEET

C:\Mt. Polley - Stage 3\Lab Testing\Zone T\[Zone T Summary.xls]Record Summary   Date Printed 30-Aug-00

Date Sampled	Sample No.	Location	C3 (Particle Size Distribution)			
			Cobbles % > 3 inch	Gravel % 3 inch to #4	Sand % #4 to #200	Silt/Clay % < #200
3-Jun-00	R/ZT-3-1	Zone T Fill	20.0	61.5	15.7	2.8
16-Jul-00	R/ZT-3-2	Zone T Fill	20.0	58.7	16.2	5.1
25-Jul-00	R/ZT-3-3	Zone T Fill	13.9	66.1	18.4	1.6
27-Jul-00	R/ZT-3-4	Zone T Fill	22.0	65.0	12.5	0.5
22-Aug-00	R/ZT-3-5	Zone T Fill , Chainage: 23+00, Elevation: 929	37.2	36.1	24.9	1.8
20-Aug-00	R/ZT-3-6	Zone T Fill, Chainage: 19+50, Elevation: 929	34.5	40.0	24.0	1.5
		MEAN	24.6	54.6	18.6	2.2
		MEDIAN	21.0	60.1	17.3	1.7
		MAXIMUM	37.2	66.1	24.9	5.1
		MINIMUM	13.9	36.1	12.5	0.5

Notes:

1) C3 (Particle Size Distribution) - ASTM D422

Revised On: August 28, 2000
Revision 0

TABLE 3.2

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE C RECORD TESTS - SUMMARY SHEET

C:\Mt. Polley - Stage 3\Lab Testing\Zone C\[Zone C Summary.xls]Record Summary   Date Printed 30-Aug-00

Date Sampled	Sample No.	Location	C3 (Particle Size Distribution)			
			Cobbles % > 3 inch	Gravel % 3 inch to #4	Sand % #4 to #200	Silt/Clay % < #200
2-Aug-00	R/ZC-3-1	Zone C Fill	56.4	34.7	8.4	0.5
21-Aug-00	R/ZC-3-2	Zone C Fill, Chainage: 22+55, Elevation 928.3	50.6	36.3	12.8	0.3
24-Aug-00	R/ZC-3-3	Zone C Fill, Chainage: 22+40, Elevation 929m	48.6	35.5	15.3	0.5
		MEAN	51.9	35.5	12.2	0.4
		MEDIAN	50.6	35.5	12.8	0.5
		MAXIMUM	56.4	36.3	15.3	0.5
		MINIMUM	48.6	34.7	8.4	0.3

Notes:
1) C3 (Particle Size Distribution) - ASTM D422

Revised On: August 28, 2000
Revision 0

TABLE 3.3

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE F CONTROL TESTS - SUMMARY SHEET

C:\Mt. Polley - Stage 3\Lab Testing\Zone F\[Zone F Summary.xls]Control Summary　　　Date Printed　30-Aug-00

Date Sampled	Sample No.	Location	C3 (Particle Size Distribution)			
			Cobbles % > 3 inch	Gravel % 3 inch to #4	Sand % #4 to #200	Silt/Clay % < #200
17-Jul-00	C/ZF-3-1	Conveyor	0.0	64.2	32.9	2.9
19-Jul-00	C/ZF-3-2	Stockpile	0.0	50.9	45.4	3.7
19-Jul-00	C/ZF-3-3	Conveyor	0.0	61.4	36.2	2.4
20-Jul-00	C/ZF-3-4	Stockpile	0.0	49.9	47.0	3.1
1-Aug-00	C/ZF-3-5	Stockpile	0.0	61.0	38.0	1.0
25-Aug-00	C/ZF-3-6	Conveyor	0.0	60.5	38.0	1.5
25-Aug-00	C/ZF-3-7	Stockpile	0.0	70.2	27.7	2.1
25-Aug-00	C/ZF-3-8	Stockpile	0.0	46.7	51.0	2.3
		MEAN	0.0	58.1	39.5	2.4
		MEDIAN	0.0	60.8	38.0	2.4
		MAXIMUM	0.0	70.2	51.0	3.7
		MINIMUM	0.0	46.7	27.7	1.0

Notes:
1) C3 (Particle Size Distribution) - ASTM D422

Revised On: August 28, 2000
Revision 0

TABLE 3.4

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE F RECORD TESTS - SUMMARY SHEET

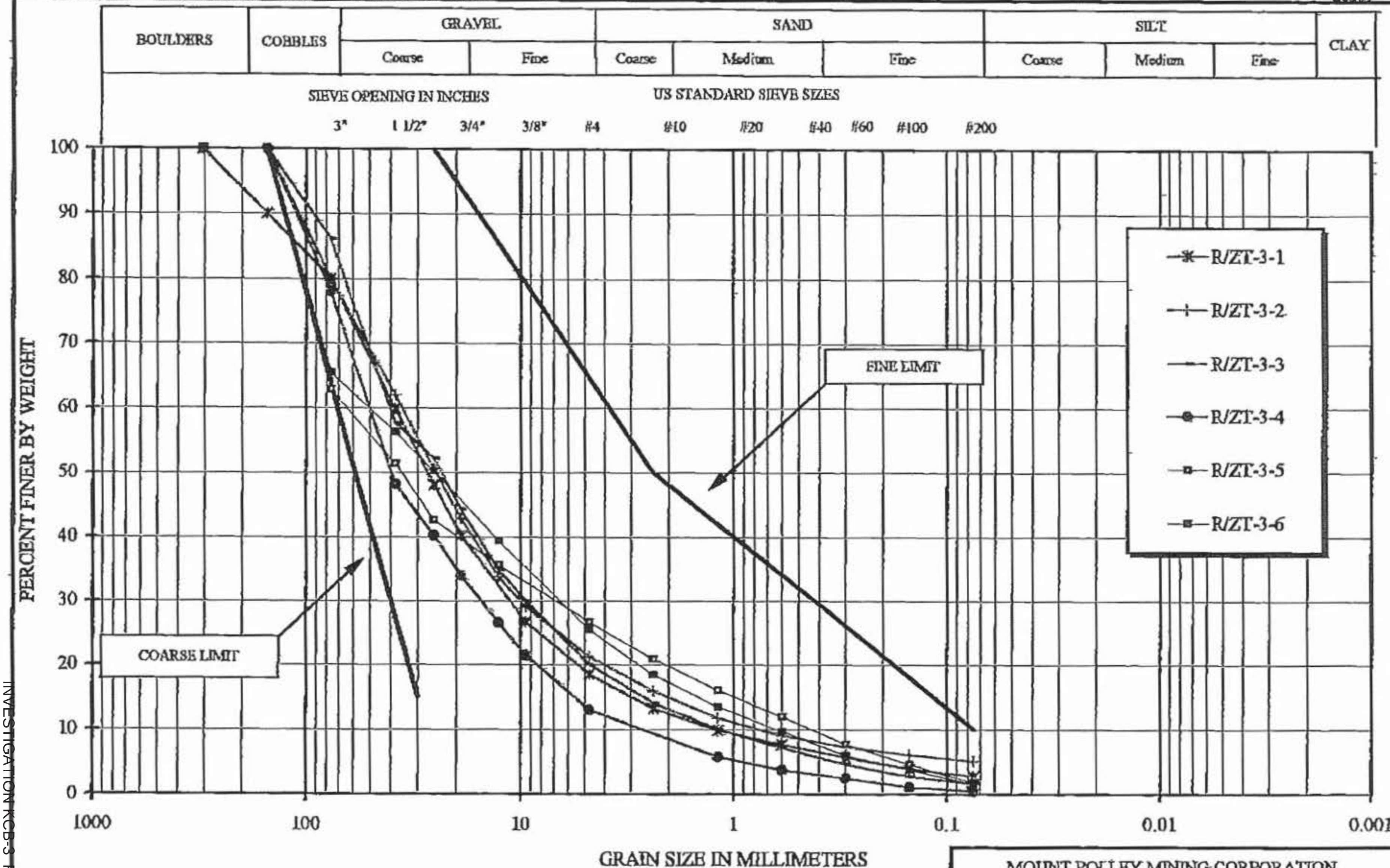
C:\Mt. Polley - Stage 3\Lab Testing\Zone F\[Zone F Summary.xls]Record Summary — Date Printed 30-Aug-00

Date Sampled	Sample No.	Location	Chainage	Elevation	C3 (Particle Size Distribution)			
					Cobbles % > 3 inch	Gravel % 3 inch to #4	Sand % #4 to #200	Silt/Clay % < #200
19-Aug-00	R/ZF-3-1	Zone F Fill	26+10	935 m	0.0	48 2	48.7	3.1
20-Aug-00	R/ZF-3-2	Zone F Fill	17+10	935 m	0.0	50.0	45.8	4.2
21-Aug-00	R/ZF-3-3	Zone F Fill	20+00	933 m	0.0	53.4	43.6	3.0
23-Aug-00	R/ZF-3-4	Zone F Fill	20+05	935 m	0 0	46.3	50.4	3.3
24-Aug-00	R/ZF-3-5	Zone F Fill	25+50	935 m	0.0	57.9	39.0	3.1
26-Aug-00	R/ZF-3-6	Zone F Fill	19+00	935 m	0.0	52.2	44.1	3.7
26-Aug-00	R/ZF-3-7	Zone F Fill	21+60	935 m	0.0	53.6	45.7	0.7
27-Aug-00	R/ZF-3-8	Zone F Fill	22+00	935 m	0.0	58.0	39 6	2.4
28-Aug-00	R/ZF-3-9	Zone F Fill	24+50	937m	0.0	54.5	41.7	3.8
				MEAN	0.0	52.7	44.3	3.0
				MEDIAN	0.0	53.4	44.1	3.1
				MAXIMUM	0.0	58.0	50.4	4.2
				MINIMUM	0.0	46.3	39 0	0.7

Notes:
1) C3 (Particle Size Distribution) - ASTM D422

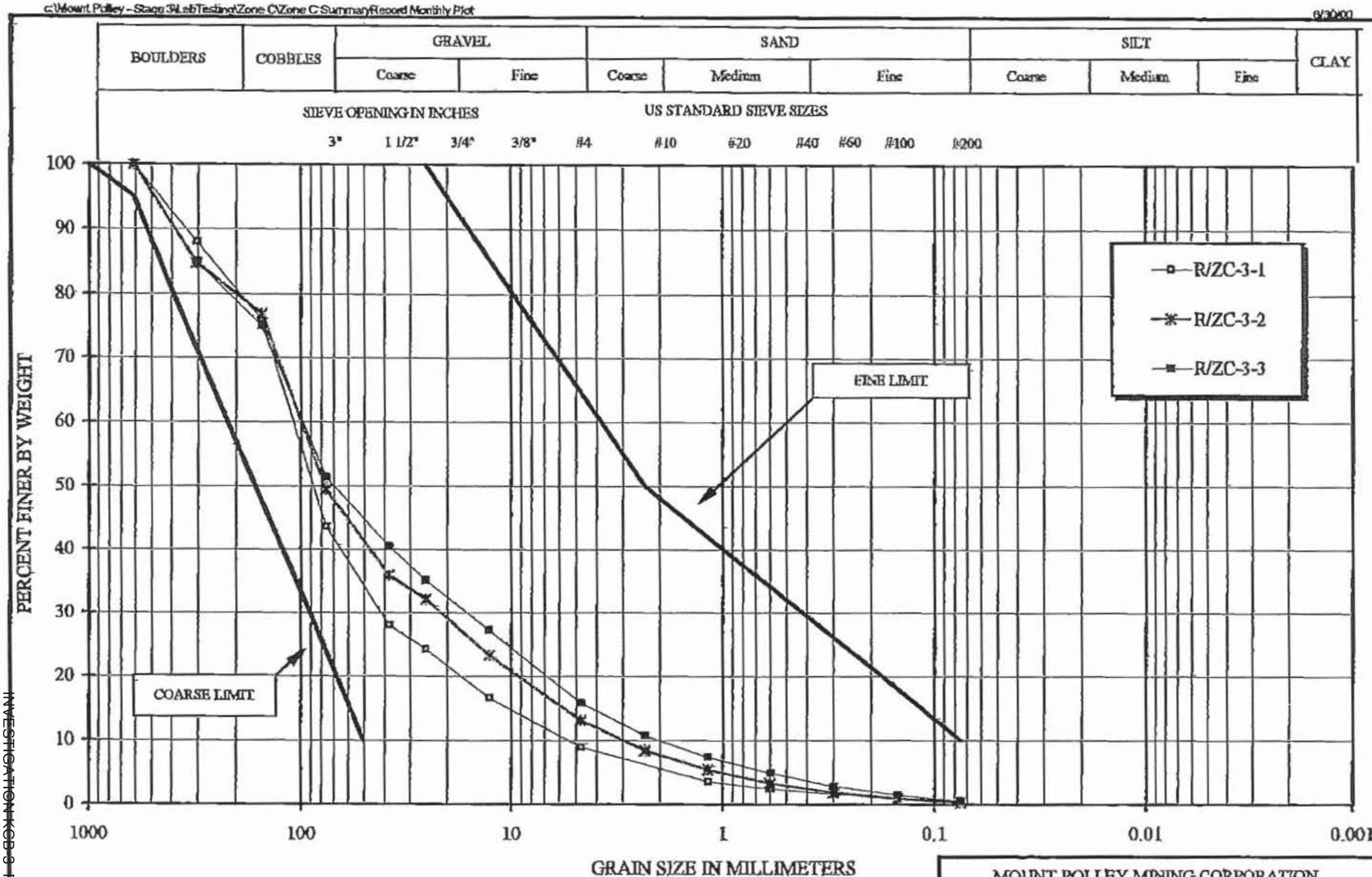
Revised On: August 28, 2000
Revision 0

c:\Mount Polley - Stage 3\LabTesting\Zone T\Zone-T Summary\Record Monthly Plot 8/30/00



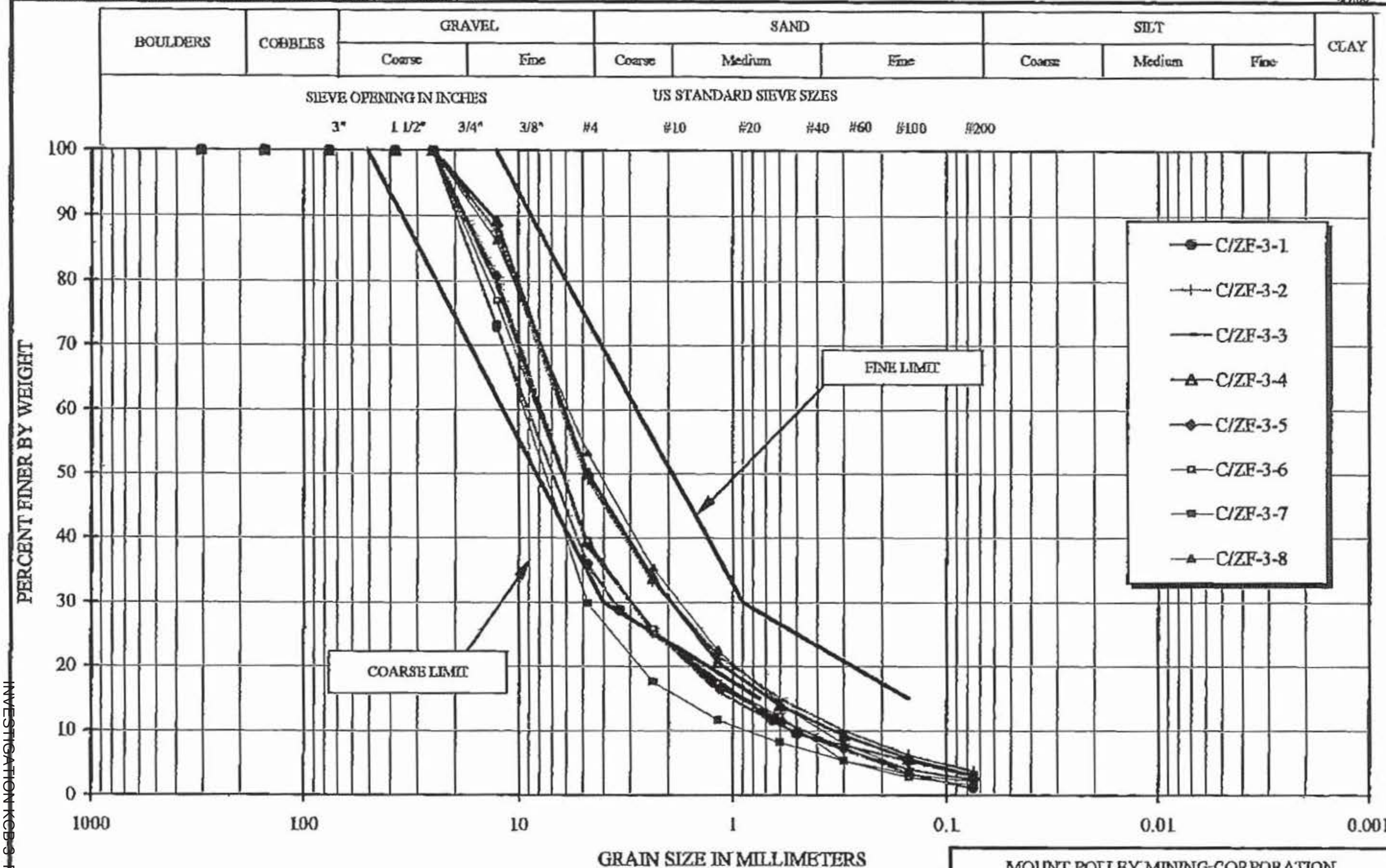
MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
STAGE 3 CONSTRUCTION ZONE T - RECORD SAMPLES GRADATION SUMMARY

Knight Piésold CONSULTING	PROJECT NO.	REF NO.	REV.
	11162/13		0
	FIGURE 3.1		



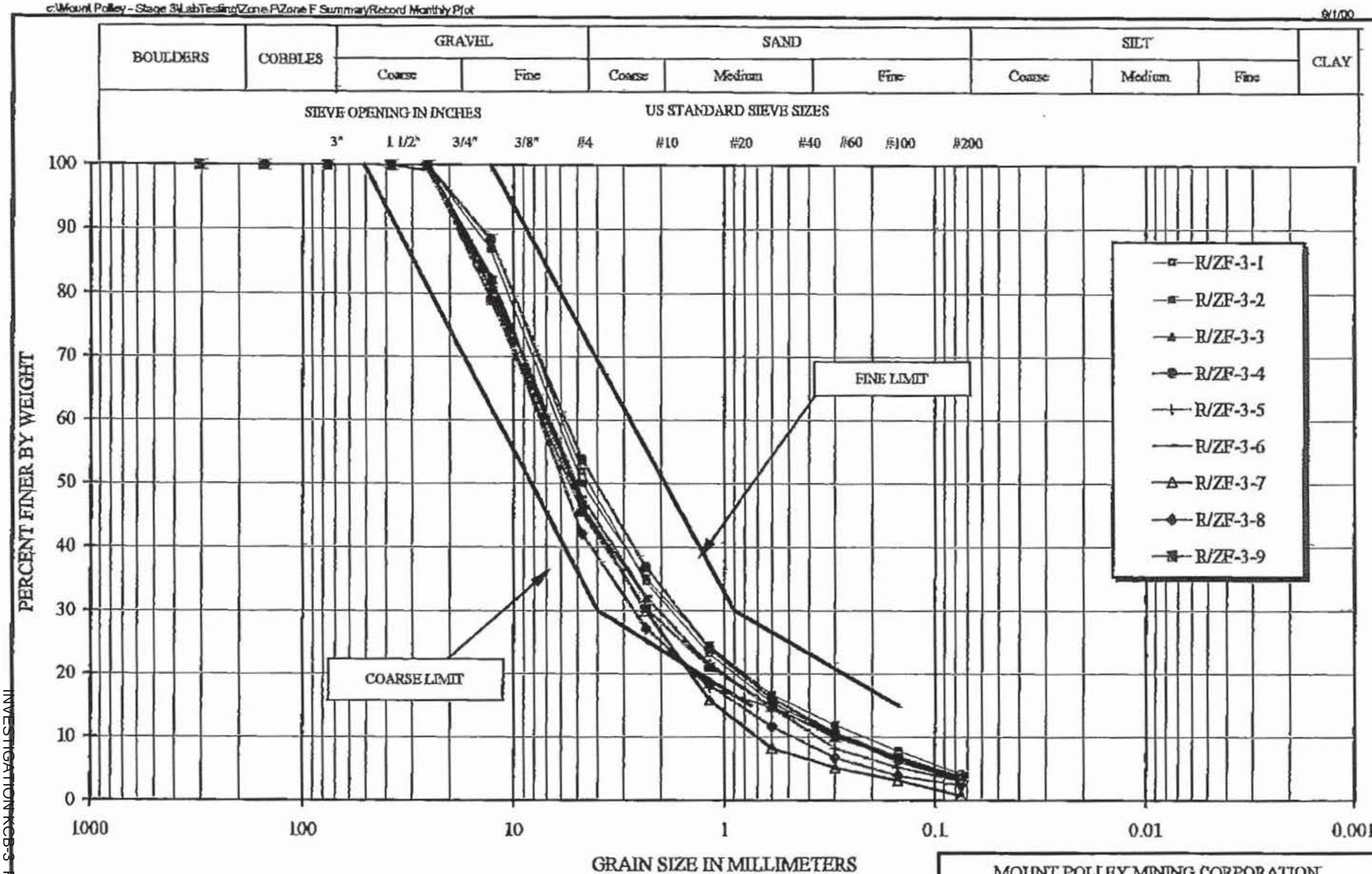
MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
STAGE 3 CONSTRUCTION ZONE C - RECORD SAMPLES GRADATION SUMMARY

Knight Piésold CONSULTING	PROJECT NO.	REF. NO.	REV.
	11162/13		0
	FIGURE 3.2		



MOUNT POLLEY MINING CORPORATION			
MOUNT POLLEY MINE			
STAGE 3 CONSTRUCTION ZONE F - CONTROL SAMPLES GRADATION SUMMARY			
Knight Piésold CONSULTING	PROJECT NO. 11162/13	REF. NO.	REV. 0
	FIGURE 3.3		

c:\Mount Polley - Stage 3\LabTesting\Zone F\Zone F Summary\Record Monthly Plot 9/1/00



MOUNT POLLEY MINING CORPORATION		
MOUNT POLLEY MINE		
STAGE 3 CONSTRUCTION ZONE F - RECORD SAMPLES GRADATION SUMMARY		
Knight Piésold CONSULTING	PROJECT NO. I1162/13	REF NO.	REV. 0
	FIGURE 3.4	

KNIGHT PIESOLD
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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE A PIEZOMETERS

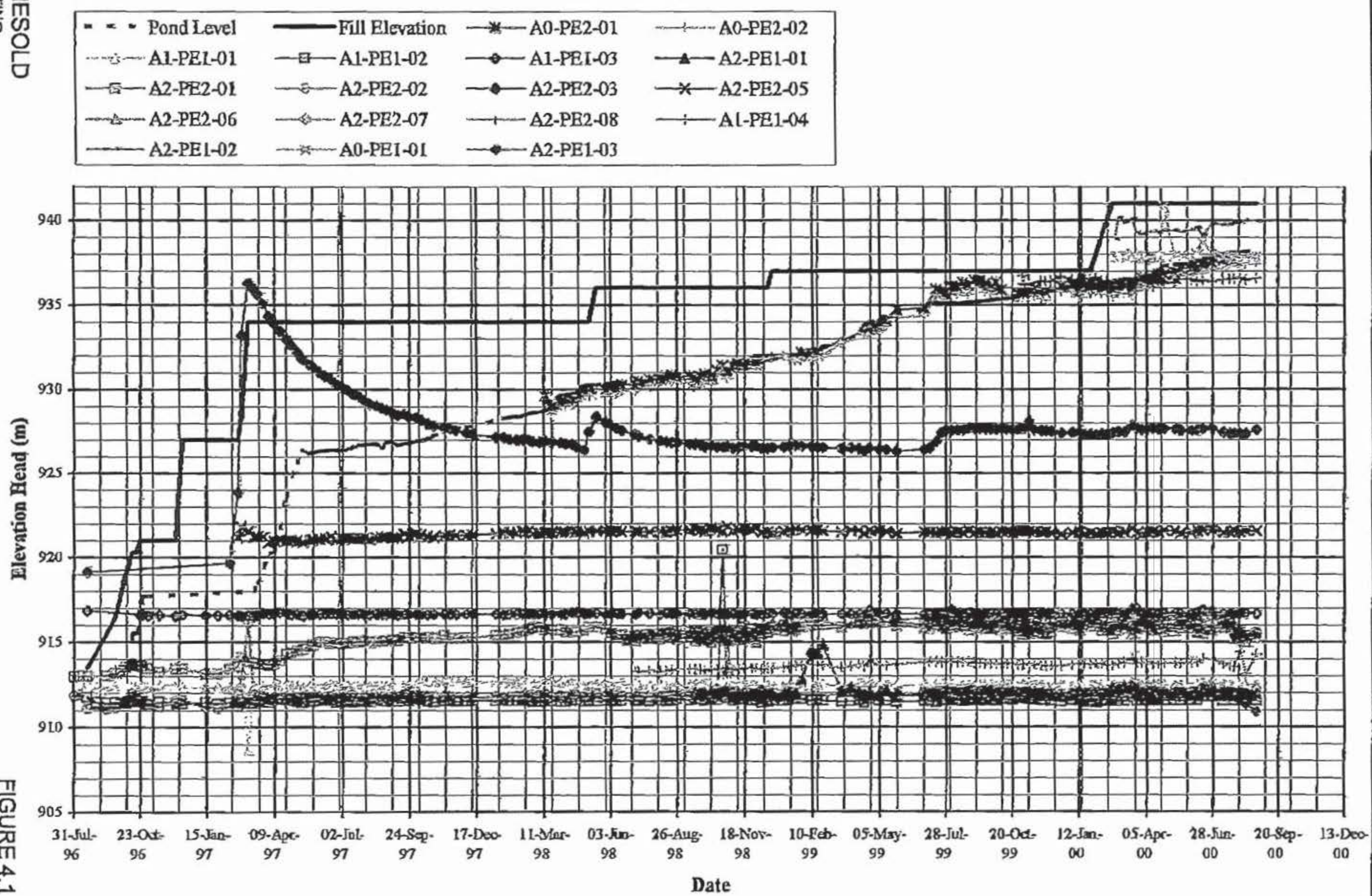


FIGURE 4.1

KNIGHT PIESOLD
CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE B PIEZOMETERS

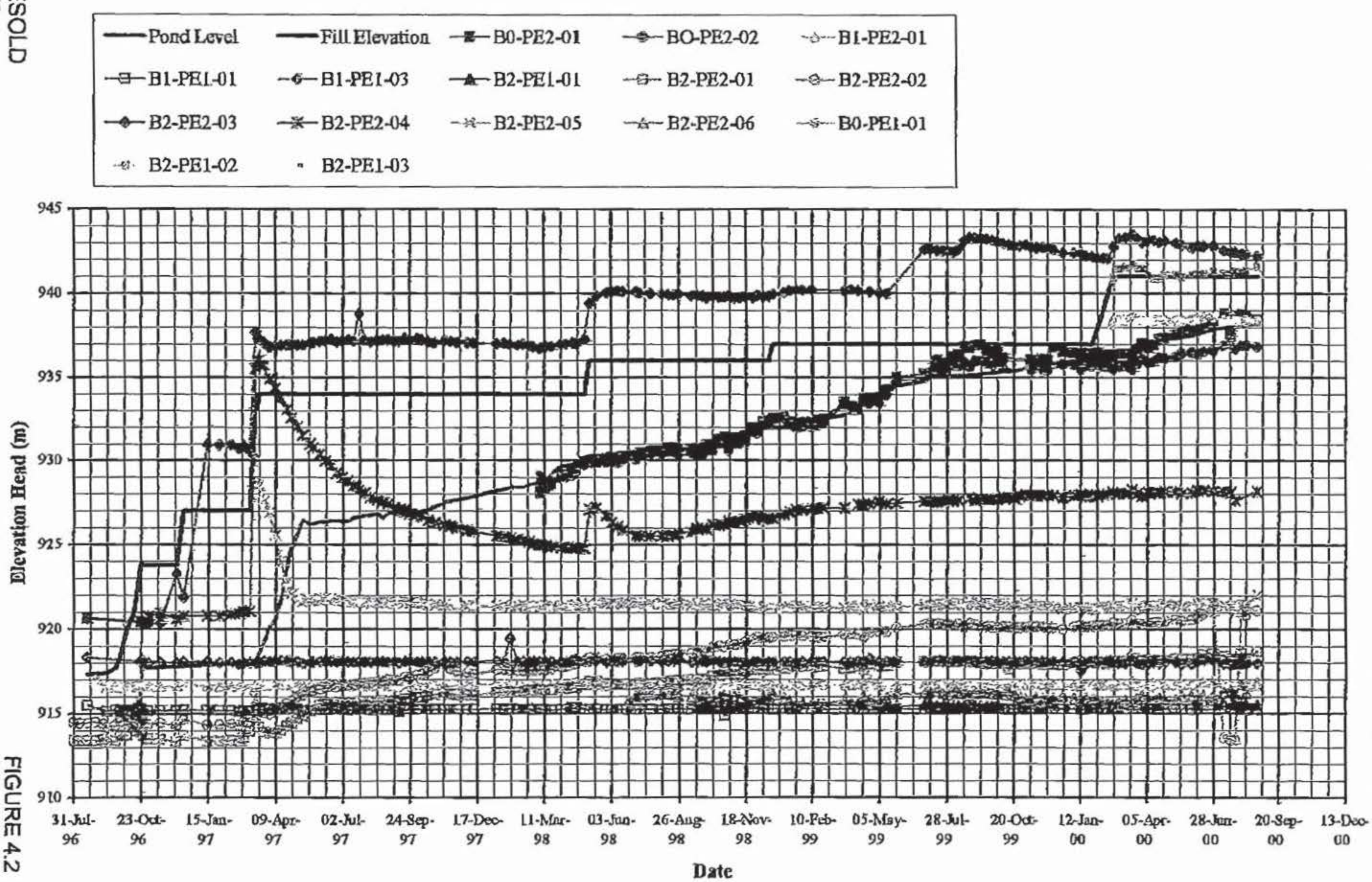


FIGURE 4.2

KNIGHT PIESOLD
CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE C PIEZOMETERS

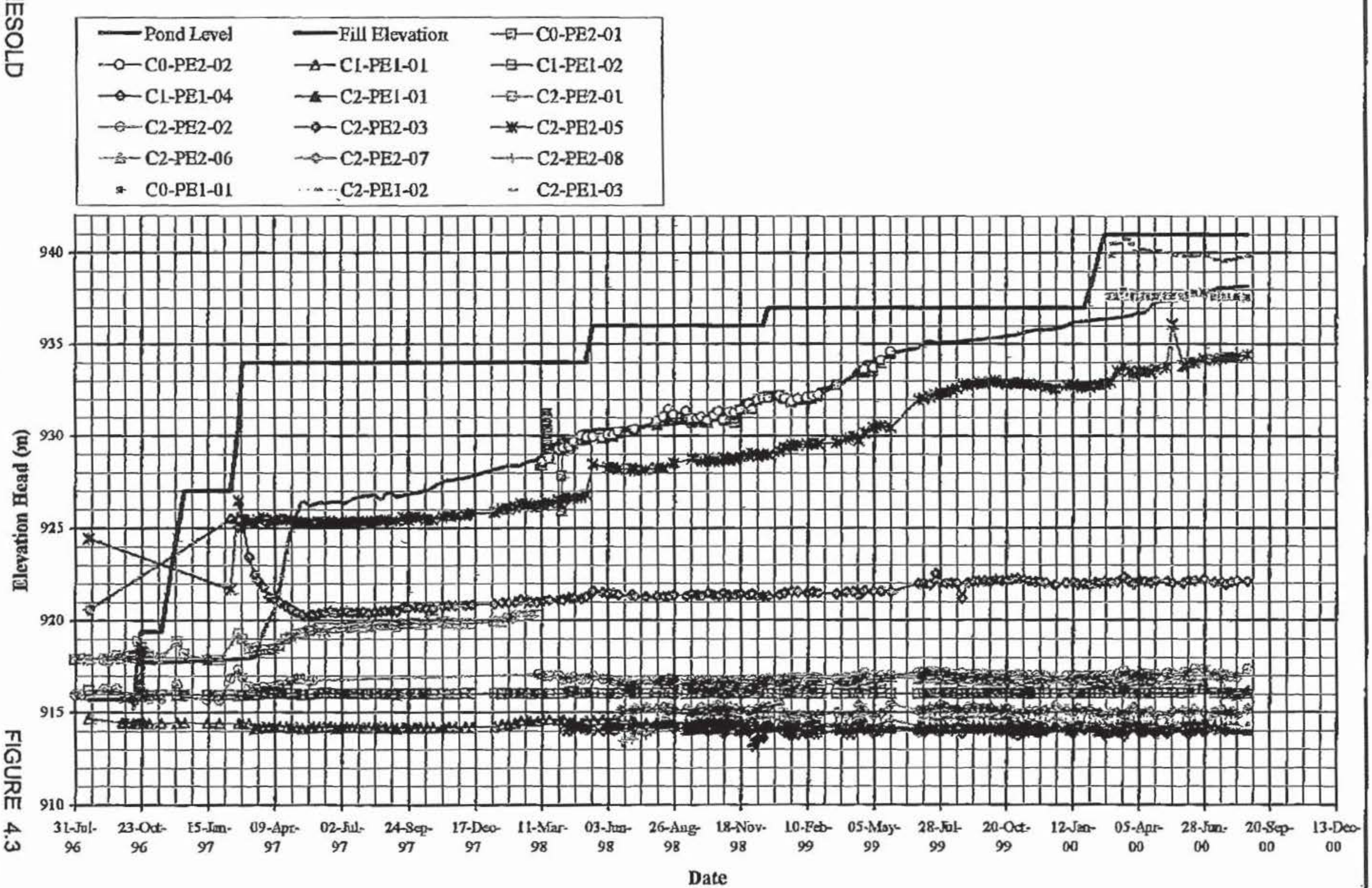


FIGURE 4.3

KNIGHT PIESOLD
CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE D PIEZOMETERS

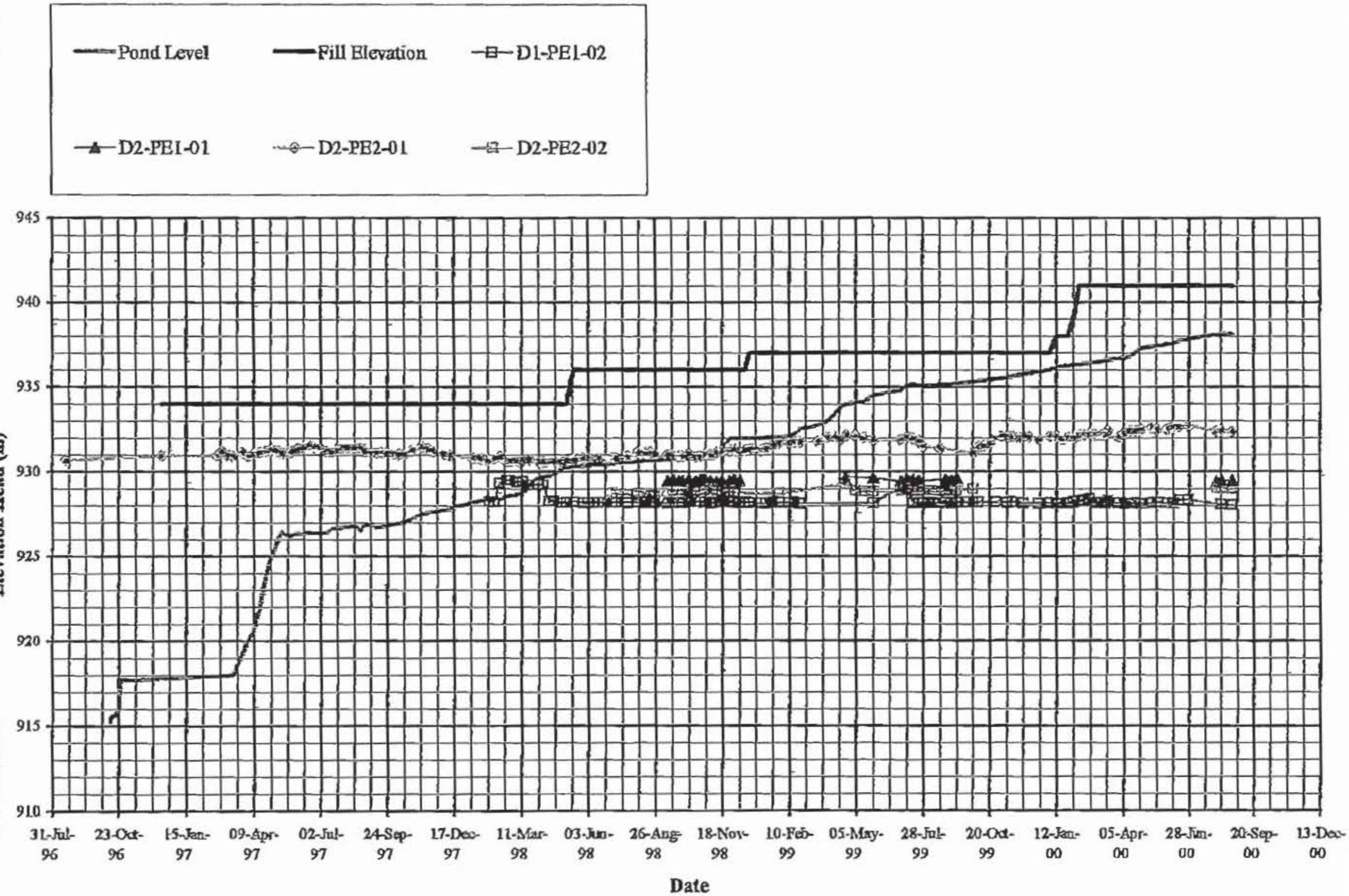
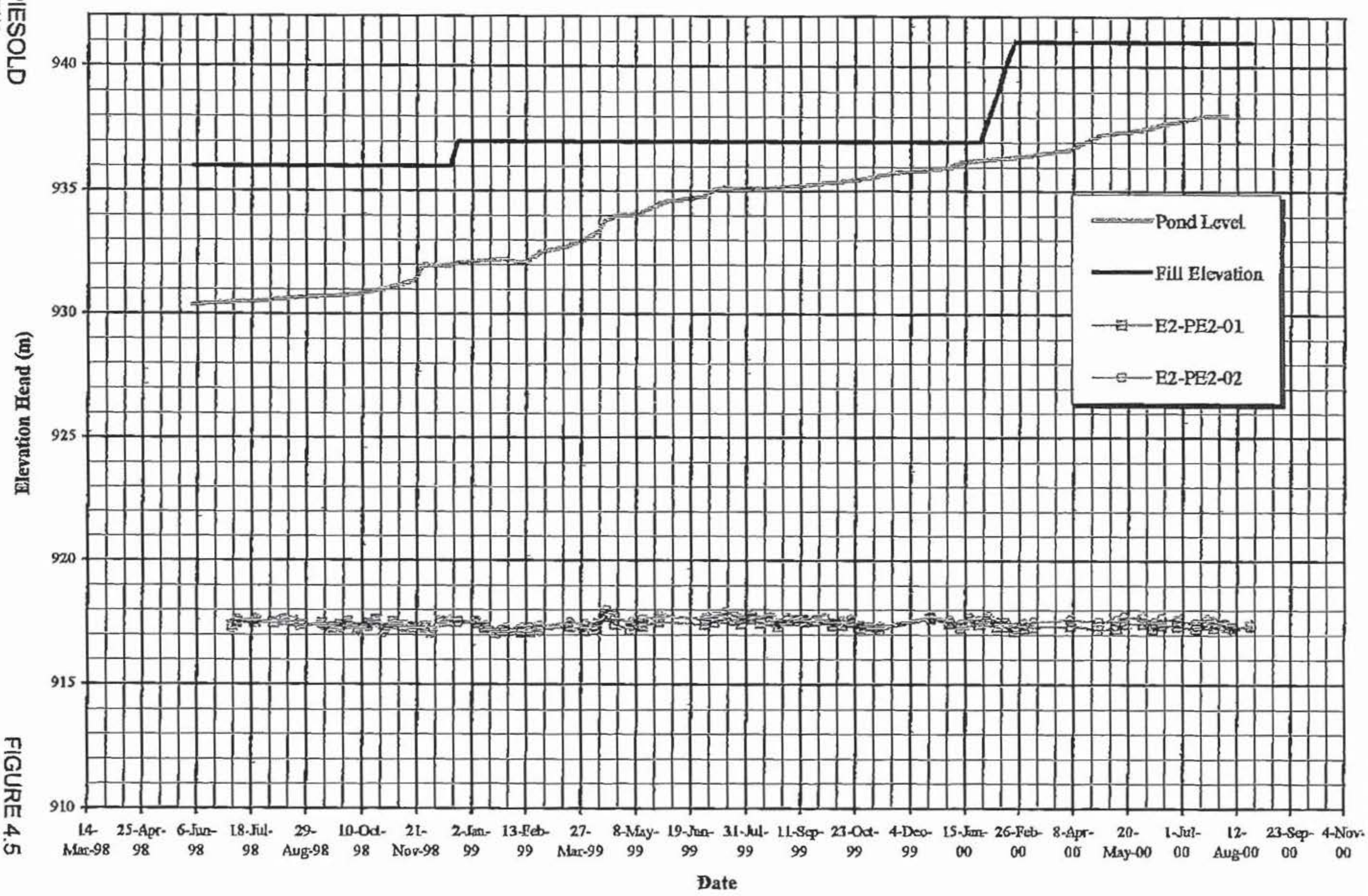


FIGURE 4.4

Plane E All Piezos

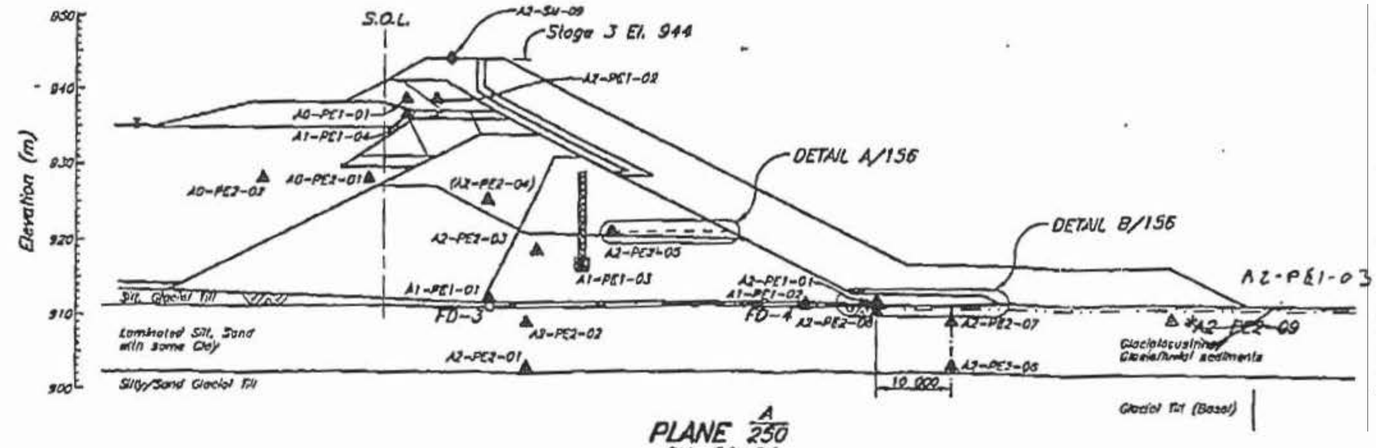
8/26/00

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE E PIEZOMETERS

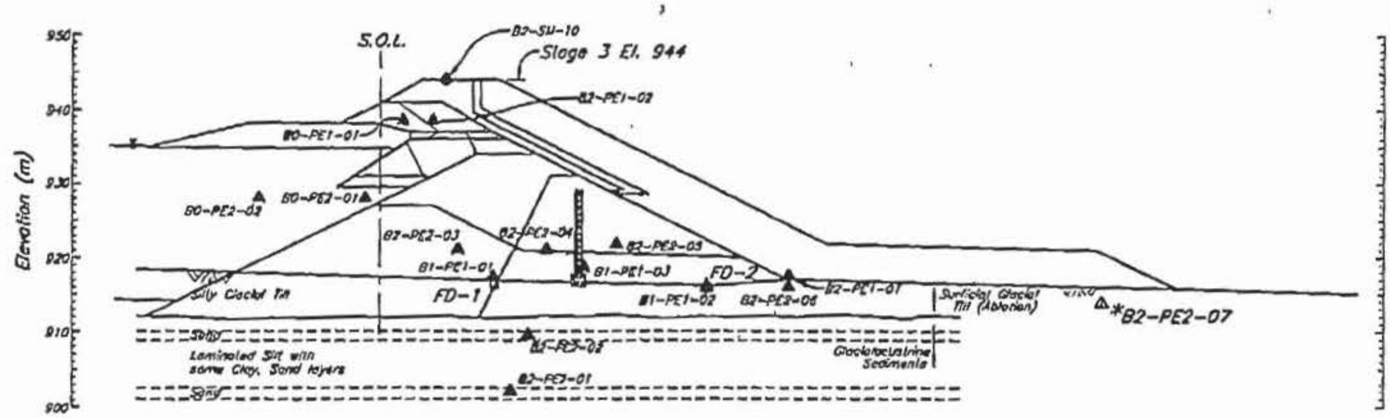


KNIGHT PIESOLD CONSULTING

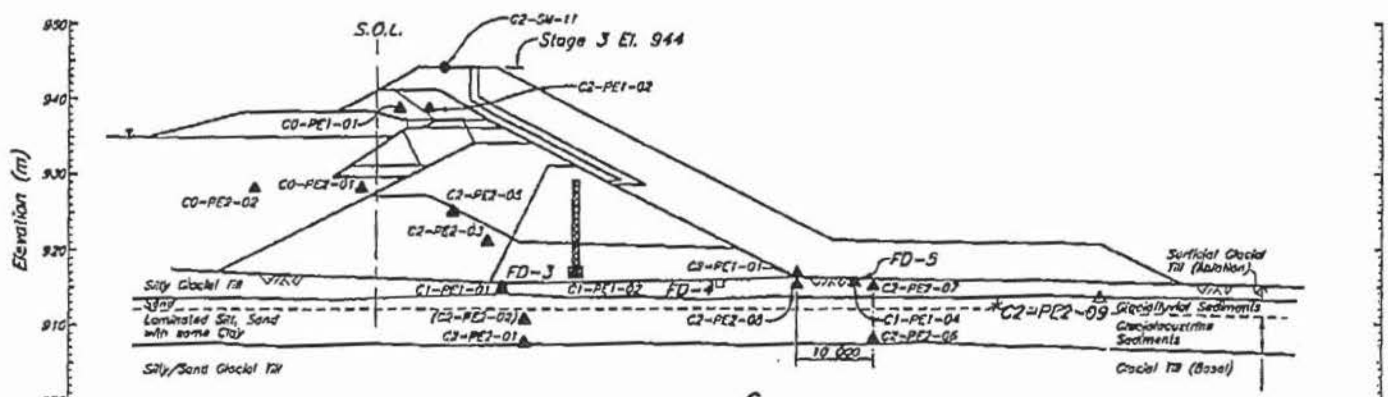
FIGURE 4.5



PLANE A/250
CH. 20+00



PLANE B/250
CH. 22+40



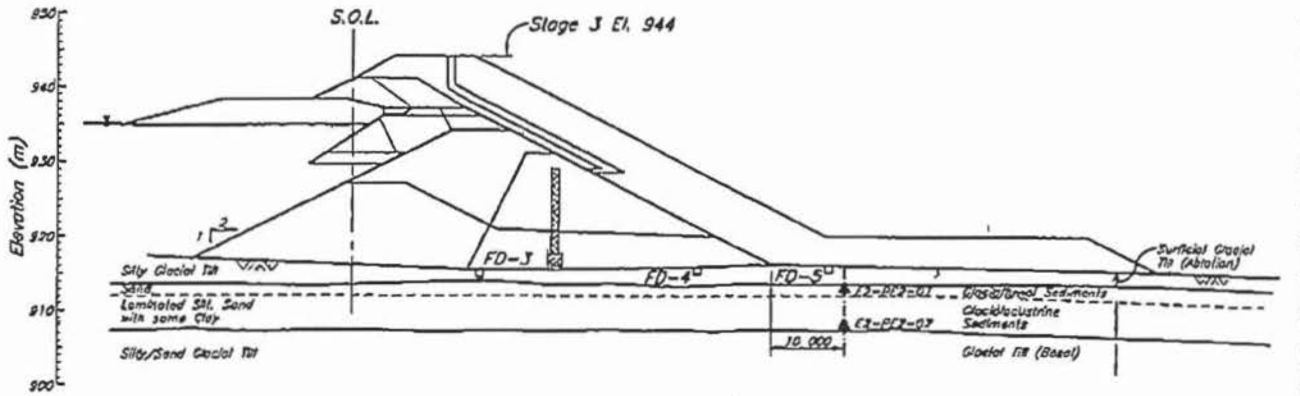
PLANE C/250
CH. 18+50

DESCRIPTION
- INSTRUMENTATION - SECTIONS 2 OF 2
- INSTRUMENTATION - SUMMARY OF INSTALLATION & TYP. DETAILS
- INSTRUMENTATION - PLAN

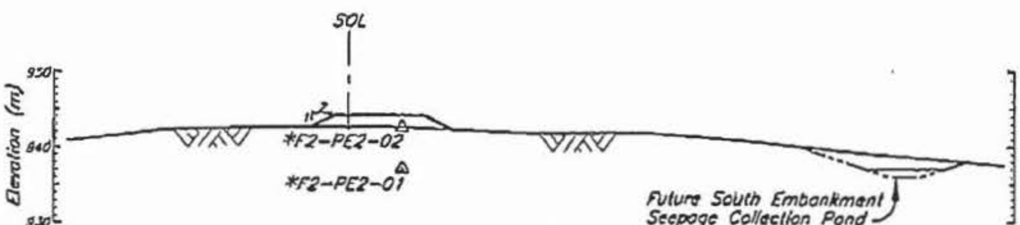
:NCE DRAWINGS

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D	REV.	DATE	DESCRIPTION
							0	2JUN'00	ISSUED FOR CONSTRUCTION

REVISIONS | REVISIONS



PLANE $\frac{E}{250}$
CH. 17+60



PLANE $\frac{F}{254}$
CH. 7+19

DRG. NO.	DESCRIPTION
256	TSF – STAGE 3 TAILINGS EMBANKMENT – INSTRUMENTATION SUMMARY OF INSTALLATION & TYPICAL DETAILS
254	TSF – STAGE 3 TAILINGS EMBANKMENT – SOUTH EMBANKMENT – INSTRUMENTATION PLAN
250	TSF – STAGE 3 TAILINGS EMBANKMENT – MAIN EMBANKMENT – INSTRUMENTATION PLAN
130	TSF – STAGE 3 SOUTH EMBANKMENT – PLAN AND SECTION
215	TSF – STAGE 3 MAIN EMBANKMENT – SECTIONS AND DETAILS

REFERENCE DRAWINGS

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D

REVISIONS

AUGUST 16, 2000

Knight Piésold CONSULTING	**DATE:**	August 10, 2000	**FILE NO.:**	11162/13.F01
	TIME:		**REF NO.:**	00-032
Knight Piésold, Mt. Polley Site *Fax: (600) 700-9075* *Phone: (600) 700-1879*	**OPERATOR:**	s.22	**PAGES:**	1 of 19
	SENDER:		**APPROVED:**	

TO: KP Vancouver **FAX :** 604-685-0147

ATTN: Ken Brouwer

CC: George Headley, MEM (250) 952-0481
Don Parsons, MPMC
Eric LeNeve, MPMC

SUBJECT: Mount Polley Stage 3 TSF Construction - Progress Report No. 3

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY PROJECT

TAILINGS STORAGE FACILITY
STAGE 3 CONSTRUCTION
PROGRESS REPORT NO. 3
JULY 24 TO AUGUST 6, 2000

SECTION 1.0 – GENERAL

Mount Polley Mining Corporation (MPMC) continued Stage 3 construction activities for the Main and South Embankment with Tercon Contractors Ltd. (TCL) construction efforts at the Main Embankment and South Embankments. Knight Piésold Ltd. (KP) carried out QA/QC activities as required.

