APPENDIX E

2000 Thermistor Installation Report - BGC Engineering Inc.

ECHO BAY MINES LTD.

THERMISTOR INSTALLATION PROGRAM

DAM 1A, DAM 2, M DAM
CELL 1 AND ESKER
LUPIN MINE, NUNAVUT

FINAL REPORT

PROJECT NO.: 0256-002-01
DATE: DECEMBER 11, 2000

DISTRIBUTION LIST:
ECHO BAY MINES LTD. – 3 COPIES
BGC CALGARY – 2 COPIES
BGC VANCOUVER – 1 COPY

BGC ENGINEERING INC.

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Suite 1170–840 7th Ave. S.W.
Calgary, Alberta
Canada T2P 3G2
Tel: (403) 250-5185
Fax: (403) 250-5330

Project No. 0256-002-01
Date: December 11, 2000

Mr. David Hohnstein, C.E.T
Environmental Co-ordinator
Echo Bay Mines Ltd.
9818 Edmonton International Airport
Edmonton, Alberta
T5J 2T2

Re: Thermistor Installation Report, Tailings Containment Area, Lupin Mine, Nunavut

Dear Dave:

Attached are 3 copies of our above referenced report. This documents the installation of five thermistor cables at Lupin Mine. Four more thermistor cables are still to be installed.

Should you have any questions or comments, please do not hesitate to contact me at the number listed above.

Yours truly,
BGC Engineering Inc.
per:

Gerry Ferris

Gerry Ferris, M.Sc., P.Eng. (AB)
Geotechnical Engineer

Enclosures
GWF/sf

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 FIELD PROGRAM 1

2.1 Thermistor Supply 1

2.2 Installation Procedures 2

2.3 Drilling Program 3

3.0 INSTALLATION SUMMARY 5

4.0 SUMMARY AND RECOMMENDATIONS 6

5.0 CLOSURE 7

Tables

Table 1 Summary of the Thermistor Installations 5

Table 2 Thermistor Locations 6

Figures

Appendix 1 - Calibration Sheets

Appendix 2 - Daily Drilling Reports

Appendix 3 - Thermistor Plots

LIMITATIONS OF REPORT

This report was prepared by BCG Engineering Inc. (BGC) for the account of Echo Bay Mines Ltd. The material in it reflects the judgement 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.

As a mutual protection to our client, the public, and ourselves, all reports and drawings are submitted for the confidential information of our client for a specific project and authorization for use and / or publication of data, statements, conclusions or abstracts from or regarding our reports and drawings is reserved pending our written approval.

1.0 INTRODUCTION

Lupin Mine, owned and operated by Echo Bay Mines Ltd., is located north-east of Yellowknife on Contwoyto Lake, at approximately 65°46'N and 111°14'W, as shown in Figure 1. The tailings facilities at Lupin Mine are located approximately 5 km to the south east of the mill area. The containment elements in the tailings area consists of a number of low embankments. The embankments 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, as shown on Figure 2.

The granular embankment dams use a combination of geosynthetic liner and permafrost aggradation to reduce seepage potential through and under the dams. Thermistors had previously been installed to monitor the subsurface thermal regime in the dams and foundation materials. Over time, the thermistors installed in the perimeter dams have stopped functioning. In August, 2000 only the four thermistors installed in Dam 4 were operational. Therefore in September of 2000, Lupin Mine retained BGC Engineering Inc. (BGC) to install thermistors in the two main water retaining permimeter dams, Dams 1A and 2. In addition to the thermistors proposed for the perimeter dams, Lupin Mine requested that a thermistor be installed in the internal M Dam, in the cover material within Cell 1 and within the natural soil at the Finger Lake esker.

Within the current abandonment plan for Lupin Mine, it is proposed to cover the tailings with a sufficient thickness of material that the underlying tailings remain frozen. A small test area was constructed in the Summer of 2000, which consisted of placing a 1 m thick lift of esker material over the previous lift. Lupin Mine requested that a thermistor be installed in the test area to determine the depth of the active layer for this thickness of cover material. In addition, Lupin Mine requested that one thermistor be installed in the Finger Lake esker to determine the depth of the active layer in the esker material.

This report provides a summary of the field program undertaken, the installation procedures used and the subsurface conditions encountered. In addition, the as-built co-ordinates are provided, along with some follow-up recommendations.

2.0 FIELD PROGRAM

2.1 Thermistor Supply

Nine thermistors were required for this program; eight were ordered and one was available on site from a previous 1995 installation program. Three thermistors were proposed for Dam 1A, three for Dam 2, one for M Dam, one for Cell 1 and one for the esker.

The eight new thermistors for the program were purchased from M-squared Instruments of Cochrane, Alberta. These cables use YSI 44007 type thermistors (0.2°C accuracy) and each cable was calibrated in an ice-water bath prior to shipment. A copy of the thermistor calibration for each of the thermistor strings was provided to both BGC and mine personnel, and is included in Appendix 1. The purchased strings consisted of:

- 6 – 20 m long strings with beads at 1, 2, 3, 4, 5, 6, 8, 10, 15 and 20 m for a total of 10 beads.
- 1 – 20 m long string with beads at 0, 0.5, 1, 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10, 15 and 20 m for a total of 14 beads.
- 1 – 20 m long string with beads at –1, 0, 0.25, 0.5, 0.75, 1, 1.25, 1.5, 1.75, 2, 2.25, 2.5, 5, 10, 15 and 20 m for a total of 16 beads.

The one thermistor that was onsite form the 1995 program, also purchased from M-squared, was 13 m long and had beads located at –1, 0, 0.25, 0.5, 0.75, 1, 1.25, 1.5, 1.75, 2, 2.25, 2.5, 2.75, 3, 5, 8 and 13 for a total of 16 beads. No calibration sheet was available for this thermistor cable.

2.2 Installation Procedures

The borehole drilling was performed using a Power Track, CHA 1100 drilling machine owned by Echo Bay Mines Ltd. This type of drill advances the bit and the rods into the ground through a combination of rotation and percussion. The drill cuttings are cleaned from the hole through a combination of compressed air from the head of the drill bit and a vacuum applied at the top of the borehole. Two photos taken during the drilling program, of the drill and a close up of the drill head are included on Figure 3.

With this drill, the successful drilling of a borehole was very dependent on the nature of the soils. If the subsurface conditions were either soft, dry or very wet, then slough would occur into the hole blocking it. The amount of sloughing following removal of the rods determined if the installation was successful or not.

Given the drilling method used, it was not possible to observe any undisturbed samples of the subsurface ground conditions. As such, only cuttings were returned to the surface and hence, field logging was limited to major soil type along with an approximate depth of the overburden/bedrock contact. Given the drilling method, it was also not possible to log the subsurface for any indications of ground ice. The approximate depth to bedrock is noted in Table 1.

Immediately following drilling, when the hole remained open, PVC threaded casing was installed into the hole. Later, the thermistor strings were installed inside these 20 mm inside diameter Schedule 40 PVC pipe. The joints had silicon grease applied to the threads prior to tightening. The top of the PVC casings were sealed at the surface with silicone to prevent water infilling the casing.

