Golder Associates Ltd.

10th Floor, 940 6th Avenue S.W.
Calgary, Alberta
Canada T2P 3T1
Telephone (403) 299-5600
Fax (403) 299-5606

REPORT ON

1997 GEOTECHNICAL INSPECTION OF THE TAILINGS CONTAINMENT PERIMETER EMBANKMENTS LUPIN MINE CONTWOYTO LAKE, N.W.T.

Submitted to:

Echo Bay Mines Ltd.
Lupin Operation, c/o Nisku, AB

DISTRIBUTION:

6 Copies	**Echo Bay Mines Ltd.** **Lupin Operation, c/o Nisku, Alberta**
2 Copies	**Golder Associates Ltd.** **Calgary, Alberta**

October 1997

972-2417

Golder Associates Ltd.

10th Floor, 940 6th Avenue S.W.
Calgary, Alberta
Canada T2P 3T1
Telephone (403) 299-5600
Fax (403) 299-5606

October 7, 1997

972-2417

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

Attention: Mr. David Hohnstein
Environmental Coordinator

RE: 1997 GEOTECHNICAL INSPECTION OF
TAILINGS CONTAINMENT FACILITIES
REPORT OF FINDINGS AND OBSERVATIONS

Dear Sir:

We are pleased to present herein our report regarding the 1997 inspection of the tailings area perimeter embankments. The inspection was conducted by the undersigned on August 11, 1997 and the findings were conveyed on August 12, 1997.

The assistance provided during the site visit by yourself and Rick Nutbrown was much appreciated. Additionally, thank you for the use of the office space during the visit.

Should you have questions concerning the contents of this report, please contact the undersigned.

Yours truly,

GOLDER ASSOCIATES LTD.

REGISTERED PROFESSIONAL ENGINEER
J. W. CASSIE
LICENSEE
N.W.T.

J.W. Cassie, P.Eng.
Senior Geotechnical Engineer

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER
P 049
GOLDER
ASSOCIATES LTD.

H.G. Gilchrist, P.Eng.
Specialist Consultant

TABLE OF CONTENTS

LIST OF FIGURES

Figures situated within the text.

Figures within appendix.

1.0 INTRODUCTION

Lupin Mine, owned and operated by Echo Bay Mines. Ltd., is located northeast of Yellowknife on Contwoyto Lake, as illustrated on Figure 1, at approximately 65°46'N and 111°14'W. Echo Bay's NWT Water Licence (N7L2-0925) requires that the tailings containment area (TCA) be inspected annually by a qualified geotechnical engineer. As such, Mr. R. Nutbrown, P.Eng., Environmental Co-ordinator for Lupin Mine, requested that Golder Associates Ltd. conduct an inspection of the tailings facility perimeter embankments. A proposal to conduct this inspection, dated 14 March 1997, was submitted and Requisition No. L51642 was issued to Golder Associates on 6 May 1997.

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

- a freeboard limit of 1.0 m should be maintained at all times,
- 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.

2.0 TAILINGS CONTAINMENT AREA OPERATION DESCRIPTION

As illustrated by 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, concurrent with the injection of water treatment chemicals.

For the operating period, August 1996 until July 1997, Table 1 provides a summary of the tailings quantities placed in the TCA, the location of the discharge within the basin (provided by Echo Bay) and a calculated value for the slurry solids content (by weight):

Table 1: Summary of TCA Operating Parameters

Month	Tonnes of Ore Processed			Location of Tailings Discharge Point	Water Volumes Discharged to TCA (m^3)	Tailings Solids Content (by weight)
	Sent U/G as Backfill	Sent to TCA	Total			
Aug-96	28,268	27,836	56,104	Cell 2	70,198	28.4%
Sep-96	26,587	31,150	57,737	Cell 2	59,564	34.3%
Oct-96	24,343	27,823	52,166	Cell 3	56,258	33.1%
Nov-96	23,322	30,328	53,650	Cell 3	53,940	36.0%
Dec-96	25,549	30,131	55,680	Cell 3	57,462	34.4%
Jan-97	27,153	31,729	58,882	Cell 3	61,813	33.9%
Feb-97	25,880	26,921	52,801	Cell 3	57,025	32.1%
Mar-97	27,887	34,364	62,251	Cell 3	68,064	33.5%
Apr-97	10,160	51,722	61,882	Cell 3	60,426	46.1%
May-97	17,478	41,907	59,385	Cell 3	64,509	39.4%
Jun-97	15,650	46,523	62,173	Cell 5	63,723	42.2%
Jul-97	17,842	46,117	63,959	Cell 5	64,423	41.7%
Total	270,119	426,551	696,670		737,405	36.6%

From Table 1, it can be seen that 61% of the total tailings produced during the 12 months were placed in the TCA at an average solids content of 37%. Of the total tonnage sent to the TCA, approximately 65% of the total was deposited within Cell 3 within the specified time period.

In addition to the tonnages listed in Table 1, the following list details the water management operations for the TCA:

- Discharge of aged tailings water from Pond 2, over Dam 1A, began on July 15, 1997. When the operation completed on Sept.1, 1997, approximately 2.88 million m^3 of water had been discharged.
- Transfer of tailings water from Pond 1 to Pond 2, via the syphons over J-Dam, began on August 5, 1997. This transfer operation was completed on Aug. 29, 1997 and approximately 1.15 million m^3 were conveyed.

Table 2 summarises the water level elevations within the TCA, as provided by Echo Bay:

Table 2: Summary of Water Levels Within TCA

Location	July 15, 1997 Water Elevation (m)	Aug. 5, 1997 Water Elevation (m)	Aug. 12, 1997 Water Elevation (m)
Pond 1	484.15	484.15	481.67
Pond 2	481.52	480.41	480.51
Cell 4	486.26	486.26	486.26

Since water discharge from Pond 2 did not occur until July 15, the 481.52 m elevation would represent a maximum level for 1997.