1.1 PERSONNEL

The following KP personnel were on site during the reporting period:

- s.22 On site July 24 through August 3.

The following MPMC management personnel were on site during the reporting period:

- Eric LeNeve, Tailings Coordinator: Left site July 28.
- Charlie O'Hara, Acting Mine Superintendent

1.2 WEATHER

Conditions were generally clear and warm during the reporting period, with occasional showers and thunderstorms. There were no weather related delays in the work.

1.3 DESIGN AND CONTRACT DEVELOPMENTS

Design modifications and contractual developments over the reporting period were as follows:

- TCL worked a skeleton crew on dayshift only from August 3 until the end of the reporting period. Full production is scheduled to resume on August 10.
- TCL rented MPMC's 14G grader.
- TCL hauled rock to a new spoil dump near the left abutment of the Perimeter Embankment.

There were no design changes during the reporting period.

1.4 TAILINGS FACILITY OPERATION AND MAINTENANCE

MPMC extended the tailings header to approximately CH 22+00 to facilitate beach development at the southwest end of the Main Embankment. Sanding problems continue to prevent discharge between CH 16+00 and CH 20+00.

The return pipeline from Main Embankment Seepage Collection Pond (MESCP) was reinstated on August 3. The release of water from Borrow Area No. 2 raised the pond level above the foundation drain outlets. The pond level has been reduced and flow readings can resume. MPMC is in the process of installing a platform inside the drain monitoring sump.

The new Linatex Separators arrived on site. Assembly is expected to commence in the next two weeks.

2.0 CONSTRUCTION ACTIVITIES

Construction activities for most of the reporting period consisted of foundation preparation and placement of Zones T and C. TCL has the following equipment on site for execution of the work:

- Seven Caterpillar 773 rock trucks (3 rentals)
- One Caterpillar 16G grader
- One Hitachi EX1100 backhoe
- One Caterpillar 375 backhoe
- One Caterpillar 322 backhoe
- One Caterpillar 583 packer
- One Caterpillar D8R dozer
- One Caterpillar D6D dozer
- One Caterpillar IT28B forklift
- One Caterpillar D8N dozer (rental)
- One Caterpillar CS563 packer (rental)
- One Hitachi EX700 backhoe (rental)
- Sevice, Fuel, and Water Trucks

The Hitachi EX1100 backhoe and three additional 773 rock trucks will be put into service on August 10. The D8N dozer was brought in to replace a rented D9N, which has been returned. CS563 packer was brought in as a temporary replacement for the CS583, which broke down.

The major activities during the reporting period are summarized below:

- Completion of foundation preparation and placement of geotextile filter fabric between CH 21+10 and 23+00. Filter sand was used in place of filter fabric between CH 21+80 and CH 23+00.
- Drilling and blasting in the Rock Borrow Area to produce Zone C and Zone T rock.
- Placement of Zone T rockfill on the prepared surface of the Main Embankment foundation between CH 21+10 and CH 23+00. Zone T was also spread on the existing downstream slope of the Main Embankment from CH 21+00 to CH 24+80.
- Placement of Zone C rockfill in the Main Embankment downstream buttress from CH 18+50 to CH 23+00. The buttress is essentially on grade.
- Trimming completed downstream slopes.
- Stripping the Main Embankment footprint between CH 15+00 and CH 15+50.
- Stripping the South Embankment footprint.
- Removal of unsuitable material from the existing downstream slope of the Main Embankment between CH 15+50 and CH 16+50, and between CH 24+80 and CH 28+26. Loose, saturated till was removed with the 375 and 322 excavators and hauled to spoil.
- Standing water was drained from Borrow Area No. 2. Water was collected by the existing sediment control system and routed into the MESCP.
- The MPMC tailings crew removed unsuitable material from the downstream slope of the Perimeter Embankment from CH 37+00 to CH 44+80. The material was removed from the slope with Hitachi 270 and 400 excavators and haul to spoil using a CAT 777 rock truck.

The following summarizes the excavation and fill placement quantities completed during the reporting period and to date:

Material	Volume over Reporting Period (m^3)	Total Volume to Date (m^3)	Total Volume Required (m^3)	Percent Complete (%)
Main Embankment				
Foundation Exc.	2,752	46,528	45,000	103
Zone C	48,941	77,167	348,000	22
Zone F	0	0	27,000	0
Zone S	0	0	37,000	0
Zone T	15,560	37,174	51,000	73
Unsuitable from Emb. Slopes	6,400	6,821	11,000	62
South Embankment				
Foundation Excavation	3,600[2]	3,600	4,500	80
Zone S	0	0	8,300	0

Notes: 1. Fill volumes are based on load counts and are supplied by MPMC.

2. South Embankment foundation excavation completed with bulldozer.

SECTION 3.0 – KNIGHT PIESOLD ACTIVITIES

KP activities over the reporting period included the following:

- Completion of quality control testing of Zone C and Zone T samples.

- Monitoring of Main and South Embankment foundation preparation.
- Monitoring of embankment slope preparation.
- Monitoring placement of geotextile filter fabric and filter sand on approved foundations.
- Monitoring of Zone T and C placement in the downstream buttress of Main Embankment.
- Monitoring of Rock Borrow Area development and materials available for fill placement.
- Attendance of progress meetings.
- Monitoring of flows from Main Embankment foundation and toe drain outlets.
- Reviewing piezometer data.
- Completion of daily reports summarizing QA/QC and construction activities.

SECTION 4.0 – EMBANKMENT MONITORING

On-going monitoring of instrumentation was continued over the reporting period. Data collected indicates that the TSF is performing well within design tolerances.

4.1 VIBRATING WIRE PIEZOMETERS

Initial data was collected for three new vibrating wire piezometers, A2-PE1-03, B2-PE1-03 and C2-PE1-03, installed in foundation soils during the previous reporting period. Two piezometers on Plane D, which have not been monitored since September 1999, were reinstated. These comprised D2-PE1-01 (Zone T) and D2-PE2-02 (Foundation). Readings taken on August 2 were unchanged from those taken in 1999.

The following observations of the vibrating wire piezometer data are based on the summary data provided on Figures 1 through 5.

- <u>Foundation Piezometers</u>

  Three foundation piezometers indicated slight increases in pore water pressure in response to fill placement.

  - A2-PE2-08: increase of 0.87 m
  - B2-PE2-06: increase of 0.54 m
  - B2-PE1-03: new piezometer, increase of 1.04 m

  The remaining foundation piezometers remained static during the reporting period.

- <u>Fill Piezometers</u>

  Fill piezometers generally remained static with the exception of C2-PE2-05, which continues to show gradual increases in the measured pore water pressures.

- <u>Drain Piezometers</u>

  All piezometers located within the drains have remained static and at very low head indicating that the drains are free draining and are functioning as designed.

- <u>Tailings Piezometers</u>

  Readings from piezometers installed in the tailings continue to mimic the pond level.

4.2 DRAIN FLOWS

The water level in the MESCP exceeded the height of the drain outlets during the reporting period. It has since been pumped down, and flow measurements can resume. The results of July 25 measurements are summarized below.

Drain	Flow (l/min)	Comments
FD-1	4.2	Clear.
FD-2	1.4	Clear.
FD-3	16.8	Clear.
FD-4	1.5	Clear.
FD-5	39.0	Clear. Top of drain exposed during foundation excavation and is intercepting surface runoff.
FD Total	62.9	
ME East TD Outlet	85.2	Clear. Higher flow (compared to west outlet) may be due to active tailings deposition on the east side of the impoundment.
ME West TD Outlet	42.6	Clear
PE South TD Outlet	3.8	Clear.
Toe Drain Total	131.6	
Grand Total	194.5	

The water level in GW96-9 was observed to be approximately 30 cm below the top of the well casing. It decreased slightly during the Stage 3 foundation excavation.

5.0 – LABORATORY TESTING

A total of three (3) record samples (two Zone T and one Zone C) were collected during the reporting period. Test results, summarized on Tables 5.1 and 5.2, and Figures 5.1 and 5.2, show that both samples meet the specification for particle size distribution.

6.0 – ONGOING ISSUES

The following issues are to be addressed during the upcoming or future reporting periods:

- MPMC continues to focus on difficulties with the tailings discharge line.
- MPMC will assemble the new Linatex Separators.
- Production is expected to increase significantly with the larger EX1100 excavator and three additional trucks.
- Collection and evaluation of monitoring data will continue.
- Groundwater monitoring wells downstream of the South Embankment to be installed.

Submitted by

s.22

Knight Piésold Ltd.

Distribution: Eric LeNeve, Tailings Coordinator, MPMC, Site

Don Parsons, Mine Superintendent, MPMC, Site

George Headley, Ministry of Energy and Mines, Victoria, B.C.

Ken Brouwer, Project Director, KP Vancouver

TABLE 5.1

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE T RECORD TESTS - SUMMARY SHEET

C:\Mt Polley Stage 3\data\lab\Zone T\[Zone T Summary.xls]Table

Date Printed: 09-Aug-00

Date Sampled	Sample No.	Location	C3 (Particle Size Distribution)[1] Cobble %	Gravel %	Sand %	Silt and Clay %
05-Jul-00	R/ZT-3-1	Zone T Fill	20.0	61.5	15.7	2.8
15-Jul-00	R/ZT-3-2	Zone T Fill	20.0	58.7	16.1	5.1
24-Jul-00	R/ZT-3-3	Zone T Fill - 20+20, El. 912 (approx.)	13.9	66.1	18.4	1.6
27-Jul-00	R/ZT-3-4	Zone T Fill - 22+00, El. 915 (approx)	22.0	65.0	12.5	0.5
		MEAN	19.0	62.8	15.7	2.5
		MEDIAN	20.0	63.3	15.9	2.2
		MAXIMUM[2]	22.0	66.1	18.4	5.1
		MINIMUM[2]	13.9	58.7	12.5	0.5

Notes:
1. C3 (Particle Size Distribution) - ASTM D422
2. These are 100 % limits.

Revised On: July 23, 2000
Revision 0

TABLE 5.2

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE C RECORD TESTS - SUMMARY SHEET

C:\Mt Polley Stage 3\data\lab\Zone C\[Zone C Summary.xls]Table

Date Printed: 09-Aug-00

Date Sampled	Sample No.	Location	C3 (Particle Size Distribution)[1]				
			Boulder %	Cobble %	Gravel %	Sand %	Silt and Clay %
02-Aug-00	R/ZC-3-1	Zone C Fill, CH 20+10	19.0	37.4	34.7	8.4	0.5
		MEAN	19.0	37.4	34.7	8.4	0.5
		MEDIAN	19.0	37.4	34.7	8.4	0.5
		MAXIMUM[2]	19.0	37.4	34.7	8.4	0.5
		MINIMUM[2]	19.0	37.4	34.7	8.4	0.5

Notes:
1. C3 (Particle Size Distribution) - ASTM D422
2. These are 100 % limits.

Revised On: July 23, 2000
Revision 0

KNIGHT PIESOLD CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE A PIEZOMETERS

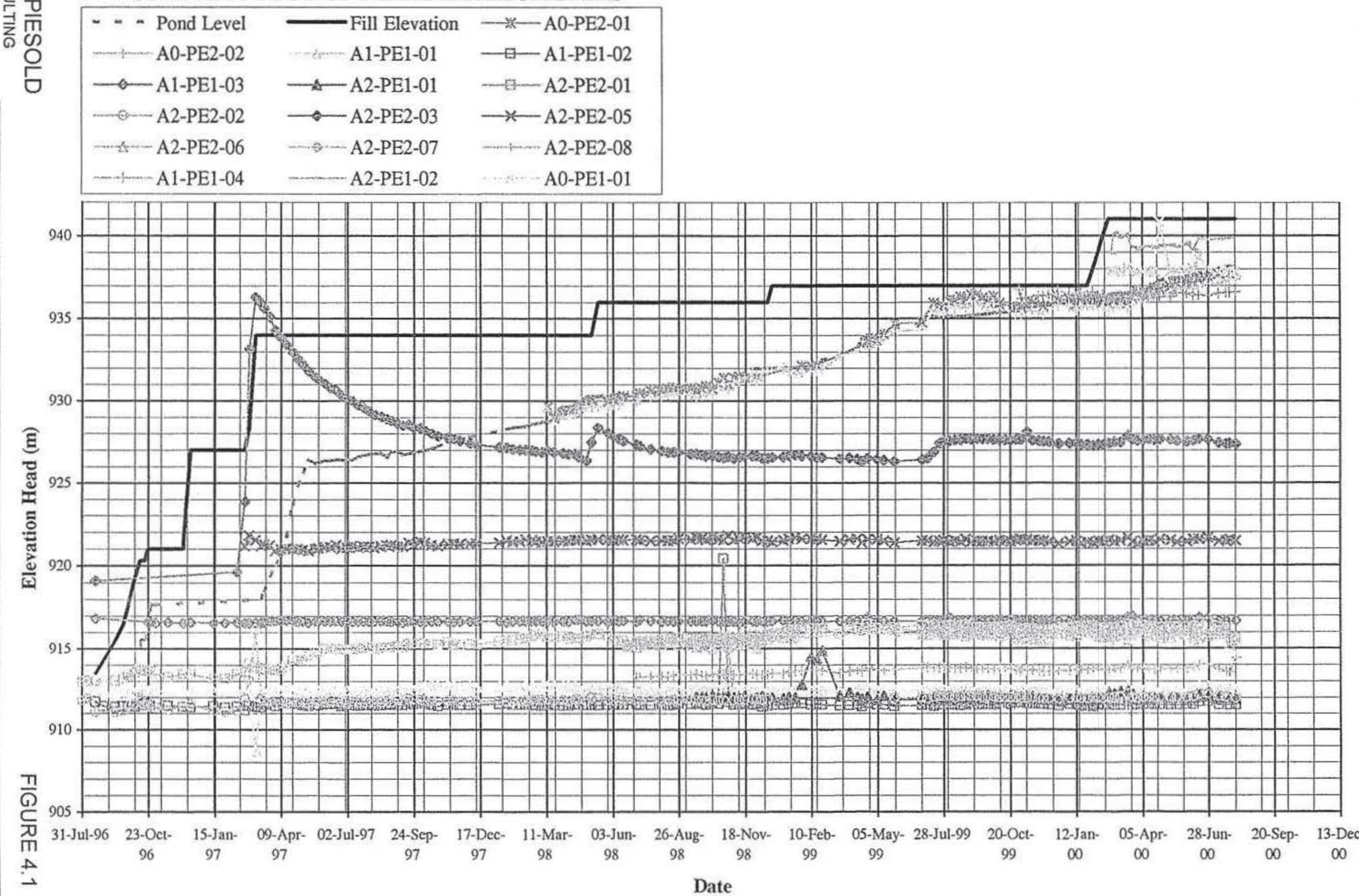


FIGURE 4.1

KNIGHT PIESOLD
CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE B PIEZOMETERS

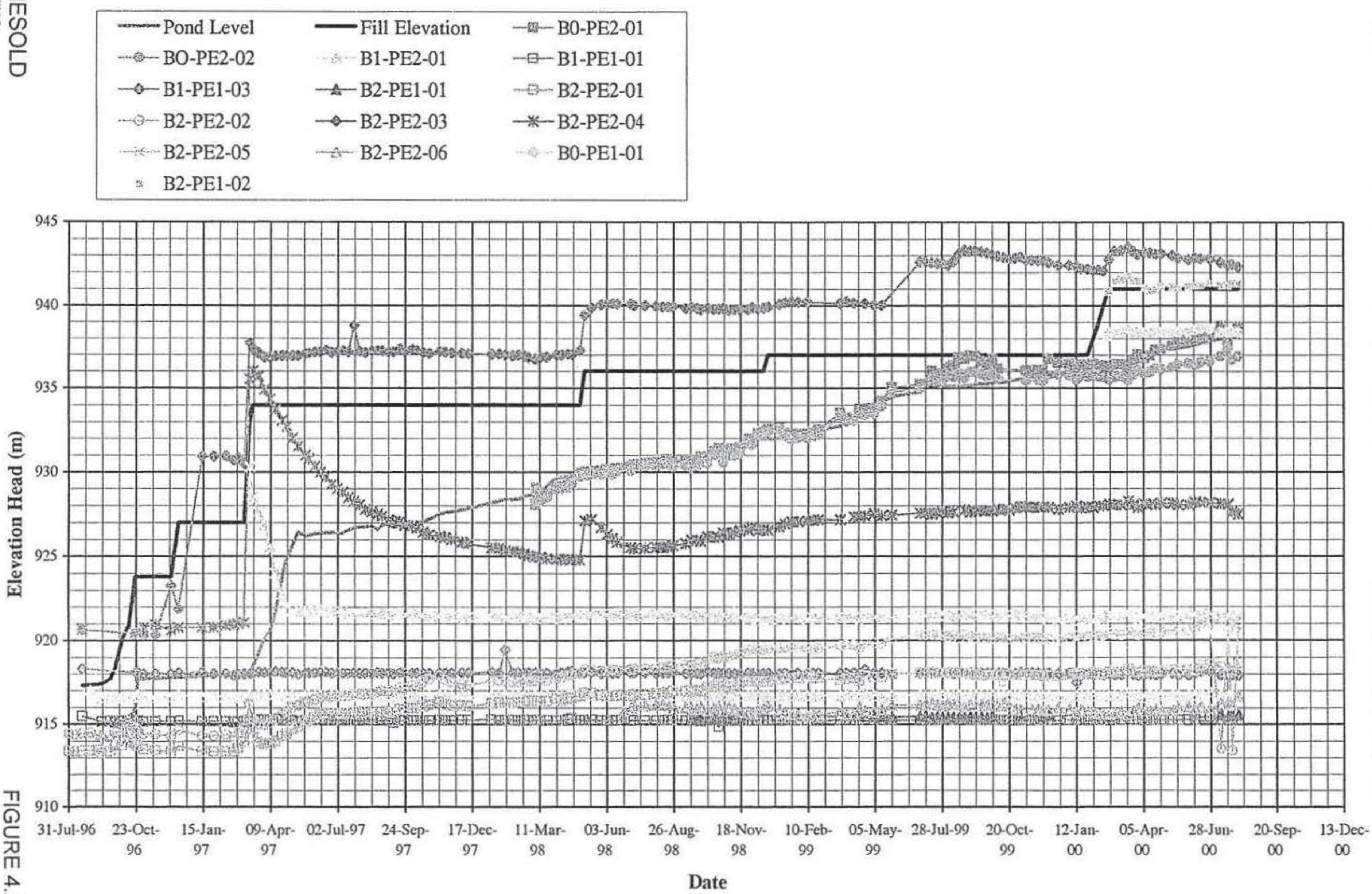


FIGURE 4.2

KNIGHT PIESOLD CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE C PIEZOMETERS

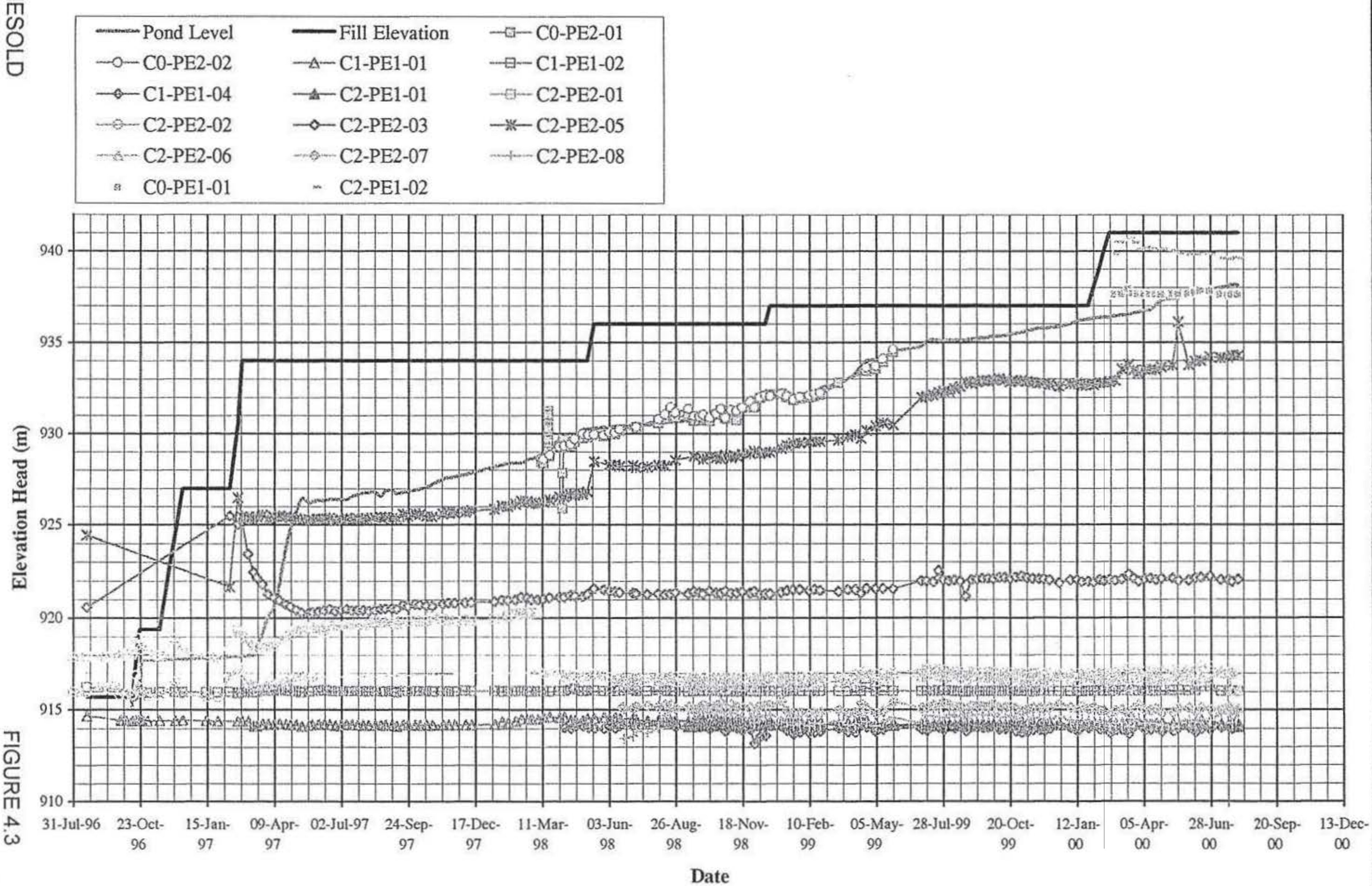


FIGURE 4.3

KNIGHT PIESOLD
CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE D PIEZOMETERS

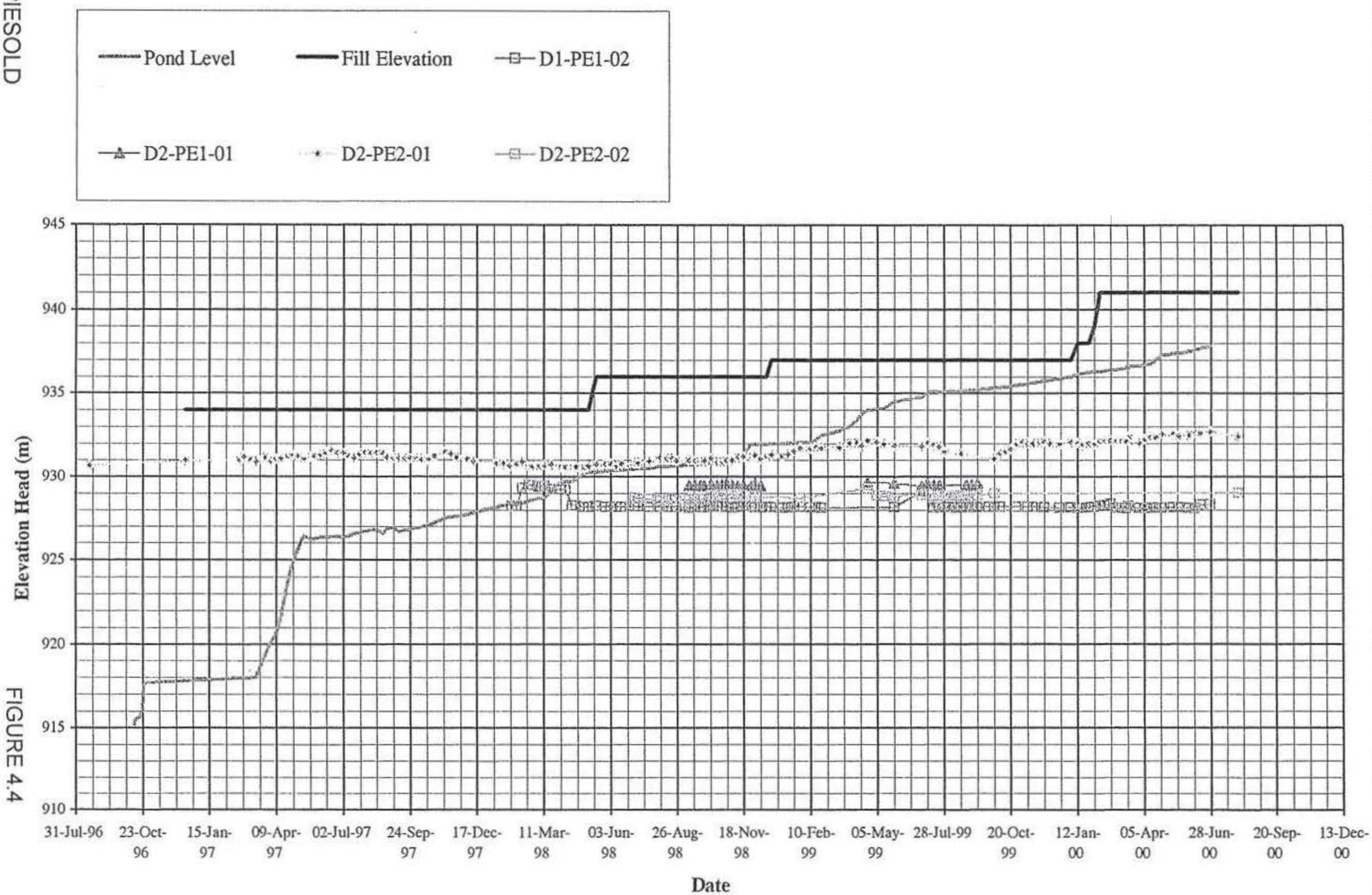
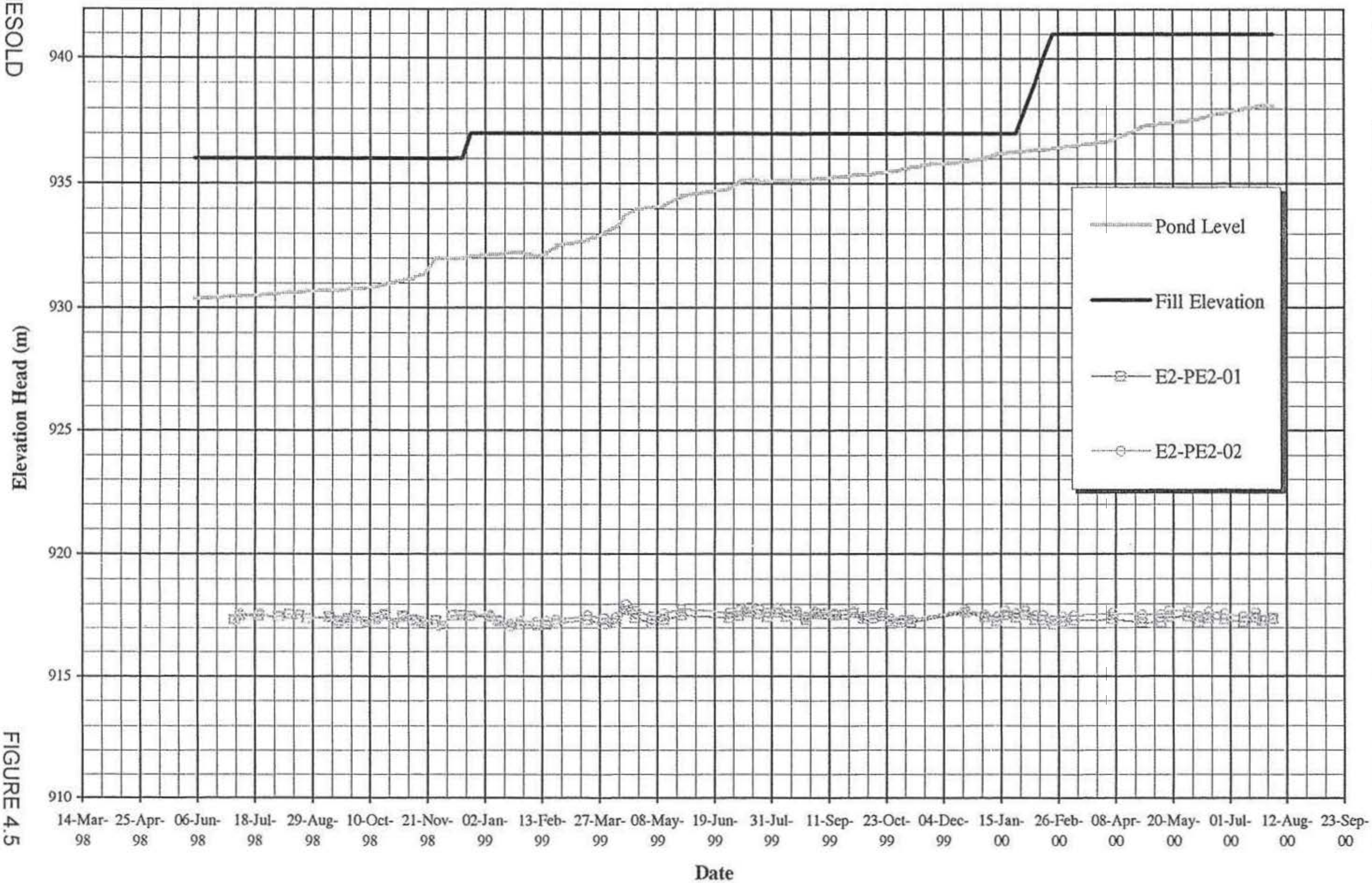


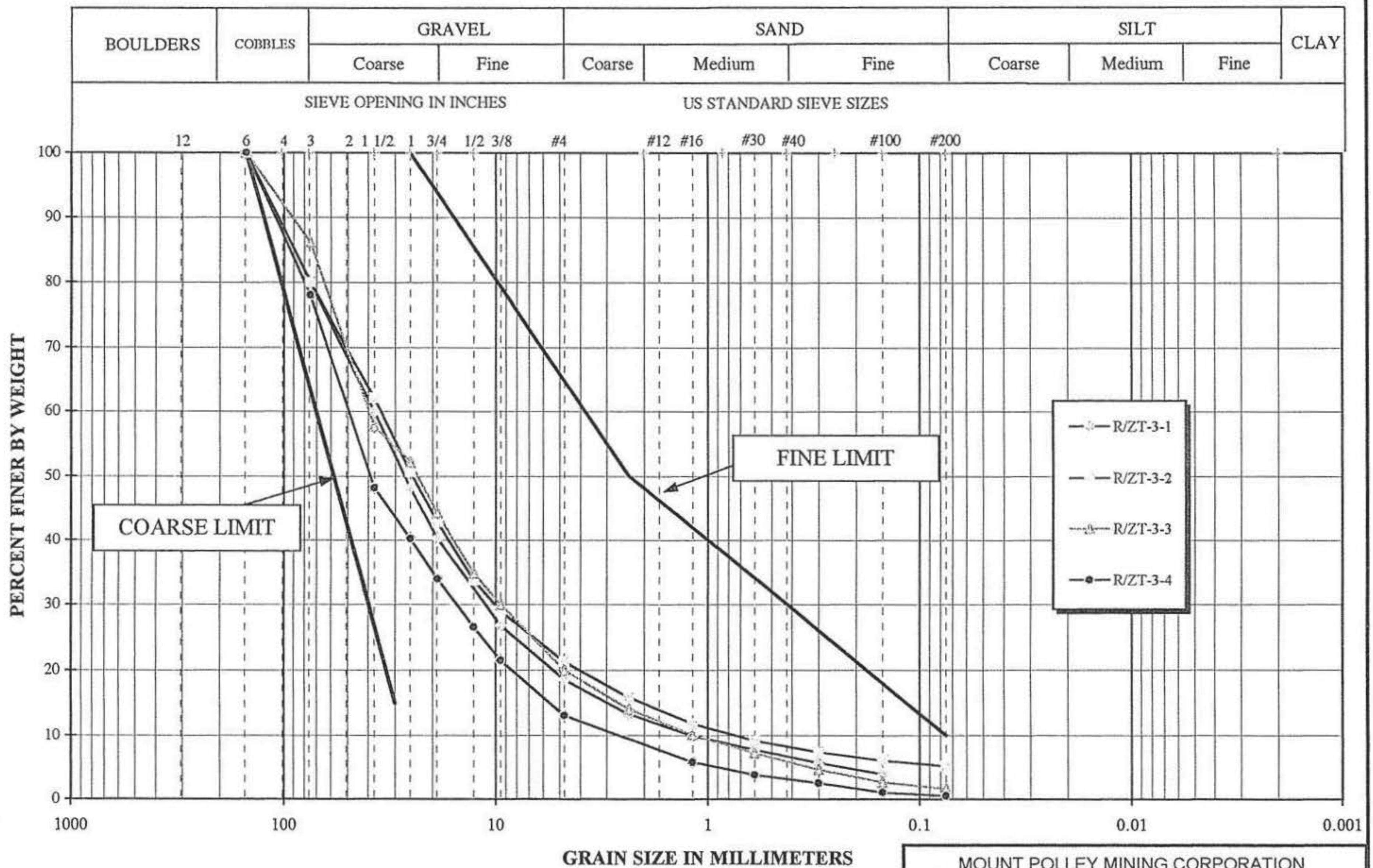
FIGURE 4.4

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE E PIEZOMETERS



KNIGHT PIESOLD CONSULTING

FIGURE 4.5



MOUNT POLLEY MINING CORPORATION

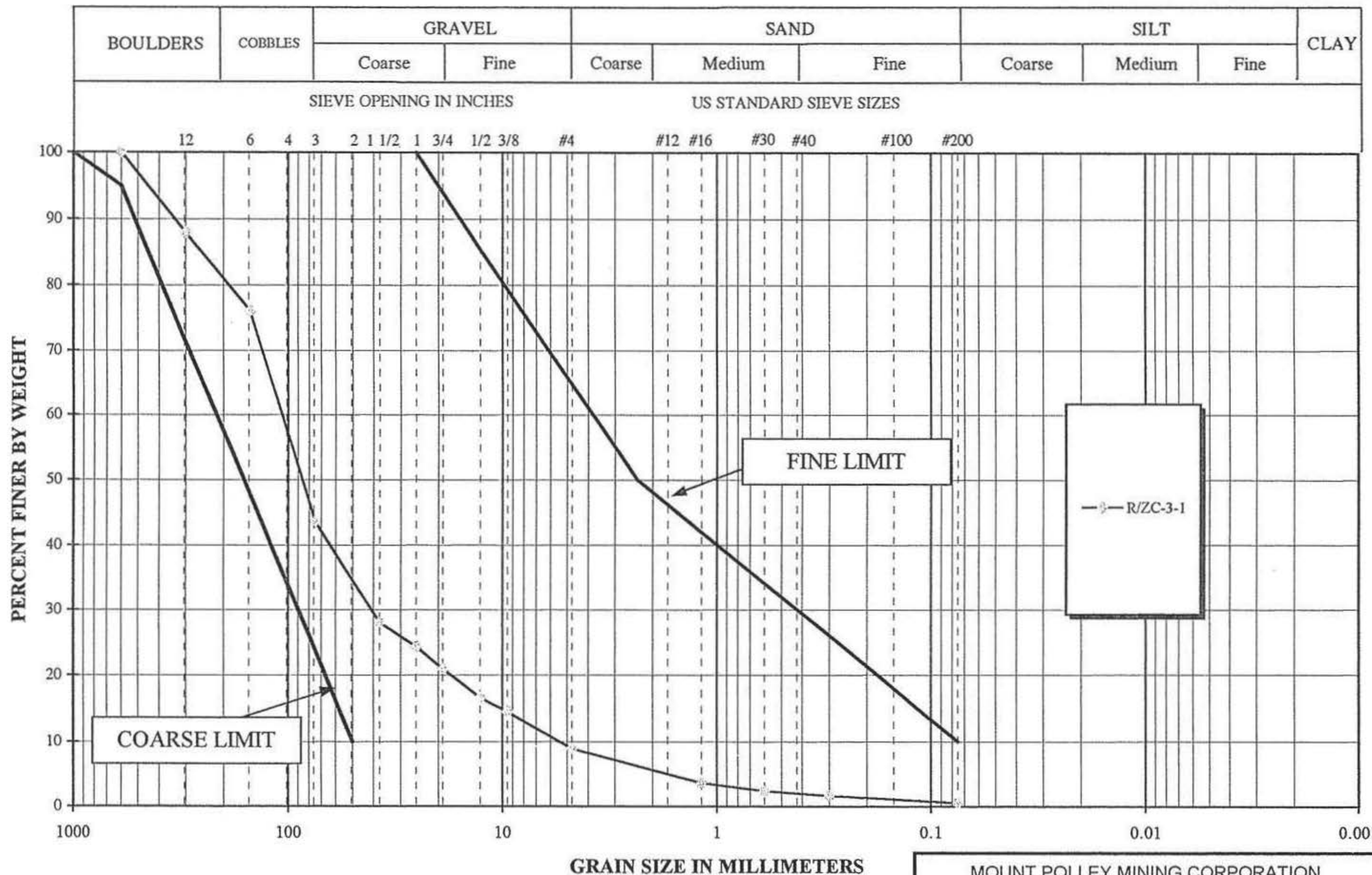
MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY
ZONE T RECORD SAMPLES
GRADATION CURVES

Knight Piésold CONSULTING

PROJECT NO.	REF. NO.	REV.
11162/13		

FIGURE 5.1



MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY ZONE C RECORD SAMPLES GRADATION CURVES

Knight Piésold CONSULTING

PROJECT NO.	REF. NO.	REV.
11162/13		
FIGURE 5.2		

14745-40/MTPO/01

Knight Piésold
CONSULTING

Knight Piésold, Mt. Polley Site
Fax: (250) 790-2268
Phone: (250) 790-2215

DATE:	July 25, 2000	**FILE NO.:**	11162/13.F01
TIME:		**REF NO.:**	00-026
OPERATOR:		**PAGES:**	1 of 19
SENDER:	s.22	**APPROVED:**	

TO:	KP Vancouver	**FAX:**	604-685-0147
ATTN:	Ken Brouwer		
CC:	George Headley, MEM (250) 952-0481 Eric LeNeve, MPMC Charlie O'Hara, MPMC		
SUBJECT:	Progress Report No. 2		

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY PROJECT

TAILINGS STORAGE FACILITY
STAGE 3 CONSTRUCTION
PROGRESS REPORT NO. 2
JULY 10 TO JULY 23, 2000

SECTION 1.0 – GENERAL

Mount Polley Mining Corporation (MPMC) continued Stage 3 construction activities for the Main and South Embankment with Tercon Contractors Ltd. (TCL) construction efforts at the Main Embankment. Knight Piesold Ltd. (KP) carried out QA/QC activities as required.