Of the nine locations where an attempt was made to install a thermistor five were successfully completed. At the four locations where the thermistor installations were not successful the hole sloughed in blocking the hole. All of the holes that were drilled were backfilled; different backfilling procedures were used for various locations as noted below.

Boreholes drilled in the dams were backfilled according to the following procedure:

- Approximately the lower most 1.5 m was backfilled with cuttings,
- Grout was poured into the holes from the top and the grout was brought up to approximately 1 m below the ground surface,
- Cuttings were placed into the upper one meter of the hole,
- Bentonite chips were used to fill the upper most approximately 0.25 m of the hole.

Boreholes drilled at the esker were backfilled with sand taken from the surface of the esker.

Boreholes attempted in the Cell 1 area were backfilled with sand and gravel taken from the surface of the area and drill cuttings. The holes were on average 1 m depth following sloughing.

Boreholes that were attempted in the dams but sloughed in prior to installation of the casing were backfilled with a combination of grout and drill cuttings.

2.3 Drilling Program

The drilling program, which consisted of the installation of five thermistor strings and attempts at four other installations, was completed between November 7, 2000 and November 13, 2000. The drill rig was used between November 8, 2000 and November 10, 2000. Mr. Ferris of BGC was on-site during this program.

During the installation program, a daily drilling report was prepared and submitted to mine site personnel and these are attached in Appendix 2. The information contained in the daily drilling report included; date of the installation, depth of the installation, thermistor number, working hours, weather conditions and other pertinent information on the progress of the installation program.

The following is a summary of the drilling program, which includes both the thermistors successfully installed and the attempted installations. Figures 4 and 5 display the locations of the successfully installed thermistors at Dams 1A and 2.

D1A-00-1 – This borehole is located south of the siphons on the crest of Dam 1A, as shown on Figure 4. The installation was successful on the upstream side of the crest. Two attempts were made on the downstream side of the crest, but soft drilling conditions were encountered in the upper portion of the dam and sloughing filled the hole between a depth of 3 m and 4 m.

D1A-00-2 – This installation is located north of the siphons on the crest of Dam 1A, as shown in Figure 4. It was successfully installed on the upstream side of the crest on the first attempt.

D1A-00-3 – This installation was attempted on the upstream toe of Dam 1A, located directly downslope from D1A-00-2. This installation was not successful following two attempts at drilling the hole. A wet zone was encountered at approximately 5 m depth. Attempts at cleaning out the sloughed material brought soft wet material to the surface. The hole continued to slough into the borehole from this wet zone.

D2-00-1 – This installation was attempted on the downstream toe of Dam 2, located directly downslope from D2-00-2, as shown in Figure 5. Two attempts were made at drilling in this location. Drilling conditions were soft, with sand and silt sized particles noted in the cuttings. Upon first attempt, the cuttings were dry, but following completion of the hole, it sloughed in at a depth of 4 m. Attempts at cleaning the sloughed material from the hole brought some wet material to the surface. Following this initial attempt at cleaning, the material that sloughed in the borehole was wet, with some free water noted on the surface of the sloughed material.

D2-00-2 – This installation was successfully installed on the upstream side of the crest of Dam 2, as shown on Figure 5.

D2-00-3 – This installation was successfully completed on the upstream side of the crest of Dam 2, as shown on Figure 5. The first attempt at this location was on the downstream side of the crest, and was unsuccessful due to soft, dry soil sloughing into the hole between a depth of 3 to 4 m.

MD-00-1 – This installation was attempted on both the upstream and downstream side of the crest of the newly raised M Dam. The drilling conditions were very soft in the upper 4 m of the holes. Soft dry ground sloughed into the holes at depths between 3 m and 4 m.

C1-00-1 – This installation was attempted near the existing TC1-5 on a newly raised pad of esker material. Three attempts were made at installing the thermistor at this location. The drilling conditions were very soft, and the holes sloughed in to approximately 1 m depth. During the first attempt, with the drill bit at an approximate depth of 9 m, thawed tailings moved up into the center of the rods, plugging them.

E-00-1 – Two successful holes were drilled at the esker. The first hole was located north of the main road (UTM 12488238, W7289853) and it encountered bedrock at a depth of 4 m. The second hole, where the thermistor was installed, was located further south (UTM 12490982, W 7286642) and encountered bedrock at a depth of 12.8 m.

Following grouting, on November 12, 2000, the five installed thermistors were read and the temperatures were determined. The initial temperature plots for these thermistors are included in Appendix 3. An Excel spread sheet was created for the thermistors, including the calibration data and initial data set was provided to mine personnel.

3.0 INSTALLATION SUMMARY

As outlined in the previous section only five of the proposed nine thermistor strings could be installed during the November drilling program. A summary of the thermistor installation program is given in Table 1. The co-ordinates of the installations and the attempted installations are given in Table 2.

Table 1 Summary of the Thermistor Installations

Borehole	Thermistor Number	Installation Date	Approx. Depth to Bedrock	Depth of Installation	Comments
D1A-00-1	0256-002-4	9 Nov 2000	16 m ±	18.80 m	
D1A-00-2	0256-002-5	9 Nov 2000	8.5 m	19.98 m	
D1A-00-3		Not installed	N/A	N/A	Wet, sloughing
D2-00-1		Not installed	N/A	N/A	Wet, sloughing
D2-00-2	0256-002-2	8 Nov 2000	6 m ±	20.03 m	
D2-00-3	0256-002-3	8 Nov 2000	?	19.80 m	
MD-00-1		Not installed	N/A	N/A	soft dry soils, sloughing
C1-00-1		Not installed	N/A	N/A	soft dry soils, sloughing. soft wet soils plugging rods
E-00-2	1995 Therm	10 Nov 2000	12.8 m	17 m	

Table 2 Thermistor Locations

Borehole	Thermistor Number	Northing	Easting
D1A-00-1	0256-002-04	12485985	W7289706
D1A-00-2	0256-002-05	12485920	W7289785
D1A-00-3	not installed	12485939	W7289793
D2-00-1	not installed	12486261	W7290420
D2-00-2	0256-002-02	12485920	W7289785
D2-00-3	0256-002-03	12486322	W7290481
MD-00-1	not installed	12487129	W7290087
C1-00-1	not installed	12488238	W7289853
E-00-1	1995 therm	12490982	W7286642

The location and elevation of the thermistor installations and attempted installations were determined using a hand held GPS unit. The reference datum used in this survey was NAD 83. The reported co-ordinates for the installation was established using a minimum of three satellites, but should only be considered actuate to within 6 m. It is recommended that on site survey staff determine the location and elevation of each thermistor.

The approximate locations of the thermistors installed on Dam 1A and Dam 2 are shown in Figures 4 and 5 respectively.

4.0 SUMMARY AND RECOMMENDATIONS

Five thermistors were installed during this program; two in the crest of Dam 1A, two in the crest of Dam 2 and one in the Fingers Lake esker. The thermistors installed re-establishes the ability of Lupin Mine to monitor the temperature of these two dams. The thermistors were installed within a protective PVC casing in an attempt to protect the string from the effects of water during freeze/thaw cycles.

