PY

ECHO BAY MINES LTD.

2000 GEOTECHNICAL INSPECTION OF PERIMETER TAILINGS DAMS

LUPIN MINE
NUNAVUT

Final

PROJECT NO.: 0256-001-01
DATE: OCTOBER 3, 2000

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Project No. 0256-001
October 3, 2000

Mr. Dave Hohnstein
Echo Bay Mines Ltd.
Lupin Operation
Bag No. 1
Nisku, Alberta
T0C 2G0

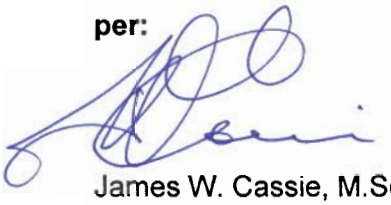
Re: Annual Geotechnical Inspection of Perimeter Tailings Dams
Lupin Mine, Nunavut

Dear Dave:

Please find attached our final report on the annual geotechnical inspection of the perimeter tailings dams at Lupin Mine, which was carried out on August 3rd, 2000.

Thank you to you and your staff for the hospitality shown during my site visit. If there are any questions regarding this report, please contact the undersigned at your convenience.

Yours truly,
BGC ENGINEERING INC.
per:



James W. Cassie, M.Sc., P.Eng.
Senior Geotechnical Engineer
(direct line 403/250-5185 ext. 103)

encl.
JWC/sf

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LIMITATIONS OF REPORT

This report was prepared by BGC Engineering Inc. (BGC) for Echo Bay Mines Ltd. The material in it reflects the judgment of BGC staff in light of the information available to BGC at the time of report preparation. Any use which a Third Party makes of this report, or any reliance on decisions to be based on it are the responsibility of such Third Parties. BGC Engineering Inc. accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this report.

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1.0 INTRODUCTION

Lupin Mine, owned and operated by Echo Bay Mines Ltd., is located north-east of Yellowknife on Contwoyto Lake, as illustrated on Figure 1, at approximately 65°46'N and 111°14'W. Echo Bay's Nunavut Water Board's License (NWB1LUP0008) requires that the tailings containment area (TCA) be inspected annually by a qualified Geotechnical Engineer. As such, Mr. D. Hohnstein, Environmental Co-ordinator for Lupin Mine, requested that BGC Engineering Inc. (BGC) conduct an inspection of the tailings facility perimeter embankments. A proposal to conduct this inspection, dated May 24, 2000 was submitted and Requisition No. L51425 was issued to BGC on July 21, 2000.

This inspection and the preparation of a report are required in partial satisfaction of the Lupin Mine Water License obligations. Other conditions in the Water License that apply to the annual inspection are as follows:

- a freeboard limit of 1.0 m should be maintained at all times;
- seepage from the TCA be minimised;
- any seepage that occurs should be collected and returned immediately;
- any erosion of the facilities should be addressed immediately; and
- the inspection report should be forwarded to the Water Board within 60 days of the inspection date.

The objectives of the inspection are to visually assess the performance of the structures from a geotechnical perspective and to bring deficiencies and points of concern to Echo Bay's attention.

Previous annual inspection reports by Golder Associates Ltd. should be reviewed for observations and recommendations prior to 2000.

2.0 TAILINGS CONTAINMENT AREA OPERATION DESCRIPTION

As illustrated on Figure 2, tailings storage at Lupin Mine utilises a number of low embankments which are arranged to provide five cells for solids accumulation, some supernatant water storage within these cells, supernatant runoff storage accumulation (Pond 1), and an adjacent area (Pond 2) for transport water conditioning and staged release. In that none of the tailings water is recycled to the mill, aged water is typically transferred from Pond 2 to the environment once a year (usually beginning July 15). Following this discharge, tailings water is transferred from Pond 1 to Pond 2 for subsequent ageing, during the transfer water treatment chemicals are added, if required.

Lupin Mine went into care and maintenance mode in January, 1998 and remained at that status until December, 1999 when a decision was made to resume operations. Mill production resumed in April, 2000 with Cell 3 used for tailings placement. The following list details the water management operations for the TCA:

- Transfer of tailings water from Pond 1 to Pond 2, via the siphons over J-Dam, began on Aug. 1, 2000. This transfer operation was completed on Aug. 30, 2000 with approximately 524,060 m^3 of water conveyed.

- Discharging of aged tailings water from Pond 2 over Dam 1A began on July 15, 2000 and ended on September 2, 2000; approximately 2,701,360 m^3 were discharged.

Table 1 summarises the water level elevations within the TCA, as provided by Echo Bay:

Table 1 Summary of Summer Water Levels Within TCA

Location	July 16 2000 Water Elevation (m)
Pond 1	484.34
Pond 2	483.02
Cell 4	486.55
Cell 5	empty

Table 2 provides a summary of monthly climatic values that were recorded over the previous 13 months at the site weather station:

Table 2 Summary of Lupin Climatic Values Over Past 13 Months

Date	Mean Monthly Temperature (°C)	Total Monthly Precipitation (mm)
Jul-'99	8.3	62.4
Aug-'99	8.7	57.2
Sep-'99	2.2	84.2
Oct-'99	-8.8	23.8
Nov-'99	-16.8	13.4
Dec-'99	-24.8	30.8
Jan-'00	-26.2	3.8
Feb-'00	-24.9	5.4
Mar-'00	-22.3	8.0
Apr-'00	-15.5	12.4
May-'00	-3.9	18.6
Jun-'00	7.3	4.6
Jul-'00	15.0	27.2

In addition to the monthly data provided in Table 2, Figures 3 and 4 provide a graphical representation of the 1999 and 2000 (to-date) monthly data, versus the long term mean values, which have been recorded since 1982. Figure 3 indicates that the 1999 temperature values were approximately typical, except for the month of July, which was dramatically cooler. July 2000 was significantly warmer than the average value for the month. Figure 4 illustrates that 1999 was wetter than normal, except for the months of June and August, which were drier. Values for 2000 appear to be drier than average values.

3.0 INSPECTION CONDITIONS AND APPROACH

3.1 General

The inspection was conducted by Mr. Jim Cassie, P. Eng., on August 3, 2000, commencing at about 09:00 and concluding later the same day. The temperature during the inspection was approximately 14°C under overcast, but generally clear visual condition. In the two weeks preceding the inspection (July 20 to Aug. 3), approximately 19 mm of rain fell.

At the time of the inspection, tailings were being deposited on the southern side of Cell 3. Decant siphon pipes at J-dam just started to convey Pond 1 water into Pond 2.

Each of the embankments was inspected on foot. Pertinent observations concerning both physical condition and seepage were recorded by photograph and notes were taken by Dictaphone. In general, the crest and upstream slope of a given embankment were inspected first, followed by inspection of the downstream slope by walking along the toe of the slope. The transcribed Dictaphone notes and photographs constitute the field record (the Field Memo which remains in the office of BGC) and provide the basis for this formal report. Before leaving the site, a summary memo regarding tailings area maintenance items was prepared and reviewed with staff from Echo Bay in a brief meeting; this memo is attached in Appendix 1

3.2 Instrumentation

At the current time, only four thermistor strings are monitored in the dams and all are located in Dam #4. Table 3 outlines the location of these thermistors.

Table 3 Thermistor Cable Locations in Dam #4

Cable No.	Northing (m)	Easting (m)	Elevation (m)
D4-1 (east end)	6233.68	6399.85	489.74
D4-2	6281.75	6230.27	489.05
D4-3	6255.57	5812.19	489.38
D4-4 (west end)	6230.39	5734.57	489.39

These cables were installed in October 1995 by Seacor Environmental Engineering Inc. Data from August, 1999 until August, 2000 was provided by Echo Bay, which is attached in Appendix 2.

4.0 FINDINGS AND CONCLUSIONS

The results of the inspection of each of the structures are presented on the following pages in standardised format, complemented by a selection of site photographs. Refer to Figure 2 for the location of each structure. Specific maintenance requirements are documented on each of the individual sheets and again in the summary memo provided in Appendix 1.

In general, the inspection confirms that the perimeter embankments are in good condition. Precipitation events and the associated run-off in both 1997 and 1998 resulted in numerous erosional gullies on the unprotected downstream slopes on a majority of the perimeter dams; these gullies were previously repaired. Minor longitudinal cracking is visible on some of the dams, but no concerns are expressed at the current time.

The water ponded at the downstream toe of Dam 4 was pumped out during site inspection tour, as it was in 1999. Seepage water appeared to be coming into the bermed off area from the lake on the downstream side of the berm, rather than from the upstream direction. Hence, while Dam 4 is functioning without apparent seepage, any plan for increasing the pond water level should include a plan for beach placement upstream of this area in view of its contribution to potential seepage mitigation.