1.1 PERSONNEL

The following KP personnel were on site during the reporting period:

- s.22 left site July 18.
- s.22 arrived on site July 17.
- s.22 On site July 17 and 18

The following MPMC management personnel were on site during the reporting period:

- Eric LeNeve, Tailings Coordinator
- Don Parsons, Mine Superintendent

1.2 WEATHER

Scattered showers at the beginning of the reporting period preceded sunny and warm conditions. There were no weather related delays in the work.

1.3 DESIGN AND CONTRACT DEVELOPMENTS

Design modifications and contractual developments over the reporting period were as follows:

- The limits of geotextile filter fabric to be placed on the foundation of the downstream buttress were revised to reflect foundation conditions. The design change allowed Zone T material to be placed directly on the glacial till foundation within 5 m of the downstream toe between CH 19+00 and CH 21+00. The downstream limit of the filter fabric was reduced further from CH 21+00 to CH 23+00. The entire Stage 3 footprint was covered between CH 17+00 and CH 19+00, where glaciofluvial sediments and artesian pressures were observed.

1.4 TAILINGS FACILITY OPERATION AND MAINTENANCE

MPMC continues to discharge tailings from a single point at CH 27+00 on the Main Embankment. Discharge from CH 16+00 to CH 20+00 is prevented by on-going problems with pressure build-up and sanding in the tailings pipeline. MPMC is working to resolve the problems and establish a beach at the southwest end of the Main Embankment.

The water level in the Main Embankment Seepage Collection Pond (MESCP) has been reduced following modifications to one of the pumps. The foundation and toe drain outlets are now above the pond level and monitoring can continue. The MESCP return pipeline was disassembled and removed from the Stage 3 footprint after the pond was pumped down. It will be reinstated as required.

2.0 CONSTRUCTION ACTIVITIES

Construction activities for most of the reporting period consisted of foundation preparation and placement of Zones T and C. TCL has the following equipment on site for execution of the work:

- Four Caterpillar 773 rock trucks
- One Caterpillar 16G grader
- One Caterpillar 375 backhoe
- One Caterpillar 322 backhoe
- One Caterpillar 583 packer
- One Caterpillar D8R dozer
- One Caterpillar D6D dozer
- One Caterpillar IT28B forklift
- One Caterpillar D9N dozer (rented from Peterson Contracting)
- One Hitachi EX700 backhoe (rented from Peterson Contracting)
- Sevice, Fuel, and Water Trucks

The major activities during the reporting period are summarized below:

- Construction of a haul road into the Borrow Area No. 2 spoil area using Zone C type material from the rock borrow.
- Removal of unsuitable material from the Stage 3 Main Embankment footprint from CH 20+50 to CH 23+00. The excavation was completed with the CAT 375 backhoe equipped with a cleanup bucket, leaving a contoured, water resistant surface.

- Placement of geotextile filter fabric on the approved foundation between CH 17+00 and CH 21+10. New filter fabric was overlapped 500 mm with the existing filter fabric at the toe of the Zone T haul road.
- Placement of Zone T on the prepared surface of the Main Embankment foundation between CH 17+00 and CH 21+10. The material consisted of select shot rock from the Rock Borrow Area.
- Placement of Zone C rockfill from CH 17+00 to CH 20+40.
- Grading completed downstream slopes,
- Extension of piezometers leads on Instrumentation Planes A, B, C and E.
- Installation of vibrating wire piezometers in the foundation materials of the Main Embankment on Planes A, B and C.

The following summarizes the excavation and fill placement quantities completed during the reporting period and to date:

Material	Volume over Reporting Period (m^3)	Total Volume to Date (m^3)	Total Volume Required (m^3)	Percent Complete (%)
Main Embankment				
Foundation Exc.	28,928	43,776	45,000	97
Zone C	28,226	28,226	348,000	8
Zone F	0	0	27,000	0
Zone S	0	0	37,000	0
Zone T	16,148	21,524	51,000	42
Unsuitable from Emb. Slopes	0	421	11,000	4

South Embankment				
Foundation Excavation	0	0	4,500	0
Zone S	0	0	8,300	0

Notes: 1. Fill volumes are based on load counts and are supplied by MPMC.

Night shift commenced on July 14.

SECTION 3.0 – KNIGHT PIESOLD ACTIVITIES

KP activities over the reporting period included the following:

- Completion of quality control testing of Zone F and Zone T samples.
- Monitoring of Main Embankment foundation excavations.
- Monitoring placement of geotextile filter fabric on approved foundation.
- Monitoring of Zone T and C placement in the downstream buttress of Main Embankment.
- Evaluation of Owner requested design changes and submission of same to KP Vancouver.
- Monitoring of Rock Borrow Area development and materials available for fill placement.
- Attendance of progress meetings.
- Monitoring of flows from Main Embankment foundation and toe drain outlets.
- Completion of daily reports summarizing QA/QC and construction activities.

SECTION 4.0 – EMBANKMENT MONITORING

On-going monitoring of instrumentation was continued over the reporting period. Data collected indicates that the TSF is performing well within design tolerances

4.1 VIBRATING WIRE PIEZOMETERS

Three new vibrating wire piezometers, A2-PE1-03, B2-PE1-03 and C2-PE1-03, were installed in foundation soils during the reporting period. Each instrument was installed in a test pit approximately 1.5 m deep, and was surveyed prior to burial. Data collected from these piezometers will be included in the bi-weekly summaries as trends develop.

The following observations of the vibrating wire piezometer data are based on the summary data provided on Figures 1 through 5.

- Foundation Piezometers

  Foundation piezometers remained static during the reporting period.

- Fill Piezometers

  The majority of fill piezometers remain static, with the exception of C2-PE2-05, which continue to show gradual increases in the measured pore water pressures.

- Drain Piezometers

All piezometers located within the drains have remained static and at very low head indicating that the drains are free draining and are functioning as designed.

- Tailings Piezometers

Readings from piezometers installed in the tailings continue to mimic the pond level.

4.2 DRAIN FLOWS

The MESCP was pumped down during the reporting period, permitting the measurement of flows from the foundation drains for the first time since December 22, 1998. Flows from the upstream toe drain outlets were measured for the first time. The results of July 18 measurements are summarized below.

Drain	Flow (l/min)	Comments
FD-1	3.6	Clear. Flow unchanged.
FD-2	0.6	Clear. Flow unchanged.
FD-3	16.8	Clear. Flow unchanged.
FD-4	1.2	Clear. Slight decrease in flow since 1998.
FD-5	24.0	Water is slightly turbid. Flow approximately double historic average. Top of drain exposed during foundation excavation and is intercepting surface runoff.
FD Total	46.2	
ME East TD Outlet	98.4	Clear. Higher flow (compared to west outlet) may be due to active tailings deposition on the east side of the impoundment.
ME West TD Outlet	44.4	Clear
PE South TD Outlet	4.0	Clear.

Toe Drain Total	146.8	
Grand Total	193.0	

The water level in GW96-9 was observed to be approximately 5 cm below the top of the well casing. It decreased slightly during the Stage 3 foundation excavation.

5.0 – LABORATORY TESTING

A total of six (6) control samples of Zone F material were collected and tested during the reporting period. MPMC crushes Zone F material at the mill. The results of particle size analyses indicate that the material is marginal, typically meeting or slightly exceeding the maximum D_{15}. Samples that met the specification were mixed by equipment prior to sampling. MPMC may adjust the crushing operation to achieve a finer product. Test results are summarized on Table 5.1 and Figure 5.1.

A total of two (2) record samples of Zone T material have been collected during the reporting period. Both samples came from material blasted by MPMC prior to Stage 3 construction. Test results, summarized on Table 5.2 and Figure 5.3, show that both samples meet the specification for particle size distribution.

6.0 – ONGOING ISSUES

The following issues are to be addressed during the upcoming or future reporting periods:

- MPMC continues to focus on difficulties with the tailings discharge line.
- TCL will experiment with removal of unsuitable material from the downstream slope of the Main Embankment and placement of Zone F material above El. 928.5 m. TCL hopes to place Zone F from CH 16+00 to CH 17+00 and from CH 26+00 to CH 28+00 by

pushing material up the slope. This placement method will be evaluated to ensure proper compaction.

- Fill placement at the Main Embankment downstream buttress will continue.
- Collection and evaluation of monitoring data will continue.
- Groundwater monitoring wells downstream of the South Embankment to be installed.

Submitted by,

s.22

Knight Piésold Ltd.

Distribution: Eric LeNeve, Tailings Coordinator, MPMC, Site
Don Parsons, Mine Superintendent, MPMC, Site
George Headley, Ministry of Energy and Mines, Victoria, B.C.
Ken Brouwer, Project Director, KP Vancouver

TABLE 5.1

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE F CONTROL TESTS - SUMMARY SHEET

C:\Mt Polley Stage 3\data\lab\Zone F\[Zone F Summary.xls]Table

Date Printed: 24-Jul-00

Date Sampled	Sample No.	Location	C3 (Particle Size Distribution)[1] Gravel %	Sand %	Silt and Clay %
17-Jul-00	C/ZF-3-1	Sampled from conveyor	64.2	32,9	2,9
19-Jul-00	C/ZF-3-2	Filter sand stockpile - July 17 crush	50.9	45.4	3.7
19-Jul-00	C/ZF-3-3	Sampled from conveyor	61.4	36.2	2.4
20-Jul-00	C/ZF-3-4	Filter sand stockpile - July 19 crush	49.9	47.0	3.1
29-Jun-00	C/ZF-3-5	Filter sand stockpile	61.0	38.0	1.0
29-Jun-00	C/ZF-3-6	Filter sand stockpile	59.7	37.2	3.1
		MEAN	57.9	39.5	2.7
		MEDIAN	60.4	37.6	3.0
		MAXIMUM[2]	64.2	47.0	3.7
		MINIMUM[2]	49.9	32.9	1.0

Notes:
1. C3 (Particle Size Distribution) - ASTM D422
2. These are 100 % limits.

Revised On: July 23, 2000
Revision 0

TABLE 5.2

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE - TAILINGS STORAGE FACILITY

STAGE 3 CONSTRUCTION
ZONE T RECORD TESTS - SUMMARY SHEET

C:\Mt Polley Stage 3\data\lab\Zone T\[Zone T Summary.xls]Table

Date Printed: 24-Jul-00

Date Sampled	Sample No.	Location	C3 (Particle Size Distribution)[1] Cobble %	Gravel %	Sand %	Silt and Clay %
05-Jul-00	R/ZF-3-1	Zone T Fill	20.0	61.5	15.7	2.8
15-Jul-00	R/ZF-3-2	Zone T Fill	20.0	58.7	16.1	5.1
		MEAN	20.0	60.1	15.9	4.0
		MEDIAN	20.0	60.1	15.9	4.0
		MAXIMUM[2]	20.0	61.5	16.1	5.1
		MINIMUM[2]	20.0	58.7	15.7	2.8

Notes:
1. C3 (Particle Size Distribution) - ASTM D422
2. These are 100 % limits.

Revised On: July 23, 2000
Revision 0

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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE A PIEZOMETERS

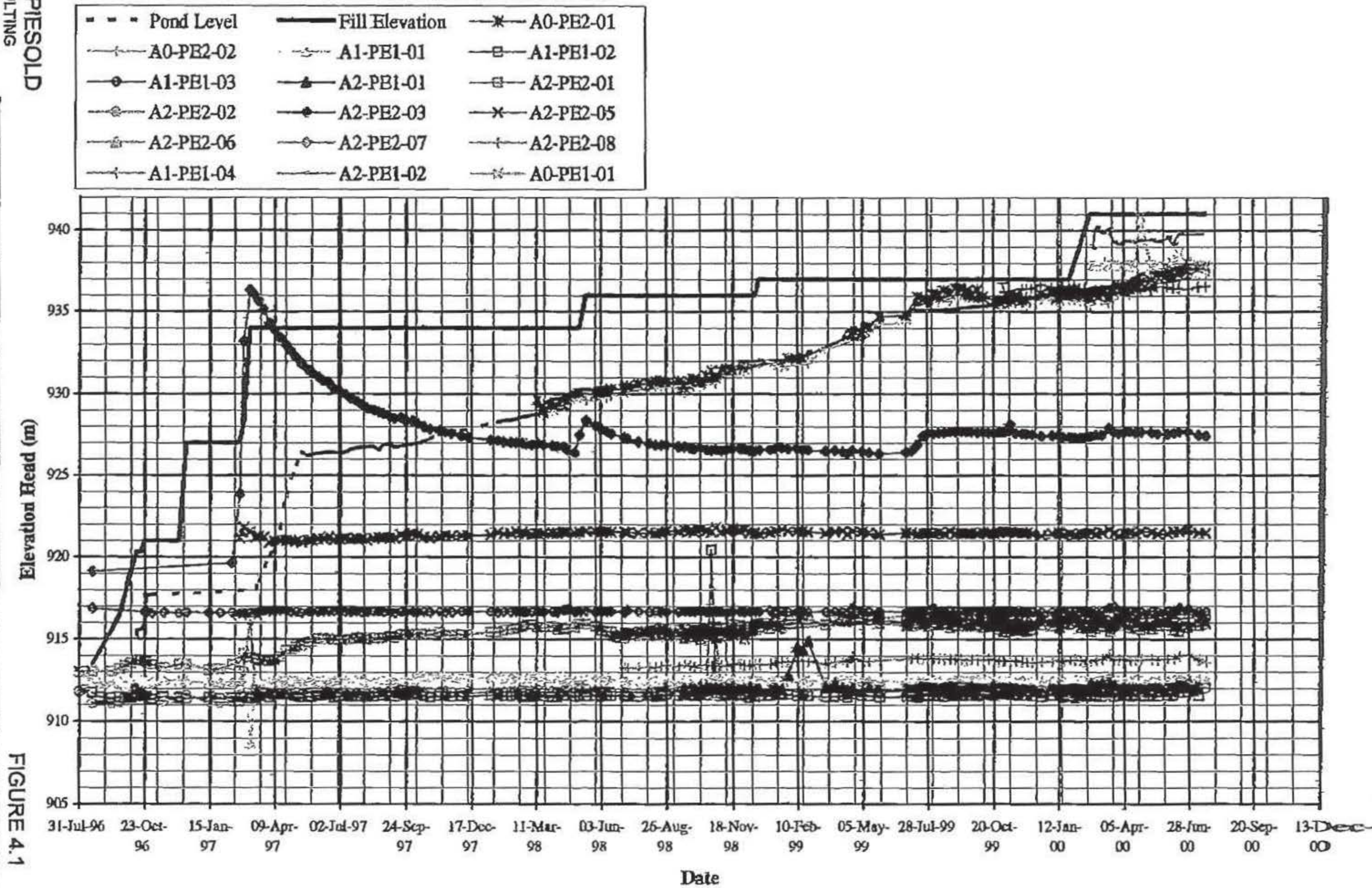

FIGURE 4.1

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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE B PIEZOMETERS

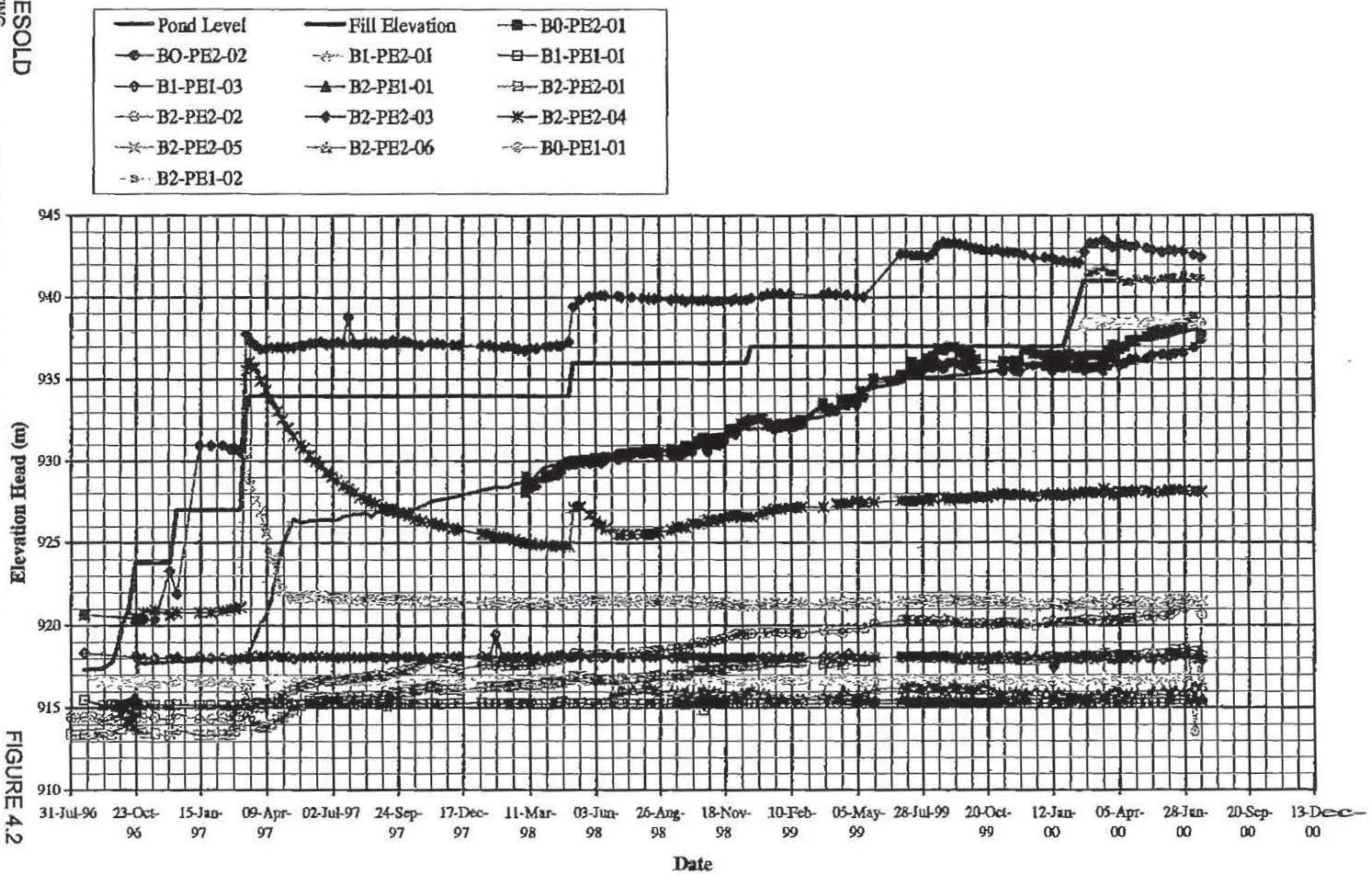

FIGURE 4.2

KNIGHT PIESOLD CONSULTING

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE C PIEZOMETERS

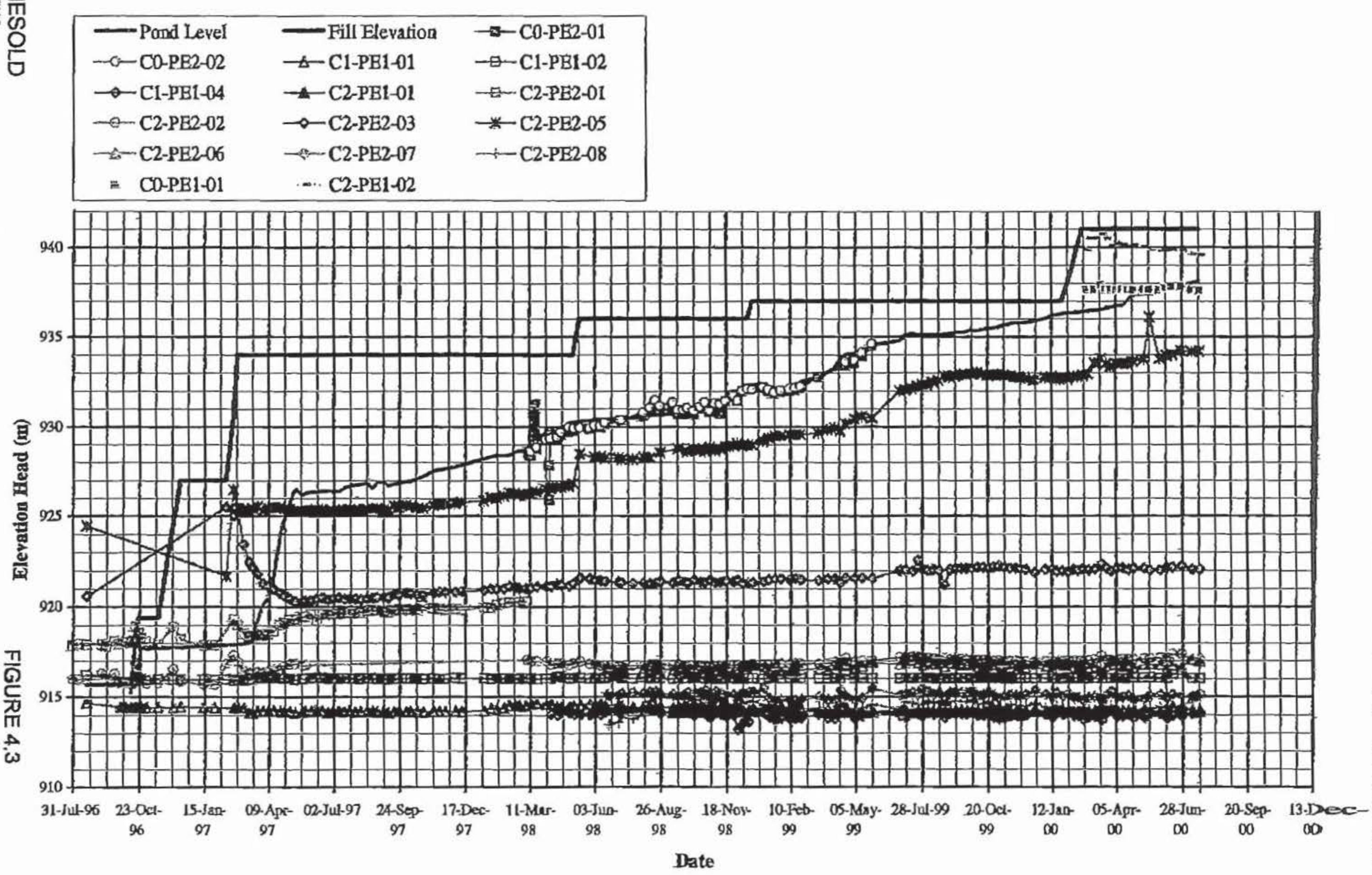

FIGURE 4.3

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE D PIEZOMETERS

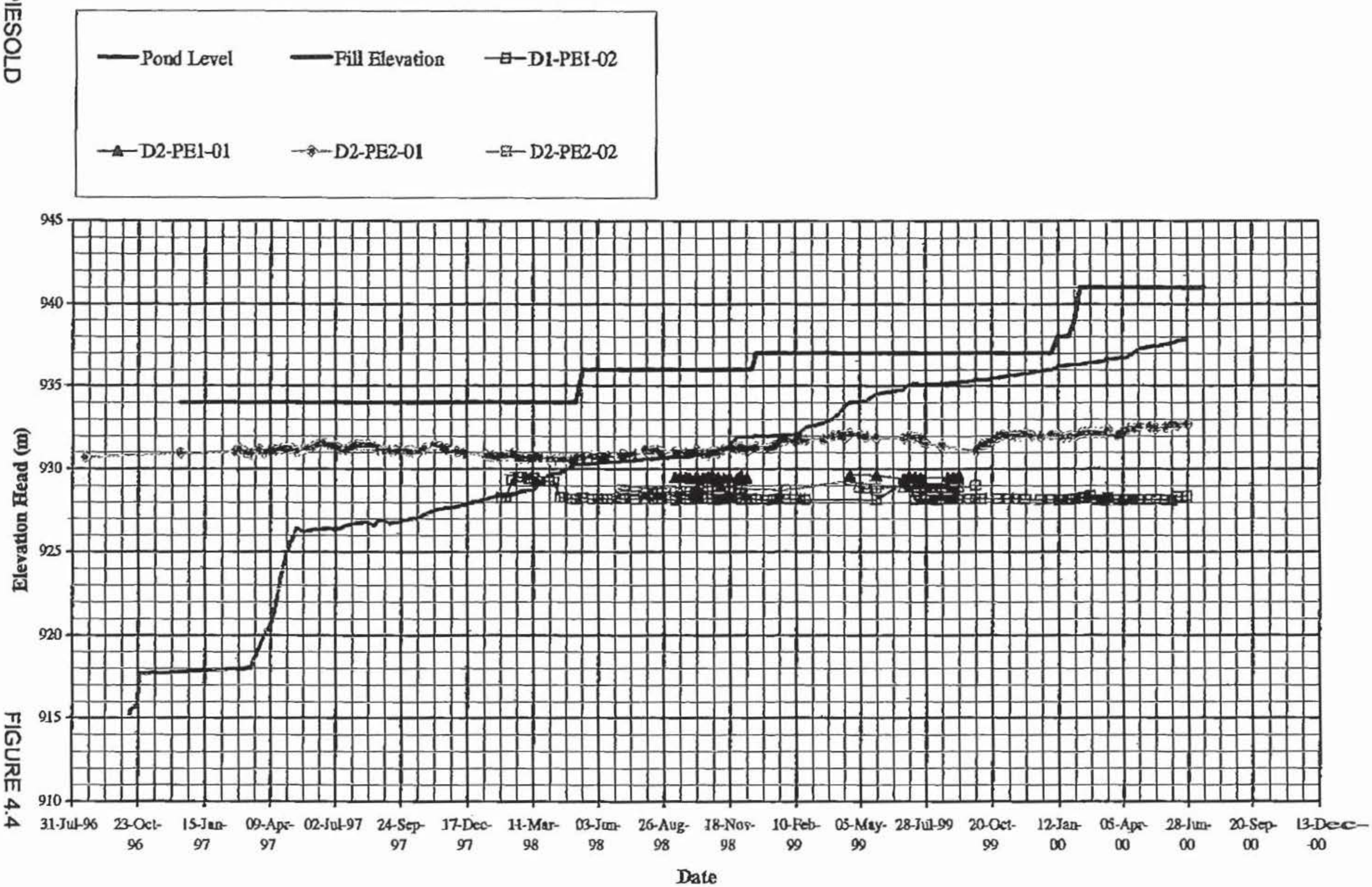

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FIGURE 4.4

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MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY
SUMMARY PLOT OF PLANE E PIEZOMETERS

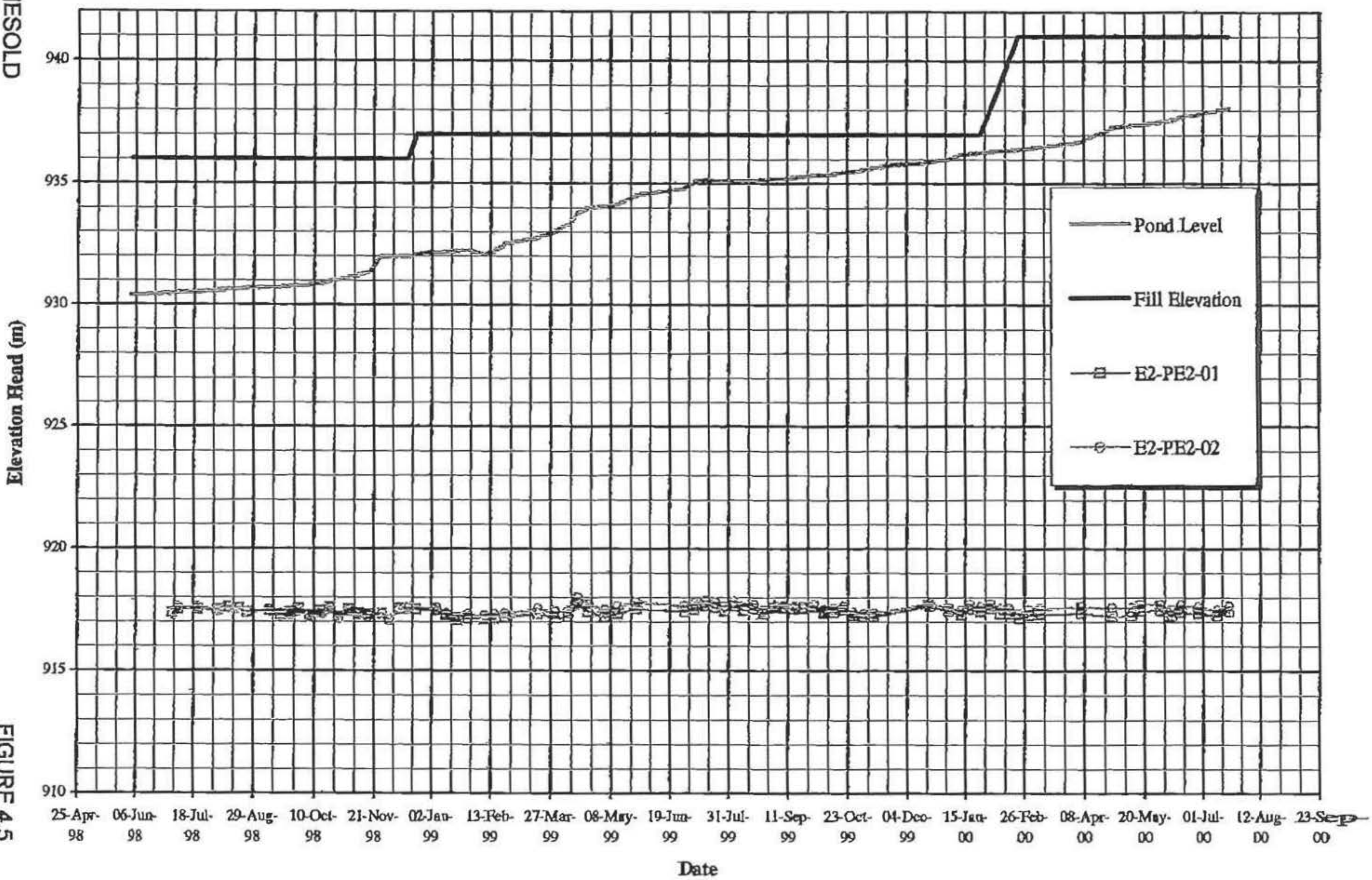

FIGURE 4.5

C:\MT POLLEY STAGE 3\DATA\LAB\ZONE F\Zone F Summary.xls Plot

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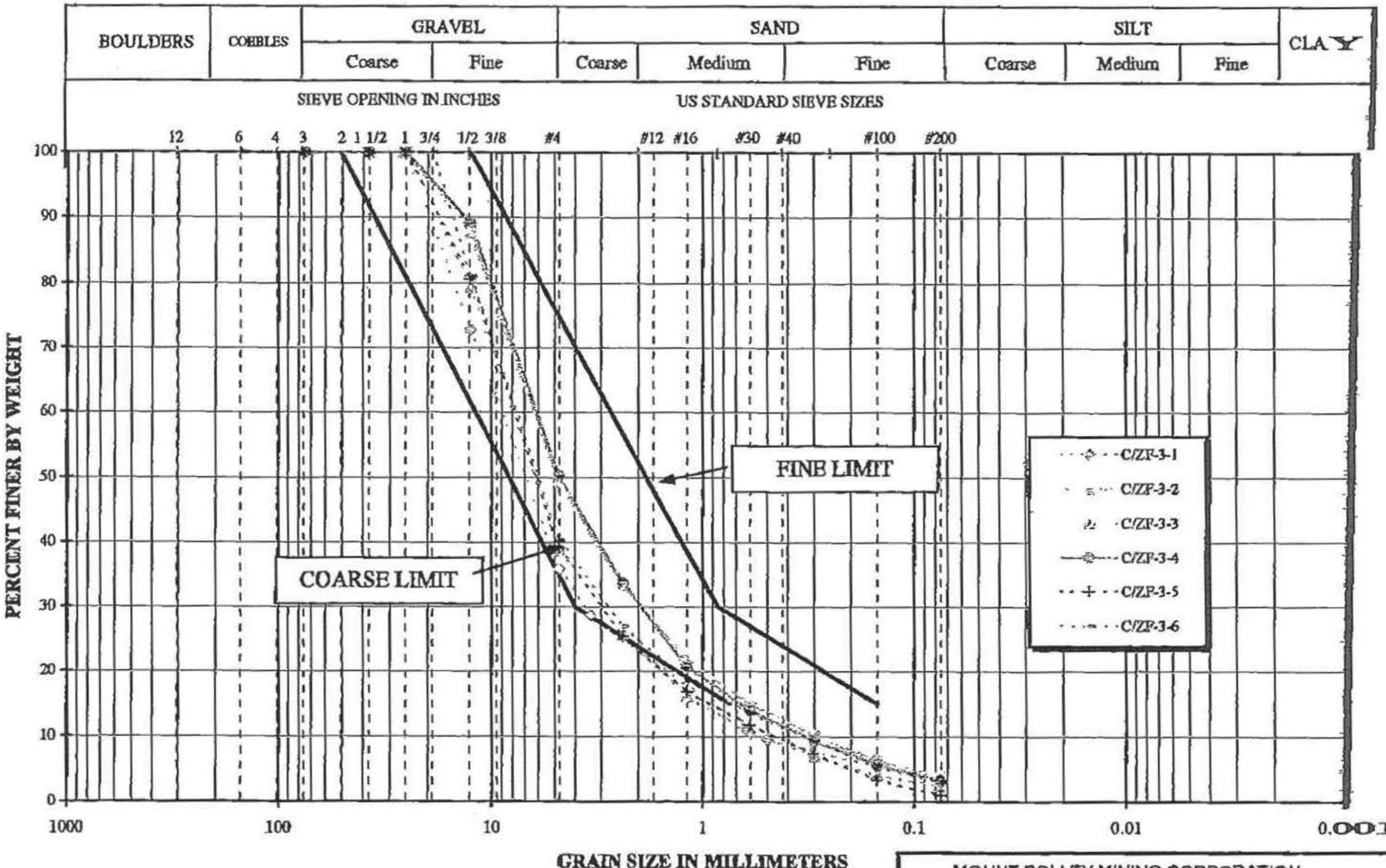
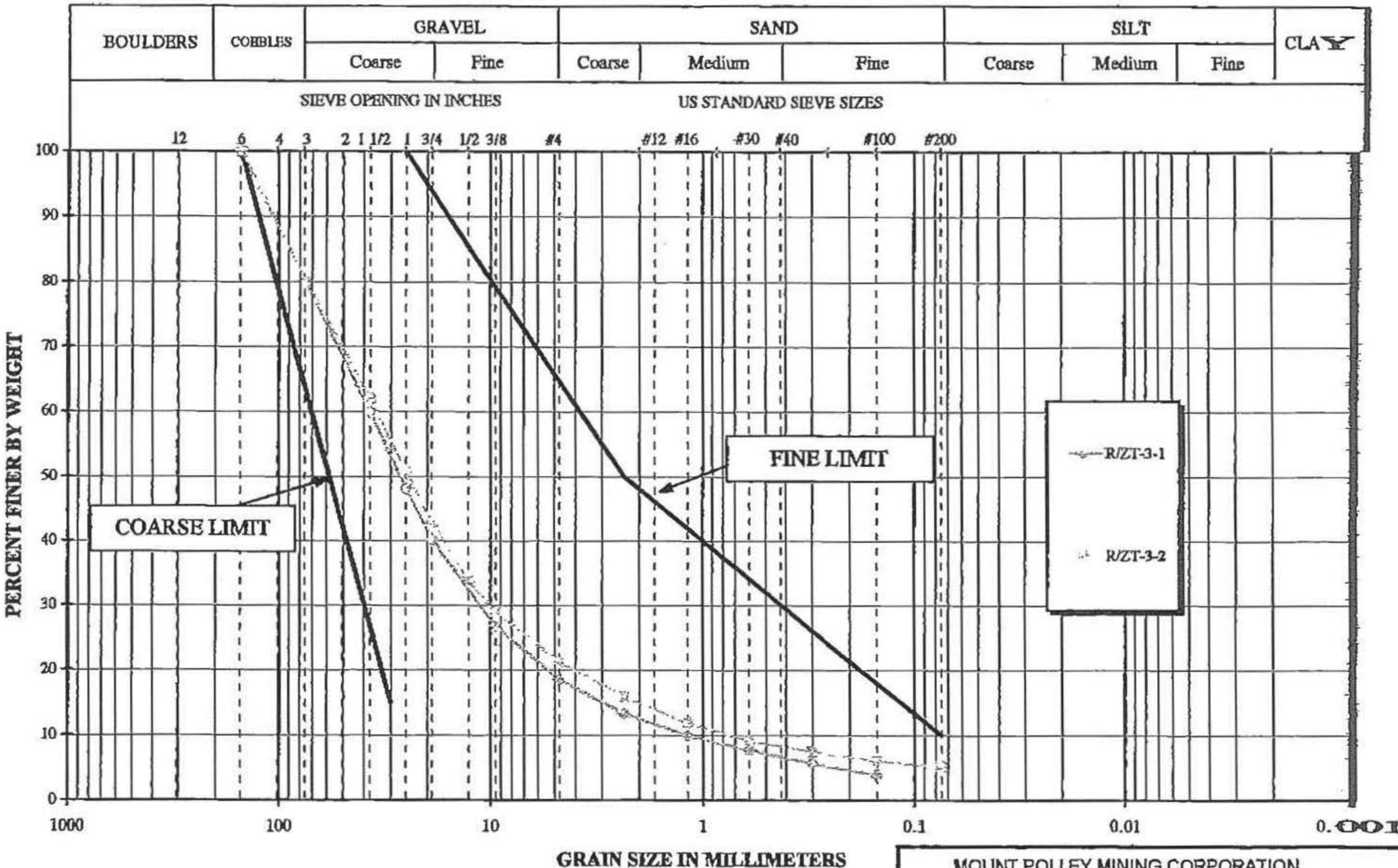


MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY ZONE F CONTROL SAMPLES GRADATION CURVES
Knight Piésold CONSULTING — PROJECT NO. 11162/13 — REF. NO. — REV. — FIGURE 5.1



MOUNT POLLEY MINING CORPORATION		
MOUNT POLLEY MINE		
TAILINGS STORAGE FACILITY ZONE T RECORD SAMPLES GRADATION CURVES		
Knight Piésold CONSULTING	PROJECT NO. 11162/13	REF. NO.
	FIGURE 5.2	REV.

CAL 17/01/01 → File.

FAX COVER SHEET

MOUNT POLLEY MINING CORPORATION
A DIVISION OF IMPERIAL METALS CORPORATION

DATE: SEPT. 1/00

ATTENTION TO: GEORGE HEADLY

FROM: ERIC LENEVE

COMPANY NAME: MEMPR.

PHONE: 250-790-2215
OR VANCOUVER LINES
604-602-7569
604-602-1793

FAX NO:

FAX NO: 250-790-2268

NUMBER OF PAGES:
INCLUDING COVER 13

LOG NUMBER: 1152?

REMARKS: ☐ URGENT ☐ FOR YOUR INFORMATION ☐ REPLY ASAP ☑ PLEASE COMMENT

SUBJECT: GEORGE; TSF ROCK BORROW WALL DESIGN COMMENTS, APPROVAL?

Eric

Knight Piésold
CONSULTING

Knight Piésold Ltd.

Suite 1400
750 West Pender Street
Vancouver, British Columbia
Canada V6C 2T8

Telephone: (604) 685-0543
Facsimile: (604) 685-0147
E-mail: kpl@knightpiesold.com

Our Reference: 11162/13.01
Number: 0/1854
August 22, 2000

Mr. Don Parsons
Mine Superintendent
Mount Polley Mining Corporation
Box 12
Likely, BC V0L 1N0

Dear Mr. Parsons,

Re: Mount Polley Mine
Tailings Storage Facility
Rock Borrow Bench Stability Assessment

1.0 INTRODUCTION

Mount Polley Mining Corporation (MPMC) is currently constructing the Stage 3 raise of the Tailings Storage Facility. Fill materials for the downstream shell zone of the Main Embankment comprise drilled and blasted rock taken from the Rock Borrow, which is located northwest of the facility. Drilling and blasting is carried out by the principal contractor, Tercon Contractors Ltd. (TCL), following initial development by MPMC.

Knight Piésold was requested to assess the stability of the Rock Borrow after the first bench face was exposed. The assessment included a review of the proposed bench design, surface mapping and evaluation of geotechnical data. The results of the assessment, with recommendations regarding bench design, are provided herein.

2.0 ROCK BORROW LAYOUT

The Rock Borrow layout comprises northwest, southwest and southeast walls as shown in plan on Figure 2.1. The proposed development plan consists of the formation of a 20 m high double bench with a 10 m berm and 70 degree bench-face slope. The design inter-ramp slope is 49 degrees. The ultimate height of the borrow walls will be approximately 46 m. Access is from the southeast.

The geology of the Rock Borrow primarily consists of megacrystic granite, characterized by large feldspar phenocrysts with a distinct augen shape. The granite is cut by dykes of varying composition, including monzonite, red granite, and a white volcanic.

3.0 GEOTECHNICAL DATA

3.1 Geotechnical Data Collection

Surface mapping of the exposed face on the El. 1020 bench was conducted by s.22 s.22 n August 12 and 14, 2000. The investigation included measurements of dip and dip direction as well as qualitative assessment of exposed rock joints. A total of 94 structures were measured along a 180 m traverse. A photographic log was also compiled.

3.2 Rock Mass Structure

The results of surface mapping on the El. 1020 bench are shown in stereographic projection on Figure 3.1. The rock is highly jointed. Joints are typically closely spaced and continuous, with smooth, planar to slightly undulating surfaces. Clay gouge was observed along 25 percent of joints. Dykes, faults and shears were also identified. Four dominant joint planes were identified:

- Plane A dips at 49 degrees toward the southeast and daylights in the northwest wall, as shown in Photograph 1.

- Plane B dips at 81 degrees toward the northeast and strikes sub-parallel to the southwest wall, as shown in Photograph 2.

- Plane C dips at 38 degrees toward the north-northwest.

- Plane D dips at 85 degrees toward the southwest.

The noted dip angles represent average values and the average orientations are included in Figure 3.1. Minor faults and shears within the rock are oriented parallel

Planes A, B and C. The orientation of dykes is somewhat random. These structures are characterized by highly fractured rock.

No water was observed in the face, although staining was observed on joint surfaces. Clay gouge was typically dry to moist. The more heavily fractured fault zones and dykes may act as conduits for water, as several holes drilled from the El. 1020 bench were wet. Anecdotal evidence also indicates wet zones within the rock mass.

4.0 BENCH STABILITY ASSESSMENT AND DESIGN

4.1 Northwest Wall

The type of instability along the northwest wall is characterized by planar sliding due to Plane A that strikes sub-parallel to and dips out of this wall as illustrated in Photograph 1. This type of instability results in slabs sliding into the Rock Borrow, although the close joint spacing of Plane A limits the size of the slabs. The proposed MPMC design bench configuration with a 10m berm (and bench height 20m) results in an inter-ramp angle approximately equal to the average dip of Plane A (49 degrees). The proposed design can be expected to give rise to further sliding and slabbing with subsequent excavation of the lower benches.

In order to minimize the size and occurrence of slabs along this wall it is recommended that MPMC adopt a 13m wide berm that results in an inter-ramp angle of 45 degrees. This flatter slope will decrease the number of joint planes that will daylight along this wall and instabilities, if at all, will be limited to the partial loss of the crest of the berm. This expected occurrence of instability should not manifest into any type of larger significant failure along this wall. Access along this wall may however not be possible and should not be planned.

4.2 Southwest Wall

Instability along the southwest wall is characterized by ravelling due to Plane B that strikes sub-parallel to this wall. Planes A and C combine to form shallow dipping wedges along the southwest wall. Small wedges have been dislodged with blasting, however no unstable large wedges were observed or are anticipated as the close

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spacing of Plane B limits the size of the wedges. This is illustrated in Photographs 2 and 3. The current MPMC design bench configuration with a berm width of 10m will serve to catch all small wedges and ravelling along the southwest wall.

4.3 Southeast Wall

No types of failure or instabilities have been observed or are anticipated along the southeast wall since the dominant joint sets are favourably oriented as shown in Photograph 4.

5.0 RECOMMENDATIONS

A minimum 13m wide berm should be provided along the northwest wall between the 20m high benches. Excavation along the northwest wall will then only result in the localized loss of the crests of the berm. It is not recommended that this area of the Rock Borrow be used or planned for access.

The southwest wall will continue to ravel but no large-scale failures are anticipated. The 10 m wide berm should be sufficient to catch ravelling and small wedges. The favourable orientation of the southeast wall will allow for a narrower berm width than 10 m. The 8 m minimum width required by the Mines Act is considered to be sufficient. This wall is also the most favourable location for access ramps.

The recommended bench configurations for each of the walls are shown in Figure 5.1. Controlled bench blasting in terms of closely spaced holes and/or reduced charge weights along the final row of holes for the northwest and southwest walls will minimize the amount of loose slabs and ravelling respectively.

A follow-up inspection of the stability of each of the benches should be carried out after further excavation. This inspection can be conducted by s.22 who is currently on site, or by s.22 who will replace s.22 in October.

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We trust that this letter report satisfies your requirements. Please do not hesitate to contact us if you have any questions or concerns.