The following recommendations are made:

- Mine site staff should undertake a survey of all of the new thermistor locations installed. This data should be forwarded to BGC,
- Following spring thaw, the protective quadropods should be moved to protect the new installations,
- The quadropods should be relabeled with the appropriate information,
- Monitoring of the thermistors should be performed monthly, at a minimum. During spring time thawing conditions, reading every two weeks would be useful,
- The end connector of each thermistor cable should be protected from the elements with an end cap and/or other form of protective cover,

- It is expected that some settlement will occur in the spring at the location of the installed thermistors and the attempted locations. These settlement locations should be backfilled with bentonite chips to ensure the water does not pond and/or infiltrate at these locations.

The four thermistors that could not be installed during the November program, should be installed during a future program, especially the cables at the toes of Dam 1A and 2. At these locations (upstream toe of Dam 1A and downstream toe of Dam 2), wet ground was encountered, which may indicate thawed conditions. It is recommended that if the same type of drill rig is used to install these to thermistors, that the installation program be performed in the springtime, when the ground conditions are the coldest.

5.0 CLOSURE

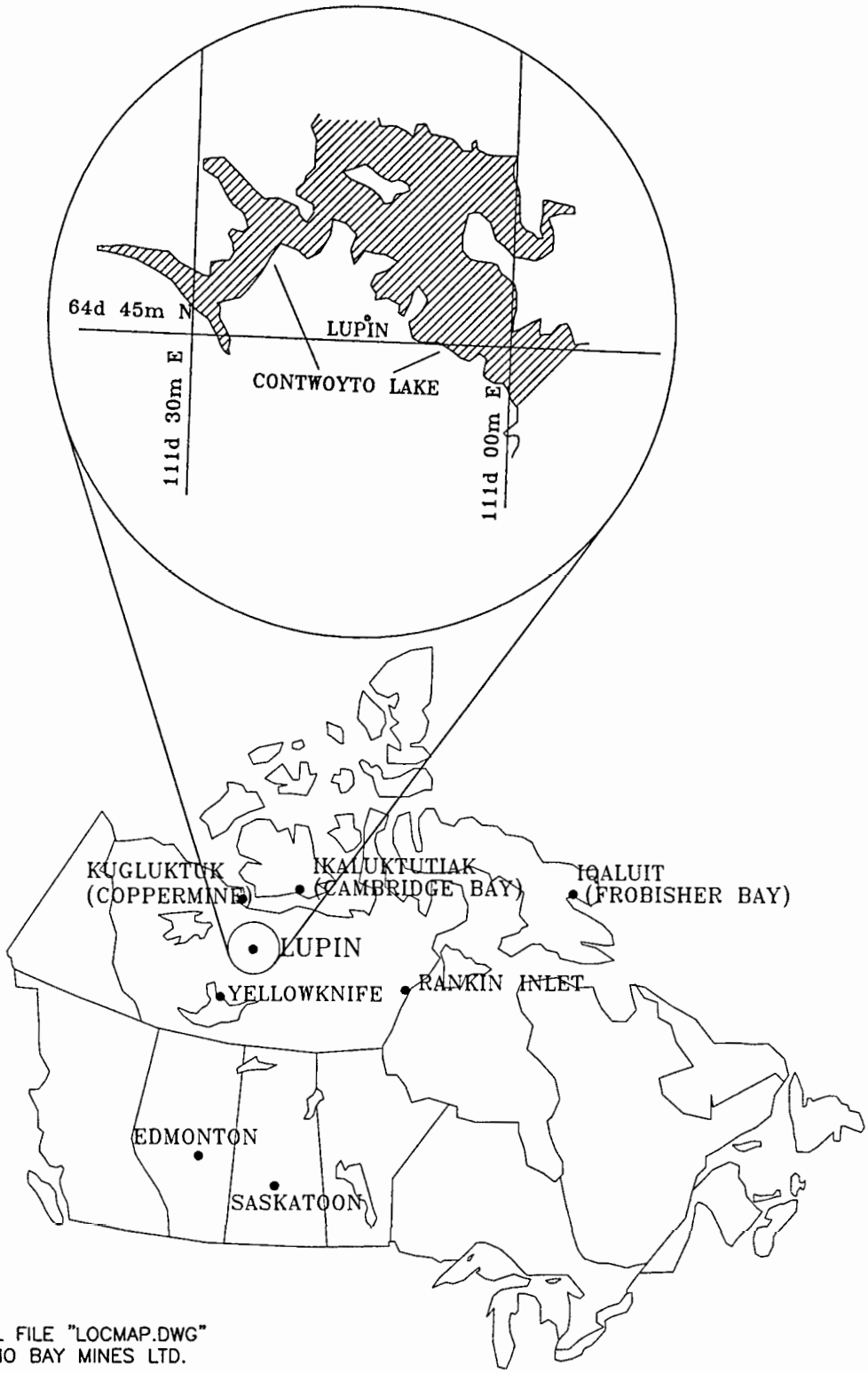
We trust the report provided herein meets your present requirements and we thank Echo Bay Mines Ltd. for the opportunity to be of service at Lupin Mine. If you have any questions or require additional information, please contact the undersigned.

Respectfully submitted,
BGC Engineering Inc..
Per:

Gerry Ferris, M.Sc., P.Eng. (AB)
Geotechnical Engineer

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

Figures



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

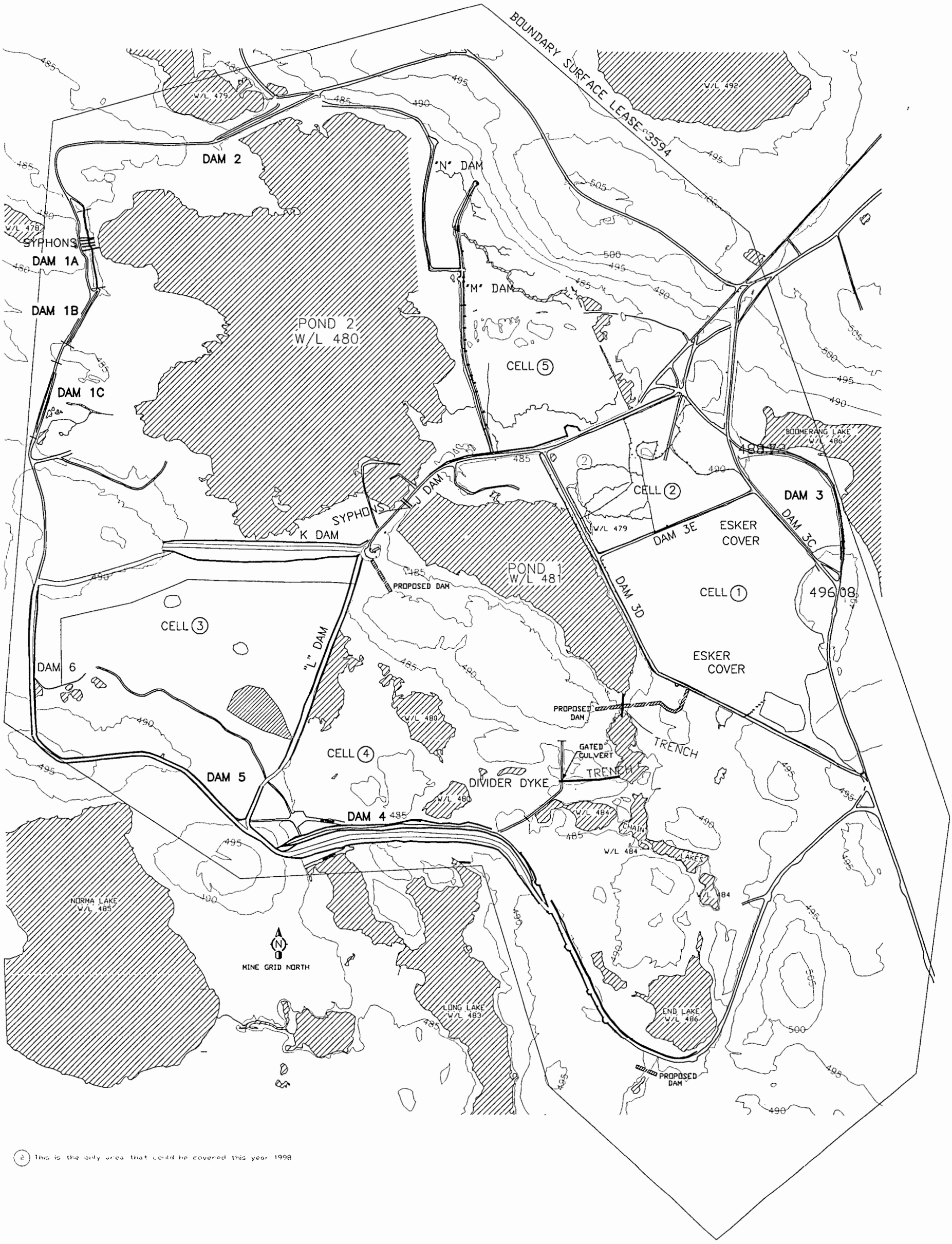
SCALE:	N.T.S.	DESIGNED:	JWC
DATE:	AUG 2000	CHECKED:	JWC
DRAWN:	MT	APPROVED:	JWC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, AB. Phone: (403) 250-5185

PROJECT: THERMISTOR INSTALLATION PROGRAM

TITLE: LUPIN MINE LOCATION MAP

CLIENT:	PROJECT No.	DWG. No.	REV.
ECHO BAY MINES LTD.	0256-002-01	FIGURE 1	



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

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

REV.	DATE	REVISION	DRAWN	CHECKED	APPROVED

SCALE:	1 : 12 500
DATE:	AUG 2000
DRAWN:	MT
DESIGNED:	JWC
CHECKED:	JWC
APPROVED:	JWC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, AB Phone: (403) 250-5185

PROJECT: THERMISTOR INSTALLATION PROGRAM

TITLE: TAILINGS CONTAINMENT AREA PLAN

CLIENT: ECHO BAY MINES LTD.

PROJECT No.: 0256-002-01

DWG. No.: FIGURE 2

REV.:

Photo 1 - Drilling at downstream toe of Dam 2

Photo 2 - Close up of drill head

SCALE: As shown	DESIGNED: GWF
DATE: December 2000	CHECKED: GWF
DRAWN: SLF	APPROVED: GWF

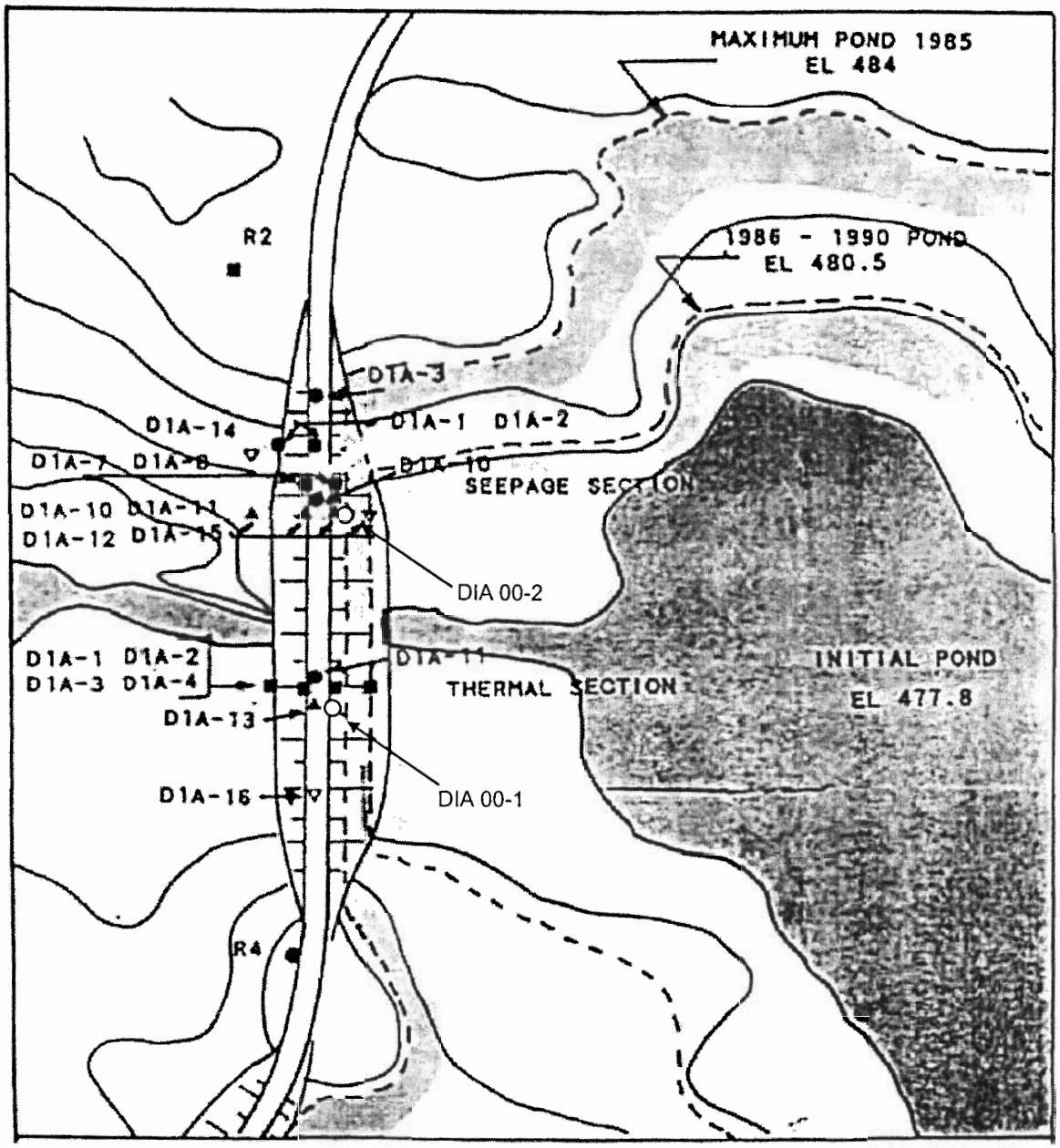
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, AB Phone (403) 250-5185

PROJECT: Thermistor Installations

TITLE: Drill Photos

CLIENT: ECHO BAY MINES LTD.