Storage of pond water against the various Pond 2 retention dams may cause detrimental effects if foundation temperatures beneath these dams begin to increase significantly. At the current time, none of the thermistors in these dams are operational. Hence, it is recommended that some thermistors be installed in the most critical dams (#1A and #2) in order to determine if foundation warming is apparent. In addition, visual inspection of the downstream toe of these Pond 2 dams should be carried out to determine if any seepage is being initiated. Should the Pond 2 level rise such that water is impounded by Dams #1B and #1C, then visual inspection of the toe of these dams should also be initiated.

DAM 1A

LOCATION:	West side of Pond 2.
FUNCTION:	Major perimeter closure for water retention; carries siphon pipes for water decant system.
LENGTH:	+/- 250 m
MAX HEIGHT:	+/- 8 m above d/s tundra.
AS-BUILT ELEVATION:	486.1 m (486.27 m by GPS kinematic survey)
CREST WIDTH AND CONDITION:	7 to 8 m; surfaced with esker material, but not travelled because of the siphons. No significant cracking evident; condition is good.
RIPRAP:	Run of Mine rockfill; broadly graded; good condition.
BACKSLOPE:	Approx. 1.5H:1V; variably armoured with cobbles and boulders; some runoff erosion rills present; no evidence of cracking.
TOE BERM:	Minor longitudinal cracking and slumping still occurring at oversteepended toe.
SEEPAGE:	No evidence of seepage.
MAINTENANCE RECOMMENDATIONS:	Cracks on the downstream toe need to be graded over. Downstream toe side slope needs to be flattened to prevent reoccurrence. Installation of thermistor string would be useful to determine if foundation warming is occurring.
CONCLUSIONS:	The dam is in good condition with no evidence of seepage passing through or beneath the dam. Need to monitor downstream toe as Pond 2 level increases.

DAM 1B

LOCATION:	West side of Pond 2.
FUNCTION:	Minor perimeter closure for water retention; pond level is below dam base elevation thus currently functioning only as a road embankment.
LENGTH:	+/- 200 m
MAX HEIGHT:	+/- 2.5 m above d/s tundra.
AS-BUILT ELEVATION:	485.4 m (485.83 m by GPS kinematic survey)
CREST WIDTH AND CONDITION:	5 to 6 m wide; surfaced with esker material so that this dam may also function as a roadway for access around the perimeter of the area. Small sinkhole observed on the crest. Crest condition is good, no cracking evident but vehicle traffic rutting is apparent.
RIPRAP:	Run of Mine rockfill; variable sizes; undulating; disturbed in areas but in good condition overall.
BACKSLOPE:	Approx. 1.5H:1V with some runoff erosion rills and a toe-of-slope roadway berm. No cracking observed.
SEEPAGE:	No comment possible; no water head being retained by the structure.
MAINTENANCE RECOMMENDATIONS:	*Grade crest to remove slight settlement trough and small sink hole.*
CONCLUSIONS:	The structure is in good condition; it should be monitored for seepage if Pond 2 rises sufficiently to place a water head against the dam.

DAM 1C

LOCATION:	West side of Pond 2.
FUNCTION:	Minor perimeter closure for water retention: currently retaining no water other than small puddles. Currently functioning only as a road embankment.
LENGTH:	+/- 230 m
MAX HEIGHT:	+/- 2.0 m above d/s tundra.
AS-BUILT ELEVATION:	485.3 m (485.88 m by GPS kinematic survey)
CREST WIDTH AND CONDITION:	+/- 9 m wide; surfaced with esker material, so that this dam may also function as a roadway, although the downstream toe roadway appears more commonly used. Crest condition is good; slight settlement trough formed at the contact with the upstream riprap.
RIPRAP:	Run of Mine rockfill; overall condition satisfactory.
BACKSLOPE:	Approx. 3H:1V, smooth slope; Two minor sinkholes noted on the backslope and on the access road berm. Minor longitudinal cracking and settlement trough noted along the toe of the access road berm. One transverse crack noted 20 m south of the north abutment.
SEEPAGE:	No comment possible; no water currently being retained by the structure.
MAINTENANCE RECOMMENDATIONS:	Grade over minor cracking and small settlement holes on both the backslope and the downstream side of the access road berm.
CONCLUSIONS:	The structure is in good condition; it should be monitored for seepage if Pond 2 rises sufficiently to place a water head against the dam.

DAM 2

LOCATION:	North end of Pond 2.
FUNCTION:	Major perimeter closure for water retention; natural pond downstream of the dam.
LENGTH:	+/- 350 m
MAX HEIGHT:	+/- 5.5 m above d/s tundra.
AS-BUILT ELEVATION:	485.6 m (486.30 m by GPS kinematic survey)
CREST WIDTH AND CONDITION:	Approx. 6 m; surfaced with esker material and used as the primary traffic route. There is a toe-of-slope berm roadway along the north-east portion of the dam. Crest condition is good; no cracking is evident. Small settlement trough formed on the crest near south abutment.
RIPRAP:	Run of Mine rock forms convex-upward, gently-sloped upstream face; slight erosional scarp being formed at higher water level; good condition.
BACKSLOPE:	Approx. 1.5H:1V with some runoff erosion rills. Minor longitudinal cracking noted at the toe of the access road berm
SEEPAGE:	One small seepage discharge point again noted at the toe of the north-east abutment. In 1998, a survey shot of seepage discharge point indicated that the point was higher in elevation than the upstream pond level. Likely that seepage occurs from surface water build-up within pore spaces. Monitor seepage discharge for any increase in quantity and presence of sediment within the water.
MAINTENANCE RECOMMENDATIONS:	Grade toe berm to cover over minor toe cracking. Continue to monitor north abutment toe for seepage quantity. Installation of thermistor string will be useful to determine if foundation warming is occurring.
CONCLUSIONS:	The dam is in satisfactory condition.

DAM 3

LOCATION:	East end of now-covered tailings storage area, east of Cells 1 and 2.
FUNCTION:	Minor perimeter closure for tailings retention; Boomerang Lake downstream of the dam. The dam retains tailings covered with an esker material cap, recently (1995) thickened by one meter using esker material.
LENGTH:	+/- 600 m
MAX HEIGHT:	+/- 2.5 m above d/s tundra.
AS-BUILT ELEVATION:	488.4 m (no new GPS elevation determined)
CREST WIDTH AND CONDITION:	Approx. 8 m; surfaced with esker material. Previously used as a heavy haul traffic route from the esker borrow area. Crest condition is good and no cracking is evident. Two erosional gullies formed in the southern portion of the top of the dam. Not an active tailings pond.
RIPRAP:	Inside slope buried with tailings; most of backslope length is riprapped; grade of 3 to 5H:1V for most of the slope; where northwest end toe meets Boomerang Lake edge, the eroded slope is excessively steep.
BACKSLOPE:	Variable in inclination; locally meets the shoreline of Boomerang Lake. Old cracking indicated along portions of the dam, probably indicative of over-steepening.
SEEPAGE:	One small seepage point noted within northwest portion of the dam, adjacent to Boomerang Lake.
MAINTENANCE RECOMMENDATIONS:	Either fill and grade over or armour with cobbles two surface erosional gullies on top of the cover sand. Flatten the backslope along Boomerang Lake for the northwest part of the dam. Review source of seepage water at the toe.
CONCLUSIONS:	The dam is in good condition.

DAM 4

LOCATION:	South end of Cell 4 for K Dam sub-pond.
FUNCTION:	Perimeter closure for water retention at present; natural pond downstream of the dam at its west end.
LENGTH:	+/- 900 m
MAX HEIGHT:	+/- 6 m above u/s native ground elevation.
AS-BUILT ELEVATION:	489.2 m (489.59 m by GPS kinematic survey)
CREST WIDTH AND CONDITION:	Slight settlement trough formed at the contact of the crest and the upstream rip rap material. Approximately 12 m wide crest width in good condition, no cracks found.
RIPRAP:	Run of Mine rockfill in generally good condition on upstream slope. Some construction machinery/dozer activity on the upstream, near the bend in the dam, has disturbed the overall slope of the rip rap.
BACKSLOPE:	Esker sand; slope steeper in upper portion and flattens in the lower portion, approximately 2H:1V. Geogrid exposed in places. Some minor cracks parallel the contours in the lower portion of the slope (seen previously and not of concern), adjacent to the steep toe. Cracking still apparent in the regraded area located downstream of the backslope.
SEEPAGE:	No apparent seepage but the head of water across the dam is relatively low. Temporary cofferdams, which were on the downstream side of dam, have been graded along the toe; the west end cofferdam remains. After pumping of the toe berm pond was undertaken, seepage into pond was coming from downstream lake side, not from the upstream side of the dam.
INSTRUMENTATION:	Based on the data in Appendix 2, the depth of the active layer is approximately 3 m in the dam section. At the base of the embankment (approximately 6 m depth), the in-situ temperature ranges from –2.5° to –6.5°. At a depth of 12 m below the dam crest, the in-situ temperature ranges from –3.5° to –4.5°.