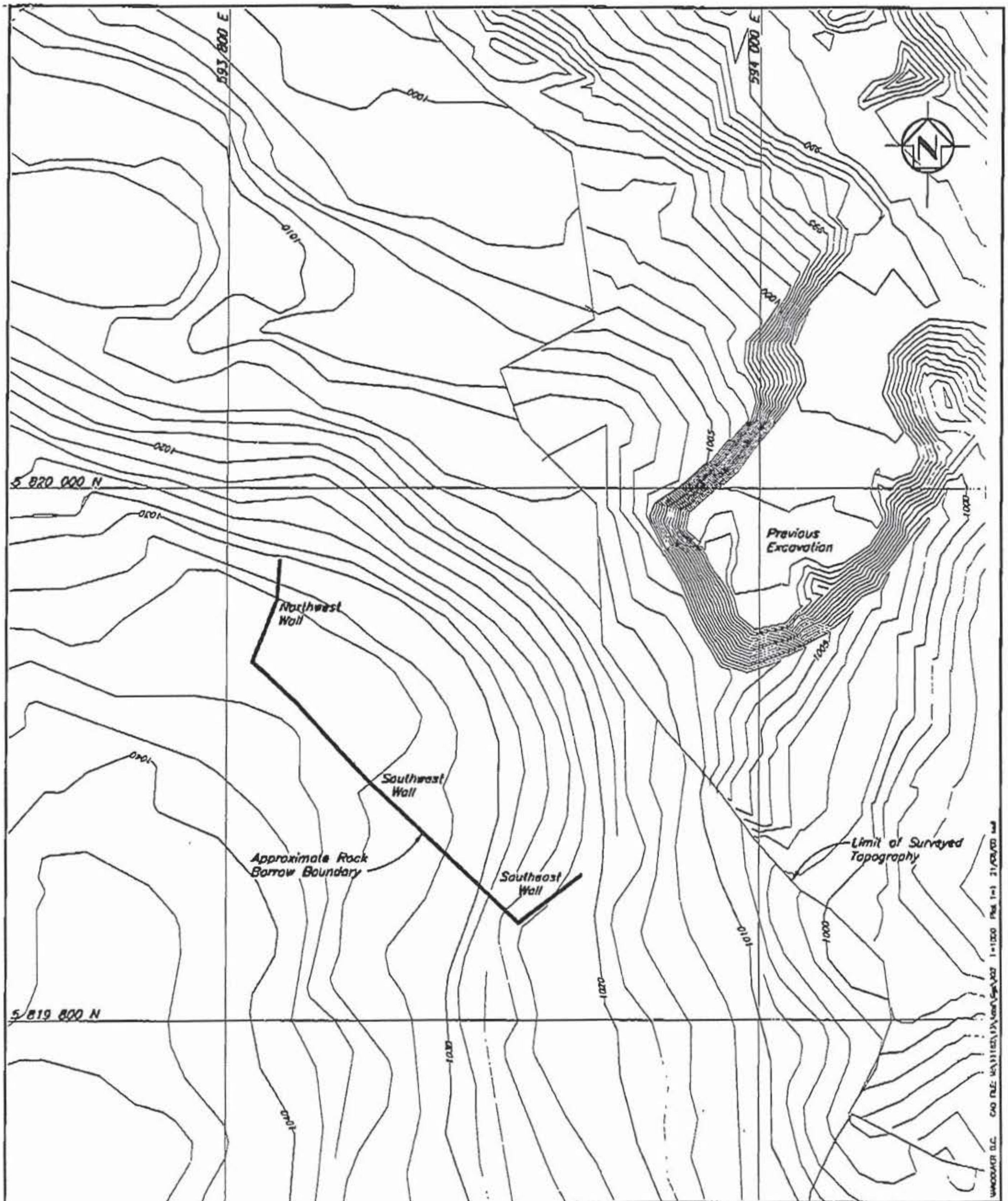
Yours truly,
KNIGHT PIÉSOLD LTD.

s.22

Ken J. Brouwer, P.Eng.
Principal

/jrk

Enclosures



0	22AUG'00	ISSUED FOR LETTER REPORT	JRK	NSD			
REV.	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D	
REVISIONS							

MOUNT POLLEY MINING CORPORATION

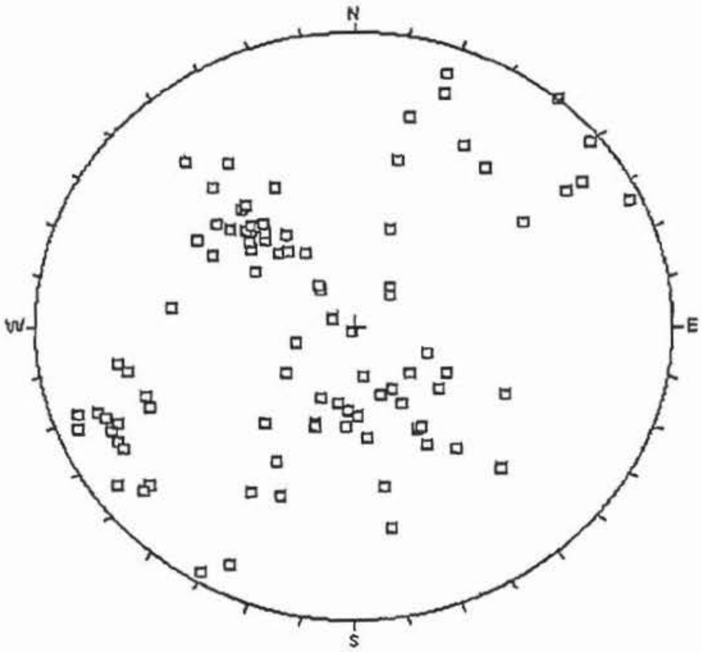
MOUNT POLLEY MINE

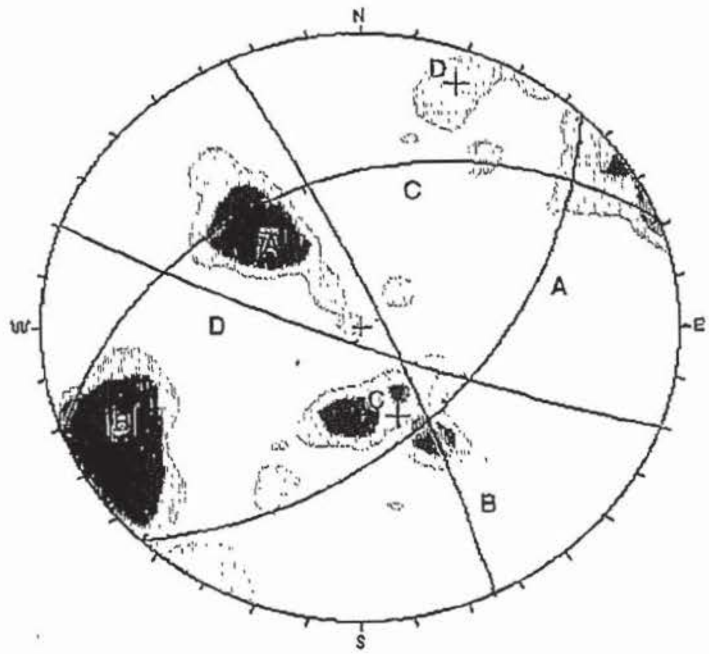
ROCK BORROW

Knight Piésold

PROJECT NO.	REF. NO.	REV.
11162/13	8	0

FIGURE 2.1





Peak Joint Sets

Plane	Dip/Dip Direction
A	49 / 134
B	81 / 065
C	38 / 336
D	85 / 202

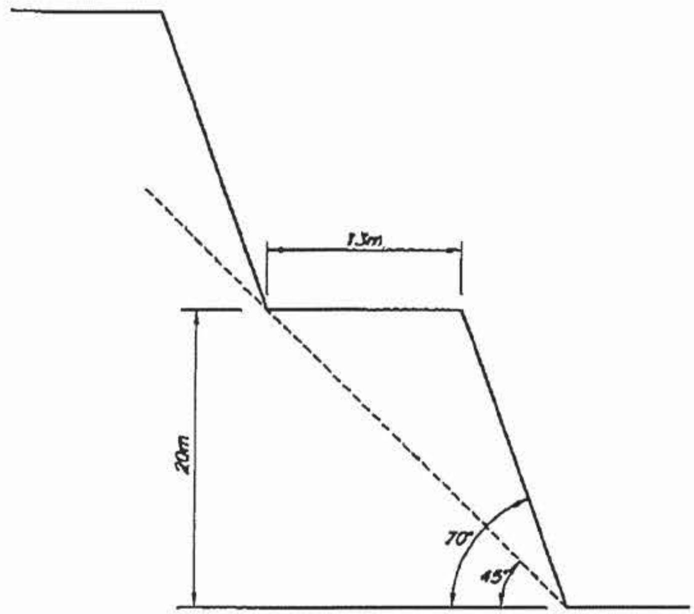
Equal Angle - Lower Hemisphere
No Bias Correction
94 Poles
94 Entries
All Structures

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE
ROCK BORROW
MEASURED JOINT ORIENTATIONS
AND CONTOURED STEREONET

Knight Piésold CONSULTING

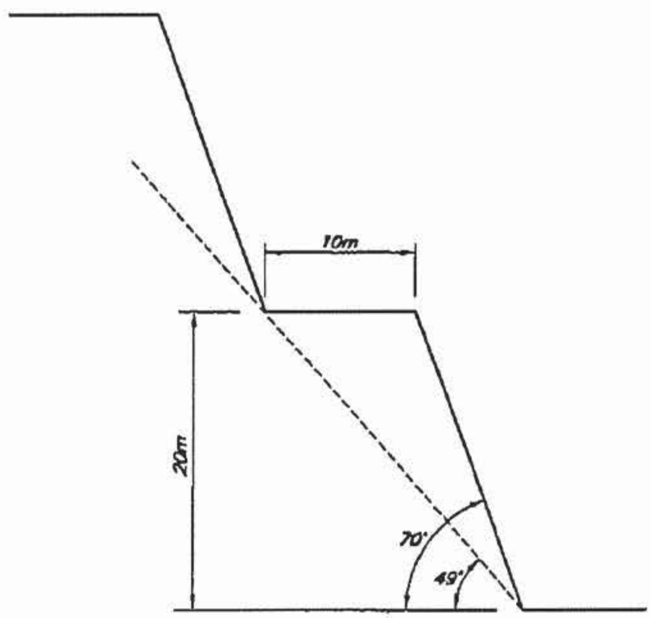
11162/13	B	0

FIGURE 3.1

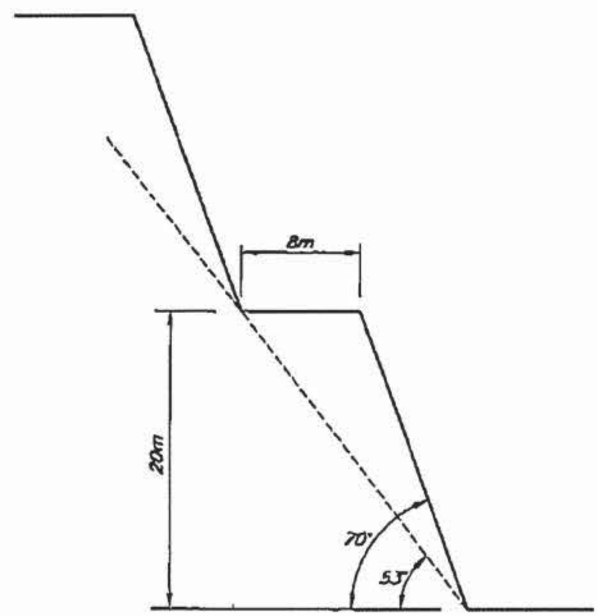


NORTHWEST WALL

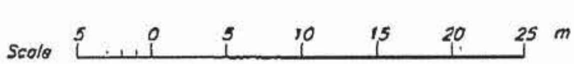
NOTE: Plane A dipping at 49° out of northwest wall may result in partial loss of berm.



SOUTHWEST WALL



SOUTHEAST WALL



MOUNT POLLEY MINING CORPORATION

MOUNT POLLEY MINE

ROCK BORROW STABILITY ASSESSMENT
RECOMMENDED BENCH DESIGN

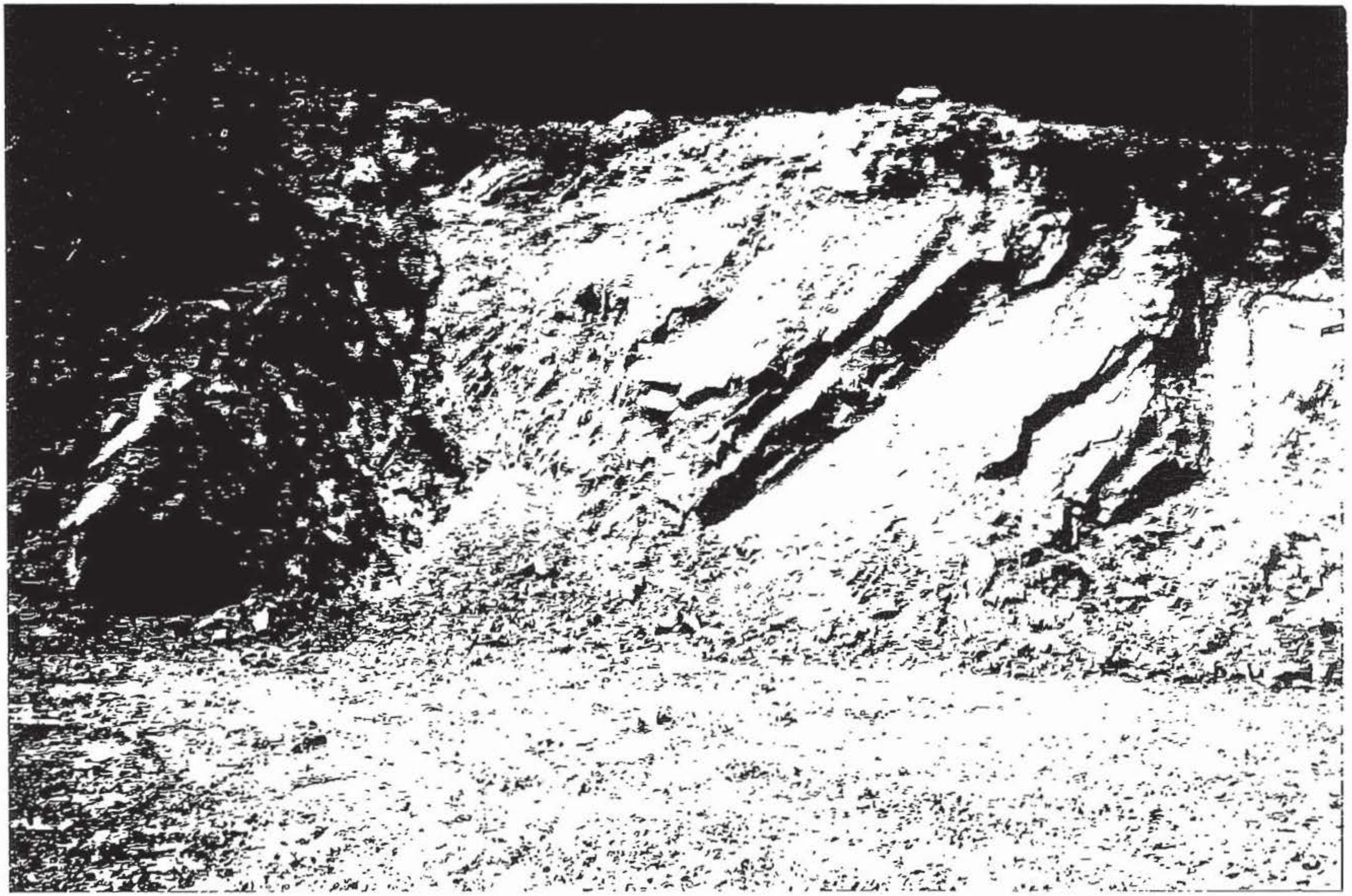
REV.	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	22AUG'00	ISSUED FOR LETTER REPORT	JKK	NSD		

REVISIONS

Knight Piésold

PROJECT NO.	REF NO.	REV.
11162/13	8	0

FIGURE 5.1



Photograph 1: Northwest Wall. 70 degree bench face angle undercuts Joint Set A causing sliding and slabbing.

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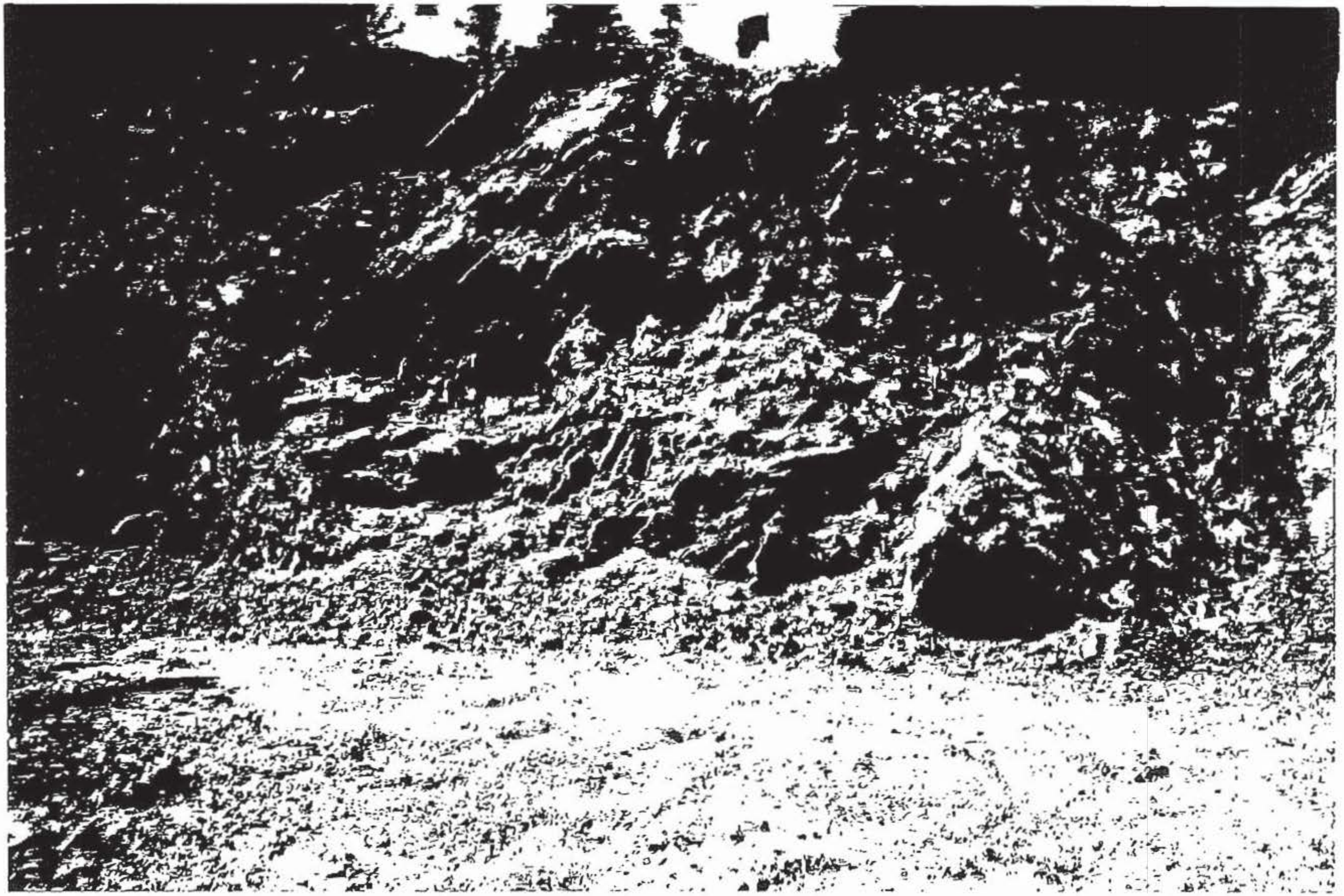

Photograph 2: Southwest Wall. Joint Set B strikes sub-parallel to the wall and forms a back plane for small wedges.

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<u>Photograph 3:</u> Raveling typically occurs on Southwest Wall.

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Photograph 4: Southeast wall. Joint sets dip into the wall.

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CONSULTING

TSF Weekly Report
Wednesday January 1st – Tuesday January 7th, 2014

Dam

Perimeter

- No work was completed on the Perimeter Embankment

Main

- No work was completed on the Main Embankment

South

- Zone U (Sand Cell) construction continue

Sand Cells

- Zone U (Sand Cell) construction continue at the 968.0m elevation from Sta. 06+20 to Sta. 07+00

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- The new Orica site was cleared of snow in preparation for Pacific Apex to put up the steel building
- The TSF crew continue working on the new ditching system at Corner 5
- A new access road to the Sand Cell on the Perimeter Embankment was establish from Corner 5
- Assistance was provided to the Surface Crew to work on pumping issues at the Perimeter Pond
- Pipes were moved from the Perimeter Embankment to the South Embankment in preparation for the Sand Cell construction
- Due to intense snow fall, the TSF crew cleared the snow out the C Zone (Rock) all around the dam, at the barge and at the Gavin Lake road
- Peterson Contracting was on site for a couples of days for snow removal
- The inside of the Orica foundation was cleared of snow and a ramp made of crush material was establish to get in with scissors lifts as required by Pacific Apex

Elevation Summary

Zone	Description	Embankment: South	Embankment: Main	Embankment: Perimeter
U (CBL/Sand Cell)	Base *(Chainage)*	964.7m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	965.6m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	968.8m *(Sta. 04+25 to Sta. 07+00)*	965.4m *(Sta. 25+00 to Sta. 27+75)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (December 9th, 2013): 964.00m
2014 TSF Construction Target: 971.00m

TSF Weekly Report

Wednesday January 8th – Tuesday January 14th, 2014

Dam

Perimeter

- No work was completed on the Perimeter Embankment

Main

- No work was completed on the Main Embankment

South

- Zone U (Sand Cell) construction continue

Sand Cells

- Zone U (Sand Cell) construction continue to the 968.6m elevation from Sta. 07+00 to Sta. 08+40

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- The TSF crew completed the tailings ditching system to direct all flow into the dam basin at Corner 5
- The propane tank beside the ABR was cleared of snow prior the its move by the Surface Crew
- The TSF Crew assisted Mine Ops at Bootjack Creek by building a ramp to access the pump
- Assistance was provided to Surface Crew on the Wight Pit discharge pipe in the long ditch
- The TSF Crew assisted Surface Crew with pumps set-up at the Perimeter Pond
- Snow removal took place all around the dam, at the barge, at the new Orica site and at Bootjack Creek.

Elevation Summary

Zone	Description	Embankment South	Embankment Main	Embankment Perimeter
U (CBL/Sand Cell)	Base *(Chainage)*	964.7m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	965.6m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	966.7m *(Sta. 04+25 to Sta. 07+20)*	965.4m *(Sta. 25+00 to Sta. 27+75)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (December 9th, 2013): 964.00m
2014 TSF Construction Target: 971.00m

TSF Weekly Report

Wednesday January 15th – Tuesday January 21st, 2014

Dam

Perimeter

- No work was completed on the Perimeter Embankment

Main

- No work was completed on the Main Embankment

South

- Zone U (Sand Cell) construction continue

Sand Cells

- Zone U (Sand Cell) construction continue to the 968.6m elevation from Sta. 07+00 to Sta. 08+40
- The Mill was down for most of the week, so were the sand cells.

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- A new parking pad for the water treatment pilot plant was constructed far from the running pumps at the Perimeter pond.
- Snow removal took place all around the dam, at the new Orica site, at the Polley lake road and at the Gavin lake road.
- The TSF crew opened up the road beside the West ditch from the booster station to the Mine drainage creek sump.
- The TSF crew assisted the Mine Ops at the Bootjack creek by building berm on the edges of the road.
- The TSF crew assisted the Mine Ops by cleaning berms in the pit and by removing the snow from the low grade oxide stockpile.
- Gates for the Wight Pit were moved out of the shop to the Surface crew yard by the TSF crew.

Elevation Summary

Zone	Description	Embankment		
		South	Main	Perimeter
U (CBL/Sand Cell)	Base *(Chainage)*	964.7m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	965.6m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	966.7m *(Sta. 04+25 to Sta. 07+40)*	965.4m *(Sta. 25+00 to Sta. 27+75)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (January 22nd, 2014): 964.10m
2014 TSF Construction Target: 971.00m

TSF Weekly Report

Wednesday January 22nd – Tuesday January 28th, 2014

Dam

Perimeter

- No work was completed on the Perimeter Embankment

Main

- No work was completed on the Main Embankment

South

- Zone U (Sand Cell) construction was started from Sta. 08+40 to Sta. 09+30

Sand Cells

- Zone U (Sand Cell) construction was completed to the 966.7m elevation from Sta. 07+00 to Sta. 08+40

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- The Mine Drainage Creek Sump was expanded
- BI Pure Water was on site and a new pad was prepared to set up the trailer
- The TSF crew, with the help of Peterson contracting, completed the armouring of the Main Embankment pipe crossing
- Pacific Apex completed the construction of the Orica Maintenance Building
- The Frypan access road was plowed from the 9K sump to 8km of Bootjack road
- Assistance was provided to the Surface crew fixing broken pipe at the Perimeter Pond
- The TSF crew trenched the Bootjack Creek for the power cable with the help of Peterson Contracting

Elevation Summary

Zone	Description	Embankment		
		South	**Main**	**Perimeter**
U (CBL/Sand Cell)	Base *(Chainage)*	964.7m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	965.6m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	966.7m *(Sta. 04+25 to Sta. 08+40)*	965.4m *(Sta. 25+00 to Sta. 27+75)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (January 22nd, 2014): 964.10m
2014 TSF Construction Target: 971.00m

TSF Weekly Report

Wednesday January 29th– Tuesday February 4th, 2014

Dam

Perimeter

- No work was completed on the Perimeter Embankment

Main

- No work was completed on the Main Embankment

South

- Zone U (Sand Cell) construction continue

Sand Cells

- Zone U (Sand Cell) construction continued to the 966.7m elevation from Sta. 08+40 to Sta. 09+30
- The sand cell were down most of the week due to equipment maintenance

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- A rock pad was built beside the dirty water sump at Bootjack creek for the pumping shack and the trenching was completed to get power to the shack
- The TSF crew assisted BI Pure Water to set up the pump
- The Orica site was cleared of snow
- An path was opened up to access the instrumentation down below Corner 2 toward the till borrow pit
- The road from the 9K sump towards the NW PAG sump was widen to facilitate the installation of the piping system
- The low spot beside the West ditch was upgraded to prevent overflow
- The TSF crew started to expand the 9K sump and to install the culvert

Elevation Summary

Zone	Description	Embankment		
		South	**Main**	**Perimeter**
U (CBL/Sand Cell)	Base *(Chainage)*	964.7m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	965.6m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	966.7m *(Sta. 04+25 to Sta. 08+40)*	965.4m *(Sta. 25+00 to Sta. 27+75)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (January 22nd, 2014): 964.10m
2014 TSF Construction Target: 971.00m

TSF Weekly Report
Wednesday February 5th– Tuesday February 11th, 2014

Dam

Perimeter
- No work was completed on the Perimeter Embankment

Main
- No work was completed on the Main Embankment

South
- Zone U (Sand Cell) construction started between Sta. 09+30 and Sta. 10+30

Sand Cells

- Zone U (Sand Cell) construction completed to the 966.4m elevation from Sta. 08+40 to Sta. 09+30

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- Valves were moves closer the sand cell
- The 9K sump was expanded and the culvert was put in place
- The Orica site was cleared of construction material left over
- Logs were placed on the clean water culverts at Bootjack creek for protection
- The TSF crew assisted the Surface Crew with frozen pipes at the dam
- A leak in the tailings line was fixed somewhere at the beginning on the new tailings pipe grade

Elevation Summary

		Embankment		
Zone	**Description**	**South**	**Main**	**Perimeter**
U (CBL/Sand Cell)	Base *(Chainage)*	964.7m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	965.6m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	966.5m *(Sta. 04+25 to Sta. 09+30)*	965.4m *(Sta. 25+00 to Sta. 27+75)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (January 22nd, 2014): 964.10m
2014 TSF Construction Target: 971.00m

TSF Weekly Report

Wednesday February 12th– Tuesday February 18th, 2014

Dam

Perimeter

- No work was completed on the Perimeter Embankment

Main

- No work was completed on the Main Embankment

South

- Zone U (Sand Cell) construction continue

Sand Cells

- Zone U (Sand Cell) construction completed to the 966.5m elevation from Sta. 09+30 to Sta. 10+30

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- The gate at the 9K sump was put in place. It needs a lock
- The culvert at the Bootjack creek dirty sump was installed
- A access was created to the last power pole at the new Orica site
- A pipe grade was establish at the Bootjack creek dirty sump for the discharge line

Elevation Summary

Zone	Description	Embankment South	Embankment Main	Embankment Perimeter
U (CBL/Sand Cell)	Base *(Chainage)*	964.7m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	965.6m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	966.5m *(Sta. 04+25 to Sta. 10+30)*	965.4m *(Sta. 25+00 to Sta. 27+75)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (February 19th, 2014): 964.60m
2014 TSF Construction Target: 971.00m

TSF Weekly Report

Wednesday February 19th– Tuesday February 25th, 2014

Dam

Perimeter

- No work was completed on the Perimeter Embankment

Main

- No work was completed on the Main Embankment

South

- Zone U (Sand Cell) construction continue
- The south seepage pond pipe was change from 4in. to 6in. over the dam

Sand Cells

- Zone U (Sand Cell) construction completed to the 966.4m elevation from Sta. 10+30 to Sta. 11+40

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- The bootjack creek dirty sump was armoured with till in order to fix the leak
- The West ditch has been cleared of ice at the culvert intake near the booster station
- Pipes and valves were moved from the Perimeter embankment to the South Embankment for sand cell construction
- A pad was established across the Perimeter pond for the diesel pumps
- Assistance was provided to the Surface crew for pumps installation at the Perimeter pond and Bootjack creek

Elevation Summary

Zone	Description	Embankment: South	Embankment: Main	Embankment: Perimeter
U (CBL/Sand Cell)	Base *(Chainage)*	964.7m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	965.6m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	966.4m *(Sta. 04+25 to Sta. 11+40)*	965.4m *(Sta. 25+00 to Sta. 27+75)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (February 19th, 2014): 964.60m
2014 TSF Construction Target: 971.00m

TSF Weekly Report
Wednesday February 26th– Tuesday March 4th, 2014

Dam

Perimeter

- No work was completed on the Perimeter Embankment

Main

- No work was completed on the Main Embankment

South

- Zone U (Sand Cell) construction continue

Sand Cells

- Zone U (Sand Cell) construction continue from Sta. 11+40 to Sta. 12+40
- Sand Cell were down for the last three (3) days due to equipment breakdown

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- The TSF crew started excavating the new road for the power line between the Perimeter Pond and the Hazeltine discharge tank
- Knife gates and pipes were added for sand cell construction
- TSF crew assisted Allteck electric with power pole installation at the new Orica site
- Assistance was provided to Surface crew with work on the Perimeter pond expansion
- A 24in. pipe was installed over the dam from the perimeter pond for diesel pumps

Elevation Summary

Zone	Description	Embankment South	Embankment Main	Embankment Perimeter
U (CBL/Sand Cell)	Base *(Chainage)*	964.7m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	965.6m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	966.4m *(Sta. 04+25 to Sta. 11+40)*	965.4m *(Sta. 25+00 to Sta. 27+75)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (March 4th, 2014): 964.46m
2014 TSF Construction Target: 971.00m

TSF Weekly Report

Wednesday March 5th – Tuesday March 11th, 2014

Dam

Perimeter

- No work was completed on the Perimeter Embankment

Main

- No work was completed on the Main Embankment

South

- Zone U (Sand Cell) construction continue

Sand Cells

- Zone U (Sand Cell) construction continue from Sta. 11+40 to Sta. 12+40

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- The stripping and leveling for the power line between the Perimeter pond and Hazeltine discharge tank was completed
- Snow was removed around the Hazeltine discharge tank
- The SERDS ditch was upgraded between the booster station and the waste haul road
- Overflow culverts were installed at the 9K and NW PAG sumps
- Valves were moved and installed closer to current sand cell
- Assistance was provided to the Surface crew with the installation of the diesel pumps and the header
- The Perimeter pond expansion was completed
- A test hole was excavated in the contaminated material inside the dam at Corner 5
- The Orica building was backfilled with crushed material and the compaction is in progress
- Peterson contracting hauled rock for the Perimeter pipe crossing

Elevation Summary

Zone	Description	Embankment: South	Embankment: Main	Embankment: Perimeter
U (CBL/Sand Cell)	Base *(Chainage)*	964.7m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	965.6m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	966.4m *(Sta. 04+25 to Sta. 11+40)*	965.4m *(Sta. 25+00 to Sta. 27+75)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (March 4th, 2014): 964.46m
2014 TSF Construction Target: 971.00m

TSF Weekly Report
Wednesday March 12th – Tuesday March 18th, 2014

Dam

Perimeter

- No work was completed on the Perimeter Embankment

Main

- No work was completed on the Main Embankment

South

- Zone U (Sand Cell) construction continue

Sand Cells

- Zone U (Sand Cell) construction completed to the 965.35m from Sta. 11+40 to Sta. 12+40

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- The TSF crew started excavating the clean water ditch north of the PAG dump
- Assistance was provided to the Surface crew with the completion of the pumping infrastructure at the Perimeter pond
- Assistance was provided to Altec for the installation of the power poles at the Perimeter pond
- An access to the tailings pipe along the Perimeter embankment was established
- The TSF crew re-established a drainage ditch from the Perimeter pond to the Till Borrow pit
- The surface crew installed a 140hp pump and connected it to the 16in. line at Mine drainage creek
- Peterson contracting cap the new power line road from the Perimeter pond to the Hazeltine discharge tank
- Peterson contracting started to cap the road beside the West ditch starting at the booster station
- Peterson contracting started cleaning out snow over the new reclaim line road

Elevation Summary

Zone	Description	Embankment: South	Embankment: Main	Embankment: Perimeter
U (CBL/Sand Cell)	Base *(Chainage)*	964.7m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	965.6m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	965.4m *(Sta. 04+25 to Sta. 12+40)*	965.4m *(Sta. 25+00 to Sta. 27+75)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (March 4th, 2014): 964.46m
2014 TSF Construction Target: 971.00m

TSF Weekly Report

Wednesday March 19th – Tuesday March 25th, 2014

Dam

Perimeter

- No work was completed on the Perimeter Embankment

Main

- No work was completed on the Main Embankment

South

- Zone U (Sand Cell) construction continue to the 965.7m from Sta. 14+40 to Sta. 15+20

Sand Cells

- Zone U (Sand Cell) construction completed to the 965.7m from Sta. 12+40 to Sta. 14+40

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- The TSF crew completed the excavation of the clean water ditch
- The TSF crew started the cleaning of the ditch system at the SERDS ditch behind Orica
- Assistance was provided to the Surface crew in preparation for the reclaim line move
- A container was moved from the quarry to the new Orica site
- The Main pond discharge tank area was cleared out for foot access
- The overflow culvert of the NW PAG Sump was armoured
- Peterson contracting finished to cap the road beside the West ditch starting at the booster station

Elevation Summary

Zone	Description	Embankment: South	Embankment: Main	Embankment: Perimeter
U (CBL/Sand Cell)	Base *(Chainage)*	964.7m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	965.6m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	965.4m *(Sta. 04+25 to Sta. 14+40)*	965.4m *(Sta. 25+00 to Sta. 27+75)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (March 4th, 2014): 964.46m
2014 TSF Construction Target: 971.00m

TSF Weekly Report
Wednesday March 26th – Tuesday April 1st, 2014

Dam

Perimeter

- No work was completed on the Perimeter Embankment

Main

- Zone U (Sand Cell) construction completed to the 966.0m elevation from Sta. 15+50 to Sta. 16+70

South

- Zone U (Sand Cell) construction completed to the 965.7m from Sta. 15+20 to Sta. 15+50

Sand Cells

- Zone U (Sand Cell) construction continue to the 966.0m elevation from Sta. 16+70 to Sta. 17+70

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- The TSF crew completed the cleaning of the ditch system at the SERDS ditch behind Orica
- Assistance was provided to the Surface crew with the Mill clean up
- An access to the power pole at Corner 5 was established
- The armouring of the inlet and outlet culverts was completed at the TSF light duty road crossing
- Concrete blocks and a 10m pipe were put in place at the Bootjack creek bridge
- The TSF crew upgraded the power pole road at the Perimeter pond by adding a layer of crush material
- The TSF crew cleaned the impoundment area at the Hazeltine creek bridge

Elevation Summary

Zone	Description	Embankment: South	Embankment: Main	Embankment: Perimeter
U (CBL/Sand Cell)	Base *(Chainage)*	965.4m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	965.6m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*		966.0m *(Sta. 15+50 to Sta. 16+70)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (April 1st, 2014): 964.65m
2014 TSF Construction Target: 971.00m

TSF Weekly Report
Wednesday April 2nd – Tuesday April 8th, 2014

Dam

Perimeter

- No work was completed on the Perimeter Embankment

Main

- Zone U (Sand Cell) construction completed to the 966.0m elevation from Sta. 16+70 to Sta. 18+50

South

- No work was completed on the South Embankment

Sand Cells

- Zone U (Sand Cell) construction continue to the 966.0m elevation from Sta. 18+50 to Sta. 19+40

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- The dewatering pipe grade was completed at Bootjack creek and the 12in. line was put in place
- The Perimeter Pond dirt pile was leveled off and access was created to the staff gauge
- The road to Hazeltine creek was cleaned and water bars were established across it
- The 9K was pumped down, armoured and an additional pump was installed
- A check dam was established in the clean water ditch at the 9K sump
- The TSF crew started excavating a water collection ditch along the toe of the PAG dump between the 9K and NW PAG sumps
- An access to the lower Long ditch sump was established
- A new 70ft power pole was installed at Corner 5

Elevation Summary

Zone	Description	Embankment: South	Embankment: Main	Embankment: Perimeter
U (CBL/Sand Cell)	Base *(Chainage)*	965.4m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	965.6m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*		966.0m *(Sta. 15+50 to Sta. 18+50)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (April 1st, 2014): 964.65m
2014 TSF Construction Target: 971.00m

TSF Weekly Report

Wednesday April 9th – Tuesday April 15th, 2014

Dam

Perimeter

- No work was completed on the Perimeter Embankment

Main

- Zone U (Sand Cell) construction completed to the 966.0m elevation from Sta. 18+50 to Sta. 20+40

South

- No work was completed on the South Embankment

Sand Cells

- Zone U (Sand Cell) construction continue from Sta. 20+40 to Sta. 21+40

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- A leak in the reclaim line ditch was fixed
- Assistance was provided to RL-7 with pipe fusing
- Snow was removed from the till on the Perimeter Embankment in preparation for the construction season
- The South Embankment pipe crossing hump was improved
- An access to the W5 sample site was established from the old waste haul road
- The rock pad for the diesel pumps at the Perimeter Pond was repaired
- The TSF crew fixed a backup of water at the Gavin Lake road beside the ABR

Elevation Summary

Zone	Description	Embankment: South	Embankment: Main	Embankment: Perimeter
U (CBL/Sand Cell)	Base *(Chainage)*	965.4m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	965.6m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*		966.0m *(Sta. 15+50 to Sta. 20+40)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (April 1st, 2014): 964.65m
2014 TSF Construction Target: 971.00m

TSF Weekly Report
Wednesday April 16th – Tuesday April 22nd, 2014

Dam

Perimeter

- Zone U (Sand Cell) construction completed to the 967.5m elevation from Sta. 47+75 to Sta. 46+75

Main

- No work was completed on the Main Embankment

South

- No work was completed on the South Embankment

Sand Cells

- Zone U (Sand Cell) construction continue from Sta. 46+75 to Sta. 45+75

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- A leak in the tailings line was fixed at Corner 5
- A new drainage system was established on the South Till borrow pit
- The duck pond overflow was re-established at the Main Embankment pond
- A sediment settling sump was excavated on the side of the W5 road
- Assistance was provided to the Surface Crew with the Perimeter pond overflow
- Sand cell were switched from the Main to the Perimeter Embankment
- A fresh water ditch diversion was established at Corner 4
- The old tailing ditch was plugged to divert water in new pipe grade ditch
- Bolders were move from the toe of the new haul road closer to the SERDS ditch

Elevation Summary

Zone	Description	Embankment: South	Embankment: Main	Embankment: Perimeter
U (CBL/Sand Cell)	Base *(Chainage)*	965.4m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
	Additional *(Chainage)*		966.0m *(Sta. 15+50 to Sta. 20+40)*	967.5m (*Sta. 47+75 to Sta. 46+75)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (April 23rd, 2014): 965.30m
2014 TSF Construction Target: 971.00m

TSF Weekly Report

Wednesday April 23rd – Tuesday April 29th, 2014

Dam

Perimeter

- Zone U (Sand Cell) construction completed to the 966.6m elevation from Sta. 46+75 to Sta. 44+75

Main

- No work was completed on the Main Embankment

South

- No work was completed on the South Embankment

Sand Cells

- Zone U (Sand Cell) construction continue from Sta. 44+75 to Sta. 43+75

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- A rock pad for pumps was established in the Till borrow pit
- The TSF crew hauled rock at Corner 2 for u-zone protection
- The area for the filter stockpile has been cleared
- The berm on the Bootjack Creek bridge was re-established
- Assistance was provided to the Surface crew with pumps at the Perimeter pond
- Filter material was hauled to the new Orica site
- The Orica silos foundations were excavated

Elevation Summary

Zone	Description	Embankment: South	Embankment: Main	Embankment: Perimeter
U (CBL/Sand Cell)	Base *(Chainage)*	965.4m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
	Additional *(Chainage)*		966.0m *(Sta. 15+50 to Sta. 20+40)*	967.5m (*Sta. 47+75 to Sta. 46+75)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (April 23rd, 2014): 965.30m
2014 TSF Construction Target: 971.00m

TSF Weekly Report
Wednesday April 30th – Tuesday May 6th, 2014

Dam

Perimeter

- Zone U (Sand Cell) construction completed to the 966.6m elevation from Sta. 44+75 to Sta. 43+75

Main

- No work was completed on the Main Embankment

South

- No work was completed on the South Embankment

Sand Cells

- Zone U (Sand Cell) were shifted ahead to catch up at Corner 2
- Zone U (Sand Cell) construction started from Sta. 36+00 to Sta. 35+00

ABR

- The ABR continues to discharge at ~75GPM

Project Work

TAILINGS

- Upstream berms were re-shaped all around the dam
- Piezometers were extended at the Perimeter pipe crossing inside Sand Cell
- The clean water culvert was pulled out at Corner 5
- RL-7 provided assistance with pipes fusing

ORICA SITE

- The Orica foundation footing were poured
- The TSF crew hauled crush material
- The electrical MCC building was put in place

PETERSON CONTRACTING

- Rock was hauled to armour the Zone S (Till) on the Main Embankment

Elevation Summary

Zone	Description	Embankment: South	Embankment: Main	Embankment: Perimeter
U (CBL/Sand Cell)	Base *(Chainage)*	965.4m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
	Additional *(Chainage)*		966.0m *(Sta. 15+50 to Sta. 20+40)*	967.5m (*Sta. 47+75 to Sta. 46+75)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (May 5th, 2014): 965.72m
2014 TSF Construction Target: 971.00m

TSF Weekly Report

Wednesday May 7th – Tuesday May 13th, 2014

Dam

Perimeter

- Zone U (Sand Cell) construction completed to the 967.1m elevation from Sta. 35+00 to Sta. 33+29

Main

- No work was completed on the Main Embankment

South

- No work was completed on the South Embankment

Sand Cells

- Zone U (Sand Cell) construction started from Sta. 33+29 to Sta. 32+28

ABR

- The ABR continues to discharge at ~75GPM

Project Work

TAILINGS

- The tailings spill area was cleaned below the quarry
- The access to the ground water well at the Perimeter Pond was re-established
- The pipes crossings on the Perimeter and Main Embankment were raised
- The till borrow pit was started to be dewatered

ORICA SITE

- The TSF crew hauled crush material
- The silo foundations have been backfilled

PETERSON CONTRACTING

- Till armouring on the Main and Perimeter Embankment was completed
- Started to fill with rock the Zone U (Sand Cell) under water on the Main Embankment from Sta. 27+75 to Sta. 20+40

Elevation Summary

Zone	Description	Embankment: South	Embankment: Main	Embankment: Perimeter
U (CBL/Sand Cell)	Base *(Chainage)*	965.4m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
	Additional *(Chainage)*		966.0m *(Sta. 15+50 to Sta. 20+40)*	967.1m (*Sta. 47+75 to Sta. 32+28)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (May 5th, 2014): 965.72m
2014 TSF Construction Target: 971.00m

TSF Weekly Report

Wednesday May 14th – Tuesday May 20th, 2014

Dam

Perimeter

- Zone U (Sand Cell) construction completed to the 967.1m elevation from Sta. 33+29 to Sta. 30+38
- Zone C (Rock) stripping completed at Corner 5 in preparation for the filter blanket
- Zone F (Filter) placement completed at Corner 5 [**Peterson Contracting]**

Main

- Zone C (Rock) placement in the sand cell where it is under water from Sta. 20+40 to Sta. 23+20 [**Peterson Contracting]**

South

- No work was completed on the South Embankment

Sand Cells

- Zone U (Sand Cell) construction continue from Sta. 30+38 to Sta. 29+38

ABR

- The ABR continues to discharge at ~75GPM

Project Work

TAILINGS

- A leaking valve was repaired at Corner 1
- Piezometers instruments were dug out in preparation for expansion
- Road access was opened for evaporators on the Main Embankment
- Pipes bundle was moved from the Main tank to the underground portal
- Access to the ground water well was re-established at the Mine Drainage Creek
- Safety catch berm was established along the Main Embankment
- The reclaim line was buried where it crosses the TSF light duty road

Elevation Summary

Zone	Description	Embankment: South	Embankment: Main	Embankment: Perimeter
U (CBL/Sand Cell)	Base *(Chainage)*	965.4m *(Sta. 04+25 to Sta. 15+50)*	964.2m *(Sta. 15+50 to Sta. 25+00)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
	Additional *(Chainage)*		966.0m *(Sta. 15+50 to Sta. 20+40)*	967.1m *(Sta. 47+75 to Sta. 30+8)*
S (Till)	Base *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*			967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (May 5th, 2014): 965.72m
2014 TSF Construction Target: 971.00m

TSF Weekly Report
Wednesday May 21st – Tuesday May 27th, 2014

Dam

Perimeter

- Zone U (Sand Cell) construction completed to the 967.1m elevation from Sta. 29+38 to Sta. 27+10
- Zone C (Rock) placement completed at Corner 5 [**Peterson Contracting]**