Table 3 provides a summary of monthly climatic values that were recorded over the previous 12 months at the site weather station:

Table 3: Summary of Lupin Climatic Values Over Past 12 Months

Date	Mean Daily Maximum Temp (deg. C)	Mean Daily Minimum Temp (deg. C)	Total Monthly Precipitation (mm)	Maximum One Day Rainfall Event (mm)
Aug-96	10.4	4.6	131.8	23.8
Sep-96	7.6	2.7	68.8	33.8
Oct-96	-7.2	-11.3	13.0	n/a
Nov-96	-16.9	-23.8	13.6	n/a
Dec-96	-23.7	-30.0	6.6	n/a
Jan-97	-26.5	-34.1	6.0	n/a
Feb-97	-23.6	-31.4	6.6	n/a
Mar-97	-23.9	-31.2	6.8	n/a
Apr-97	-11.5	-20.9	12.8	n/a
May-97	-3.1	-9.8	27.2	3.2
Jun-97	9.9	2.1	21.2	13.2
Jul-97	18.5	8.2	18.2	5.6

In addition to the monthly data provided in Table 3, Figures 3 and 4 provide a graphical representation of the 1996 and 1997 monthly data, versus the long term mean values which have been recorded since 1982. Figure 3 shows that monthly mean temperatures for 1996 and 1997 (to July only) are consistent with mean values, except for the Summer of 1996 which was significantly warmer than the means during June, July and September. Figure 4 illustrates that 1996 was significantly wetter than normal; in fact, 1996 had the highest recorded total precipitation value (407 mm) since measurements began at Lupin in 1982. Precipitation data for 1997 (to July only) indicated slightly drier than normal values in the winter and significantly drier than normal values for June and July.

3.0 INSPECTION CONDITIONS AND APPROACH

The inspection was conducted by Mr. Jim Cassie, P.Eng., on August 11, 1997, commencing at about 10:30 and concluding later the same day. The temperature during the day was approximately 15°C under partly cloudy, but generally clear and bright conditions. Approximately 20 mm of rain had fallen on the morning of August 11, before the inspection began. In the two weeks preceding the inspection (July 27 to August 10), only 25 mm of rain had fallen on 4 different days.

At the time of the inspection, tailings were being deposited in the northwest corner of Cell 5, just upstream of M-Dam. Water was in the process of being syphoned over both Dams 1A (for discharge to the environment) and J-Dam (for ageing in Pond 2). Given that the quality of Pond 1 water met discharge criteria, no chemical treatment of the conveyed water was being carried out.

Each of the embankments was inspected on foot. Pertinent observations concerning both 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 and provide the basis for this formal report.

Since last year's inspection was carried out, additional sandy cover material has been placed over the tailings solids situated in Cell 2. The cover thickness was estimated to be 0.7 to 1 m. Only one small area of exposed tailings, approximately 150 m by 200 m, remains to be covered in the northwest corner of Cell 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.

The inspection confirms that the perimeter embankments are in good condition. Precipitation events and its run-off in 1996 had a considerable surficial effect on a majority of the perimeter dams, generally creating numerous erosional gullies on the unprotected downstream slopes. As recommended last year, a number of these erosional gullies were backfilled and graded to prevent further erosion from occurring. A number of gullies are still present on Dams 1A, 1C, 2, 5 and 6 and repair work on these should be undertaken in the near future. It should be noted that Echo Bay did undertake the repair of a number of these gullies in the second half of August; detailed repair comments can be found on each of the following specific dam sheets.

While Dam 4 is functioning without apparent seepage, any plan for increasing the pond water level should include considerations for beach placement in view of its contribution to potential seepage mitigation. Additionally, it may be prudent to drain the existing water collected behind the downstream berm (near the western end of the dam). This would allow the observation of any potential seepage that is occurring under the dam.

DAM 1A

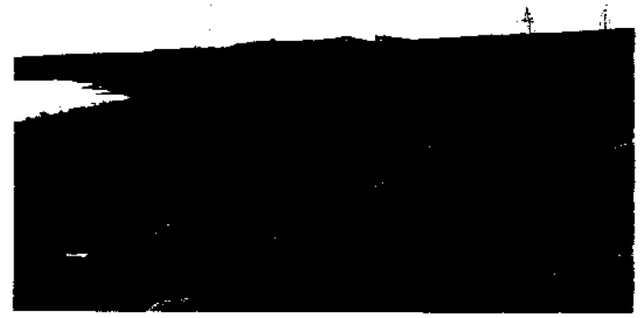
LOCATION:	West side of Pond 2.
FUNCTION:	Major perimeter closure for water retention; carries siphon pipes for water decant system.
LENGTH:	+/- 250 m
MAX HEIGHT:	+/- 8 m above d/s tundra.
AS-BUILT ELEVATION:	486.1 m
CREST WIDTH AND CONDITION:	7 to 8 m; surfaced with esker material, but not travelled because of the siphons. Condition is good; no cracking evident.
RIPRAP:	Run of Mine rockfill; broadly graded; good condition.
BACKSLOPE:	Approx. 1.5H:1V; somewhat armoured with cobbles and boulders; with some runoff erosion rills (none are new); no evidence of cracking.
SEEPAGE:	No evidence of seepage.
MAINTENANCE RECOMMENDATIONS:	One significant erosional gulley located on the downstream side of the downstream berm, adjacent to the central decant pipe. Should be backfilled and graded to prevent further erosion. *Echo Bay notes that access is very difficult and repair will be undertaken when a crane is available.*
CONCLUSIONS:	The dam is in good condition with no evidence of seepage passing through or beneath the dam.