MAINTENANCE RECOMMENDATIONS: Grade crest to remove traffic ruts. Repair disturbed rip rap on the upstream side and investigate if underlying liner has been disturbed as well.

CONCLUSIONS: The dam is in good condition and is functioning without apparent seepage. Any plan for significantly increasing the pond water level should include considerations for beach placement in view of its contribution to potential seepage mitigation.

DAM 5

LOCATION:	Southeast corner of Cell 3, just northwest of Dam 4.
FUNCTION:	Minor perimeter closure intended for future tails and water retention; currently functioning as a road embankment.
LENGTH:	+/- 250 m
MAX HEIGHT:	+/- 1.5 m above d/s tundra.
AS-BUILT ELEVATION:	490.8 m (491.54 m by GPS kinematic survey)
CREST WIDTH AND CONDITION:	Approximately 8 meters wide and esker surfaced so that the dam may also function as roadway. Crest is in good condition with no evidence of cracking.
RIPRAP:	Angular rockfill, maximum particle size from 20 to 30 cm, has been placed on the upstream face. Approximate slope of 3H:1V and in good condition.
BACKSLOPE:	About 1.5 to 2H:1V with till and esker sand.
SEEPAGE:	No comment possible; no water head being retained by the structure.
MAINTENANCE RECOMMENDATIONS:	None required.
CONCLUSIONS:	The dam is in good condition and should be inspected for seepage when pond levels place a water head against it.

DAM 6

LOCATION:	West side of Cell 3 retaining tailings placed behind K-dam.
FUNCTION:	Minor perimeter closure. Retaining some tailings beach and local ponded water.
LENGTH:	+/- 300 m
MAX HEIGHT:	+/- 2.5 m above d/s tundra.
AS-BUILT ELEVATION:	489.5 m (490.25 m by GPS kinematic survey)
CREST WIDTH AND CONDITION:	Approximately 10 m wide and esker surfaced so that dam may also function as a roadway. Crest in good condition, no cracking evident. Slight settlement trough and one minor sinkhole formed at the contact with the upstream shell.
RIPRAP:	Run of mine rockfill in good condition on upstream slope; slightly steeper in southern portion.
BACKSLOPE:	About 2H:1V with till and esker sand; no evidence of previously indicated cracking.
SEEPAGE:	Dam retaining damp tailings beach but no free water; no seepage observed.
MAINTENANCE RECOMMENDATIONS:	None recommended.
CONCLUSIONS:	The dam is in good condition.

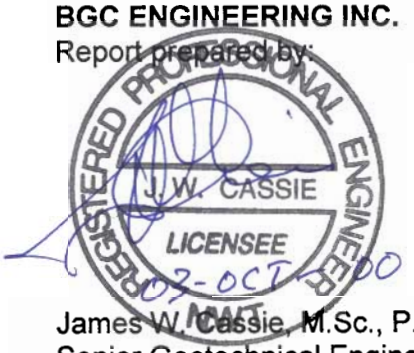
5.0 CLOSURE

We trust the above meets your present requirements and we thank Echo Bay Mines Ltd., for the opportunity to be of service at Lupin Mine. If you have any questions or require additional information, please contact the undersigned.

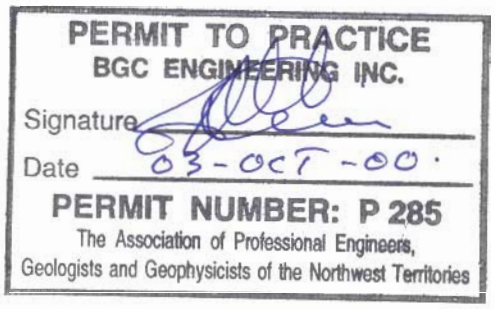
Respectfully submitted,

BGC ENGINEERING INC.

Report prepared by:



James W. Cassie, M.Sc., P.Eng.
Senior Geotechnical Engineer



APPENDIX 1

SITE INSPECTION MEMO

BGC ENGINEERING INC.

AN APPLIED EARTH SCIENCES COMPANY

#1170 - 840 7th Avenue S.W., Calgary, Alberta, Canada. T2P 3G2
Phone (403) 250-5185 Fax (403) 250-5330

FACSIMILE TRANSMISSION

To:	**Echo Bay Mines**	**Fax No.:**	**n/a**
Attention:	**Dave Hohnstein**	**CC:**	**none**
From:	**Jim Cassie**	**Date:**	**August 4, 2000**
Subject:	**Annual Inspection of Tailings Dams – Maintenance Requirements**		
No. of Pages (including this page): 3 Pages		**Project No:**	**0256-001-01**

The following provides some comments on required maintenance, following my inspection of the tailings dams on the August 3rd, 2000. This work should be undertaken in the near future to prevent potential further damage from occurring.

External Dams

Dam 1A

- Some longitudinal cracking and slumping is still occurring adjacent to the erosional gullies previously formed adjacent to the siphon pipes at the downstream access road berm. Cracks need to be graded over and the downstream side slope should be flattened to prevent further slumping from occurring.

Dam 1B

- Crest to be graded to remove small settlement trough.

Dam 1C

- Grade over the minor cracking and small settlement holes on the downstream access road berm and backslope.

Dam 2

- Very small amount (<1 l/min) of seepage observed again at the toe of the north abutment. Surveying of the seepage point elevation last year indicated it was higher than the upstream pond level. Continue to monitor seepage for any increases in quantity and to observe if seepage water contains any sediment.

- Grading required on toe berm access road to cover over minor cracking situated on the downstream side.

Dam 3

- Three erosional gullies have been formed near the toe, south of the bend in the dam. These should be backfilled and graded to prevent surface runoff concentration.
- Small swale situated near the southern portion of Dam 3 should be armored properly, if required for discharge of surface runoff water.
- Flatten toe slope or apply some riprap to the downstream slope along the northwestern portion of the dam (where Dam 3 contacts Boomerang Lake), where tension cracks are currently located.

Dam 4

- Dozer /construction activity on the upstream side has disturbed the rip rap placement, exposing the underlying sand at some locations. In addition, some rutting in the crest has occurred, near the contact with the upstream shell material. Consideration should be given to regrading the materials to an overall consistent slope to prevent the concentration of surface runoff.

Dam 5

- No maintenance suggested.

Dam 6

- No maintenance suggested.

Internal Dams

J-Dam

- High water level has resulted in erosion of the upstream face of the dam. The vertical scarp created is quite extensive and consideration should be given to regrading or protecting these eroded faces.
- Two to three tension cracks located near the upstream side of the crest, just under the location of the pipeline at its southwest abutment, should be backfilled and graded over to prevent the infiltration of surface runoff.

K-Dam

- Two small erosional gullies exist on the upstream slope, but the liner is only exposed at one location. These gullies should be backfilled over to prevent further erosion.
- Significant erosional scarps have formed at the toe of the downstream slope, due to the previous and current water levels of Pond #2. Regrading of this eroded toe and/or placement of protective rip rap should be undertaken to prevent further erosion leading to progressive slumping of the face.

Dam 3D

- Rockfill material placed on the southwest side of Dam 3D has undergone some deformation as manifested by longitudinal cracks in the rockfill. Regrade and/or monitor situation for further settlement.

M Dam

- Sand placement and construction activity currently on-going. Documentation in terms of as-built survey information and material grain size and moisture content information should be kept for record purposes.