PROJECT No.	DWG No.	REV.
0256-002-01	Figure 3	0.



LEGEND

THERMISTOR INSTALLATION DATES

● 1982 ▲ 1985 ○ 2000

■ 1983 ▽ 1988

Note:

1. Drawing taken from Geocon Inc. Report "Thermal Performance of earth structures at Lupin Mine, Contwoyto Lake, NWT" Dated September, 1990.

SCALE: As shown		DESIGNED: GWF
DATE: December 2000		CHECKED: GWF
DRAWN: SLF		APPROVED: GWF

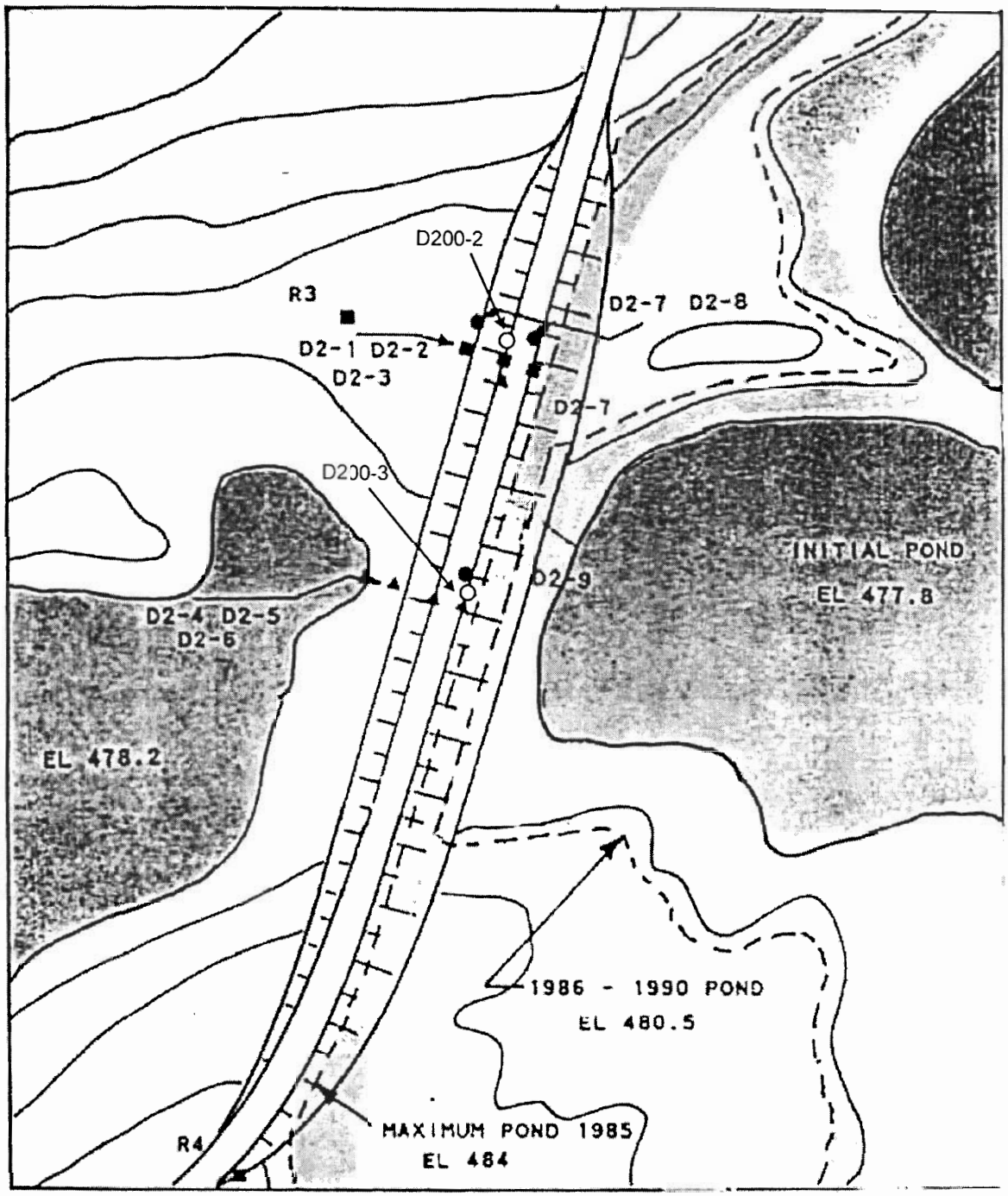
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, AB Phone (403) 250-5185

PROJECT: Thermistor Installation

TITLE: Thermistor Locations - Dam 1A

CLIENT: ECHO BAY MINES LTD.

PROJECT No.	DWG No.	REV.
0256-002-01	Figure 4	0.



LEGEND

THERMISTOR INSTALLATION DATES

- ● 1982
- ▲ 1985
- ■ 1983
- O 2000

Note:

1. Drawing taken from Geocon Inc. Report "Thermal Performance of earth structures at Lupin Mine, Contwoyto Lake, NWT" Dated September, 1990.

SCALE: As shown	DESIGNED: GWF
DATE: December 2000	CHECKED: GWF
DRAWN: SLF	APPROVED: GWF

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, AB Phone (403) 250-5185

PROJECT: Thermistor Installation

TITLE: Thermistor Locations - Dam 2

CLIENT: ECHO BAY MINES LTD.

PROJECT No.	DWG No.	REV.
0256-002-01	Figure 5	0.

Calibration Sheets

M-Squared Instruments

144 West Terrace Cres.
Cochrane, AB. T0L-0W4

Ph. 403-932-3448
Fx. 403-932-6597

Thermistor Cable Data Sheet

Customer: Bruce Geotechnical Consultants Inc.
1170 - 840 7 Ave. SW, Calgary, AB. T2P-3G2.
Contact: Gerry Ferris
Project: Lupin
Date Ordered: Sept. 14, 2000
Purchase Order No.: Gerry Ferris

Serial No.: BGC 0256-002-01
Total Length: 30
Lead Length: 10
Termination: AMP CPC 206838-2
Thermistor Type: YSI 44007
No. of Thermistors: 10
One Point Calibration: Yes
Number of Cables in Order: 8

Shielded Flex Conduit
Molded: No

T. No.	Colour Code	Depth	Connector Pin Number	kOhms @ 0 deg. C.
1	RD	1.00	1	16.31
Com.	BN		24	
2	GY	2.00	2	16.34
Com.	BK		24	
3	WH	3.00	3	16.27
Com.	BU		24	
4	PU	4.00	4	16.25
Com.	BN		24	
5	OR	5.00	5	16.31
Com.	GN		24	
6	YW	6.00	6	16.3
Com.	BU		24	
7	GY	8.00	7	16.25
Com.	RD		24	
8	BK	10.00	8	16.31
Com.	WH		24	
9	PU	15.00	9	16.33
Com.	GY		24	
10	GN	20.00	10	16.31
Com.	BU		24	