J:\1997\2417\FIGUREBASE

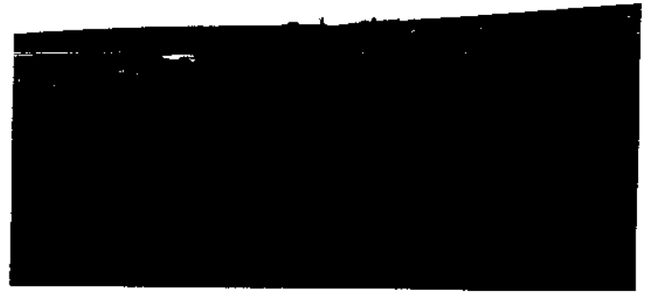
DAM 1A
SITE INSPECTION
PHOTOS

Figure 1A-1

.1) View of the crest of Dam 1A, which provides topographic closure for Pond 2. Note syphon decant pipes on the crest. No signs of cracking noted.



.2) View of the downstream side of Dam 1A. Grey angular rip rap is in good condition.



.3) View of the downstream side, showing decant pipes in the middle of the photo.

.4) View of the downstream berm, directly above the decant pipe discharge location. Some erosion noted at this location.

Golder Associates

PROJECT: 972-2417	DRAWN BY: DC	DATE: 10 OCT 97	REVIEWED:

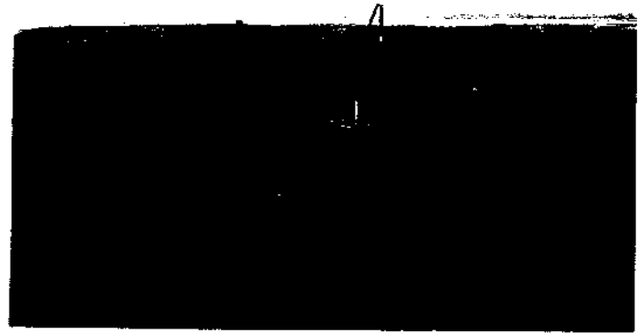
DAM 1B

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
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. Crest condition is good, no cracking evident. One 20 to 30 cm depression located at the contact of the upstream shell and the crest.
RIPRAP:	Run of Mine rockfill; variable sizes; undulating; good condition.
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:	Backfill and grade small depression on the crest. *Echo Bay notes that repair has been done.*
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.

J:\1997\2417\FIGURE\BASE

DAM 1B
SITE INSPECTION
PHOTOS

Figure 1B-1



.1) View of the crest of Dam 1B, looking towards the north / northeast. This dam does not currently retain any water.

.2) View of the downstream side and access road, looking to the south.

Golder Associates

PROJECT: 972-2417	DRAWN BY: DC	DATE: 03 OCT 97	REVIEWED:

DAM 1C

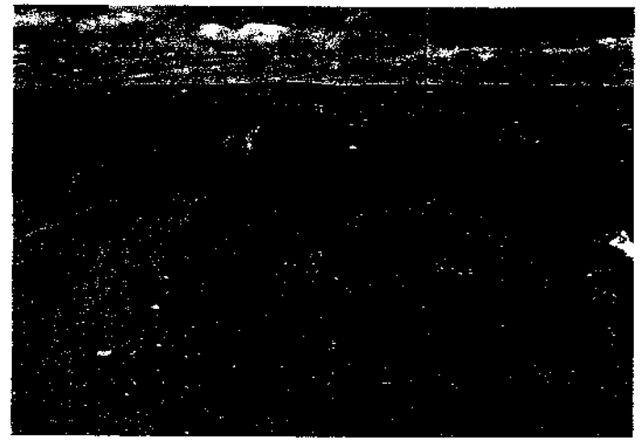
LOCATION:	West side of Pond 2.
FUNCTION:	Minor perimeter closure for water retention: currently retaining no water other than small puddles. Currently functioning only as a road embankment.
LENGTH:	+/- 230 m
MAX HEIGHT:	+/- 2.0 m above d/s tundra.
AS-BUILT ELEVATION:	485.3 m
CREST WIDTH AND CONDITION:	+/- 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, no cracking evident.
RIPRAP:	Run of Mine rockfill; one linear depression in riprap at the south end of the dam due to steep toe; overall condition satisfactory.
BACKSLOPE:	Approx. 3H:1V, smooth and no evidence of cracking; toe-of-slope roadway berm shows minor downstream edge cracking, present in previous inspection, due to settlement.
SEEPAGE:	No comment possible; no water currently being retained by the structure.
MAINTENANCE RECOMMENDATIONS:	Two significant erosional gullies located on the downstream side of the downstream berm. Should be backfilled and graded to prevent further erosion. *Echo Bay notes that the entire length of the backslope has been graded to repair erosional gullies.*
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.

J:\1997\241\FIGURE\BASE

DAM 1C
SITE INSPECTION
PHOTOS

Figure 1C-1

.1) View of the crest and upstream side, looking towards the south. Rip rap appears to be in good condition.



.2) View of the crest and upstream side, looking towards the north. Dam 1C is not currently retaining any water, except for the small pond on the right of the photo. Also note some slight cracking in the grey rock fill shell in the right foreground.

.3) View of the downstream berm, looking to the south. Note some small rivlets on the downstream side.

Golder Associates

PROJECT: 972-2417	DRAWN BY: DC	DATE: 03 OCT 97	REVIEWED:

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
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 northeast portion of the dam. Crest condition is good; no cracking is evident.
RIPRAP:	Run of Mine rock forms convex-upward, gently-sloped upstream face; good condition.
BACKSLOPE:	Approx. 1.5H:1V with some runoff erosion rills. Several (3 to 4) significant erosional gullies located on the downstream slope; one also located on the downstream side of the downstream berm.
SEEPAGE:	No evidence of seepage.
MAINTENANCE RECOMMENDATIONS:	Repair erosional gullies that have formed on the backslope and the downstream berm to prevent further erosion. *Echo Bay notes that all erosional gullies were backfilled during the week of Aug. 18 to 24, 1997.*
CONCLUSIONS:	The dam is in good condition with no evidence of seepage passing through or beneath the dam.