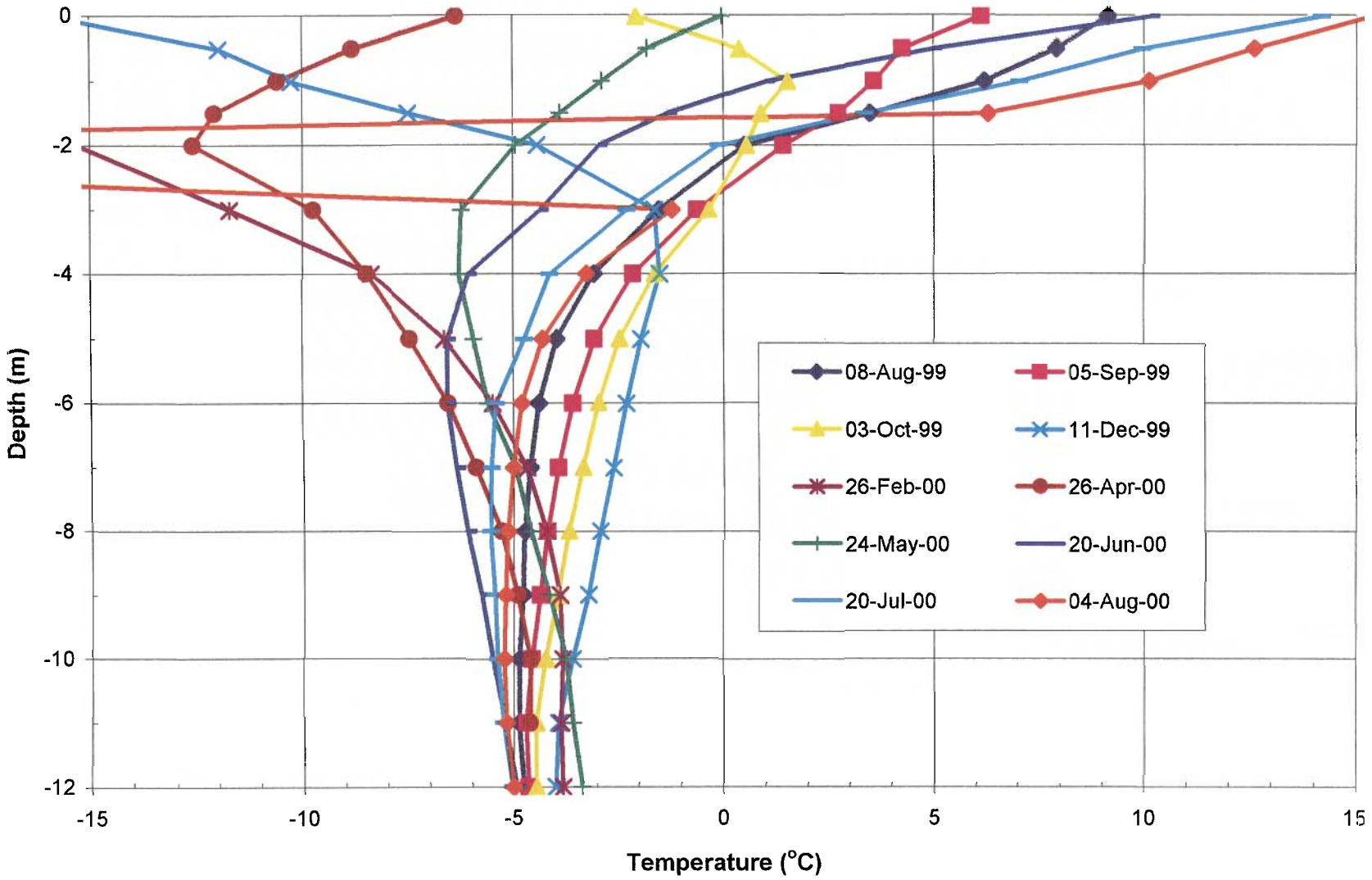
Respectfully submitted,
BGC Engineering Inc.

Jim Cassie, M.Sc., P.Eng.
Senior Geotechnical Engineer

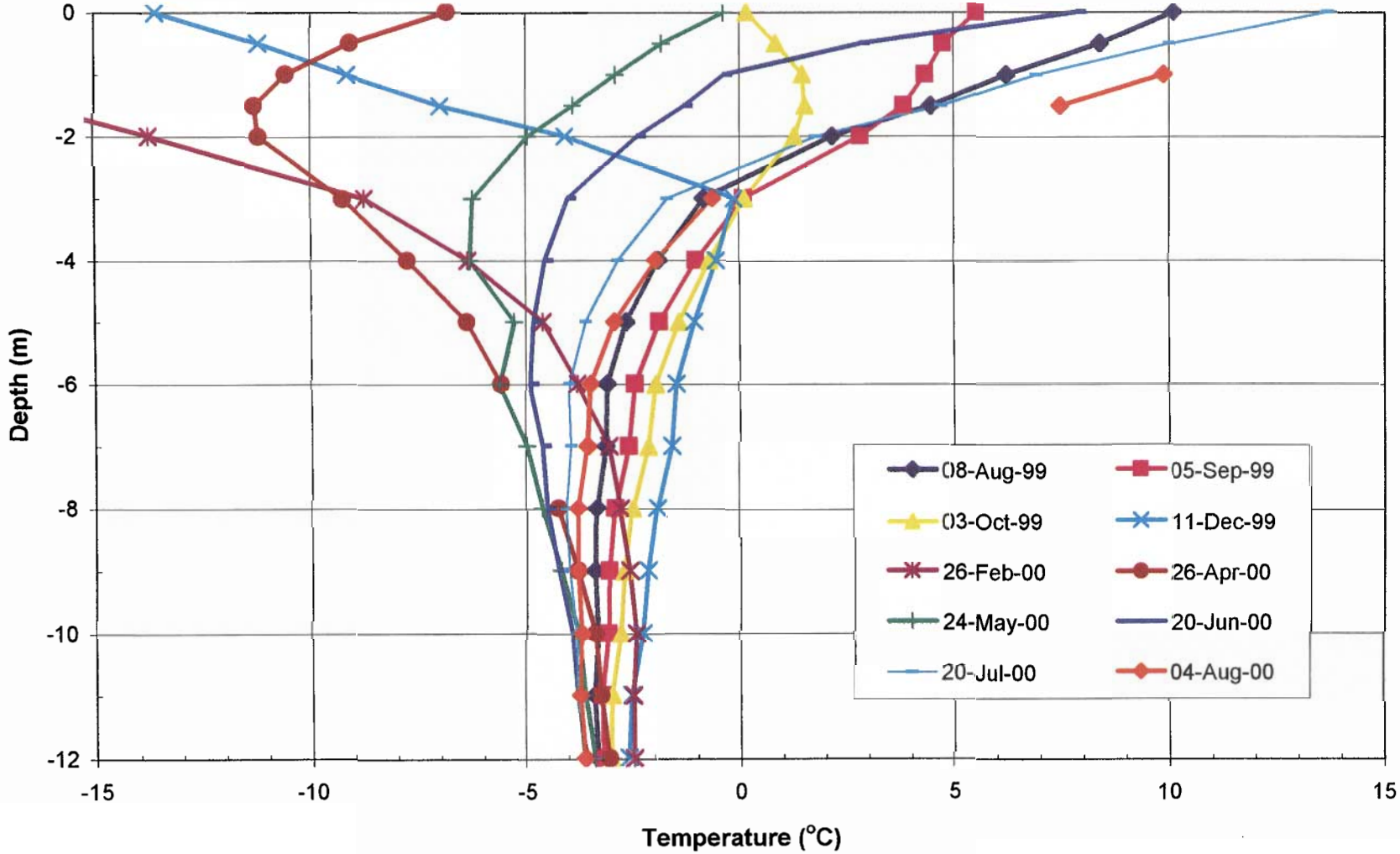
APPENDIX 2

DAM #4 THERMISTORS

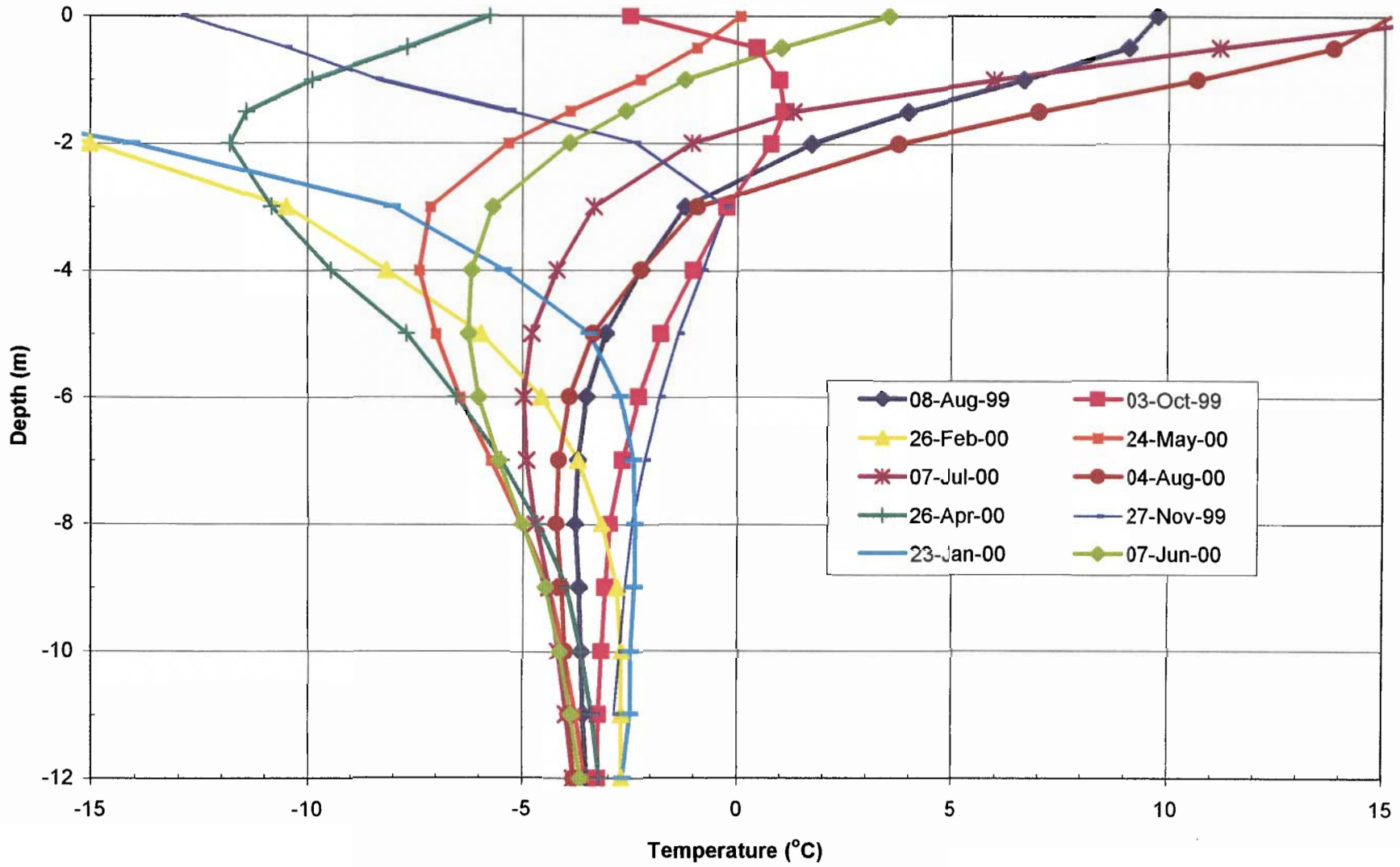
Dam4-1 Thermistor Readings
Lupin Mine TCA