M-Squared Instruments

144 West Terrace Cres.
Cochrane, AB. T0L-0W4

Ph. 403-932-3448
Fx. 403-932-6597

Thermistor Cable Data Sheet

Customer: Bruce Geotechnical Consultants Inc.
1170 - 840 7 Ave. SW, Calgary, AB. T2P-3G2.
Contact: Gerry Ferris
Project: Lupin
Date Ordered: Sept. 14, 2000
Purchase Order No.: Gerry Ferris

Serial No.: BGC 0256-002-02
Total Length: 23
Lead Length: 3
Termination: AMP CPC 206838-2
Thermistor Type: YSI 44007
No. of Thermistors: 14
One Point Calibration: Yes
Number of Cables in Order: 8

Shielded Flex Conduit
Molded: No

T. No.	Colour Code	Depth	Connector Pin Number	kOhms @ 0 deg. C.
1	RD	1.00	1	16.31
Com.	BN		24	
2	GY	2.00	2	16.33
Com.	BK		24	
3	WH	3.00	3	16.27
Com.	BU		24	
4	PU	4.00	4	16.3
Com.	BN		24	
5	OR	5.00	5	16.31
Com.	GN		24	
6	YW	6.00	6	16.25
Com.	BU		24	
7	GY	8.00	7	16.25
Com.	RD		24	
8	BK	10.00	8	16.27
Com.	WH		24	
9	PU	15.00	9	16.29
Com.	GY		24	
10	GN	20.00	10	16.3
Com.	BU		24	

M-Squared Instruments

144 West Terrace Cres.
Cochrane, AB. T0L-0W4

Ph. 403-932-3448
Fx. 403-932-6597

Thermistor Cable Data Sheet

Customer: Bruce Geotechnical Consultants Inc.
1170 - 840 7 Ave. SW, Calgary, AB. T2P-3G2.
Contact: Gerry Ferris
Project: Lupin
Date Ordered: Sept. 14, 2000
Purchase Order No.: Gerry Ferris

Serial No.: BGC 0256-002-03
Total Length: 23
Lead Length: 3
Termination: AMP CPC 206838-2
Thermistor Type: YSI 44007
No. of Thermistors: 10
One Point Calibration: Yes
Number of Cables in Order: 8

Shielded Flex Conduit
Molded: No

T. No.	Colour Code	Depth	Connector Pin Number	kOhms @ 0 deg. C.
1	RD	1.00	1	16.31
Com.	BN		24	
2	GY	2.00	2	16.34
Com.	BK		24	
3	WH	3.00	3	16.33
Com.	BU		24	
4	PU	4.00	4	16.32
Com.	BN		24	
5	YW	5.00	5	16.29
Com.	BU		24	
6	OR	6.00	6	16.33
Com.	GN		24	
7	GY	8.00	7	16.27
Com.	RD		24	
8	BK	10.00	8	16.27
Com.	WH		24	
9	PU	15.00	9	16.27
Com.	GY		24	
10	GN	20.00	10	16.27
Com.	BU		24	

M-Squared Instruments

144 West Terrace Cres.
Cochrane, AB. T0L-0W4

Ph. 403-932-3448
Fx. 403-932-6597

Thermistor Cable Data Sheet

Customer: Bruce Geotechnical Consultants Inc.
1170 - 840 7 Ave. SW, Calgary, AB. T2P-3G2.
Contact: Gerry Ferris
Project: Lupin
Date Ordered: Sept. 14, 2000
Purchase Order No.: Gerry Ferris

Serial No.: BGC 0256-002-04
Total Length: 23
Lead Length: 3
Termination: AMP CPC 206838-2
Thermistor Type: YSI 44007
No. of Thermistors: 10
One Point Calibration: Yes
Number of Cables in Order: 8

Shielded Flex Conduit
Molded: No

T. No.	Colour Code	Depth	Connector Pin Number	kOhms @ 0 deg. C.
1	RD	1.00	1	16.24
Com.	BN		24	
2	GY	2.00	2	16.31
Com.	BK		24	
3	WH	3.00	3	16.31
Com.	BU		24	
4	PU	4.00	4	16.24
Com.	BN		24	
5	OR	5.00	5	16.3
Com.	GN		24	
6	YW	6.00	6	16.33
Com.	BU		24	
7	GY	8.00	7	16.33
Com.	RD		24	
8	BK	10.00	8	16.32
Com.	WH		24	
9	PU	15.00	9	16.33
Com.	GY		24	
10	GN	20.00	10	16.33
Com.	BU		24	

M-Squared Instruments

144 West Terrace Cres.
Cochrane, AB. T0L-0W4

Ph. 403-932-3448
Fx. 403-932-6597

Thermistor Cable Data Sheet

Customer: Bruce Geotechnical Consultants Inc.
1170 - 840 7 Ave. SW, Calgary, AB. T2P-3G2.
Contact: Gerry Ferris
Project: Lupin
Date Ordered: Sept. 14, 2000
Purchase Order No.: Gerry Ferris

Serial No.: BGC 0256-002-05
Total Length: 23
Lead Length: 3
Termination: AMP CPC 206838-2
Thermistor Type: *YSI 44007*
No. of Thermistors: 10
One Point Calibration: Yes
Number of Cables in Order: 8

Shielded Flex Conduit
Molded: No

T. No.	Colour Code	Depth	Connector Pin Number	kOhms @ 0 deg. C.
1	RD	1.00	1	16.24
Com.	BN		24	
2	GY	2.00	2	16.22
Com.	BK		24	
3	WH	3.00	3	16.24
Com.	BU		24	
4	PU	4.00	4	16.31
Com.	BN		24	
5	OR	5.00	5	16.27
Com.	GN		24	
6	YW	6.00	6	16.25
Com.	BU		24	
7	GY	8.00	7	16.29
Com.	RD		24	
8	BK	10.00	8	16.3
Com.	WH		24	
9	PU	15.00	9	16.25
Com.	GY		24	
10	GN	20.00	10	16.3
Com.	BU		24	

M-Squared Instruments

144 West Terrace Cres.
Cochrane, AB. T0L-0W4

Ph. 403-932-3448
Fx. 403-932-6597

Thermistor Cable Data Sheet

Customer: Bruce Geotechnical Consultants Inc.
1170 - 840 7 Ave. SW, Calgary, AB. T2P-3G2.
Contact: Gerry Ferris
Project: Lupin
Date Ordered: Sept. 14, 2000
Purchase Order No.: Gerry Ferris

Serial No.: BGC 0256-002-06
Total Length: 23
Lead Length: 3
Termination: AMP CPC 206838-2
Thermistor Type: YSI 44007
No. of Thermistors: 10
One Point Calibration: Yes
Number of Cables in Order: 8