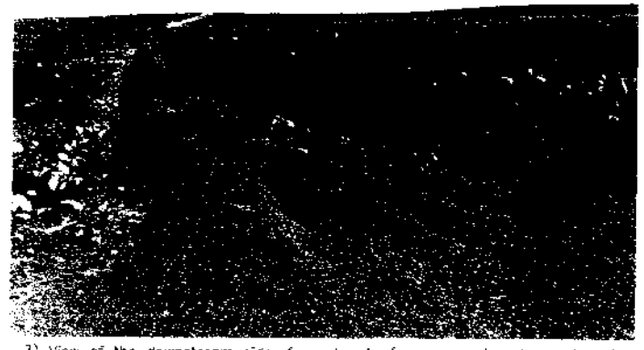
J:\1997\2417\FIGURE\BASF

DAM 2
SITE INSPECTION
PHOTOS

Figure 2-1

.1) View of the crest, looking towards the southwest. The upstream side of the dam has a concave shape with the steepest portion down near the waterline.

.2) View of the crest and upstream side showing the high water mark on the grey rip rap.



.3) View of the downstream side, formed out of esker sand and gravel. A few significant erosional gullies were observed, but have since been repaired by Echo Bay.

Golder Associates			
PROJECT: 972-2417	DRAWN BY: DC	DATE: 03 OCT 97	REVIEWED:

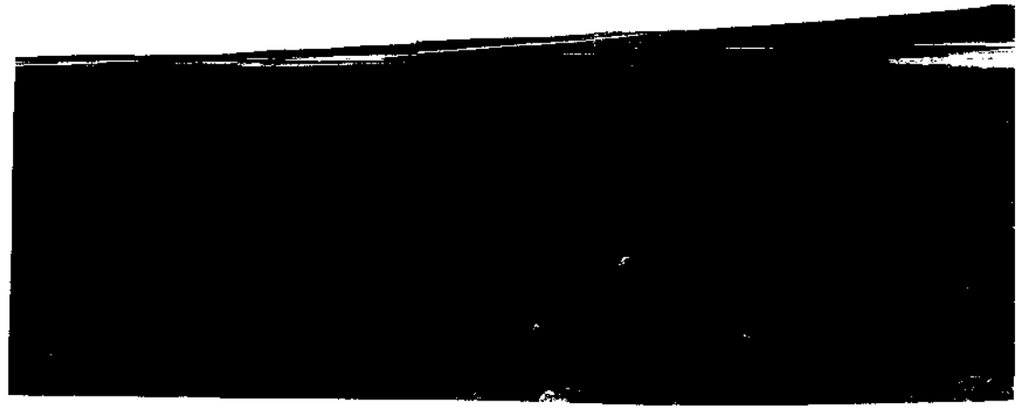
DAM 3

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 metre using esker material.
LENGTH:	+/- 600 m
MAX HEIGHT:	+/- 2.5 m above d/s tundra.
AS-BUILT ELEVATION:	488.4 m
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 was graded between Aug. 4 to 10, 1997 to repair 1996 erosion; crest condition is good and no cracking is evident. Not an active tailings pond.
RIPRAP:	Inside slope buried with tailings; most of backslope length is riprapped; grade of 3 to 5 H: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. Cracking along the slope of the north portion of the dam probably indicative of over-steepening.
SEEPAGE:	No seepage noted, including observation point made near middle inflection of dam. Small excavation at previous seepage point is now dry.
MAINTENANCE RECOMMENDATIONS:	Flatten the backslope along Boomerang Lake for the northwest part of the dam. *Echo Bay notes potential conflict with deposition of sediment into Boomerang Lake.*
CONCLUSIONS:	The dam is in good condition.

J:\1997\2417\FIGUREBASE

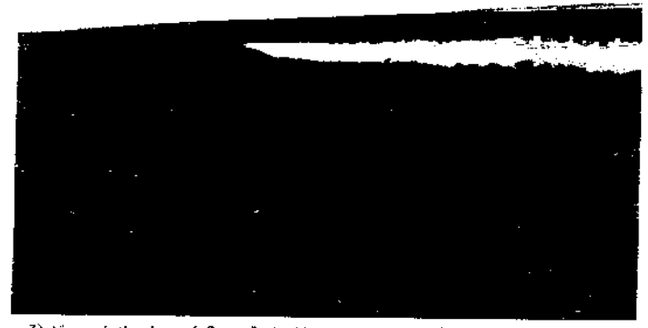
DAM 3
SITE INSPECTION
PHOTOS

Figure 3-1



.1) Panoramic view of the reclaimed area, upstream of Dam3. This arcuate shaped dams runs initially north-south (foreground) and then curves to the northwest. Note the August placement of additional sand to repair an eroded area.

.2) View of a 1m deep excavation carried out at the location of some seepage noted last year. Excavation is presently dry.



.3) View of the toe of Dam 3, looking to the west /northwest. Some inactive cracks noted at this location, proximal to the oversteepened toe.

Golder Associates

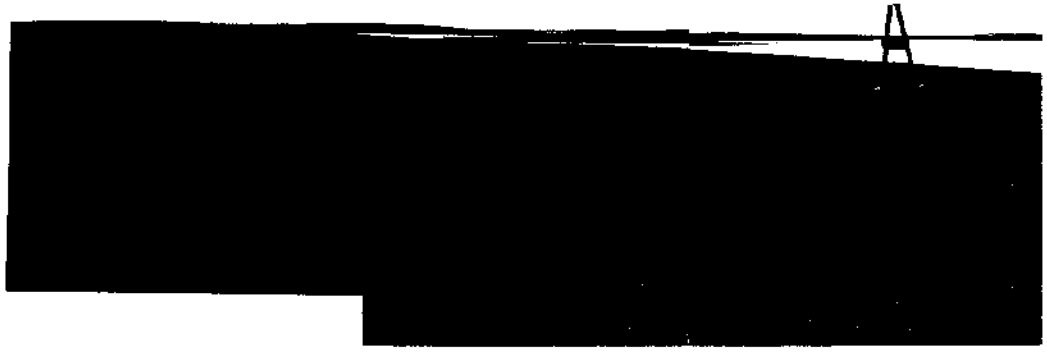
PROJECT: 972-2417	DRAWN BY: DC	DATE: 03 OCT 97	REVIEWED:

DAM 4

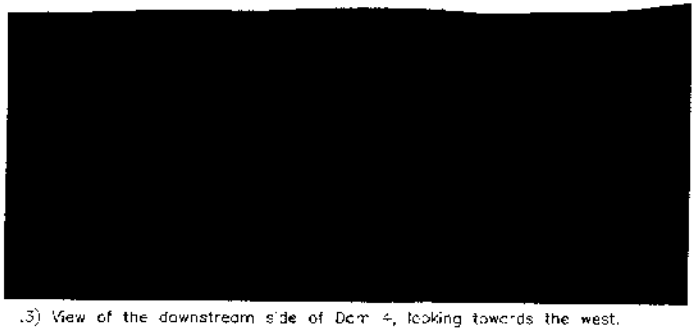
LOCATION:	South end of Cell 4 for K Dam sub-pond.
FUNCTION:	Perimeter closure for water retention at present; natural pond downstream of the dam at its west end.
LENGTH:	+/- 900 m
MAX HEIGHT:	+/- 6 m above u/s tundra.
AS-BUILT ELEVATION:	489.2 m
CREST WIDTH AND CONDITION:	Approximate 12 m wide crest width in good condition, no cracks found.
RIPRAP:	Run of Mine rockfill in good condition on upstream slope.
BACKSLOPE:	Esker sand; slope steeper in upper portion and flattens in the lower portion, approximately 2H:1V. Numerous significant erosional gullies have been backfilled. Geogrid exposed in places. Some minor cracks parallel the contours in the lower portion of the slope (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. Suggested to pump out existing water behind toe berm to allow observation any potential seepage.
MAINTENANCE RECOMMENDATIONS:	No maintenance items noted.
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 4 SITE INSPECTION PHOTOS	Figure 4-1

.1) View of Dam 4, which maintains topographic closure for Cell 4. This dam runs in an east–west west direction, except for the eastern extent which runs towards the southeast. More than 2m of freeboard currently.



.2) Panoramic view of the downstream side. Note dark grey rock fill used to fill erosion gullies.



.3) View of the downstream side of Dam 4, looking towards the west.

Golder Associates			
PROJECT: 972–2417	DRAWN BY: DC	DATE: 03 OCT 97	REVIEWED:

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
CREST WIDTH AND CONDITION:	Approximately 8 metres 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. Minor, well-weathered cracks in loose material at the downstream edge of the crest. Assumed to be inactive and not of concern. A number of erosional gullies still exist on the downstream slope. Granular material placed for backfilling operation in near future.
SEEPAGE:	No comment possible; no water head being retained by the structure.
MAINTENANCE RECOMMENDATIONS:	All erosional gullies should be backfilled and graded to prevent further crest erosion. *Echo Bay notes that repair work was completed during the week of Aug. 18 to 24, 1997.*
CONCLUSIONS:	The dam is in good condition and should be inspected for seepage when pond levels place a water head against it.

DAM 5
SITE INSPECTION
PHOTOS

Figure 5-1

1) View of the crest, looking towards the west/northwest. Note the new construction of an access road and tailings line on the upstream side.

2) View of the downstream toe. Note small delta of soil which has formed due to concentration of runoff in an erosional gully. Also note granular material on crest to begin repair of all gullies

3) View of the downstream toe looking towards the east.

Golder Associates			
PROJECT: 972-2417	DRAWN BY: DC	DATE: 03 OCT 97	REVIEWED:

DAM 6

LOCATION:	West side of Cell 3 retaining tailings placed behind K-dam.
FUNCTION:	Minor perimeter closure. Retaining some tailings beach and local water.
LENGTH:	+/- 300 m
MAX HEIGHT:	+/- 2.5 m above d/s tundra.
AS-BUILT ELEVATION:	489.5 m
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.
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, some contour-parallel cracking still existing at mid-height of backslope, previously noted in 1994 and 1995, is now judged to be inactive. Five significant erosional gullies have formed on the downstream slope.
SEEPAGE:	Dam retaining damp tailings beach but no free water; no seepage observed.
MAINTENANCE RECOMMENDATIONS:	Backfill and grade erosional gullies on backslope to prevent further erosion. *Echo Bay notes that repair work was completed during the week of Aug. 18 to 24, 1997.*
CONCLUSIONS:	The dam is in good condition; cracks are concluded to be inactive.

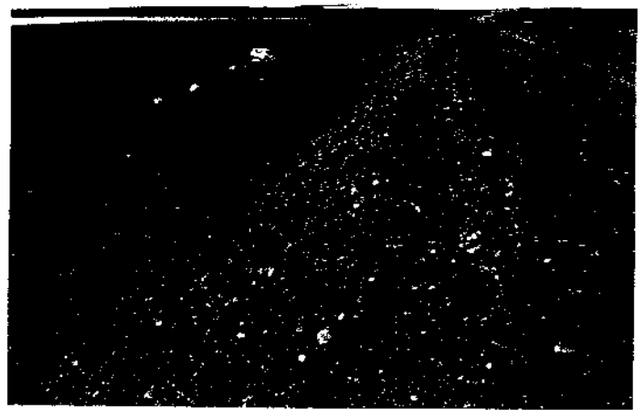
J:\1997\2417\FIGUREBASE

DAM 6
SITE INSPECTION
PHOTOS

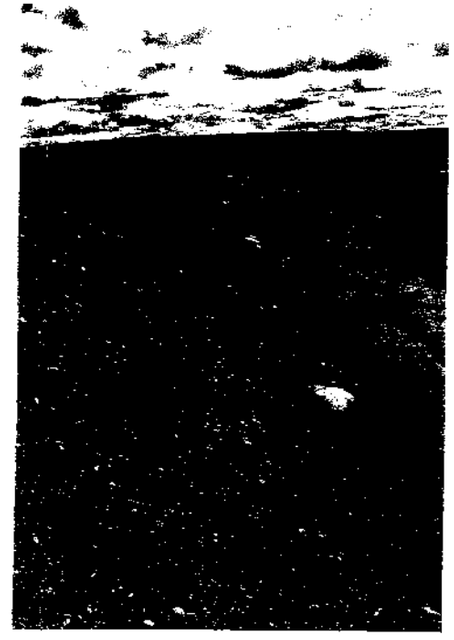
Figure 6-1

1) View of the overall setting for Dam 6, which provide topography closure for Cell 3. Most of the tailings deposition in the past year has occurred within this cell.