Main

- Zone C (Rock) placement to the 966.4m elevation in the Zone U from Sta. 23+20 to Sta. 22+10 [**Peterson Contracting]**
- Zone C (Rock) placement to the 967.0m elevation in the Zone U from Sta. 16+90 to Sta. 15+50
- Zone S (Till) placement completed to the 966.6m elevation from Sta. 16+05 to Sta. 15+50 [**Peterson Contracting]**

South

- Zone C (Rock) placement completed to the 967.0m elevation from Sta. 15+50 to Sta. 13+00
- Zone S (Till) placement completed to the 966.6m elevation from Sta. 15+50 to Sta. 14+95 [**Peterson Contracting]**

Sand Cells

- Zone U (Sand Cell) construction continue from Sta. 27+10 to Sta. 26+10

ABR

- The ABR continues to discharge at ~75GPM

Project Work

TAILINGS

- A safety catch berm was established below the Main Embankment from Corner 2 to Corner 3
- The upstream berm in the Zone U (Sand Cell) were shaped up from Corner 2 to Corner 4
- A temporary berm of Zone S (Till) was established at Corner 3 to stop the water [**Peterson Contracting]**

Elevation Summary

		Embankment		
Zone	**Description**	**South**	**Main**	**Perimeter**
U (CBL/Sand Cell)	Base *(Chainage)*	965.4m *(Sta. 04+25 to Sta. 15+50)*	966.0m *(Sta. 15+50 to Sta. 20+40)*	966.3m *(Sta. 34+90 to Sta. 38+70)*
	Additional *(Chainage)*		967.1m*(Sta. 27+50 to Sta. 27+10)*	967.1m *(Sta. 47+75 to Sta. 27+75)*
S (Till)	Base *(Chainage)*	966.6m*(Sta. 14+95 to Sta. 15+50)*	966.6m*(Sta. 15+50 to Sta. 16+05)*	967.0m*(Sta. 27+75 to Sta. 40+50)*
	Additional *(Chainage)*	967.3m *(Sta. 05+06 to Sta. 15+50)*	967.1m *(Sta. 15+50 to Sta. 27+75)*	967.3m*(Sta. 40+50 to Sta. 48+50)*
	Additional *(Chainage)*			967.6m*(Sta. 40+25 to Sta. 48+25)*
	Additional *(Chainage)*			967.9m*(Sta. 40+00 to Sta. 48+00)*
F (Filter)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	966.2m *(Sta. 15+50 to St. 27+75)*	966.1m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*			967.0m *(Sta. 29+75 to Sta. 48+50)*
T/C (Transition/Rock)	Base *(Chainage)*	966.4m *(Sta. 04+50 to Sta. 15+50)*	967.2m *(Sta. 15+50 to St. 27+75)*	967.0m *(Sta. 27+75 to Sta. 48+50)*
	Additional *(Chainage)*	967.3m *(Sta. 14+50 to Sta. 15+50)*		

Water Elevation (May 28th, 2014): 966.50m
2014 TSF Construction Target: 971.00m

TSF Weekly Report
Wednesday May 28th – Tuesday June 3rd, 2014

Dam

Perimeter

- Zone S (Till) placement completed at Corner 5 from the 965.5m elevation to the 967.0m elevation [**Peterson Contracting]**
- Zone S (Till) placement completed at Corner 2 from Sta. 27+15 to 28+50 from the 966.5m elevation to the 967.2m elevation **[Peterson Contracting]**
- Zone S (Till) placement completed at the pipe crossing from Sta. 39+80 to Sta. 39+15 from the 966.4m elevation to the 967.9m elevation **[Peterson Contracting]**

Main

- Zone U (Sand Cell) construction completed to the 967.1m elevation from Sta. 27+10 to Sta. 24+20
- Zone U (Rock) placement completed to the 967.1m elevation from Sta. 17+50 to Sta. 20+40 **[Peterson Contracting]**
- Zone U (Rock) placement completed to the 966.4m elevation from Sta. 21+86 to Sta. 20+95 **[Peterson Contracting]**
- Zone F (Filter) excavated from Sta. 26+00 to Sta. 23+50 **[Peterson Contracting]**

South

- Zone U (Rock) placement completed to the 967.9m elevation from Sta. 11+50 to Sta. 12+00
- Zone S (Till) placement completed at Corner 3 from Sta. 14+50 to Sta. 15+75 from the 966.9m elevation to the 967.2m elevation [**Peterson Contracting]**

Sand Cells

- Zone U (Sand Cell) construction continue from Sta. 24+20 to Sta. 23+20

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- A clean water culvert diversion was put in place at Corner 5
- A clean water culvert diversion was put in place below the quarry
- Tyee Contracting was on site fencing around the dam
- TSF Crew dug up the 12" line from Mine drainage creek to the West ditch
- The septic tank and the foundation were excavated at the new Orica site
- Mine drainage creek seepage investigation

TSF Weekly Report
Wednesday June 4th – Tuesday June 10th, 2014

Dam

Perimeter

- Zone S (Till) placement completed at Corner 5 from Sta. 49+50 to Sta. 47+96 to EL. 967.3m **[Peterson Contracting]**
- Zone S (Till) placement completed from Sta. 34+50 to Sta. 31+00 to EL. 967.3m **[Peterson Contracting]**
- Zone S (Till) placement completed from Sta. 34+65 to Sta. 26+40 to EL. 967.3m **[Peterson Contracting]**
- Zone S (Till) placement completed from Sta. 37+87 to Sta. 38+87 to EL. 967.3m **[Peterson Contracting]**
- Zone S (Till) placement completed from Sta. 38+95 to Sta. 31+00 to EL. 967.6m **[Peterson Contracting]**

Main

- Zone U (Sand Cell) construction completed to EL.966.9m from Sta. 25+25 to Sta. 23+25
- Zone U (Rock) placement completed to EL.967.3m from Sta. 20+40 to Sta. 22+98
- Zone F (Filter) placement from Sta. 26+00 to Sta. 20+42 to EL. 967.2m **[Peterson Contracting]**
- Zone S (Till) placement completed to EL. 967.0 from Sta. 24+50 to Sta. 23+37 **[Peterson Contracting]**

South

- No work was completed on the South Embankment

Sand Cells

- Zone U (Sand Cell) construction started from Sta. 45+00 to Sta. 44+00 on the Perimeter Embankment

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- Tyee Contracting was on site fencing around the dam
- TSF crew started stripping the new road to the Main Embankment discharge tank
- A new ramp, berms and pipe grade were established at Corner 4
- The Orica silo foundation was backfilled
- The septic tank was put in place at the new Orica site

TSF Weekly Report
Wednesday June 11th – Tuesday June 17th, 2014

Dam

Perimeter

- Zone S (Till) placement completed from Sta. 31+00 to Sta. 28+75 to El. 967.6m **[Peterson Contracting]**
- Zone U (Sand Cell) construction completed from Sta. 43+96 to Sta. 42+86 to El. 967.6m

Main

- Zone U (Rock) placement completed from Sta. 22+98 to Sta. 23+70 to El. 967.4m
- Zone S (Till) placement completed from Sta. 26+90 to Sta. 14+90 to El. 967.3m **[Peterson Contracting]**
- Zone S (Till) placement completed from Sta. 26+00 to Sta. 20+50 to El. 967.6m **[Peterson Contracting]**
- Zone F (Filter) placement completed from Sta. 20+42 to Sta. 14+75 to El. 967.0m **[Peterson Contracting]**

South

- Zone C (Rock) placement completed from Sta. 12+65 to 08+75 to El. 967.6m **[Peterson Contracting]**
- Zone C (Rock) placement completed from Sta. 04+60 to 07+00 to EL. 967.6m **[Peterson Contracting]**

Sand Cells

- Zone U (Sand Cell) construction continue from Sta. 04+40 to Sta. 05+33 on the South Embankment

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- Tyee Contracting was on site fencing around the dam
- TSF crew continued working the new road to the Main Embankment discharge tank
- A new valve set-up was established at Corner 4
- The Mine Drainage Creek seepage Sump was established
- The Main Embankment discharge pipe was raised
- The Main Embankment pond barge was fixed
- The mezzanine was put in place in the maintenance building at the new Orica site
- The plumbing of sewage system was completed at the new Orica site

TSF Weekly Report
Wednesday June 18th – Tuesday June 24th, 2014

Dam

Perimeter

- Zone C (Rock) placement from Sta. 47+03 to Sta. 42+54 to El. 967.9m

Main

- Zone C (Rock) placement from Sta. 26+67 to Sta. 27+00 to El. 967.3m
- Zone S (Till) placement from Sta. 19+76 to Sta. 20+41 to El. 967.3m
- Zone S (Till) placement from Sta. 15+50 to Sta. 20+54 to El. 967.6m
- Zone S (Till) placement from Sta. 15+50 to Sta. 26+50 to El. 967.9m
- Zone S (Till) placement from Sta. 19+56 to Sta. 20+50 to El. 968.2m

South

- Zone U (Sand Cell) completed from Sta. 04+40 to Sta. 05+33 to El. 970.0m
- Zone C (Rock) placement completed from Sta. 07+00 to Sta. 08+75 to El. 967.6m
- Zone S (Till) placement from Sta. 14+69 to Sta. 14+80 to El. 967.0m
- Zone S (Till) placement from Sta. 14+71 to Sta. 15+00 to El. 967.3m
- Zone S (Till) placement from Sta. 14+55 to Sta. 15+50 to El. 967.6m
- Zone S (Till) placement from Sta. 14+82 to Sta. 15+50 to El. 967.9m

Sand Cells

- Zone U (Sand Cell) construction continue from Sta. 05+33 to Sta. 06+36 on the South Embankment

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- A ramp was established to access the barge
- A power pole was put in place on the new barge ramp
- The tailings shack was moved by the communication tower at Corner 2

TSF Weekly Report

Wednesday June 25th– Tuesday July 1st, 2014

Dam

Perimeter

- Zone C (Rock) placement from Sta. 42+54 to Sta. 38+50 to El. 967.9m
- Zone S (Till) placement from Sta. 39+12 to Sta. 29+05 to El. 967.9m

Main

- Zone C (Rock) placement from Sta.27+12 to Sta. 26+86 to El. 967.9m
- Zone S (Till) placement from Sta. 28+35 to Sta. 26+40 to El. 967.6m

South

- Zone F (Filter) placement from Sta. 14+94 to Sta. 04+00 to El. 967.6m
- Zone S (Till) placement from Sta. 14+87 to 04+50 to El. 967.9m
- Zone S (Till) placement from Sta. 14+85 to Sta. 13+05 to El. 968.2m
- Zone U (Sand Cell) completed from Sta. 05+33 to Sta. 06+36 to El. 969.5m

Sand Cells

- Zone U (Sand Cell) construction continue from Sta. 06+36 to Sta. 07+36 on the South Embankment

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- The barge was turned and fixed to the new reclaim line
- The useless reclaim line left behind was moved to the quarry
- A road was established to access the Sand Cell on the Perimeter Embankment from the Valve set at Corner 5
- The ditches around the Tailings and Reclaim lines were re-established
- The Orica site was cleaned out of construction left over
- The log piles by the Till pit were moved across the Gavin Lake road
- The access to the Main Embankment Hazeltine tank was completed

TSF Weekly Report
Wednesday July 2nd – Tuesday July 8th, 2014

Dam

Perimeter

- Zone C (Rock) placement from Sta. 38+50 to Sta. 30+58 to El. 967.9m

Main

- Zone C (Rock) placement from Sta.16+70 to Sta. 191+68 to El. 967.9m

South

- Zone S (Till) placement from Sta. 13+05 to 04+50 to El. 968.2m
- Zone S (Till) placement from Sta. 14+64 to Sta. 04+75 to El. 968.5m

Sand Cells

- Zone U (Sand Cell) construction continue from Sta. 06+36 to Sta. 07+36 on the South Embankment
  - Sand Cat down since July 3rd in afternoon

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- The ditch from the Main Embankment Hazeltine tank to the ABR pond was completed
- A crushing pad was established at Corner 5 loading area
- Construction of causeway on right hand side of the barge
- Lake Ex fuel tank were moved to the quarry
- A new access and exit was established at Corner 5 loading area **[Peterson Contracting]**
- A temporary haul road was established below the Perimeter Embankment to bypass the Till borrow pit **[Peterson Contracting]**
- The Till borrow pit was stripped **[Peterson Contracting]**

TSF Weekly Report

Wednesday July 9th – Tuesday July 15th, 2014

Dam

Perimeter

- Zone C (Rock) placement from Sta. 38+50 to Sta. 27+50 to El. 967.9m
- Zone S (Till) placement from Sta. 26+36 to Sta. 28+27 to El. 967.9m at Corner 2
- Zone S (Till) placement from Sta. 49+41 to Sta. 47+77 to El. 967.6m at Corner 5
- Zone S (Till) placement from Sta. 49+33 to Sta. 47+71 to El. 967.9m at Corner 5
- Zone S (Till) placement from Sta. 49+25 to Sta. 47+63 to El. 968.2m at Corner 5
- Zone S (Till) placement from Sta. 49+25 to Sta. 39+80 to El. 968.5m
- Zone S (Till) placement from Sta. 47+70 to Sta. 44+20 to El. 968.8m
- Zone F (Filter) placement from Sta. 47+50 to Sta. 28+27 to El. 967.9m

Main

- Zone C (Rock) placement from Sta.19+68 to Sta. 27+50 to El. 967.9m
- Oversized material excavated against Zone F

South

- Zone U (Sand Cell) completed from Sta. 06+36 to 07+36 to El. 969.5m
- Zone C (Rock) placement from Sta. 04+64 to Sta. 09+10 to El. 968.8m
- Oversized material excavated against Zone F

Sand Cells

- Zone U (Sand Cell) construction continue on the South Embankment from Sta. 07+30 to 08+30

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- The South East end of the till borrow pit was stripped **[Peterson Contracting]**
- Test pits were performed above Corner 4 and 5
- The bootjack creek improvement were completed
- The junction ditch leak was fixed
- Protection was established around the Hazeltine discharge pipes
- The new light duty road was established between the Old Orica site and Corner 5
- The barge causeway was under construction and not completed

TSF Weekly Report
Wednesday July 16th – Tuesday July 22nd, 2014

Dam

Perimeter

- Zone S (Till) placement from Sta. 47+68 to Sta. 39+90 to El. 968.8m
- Zone S (Till) placement from Sta. 47+57 to Sta. 39+95 to El. 969.1m
- Zone S (Till) placement from Sta. 39+00 to Sta. 28+03 to El. 968.2m
- Zone S (Till) placement from Sta. 36+00 to Sta. 32+15 to El. 968.5m
- Zone F (Filter) placement from Sta. 39+21 to Sta. 27+50 to El. 967.9m

Main

- Zone F (Filter) placement from Sta. 27+50 to Sta. 27+30 to El. 967.9m

South

- Zone C (Rock) placement from Sta. 09+10 to Sta. 15+57 to El. 968.8m
- Zone U (Sand Cell) completed from Sta. 07+30 to Sta. 08+30 to El. 968.6m

Sand Cells

- Zone U (Sand Cell) construction continue on the South Embankment from Sta. 08+30 to 09+30

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- The barge causeway was under construction but not completed
- The organic material piles were hauled out at the 9K sump
- The Orica emulsion silo was remove from the existing structure and moved to the new site
- Crush material was put in place for the extension of the instrumentation
- An exposed pipe at Corner 5 was fixed
- A rock berm was established at Corner 5 for Till support on the downstream side

Elevation Summary

Zone	Description	Embankment: South	Main	Perimeter
U (CBL/Sand Cell)	Base *(Chainage)*	968.6m *(Sta. 04+30 to Sta. 08+30)*	967.1m *(Sta. 15+50 to Sta. 27+50)*	967.1m (*Sta. 27+50 to Sta. 48+50)*
	Additional *(Chainage)*			
S (Till)	Base *(Chainage)*	968.8m *(Sta. 04+30 to Sta. 15+50)*	967.9m *(Sta. 15+50 to Sta. 27+50)*	967.9m *(Sta. 27+50 to Sta. 39+50)*
	Additional *(Chainage)*			969.1m *(Sta. 40+00 to Sta. 47+50)*
F (Filter)	Base *(Chainage)*	968.8m *(Sta. 04+30 to Sta. 15+50)*	967.0m *(Sta. 15+50 to St. 27+50)*	967.9m *(Sta. 27+50 to Sta. 47+50)*
	Additional *(Chainage)*			
T/C (Transition/Rock)	Base *(Chainage)*	968.8m *(Sta. 04+30 to Sta. 15+50)*	967.9m *(Sta. 15+50 to St. 27+50)*	967.9m *(Sta. 27+50 to Sta. 47+50)*
	Additional *(Chainage)*			

Water Elevation (July 22nd, 2014): 966.68m
2014 TSF Construction Target: 972.50m

TSF Weekly Report
Wednesday July 23th – Tuesday July 29th, 2014

Dam

Perimeter

- Zone S (Till) placement from Sta. 39+76 to Sta. 39+10 (Pipe crossing) to El. 968.0m
- Zone S (Till) placement from Sta. 39+83 to Sta. 38+99 (Pipe crossing) to El. 968.3m
- Zone S (Till) placement from Sta. 39+92 to Sta. 38+85 (Pipe crossing) to El. 968.6m
- Zone S (Till) placement from Sta. 40+03 to Sta. 39+12 (Pipe crossing) to El. 969.0m
- Zone S (Till) placement from Sta. 38+85 to Sta. 36+00 to El. 968.5m
- Zone S (Till) placement from Sta. 32+22 to Sta. 27+90 to El. 968.7m
- Zone C (Rock) placement from Sta. 47+50 to Sta. 37+50 to El. 969.0m

Main

- Zone F (Filter) placement from Sta. 27+30 to Sta. 15+05 to El. 967.9m
- Zone S (Till) placement from Sta. 28+18 to Sta. 15+05 to El. 968.2m

South

- Zone C (Rock) placement from Sta. 16+00 to Sta. 15+77 to El. 968.8m
- Zone U (Sand Cell) completed from Sta. 08+30 to Sta. 09+30 to El. 968.6m

Sand Cells

- Zone U (Sand Cell) construction continue on the South Embankment from Sta. 09+30 to 10+80

ABR

- The ABR continues to discharge at ~75GPM

Project Work

- A new water collection ditch was establish beside the TAR road going to the Bootjack creek sump
- The Perimeter Embankment pipe crossing was partially raised
- The dirty material at the 9K sump was hauled away and a road was put in place
- The trenching for the silos power feed was completed at the new Orica site
- A temporary gate was installed at the entrance of the new Orica site
- A pad was established at the SERDS dump for Peterson crusher relocation

Elevation Summary

Zone	Description	Embankment South	Embankment Main	Embankment Perimeter
U (CBL/Sand Cell)	Base *(Chainage)*	968.6m *(Sta. 04+30 to Sta. 08+30)*	967.1m *(Sta. 15+50 to Sta. 27+50)*	967.1m (*Sta. 27+50 to Sta. 48+50)*
	Additional *(Chainage)*			
S (Till)	Base *(Chainage)*	968.8m *(Sta. 04+30 to Sta. 15+50)*	968.2m *(Sta. 15+50 to Sta. 27+50)*	968.2m *(Sta. 27+50 to Sta. 40+00)*
	Additional *(Chainage)*			969.1m *(Sta. 40+00 to Sta. 47+50)*
F (Filter)	Base *(Chainage)*	968.8m *(Sta. 04+30 to Sta. 15+50)*	967.9m *(Sta. 15+50 to St. 27+50)*	967.9m *(Sta. 27+50 to Sta. 47+50)*
	Additional *(Chainage)*			
T/C (Transition/Rock)	Base *(Chainage)*	968.8m *(Sta. 04+30 to Sta. 15+50)*	967.9m *(Sta. 15+50 to St. 27+50)*	967.9m *(Sta. 27+50 to Sta. 40+00)*
	Additional *(Chainage)*			969.0m *(Sta. 40+00 to Sta. 47+50)*

Water Elevation (July 29th 2014): 966.70m
2014 TSF Construction Target: 972.50m

From: Warnock, George MEM:EX
To: Plewes, Howard
Cc: McLeod, Harvey; Kuppers, Haley MEM:EX; Pocklington, Cheryl M MEM:EX; Hoffman, Al MEM:EX; "Douglas Kiloh"; XT:Elwood, Keith FIN:IN
Subject: RE: Assessment of Failure Mechanism - Draft Report
Date: Thursday, April 2, 2015 1:54:16 PM
Attachments: 150320R-MtPolleyTSF_FailureAssess_Review_gw review.docx

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Hello Howard,

I have completed my review of the Mechanism of Failure report. The report is concise, well written, and easy to read. See tracked changes and comments in the attached WORD document. You will see that all suggested revisions are minor and have no effect on the intent of the report – feel free to incorporate or discard as you see fit. I have nothing profound to offer in terms of content. Note that I have not attempted to review the appendices in any detail.

I reviewed hard copies of all of the Figures that were provided by Harvey. I understand that these might be outdated, but I haven't tried to cross-check them against the digital versions in your report. The comments below are offered for consideration – most relate to minor typos, and again do not have a material effect on the intent of the original figures. Where applicable, I have also summarized comments that Harvey had written in pencil on the hard copy figures. Comments as follows:

- Figure 3.9 (a) and (b) – I believe that it is more common to use the term "Northwest" instead of "North West" but I understand that both are acceptable. I will not repeat this comment, but note that it would also apply to Figure 3.10 (b) and (d) and Figure 4.5 (b)
- Figure 3.9 has (a) written twice instead of (a) and (b)
- Figure 3.9 (d) – I believe that view is toward southeast
- Figure 3.10(a) – I believe that view is toward southwest
- Figure 3.11 – Harvey had a note that suggested that the "piping" zone be shown on (b)
- Figure 4.2 – Harvey had a note to indicate that MP89-231 is mislabelled as MP98-231 and is shown in a location that is inconsistent with Figure 2.9
- Figure 4.3 – the same issue noted on Figure 4.2
- Figure 5.8 – Harvey noted that station labels are missing
- Figure 5.9 – also missing station labels
- Figure 5.13 – Harvey noted the missing section reference "Section C/5.11"
- Figure 5.14 – Harvey noted the missing section reference "Section D/5.14"
- Figure 5.18 – Harvey noted the missing section reference "Section C/5.11" There was also a note by Harvey that I could not decipher (L02 50,L?)
- Figure 5.19 – Similarly missing "Section D/5.11"
- Figure 5.28 – a section is mislabelled as "F/5.24" – I believe this should be "F/5.27"
- Figures 5.30, 5.31, and 5.32 – Note 4: typo "Readies" should be "Readings"
- Figure 5.31 – I believe that "Section C/5.26" should read "Section C/5.29"
- Figure 6.2 – Add label "Section C/6.1"
- Figure 6.3 – Add label "Section D/6.1"
- Figure 6.5 – charts (a) and (b) have types: "POER" should be "PORE" and "MODDLE" should be "MIDDLE"
- Figure 6.6 – I believe that "SHAIR" should be "Shear Strain"

Thanks again for all of your work on this – very nicely done. Please give the rest of the investigation team until the end of next week to offer any additional comments and then go ahead and finalize.

Regards,

George

From: Plewes, Howard [mailto:HPlewes@klohn.com]
Sent: Friday, March 27, 2015 5:23 PM
To: Warnock, George MEM:EX
Cc: McLeod, Harvey
Subject: RE: Assessment of Failure Mechanism - Draft Report

George,

The copies that Harvey gave you might be a bit dated as we did make some small changes right to the end. You are not holding me up at all as I am trying to catch up on other things now.

Howard

Howard Plewes, M.Sc., P.Eng.

Vice President, Mining Environmental Group, Principal

Klohn Crippen Berger 500-2955 Virtual Way, Vancouver BC V5M 4X6, CANADA

T 604.251.8457 | HPlewes@klohn.com | www.klohn.com

From: Warnock, George MEM:EX [mailto:George.Warnock@gov.bc.ca]
Sent: Friday, March 27, 2015 4:52 PM
To: Plewes, Howard
Cc: McLeod, Harvey
Subject: RE: Assessment of Failure Mechanism - Draft Report

Hi Howard,

I haven't forgotten about this – I am making some progress, but am getting derailed everyday by other priorities. I have reviewed the figures (Harvey gave me hard copies) and about 40 pages of text. I expect to finish this off early next week. I am not coming up with anything profound – I think that you will be able to finalize with almost no revisions. Hopefully I am not holding up the show.

Have a great weekend.

George

From: Warnock, George MEM:EX
Sent: Monday, March 23, 2015 2:26 PM
To: Plewes, Howard
Cc: McLeod, Harvey
Subject: RE: Assessment of Failure Mechanism - Draft Report

Hi Howard,

I haven't managed to get to your report yet, but hope to do so in the next few days (at least the text portion). Once I've had a chance to read it, I'll contact you to set-up a meeting.

Regards,

George

From: Warnock, George MEM:EX
Sent: Friday, March 20, 2015 3:52 PM
To: Plewes, Howard
Cc: McLeod, Harvey
Subject: Re: Assessment of Failure Mechanism - Draft Report

Sounds good Howard - I'll get back to you on Monday and we can set up a time then.

Sent from my iPhone

On Mar 20, 2015, at 3:44 PM, "Plewes, Howard" <HPlewes@klohn.com> wrote:

Hi George,
We are planning to issue our draft report to you today for information and comment. I would welcome a meeting to go through the report with you.
I caution you that this report should not be distributed and should be destroyed when the final is issued.
Regards,
Howard

Howard Plewes, M.Sc., P.Eng.
Vice President, Mining Environmental Group, Principal

Klohn Crippen Berger 500-2955 Virtual Way, Vancouver BC V5M 4X6, CANADA
T 604.251.8457 | HPlewes@klohn.com | www.klohn.com

March 20, 2015

BC Ministry of Energy and Mines
Suite 600 – 1810 Blanshard Street
Victoria, British Columbia
V8T 4J1

Mr. George Warnock, P.Eng.
Manager, Geotechnical Engineering

Dear Mr. Warnock:

Mount Polley Tailings Dam Failure
Assessment of Failure Mechanism
Draft Report

This draft report presents our technical assessment and opinion on the mechanism of failure of the Mount Polley Tailings Dam.

Please do not hesitate to contact the undersigned if you have any questions concerning this report.

Yours truly,

KLOHN CRIPPEN BERGER LTD.

Howard Plewes, M.Sc., P.Eng.
Project Manager

HP/HB:dl

150320R-MtPolleyTSF_FailureAssess_Review_gw review
M09954A01.730

Klohn Crippen Berger Ltd • 500 - 2955 Virtual Way • Vancouver BC V5M 4X6 • CANADA
604 669 3800 t • 604 669 3835 f • www klohn com

EXECUTIVE SUMMARY

This report presents Klohn Crippen Berger's (KCB) opinion on the mechanism of failure of the Mount Polley tailings dam on August 4, 2014. Our work was commissioned by the British Columbia Ministry of Energy and Mines (MEM) to assist in their investigation~~s~~ into ~~of~~ the cause of the failure. This report documents our work, the progress of which was presented to the Ministry in meetings in October 2014 and January 2015.

The Mount Polley mine site is located 11 km from the town of Likely in the interior of British Columbia at N5819160 m and E595110 m. Tailings are retained by a U-shaped dam abutting a natural slope on the northwest side. The tailings dam comprises three embankments: the Main Embankment on the southeast side, South Embankment bounding the southwest side and Perimeter Embankment bounding the northeast side. The dam failed between Stations 4+110 and 4+350 at the highest section of the Perimeter Embankment. The breach released an estimated[1] 17 million m^3 of water (including interstitial water) and 8 million m^3 of tailings solids which flowed into Polley Lake, Hazeltine Creek and ~~thence into~~ Quesnel Lake.

The Perimeter Embankment comprises a rockfill embankment raised in stages by the centreline and modified upstream construction methods, with an upstream "core" of compacted glacial till and filter zones to restrict seepage through the dam. The dam failed during construction of the Stage 9 raise to Elevation 970 m when the dam was approximately 40 m high. At the time of failure, the exterior dam slope was nominally 1.3H:1V, which is the steepest slope that dumped rockfill can typically be placed.

An Independent Review Panel (IRP) was formed by the Government of British Columbia shortly after the failure to determine the mechanism of failure of the tailings dam. The IRP's mandate is given in their Terms of Reference dated October 6, 2014 and their report was published on January ~~31~~30, 2015 (IRP 2015). Overall, this report agrees with the Panel's opinion on the basic mechanism of failure of the tailings dam. That basic mechanism was a sliding failure through a lightly over-consolidated glaciolacustrine clay unit (UGLU) in the foundation which dropped the embankment crest enough to allow the pond to overtop and, within a few hours, to completely breach a portion of the Perimeter Embankment. This mechanism is manifested by physical evidence of dam displacements and shear movements in the dam foundation, and is supported by analyses using the engineering properties of the dam and foundation soils. From all available evidence, the final trigger for the failure was the recent excavation at the toe in 2013 and raising of the embankment with the steep outer slope of 1.3H:1V.

KCB conducted the majority of the post-failure field investigations and supporting laboratory testing in the immediate breach area. That factual work was published in Progress Report Nos. 1 through 4 which were distributed to MEM and the Mount Polley Mine as they were completed. Data was also made available to the IRP, directly from the Mount Polley Mine. This report relies on the factual data presented in those Progress Reports and the following additional work:

- review of dam construction history and records;

[1] Estimates taken from BCMEMPR website.

- interpretation of the morphology of the failed dam and breach;
- review of instrumentation data prior to failure in conjunction with that of new instrumentation installed post-failure; and
- seepage, stability and numerical stress analyses of the dam.

The following sections describe the relevant findings from our failure assessment.

Properties of UGLU

The dam failed by sliding on a foundation clay layer of glaciolacustrine origin, which lies approximately 10 m below the base of the embankment. This clay layer, termed the UGLU, is a high plastic, clay-rich varved lacustrine deposit ranging up to 2 m thick. The areal extent of the UGLU is largely confined to the immediate area of the failed dam.

The native UGLU is a "lightly over-consolidated" clay with a pre-consolidation pressure between 380 kPa and 420 kPa. In its native state prior to dam construction, the UGLU would have exhibited dilative response to shearing and its ultimate strength would be governed by the drained frictional strength. The weight of the 40 m high tailings dam subjected the UGLU to vertical stresses up to 800 kPa and substantial portions of the UGLU beneath the dam were loaded to stresses well above the pre-consolidation pressure. These loaded portions of the UGLU became "normally consolidated" and would have displayed a contractive response to shearing. The ultimate strength of normally consolidated clay is its undrained strength, which accounts for pore pressures developed during shearing. This change from lightly over-consolidated behavior to normally consolidated behavior occurred incrementally over time as the dam was raised. At the time of failure, the demarcation point between "lightly over-consolidated" and "normally consolidated" behavior occurred below the lower third of the dam slope.

The shear strength of the UGLU is controlled by the higher plastic zones within the clay layer. Accordingly, we estimate the peak drained strength of the UGLU as $c' = 0$ kPa and $\phi_p' = 22°$, and the residual drained strength as $\phi_r' = 12° - 14°$. The similarity of these parameters to the shear strength of other clay soils reported by Stark et al. (2013) indicates that the UGLU is not a unique or special soil.

Under rapid loading and straining, the undrained strength of the UGLU is represented by $Su = 0.22\ (OCR)^{0.8}\ \sigma_{vo}'$, where σ_{vo}' is the effective vertical confining stress and OCR is the overconsolidation ratio. This relationship is identical to the average relationship for homogeneous sedimentary clays recommended by Ladd (1991) and, again, indicates the UGLU is not unique.

The UGLU is also a strain-weakening material which loses appreciable strength when deformed past its peak strength, in both drained and undrained loading conditions. The strain-weakening nature of the UGLU was observed in direct shear tests, direct simple shear tests and undrained triaxial compression tests.

The piezometers installed in the UGLU after the failure found no evidence of high excess pore pressures related to the loading of the dam during construction. However, unloading and deformations in the UGLU during the failure and breach would have substantially changed the pore pressure regime in the clay from that of the pre-failure state. Pore pressure analyses using the consolidation properties of the clay and rate of dam construction predicts that excess pore pressures up to 158 kPa may have existed at the time of dam failure.

On the other hand, evidence of "artesian" water pressures were encountered during post-failure site investigations in the permeable glaciofluvial deposits which are present about 5 m below the UGLU. These artesian water pressures were also predicted by pre-failure seepage analyses of the dam by KCB. These pressures reduce the consolidation stress and strength of the UGLU by about 5% to 10%.

Analysis of Failure

At the time of failure, the Factor of Safety (FoS) of the dam was calculated using limit equilibrium methods to be 1.27 using the peak drained strength of the UGLU and the pre-failure pore pressures estimated by seepage analyses. The FoS reduces to 1.19 with an allowance for construction induced pore pressures.

Numerical stress analyses of the dam show that, at these low FoS, the shear stresses induced in the UGLU below the steep outer dam slope would have exceeded the available peak drained strength, thereby initiating a progressive undrained failure mechanism in the UGLU. Using the peak undrained strength of the UGLU, the calculated FoS of the tailings dam reduces to unity.

Because of the strain-weakening behavior of the UGLU, the displacement of the dam probably accelerated once failure was initiated (FoS less than 1) as described above. This acceleration of movement subjected the UGLU to progressively larger strains and greater strength loss, with calculated FoS ultimately reducing to as low as 0.80 at the fully remolded strength of the UGLU. At this stage, rapid movement of the dam continued until the geometry of the failed mass re-stabilized at a FoS of unity.

The existence of a pre-existing shear plane in the UGLU was considered as a possible factor in the failure. Samples retrieved from outside the failed dam were examined for t~~T~~he presence of shear planes or other distortions of the varved clay structure, ~~was looked for in the samples retrieved from outside the failed dam~~ but none was found. The near-horizontal inclination of the varve bedding in free field samples of the UGLU also tends to rule out an old landslide or glacial shearing as a contributory factor in the failure. The absence of a pre-existing shear plane is corroborated by the fact that the dam probably would have failed earlier if a shear plane at lower shear strength had been present.

The forensic drilling and excavations in the failed dam and breach area identified a distinctive shear plane and down-drop in the upstream till core and upthrust of the foundation soils at the dam toe. Movements interpreted from these and other features indicate net dam displacements in the order of 5 m to 10 m along the sliding plane in the UGLU. Numerical deformation analysis of the dam by KCB shows that the down-drop of the dam crest during the failure would have been sufficient for the tailings pond water to overtop the crest of the till core and trigger the subsequent dam breach.

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Large movements in the UGLU are also consistent with the small movements in the UGLU recorded by inclinometers installed post-failure, the heavily de-structured and folded varves of the UGLU in the failure zone below the dam, and the weakened state of the UGLU in the failure zone consistent with the remolding of the clay during the dam displacements.

Comparison to Aznalcollar Tailings Dam Failure

It is notable that the Aznalcollar Tailings Dam near Seville, Spain was also constructed with a 1.3H:1V exterior slope and failed at a height of 28 m in 1998. It is likely the closest direct comparable in the mining industry to the Mount Polley dam failure.

This dam failed by sliding on a heavily overconsolidated, high plastic, marl clay foundation. While overconsolidated and dilative in shear, the marl clay displayed remarkable "brittle" behavior with substantial loss of frictional strength once the peak strength was exceeded. Failure was initiated by local yielding of the clay, which initiated a progressive failure within the dam foundation. Contributing factors to the local yielding were the steep dam slope and excess pore pressures generated in the clay during the dam construction.

At the time of failure, the tailings pond was maintained against the dam crest to keep the stored sulfide-rich tailings saturated to prevent oxidation. Failure of the dam released the entire 5.5 million m^3 of stored pond water and 1.5 million m^3 of tailings slurry.

Table 1 compares some of the features of the Mount Polley and Aznacollar tailings dams. Ultimately, both dams failed because the exterior slopes were too steep for the foundation conditions.

Table 1 Comparison of Mount Polley and Aznalcollar Tailings Dam Failures

Feature	Mount Polley Tailings Dam	Aznalcollar Tailings Dam
Dam Height	40 m	28 m
Dam Construction Method	Modified upstream method with "core" of compacted till and filter zones	Downstream method with lining of compacted soil on the upstream dam face and filter zones
Exterior Dam Slope	1.3H:1V in upper slope 1.8H:1V at toe	1.3H:1V
Foundation Clay Involved in Failure	Glaciolacustrine Varved Clay	Marine Marl Clay
Clay Thickness	2 m maximum	Over 25 m
Clay Properties	Liquid Limit = 40 – 70% Clay Fraction = 40 – 70%	Liquid Limit = 55 – 75% Clay Fraction = 45 - 75%
Consolidation State	Lightly Overconsolidated Liquidity Index = 0.5	Heavily Overconsolidated Liquidity Index = 0.13
Behavior Under Shear	Contractive Undrained strength governs Gradual loss in undrained strength from peak to remolded	Dilative Drained strength governs Brittle with high strength loss from peak to residual friction angle
Construction Excess Pore Pressures	Low based on post-failure pore pressure analyses	High based on piezometers installed after failure event
Rate of Failure	< 2 hours 10 m of dam displacement	< 2 hours Up to 50 m of dam displacement
Water Pond at Time of Failure	High pond level against dam crest following high spring runoff	High pond level against dam crest to keep sulfide tailings saturated

Consequences of Failure	Release of 17 million m^3 of water and 8 million m^3 of tailings solids	Release of 5.5 million m^3 of water and 1.5 million m^3 of tailings slurry

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1 INTRODUCTION

1.1 General

This report presents Klohn Crippen Berger's (KCB) opinion on the mechanism of failure of the Mount Polley tailings dam on August 4, 2014. This work was commissioned by the British Columbia Ministry of Energy and Mines (MEM) to assist in their investigation~~s~~ into ~~of~~ the cause of the failure. This report documents our work, the progress of which was presented to the Ministry in meetings in October 2014 and January 2015.

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KCB conducted the majority of the post-failure field investigations and supporting laboratory testing in the immediate breach area. That factual work was published in Progress Report Nos. 1 through 4 which were distributed to MEM and the Mount Polley Mine as they were completed. Data was also made available to the IRP, directly from the Mount Polley Mine. This report relies on the factual data presented in those Progress Reports and the following additional work:

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- interpretation of the morphology of the failed dam and breach;
- review of instrumentation data prior to failure in conjunction with that of new instrumentation installed post-failure; and
- seepage, stability and numerical stress analyses of the dam.

1.2 Report Organization

Section 2 ~~is~~ provides a review of historical information on the site conditions and construction of the Perimeter Embankment in the vicinity of the breach. A selection of supporting factual data in the form of reports and drawings is contained in Appendix I.

Section 3 describes the failure including a chronology of the event and pertinent post-failure morphological features.

Section 4 describes the site investigations and laboratory testing conducted by KCB, which was included in Progress Report Nos. 1 through 4. Selected information from this work is contained in Appendix II.

Section 5 ~~gives~~ includes our interpretation of the soil profile and geotechnical properties at the breach area.

Section 6 presents our analysis of the probable seepage and pore pressure conditions in the dam prior to failure. ~~Following that, t~~The failure mechanism of the dam is then assessed using limit equilibrium and numerical modelling methods.

Conclusions on the failure mechanism are discussed in Section 7.

Section 8 compares the Mount Polley Breach with the Aznalcollar Tailings Dam Failure that occurred in Spain in 1998.

2 REVIEW OF HISTORICAL INFORMATION

2.1 General

The Tailings Storage Facility (TSF) is located 3 km southeast of the mill site. The TSF is approximately 1.8 km long by 1.6 km wide, and covers an area of about 304 ha. The pre-failure configuration of the TSF from the most recent Lidar survey on August 21, 2013 is shown in Figure 2.1. A more recent aerial view in July 2014 is shown in Figure 2.3, overlain by topographic contours from August 2013.

TSF construction started in May 1996 at the Main Embankment. Construction of the Perimeter Embankment started in December 1996. Excluding a mill shutdown from mid-October 2001 to March 2005, it was raised semi-annually in nine main stages ending in August 2014. Figure 2.2 presents historic aerial photographs of the TSF for 1985, 1998, 2005, and 2010.

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The following sections describe the Perimeter Embankment section, construction history including material zonation, regional geology, and instrumentation records prior to failure. Appendix I provides select supporting information that was used in preparation of this section.

2.2 Embankment Section

The plan layout of the Perimeter Embankment in the failure area is shown in Figure 2.4, including fill zonation and location of drainage systems. Figure 2.6 presents the as-built section of the failed embankment based on our compilation of design and as-built records.

The zonation of the Perimeter Embankment includes a compacted till core (Zone S) supported on the downstream side by a rockfill shell (Zone C), and upstream by a random fill zone with varying material types throughout operation (Zone U). Fine and coarse filter materials separate the core and the downstream shell (Zone F and Zone T).

An Upstream Toe Drain, installed within the upstream fill (Zone U) during Stage 5, comprises a 250 mm diameter perforated pipe embedded in a 1 m x 1 m trench backfilled with granular drain material. The drain extends between Stations 3+000 to 4+575 with the pipe invert at El. 946.3 m. The drain passes underneath the embankment at Station 4+575 (within a concrete encased steel pipe) and discharges into a ditch that conveys flows to the Perimeter Embankment Seepage Collection Pond (see Figure 2.4).

The most recent Stage 8 and 9 raises were constructed following the centerline method. Prior raises in Stages 2 to 7 were conducted following a modified upstream construction method.

Construction of the final Stage 9 raise to a crest elevation of 970 m commenced by end of April 2013 and was progressing under MEM Permit No M-200 in accordance with the design completed by AMEC in April 11, 2013 (MP00045).The raise started at El. 963.5 m which represents the end of Stages 8/8A. At the time of the failure, Zones U, S and C had been raised to 969 m, 970 m and 969 m, respectively.

2.3 Construction History

2.3.1 Embankment Staging, Pond and Tailings Elevations

Table 2.1 summarizes the timeline of the embankment raises and the pond and tailings elevations for the Perimeter Embankment. Reference information for the timeline is included in Appendix I-B.

2.3.2 Foundation Preparation

Figure 2.5 summarizes the available foundation preparation records in the vicinity of the failure breach. Foundation preparation comprised an initial clearing and stripping of vegetation followed by specific preparation works in eight individual foundation areas. Reference information is included in Appendix I-C. Main observations are:

- The ground was generally stripped to native glacial till.
- Due to wet and soft ground conditions, filter fabric was laid over the till in a portion of Area 2. This explains fragments of non-woven geotextile that were encountered during the post-failure site investigation in drill holes SH14-03 and SH14-08 at the contact between the embankment fill and the native ground.
- A near surface clay deposit was encountered along the outer quarter of the Stage 2B haul road between Stations 4+275 and 4+200 (shown as Area 3 in Figure 2.5). The clay was at least 0.8 m thick and deemed a local deposit. At the same period, “pumping” was observed during construction in a “low swampy area” between Stations 4+195 and 4+250. Portions of the local clay deposit were left in place. Accordingly, during the post-failure site investigation, a 0.5 m nominal thickness of sandy clay was encountered in drill holes SH14-08 and SH14-09 immediately below the base of the embankment. The non-woven geotextile found in SH14-08 was at the contact between the overlying embankment fill and the clay.
- Stage 9 foundation preparation in Area 6 was approved for fill placement except for a section between Stations 4+100 and 4+300. Interviews with mine personnel indicated that a 2 m deep excavation at the embankment toe was conducted in this area in November 2013 in preparation for future construction of a toe buttress. This excavation was reported to be left open at the time of embankment failure. The impact of this open excavation is considered in our failure analyses.

Table 2.1 Embankment Staging, Pond Elevation and Estimated Tailings Elevations at Failed Embankment Section

Stage	Raise Methodology	As-Constructed Crest Elevation (m)			Construction Period		Pond and Tailings Elevation		Reference Document	Design Engineer
		Upstream Zone	Core	Downstream Shell	From	To	Pond Elevation (m) and Recorded Date[3]	Estimated Tailings Elevation (m)[4]		
1A	Modified Upstream Method	-	927.0	-	-	End of 1996	-	-	MP00019	Knight Piesold Ltd. (KP)
1B		934.0	934.0	934.0	Dec 12, 1996	March 17, 1997[1]	920.0 (May 1997)	921.9	MP00019	
2A		936.0	936.0	934.0	Feb 6, 1998	May 15, 1998[1]	930.0 (March 1998)	930.3	MP00012	
2B		936.0	936.7	934.0	Sep 23, 1998	Dec 22, 1998[1]	930.8 (Oct 1998)	931.1	MP00012	
2C		941.0	941.0	941.0	Apr 1999	Feb 12, 2000[1]	934.8 (Aug 2000)	934.9	MP10032	
3A		941.3	941.3	941.0	Nov 2000	Mar 2001	940.5 (Oct 2001)	942.0[5]	MP00072	
3B		942.5	942.5	941.0	May 2001	End Aug 2001	940.5 (Oct 2001)	942.0[5]	MP00072	
3C		944.0	944.0	944.0	Aug 2004	Mar 2005	941.1 (Aug 2005)	942.5	MP00038	
4		948.0	948.0	944.0	May 2005	Oct 2006	944.5 (March 2007)	945.9	MP00031	
5		951.0	951.0	950.5	Nov 2006	Nov 2007	948.0 (Feb 2008)	949.4	MP00033	
6A		952.3	954.0	952.3	May 2008	Oct 2008	951.5 (June 2009)	952.8	MP00034	
6B		958.5	958.0	957.3	Oct 2009	Aug 2010	953.2 (Sep 2010)	954.5	MP00036	
7		960.5	960.1	959.9	Jun 13, 2011	Sep 21, 2011	957.6 (Dec 2011)	958.5	MP00041	AMEC
8/8A		963.5	963.5	962.7	May 30, 2012	Oct 26, 2012	961.2 (Feb 2013)	961.3	MP00217	
9	Centerline	964.5	967.0	966.1	End of April 2013	Oct 30, 2013	964.4 (Feb 2014)	964.4	MP00044	
		969.0	970.0[2]	969.0	Spring 2014[1]	August 2014[1]	966.8 (Aug 2014)[6]	966.3[7]	-	

Notes:

1. This construction period is for the Perimeter Embankment as indicated in references. Other construction periods are for the entire TSF.
2. Crest elevation based on cross-section from the August 5, 2014 LiDAR and from surveyed site investigation drill holes and CPT sounding at the embankment crest (i.e., El. 969.9 m at SH14-20, El. 968.9 m at SH14-21, and El. 971 m at CPT14-21).
3. Some differences were found when comparing pond levels in as-built reports and pond levels presented in historical piezometer records from AMEC 2013 (MP00044). Differences are for Stages 1 and 2 (1 m to 5 m higher in AMEC's plot) and for Stages 3C, 4, and 6B (1 m to 2 m higher in plot).
4. Tailings elevation was not available, thus it was estimated based on tailings beach width from as-built records and a beach slope of 0.5%.
5. Refer to Stage 3 construction report. Tailings built higher than crest, although tailings assumed at crest elevation.
6. Pond elevation reported in construction daily report No TSF14-08-03, dated August 3, 2014.
7. Tailings elevation inferred from 2014 LiDAR for cross-sections taken east and west of the breach area.