Shielded Flex Conduit
Molded: No

T. No.	Colour Code	Depth	Connector Pin Number	kOhms @ 0 deg. C.
1	RD	1.00	1	16.29
Com.	BN		24	
2	GY	2.00	2	16.32
Com.	BK		24	
3	WH	3.00	3	16.3
Com.	BU		24	
4	PU	4.00	4	16.31
Com.	BN		24	
5	OR	5.00	5	16.33
Com.	GN		24	
6	YW	6.00	6	16.31
Com.	BU		24	
7	GY	8.00	7	16.3
Com.	RD		24	
8	BK	10.00	8	16.31
Com.	WH		24	
9	PU	15.00	9	16.32
Com.	GY		24	
10	GN	20.00	10	16.33
Com.	BU		24	

M-Squared Instruments

144 West Terrace Cres.
Cochrane, AB. T0L-0W4

Ph. 403-932-3448
Fx. 403-932-6597

Thermistor Cable Data Sheet

Customer: Bruce Geotechnical Consultants Inc.
1170 - 840 7 Ave. SW, Calgary, AB. T2P-3G2.
Contact: Gerry Ferris
Project: Lupin
Date Ordered: Sept. 14, 2000
Purchase Order No.: Gerry Ferris

Serial No.: BGC 0256-002-07
Total Length: 23
Lead Length: 3
Termination: AMP CPC 206838-2
Thermistor Type: YSI 44007
No. of Thermistors: 16
One Point Calibration: Yes
Number of Cables in Order: 8

Shielded Flex Conduit
Molded: No

T. No.	Colour Code	Depth	Connector Pin Number	kOhms @ 0 deg. C.
1	RD	-1	1	16.31
2	OR(yw)	0	2	16.3
Com.	GY		24	
3	BK	0.25	3	16.29
4	WH	0.5	4	16.31
5	BU	0.75	5	16.25
6	PU	1	6	16.29
Com.	BN		24	
7	OR	1.25	7	16.32
8	GN	1.5	8	16.27
9	YW	1.75	9	16.32
10	BU	2	10	16.31
Com.	GY		24	
11	RD	2.25	11	16.3
12	BK	2.5	12	16.31
13	WH	5	13	16.29
14	PU	10	14	16.31
Com.	GY		24	
15	GN	15	15	16.29
16	BU	20	16	16.26
Com.	BN(rd)		24	
Com.	YW		24	

M-Squared Instruments

144 West Terrace Cres.
Cochrane, AB. T0L-0W4

Ph. 403-932-3448
Fx. 403-932-6597

Thermistor Cable Data Sheet

Customer: Bruce Geotechnical Consultants Inc.
1170 - 840 7 Ave. SW, Calgary, AB. T2P-3G2.
Contact: Gerry Ferris
Project: Lupin
Date Ordered: Sept. 14, 2000
Purchase Order No.: Gerry Ferris

Serial No.: BGC 0256-002-08
Total Length: 23
Lead Length: 3
Termination: AMP CPC 206838-2
Thermistor Type: YSI 44007
No. of Thermistors: 14
One Point Calibration: Yes
Number of Cables in Order: 8

Shielded Flex Conduit
Molded: No

T. No.	Colour Code	Depth	Connector Pin Number	kOhms @ 0 deg. C.
1	RD	0.0	1	16.3
2	BN	0.5	2	16.3
Com.	GY		24	
3	BK	1.0	3	16.29
4	WH	1.5	4	16.28
5	BU	2.0	5	16.28
6	PU	2.5	6	16.26
Com.	BN		24	
7	OR	3.0	7	16.25
8	GN	4.0	8	16.32
9	YW	5.0	9	16.32
10	BU	6.0	10	16.3
Com.	GY		24	
11	RD	8.0	11	16.31
12	BK	10.0	12	16.32
13	WH	15.0	13	16.31
14	PU	20.0	14	16.33
Com.	GY		24	

TRACEABLE®

Certificate of Calibration for Digital Thermometer

Certificate Number	Model Number	Serial Number
C345446	NEW 4052	20085794

This Electronic Digital Thermometer was calibrated against National Institute of Standards and Technology Traceable Instrumentation. This calibration complies with the requirements of ISO 9000 Certification. All values are in accordance with ITS-90 (International Temperature Scale of 1990).

Calibration Test Information

Test Equipment	Serial Number	Calibration Due Date
HART PRECISION BATH, 7011	56063	06/23/00

NIST Traceable Test Number(s)
256495, ITS-90

Accuracy

Testing was performed on the unit as shown below. Test results are as follows:

Standard °C	Reading °C	Standard °F	Reading °F
0.00	-1.0	32.00	30.2
100.00	99.5	212.00	211.1

ADDITIONAL READINGS

STANDARD °C	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0
READING °C	-1.0	9.1	19.1	29.2	39.2	49.3	59.3	69.4	79.4	89.5	99.5
STANDARD °F	32.0	50.0	68.0	86.0	104.0	122.0	140.0	158.0	176.0	194.0	212.0
READING °F	30.2	48.3	66.4	84.5	102.6	120.7	138.7	156.8	174.9	193.0	211.1

Additional readings are a combination of measured and calculated points, provided for users needing temperature offsets at other than the actual measured points.

The maximum error of this Electronic Digital Thermometer at the time of calibration did not exceed the specified accuracy of: ± 1°C

Test Conditions:	Temperature °C	Relative Humidity %	Barometric Pressure (inHg)
	25.50	44.00	29.94

Maintaining Accuracy

Once measured and calibrated your Electronic Digital Thermometer should maintain it's accuracy. There is no exact way to determine how long calibration will be maintained. Electronics change little, if any at all, but can be affected by aging, temperature, and shock.

Calibration Dates

Factory Calibration Date	Next Calibration Due Date
03/06/00	03/06/02

We recommend that the unit's accuracy be recertified on an annual basis for those users with critical needs such as accreditation demands, government specifications, or ISO 9000 requirements.

Tester's Initials	Metrology Manager
PUL	Wallace Berry

Recalibration

For factory calibration and recertification of this thermometer contact:

Control Company • 308 West Edgewood • Friendswood, Texas 77546 • USA
Phone 281 482-1714 • Fax 281 482-9448.

Control Company is an ISO 9001 Quality Certified Company.
ISO 9001 Certificate No. 97 177

Daily Drilling Reports

BGC ENGINEERING INC.

AN APPLIED EARTH SCIENCES COMPANY

1170, 840 – 7 Avenue SW, Calgary, Alberta, Canada. T2P 3G2
Phone (403) 250-5185 Fax (403) 250-5330

PROJECT MEMORANDUM

To:	**Echo Bay Mines Ltd.**	**Fax No.:**	**(780) 890-8814**
Attention:	**Dave Hohnstein**	**CC:**	**Jim Cassie, BGC**
			(403) 250-5330
From:	**Gerry Ferris**	**Date:**	**November 7, 2000**
Subject:	**Daily Drilling Report**		
No. of Pages (including this page): 2		**Project No:**	**0256-002-01**

1.0 Weather Conditions

Approximately –20°C throughout the day with low cloud cover and a slight wind.