2) View of the crest and upstream side, looking towards the north. No water is currently retained by Dam 6 except for the small pond shown in this photo.



3) View of an erosional gully, approximately 0.2 to 1m wide and 0.5m deep (hat for scale).



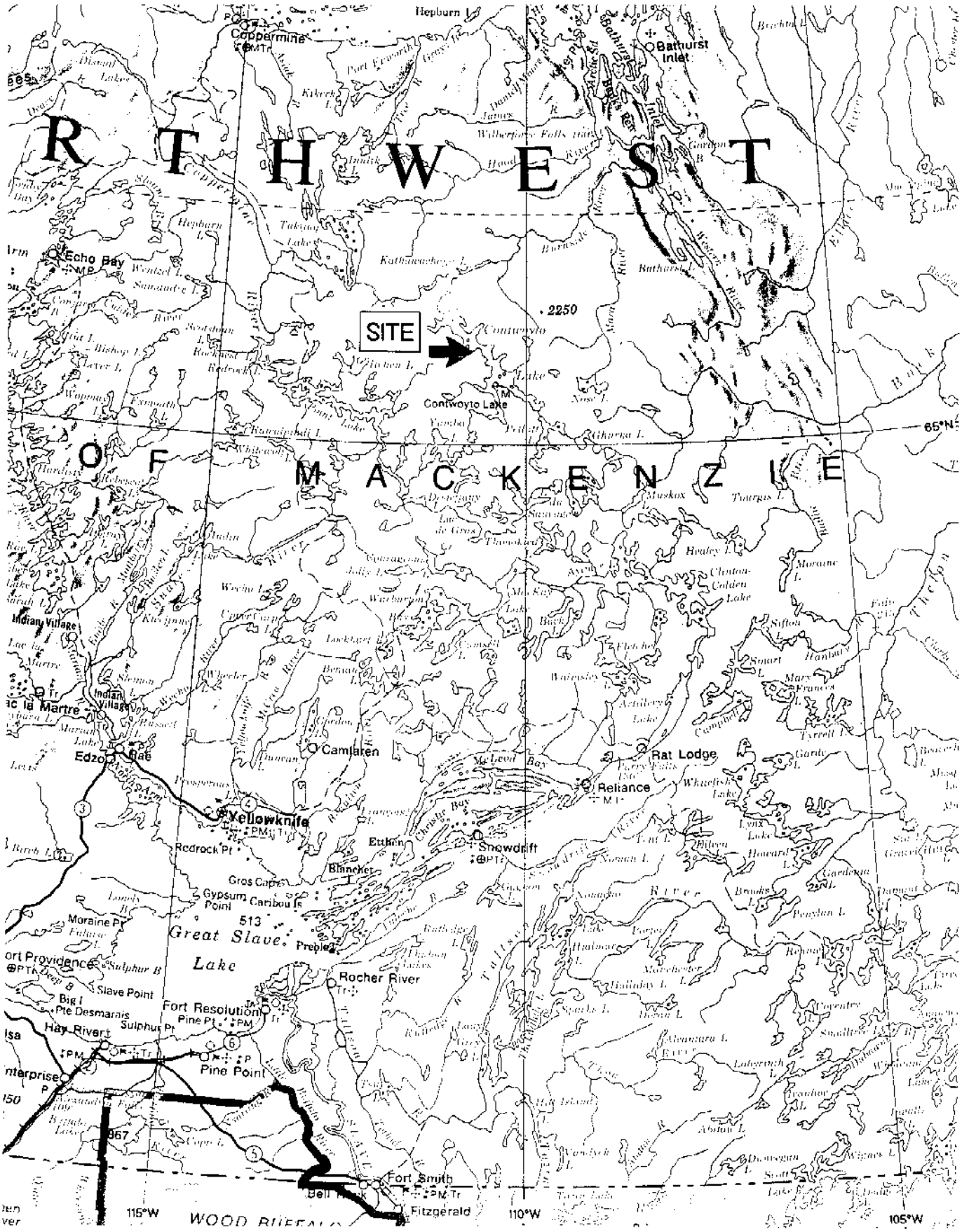
4) View of the toe, looking towards the south. Note a number of erosional gullies located in the mid ground of the photo.

Golder Associates

PROJECT: 972-2417	DRAWN BY: DC	DATE: 06 OCT 97	REVIEWED:

LUPIN MINE
SITE LOCATION MAP

Figure 1

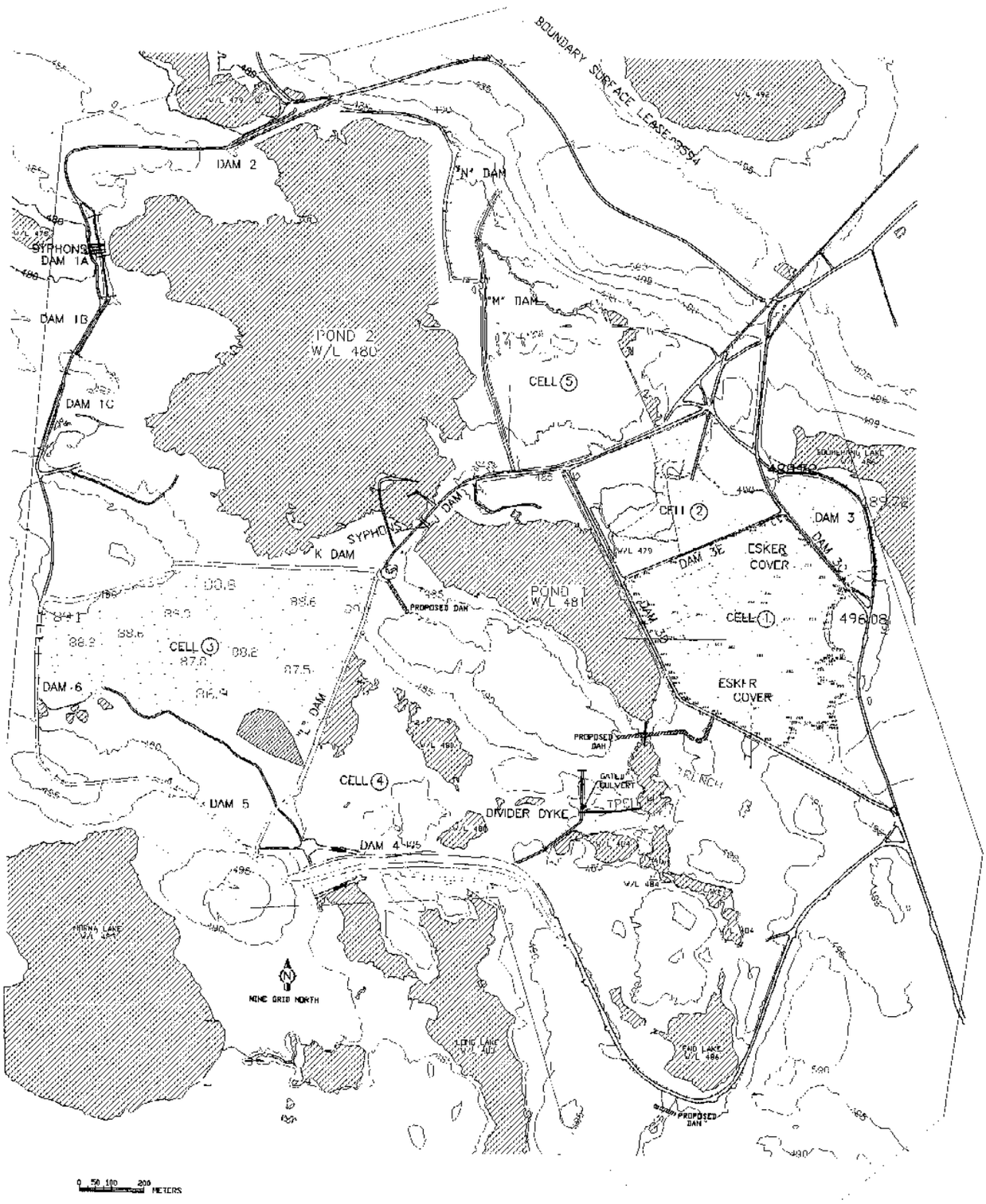


PROJECT No. 972-2417 DRAWN _____ REVIEWED _____ DATE 15 AUG 97

Golder Associates

SCALE: 1:4 000 000

LUPIN MINE - TAILINGS CONTAINMENT AREA PLAN | **Figure 2**



NOTE:

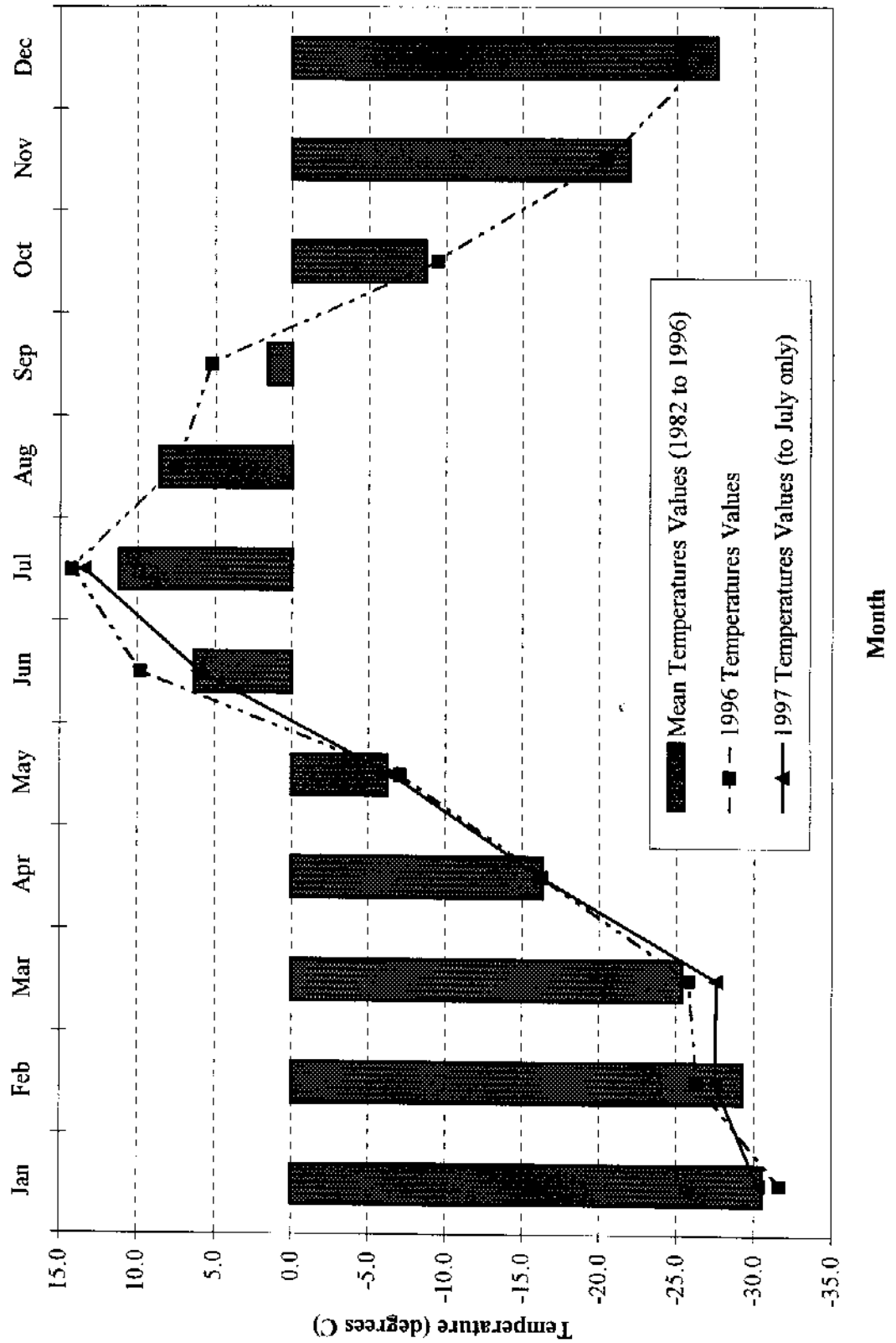
PLAN BASED ON DIGITAL DRAWING (DATED AUG.21,1997) PROVIDED BY ECHO BAY MINES LTD., LUPIN MINE TAILINGS AREA, DATED JAN/95
MAPPING BASED ON PHOTOGRAMMETRY BY STEWART WEIR , AUG. 1989
FOR CURRENT POND WATER LEVEL, REFER TO REPORT TEXT.