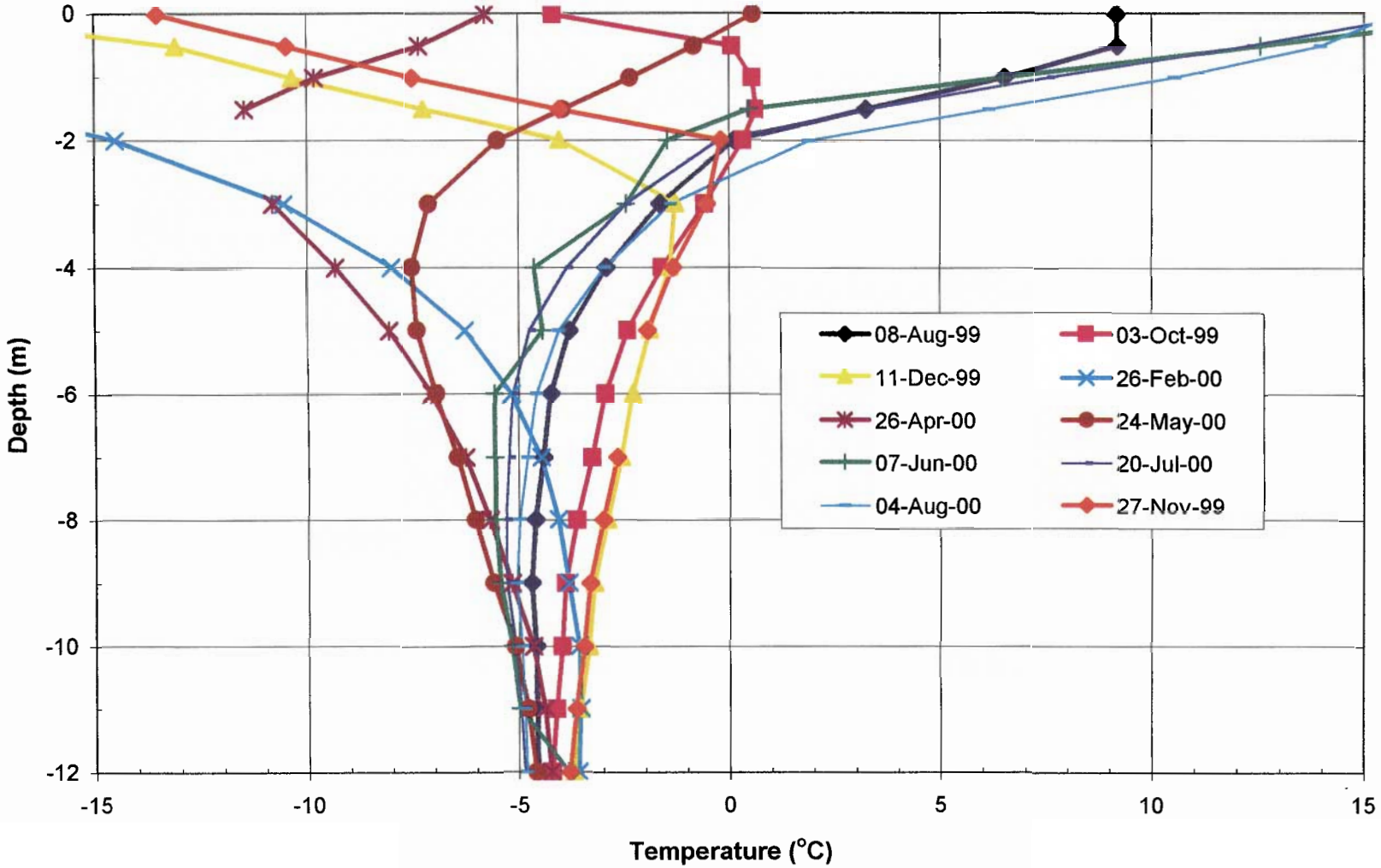
Dam4-2 Thermistor Readings
Lupin Mine TCA

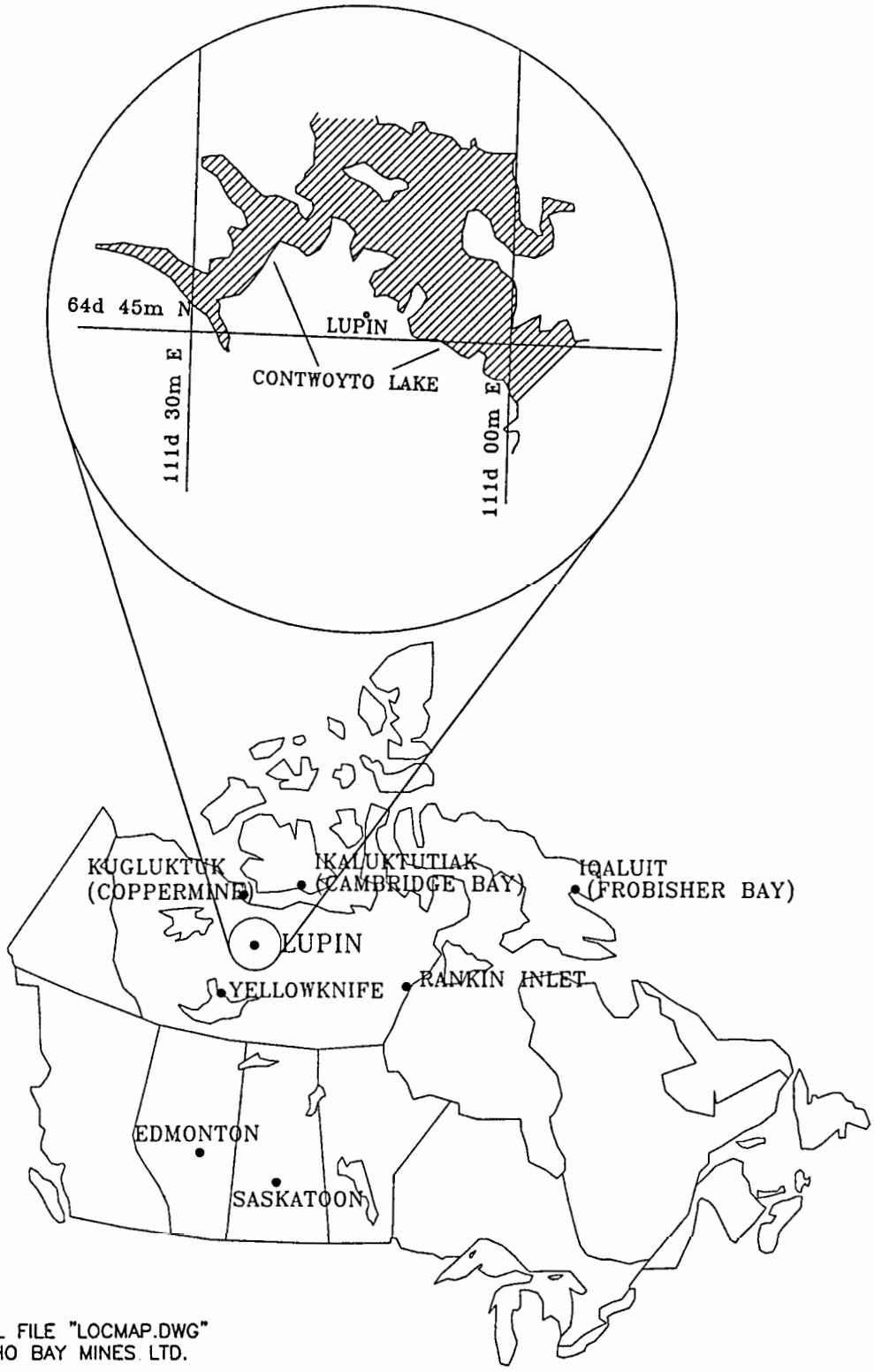


Dam4-3 Thermistor Readings
Lupin Mine TCA



Dam4-4 Thermistor Readings
Lupin Mine TCA





NOTE:
BASED ON DIGITAL FILE "LOCMAP.DWG"
PROVIDED BY ECHO BAY MINES LTD.