2.3.3 Embankment Zonation

The embankment was constructed using the nine main fill zones listed in Table 2.2. Figure 2.6 shows the re-constructed pre-failure section of the embankment (Section C) and the material zones. The re-constructed section is based on reference information included in Appendix I-D and reference photographs from construction records included in Appendix I-E.

Table 2.2 General Description of Fill Materials

Zone	Material Type	Function
S	Glacial till	Till Core
B	Glacial till, glaciolacustrine or granular material	Fill Zone
C	Rockfill	Downstream shell Zone
T	Fine Rockfill	Transition Zone/ Confining berm/Haul Road
F	Sand and Gravel	Chimney Drain, Longitudinal/Outlet Drain
G	Drain Gravel	Foundation/Longitudinal/Outlet drain
CBL	Random/Select Rockfill	Base Layer for Upstream Fill
CS	Cycloned Sand	Hydraulically or Mechanically Placed as Upstream Fill
U	Random fill and Tailings Sand	Upstream Fill

Fine-grained glacial till for Zones B and S were sourced from borrow areas around the perimeter of the TSF or within the TSF impoundment (during early years of construction). Zone C rockfill materials were quarried from rock exposures or mine pits. Filter materials for Zones F and T were processed from the rockfill by crushing and/or screening.

Technical specifications for the fill materials are given in the design reports and are summarized in Appendix I. The following presents the description of the fill materials as-placed in the embankment as described in the as-built records and reports.

Glacial Till Core (Zone S and Zone B)

- Zone S was reported to be glacial till comprising a medium to low plastic silty sand to sandy silt material, with some gravel, and trace to some clay. During Stage 8 only, Zone S was reported to be a mixture of glacial till and glaciolacustrine clay from the Perimeter Embankment borrow. Zone S was generally placed at or above the optimum water content[3]. The median compaction was generally greater than 97% of the maximum Standard Proctor dry density (see Figure I-D-2 in Appendix I-D).
- Zone B was only placed in Stages 1 and 2. It allows for a coarser gradation than Zone S, but gradation records from placed materials showed similar gradation ranges. Zone B had lower compaction requirements and testing frequencies than Zone S. Compaction was greater than 95% of the maximum Standard Proctor dry density. A coarse bearing layer (CBL) was placed below Zone B in Stages 1 and 2 to improve local trafficability prior to the fill placement.

[3] Optimum water content and maximum dry density obtained from Standard Proctor Tests.

- Zone S till core width was reported to be out of compliance during Stage 8 construction, when the core width was less than the specified 5 m. During Stage 9, a minor repair to the core was needed due to a minor upstream slump (0.5 m width and 0.3 m deep repair).

Upstream Support for the Till Core (Zone U, Zone CS, and Zone CBL)

- The material used in the support zone upstream of the till core varied throughout operation and has a high variability in gradation and material characteristics. Zone U generally comprises gravelly sand fills with variable fines content (3% to 62%) interlayered with tailings placed hydraulically in cells (silty sand with fines content of 10% to 45%). Mine waste rock was used for part of Stage 6B as shown in Figure 2.6. It was used in other Stages as well.
- Rockfill layers (Zone CBL) were used to gain support over the tailings beach for fill placement during Stages 2C and 4.
- Cycloned sand (Zone CS) comprising uniform silty sand with fines content of 21% to 34% was used as upstream support during Stage 3A/3B.
- As-built construction records indicated that till core material that failed compaction requirements was also dumped towards the impoundment since Stage 4. Photographs of the contact between Zone S and Zone U showed uncompacted till/random fill materials[4] (see Appendix I-D).

Downstream Support for the Till Core (Zone C)

- Zone C is rockfill comprising fine to coarse gravel with trace to some sand, some cobbles and trace of boulders. As-built records report up to 10% fines. Compaction was applied with a vibratory smooth drum roller and the passage by trucks and/or construction equipment. The lift thickness was specified to be 1 m, but construction records indicated it was placed up to 2 m thick.
- The downstream slope was steepened above El. 944 m from 2H:1V to 1.4H:1V during Stage 5 construction. Also, starting from Stage 6, the dam slope was steepened to maintain a wider embankment crest to allow for passage of larger mine haul trucks. Dumping of rockfill onto the dam slope resulted in an uncompacted outer slope at the angle of repose (1.3H:1V) for Stages 7 to 9.

Filters (Zone T and Zone F)

- Zone F (fine filter) comprises sand and gravel and Zone T (coarse filter) comprises gravel with some sand and trace cobbles. Fines content typically ranged from 0% to 15% for both materials. As-built records for Zone F show that the fine end of the particle size distributions were frequently coarser than the specified D_{15} gradation limit. Potential segregation and filter compatibility was assessed visually during construction.

[4] Lower tip resistance and undrained shear strength was subsequently observed by KCB in CPT14-21 results when passing through the inferred contact between Zone S and Zone U.

Impounded Tailings

- Properties for the impoundment tailings were inferred from Cone Penetration Testing (CPT) soundings conducted in 1999 during Stage 2C construction (included in Appendix I-F). A total of six CPT holes were completed between Stations 4+000 and 4+600. Up to 5 m of tailings was encountered. Sounding locations are shown on Figure 2.9.
- Tailings consisted of loose to compact (equivalent SPT $(N_1)_{60}$ of 10) sandy silt, interlayered with loose silt lenses ($(N_1)_{60}$ of 5) every 0.5 m to 1.0 m. Shear wave velocities were low, ranging from 100 m/s to 125 m/s.
- Soft "sensitive fines" were observed at 1.5 m to 2.0 m intervals, which may correspond to slimes deposited between discharge locations. Slimes showed longer dissipation times and lower coefficients of horizontal consolidation than the coarser tailings layers.
- Measured pore water pressures showed hydrostatic conditions for the tested depths. Material properties for our analyses in Section 6 were inferred from dissipation testing, shear wave velocities, and interpreted data at CPT99-13 and CPT99-14 which are located immediately upstream of the filled dam.

2.4 Regional Surficial Geology

The Mount Polley site is located in the Interior Plateau of British Columbia, an area of relatively subdued topographic relief and lower elevation between the Coastal and Cariboo Mountains. During glaciation, glaciers flowed from the mountains to merge over the Interior Plateau (Clague 1988, Clague 1991). There is evidence to suggest that at least two glaciations occurred within these valleys: the penultimate glaciation (>35,000 BP[5]), and the Fraser Glaciation (10,000 BP to 25,000 BP).

Figure 2.7 shows the regional surficial geology surrounding the TSF. The TSF sits on morainal blankets of variable thickness interpreted as lodgement till. Surficial soils are attributed to the later Fraser Glaciation. Mapping of streamlined subglacial bedforms show that the direction of glacial movement was in the northwest direction.

The till blanket comprises poorly sorted, moderate to well compacted, clayey to silty diamicton. Less compact, boulder rich tills with a sandy matrix are found at higher elevations and classified as ablation till.

Glaciolacustrine deposits (interbedded sand, silt, and clay) are reported to underlie terraces within major river valleys in the vicinity of Mount Polley. Glaciofluvial sediments associated with melt-water channels or drainage courses (typically moderately sorted, weak to moderately compacted, cobble or boulder cobble gravel with a sand matrix) are also present in major valleys as terraces (up to 70 m above river levels) or as irregular deposits at higher elevations on valley slopes or plateaus.

Glaciolacustrine and glaciofluvial sediments were deposited in the valleys during glacial advance and retreat. According to Clague (1991), the glaciolacustrine deposits associated with the penultimate

[5] Conventional Radiocarbon Age (BP)

glacial retreat are described as mainly “massive and stratified silt, sand, gravel, and minor diamicton”. Structures within these sediments include folds, faults and sedimentary dykes that are both syndepositional (occurred during deposition) and post-depositional. A second package of glaciolacustrine sediments were deposited at the end of the Fraser Glaciation, and consist of laminated sand, silt and mud. This unit resembles the sediments deposited after the penultimate glaciation but “lack the pervasive deformation and complex intertonguing of lithologies typical of the latter”.

The glacial till and glaciolacustrine deposits encountered in the post-failure site investigations, as discussed in Section 5, are consistent with the published regional surficial geology.

2.5 Regional Bedrock Geology

Figure 2.8 shows a regional bedrock geology map for the TSF area. The Mount Polley mine is located in an alkali intrusive complex in the Quesnel Trough, a 35 km wide northwest trending volcanic sedimentary belt of regional extent. The Quesnel Trough constitutes a regional synclinal structure formed within a Triassic continent-margin basin, infilled with Triassic sediments and then Triassic to Jurassic volcanic rocks.

A major portion of the TSF sits on what is described as quaternary thick alluvium (Qal), with no description on the underlying bedrock type. The bedrock outcrops in the hill slope confining the west side of the TSF present jointing, shearing, and vertical dikes mainly formed of intrusions of melanocratic syenite rock from the late Triassic.

A 1.5 km long fault is inferred to cross the right abutment of the South Embankment and extend along the western edge of the impoundment crossing the left abutment of the Perimeter Embankment at approximately Station 4+500 (see Detail 1 in Figure 2.8). The rock in this fault zone comprises mainly pseudoleucite syenite in the form of vertical dikes and pyroxene/hornblende-biotite monzonite at the Perimeter Embankment.

2.6 Previous Site Investigations

Campaigns of site investigations were conducted from 1989 to 2012 at the TSF. Figure 2.9 presents the plan of pre-failure site investigations conducted at or near the failed embankment. The investigations comprised the following:

- In 1989, MP89-231 was drilled below the failed embankment to 122 m depth by tricone rotary drilling. The overburden was characterized from drill cuttings, which is usually imprecise in quantifying soil properties or identifying thin layers. Hence, no glaciolacustrine deposits were identified in MP89-231. The water table was found at surface.
- From 1995 and 1999, a total of 4 test pits and 17 drill holes were completed in the vicinity, with 2 test pits and 11 drill holes below the failed embankment. These investigations were restricted to 5 m depth, except for DH99-132 which was 7.5 m deep. A clay layer, up to 2 m thickness, was encountered near surface overlying stiff to very stiff glacial till. The areal extents of this layer was confined to the center of the failed embankment area, at DH99-114

to DH99-119 as shown in Figure 2.9. This correlates with the shallow clay deposit encountered during the foundation preparation as discussed in Section 2.3.2.

- In 1996, a 61 m deep groundwater monitoring well (GW96-1A/1B) was installed downstream of the Perimeter Embankment Seepage Collection Pond, approximately 100 m downstream and east of the failed embankment. A soft glaciolacustrine deposit was encountered from El. 919 m to El. 923 m, with an SPT blow count of 6. Artesian conditions were also encountered in a permeable glaciofluvial unit from El. 896 m to El. 885 m.
- As discussed earlier, five CPT's were completed in 1999 through the upstream tailings beach to 8 m below tailings level. Three CPT's are upstream of the failure area. CPT99-14 reached 7.9 m below the tailings surface and encountered soils classified as silty clay. Tailings thickness in the area was about 5 m, indicating this CPT sounding reached about 3 m into the underlying foundation.
- In 2011, two sonic core holes (VW11-10 and VW11-11) were drilled at the embankment toe. VW11-11, located west of the failed dam, encountered glaciolacustrine deposits at El. 933 m to El. 929 m and VW11-10, located east, encountered a thin layer of glaciolacustrine at El. 917 m. Vibrating wire piezometers were installed in foundation soils in both holes.
- Also in 2011, one inclinometer (SI11-04) was installed downstream of the embankment toe, approximately 150 m east of the failed embankment. A stiff to hard glaciolacustrine layer was encountered at El. 914.9 m. In 2012, a replacement inclinometer (SI12-01) was installed adjacent to SI11-04 due to a suspected malfunction in SI11-04. This is discussed in 2.7.2.

In summary, detailed information on the soil profile below the failed embankment was restricted to a 7.5 m depth below the ground surface. The investigations encountered glacial till overlain in local areas by a deposit of glaciolacustrine clay. Deeper investigations outside the failure area revealed the presence of three other glaciolacustrine deposits at different elevations and depths, and the occurrence of artesian pressures within glaciofluvial deposits at depth.

2.7 Instrumentation Records

Figure 2.10 presents the pre-failure instrumentation plan at Corner 1 of the Perimeter Embankment. Instrumentation includes: 17 vibrating wire piezometers, 2 slope inclinometers and flow measurements from the Upstream Toe Drain. Reference information for the instrumentation is included in Appendix I-G.

Monitoring frequency varied throughout the operation of the TSF. Frequency was initially every two weeks for inclinometers and piezometers, and was reduced to once a month after 2012 (MP00217). Seepage measurements from the Upstream Toe Drain were typically recorded 3 to 8 times per year since 2011.

2.7.1 Piezometers

The piezometers were either installed during construction in the tailings impoundment and fill materials, or installed in foundation soils during site investigations. Twelve of the 17 vibrating wire piezometers were functioning in 2014. The functioning piezometers are located along three sections as shown from Figure 2.10 to Figure 2.13:

- Section G (AMEC): Two in foundation soils (glacial till and glaciolacustrine);
- Sections G' (KP): One installed in the upstream tailings, one in the upstream fill (Zone U), and one in the till core (Zone S); and
- Section D (KP and AMEC): Three in foundation soils (glacial till, glaciolacustrine, and glaciofluvial), two in the filter materials, one in the till core, and one in the upstream tailings.

Salient observations from the piezometers are as follows:

- Piezometers G2 and D04 were installed in the till core (Zone S) at a nominal elevation of 948 m. Pore pressures in G2 began to increase as the pond elevation rose above about El. 960 m, indicating saturation of the core. No pore pressure response was observed in D04 in response to the pond rise. However, the pore pressure in piezometer D03 located downstream in Filter Zone F increased as the pond level rose above 955 m, which is an indication of high seepage through the core. Other explanations are that the readings for D04 and D03 are interchanged and misreported or D03 is actually in the core.
- Piezometers installed in the upstream tailings (G3 and D05) and in Zone U (G1) all responded as the upstream pond level rose above the elevation of the piezometer tips. However, the piezometric levels were typically 5 m to 10 m below the adjacent pond level, reflecting the influence of the Upstream Toe Drain.
- Piezometers installed in drain and fill materials downstream of the core showed no response to embankment raising or pond level rise. The exception is the anomalous response in D03 which is noted above.
- Only two piezometers at Section D outside the failure area, D01 and D02, are installed below the embankment. Both were installed in the upper glacial till deposits. Neither piezometer showed any transient increases in pore pressures caused by loading during periods of embankment raising. D01 gradually increased by about 5 m over time, likely in response to seepage pressures increasing with the rise in the upstream tailings pond.
- Piezometers D6, D7, G4 and G5 are located outside the failure zone and beyond the downstream toe of the embankment. G4 and G5 indicate a water table near the ground surface and a downward gradient. Piezometric elevations at D6 and D7 are about 12 m below the ground surface and also indicate a downward gradient.

2.7.2 Inclinometers

Only one inclinometer (SI11-04) was installed in 2011 at the Perimeter Embankment. It is located approximately 150 m southeast of the dam failure and 20 m downstream of the embankment toe. As such, this inclinometer would not have given prior warning of the dam failure.

The 2012 as-built report (MP00217) indicated the following: *"In late 2012, readings from an inclinometer located downstream of the Perimeter embankment (SI11-04) showed compression failure deformation consistent with settlement at depths from ground surface to 15 m below ground surface. AMEC recommended that additional instrumentation be installed, as the SI11-04 would likely cease functioning due to the deformation."* Based on the soil profile at SI11-04, this deformation occurred in the upper glacial till unit. No significant displacements were observed in glaciolacustrine layer encountered at El. 914.9 m, which is described as very stiff to hard. The elevation and characteristics of this unit are similar to the Lower Glaciolacustrine Layer (LGLU) discussed later in this report.

An inclinometer casing with compression fittings (SI12-01) was subsequently installed to replace SI11-04 and set 42 m below ground surface. Readings for SI12-01 began on March 12, 2013 and continued until August 13, 2014. No preferential displacement trends or shear planes were observed in SI12-01. Cumulative displacement was in the order of 5 mm for a period of 10 months.

Installation details and readings from SI11-04 and SI12-01 are included in Appendix I-G. AMEC did not issue final drill logs for the SI12-01 installation; only a hand written field log and simplified log included in the inclinometer reading plots are available.

2.7.3 Seepage Flows

The flow rates from the Upstream Toe Drain were measured in the ditch located downstream of the pipe outlet. Flow records extracted from as-built reports are included in Appendix I-G and shown in Figure 2.13. Relevant observations include:

- Seepage rates from the Upstream Toe Drain increased with time as the tailings pond rose. The seepage rate on July 2014 just prior to the dam failure was 23.4 L/s at a tailings pond elevation of 966.3 m.
- A temporary "spike" in seepage rate to 91 L/s was reported for April 2013. The tailings pond during the spike was rising to El. 962 m, when the embankment crest was at El. 965 m. The seepage rate diminishes after the pond surpasses El. 962 m. The increased seepage may be related to the higher permeability of the upstream fill berms placed in Stages 6B and 7, which used mainly rockfill. The seepage dropped as this rockfill was covered by tailings.

Flow measurements from the Outlet Drains (see Figure 2.4) were reported from July 2000 to November 2006 and yielded flow rate of less than 1 L/s.

3 DESCRIPTION OF THE FAILURE

3.1 Timeline of Failure Event

The Perimeter Embankment failed on August 4, 2014 east of Corner 1 between Stations 4+110 and 4+350. The timeline of the failure event is summarized in Table 3.1 based on mine staff interviews conducted post-failure. These are reported in detail in the Inquiry Report (KCB 2015c).

Table 3.1 indicates the tailings failed rapidly within a period of 2 hours to 3 hours between 10:35 pm on August 3, 2014 and 12:10 am August 4, 2014. The rapid rise in the perimeter sump and the loss of power at the mill indicates that the subsequent breach of the dam initiated shortly after and was fully advanced by 1:08 am on August 4, 2014. Subsequent release of water and tailings slurry continued at full force until 4:00 pm on August 4, 2014.

The rapid timeline of the failure prevented the possibility of any remedial actions to repair the dam or breach. It leads to the conclusion that a "brittle" failure mechanism was activated during the failure, as no prior evidence of distress in the dam was visually evident to mine staff.

Table 3.1 Timeline of Failure

Date	Time	Observation
August 3, 2014	10:35 pm	The No. 2 pump was turned on in the Perimeter Embankment Seepage Collection Pond sump (normal procedure). An employee drove along the crest of dam, near the breach.
August 3/4, 2014	11:40 pm to 12:10 am	Water level in the sump started to level out, i.e. water was flowing into the sump at a rate equal to the pumping, which is not normal.
August 4, 2014	12:10 am	Water level starts to modestly increase – suggesting that failure had occurred and water was overflowing the crest of the dam. The time is also near when the sand cat operator working at the South Perimeter dam thought he heard "some water".
	01:00 am to 1:06 am	Water level rapidly rises in the Perimeter Sump; a short interim spike within that time also suggests that there may have been a surge of water, before the sump water level was exceeded. The rapid rise suggests that the dam had breached further.
	01:08 am	Time reported by a number of staff as to when the power went out at the mill, which is near the time of the rapid rise in the sump water level. The power going out appears to be the result of the dam failure inundating the power lines located approximately 300 m downstream of the breach.
	01:40 am to 2:20 am	Staff went to the TSF to check the power lines and reclaim water lines and realized that failure of the dam was in progress.
	2:20 am	Emergency calls started being made to all potential parties and the dam area was being cordoned off.
	04:30 am to 4:45 am	Checking on Polley Lake – lake level rose by 1 m.
	05:15 am	Breach flow was observed as also reporting to Hazeltine Creek. Starting to get light outside.
	5:30 am	Reclaim barge on tailings – water still "roaring" out of the TSF. Muddy water flowing out of the breach.
	06:00 am	Helicopters on site: breach flow was observed as "going over the displaced block of soil on the downstream side of the dam".
	12:00 pm	Flow had reduced but was still "significant".
	04:00 pm	Flow had abated.

Note: Failure timeline as presented in KCB (2015c).

3.2 Pre-Failure Conditions

3.2.1 Stage 9 Dam Raise Construction

As described in Section 2, the Stage 9 raise of the embankment commenced in 2013 and continued up to the time of failure. Stage 9 construction in 2014 included: the raise of the till core (Zone S) from El. 967 m to El. 970 m (3 m raise), the raise of the upstream and downstream support materials to El. 969 m (3 m raise), and the re-location of the seepage recycle pipe located near Station 3+950 (see Figure 2.4). Further details on the construction sequencing are as follows:

- The till core (Zone S) was raised to El. 967 m by October 2013. Till core placement resumed in June 2014 in the Perimeter Embankment starting at Station 3+100. Daily construction reports indicated the till core was completed to El. 968.8 m on July 31, 2014, but surveyed elevations from drill holes and a CPT sounding at the embankment crest located west and east of the breach area indicate the till core was likely closer to El. 970 m (see Table 2.1).
- Raise of the downstream shell (Zone C) started in June 2014. AMEC's daily reports indicate, by August 1, 2014, Zone C placement reached the target elevation and was being graded to El. 969 m. On August 3, 2014, Zone C placement at the re-located seepage recycle pipe was completed.
- Placement in the upstream shell (Zone U) of the Perimeter Embankment started November 2013 and was last reported at El. 967.6 m in June 11, 2014 between Stations 4+286 and 4+396 m (AMEC's construction daily report TSF14-06-11). Post-failure survey contours to the east and west of the failure area showed that Zone U was likely between El. 968 m and El. 969 m.

As discussed in Section 2.3.2, a 2 m deep excavation was reported to be made in November 2013 downstream of the embankment toe for the foundation of a future toe buttress. The excavation was open between Stations 4+100 and 4+300 at the time of failure.

Figure 2.6 shows the estimated Stage 9 embankment raise configuration at the time of failure.

3.2.2 Pond and Tailings Beach Levels

Historical pond elevation and tailings beach levels are given in Table 2.1. The pond elevation immediately prior to failure was El. 966.8 m as reported in AMEC's daily report dated August 3, 2014. The beach elevation at that time was estimated to be El. 966.3 m as inferred from the post-failure tailings contours outside the breach area and the observed submergence of the tailings beach seen in Figure 2.3.

The embankment crest was raised to meet freeboard requirements and to allow development of beach in front of the embankment. Starting in June 2011 (Stage 7), rises in the pond level hampered the ability to maintain the tailings beach in front of the embankment. Subsequently, the tailings beach was partially submerged during Stage 8 and completely submerged during the final Stage 9 construction (see Figure 2.3).

Although not in the vicinity of the failure, a "near-overtopping" incident was reported on May 25, 2014 near the corner between the Main and South Embankments (Corner 3), between Stations 1+475 and 1+515. The incident was described in AMEC's daily report as: *"water is seeping through the u zone and ending up on top of our till which then flows into the filter due to the water elevation in the sand cell being 0.2 m higher than the top of the till @ corner 3."* A temporary berm comprised of random fill (Zone U) over the sand cell and glacial till was subsequently placed upstream of the core to contain the water. The pond water level at the time of this incident was 966.5 m.

3.3 Post-Failure Conditions

Figure 3.1 shows the post-failure topography of the TSF as determined from a Lidar survey by MPMC on August 5, 2014. Figure 3.2 presents an aerial plan view of the immediate breach area.

Field mapping and visual reconnaissance of the failure area was conducted by KCB and the findings are documented in Progress Report No. 2. Figures 3.3 and 3.4 present a zonation of the breach area, with select key field mapping features presented in Figures 3.5 and 3.6, and in reference photographs in Figures 3.7 to 3.11. Relevant observations are discussed below:

- Zones 1 to 5: Upthrust ground and bulging at the dam toe was observed from nominally Stations 4+110 to 4+330, indicating a failure width of 220 m. This corresponds to a failure aspect ratio[6] of 5.5.
- Zone 1: The failed dam was not subject to erosion during the subsequent dam breach and was left largely intact. The toe of the dam was upthrust vertically 6 m. The original ditch at the dam toe was also displaced laterally approximately 10 m. The dam displacements associated with the toe bulge are visible in Figure 3.9a.
- Zone 2: Between Stations 4+180 and 4+220, the failed dam was overtopped and the downstream slope subjected to surface water flow, leaving a 0.3 m to 0.6 m layer of water washed rock on the lower half of the slope and shallow erosion channels up to 0.6 m deep (Figure 3.9b and 3.9c). The upthrusted toe bulge was also eroded by the water flow (Figure 3.9d), indicating that the toe bulge occurred prior to pond release.
- Zone 3 and 4: The main breach of the dam and release of water and tailings occurred between Stations 4+200 and 4+300. Initial downcutting of the dam in Zones 3 and 4 reached elevation 940 m, followed by downcutting to the original ground between Stations 4+250 and 4+290 in Zone 4.
- Zones 5 and 6: The left abutment of the failed dam was eroded during the breach to a steep angle of about 60°. Intact features of the rockfill placement in Zone C are clearly visible in the exposure in Figure 3.8. The construction lifts are back-tilted 10° upstream into the impoundment. Surface mapping of the abutment revealed several shallow scarps oriented parallel to the eroded slope (perpendicular to the dam crest). These scarps are seen in Figure 3.11c and are interpreted to be relaxation of the slope into the breach area as the dam

[6] Failure aspect ratio is defined in the failure width to dam height, which was nominally 40 m at the time of failure.

was eroded out. The stability of the steep left abutment slope was therefore considered marginal by MPMC and site investigations within the breach area were restricted to keep a safe distance.

- Zone 3: Similar scarps were detected on the right abutment of the breach zone as denoted in Figure 3.7.
- Zones 7 and 8: As a consequence of the upstream construction method of the Perimeter Embankment, tailings lost by erosion through the breach destabilized the upstream side of the embankment. Large portions of Zone U, S and C were lost on either side of the breach, extending from Stations 4+100 to 4+450. This included the upstream toe drain and concentrated seepage observed emanating from the exposed upstream slope is considered to be from the "broken" ends of the drain. Locations of these seep points are shown on Figures 3.5 and 3.6.
- Zones 7 and 9: The loss of the upstream tailings exposed the construction lifts in the rock fill and till core on the upstream face of the embankment. These construction lifts are visible in Figure 3.10d, 3.11a and 3.11b. On the left abutment, horizontal lift layers were observed outside the failure zone beyond Station 4+350. Similarly, on the right abutment, lift interfaces were horizontal up to about Station 4+100 and were noticeably tilted longitudinally towards the breach area from Station 4+150 to 4+250. Field measurements of the longitudinal tilting ranged from 5 ° to 6 ° towards the breach.
- Zone 8: A large segment of the compacted till core was left intact between Stations 4+200 and 4+250. Construction lifts are visible in Figure 3.10c and were measured to be back-tilted nominally 16° into the impoundment. A subsequent excavation into the core revealed a distinct shear plane extending downstream through the core and into the underlying native till. This important observation is discussed further in Section 4.3.

3.4 Interpretation of Field Observations

The field observations clearly point to a foundation failure of the tailings embankment as the cause of the ultimate dam breach. The upthrust at the dam toe and back-tilting of the body of the dam cannot be explained by alternate failure mechanisms, including dam overtopping or internal piping through the till core. The upthrust at the dam toe show that the displacements of the failed dam were 5 m to 10 m or more.

The geomorphological evidence shows that the failed dam was subject to initial overtopping of water onto the exterior over a wide spread area. This indicates that the pond water had overtopped the core of the dam, which can only be explained by a sudden drop of the dam crest. Subsequent erosion and concentration of the overtopping water flow lead to rapid downcutting of the dam, thereby allowing the stored tailings to escape the impoundment. Figure 3.12 presents our interpretation of this failure progression.

4 POST-FAILURE SITE INVESTIGATIONS

KCB was retained by MEM to conduct a Site Investigation (SI) program to collect pertinent geotechnical information to support an evaluation of the mechanism of failure of the tailings dam. Field activities were conducted between mid-September and late-November 2014. Subsequent laboratory testing continued to the end of January 2015.

Progress Report No. 2 (KCB 2015a) sets out the results of the field investigations and laboratory index testing. Progress Report No. 4 (KCB 2015b) presents the procedures and results from more advanced laboratory testing.

The main objectives of the SI Program were to:

- collect field data to help determine the failure mechanism;
- characterize the profile and geotechnical properties of the foundation soils both inside and outside the failed area;
- investigate and characterize any construction materials within the dam that may have influenced the failure mechanism; and
- locate the seat of the dam failure through the foundation materials, if applicable.

Figures 4.1 to 4.3 present the layout of the investigations conducted by KCB. Select information from the SI program is included in Appendix II for ease of reference.

Figure 4.4 shows the location of cone penetration testing conducted by the Panel under the direction of Thurber Engineering Ltd. This information has been reviewed but is not included in the summary below.

4.1 Site Investigations

The site investigations comprised:

Geotechnical Investigation

- Visual reconnaissance and surficial mapping at the dam breach area to establish the post-failure configuration and provide insights into the nature of the failure mechanism.
- Eight electric resistivity survey lines and seven seismic refraction survey lines to estimate bedrock depth and approximate material boundaries.
- Sonic coring to delineate the soil profile, obtain samples for geotechnical testing, and install instrumentation.
- Thirty-two sonic core holes were drilled at 22 primary investigation locations. Two sonic core holes (SH14-20 and SH14-21) were located on the dam crest on the left and right side (looking downstream) of the breach, respectively. The proximity of these two holes to the dam breach was restricted by MPMC due to safety concerns.

- Undisturbed thin-walled tube samples collected in mud rotary drill holes. High quality samples, confirmed with X-Ray testing, were used for advanced laboratory testing. Additionally, preserved cores from sonic drilling and undisturbed block samples were collected targeting the main soil profile units.
- Trench and test pit excavations in the exposed Till Core and in the upthrusted toe bulge to map features and to collect representative disturbed and undisturbed samples.
- Two bulk samples from the embankment till core were collected for advanced testing.

In Situ Testing

- Standard Penetration Testing (SPT) was conducted on the upper glacial till soils at four locations to a maximum depth of 13.8 m below ground surface. Two SPTs were completed within the failed area and two in the free field downstream area.
- Seismic Cone Penetration Testing (CPT) was conducted at 21 locations adjacent to sonic drill holes. One CPT was completed at the embankment crest through the Till Core.
- Vane Shear Testing (VST) was conducted at four locations in the upper glaciolacustrine deposits. One test was completed within the failed area and two in the free field downstream area.

Instrumentation

- A total of 22 vibrating wire piezometers (VWP) were installed in the foundation soil units and bedrock at selected depths. VWP's were preferentially placed in the glaciolacustrine and glaciofluvial deposits.
- Six of the VWP's were installed in SH14-20 and SH14-21 on the embankment crest, at the nearest locations to the embankment breach allowed by MPMC due to safety concerns. These VWP's were intended to measure the piezometric conditions within the foundation soils which were not disturbed by the failure. It is noted that the measured piezometric levels reflect post-failure conditions and would be influenced by the loss of the stored water pond, removal of the tailings upstream by erosion through the breach and subsequent post-failure drainage of the tailings deposits.
- A total of five inclinometers were installed within the failed embankment. Each was installed with a minimum 3 m embedment into bedrock, to depths of 23.5 m to 61.7 m. The objective was to record potential post-failure creep movements in the foundation soils.

4.2 Laboratory Testing

Laboratory tests were conducted on representative disturbed soil and bedrock samples to determine soil index properties. Undisturbed piston tube and block samples were tested to determine consolidation and strength properties. The laboratory testing included:

- 991 in situ water content tests at approximately 0.5 m to 1.0 m intervals on the sonic core.

- 17 specific gravity tests~~ing~~ for glacial till and the upper and lower glaciolacustrine units.
- 3 organic content tests in the upper glaciolacustrine.
- 139 Atterberg limits in fine-grained foundation soils.
- 12 X-ray Diffraction tests in fine-grained foundation soils to assess clay mineralogy.
- 127 particle size tests, with 125 hydrometer tests.
- 2 Standard Proctor Tests on Till Core samples.
- 8 Triaxial Permeability and Compression tests on the upper glacial till and the Till Core.
- 1 Triaxial Extension test on the upper glacial till.
- 4 Triaxial Compression tests on the upper glaciolacustrine.
- 15 Direct Shear tests on the upper and lower glaciolacustrine deposits.
- 15 Direct Simple Shear tests on the upper and lower glaciolacustrine deposits.
- 10 One-dimensional Consolidation tests~~ing~~ on the upper and lower glaciolacustrine deposits.
- 3 Reconstituted one-dimensional consolidation tests on upper and lower glaciolacustrine deposits.

4.3 Observations of Failure Plane

In addition to the drilling investigations, trenches and test pits were undertaken to investigate the nature of the dam displacements and identify the shear~~ing~~ plane invoked by the dam failure. These included a deep trench excavation[7] into the remnant near-vertical till core in Zone 8 (Figure 3.3 and 3.10c) and a test pit (TP14-01) into the upthrust ground bulge at the embankment toe. Salient observations are:

- The dominant feature exposed in the till core excavation was a shear zone that cross cut the core dipping steeply in the downstream direction. The shear zone was typically identified in each excavation slice by the following:
  a. An abrupt color change in the till core upstream and downstream of the shear. Generally the till downstream of the shear was a mixture of grey and brown till with some color “banding” which were likely construction lifts. The heterogeneity in the fill color is attributed to variability in the till fill borrow source. Upstream of the shear, the till core was ~~a much~~ consistently a more homogeneous brown color, and no grey till was observed.
  b. A zone of disturbance and softening within the shear zone, often accompanied with foreign materials such as tailings sand, gravel and cobbles. The width of the disturbed zone, and the degree of disturbance, was highly variable. Shear zone width was highly

[7] The excavation of the till core was planned and supervised by Thurber Engineering Ltd. KCB was present during the excavation to make independent observations.

variable and ranged from closed and only perceptible by the abrupt colour change to up to 2 m wide.

c. Zones of seepage and saturated tailings emanating from the shear zone.

Excavation of test pits at the base of some of the slices showed that the shear zone continued into the foundation, to El. 925 m, and appeared visually to extend to deeper elevations. This is over 3 m below the natural ground surface (after site preparation) which ranged in elevation from 928.0 m to 928.7 m. This also indicated this feature was not a construction interface between material zones.

Selected photographs of the shear zone are shown in Figure 4.5. The shear plane surface interpolated from survey data is shown in Figure 4.5b.

- In TP14-01, a glaciolacustrine clay layer was encountered at El. 927.5 m, which is 6.5 m above the top elevation of the glaciolacustrine layers in adjacent sonic core holes (El. 921 m). Varve laminations in the clay were inclined 40° to 45°, dipping towards the upstream direction. Figure 4.6 shows the clay exposure and inclined varve laminations.

These observations indicate that the ~~planned of~~ dam failure surface passed through the lower portions of the compacted till core and exited at depth near the embankment toe. Dam displacements along the shear plane were likely in excess of 5 m. These findings are consistent with the field observations of the failed dam discussed in Section 3.3 and 3.4.

5 SITE CONDITIONS

5.1 General

This section describes our characterization of the site conditions at the failed embankment and selects parameters for the failure analyses in Section 6. Information presented includes: site topography prior to TSF construction, soil profiles below the failed embankment, characterization of the foundation soils and bedrock units, a summary of observations from piezometers and inclinometers installed post-failure, and forensic evidence of shearing and displacements in the dam and foundation.

Most of this information is based on results from the post-failure site investigation and laboratory testing presented in Progress Reports Nos. 2 and 4 (KCB 2015a and 2015b), which contain additional information. Select information from these reports and supplementary data summaries are given in Appendix II.

5.2 Pre-Development Topography

Figures 5.1 and 5.2 show the original topography and an aerial view of the TSF prior to the start of construction. The TSF rests in the upper catchment of a tributary to Edney Creek draining to the southeast. The Main Embankment crosses the tributary creek valley and confines the southeast side of the TSF. The Perimeter Embankment and the South Embankment are extensions of the Main Embankment across topographic lows on the southwest and northeast sides. Together, the three embankments result in a U-shaped tailings dam abutting a natural slope on the northwest side.

Figure 5.1 shows the set-out-line (S.O.L) of the tailings embankment. The figure includes the six location points where the S.O.L bends and ends on the valley abutment. These are labelled Corners 1 to 5, and 1.5 in the design and as-built reports. The embankment failure occurred adjacent to Corner 1 in a topographic low along the Perimeter Embankment.

As described in Section 3, references to “swampy areas” were reported during the foundation preparation works near Corner 1. These observations correlate with the relatively flat topographic low in the “saddle” to the east of Corner 1.

Figure 5.3 shows the Perimeter Embankment profile along the S.O.L. based on the original ground surface digitalized from Drawing 1625.101 in Knight Piesold 1995 TSF design report (MP00001, KP 1995), the pre-failure surface from August 2013, and the post-failure surface from August 5, 2014. The profile shows that the embankment failed near the highest section of the Perimeter Embankment and the subsequent breach eroded down to the original ground surface.

Figure 5.4 compares the contact elevation between embankment fill and native ground encountered in sonic core holes. Excluding the upthrusted ground in SH14-05, the contact elevations confirm the topographic low below the failed embankment.

5.3 Soil Profile

The soil profile encountered in the vicinity of the embankment failure consists of the ten main soil and bedrock units listed in Table 5.1. The following sections describe the units and relevant geotechnical properties.

Table 5.1 Description of Main Soils and Bedrock Units

Unit Name	ID	General Description
Upper Glacial Till	UGT	CLAY AND SAND (CL-SC), some silt, trace gravel, low plasticity, very stiff to hard near surface and becoming firm to stiff at contact with UGLU brown/grey.
Upper Glaciolacustrine Unit	UGLU	CLAY (CI-CH), some silt, trace sand, intermediate to high plasticity, firm to stiff, grey, typically laminated with fine grained sand or silt, high dry strength. Laminations are sub-horizontal in the free field beyond the dam toe and may be inclined or deformed beneath the failed dam.
Middle Glacial Till	MGT	SANDY CLAY (CL), some gravel, some silt, low plasticity, hard, greenish-grey.
Lower Glaciolacustrine Unit	LGLU	CLAY (CI), some silt, trace sand, intermediate plasticity, hard, greenish-grey with some dark grey layering at the base of the layer, high dry strength, laminated with wavy layers of clay/silt and trace fine grained sand.
Upper Glaciofluvial	UGF	SANDY SILT (ML), trace gravel, non to low plasticity, dark grey, strong organics odour, varies in fines content from laminated silt and fine grained sand to well graded sand with some gravel.
Lower Glaciofluvial	LGF	SANDY SILT (ML), trace gravel, non to low plasticity, brown, sand is primarily fine grained, varies in fines content from laminated silt and fine grained sand layers or sand and gravel with no silt to coarse gravel in a silt matrix.
Lower Glacial Till	LGT	SANDY SILT (ML-CI), some gravel, some clay, low to intermediate plasticity, hard, brown and at times reddish brown near the bottom of the unit.
Weathered Sedimentary Bedrock	WB (Sed)	CLAY (CH), some silt, trace sand, high plasticity, greenish-grey to at times brown, hard, varying sand content from trace to sandy, at times having discontinuous green, red/brown, and yellow/green sand pockets and seams, high dry strength. Slickensides and smooth fracture surfaces occasionally observed at various inclinations.
Weathered Mafic-Igneous Bedrock	WB (Mafic)	SANDY GRAVELLY SILT (ML), trace clay, low plasticity, hard, dark grey, massive, all gravel and sand particles are black, angular, fine grained mafic rock, fines content decreases with depth and gravel content increasing with depth, becoming coarse grained and clast supported.
Weathered Volcanics Bedrock	WB (Vol)	SILTY SAND (SM), fine to medium grained, some gravel, poorly graded, angular, reddish brown to purple, gravel and sand grains are medium to fine grained volcanoclastic rock, reddish brown in colour

5.4 Glacial Tills

Three glacial till units were identified: the Upper Glacial Till (UGT), the Middle Glacial Till (MGT), and the Lower Glacial Till (LGT). Table 5.2 compares the index properties for these tills.

Table 5.2 Summary of Index Properties for UGT, MGT, and LGT

Parameter	Upper Glacial Till (UGT)	Middle Glacial Till (MGT)	Lower Glacial Till (LGT)
Soil classification	CL-SC	CL	ML-CI
Specific gravity	2.74	-	-
Gravel content (%)	2 to 21 (12)	0 to 13 (6)	9 to 22 (14)
Sand content (%)	15 to 42 (36)	3 to 47 (37)	37 to 52 (48)
Fines content (%)	37 to 83 (52)	43 to 97 (51)	29 to 54 (40)
Clay content (%)	13 to 26 (17)	12 to 30 (19)	9 to 17 (13)
In situ water content (%)	7 to 31 (12)	4 to 24 (13)	4 to 25 (9)
Liquid limit (%)	21 to 29 (25)	20 to 38 (25)	20 to 46 (26)
Plastic limit (%)	11 to 16 (13)	13 to 20 (15)	13 to 16 (14)
Plasticity index (%)	6 to 15 (12)	6 to 18 (11)	6 to 30 (13)
Liquidity index	(0.15)	(-0.20)	(-0.10)
Activity	(0 60)	(0.60)	(0.70)

Note:

1. Values presented are minimum and maximum range of tested data. The median of this range is included in brackets.

5.4.1 Upper Glacial Till (UGT)

The UGT comprises a low plastic, brown to brown-grey, silty, clayey sand matrix, with trace to some gravel. The upper till is moderately layered with thin lenses or partings of fine-grained, silty sand and/or silt. Vertical fine-grained sand streaks with rust mottling were observed in the upper one to two meters and are attributed to desiccation cracks infilled with fine sediments. Representative photos of the UGT are shown in Figure 5.5.

The UGT is continuous in extent and thickness below the failed embankment. Thickness varies from 8 m to 10 m and the bottom of the UGT is typically El. 920 m to El. 922 m.

Water content varies from 7% to 31%, with a median of 12%. The median liquidity index of 0.15 indicates the UGT is moderately overconsolidated. A preconsolidation stress of 200 kPa is inferred for the UGT based on consolidation testing conducted by the Independent Review Panel (IRP 2015).

Figure 5.6 presents SPT blow counts in the UGT. The median N_{value} of 11 in the free field indicates that the native UGT is stiff in consistency. CPT soundings in the free field gave a median tip resistance of 30 bars and undrained strengths over 100 kPa (see figures in Appendix II-D).

Figure 5.7 shear wave velocity data from the seismic CPT soundings. The minimum shear wave velocity in the free field was 260 m/s versus 160 m/s for tests conducted below the failed embankment. This is an indication of disturbance of the UGT during the failure.

Triaxial consolidated undrained tests in compression and extension were conducted in free field samples at an effective confining stress of 200 kPa (Figures VI-2 and VI-4 in Appendix II-E). The UGT showed net dilatant response to undrained loading reflecting the overconsolidated in situ state. The effective friction angle at the peak strength is 34° in compression and 33° in extension.

Flexible-walled permeability tests showed vertical hydraulic conductivities (K_v) ranging from 5×10^{-10} m/s to 5×10^{-11} m/s, which is within a range of 1×10^{-8} m/s to 1×10^{-11} m/s for matrix rich tills reported by Eyles (1983). Estimates of hydraulic conductivity from CPT dissipation testing, shown in Table II-3 in Appendix II, reflected higher permeability in the horizontal direction with an anisotropy ratio (K_h/K_v) ranging from 1 to 10, with median of 2.

5.4.2 Middle Glacial Till (MGT)

The MGT comprises a low to medium plastic, green-grey, sandy, silty clay matrix, with trace to little gravel. The MGT is sporadically layered with thin lenses or partings of fine-grained, silty sand and/or silt. The sandy clay matrix is generally unoxidized and contains a lesser portion of gravel sizes, but greater portion of fines than the LGT.

The MGT appears to be continuous below the failed embankment with thickness varying from 2 m to 5 m, and is generally present between El. 916 m and El. 920 m.

Water content ranges from 4% to 24%, with median of 13%. The median liquidity index of -0.20 indicates the soil is heavily overconsolidated. A preconsolidation stress of 400 kPa is inferred for the MGT based on consolidation testing conducted by the IRP (2015).

CPT soundings in the free field yielded a median tip resistance over 84 bars and undrained strengths over 100 kPa. The free field shear wave velocity ranges from 230 m/s to 470 m/s. These results indicate the till is very stiff to hard. No advanced laboratory testing was conducted on samples of this unit. Thus, shear strength and hydraulic conductivity properties for analysis in Section 6 were estimated based on soil classification and index properties.

5.4.3 Lower Glacial Till (LGT)

The lowermost till unit is a low to medium plastic, oxidized, brown to reddish-brown, sandy silt having a massive clast-supported structure with occasional boulders and cobbles. The LGT is discontinuous and is mainly found in bedrock lows between El. 910 m to El. 919 m.

The LGT is heavily overconsolidated with a median liquidity index of -0.10. CPT soundings classify the LGT as very hard in consistency, which agrees with the single shear wave velocity measured of 420 m/s. No advanced laboratory testing was conducted on samples of this unit. Thus, shear strength and hydraulic conductivity properties for analysis in Section 6 were estimated based on soil classification and index properties.