Golder Associates

PROJECT: 972-2417	DRAWN BY: CG/DC	DATE: 02 OCT 97	REVIEWED:

COMPARISON OF MEAN MONTHLY TEMPERATURE DATA TO '96 AND '97 (Based On Lupin Station Data From 1982-96)

Figure 3

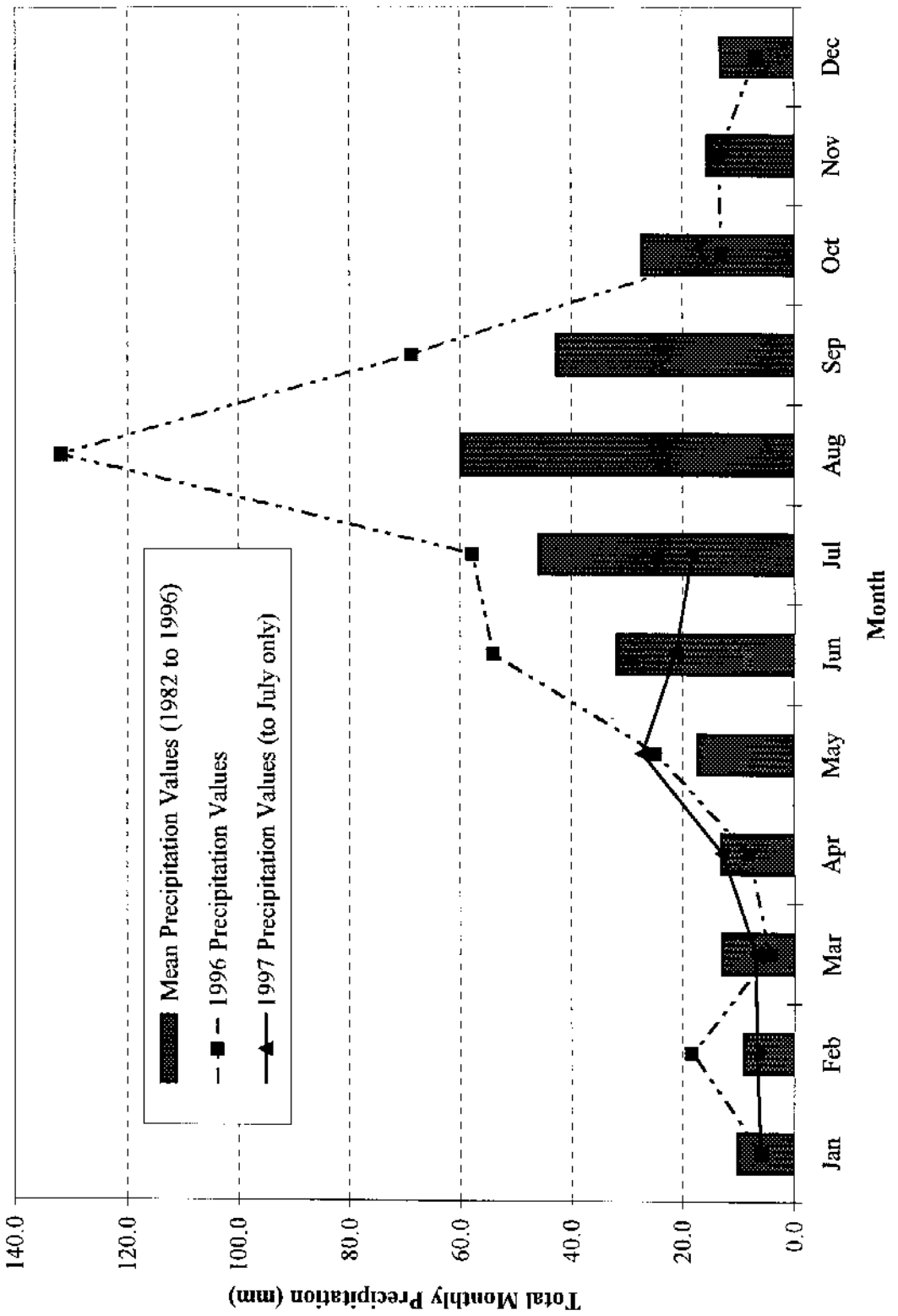


PROJECT 972-2417 DRAWN DC REVIEWED DATE 02 OCT 97 J:\1997\2417\FIGURES.dwg

Golder Associates

COMPARISON OF MEAN MONTHLY PRECIPITATION DATA vs '96 AND '97 (Based On Lupin Station Data From 1982-96)

Figure 4



PROJECT 972-2417 DRAWN DC REVIEWED DATE 02 OCT 97 J:\1997\2417\FIGURES.dwg