SCALE:	N.T.S.	DESIGNED:	JWC
DATE:	AUG 2000	CHECKED:	JWC
DRAWN:	MT	APPROVED:	JWC

BGC ENGINEERING INC.
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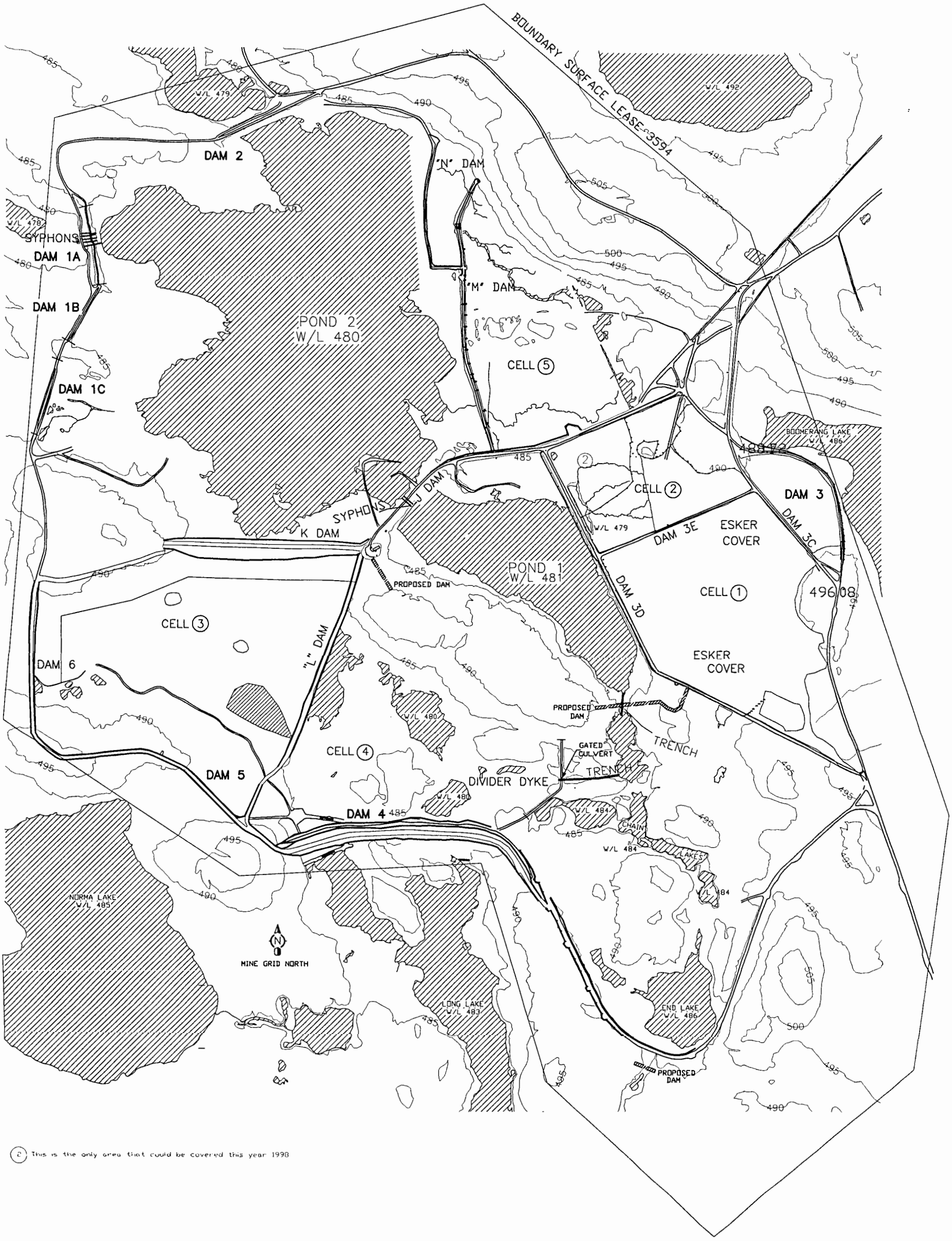
Calgary, AB. Phone: (403) 250-5185

PROJECT
ANNUAL INSPECTION OF PERIMETER TAILINGS DAMS

TITLE
LUPIN MINE LOCATION MAP

CLIENT:	PROJECT No.	DWG. No.	REV.
ECHO BAY MINES LTD.	0256-001-01	FIGURE 1	



(2) This is the only area that could be covered this year 1998

NOTE:
BASED ON DIGITAL FILE "LUDAMS.DWG"
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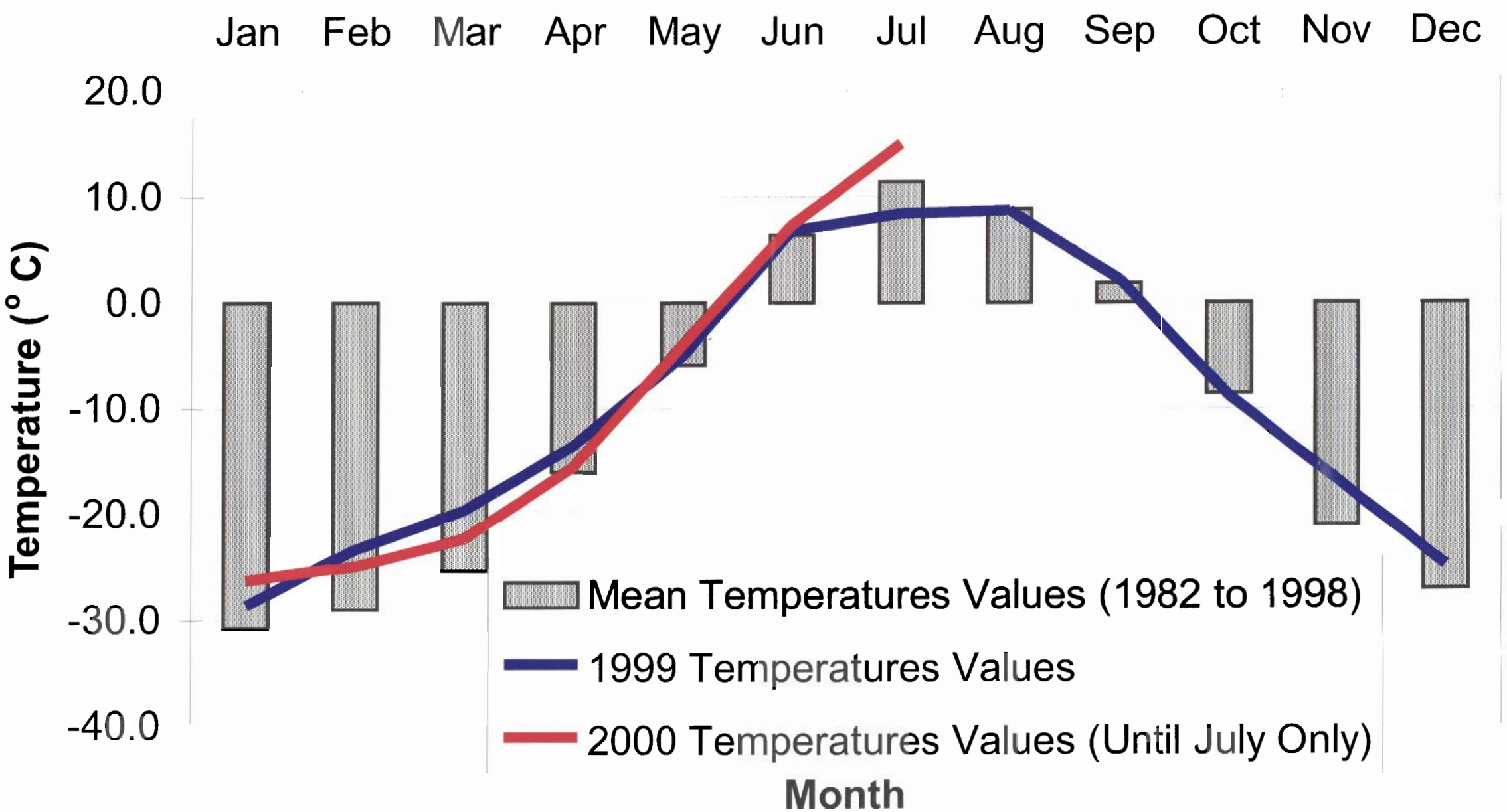
PROJECT: ANNUAL INSPECTION OF PERIMETER TAILINGS DAMS