5.4.4 Material Properties for Failure Analysis

The material properties for the glacial till units adopted for the failure analysis presented in Section 6 are given in Table 5.3.

Table 5.3 Summary of Material Properties for Failure Analysis – Glacial Till Units

Parameter	Upper Glacial Till (UGT)	Middle Glacial Till (MGT)	Lower Glacial Till (LGT)
Unit weight (kN/m^3)	22.7	22.5	23.1
Peak effective friction angle	35° (free field) 33° (below embankment)	32°	35°
Undrained shear strength (below the embankment)	$Su = 0.38\sigma_{vo}'$	-	-
Horizontal hydraulic conductivity (k_h) (m/s)	4x10^{-9} (free field) 2x10^{-9} (below embankment)	7x10^{-9}	1x10^{-10}
Vertical hydraulic conductivity (k_v) (m/s)	2x10^{-9} (free field) 1x10^{-9} (below embankment)	7x10^{-9}	1x10^{-10}
Anisotropic ratio (k_h/k_v)	2	1	1
Coefficient of consolidation (cm^2/s)	2x10^{-3} (Note 2)	4x10^{-3} (Note 2)	-
Compression index (C_c)	0.110	0.090	-
Recompression index (C_r)	0.009	0.015	-
Preconsolidation stress (P'_c) (kPa)	200	400	-
Initial void ratio (e_o)	0.41	0.50	-

Note:

1. Unit weight calculated based on median water content, specific gravity, and 100% saturation.
2. At stress levels up to 1000 kPa, laboratory testing shows similar coefficient of consolidation (vertical) for stresses higher and lower than the preconsolidation stress (P'_c).

5.5 Glaciolacustrine Deposits

Two glaciolacustrine units were identified: the Upper Glaciolacustrine (UGLU) and the Lower Glaciolacustrine (LGLU). Table 5.4 compares the index properties for these units.

Table 5.4 Summary of Index Properties for UGLU and LGLU

Parameter	Upper Glaciolacustrine (UGLU)	Lower Glaciolacustrine (LGLU)
Soil classification	CI-CH	CI
Specific gravity	2.77	-
Gravel content (%)	0 to 4 (2)	0
Sand content (%)	0 to 15 (8)	1 to 4 (3)
Fines content (%)	81 to 100 (90)	96 to 99 (97)
Clay content (%)	39 to 67 (50) [59]	23 to 32 (26) [31]
In situ water content (%)	13 to 54 (36)	15 to 29 (23)
Liquid limit (%)	33 to 69 (50) [61]	31 to 42 (35) [41]
Plastic limit (%)	15 to 26 (20)	11 to 23 (18)
Plasticity index (%)	18 to 49 (30) [39]	11 to 27 (17) [24]
Liquidity index	(0.5)	(0.2)
Activity	(0.6)	(0.6)
XRD clay speciation (Note 3)	47% illite, 29% chlorite, 22% smectite, and 11% kaolinite	43% illite, 27% chlorite, 24% smectite, and 10% kaolinite

Notes:

1. Values presented are minimum and maximum range of tested data. The median of this range is included in brackets.
2. Square brackets shows mean + standard deviation value representing the upper 2/3 bounds of data.
3. Median values for semi-quantitative amount of clay minerals reported for the < 2 microns fraction.

5.5.1 Upper Glaciolacustrine (UGLU)

The UGLU comprises a medium to high plastic, laminated/varved grey clay and silt, with trace of sand.

Figures 5.8 and 5.9 show the top elevation of the UGLU and thickness encountered in each sonic core holes. The UGLU deposit is encountered approximately 10 m below the embankment at El. 920 m to El. 924 m, and ranges up to 2 m thick. The areal extent is largely confined to the immediate area of the failed embankment and is thickest beneath the embankment toe in the center of the failure area.

Figure 5.10 shows representative photographs of the UGLU from sonic core holes. Laminations in the native UGLU downstream of the failed embankment are sub-horizontal, whereas heavily de-structured and folded varves are observed in drill holes below the failed embankment. This is an indication that the failure surface was within this unit.

The clay fraction of the UGLU ranges from 39% to 67% with a median of 50%. XRD analyses classify the clay-sized particles to be composed principally of illite, chlorite, and smectite.

Figures 5.11 to 5.12 show the areal distribution of the maximum liquid limit and maximum water content measured in the UGLU in each sonic core hole. The maximum liquid limit ranges from 33% to 69% with median of 54%. In the free field, the maximum water content ranges from 30% to 54%, with median of 37%. Below the embankment, the maximum water content is slightly lower ranging from 18.5% to 38%, with a median of 32%. The water content is lower than the free-field due to consolidation under the weight of the embankment.

Water content profiles in the sonic core holes are shown in Figures 5.13 and 5.14 for the geological sections C and D. The water contents in the UGLU are markedly higher than any other soil unit and they extend continuously from the free field to underneath the failed embankment.

The liquidity index in the UGLU ranges from 0.1 to 1.0, with median of 0.5 (see Figure 15 in Appendix II-B). This indicates the UGLU is lightly over-consolidated.

Figure 5.15 summarizes the consolidation test results on free field samples for the UGLU. The preconsolidation pressure ranges from 380 kPa to 420 kPa, with a mean of 400 kPa. For a depth of 10 m below ground, the Over-consolidation Ratio (OCR) of the native clay is nominally 4. The UGLU also shows higher compressibility and slower consolidation rates at loads above the preconsolidation stress.

Figure 5.16 shows the undrained shear strength from the CPT testing in the UGLU and LGLU, and Figure 5.17 shows results from the Vane Shear testing (VST) in the UGLU. The native UGLU had a median CPT tip resistance of 22 bars (see Table II-2 in Appendix II) and interpreted undrained shear strength of 140 kPa, which indicates very stiff consistency. Vane shear testing gave a median peak undrained strength of 130 kPa and remolded strength of 34 kPa. The sensitivity of the clay ranged from 1 to 7.

Undrained shear strength profiles are shown in Figures 5.18 and 5.19 for ~~the~~ Sections C and D. The minimum undrained shear strength of the UGLU is typically greater than 100 kPa in the free field, whereas reduced strengths as low as 50 kPa w~~h~~ere found below the failed embankment. This is counter-intuitive as higher strength should be observed due to consolidation of the clay under the weight of the embankment. This indicates a loss of strength within the UGLU during the failure, which is consistent with the disturbed structure of the clay seen in Figure 5.10b. It is notable that the lower shear strength of 50 kPa is close to the median remolded strength of 34 kPa from the VST.

In its native state prior to dam construction, the UGLU would have exhibited dilative response to shearing and its ultimate strength would be governed by the drained frictional strength. The weight of the 40 m high tailings dam subjected the UGLU to vertical stresses up to 800 kPa and substantial portions of the UGLU beneath the dam were loaded to stresses well above the pre-consolidation pressure. These loaded portions of the UGLU became “normally consolidated” and would have displayed a contractive response to shearing. The ultimate strength of normally consolidated clay is its undrained strength, which accounts for pore pressures developed during shearing. This change from lightly over-consolidated behavior to normally consolidated behavior occurred incrementally over time as the dam was raised.

The shear strength of the UGLU is controlled by the higher plastic zones within the clay layer. Accordingly, from direct shear and triaxial compression testing in Figures 5.20 and 5.21, we estimate the peak drained strength of the UGLU as c′ = 0 kPa and ϕ_p' = 22°, and the residual drained strength as ϕ_r' = 12° - 14° (see Figure 5.20). The similarity of these parameters to the shear strength of other clay soils reported by Stark et al. (2013) indicates that the UGLU is not a unique or special soil (see Figures IV-3 and IV-4 in Appendix II).

Given the low hydraulic conductivity and contractive behaviour of the normally consolidated UGLU below the embankment, the rapid failure of the embankment would have mobilized the undrained strength of the UGLU. Furthermore, the principal mode of deformation within the thin UGLU layer would be in the horizontal direction. Accordingly, the undrained shear strength was evaluated by Direct Simple Shear (DSS) tests that can simulate a horizontal sliding failure through the UGLU (Ladd 1991). The DSS apparatus also allows cyclic reversals of shearing of the clay, which was used to assess the strength loss of the clay with increasing strains.

The undrained strength of the UGLU obtained from DSS testing is represented by Su = 0.22 $(OCR)^{0\ 8}\sigma_{vo}'$, where σ_{vo}' is the effective vertical confining stress (see Figure 5.22). This relationship is identical to the average relationship for homogeneous sedimentary clays recommended by Ladd (1991) and, again, indicates the UGLU is not unique.

The UGLU loses appreciable undrained strength when deformed past its peak strength. Strengths at 20% strain and following 4 or 5 cycles of loading are also shown in Figure 5.22. The strength loss with increasing levels of strain is also seen in Figure 5.23.

The vertical hydraulic conductivity for the UGLU in oedometer testing ranged from 1.2 x 10^{-10} m/s to 5.4 x 10^{-9} m/s. Estimates of hydraulic conductivity from CPT dissipation testing, shown in Table II-3 in Appendix II, show higher permeability in the horizontal direction with an anisotropic ratio up to 30.

5.5.2 Lower Glaciolacustrine (LGLU)

The second glaciolacustrine clay unit (LGLU) is 3 m to 5 m below the UGLU. The LGLU comprises medium plastic, varved lacustrine greenish-grey clay. Figure 5.24 shows representative photographs of the LGLU. Undulating, wavy, and inclined bedding is observed in both the free field and below the failed embankment, indicating the structure in the LGLU pre-dated the failure events.

Figure 5.25 shows the top elevation of LGLU encountered in sonic core holes. The LGLU is not continuous below the failed embankment and the top of the unit varies widely from El. 915 m to El. 921 m. The LGLU is typically less than 2 m thick below the failed embankment, but is up to 4.6 m thick at drill hole SH14-15.

The clay-size fraction of the LGLU is less than the UGLU, ranging from 23% to 32%, with a median of 26%, compared to a median of 50% for the UGLU. XRD analyses identify the clay-sized particles to be principally illite, chlorite, and smectite. Water content in the LGLU is also less than the UGLU, ranging from 15% to 29%, with a median of 23%, which is 12% lower than the median water content in the UGLU.

Liquid limits for the LGLU range from 31% to 42%, with median of 35%. The liquidity index typically ranges from -0.2 to 0.5, with median of 0.2. Oedometer testing shown in Figure 5.15 show that the native LGLU is “moderately over-consolidated” with a preconsolidation stress in excess of 750 kPa. This is consistent with the liquidity index values.

The LGLU is very stiff to hard as reflected by a median CPT tip resistance of 98 bars and undrained shear strength over 500 kPa.

Under the stresses imposed by the tailings dam, the LGLU would have exhibited dilative stress-strain response ~~and~~ with its ultimate strength governed by the drained frictional strength. One direct shear test yielded a peak friction angle of 33° with a residual friction angle of 25° for a sample with 35% liquid limit and 28% clay content. This result is considered to represent the average strength of the LGLU. However, the strength of the LGLU would be controlled by the higher plastic and more clayey horizons in the unit. Accordingly, strength parameters were estimated using friction angle~~s~~ values for properties representing the upper 2/3 of the Atterberg Limits and clay-sized fraction. A fully-softened drained friction angle of 28° and residual drained friction angles of 18° (below the embankment) and 23° (free field) were chosen for the LGLU based on a liquid limit of 41% and a clay-fraction of 31% using empirical correlations from Stark et al. (2013). The empirical relationships used are shown in Figure 5.26.

The vertical hydraulic conductivity for the LGLU in oedometer testing ranged from 1.1 x 10^{-10} m/s to 2.2 x 10^{-10} m/s. Estimates of hydraulic conductivity from CPT dissipation testing (Table II-3 in Appendix II), show higher permeability in the horizontal direction with anisotropic ratios ranging from 50 to 100.

5.5.3 Material Properties for Failure Analysis

The material properties for the glaciolacustrine units adopted for the failure analysis described in Section 6 are summarized in Table 5.5.

Table 5.5 Summary of Material Properties for Failure Analysis – Glaciolacustrine Units

Parameter	Upper Glaciolacustrine (UGLU)	Lower Glaciolacustrine (LGLU)
Unit weight (kN/m^3)	18.6	20.0
Peak effective friction angle	22°	28°
Residual effective friction angle	14°	23° (free field) 18° (below embankment)
Undrained shear strength	Su = 50 + 0.13 σ_{vo}' (peak) Su = 36 +0.11 σ_{vo}' (20% strain) Su = 22 +0.03 σ_{vo}' (remolded)	-
Horizontal hydraulic conductivity (k_h) (m/s)	1x10^{-8} (free field) 5x10^{-9} (below embankment)	2x10^{-8}
Vertical hydraulic conductivity (k_v) (m/s)	1x10^{-9} (free field) 5x10^{-10} (below embankment)	2.5x10^{-10}
Anisotropic ratio (k_h/k_v)	10	80
Coefficient of consolidation (cm^2/s)	8x10^{-4} (stress higher than P'c) 3x10^{-3} (below embankment)	4x10^{-3} (Note 2)
Compression index (C_c)	0.35	0.09
Recompression index (C_r)	0.096	0.035
Preconsolidation stress (P'_c) (kPa)	400	750
Initial void ratio (e_o)	1.2	0.75
Coefficient of consolidation (C_v) at stress >P'_c (cm^2/s)	8x10^{-4}	4x10^{-3}
Coefficient of consolidation (C_v) at stress <P'_c (cm^2/s)	3x10^{-3}	4x10^{-3}

Note:

1. Unit weight calculated based on median water content, specific gravity, and 100% saturation.
2. Same coefficient of consolidation (vertical) for stresses higher and lower than the preconsolidation stress (P'_c).

5.6 Glaciofluvial Deposits

Two glaciofluvial units were identified: the Upper Glaciofluvial (UGF) and the Lower Glaciofluvial (LGF). Table 5.6 compares the index properties for these units.

Table 5.6 Summary of Index Properties for UGF and LGF

Parameter	Upper Glaciofluvial (UGF)	Lower Glaciofluvial (LGF)
Soil classification	ML	GP/SM/ML
Gravel content (%)	0 to 3 (0)	0 to 47 (0)
Sand content (%)	5 to 33 (10)	12 to 53 (46)
Fines content (%)	67 to 95 (90)	10 to 86 (48)
Clay content (%)	6 to 17 (11)	0 to 5 (5)
In situ water content (%)	7 to 29 (21)	4 to 21 (15)
Liquid limit (%)	21 to 29 (25)	-
Plastic limit (%)	19 to 25 (21)	-
Plasticity index (%)	0 to 8 (5)	NP

Notes:

1. Values presented are minimum and maximum range of tested data. The median of this range is included in brackets.

The UGF and LGF underlie the LGLU and are underlain by LGT or bedrock. Evidence of "artesian" water pressures were encountered during the post-failure site investigations in those permeable deposits. This is discussed in Section 5.9.

The UGF and LGF are mainly differentiated by the organic content, plasticity and fines content. The UGF is dark grey, none to low plasticity, and has a strong organic odour. It also varies from a laminated silt and fine grained sand to well graded sand with some gravel. The LGF is brown, non-plastic and primarily fine grained sand, but can also be present as sand and gravel with no silt to coarse gravel in a silt matrix.

CPT soundings gave median tip resistances of 194 bars for the UGF and 217 bars for the LGF. Several soundings refused further penetration near the top of these units. The median calculated $(N_1)_{60}$ for the UGF is 38 and for the LGF is 45. These values reflect a dense to very dense state.

No advanced laboratory testing was conducted on samples of this unit. Hence, the material properties in Table 5.7 are estimated based on soil classification and index properties.

Table 5.7 Summary of Material Properties for Failure Analysis – Glaciofluvial Units

Parameter	Upper Glaciofluvial (UGF)	Lower Glaciofluvial (LGF)
Unit weight (kN/m^3)	20.5	21.7
Peak friction angle	30°	33°
Horizontal hydraulic conductivity (k_h) (m/s)	4×10^{-7}	1×10^{-6}
Vertical hydraulic conductivity (k_v) (m/s)	4×10^{-8}	1×10^{-7}
Anisotropic ratio (k_h/k_v)	10	10

Note: Unit weight calculated based on median water content, specific gravity, and 100% saturation.

5.7 Bedrock

Figure 5.27 shows the top of the bedrock encountered in sonic core holes and Figure 5.28 shows a geological section along the embankment toe. Included in Figure 28 are overlays of the geophysical surveys including seismic velocity and electrical resistivity profiles. The observed top of bedrock below the failed embankment is between El. 895 m and El. 918 m, approximately 12 m to 25 m below native ground surface (El. 930 m). Three bedrock types were encountered during the post-failure site investigation: weathered mafic-igneous bedrock, weathered volcanics, and weathered sedimentary bedrock.

5.7.1 Sedimentary Mudstone Bedrock

Weathered sedimentary bedrock is the predominant bedrock unit below the failed embankment area and was typically encountered between El. 905 m and El. 916 m.

This bedrock unit comprises a very high plastic, overconsolidated greenish-grey mudstone that is weakened by occasional slickensides and shears, which likely originate from historical tectonic stresses, glacial drag, glacial unloading and weathering. The sedimentary rock contains discontinuous green, red/brown, and yellow/green sand pockets and seams.

Figure 5.28 shows a good correlation between the presence of the sedimentary rock and the high resistivity anomaly shown in blue. Given the high plasticity of the sedimentary rock, a lower permeability would be anticipated in this unit than the harder mafic-igneous and volcanic rocks. This is discussed further in Section 5.9.

Also, the sedimentary bedrock is weaker than the other mafic-igneous and volcanic rocks. Hence, preferential erosion of sedimentary outcropping bedrock is likely to have contributed to the local topographic low (see Figures 5.1 and 5.4) at this area of the Perimeter Embankment.

5.7.2 Mafic-Igneous and Volcanic Bedrock

Weathered mafic and volcanic bedrock predominate to the east and west of the failed embankment area. The main characteristics for these units are:

- Weathered mafic-igneous bedrock comprised of low plastic sandy gravelly silt with trace clay. The unit is hard, dark grey and massive. Gravel and sand particles are black, angular, fine grained mafic rock. It is observed that fines content decreases with depth and gravel content increasing with depth, becoming coarse grained and clast supported.
- Weathered volcanic bedrock comprised of reddish brown to purple fine to medium grained silty sand with some gravel. Gravel and sand grains are angular, medium to fine grained volcanoclastic rock, reddish brown in colour.

Index properties for the weathered mafic-igneous and volcanic bedrock are presented in Appendix II-B. In situ water content ranges from 2.3% to 31.9% with median of 9.8%. CPT tip resistance when available across this unit ranged from 174 to 372 bars, with median of 194 bars. Shear wave velocity from CPT testing is around 360 m/s. These results ~~show~~ indicate that the weathered bedrock is very dense.

5.7.3 Material Properties for Failure Analysis

The material properties for the bedrock units adopted for the failure analysis presented in Section 6 are summarized in Table 5.8.

Table 5.8 Summary of Material Properties for Failure Analysis – Bedrock Units

Parameter	Weathered Mafic/ Volcanics (WB(Mafic/Vol)	Weathered Sedimentary (WB(Sed))
Unit weight (kN/m^3)	23.0	17.9
Peak effective friction angle	Impenetrable	Impenetrable
Horizontal hydraulic conductivity (k_h) (m/s)	$1x10^{-10}$	$< 1x10^{-10}$
Anisotropic ratio (k_h/k_v)	1	1

Note:
1. Unit weight calculated based on median water content, specific gravity, and 100% saturation.

5.8 Glacial Till Core (Zone S)

The CPT sounding (CPT14-21) within the Zone S Till Core gave a mean tip resistance of 94 bars with an undrained shear strength of 320 kPa in the upper 14 m of the core. These results are consistent with the expected hard consistency of compacted till.

Two bulk samples of the till core were collected during the 2014 Site Investigation program. One sample from the compacted till core was taken at the top of the embankment (southeast of drill hole SH14-21) and another sample was taken within the breach area during excavation of the till core. These bulk samples were re-compacted to prepare specimens for testing.

Test results on samples compacted to 92% and 95% maximum Standard Proctor density and sheared at 500 kPa and 800 kPa confining stresses showed a net contractive response. The effective friction angle of the compacted till was 33° and the average undrained strength ratio was $S_u/p'_c = 0.38$ where p'_c is the initial confining stress.

Flexible-walled hydraulic conductivity testing on samples at 500 kPa and 800 kPa ranged from 7×10^{-9} m/s to 4×10^{-10} m/s. For the seepage analysis in Section 6, the till core was divided in two zones, Zones S-1 and S-2, representing the upper and lower portions of the core, which were subjected to different consolidation stress levels and, hence, assigned different hydraulic conductivities.

5.9 Post-Failure Piezometer Readings

Figure 5.29 shows the location of piezometers installed during the 2014 post-failure site investigation together with pre-failure piezometers. Figures 5.30 to 5.32 present the instrumentation Sections D, C and G with the latest available piezometric readings. Within the failed embankment, Section C was used to portray the data instead of Section G shown previously in Figure 2.10.

The piezometers installed post-failure in the UGLU and other units found no evidence of high excess pore pressures related to the loading of the dam during construction. However, unloading and deformations in the UGLU during the failure and breach would have substantially changed the pore pressure regime in the clay from that of the pre-failure state.

Figure 5.33 shows the vertical seepage gradients in foundation soils and bedrock estimated from the latest set of piezometric readings. Two conditions are noted:

- Pore pressures below the failed embankment are largely hydrostatic, whereas outside the failed embankment, strong downward seepage gradients (0.1 to 0.7) are observed to the east and west. These areas of downward gradient coincide with areas underlain by mafic/volcanic rocks. This is one indication that the sedimentary rock below the embankment has a lower hydraulic conductivity than the surrounding rock. This is expected given the high plasticity of the sedimentary rock.
- Four observations of artesian pressures in the foundation deposits were made during drilling of the sonic core holes below the failed embankment. These are summarized in Table 5.9. All

occur within the upper and lower glaciofluvial deposits (UGF and LGF) and are likely due to the confinement between the lower permeability LGLU and sedimentary bedrock.

Table 5.9 Post-Failure Observations of Artesian Pressures in Glaciofluvial Foundation Deposits

Sonic Core Hole	Observation
SH14-01	Piezometric water pressure 4.6 m above ground surface at embankment toe in VWP tip B.
CPT14-03	Drillers reported back pressure expelling grout out of hole during completion. End of hole at 20.5 m within UGF.
CPT14-04	Artesian pressures encountered when drilling out from 17.5 m to 18.5 m in LGF. Two drill casings were added to measure water level above ground. Water level estimated to be 3.5 m above ground level.
SH14-18	Artesian pressures encountered when drilling in UGF and LGF between depths of 11 m and 16 m. Water pressures estimated to be 2 m above ground surface.

5.10 Post-Failure Inclinometer Readings

Inclinometers, located in Figure 5.34, were installed to record post-failure "creep" movements in the embankment foundation. Such movements would be evidence of the failure plane in the foundation due to large displacements and associated strength loss in the affected soils.

As shown in Figures 5.35 to 5.39, small post-failure movements were recorded by most inclinometers in the UGLU and point to the UGLU as the seat of the embankment failure. This is consistent with the heavily de-structured and folded varves of the UGLU below the embankment, as shown in Figure 5.10b, and the weakened state of the UGLU in the failure zone consistent with the remolding of the clay during the failure movement, as discussed in Section 5.5.1.

Inclinometer SH14-06 installed through the remains of the failed embankment gave movements predominately to the north, towards the downstream toe of the failed embankment. This movement is interpreted to be a remnant from the initial embankment failure.

Inclinometers installed in SH14-09, SH14-04, and SH14-03 display movements predominately to the northwest-west in the UGLU. The direction of these movements is towards the breach opening and this is attributed to the change in direction of the "driving" shear stress within the foundation as the breach developed. No evidence of movements was observed in inclinometer SH14-16 within the breach area, where the post-failure driving shear stresses are lowest. Also, the UGLU thins out in the vicinity of SH14-16 as shown in Figure 5.9.

The last reading from inclinometer SH14-09 indicated a discrete 2 mm shear displacement at El. 904 m within the weathered sedimentary bedrock. This single occurrence should be confirmed by further readings and, if movement is confirmed, should be considered in any future designs or operations of the TSF. Such discrete movements may be reflection of strains on a pre-existing shear within the bedrock.

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5.11 Evidence of Large Embankment Displacements

Vertical displacements of the crest in excess of 3.2 m[8] would have been required to cause an overtopping of the embankment. That such vertical displacements occurred during the failure was evident from the field mapping and site investigation. Four of the most important observations are illustrated in Figure 5.40 and are as follows:

1. Vertical and lateral displacements of 6 m and 10 m, respectively, in the undisturbed toe bulge in Zone 1 (Figure 5.40a).
2. The back-tilt of the construction lift interfaces exposed in Zone C in the left abutment of the breach. The back-tilt of 10° from horizontal yields a vertical rotational movements of 8 m over the 45 m width of Zone C exposed in the slope (Figure 5.40b).
3. Upthrusted UGLU observed in TP14-01 at the dam toe. As discussed in Section 4.3, the UGLU was vertically upthrust 6.5 m from its original elevation in adjacent sonic core holes (Figure 5.40c).
4. The shear feature encountered in the remnant of the Zones S Till Core. As discussed in Section 4.3, this shear plane was traced to extend over 3.5 m below native ground.

[8] Based on maximum crest elevation of 970 m of Zone S till core and tailings water pond elevation of 966.8 m at time of failure.

6 BACK-ANALYSIS OF EMBANKMENT FAILURE

6.1 General

The forensic evidence from the field mapping, site investigation, and post-failure movements measured by the inclinometers indicate that the embankment failed by shearing through the UGLU. From all available evidence, the final trigger for the failure would have been the recent excavation at the toe in 2013 followed by raising of the crest. This section presents the results of the back-analysis used to assess whether standard modelling techniques using material parameters from the site investigation support this failure hypothesis.

6.2 Conceptual Sequence of Dam Failure

Dam failure would have been triggered by local yielding of the UGLU clay whereby the static shear stresses in the UGLU exceeded the available drained strength defined by the peak effective friction angle, ϕ'. This induced yielding of the clay would have led to rapid straining such that shear-induced pore pressures in the contractive clay would have insufficient time to dissipate, reducing the strength of the clay to its undrained resistance, Su. If the embankment is not stable with the available undrained shear strength, then the embankment would continue to deform until a stable configuration was attained. Such displacements would have strained the clay beyond its peak undrained shear strength and, if displacements were large enough, reduced the undrained strength to its remolded value.

Evidence for the failure process described above includes:

- Buckling and de-structuring of varved clay laminations in the UGLU below the failed embankment (Figure 5.10).
- The reduced undrained strength of the UGLU measured below the failed embankment as a result of shearing (Figures 5.16 and 5.17). This reduced strength approaches the remolded strength of the clay as determined by in situ vane shear testing.
- The upthrust UGLU observed in TP14-01 at the toe of the failed embankment.
- The post-failure movements measured by inclinometers in the UGLU.

Following from the above, KCB developed a conceptual sequence of dam failure as a framework to evaluate the failure process of the embankment. This hypothesized failure sequence is set out in five stages as listed in Table 6.1. Each stage corresponds to the strength state of the UGLU and considers the influence of other contractive clayey soils and fills on the failure process. The stages are as follows:

- Stage 1 considers the static stability of the embankment under fully drained conditions, using the peak effective friction angle of the UGLU. Local yielding of the foundation clay could occur if the effective stress Factor of Safety (FoS) is low, typically less than 1.3.

- Stage 2 considers the embankment stability assuming that local yielding triggers the undrained strength of clay. If the FoS is less than or close to unity, then failure of the embankment would occur. Mobilization of the peak undrained shear strength occurs at shear strains of 5% based on laboratory testing. For a 2 m maximum thickness of the UGLU, movements in the UGLU would be in the order of 0.1 m or less. Such movements would not be detectable by observation at the crest of the embankment.
- Stage 3 considers failure of the embankment is occurring and the undrained shear strength of the UGLU is reduced to a post-peak strength due to the accumulation of strain within the clay. At 20% shear strain in the UGLU, maximum movements in the UGLU would now be in the order of 0.4 m. At these larger displacements, triggering of undrained shear strength in the compacted clay core and underlying UGT is now assumed.
- Stage 4 represents the advanced state of failure with the undrained shear strength of the UGLU reduced to its remolded value.
- Stage 5 represents the failed embankment coming to rest on the weakened foundation at a FoS of 1. This final state was achieved by the reduction of driving force as the crest of the embankment dropped and the increase in resisting force with the buckling and mounding of displaced soils at the embankment toe.

Breach of the embankment followed Stage 5 as the impounded water pond overtopped the down-dropped crest of the embankment. Schematically, this is shown in Figure 3.12.

Table 6.1 Conceptual Sequence of Dam Failure

Stage	Description	Approximate Movement in UGLU (m)	Shear Strength in UGLU
1	Static conditions using peak effective angles and piezometric conditions prior to failure.	0	$\phi_p' = 22°$
2	Peak undrained shear strength mobilized at 5% strain within the UGLU as a result of local yielding. Peak drained strength in all embankment fills and other foundation soils.	0.1	$Su = 50 + 0.13\ \sigma_{vo}'$
3	Post-peak undrained shear strength achieved in the UGLU at 20% strain due to continued movement. Peak undrained strength triggered in other contractive embankment fills and foundation soils.	0.4	$Su = 36 + 0.11\ \sigma_{vo}'$
4	Remolded undrained shear strength in the UGLU and peak undrained shear strengths in contractive fills and foundation soils.	> 1	$Su = 22 + 0.03\ \sigma_{vo}'$
5	Failed embankment at equilibrium in post-failure configuration with a factor of safety close to 1.0	> 3	$Su = 22 + 0.03\ \sigma_{vo}'$

Note:

1. ϕ_p' = Effective friction angle; Su = Undrained shear strength; σ_{vo}' = Initial vertical effective stress (kPa) prior to failure. Refer to Figure 5.22 for selected Su values.
2. Maximum movements based on a 2 m thick UGLU below the embankment toe.

6.3 Analysis Sections

The embankment sections selected for the analyses are Sections C and D, shown on Figure 6.1. Figure 6.2 and Figure 6.3 show the geometry and zonation at these sections.

Section C is located near the center of the failure zone and was used to evaluate the stability of the embankment during Stages 1 to 4. The configuration of the model incorporates: the foundation soil and bedrock profiles as presented in Figure 5.13; the as-constructed embankment section as presented in Figure 2.6; and the pre-failure topography from the aerial LiDAR survey recorded in August 2013.

A 2 m deep excavation at the embankment toe (to approximately El. 930 m) was included in the model to reflect the site stripping in preparation for construction of a future toe buttress. The model domain extends 225 m upstream of the embankment set-out-line, with a transition from coarse-grained sandy tailings and fine-grained tailings “slimes” assumed 150 m upstream of the set-out-line.

Section D passes through the intact remnants of the failed embankment and was used to assess the stability of the embankment in Stage 5. The configuration of the model incorporates: the foundation soil and bedrock profiles as presented in Figure 5.14, the as-constructed embankment section as presented in Figure 2.6, and the post-failure geometry at Section D from the aerial LiDAR survey recorded in August 2014. The model extends 160 m upstream and downstream of the set-out-line.

A substantial portion of the upstream embankment fill at Section D was eroded during the tailings breach. The configuration of the embankment following initial embankment failure, but prior to breaching, was approximated based on an area-mass balance between the upthrust toe bulge and the crest downdrop, as shown in Figure 6.3.

6.4 Material Properties for Analyses

Material properties for the compacted till core (Zone S), foundation soils and bedrock units were discussed in Section 5. Material properties for other fill materials and impounded tailings are presented in Table 6.2. These properties were derived from as-built records, including: grain size distribution, in situ water content, and in situ dry density. Properties were also based on soil classification and index properties when other information was not available.

Table 6.2 Summary of Material Properties for Failure Analysis – Fill Materials and Impounded Tailings

Parameter	Fill Materials									Impounded Tailings	
	Till Core Zone S	Fill Zone B	Rockfill Zone C	Fine Rockfill Zone T	Sand and Gravel Zone F	Coarse Bearing Layer Zone CBL	Cycloned Sand Zone CS	Random Fill Zone U	Upstream Drain	Coarse Tailings	Fine Tailings (Slimes)
Water content (%)	10.5	11.0	2.5	4.4	8.4	19.9	11.6	19.9	-	-	-
Specific gravity	2.73	2.73	2.70	2.70	2.70	2.70	2.70	2.70	-	2.70	2.70
Saturation (%)	100	100	20	35	50	100	100	100	-	100	100
Average porosity	-	-	0.25	-	-	0.35	-	0.35	-	-	-
Average void ratio	-	-	0.33	0.34	0.45	0.54	0.60	0.54	-	0.90	1.00
Unit weight (kN/m^3)	22.8	22.7	20.4	20.6	19.8	20.7	18.1	20.7	-	18.6	18.1
Peak effective friction angle	33°	33°	40°	35°	34°	33°	32°	30°	30°	32°	28°
Undrained shear strength	$0.38\sigma_{vo}'$	$0.30\sigma_{vo}'$	-	-	-	-	-	-	-	-	-
Horizontal hydraulic conductivity (k_h) (m/s)	$2x10^{-8}$ (S-1) $2x10^{-9}$ (S-2)	$4x10^{-9}$	$5x10^{-2}$	$5x10^{-4}$	$1x10^{-4}$	$1x10^{-3}$	$2x10^{-5}$	$1x10^{-5}$	$1x10^{-3}$	$5x10^{-7}$	$5x10^{-9}$
Vertical hydraulic conductivity (k_v) (m/s)	$5x10^{-9}$ (S-1) $5x10^{-10}$ (S-2)	$4x10^{-10}$	$5x10^{-2}$	$5x10^{-4}$	$1x10^{-4}$	$1x10^{-3}$	$2x10^{-6}$	$2.5x10^{-6}$	$1x10^{-3}$	$5x10^{-8}$	$5x10^{-10}$
Anisotropy ratio (k_h/k_v)	4	10	1	1	1	1	10	4	1	10	10

Value obtained from as-constructed records or laboratory testing
Declared values for evaluation
Calculated values

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Note:
1. Specific gravity from as-constructed records. A value of 2.7 was adopted when other data was not available. Tailings specific gravity varies from 2.65 to 2.78, a median 2.7 was used.
2. Average porosity from soil classification.
3. Unit weight calculated based on median water content, specific gravity, and percentage saturation.
4. Hydraulic conductivity shown in table reflects adjusted values from calibration analysis conducted during the seepage analysis.
5. Coarse tailings properties were ~~based~~ established assuming consolidated peripheral-discharged beach sands with up to 30% fines and deposited mostly above water. Fine tailings (slimes) were assumed based on typical values for copper slimes deposited mostly below water.

6.5 Pore Pressure Conditions Prior to Failure

A knowledge of the pore pressures in the tailings embankment and foundation soils is essential when assessing the stability of a tailings embankment because the in situ effective stresses and strength of the embankment fills and its underlying foundation are directly dependent on them.

Steady state seepage analysis ~~were~~ was used to evaluate the pore pressure regime caused by seepage from the tailings pond through the embankment and foundation soils. This analysis is reported in Appendix III. Results were compared to pre-failure piezometric elevations recorded by piezometers installed in the till core (Zone S), upstream Zone U, and tailings beach. Seepage records from the Perimeter Embankment were also used to calibrate the model.

Additional pore pressures could have been induced in the UGLU by raising of the embankment. No piezometers in the UGLU were available to record such pore pressures. In absence of field data, consolidation analyses of the UGLU were undertaken to estimate the potential magnitude of the excess pore pressures. These analyses are reported in Appendix VI.

6.5.1 Steady-State Seepage Pore Pressures

Figure 6.4 shows the predicted total head contours and pore pressure conditions prior to failure within the embankment fills, tailings, and foundation soils. Salient observations pertinent to embankment stability include:

- Steady-state piezometric conditions in the foundation soils below the embankment are influenced by the strong seepage gradients underneath the till core of the embankment and the presence of the permeable glaciofluvial deposits (UGF/LGF) that are confined by the relatively impermeable LGLU, UGLU, and till units. Due to these factors, the predicted piezometric levels in the upper glaciolacustrine are 4 m to 6 m above the piezometric surface in the embankment.
- Predicted piezometric levels in the middle of the upper glaciofluvial unit are 6 m to 8 m above the phreatic surface in the embankment. These elevated levels agree with artesian conditions in a piezometer installed in SH14-01 (piezometric level 4.6 m above ground) and other observations of artesian conditions in the UGF during the post-failure site investigation (Section 5.9).
- The Upstream Toe Drain reduces the piezometric pressures in the tailings upstream of the core, thereby reducing the seepage gradients in the foundation below the core. A parametric analysis excluding the drain effect showed that piezometric levels upstream of the till core increased to nearly hydrostatic conditions. Seepage gradients beneath the till core increased accordingly as did piezometric levels within the UGLU, which increased to 7 m to 9 m above the piezometric surface in the embankment.

6.5.2 Transient Pore Pressures in the UGLU

One-dimensional consolidation analyses were conducted in two representative soil columns located along Section C near the crest (Column 1) and below the embankment mid-slope (Column 2). Figure 6.5 shows the excess pore pressure predicted at the middle of the UGLU at the two soil columns. The estimated pore pressures in the UGLU at the time of failure range from 97 kPa to 158 kPa below the embankment mid-slope and below the crest, respectively.

These construction-induced pore pressures are considered in parametric sensitivity analys~~i~~es of the embankment stability.

6.6 Limit Equilibrium Stability Analysis

6.6.1 General

Slope stability analyses were conducted for Section C and Section D using the software Slope/W. The objective was to obtain the Factors of Safety (FoS) at the five hypothesized stages of dam failure in Table 6.1. Details of the analyses are reported in Appendix IV.

"Base Case" analyses were conducted for Stages 1 to 4 using the predicted steady state pre-failure seepage pore pressures from Figure 6.4. A number of additional sensitivity analyses were then conducted to assess: the detrimental effect of the 2 m deep excavation at the embankment toe, the beneficial influence of the Upstream Toe Drain, the detrimental effects of the construction-induced pore pressures in the UGLU, and the stability of the embankment with a flattened 2H:1V exterior slope. For comparison, the stability of the embankment ~~sliding on~~for a hypothetical slip surface in the deeper overconsolidated LGLU was also assessed.

6.6.2 Stability Results for Section C

Figures 6.6a to 6.6d shows the "base case" analys~~e~~is results for Stages 1 to 4 at Section C using the predicted steady state pre-failure seepage pore pressures from Figure 6.4. Figures showing the results from the sensitivity analyses can be found in Appendix II-B and II-C. Table 6.3 summarizes the calculated FoS.

Table 6.3 Factors of Safety from Limit Equilibrium Stability Analyses

Case	Description	Factor of Safety (FoS)			
		Stage 1	Stage 2	Stage 3	Stage 4
Base Case	Steady state seepage pore pressures.	1.27	1.02	0.96	0.80
1	No stripping and excavation at the embankment toe.	1.34	1.10	1.03	0.89
2	Without Upstream Toe Drain and elevated piezometric levels in tailings and foundation soils.	1.12	-	-	-
3	Inclusion of construction induced pore-pressures in the UGLU.	1.19	0.98	-	-
4	Effect of ~~a~~ flattening the downstream slope to 2H:1V.	1.59	1.24	1.14	0.90
5	Slip surfaces through LGLU using peak friction angle.	1.38	-	-	-
6	Slip surfaces through LGLU using residual friction angles.	1.19	-	-	-

Salient observations are:

- In the base case, with steady state pore water pressures, the FoS for Stage 1 was 1.27. With triggering of the undrained strength of the UGLU, the FoS reduced close to unity for Stage 2 and below unity for Stages 3 and 4.
- With the addition of excess pore pressures in the UGLU, FoS for Stage 1 dropped from 1.27 to 1.19. FoS for Stage 2 dropped from 1.02 to 0.98.
- Without the 2 m deep excavation at the embankment toe, the FoS increased from 1.27 to 1.34 for Stage 1 and from 1.02 to 1.10 for Stage 2, and only the FoS for Stage 4 fell below unity. Embankment failure may not have occurred, but this would require further analyses.
- The stability of the tailings embankment is very sensitive to pore pressures in the upstream tailings and embankment fills, and the corresponding seepage gradients at the foundation soils. The FoS dropped significantly from 1.27 to 1.11 for Stage 1 when the beneficial effect of the Upstream Toe Drain was removed.
- Flattening the slope to 2H:1V improves FoS for all the stages, with only Stage 4 FoS below unity. Failure ~~is not predicted~~would likely not have occurred if the slope had been constructed at 2H:1V.
- The FoS for a slip surface through the LGLU was 1.38 and 1.19 with peak and residual drained strengths, respectively (see Figures IV-C-1 and IV-C-2). Failure through the deeper LGLU unit is not predicted. This agrees with observations from inclinometers installed post-failure which did not show any post-failure movements in the LGLU.

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6.6.3 Stability Results for Section D

Figure 6.6e shows the stability result for Stage 5 on the re-constructed Section D. FoS slightly above unity is calculated. This is consistent with the failed embankment coming to rest as the driving forces reduced (with drop in embankment crest) and resisting forces increased (with the upthrusted toe bulge).

The stability analyses for Section D rely on simplified but reasonable assumptions of post-failure pore water pressures and embankment geometry. The results are intended only to demonstrate the validity of our failure hypothesis.

6.7 Numerical Stress Analysis

6.7.1 General

As the behaviour of the UGLU is of primary concern in the assessment of the dam failure mechanism, numerical stress and deformation analyses using the 2D Finite difference modelling software, FLAC, were conducted to provide insights into the following questions:

- What was the global Factor of Safety (FoS) of the dam corresponding to peak drained shear strengths and peak undrained shear strengths in the UGLU?

- What was the local FoS within the UGLU corresponding to drained strengths and were they low enough to cause local yielding of the clay and triggering of rapid undrained shearing?
- If yielding occurred, would continued displacement or straining have led to significant strain softening or even remolding of the UGLU?
- What would be the nature of the dam displacements caused by the failure of the dam?

To answer these questions, the numerical analyses were conducted as follows:

- Step 1: Conduct FoS analysis using the strength reduction technique in FLAC/Slope module to calculate the global FoS of the dam using peak drained and peak undrained shear strengths for the UGLU.
- Step 2: Conduct static stress analysis using drained strength parameters in the UGLU to establish in situ stresses and FoS against local yielding within the UGLU just prior to failure.
- Step 3: Invoke undrained behaviour in the UGLU, as shown in Figure V-1, to assess the stability of the dam and predict its deformation.

Details of the FLAC analyses are reported in Appendix V.

6.7.2 Modelling of the UGLU

Figure 6.7 shows the assumed shear stress-strain behaviour of the UGLU under drained and undrained conditions based on the results of the advanced laboratory test work. The peak friction angle is reached under drained loading conditions at 15% shear strain. Peak undrained shear strength is attained at approximately 5% shear strain, and with further straining, the undrained strength drops to its post-peak value at about 20% shear strain. The remolded undrained shear strength is reached at approximately 60% shear strain.

6.7.3 Global Factor of Safety

The factor of safety (FoS) against slope failure is computed using a procedure known as the “strength reduction technique” (Dawson et al. 1999). In this technique, the shear strength of the material is progressively reduced to bring the slope to the state of limiting equilibrium. The factor, by which the strengths are reduced to the state of limiting equilibrium, is defined as the FoS.

Figure 6.8 shows the global FoS for the embankment with peak drained and peak undrained strengths for the UGLU and assuming hydrostatic pore pressure conditions. The global FoS of the dam is 1.21 with the peak drained strength in the UGLU and reduces to less than unity with the peak undrained shear strength. The FoS with peak strength is relatively low and could have allowed some portions of the UGLU to locally strain beyond the available peak drained strength, thereby initiating a progressive undrained failure mechanism in the UGLU. Under such conditions, failure is predicted by the strength reduction analyses (FoS = 0.94). These results are consistent with the findings from the limit equilibrium analyses in Section 6.6.

6.7.4 Local Factors of Safety and Yielding

Two-dimensional plane strain analyses were conducted with FLAC to estimate in situ stresses in the embankment and foundation soils. The analyses were carried out in six loading stages as shown in Figure V-8 in Appendix V. Figure 6.9 shows the results for the embankment configuration at Stage 6B completed in 2010 and the final Stage 9 completed just prior to failure.

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The results for Stage 9 show that:

- Vertical effective stresses in the UGLU, range from 100 kPa to 760 kPa beneath the dam.
- The average pre-consolidation stress of 400 kPa was exceeded below the lower third of the dam slope. Hence, the majority of the UGLU below the dam was normally consolidated and contractive during shear.
- The local FoS_D, corresponding to the drained shear strength, were predicted to be close to unity within portions of the UGLU. The location of yielding is predicted to occur near the dam toe where the shear stresses induced by the steep dam slope are high.
- The local FoS_{UP} within the UGLU, corresponding to peak undrained shear strength, is substantially less than 1 under virtually the entire dam slope. This result predicts rapid dam failure would occur following an initiation of local yielding.

By comparison for Stage 6B, the local FoS_D within the UGLU was greater than 1.2 and the local FoS_{UP} was above unity. While these values are low, failure would not be predicted by the model at the end of Stage 6B, and this supports the validity of the model.

For Stage 9, the drop in the global FoS following yield of the UGLU and the associated displacements within the UGLU could have triggered the spread of undrained behaviour across the UGLU and further strain softening in zones that had already reached their peak undrained shear strengths. If unchecked, the progression of shearing would have ultimately led to mobilization of remolded shear strengths within the UGLU as the dam failed. A deformation analysis is reported in Section 6.7.5 to check this possible failure mechanism.

Figures V-12 and V-13 summarize~~s~~ the results for a parametric sensitivity case without the UGLU for the ends of Stage 6B and final Stage 9. In this case, where the UGLU was replaced by UGT, the results show that the local FoS_D strengths is greater than 2.0 in Stage 6B and greater than 1.5 in Stage 9. Because the strength of UGT is much higher than the strength of UGLU, higher local FoS were obtained in this sensitivity analysis and dam failure is not predicted by the model.