TITLE: TAILINGS CONTAINMENT AREA PLAN

PROJECT No.	DWG. No.	REV.
0256-001-01	FIGURE 2	



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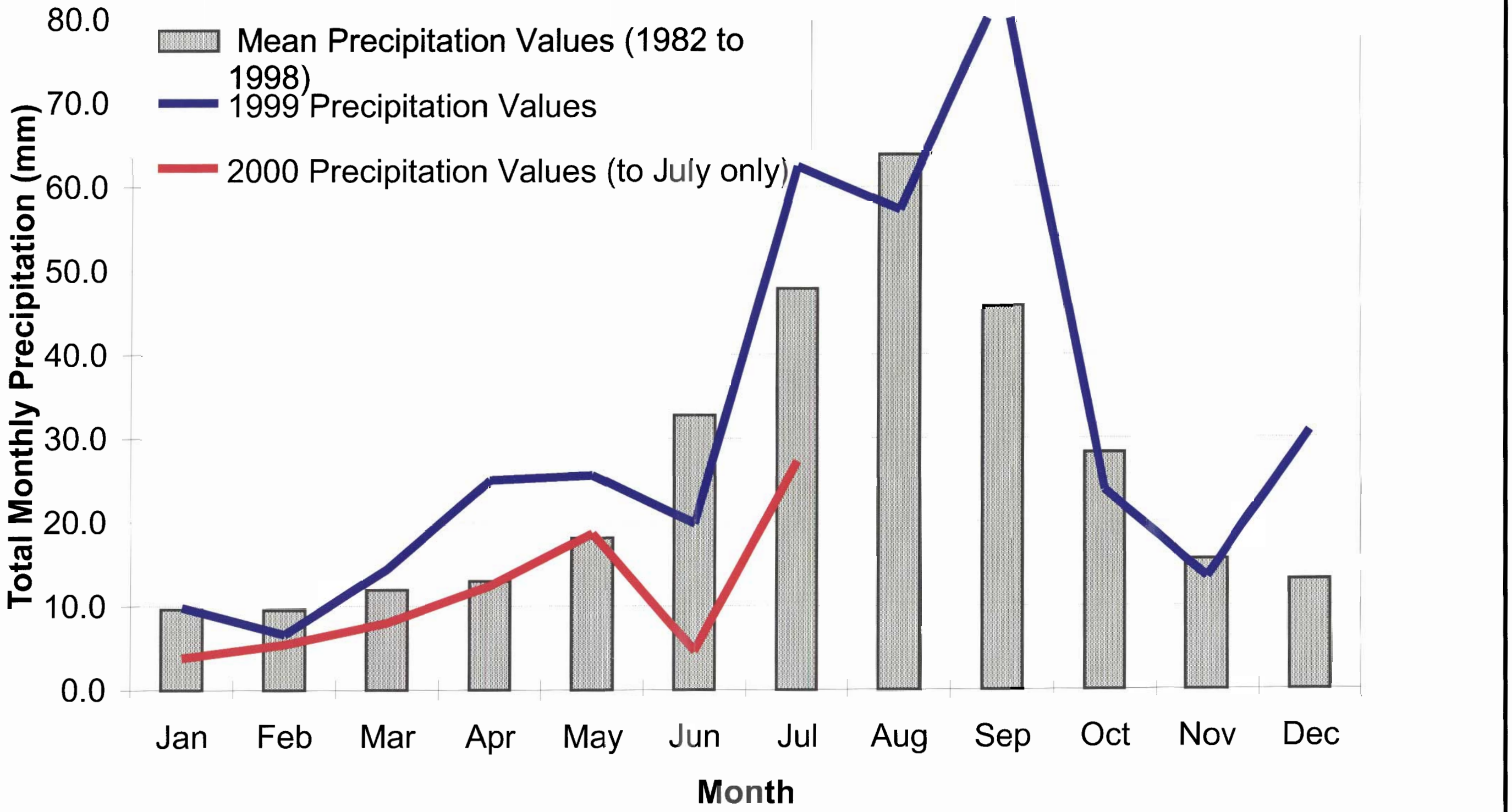
PROJECT: Annual Inspection of Perimeter Tailings Dams

TITLE: Comparison of Monthly Temperature Means to 1999 & 2000

PROJECT No.: 0256-001-01

FIGURE. No.: Figure 3

REV.: 0.



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PROJECT: Annual Inspection of Perimeter Tailings Dam

TITLE: Comparison of Monthly Precipitation Means to 1999 &

PROJECT No.: 0256-001-01

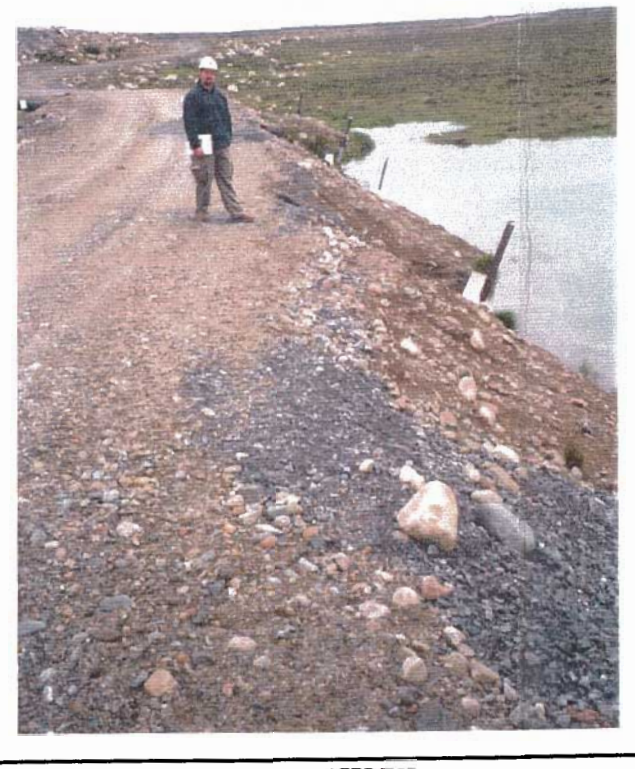
FIGURE. No.: Figure 4

REV.: 0.

View of the upstream side and crest of Dam #1A.

A view of the water level on the upstream side of the south abutment of Dam #1A.

View of the downstream side of the access road berm at the toe of the dam. Dark grey angular blast material has been previously placed in a number of the small erosional scarps. A number of these scarps are continuing to erode back into the access road, probably because the blast material was installed too steep.



View of some previously noted cracking at the toe of the access road berm.

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PROJECT: Annual Inspection of Perimeter Tailings Dams

TITLE: Dam 1A Inspection Photos

PROJECT No.: 0256-001-01

FIGURE No.: Figure 5

REV.: 0.

View of the crest and the upstream side. The crest is somewhat disturbed by rutting from vehicle traffic. In addition, the riprap on the upstream side is relatively undulating. This dam does not currently impound any water.

View of a small sink hole located in the downstream third of the crest of the dam. This small sink hole is approximately 8 to 10 inches long.

Two shot panoramic of the downstream side of Dam #1B.

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PROJECT Annual Inspection of Perimeter Tailings Dams

TITLE Dam 1B Inspection Photos

PROJECT No. 0256-001-01

FIGURE. No. Figure 6

REV 0.

View of two small ponds located on the upstream side of the southern portion of Dam #1C. The small pond located in the midpoint of the dam (on the left hand side of the photo), is a bit smaller than it was last year. The pond in the background of the photo appears to approximately the same size.

View of a minor settlement trough and cracking at the downstream side of the access road toe berm.

View of the downstream side of Dam #1C.

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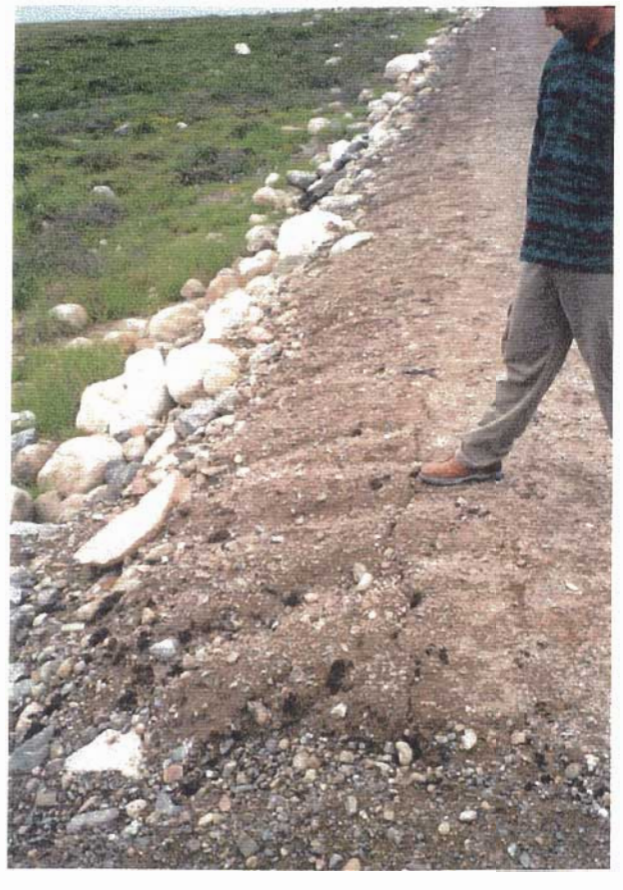
TITLE: Dam 1C Inspection Photos

PROJECT No.: 0256-001-01

FIGURE. No.: Figure 7

REV.: 0.

View of the crest of Dam #2, which appears to be in generally good condition and is graded smooth.



View of a thin longitudinal crack located right at the downstream edge of the berm on the downstream toe of Dam #2. This crack has a trace distance of approximately 15 to 18 meters along the toe. Some small associated settlement troughs are located adjacent to this crack.

View of the riprap on the upstream side. There is a marked change in colour in the riprap from the dark grey material on the upper portion to the light tan colour on the lower third of the slope. There is a slight scarp formed where the water has been lapping, approximately at the contact of the dark grey to the light tan riprap.

View of a small seepage discharge point occurring near the north abutment of Dam #2. The water is discharging just immediately to the left of the green vegetation patch. The flow is estimated at 1 to 2 litres per minute.

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TITLE: Dam 2 Inspection Photos

PROJECT No.	FIGURE. No.	REV.
0256-001-01	Figure 8	0.

View of one small erosional gully located at the toe of Dam #3. This erosional gully is approximately 3 meters long by 1 meter wide and is armoured with some cobbles and boulders. In the background, the remnants of two previous erosional gullies can be seen.

View of 2 to 3 parallel tension cracks found at the toe of Dam #3. This is on the steep northwest portion of the dam. Cracks at this location had been noted in previous inspections.

View of another erosional gully which is formed right across the crest of Dam #3. This one is located approximately 20 meters south of the bend in the dam. Again, this small erosional gully should be graded over and/or back filled to prevent any further concentration of run off water and further erosion.

View looking southeast, at the toe of Dam #3. There is a pile of a crushed angular material stock piled here, probably going to be used for back filling of either a crest road or perhaps a downstream toe area.

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PROJECT: Annual Inspection of Perimeter Tailings Dams

TITLE: Dam 3 Inspection Photos

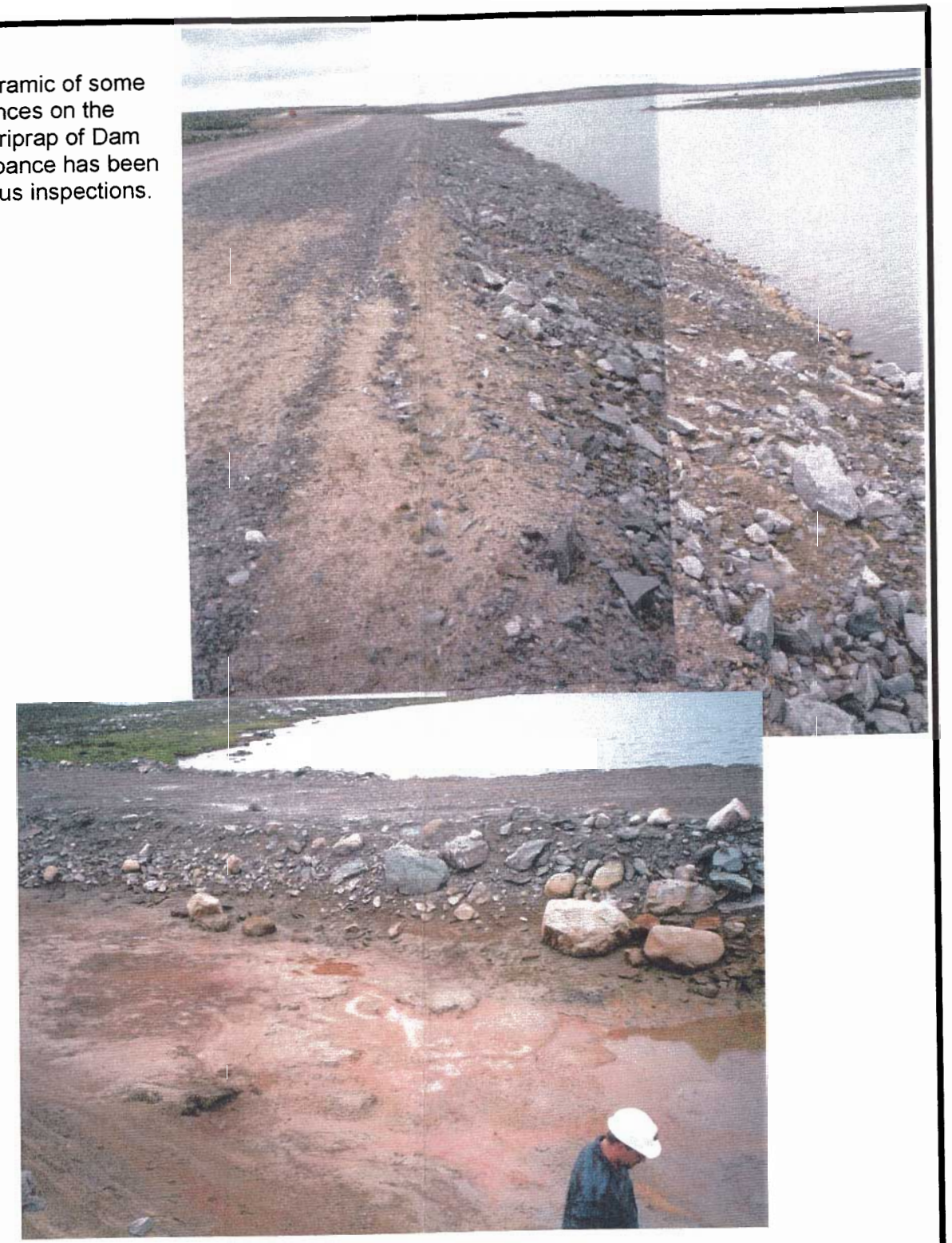
PROJECT No.: 0256-001-01

FIGURE No.: Figure 9

REV.: 0.

Overall view of Dam #4 looking towards the east/southeast. The generator truck is located on the crest of the Dam and is currently pumping water back over top of the dam.

Two shot panoramic of some of the disturbances on the upstream side riprap of Dam #4. This disturbance has been noted in previous inspections.



View along the toe of Dam #4 towards its west abutment.

View of a small amount of seepage coming into the small bermed area at the toe of Dam #4. The seepage appears to be coming in from the downstream side, likely from the lake on the far side of Dam #4. This was the same condition observed last year when the pond was being pumped out.

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PROJECT: Annual Inspection of Perimeter Tailings Dams

TITLE: Dam 4 Inspection Photos

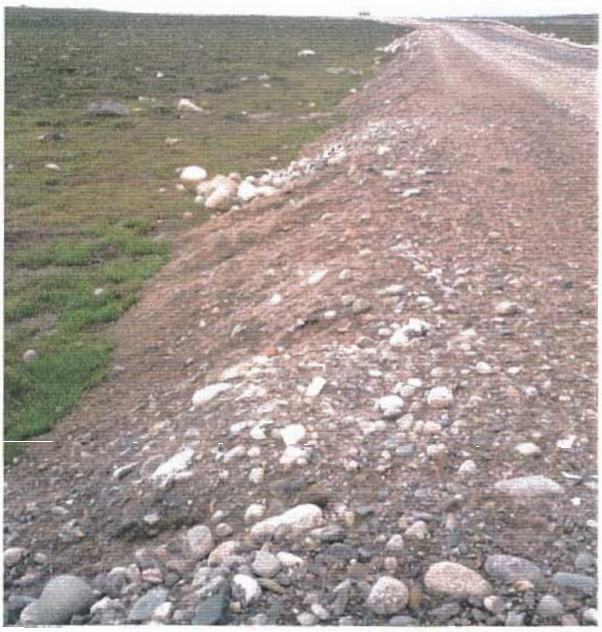
PROJECT No.: 0256-001-01

FIGURE. No.: Figure 10

REV.: 0.

View of the upstream side riprap and a portion of the crest of the dam, looking towards the southeast.

View of the downstream toe of Dam #5.



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PROJECT: Annual Inspection of Perimeter Tailings Dams

TITLE: Dam 5 Inspection Photos

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PROJECT No.	DWG No.	REV.
0256-001-01	Figure 11	0.

View of the upstream side and crest of Dam #6.

View of the downstream toe of Dam #6.

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PROJECT: Annual Inspection of Perimeter Tailings Dams

TITLE: Dam 6 Inspection Photos

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PROJECT No.	DWG No.	REV.
0256-001-01	Figure 12	0.