6.7.5 Embankment Deformation Analysis

A simplified two-dimensional plane-strain static deformation analysis was conducted using FLAC to demonstrate that triggering of undrained shear in the UGLU would have caused the failure of the dam and to predict the mode and patterns of the dam deformations. This analysis was conducted in two steps: in the first step, in situ stresses within the dam prior to the failure ~~was~~ were estimated using drained strength parameters for all materials including the UGLU; and in the second step, the undrained behaviour of the UGLU was invoked and the strain dependent behaviour of UGLU shown in Figure 6.7 was modelled.

Figure 6.10 shows the deformed shape and mobilized shear strain within the UGLU for two time intervals selected to represent early and final stages of failure. Salient observations are:

- For the early stages of failure, when the maximum horizontal displacement within the UGLU was approximately 0.3 m, the shear strain within the UGLU exceeded 5% with a number of zones experiencing more than 60% strain, indicating straining of the UGLU to its remolded strength had occurred in these areas.
- For the final stages of failure, when the maximum horizontal displacement within the UGLU was approximately 6 m, the settlement upstream of the dam was approximately 5 m and the upthrust near the toe reached about 4 m. Rotation on the backscarp is also predicted. The shear strain within the entire width of the UGLU exceeds 60% indicating the UGLU has been fully reduced to its remolded shear strength.

These results illustrate the progressive weakening of the UGLU and provide an indication of the mode of deformation and magnitude of movements.

The simplified analysis demonstrates that the dam would have undergone a sudden and rapid failure following triggering of undrained shear in the upper UGLU. The predicted sliding of the dam and discrete shear deformations in Figure 6.10 are consistent with the actual post-failure observations of upthrusting at the dam toe and the shear plane found through the lower portion of the till core. The rotation on the backscarp of the failure is also consistent with the back-tilting of the construction lifts observed in the abutments ~~in~~ of the failed dam.

The observed fully remolded strengths at final stages of the failure are also consistent with observations of low undrained shear strengths in CPT soundings and VST testing below the failed embankment.

7 CONCLUSIONS

It is our opinion that the basic mechanism of failure at the Mount Polley tailings dam was a sliding failure through the lightly overconsolidated glaciolacustrine clay unit (UGLU) in the foundation which dropped the crest enough to allow the pond to overtop and, within a few hours, to completely breach a portion of the Perimeter Embankment. This mechanism is manifested by physical evidence of dam displacements and shear movements in the dam foundation, and is supported by analyses using the engineering properties of the dam and foundation soils. From all available evidence, the final trigger for the failure was the recent excavation at the toe in 2013 and raising of the embankment with the steep outer slope of 1.3H:1V.

At the time of failure, the Factor of Safety (FoS) of the dam was calculated using limit equilibrium methods to be 1.27 using the peak drained strength of the UGLU and the pre-failure pore pressures estimated by seepage analyses. The FoS reduced further to 1.19 with an allowance for construction induced pore pressures.

Numerical stress analyses of the dam show that, at these low FoS, the shear stresses induced in the UGLU below the steep outer dam slope would have exceeded the available peak drained strength, thereby initiating a progressive undrained failure mechanism in the UGLU. Using the peak undrained strength of the UGLU, the calculated FoS of the tailings dam reduces to unity.

Because of the strain-weakening behavior of the UGLU, the displacement of the dam probably accelerated once failure was initiated (FoS less than 1) as described above. This acceleration of movement subjected the UGLU to progressively larger strains and greater strength loss, with calculated FoS ultimately reducing to as low as 0.80 at the fully remolded strength of the UGLU. At this stage, rapid movement of the dam continued until the geometry of the failed mass re-stabilized at a FoS of unity.

A pre-existing shear plane in the UGLU was considered as a possible factor in the failure. Samples retrieved from outside the failed dam were examined for t~~T~~he presence of shear planes or other distortions of the varved clay structure, ~~was looked for in the samples retrieved from outside the failed dam~~ but none ~~was~~ were found. The near-horizontal inclination of the varve bedding in free field samples of the UGLU also tends to rule out an old landslide or glacial shearing as a contributory factor in the failure. The absence of a pre-existing shear plane is corroborated by the fact that the dam probably would have failed earlier if a shear plane at lower shear strength had been present.

The forensic drilling and excavations in the failed dam and breach area identified a distinctive shear plane and down-drop in the upstream till core and upthrust of the foundation soils at the dam toe. Movements interpreted from these and other features indicate net dam displacements in the order of 5 m to 10 m along the sliding plane in the UGLU. Numerical deformation analysis of the dam by KCB shows that the down-drop of the dam crest during the failure would have been sufficient for the tailings pond water to overtop the crest of the till core and ~~trigger~~ initiate the subsequent dam breach.

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Large movements in the UGLU are also consistent with the small movements in the UGLU recorded by inclinometers installed post-failure, the heavily de-structured and folded varves of the UGLU in the

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failure zone below the dam, and the weakened state of the UGLU in the failure zone consistent with the remolding of the clay during the dam displacements.

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8 COMPARISON TO AZNALCOLLAR TAILINGS DAM FAILURE

It is notable that the Aznalcollar Tailings Dam near Seville, Spain was also constructed with a 1.3H:1V exterior slope and failed at a height of 28 m in 1998. It is likely the closest direct comparable in the mining industry to the Mount Polley dam failure.

This dam failed by sliding on a heavily overconsolidated, high plastic, marl clay foundation. While overconsolidated and dilative in shear, the marl clay displayed remarkable "brittle" behavior with substantial loss of frictional strength once the peak strength was exceeded. Failure was initiated by local yielding of the clay, which initiated a progressive failure within the dam foundation. Contributing factors to the local yielding were the steep dam slope and excess pore pressures generated in the clay during the dam construction.

At the time of failure, the tailings pond was maintained against the dam crest to keep the stored sulfide-rich tailings saturated to prevent oxidation. Failure of the dam released the entire 5.5 million m^3 of stored pond water and 1.5 million m^3 of tailings slurry.

Table 8.1 compares some of the features of the Mount Polley and Aznacollar tailings dams. Ultimately, both dams failed because the exterior slopes were too steep for the foundation conditions.

Table 8.1 Comparison of Mount Polley and Aznalcollar Tailings Dam Failures

Feature	Mount Polley Tailings Dam	Aznalcollar Tailings Dam
Dam Height	40 m	28 m
Dam Construction Method	Modified upstream method with "core" of compacted till and filter zones	Downstream method with lining of compacted soil on the upstream dam face and filter zones
Exterior Dam Slope	1.3H:1V in upper slope 1.8H:1V at toe	1.3H:1V
Foundation Clay Involved in Failure	Glaciolacustrine Varved Clay	Marine Marl Clay
Clay Thickness	2 m maximum	Over 25 m
Clay Properties	Liquid Limit = 40 – 70% Clay Fraction = 40 – 70%	Liquid Limit = 55 – 75% Clay Fraction = 45 - 75%
Consolidation State	Lightly Overconsolidated Liquidity Index = 0.5	Heavily Overconsolidated Liquidity Index = 0.13
Behavior Under Shear	Contractive Undrained strength governs Gradual loss in undrained strength from peak to remolded	Dilative Drained strength governs Brittle with high strength loss from peak to residual friction angle
Construction Excess Pore Pressures	Low based on post-failure pore pressure analyses	High based on piezometers installed after failure event
Rate of Failure	< 2 hours 10 m of dam displacement	< 2 hours Up to 50 m of dam displacement
Water Pond at Time of Failure	High pond level against dam crest following high spring runoff	High pond level against dam crest to keep sulfide tailings saturated
Consequences of Failure	Release of 17 million m^3 of water and 8 million m^3 of tailings solids	Release of 5.5 million m^3 of water and 1.5 million m^3 of tailings slurry

9 CLOSING

The work presented in this report was managed and performed under the direction of Howard Plewes, M.Sc., P.Eng.

This report is an instrument of service of Klohn Crippen Berger Ltd. The report has been prepared for the use of the BC Ministry of Energy and Mines for the specific application of contributing to the Mount Polley Dam Failure investigation. In this report, Klohn Crippen Berger has endeavoured to comply with generally-accepted professional practice common to the local area. Klohn Crippen Berger makes no warranty, express or implied.

KLOHN CRIPPEN BERGER LTD.

Hector Barriga, M.Sc., P.Eng.
Geotechnical Engineer

Howard Plewes, M.Sc., P.Eng.
Principal, Geotechnical Engineer

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APPENDIX VI

Pore Pressure Analysis of UGLU

GENERAL SERVICE AGREEMENT

BRITISH
COLUMBIA

For Administrative Purposes Only

Ministry Contract No.: CS15MAN0032
Requisition No.: ____________________
Solicitation No.(if applicable):
Commodity Code:

Contractor Information

Supplier Name: Klohn Crippen Berger Ltd.
Supplier No.: ____________________
Telephone No.: (604) 669-3800
E-mail Address: lmurray@klohn.com
Website: www.klohn.com

Financial Information

Client:	057
Responsibility Centre:	27771
Service Line:	26140
STOB:	6001
Project:	2700000

TABLE OF CONTENTS

THIS AGREEMENT is dated for reference the 15th day of August, 2014.

BETWEEN:

KLOHN CRIPPEN BERGER LTD. (the "Contractor") with the following address and phone number:
500 – 2955 Virtual Way
Vancouver, B.C. V5M 4X6
Phone: (604) 669-3800

AND:

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF BRITISH COLUMBIA, as represented by the Ministry of Energy and Mines (the "Province") with the following specified address and fax number:
PO Box 9320, Stn. Prov. Govt.
Victoria, BC V8W 9N3
(250) 952-0491

The Province wishes to retain the Contractor to provide the services specified in Schedule A and, in consideration for the remuneration set out in Schedule B, the Contractor has agreed to provide those services, on the terms and conditions set out in this Agreement.

As a result, the Province and the Contractor agree as follows:

1 DEFINITIONS

General

1.1 In this Agreement, unless the context otherwise requires:

(a) "Business Day" means a day, other than a Saturday or Sunday, on which Provincial government offices are open for normal business in British Columbia;

(b) "Incorporated Material" means any material in existence prior to the start of the Term or developed independently of this Agreement, and that is incorporated or embedded in the Produced Material by the Contractor or a Subcontractor;

(c) "Material" means the Produced Material and the Received Material;

(d) "Produced Material" means records, software and other material, whether complete or not, that, as a result of this Agreement, are produced by the Contractor or a Subcontractor and includes the Incorporated Material;

(e) "Received Material" means records, software and other material, whether complete or not, that, as a result of this Agreement, are received by the Contractor or a Subcontractor from the Province or any other person;

(f) "Services" means the services described in Part 2 of Schedule A;

(g) "Subcontractor" means a person described in paragraph (a) or (b) of section 13.4; and

(h) "Term" means the term of the Agreement described in Part 1 of Schedule A subject to that term ending earlier in accordance with this Agreement.

Meaning of "record"

1.2 The definition of "record" in the *Interpretation Act* is incorporated into this Agreement and "records" will bear a corresponding meaning.

2 SERVICES

Provision of services

2.1 The Contractor must provide the Services in accordance with this Agreement.

Term

2.2 Regardless of the date of execution or delivery of this Agreement, the Contractor must provide the Services during the Term.

Supply of various items

2.3 Unless the parties otherwise agree in writing, the Contractor must supply and pay for all labour, materials, equipment, tools, facilities, approvals and licenses necessary or advisable to perform the Contractor's obligations under this Agreement, including the license under section 6.4.

Standard of care

2.4 Unless otherwise specified in this Agreement, the Contractor must perform the Services to a standard of care, skill and diligence maintained by persons providing, on a commercial basis, services similar to the Services.

Standards in relation to persons performing Services

2.5 The Contractor must ensure that all persons employed or retained to perform the Services are qualified and competent to perform them and are properly trained, instructed and supervised.

Instructions by Province

2.6 The Province may from time to time give the Contractor reasonable instructions (in writing or otherwise) as to the performance of the Services. The Contractor must comply with those instructions but, unless otherwise specified in this Agreement, the Contractor may determine the manner in which the instructions are carried out.

Confirmation of non-written instructions

2.7 If the Province provides an instruction under section 2.6 other than in writing, the Contractor may request that the instruction be confirmed by the Province in writing, which request the Province must comply with as soon as it is reasonably practicable to do so.

Effectiveness of non-written instructions

2.8 Requesting written confirmation of an instruction under section 2.7 does not relieve the Contractor from complying with the instruction at the time the instruction was given.

Applicable laws

2.9 In the performance of the Contractor's obligations under this Agreement, the Contractor must comply with all applicable laws.

3 PAYMENT

Fees and expenses

3.1 If the Contractor complies with this Agreement, then the Province must pay to the Contractor at the times and on the conditions set out in Schedule B:

(a) the fees described in that Schedule, plus any applicable taxes; and

(b) the expenses, if any, described in that Schedule if they are supported, where applicable, by proper receipts and, in the Province's opinion, are necessarily incurred by the Contractor in providing the Services.

The Province is not obliged to pay to the Contractor more than the "Maximum Amount" specified in Schedule B on account of fees and expenses.

Statements of accounts

3.2 In order to obtain payment of any fees and expenses under this Agreement, the Contractor must submit to the Province a written statement of account in a form satisfactory to the Province upon completion of the Services or at other times described in Schedule B.

Withholding of amounts

3.3 Without limiting section 9.1, the Province may withhold from any payment due to the Contractor an amount sufficient to indemnify, in whole or in part, the Province and its employees and agents against any liens or other third-party claims that have arisen or could arise in connection with the provision of the Services. An amount withheld under this section must be promptly paid by the Province to the Contractor upon the basis for withholding the amount having been fully resolved to the satisfaction of the Province.

Appropriation

3.4 The Province's obligation to pay money to the Contractor is subject to the *Financial Administration Act*, which makes that obligation subject to an appropriation being available in the fiscal year of the Province during which payment becomes due.

Currency

3.5 Unless otherwise specified in this Agreement, all references to money are to Canadian dollars.

Non-resident income tax

3.6 If the Contractor is not a resident in Canada, the Contractor acknowledges that the Province may be required by law to withhold income tax from the fees described in Schedule B and then to remit that tax to the Receiver General of Canada on the Contractor's behalf.

Prohibition against committing money

3.7 Without limiting section 13.10(a), the Contractor must not in relation to performing the Contractor's obligations under this Agreement commit or purport to commit the Province to pay any money except as may be expressly provided for in this Agreement.

Refunds of taxes

3.8 The Contractor must:

(a) apply for, and use reasonable efforts to obtain, any available refund, credit, rebate or remission of federal, provincial or other tax or duty imposed on the Contractor as a result of this Agreement that the Province has paid or reimbursed to the Contractor or agreed to pay or reimburse to the Contractor under this Agreement; and

immediately on receiving, or being credited with, any amount applied for under paragraph (a), remit that amount to the Province.

4 REPRESENTATIONS AND WARRANTIES

4.1 As at the date this Agreement is executed and delivered by, or on behalf of, the parties, the Contractor represents and warrants to the Province as follows:

(a) except to the extent the Contractor has previously disclosed otherwise in writing to the Province,

(i) all information, statements, documents and reports furnished or submitted by the Contractor to the Province in connection with this Agreement (including as part of any competitive process resulting in this Agreement being entered into) are in all material respects true and correct,

(ii) the Contractor has sufficient trained staff, facilities, materials, appropriate equipment and approved subcontractual agreements in place and available to enable the Contractor to fully perform the Services, and

(iii) the Contractor holds all permits, licenses, approvals and statutory authorities issued by any government or government agency that are necessary for the performance of the Contractor's obligations under this Agreement; and

(b) if the Contractor is not an individual,

(i) the Contractor has the power and capacity to enter into this Agreement and to observe, perform and comply with the terms of this Agreement and all necessary corporate or other proceedings have been taken and done to authorize the execution and delivery of this Agreement by, or on behalf of, the Contractor, and

(ii) this Agreement has been legally and properly executed by, or on behalf of, the Contractor and is legally binding upon and enforceable against the Contractor in accordance with its terms except as enforcement may be limited by bankruptcy, insolvency or other laws affecting the rights of creditors generally and except that equitable remedies may be granted only in the discretion of a court of competent jurisdiction.

5 PRIVACY, SECURITY AND CONFIDENTIALITY

Privacy

5.1 The Contractor must comply with the Privacy Protection Schedule attached as Schedule E.

Security

5.2 The Contractor must:

(a) make reasonable security arrangements to protect the Material from unauthorized access, collection, use, disclosure, alteration or disposal; and

(b) comply with the Security Schedule attached as Schedule G.

Confidentiality

5.3 The Contractor must treat as confidential all information in the Material and all other information accessed or obtained by the Contractor or a Subcontractor (whether verbally, electronically or otherwise) as a result of this Agreement, and not permit its disclosure or use without the Province's prior written consent except:

(a) as required to perform the Contractor's obligations under this Agreement or to comply with applicable laws;

(b) if it is information that is generally known to the public other than as result of a breach of this Agreement; or

(c) if it is information in any Incorporated Material.

Public announcements

5.4 Any public announcement relating to this Agreement will be arranged by the Province and, if such consultation is reasonably practicable, after consultation with the Contractor.

Restrictions on promotion

5.5 The Contractor must not, without the prior written approval of the Province, refer for promotional purposes to the Province being a customer of the Contractor or the Province having entered into this Agreement.

6 MATERIAL AND INTELLECTUAL PROPERTY

Access to Material

6.1 If the Contractor receives a request for access to any of the Material from a person other than the Province, and this Agreement does not require or authorize the Contractor to provide that access, the Contractor must promptly advise the person to make the request to the Province.

Ownership and delivery of Material

6.2 The Province exclusively owns all property rights in the Material which are not intellectual property rights. The Contractor must deliver any Material to the Province immediately upon the Province's request.

Matters respecting intellectual property

6.3 The Province exclusively owns all intellectual property rights, including copyright, in:

(a) Received Material that the Contractor receives from the Province; and

(b) Produced Material, other than any Incorporated Material.

Upon the Province's request, the Contractor must deliver to the Province documents satisfactory to the Province that irrevocably waive in the Province's favour any moral rights which the Contractor (or employees of the Contractor) or a Subcontractor (or employees of a Subcontractor) may have in the Produced Material and that confirm the vesting in the Province of the copyright in the Produced Material, other than any Incorporated Material.

Rights in relation to Incorporated Material

6.4 Upon any Incorporated Material being embedded or incorporated in the Produced Material and to the extent that it remains so embedded or incorporated, the Contractor grants to the Province:

(a) a non-exclusive, perpetual, irrevocable, royalty-free, worldwide license to use, reproduce, modify and distribute that Incorporated Material; and

(b) the right to sublicense to third-parties the right to use, reproduce, modify and distribute that Incorporated Material.

7 RECORDS AND REPORTS

Work reporting

7.1 Upon the Province's request, the Contractor must fully inform the Province of all work done by the Contractor or a Subcontractor in connection with providing the Services.

Time and expense records

7.2 If Schedule B provides for the Contractor to be paid fees at a daily or hourly rate or for the Contractor to be paid or reimbursed for expenses, the Contractor must maintain time records and books of account, invoices, receipts and vouchers of expenses in support of those payments, in form and content satisfactory to the Province. Unless otherwise specified in this Agreement, the Contractor must retain such documents for a period of not less than seven years after this Agreement ends.

8 AUDIT

8.1 In addition to any other rights of inspection the Province may have under statute or otherwise, the Province may at any reasonable time and on reasonable notice to the Contractor, enter on the Contractor's premises to inspect and, at the Province's discretion, copy any of the Material and the Contractor must permit, and provide reasonable assistance to, the exercise by the Province of the Province's rights under this section.

9 INDEMNITY AND INSURANCE

Indemnity

9.1 To the extent that the Contractor is legally responsible, the Contractor must indemnify and save harmless the Province and the Province's employees and agents from any losses, claims, damages, actions, causes of action, costs and expenses that the Province or any of the Province's employees or agents may sustain, incur, suffer or be put to at any time, either before or after this Agreement ends, including any claim of infringement of third-party intellectual property rights, where the same or any of them are based upon, arise out of or occur, directly or indirectly, by reason of any act or omission by the Contractor or by any of the Contractor's agents, employees, officers, directors or Subcontractors in connection with this Agreement, excepting always liability arising out of the acts or omissions of the Province and the Province's employees and agents.

Insurance

9.2 The Contractor must comply with the Insurance Schedule attached as Schedule D.

Workers compensation

9.3 Without limiting the generality of section 2.9, the Contractor must comply with, and must ensure that any Subcontractors comply with, all applicable occupational health and safety laws in relation to the performance of the Contractor's obligations under this Agreement, including the *Workers Compensation Act* in British Columbia or similar laws in other jurisdictions.

Personal optional protection

9.4 The Contractor must apply for and maintain personal optional protection insurance (consisting of income replacement and medical care coverage) during the Term at the Contractor's expense if:

(a) the Contractor is an individual or a partnership of individuals and does not have the benefit of mandatory workers compensation coverage under the *Workers Compensation Act* or similar laws in other jurisdictions; and

(b) such personal optional protection insurance is available for the Contractor from WorkSafeBC or other sources.

Evidence of coverage

9.5 Within 10 Business Days of being requested to do so by the Province, the Contractor must provide the Province with evidence of the Contractor's compliance with sections 9.3 and 9.4.

10 FORCE MAJEURE

Definitions relating to force majeure

10.1 In this section and sections 10.2 and 10.3:

(a) "Event of Force Majeure" means one the following events:

(i) a natural disaster, fire, flood, storm, epidemic or power failure,

(ii) a war (declared and undeclared), insurrection or act of terrorism or piracy,

(iii) a strike (including illegal work stoppage or slowdown) or lockout, or

(iv) a freight embargo

if the event prevents a party from performing the party's obligations in accordance with this Agreement and is beyond the reasonable control of that party; and

(b) "Affected Party" means a party prevented from performing the party's obligations in accordance with this Agreement by an Event of Force Majeure.

Consequence of Event of Force Majeure

10.2 An Affected Party is not liable to the other party for any failure or delay in the performance of the Affected Party's obligations under this Agreement resulting from an Event of Force Majeure and any time periods for the performance of such obligations are automatically extended for the duration of the Event of Force Majeure provided that the Affected Party complies with the requirements of section 10.3.

Duties of Affected Party

10.3 An Affected Party must promptly notify the other party in writing upon the occurrence of the Event of Force Majeure and make all reasonable efforts to prevent, control or limit the effect of the Event of Force Majeure so as to resume compliance with the Affected Party's obligations under this Agreement as soon as possible.

11 DEFAULT AND TERMINATION

Definitions relating to default and termination

11.1 In this section and sections 11.2 to 11.4:

(a) "Event of Default" means any of the following:

(i) an Insolvency Event,

(ii) the Contractor fails to perform any of the Contractor's obligations under this Agreement, or

(iii) any representation or warranty made by the Contractor in this Agreement is untrue or incorrect; and

(b) "Insolvency Event" means any of the following:

(i) an order is made, a resolution is passed or a petition is filed, for the Contractor's liquidation or winding up,

(ii) the Contractor commits an act of bankruptcy, makes an assignment for the benefit of the Contractor's creditors or otherwise acknowledges the Contractor's insolvency,

(iii) a bankruptcy petition is filed or presented against the Contractor or a proposal under the *Bankruptcy and Insolvency Act* (Canada) is made by the Contractor,

(iv) a compromise or arrangement is proposed in respect of the Contractor under the *Companies' Creditors Arrangement Act* (Canada),

(iv) a receiver or receiver-manager is appointed for any of the Contractor's property, or

(vi) the Contractor ceases, in the Province's reasonable opinion, to carry on business as a going concern.

Province's options on default

11.2 On the happening of an Event of Default, or at any time thereafter, the Province may, at its option, elect to do any one or more of the following:

(a) by written notice to the Contractor, require that the Event of Default be remedied within a time period specified in the notice;

(b) pursue any remedy or take any other action available to it at law or in equity; or

(c) by written notice to the Contractor, terminate this Agreement with immediate effect or on a future date specified in the notice, subject to the expiration of any time period specified under section 11.2(a).

Delay not a waiver

11.3 No failure or delay on the part of the Province to exercise its rights in relation to an Event of Default will constitute a waiver by the Province of such rights.

Province's right to terminate other than for default

11.4 In addition to the Province's right to terminate this Agreement under section 11.2(c) on the happening of an Event of Default, the Province may terminate this Agreement for any reason by giving at least 10 days' written notice of termination to the Contractor.

Payment consequences of termination

11.5 Unless Schedule B otherwise provides, if the Province terminates this Agreement under section 11.4:

(a) the Province must, within 30 days of such termination, pay to the Contractor any unpaid portion of the fees and expenses described in Schedule B which corresponds with the portion of the Services that was completed to the Province's satisfaction before termination of this Agreement; and

(b) the Contractor must, within 30 days of such termination, repay to the Province any paid portion of the fees and expenses described in Schedule B which corresponds with the portion of the Services that the Province has notified the Contractor in writing was not completed to the Province's satisfaction before termination of this Agreement.

Discharge of liability

11.6 The payment by the Province of the amount described in section 11.5(a) discharges the Province from all liability to make payments to the Contractor under this Agreement.

Notice in relation to Events of Default

11.7 If the Contractor becomes aware that an Event of Default has occurred or anticipates that an Event of Default is likely to occur, the Contractor must promptly notify the Province of the particulars of the Event of Default or anticipated Event of Default. A notice under this section as to the occurrence of an Event of Default must also specify the steps the Contractor proposes to take to address, or prevent recurrence of, the Event of Default. A notice under this section as to an anticipated Event of Default must specify the steps the Contractor proposes to take to prevent the occurrence of the anticipated Event of Default.

12 DISPUTE RESOLUTION

Dispute resolution process

12.1 In the event of any dispute between the parties arising out of or in connection with this Agreement, the following dispute resolution process will apply unless the parties otherwise agree in writing:

(a) the parties must initially attempt to resolve the dispute through collaborative negotiation;

(b) if the dispute is not resolved through collaborative negotiation within 15 Business Days of the dispute arising, the parties must then attempt to resolve the dispute through mediation under the rules of the British Columbia Mediator Roster Society; and

(c) if the dispute is not resolved through mediation within 30 Business Days of the commencement of mediation, the dispute must be referred to and finally resolved by arbitration under the *Commercial Arbitration Act*.

Location of arbitration or mediation

12.2 Unless the parties otherwise agree in writing, an arbitration or mediation under section 12.1 will be held in Victoria, British Columbia.

Costs of mediation or arbitration

12.3 Unless the parties otherwise agree in writing or, in the case of an arbitration, the arbitrator otherwise orders, the parties must share equally the costs of a mediation or arbitration under section 12.1 other than those costs relating to the production of expert evidence or representation by counsel.

13 MISCELLANEOUS

Delivery of notices

13.1 Any notice contemplated by this Agreement, to be effective, must be in writing and delivered as follows:

(a) by fax to the addressee's fax number specified on the first page of this Agreement, in which case it will be deemed to be received on the day of transmittal unless transmitted after the normal business hours of the addressee or on a day that is not a Business Day, in which cases it will be deemed to be received on the next following Business Day;

(b) by hand to the addressee's address specified on the first page of this Agreement, in which case it will be deemed to be received on the day of its delivery; or

(c) by prepaid post to the addressee's address specified on the first page of this Agreement, in which case if mailed during any period when normal postal services prevail, it will be deemed to be received on the fifth Business Day after its mailing.

Change of address or fax number

13.2 Either party may from time to time give notice to the other party of a substitute address or fax number, which from the date such notice is given will supersede for purposes of section 13.1 any previous address or fax number specified for the party giving the notice.

Assignment

13.3 The Contractor must not assign any of the Contractor's rights under this Agreement without the Province's prior written consent.

Subcontracting

13.4 The Contractor must not subcontract any of the Contractor's obligations under this Agreement to any person without the Province's prior written consent, excepting persons listed in the attached Schedule C. No subcontract, whether consented to or not, relieves the Contractor from any obligations under this Agreement. The Contractor must ensure that:

(a) any person retained by the Contractor to perform obligations under this Agreement; and

(b) any person retained by a person described in paragraph (a) to perform those obligations

fully complies with this Agreement in performing the subcontracted obligations.

Waiver

13.5 A waiver of any term or breach of this Agreement is effective only if it is in writing and signed by, or on behalf of, the waiving party and is not a waiver of any other term or breach.

Modifications

13.6 No modification of this Agreement is effective unless it is in writing and signed by, or on behalf of, the parties.

Entire agreement

13.7 This Agreement (including any modification of it) constitutes the entire agreement between the parties as to performance of the Services.

Survival of certain provisions

13.8 Sections 2.9, 3.1 to 3.4, 3.7, 3.8, 5.1 to 5.5, 6.1 to 6.4, 7.1, 7.2, 8.1, 9.1, 9.2, 9.5, 10.1 to 10.3, 11.2, 11.3, 11.5, 11.6, 12.1 to 12.3, 13.1, 13.2, 13.8, and 13.10, any accrued but unpaid payment obligations, and any other sections of this Agreement (including schedules) which, by their terms or nature, are intended to survive the completion of the Services or termination of this Agreement, will continue in force indefinitely, even after this Agreement ends.

Schedules

13.9 The schedules to this Agreement (including any appendices or other documents attached to, or incorporated by reference into, those schedules) are part of this Agreement.

Independent contractor

13.10 In relation to the performance of the Contractor's obligations under this Agreement, the Contractor is an independent contractor and not:

(a) an employee or partner of the Province; or

(b) an agent of the Province except as may be expressly provided for in this Agreement.

The Contractor must not act or purport to act contrary to this section.

Personnel not to be employees of Province

13.11 The Contractor must not do anything that would result in personnel hired or used by the Contractor or a Subcontractor in relation to providing the Services being considered employees of the Province.

Key Personnel

13.12 If one or more individuals are specified as "Key Personnel" of the Contractor in Part 4 of Schedule A, the Contractor must cause those individuals to perform the Services on the Contractor's behalf, unless the Province otherwise approves in writing, which approval must not be unreasonably withheld.

Pertinent information

13.13 The Province must make available to the Contractor all information in the Province's possession which the Province considers pertinent to the performance of the Services.

Conflict of interest

13.14 The Contractor must not provide any services to any person in circumstances which, in the Province's reasonable opinion, could give rise to a conflict of interest between the Contractor's duties to that person and the Contractor's duties to the Province under this Agreement.

Time

13.15 Time is of the essence in this Agreement and, without limitation, will remain of the essence after any modification or extension of this Agreement, whether or not expressly restated in the document effecting the modification or extension.

Conflicts among provisions

13.16 Conflicts among provisions of this Agreement will be resolved as follows:

(a) a provision in the body of this Agreement will prevail over any conflicting provision in, attached to or incorporated by reference into a schedule, unless that conflicting provision expressly states otherwise; and

(b) a provision in a schedule will prevail over any conflicting provision in a document attached to or incorporated by reference into a schedule, unless the schedule expressly states otherwise.

Agreement not permit nor fetter

13.17 This Agreement does not operate as a permit, license, approval or other statutory authority which the Contractor may be required to obtain from the Province or any of its agencies in order to provide the Services. Nothing in this Agreement is to be construed as interfering with, or fettering in any manner, the exercise by the Province or its agencies of any statutory, prerogative, executive or legislative power or duty.

Remainder not affected by invalidity

13.18 If any provision of this Agreement or the application of it to any person or circumstance is invalid or unenforceable to any extent, the remainder of this Agreement and the application of such provision to any other person or circumstance will not be affected or impaired and will be valid and enforceable to the extent permitted by law.

Further assurances

13.19 Each party must perform the acts, execute and deliver the writings, and give the assurances as may be reasonably necessary to give full effect to this Agreement.

Additional terms

13.20 Any additional terms set out in the attached Schedule F apply to this Agreement.

Governing law

13.21 This Agreement is governed by, and is to be interpreted and construed in accordance with, the laws applicable in British Columbia.

14 INTERPRETATION

14.1 In this Agreement:

(a) "includes" and "including" are not intended to be limiting;

(b) unless the context otherwise requires, references to sections by number are to sections of this Agreement;

(c) the Contractor and the Province are referred to as "the parties" and each of them as a "party";

(d) "attached" means attached to this Agreement when used in relation to a schedule;

(e) unless otherwise specified, a reference to a statute by name means the statute of British Columbia by that name, as amended or replaced from time to time;

(f) the headings have been inserted for convenience of reference only and are not intended to describe, enlarge or restrict the scope or meaning of this Agreement or any provision of it;

(g) "person" includes an individual, partnership, corporation or legal entity of any nature; and

(h) unless the context otherwise requires, words expressed in the singular include the plural and *vice versa.*

15 EXECUTION AND DELIVERY OF AGREEMENT

15.1 This Agreement may be entered into by a separate copy of this Agreement being executed by, or on behalf of, each party and that executed copy being delivered to the other party by a method provided for in section 13.1 or any other method agreed to by the parties.

The parties have executed this Agreement as follows:

SIGNED on the 14 day of AUGUST, 20 14 by the Contractor (or, if not an individual, on its behalf by its authorized signatory or signatories): x [signature] Signature LEONARD M. MURRAY Print Name PRESIDENT KLOHN CRIPPEN BERGER Print Title	SIGNED on the 14 day of AUGUST, 20 14 on behalf of the Province by its duly authorized representative: x [signature] Signature DIANE HOWE Print Name DEPUTY CHIEF INSPECTOR. Print Title

SCHEDULE "A" - SERVICES

PART 1. TERM:

1. Subject to section 2 of this Part 1, the term of this Agreement commences on August 15, 2014 and ends on March 31, 2017.
2. The contract may be renewed, for up to one (1) additional fiscal year, to March 31, 2018 subject to funding and satisfactory contractor performance.

PART 2. SERVICES:

The Contractor will assist in the Mines Act Investigation at Mount Polley. This will include advising MEM personnel and formulating questions based on their expert knowledge of tailings dam design, construction, operation, maintenance, and surveillance. This may also include independent research, detailed technical review of design or other reports, compilation of data, data analysis, and preparation of or input to a summary report for the investigation.

The Contractor will review report submissions for other tailings dams throughout the province. This work will involve detailed technical reviews of Dam Safety Inspection Reports, Dam Break Inundation Studies, and Emergency Preparedness and Response Plans.

The Contractor may also be asked to evaluate geotechnical safety standards and ground stability monitoring programs at existing or proposed mining operations in B.C. This work will involve detailed technical reviews and/or inspections of major tailings dams, waste rock dumps, open pit slopes, haul roads, and building foundations for compliance with the Mines Act and the Health, Safety and Reclamation Code for Mines in B.C. (Code).

Inputs

The Contractor must maintain professional membership (a P.Eng.) with the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC), and must immediately inform the Ministry if membership lapses for any reason. Work will not be awarded until professional membership is restored. With the exception of drafting and administrative support, work must be completed by the geotechnical engineer identified in the proposal. Work by other engineers will be considered only in special circumstances (i.e. staff changes), and will require prior approval of the Ministry of Energy and Mines. Any substituted personnel must have extensive geotechnical engineering experience in the mining industry, be a professional member of APEGBC, and may be rejected or approved at the sole discretion of the Ministry.

The Contractor must choose the most efficient means of travel taking into account the cost of the means of transport and the time spent travelling.

Work will be awarded on an "As and When" required basis by the Manager, Geotechnical Engineering based on the Ministry's needs, the Contractor's availability, and the nature of the required work.

Outputs and Outcomes

Through the delivery of the Services the Province wishes to realize the following outcomes and, without limiting the obligation of the Contractor to comply with other provisions of this Part, the Contractor must use commercially reasonable efforts to achieve them:

a) Conducting investigations.

The contractor may be required to conduct investigations on behalf of the Ministry relating to fatalities, or serious dangerous occurrences. Investigations would be conducted with or as a designated Mines Inspector and would require attendance at mine sites throughout British Columbia. Emergencies of this nature require travel to the mine site at the earliest opportunity, normally within 24 hours of notification. The contractor must provide notes, conduct interviews, collect and provide photographs, and prepare reports as necessary during the course of the investigation.

b) Reviewing reports.

The contractor may be required to review reports required under the mine permit, the Act, the Code, or a Chief Inspector's Directive, and determine if requirements of the permit, Act, Code, or Directive are being satisfied to a suitable standard of practice.

c) Reviewing proposed and ongoing geotechnical programs.

The contractor's role will be to advise the Chief Inspector of Mines as to the merits and adequacy of existing or proposed geotechnical programs at mining projects throughout British Columbia.

d) Conducting Mine Inspections.

The Contractor may be required to conduct comprehensive field inspections of mine sites throughout British Columbia to evaluate compliance with permit conditions, the Mines Act, and the Code. If required, the Contractor will be designated as a Mines Inspector by the Chief Inspector in order to perform this role. The Contractor will discuss the results of the inspection with mine management and suggest remedial actions where necessary to correct any identified deficiencies.

e) Preparing detailed inspection reports.

The contractor will be required to prepare a detailed inspection report following any mine inspection. The report will contain observations made during the inspection, and any orders for remedial work. A copy of the inspection report with representative photographs is to be submitted to the Chief Inspector (see additional details under "Reporting requirements" below).

f) Reviewing applications for Environmental Assessments and Mines Act permits.

The contractor may be required to review permit and environmental assessment applications and prepare permit conditions for geotechnical aspects of proposed structures to ensure adequate standards for mine safety and environmental protection are maintained.

g) Attending meetings.

The contractor may be required to attend meetings on behalf of the Ministry and report back to the Manager of Geotechnical Engineering. Such meetings may include Regional Mine Development Review Committee meetings and Environmental Assessment meetings.

The parties acknowledge that the Contractor does not warrant that these outcomes will be achieved.

Reporting requirements

Input to the Mt. Polley Investigation Report will be provided in a timely manner on an as-needed basis.

Review comments for technical reviews of report submissions expected under a pending Chief Inspector's Directive will be provided in a timely manner and on an as-needed basis.

In accordance with Section 15 (4) of the Mines Act, inspection reports must be completed by the Contractor within 7 days of the inspection. The report must:

(a) list the workplaces inspected,

(b) note any contraventions of a previous order,

(c) note any contraventions of the Act, the regulations, the code or a permit, and

(d) order remedial action, specify the results to be obtained by the remedial action, and specify time limits for compliance with the order or any provision of the Act, the regulations, the code or a permit.

Reports and technical memorandums must be provided in electronic format (pdf) and digitally sealed as appropriate. Hard copies must be provided upon request.

Brief letter reports or memorandums may be required from time to time on matters not pertaining to inspections (i.e. report reviews, follow-up on EAO or MDRC meetings, recommended permit conditions, etc.). In most cases, the format of these letters or memorandums will be informal, but will need to be consistent with the Mines Act, the Code, and with generally accepted engineering practice in British Columbia. Mutually agreeable deadlines for these letters, memorandums, or reports will be determined on a case by case basis as needed to meet the project requirements. Unless otherwise specified or agreed upon, these types of reports will be due within two weeks of the date that the request for work was made.

PART 3. KEY PERSONNEL:

1. The Key Personnel for the Contractor are as follows:

   Harvey McLeod, Technical Lead, P. Eng., P. Geo.

2. The Key Personnel for the Province are as follows:

   George Warnock, Manager, Geotechnical Engineering

SCHEDULE "B" – FEES AND EXPENSES

1. MAXIMUM AMOUNT PAYABLE:

Despite sections 2 and 3 of this Schedule, **$150,000.00** is the maximum amount which the Province is obliged to pay to the Contractor for fees and expenses under this Agreement (exclusive of any applicable taxes).

2. FEES:

Fees will be paid at the following hourly rates for those hours during the Term when the Contractor provides the Services.

Harvey McLeod	s.22 per hour
Admin Support	$100.00 per hour

3. EXPENSES:

The following expenses will be paid:

a. travel, accommodation and meal expenses as per the attached **"Travel Instructions and Allowances"** form.

b. the Contractor's actual long distance telephone, fax, postage and other identifiable communication expenses.

4. STATEMENTS OF ACCOUNT:

In order to obtain payment under this Agreement, the Contractor must deliver to the Province an invoice or statement of account in a form satisfactory to the Province containing:

(a) the Contractor's legal name and address;

(b) the date of the statement, and the Billing Period to which the statement pertains;

(c) the Contractor's calculation of all fees and expenses claimed under this Agreement, including a timesheet showing hours and dates for the services that have been completed;

(d) a chronological listing, in reasonable detail, of any expenses claimed by the Contractor with receipts attached;

(e) the Contractor's calculation of any applicable taxes payable by the Province in relation to the Services for the Billing Period;

(f) the project title or description

(g) an invoice number for identification; and

(h) any other billing information reasonably requested by the Province.

5. PAYMENTS DUE:

Within 30 days of the Province's receipt of the Contractor's written statement of account delivered in accordance with this Schedule, the Province must pay the Contractor the fees and expenses (plus all applicable taxes) claimed in the statement if they are in accordance with this Schedule. Statements of account or contract invoices offering an early payment discount may be paid by the Province as required to obtain the discount.

Schedule C – Approved Sub-Contractor(s)

Not applicable

Schedule "D" – Insurance

1. The Contractor must, without limiting the Contractor's obligations or liabilities and at the Contractor's own expense, purchase and maintain throughout the Term the following insurances with insurers licensed in Canada in forms and amounts acceptable to the Province:

   (a) Commercial General Liability in an amount not less than $2,000,000.00 inclusive per occurrence against bodily injury, personal injury and property damage and including liability assumed under this Agreement and this insurance must

      (i) include the Province as an additional insured,

      (ii) be endorsed to provide the Province with 30 days advance written notice of cancellation or material change, and

      (iii) include a cross liability clause.

   (b) Professional Liability, where applicable, in an amount not less than $1,000,000, insuring the Contractor's liability resulting from errors and omissions in the performance of professional services under this agreement.

2. All insurance described in section 1 of this Schedule must:

   (a) be primary; and

   (b) not require the sharing of any loss by any insurer of the Province.

3. The Contractor must provide the Province with evidence of all required insurance as follows:

   (a) within 10 Business Days of commencement of the Services, the Contractor must provide to the Province evidence of all required insurance in the form of a completed Province of British Columbia Certificate of Insurance;

(b) if any required insurance policy expires before the end of the Term, the Contractor must provide to the Province within 10 Business Days of the policy's expiration, evidence of a new or renewal policy meeting the requirements of the expired insurance in the form of a completed Province of British Columbia Certificate of Insurance; and

(c) despite paragraph (a) or (b) above, if requested by the Province at any time, the Contractor must provide to the Province certified copies of the required insurance policies.

4. The Contractor must obtain, maintain and pay for any additional insurance which the Contractor is required by law to carry, or which the Contractor considers necessary to cover risks not otherwise covered by insurance specified in this Schedule in the Contractor's sole discretion.

Schedule E – Privacy Protection Schedule

Not applicable.

Schedule F – Additional Terms

Not applicable.

Schedule G – Security Schedule

Not applicable

BRITISH COLUMBIA
The Best Place on Earth

Modification Agreement # 1

THIS MODIFICATION AGREEMENT dated for reference October 15, 2014.

BETWEEN:

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF BRITISH COLUMBIA, represented by

The Ministry of Energy and Mines
Mines and Mineral Resources Division
P.O. Box 9320, Stn. Prov. Govt.
Victoria, B.C. V8W 9N3

needs approval form

(the "Province")

AND:

Klohn Crippen Berger Ltd.
500 – 2955 Virtual Way
Vancouver, B.C.
V5M 4X6

(the "Contractor")

BACKGROUND

A. The parties entered into an agreement dated for reference August 15, 2014 (the "Agreement").

B. The parties wish to amend the Agreement as follows:

1. Schedule "A", Services, Part 3 – Key Personnel, additional staff names (see attached)
2. Schedule "B", Fees and Expenses, Part 1 – Maximum Amount Payable (see attached)
3. Schedule "B", Fees and Expenses, Part 2 – Fees, additional staff rates (see attached)
4. Schedule "F", Additional Terms – (see attached)
5. That in all other respects, the terms and conditions of the Agreement are hereby ratified and confirmed.

SIGNED AND DELIVERED On the 23 day of OCTOBER , 2014 on behalf of the Province by its duly authorized representative	**SIGNED AND DELIVERED** On the 21 day of OCTOBER , 2014 on behalf of the Contractor by its duly authorized representative
Signature:	Signature:
Print name: AL HOFFMAN	Print name: Robert W. Chambers VICE PRESIDENT MINING ENVIRONMENT GROUP

CHIEF INSPECTOR OF MINES

Schedule "A" – Services

Part 3 – Key Personnel

1. The Key Personnel for the Contractor are as follows:

Harvey McLeod	Project Manager
Howard Plewes	Senior Reviewer
	Senior Reviewer
	Senior Reviewer
	Senior Engineer
	Senior Engineer
	Senior Engineer
	Project Coordinator and Field Engineer
	Project and Field Engineer
	Field Engineer
	Project Engineer
s.22	Project Engineer
	Laboratory Manager
	GIS Specialist
	Lead Draftsman
	Health and Safety Coordinator
	Admin Support
	Admin Support
	Admin Support
	Admin Support

Schedule "B" – Fees and Expenses

1. **Maximum Amount Payable**

   The total amount payable will be increased by $150,000.00 from $150,000.00 to $300,000.00

2. **Fees:**

   Fees will be paid at the following hourly rates for those hours during the Term when the Contractor provides the Services.

Harvey McLeod		per hour
Howard Plewes		per hour
		per hour
		per hour
		per hour
		per hour
		per hour
		per hour
		per hour
		per hour
	s.22	per hour
s.22		per hour
		per hour
		per hour
		per hour
		per hour
		per hour
		per hour
		per hour
		per hour

Schedule "F" – Additional Terms

1. In addition to the Contractor's obligation in section 5.3 (Confidentiality), the Contractor must keep strictly confidential any legal advice the Contractor receives on behalf of the Province under this Agreement other than to communicate it to authorized officials of the Province, and must not do anything that could result in a waiver or breach of the solicitor-client privilege associated with that advice.

2. Despite section 13.10 (Independent Contractor), the Contractor is an agent of the Province for the limited purpose of providing instructions on behalf of the Province to, and receiving legal advice on behalf of the Province from, the Province's legal counsel.