2.0 Drilling and Installations

Gerry Ferris arrived on site at approximately 11:45 pm on November 6, 2000.

The person designated as the operator of the drill rig for the thermistor installation was not on site, but will be ready for drilling on the 8th of November. No drilling and therefore no thermistor installation was performed today.

Table 1 provides the summary of the progress of the thermistor installation program. The borehole number referenced is the designation of the boreholes as provided by mine personnel. The thermistor number referred in table 1 is located on a Brass tag attached to the thermistor string. It should be noted that the elevation given in table 1 has been obtained from a hand held GPS unit and should only be considered as accurate to ± 6 m.

Table 1 Thermistor Installation

Borehole	Thermistor Number	Installation Date	Ground Elevation	Depth to Bedrock	Depth of Installation	Comments
D1A-00-1						
D1A-00-2						
D1A-00-3						
D2-00-1						
D2-00-2						
D2-00-3						
MD-00-1						
C1-00-1						
E-00-1						

3.0 Meetings Held and Decisions Made

As discussed with Dave Hohnstein, one of the thermistors which was originally planned for installation in the cell 1 area, will now be installed in the esker. Installation of the esker thermistor will depend on time constraints of the program. Installation of the esker thermistor is to be performed according to the procedures used to install the thermistor in the cell 1 area.

Due to the cold weather the grout mixing will be performed in a bay of the carpenters building and then transported to the tailings area.

4.0 Other Issues

All the supplies sent to the site and materials needed for the installation's have been located at the mine. A truck is being provided for the drilling program.

BGC ENGINEERING INC.

AN APPLIED EARTH SCIENCES COMPANY

1170, 840 – 7 Avenue SW, Calgary, Alberta, Canada. T2P 3G2
Phone (403) 250-5185 Fax (403) 250-5330

PROJECT MEMORANDUM

To:	**Echo Bay Mines Ltd.**	**Fax No.:**	**(780) 890-8814**
Attention:	**Dave Hohnstein**	**CC:**	**Jim Cassie, BGC**
			(403) 250-5330
From:	**Gerry Ferris**	**Date:**	**November 8, 2000**
Subject:	**Daily Drilling Report**		
No. of Pages (including this page): 3		**Project No:**	**0256-002-01**

1.0 Weather Conditions

Weather conditions were; –26°C at 7:00 am with a slight breeze, temperature continued to remain in the low 20's throughout the day. Low cloud cover throughout the day.

2.0 Drilling and Installations

Drilling started today at Dam 2 using the mine's Power Track (CHA 1100) drill rig. This drill rig advances rods into the ground by a combination of rotation and percussion. The drill cuttings are removed from the hole by air pressure forced through the head of the drill bit. Upon reaching the end of the hole the rods are removed, leaving an open hole.

The three thermistor locations on Dam 2 were drilled, with casings installed at two of the three locations, those on the crest of the dam. Seven pieces of 2.9 m long threaded PVC were placed into the borehole. The hole depth and stickup were measured.

As noted in Section 3.0, the driller and rig was needed to perform other work on Saturday (November 11, 2000) and therefore the grouting of the borehole and installation of the thermistor string was not performed immediately, but will be done at a later date.

The one installation attempted at the downstream toe of Dam 2 was unsuccessful (D2-00-1), this was due to sloughing of wet soils. The driller noted that the soils were soft, until a depth of 12 m, the interpreted depth to bedrock. Upon removal of the rods the hole was sloughed into approximately 4 m depth, where wet soils and free water were encountered. An attempt was made to clean out the hole, which were unsuccessful. A second hole was attempted near the first location with similar results. Approximately 1.5 hours after drilling both holes had sloughed in so that there was only 1 to 1.5 m of open hole, at this time fee water was encountered.

Drilling at D2-00-2 on the downstream side of the crest of Dam 2 was successful on the first attempt. This thermistor location is at the northern end of Dam 2.

Drilling at D3-00-3 was unsuccessful on the downstream side of Dam 2, with sloughing of soft soils at a depths between 3 and 4 m. The thermistor was installed on the upstream side of the crest. During drilling the hole was overdrilled by 4 to 5 m, and then backfilled with cuttings to the appropriate depth. During backfilling the lower length of PVC was stuck in the borehole and lost. The hole was redrilled to the appropriate depth and the installation of casing completed. This thermistor location is near the mid point of Dam 2.

Table 1 provides the summary of the progress of the thermistor installation program. The borehole number referenced is the designation of the boreholes, as provided by mine personnel. The thermistor number referred in table 1 is located on a Brass tag attached to the thermistor string. Elevation data will be provided at a later date, when the thermistor string is installed.

Table 1 Thermistor Installation

Borehole	Thermistor Number	Installation Date	Ground Elevation	Depth to Bedrock	Depth of Installation	Comments
D1A-00-1						
D1A-00-2						
D1A-00-3						
D2-00-1				12 m	no install, 8 Nov 2000	water, sloughing
D2-00-2		8 Nov 2000		6 m		
D2-00-3		8 Nov 2000		?		
MD-00-1						
C1-00-1						
E-00-1						

Drilling started today at 9:45 am and was completed by 4:30 pm. 14 lengths of PVC and 2 threaded end caps were used for the installation of these two casings. In addition two lengths of casing were destroyed during the installation of D2-00-3.

3.0 Meetings Held and Decisions Made

Prior to commencement of drilling Dave Hohnstein and I reviewed the locations for the thermistor for Dam 1A and Dam 2. As discussed, the locations will consist of one thermistor on the crest of the dam on either side of the siphons, and one on the north side of the siphons on the upstream toe of the dam, for Dam 1A. The locations for Dam 2 will consist of two on the crest of the dam, one at the north abutment and the other as a replacement of the existing cross-section. An additional thermistor is to be located on the downstream two of Dam 2 on the existing cross-section.

The mine manager needs the drill on Friday, therefore the drilling program has been slightly altered, the drilling and installation of the PVC casing will be performed but the grouting and installation of the thermistor strings will not be performed until later.

4.0 Other Issues

Dave would like extension to be prepared for the two thermistors to be placed on the toe of dam 1a and 2. The extensions will allow the thermistors to be read from the crest of the dam.

In addition to grouting in the thermistor strings successfully installed, the holes where attempts were made should also be grouted.

BGC ENGINEERING INC.

AN APPLIED EARTH SCIENCES COMPANY

1170, 840 – 7 Avenue SW, Calgary, Alberta, Canada. T2P 3G2
Phone (403) 250-5185 Fax (403) 250-5330

PROJECT MEMORANDUM

To:	**Echo Bay Mines Ltd.**	**Fax No.:**	**(780) 890-8814**
Attention:	**Dave Hohnstein**	**CC:**	**Jim Cassie, BGC**
			(403) 250-5330
From:	**Gerry Ferris**	**Date:**	**November 9, 2000**
Subject:	**Daily Drilling Report**		
No. of Pages (including this page): 3		**Project No:**	**0256-002-01**

1.0 Weather Conditions

Weather conditions were; –22°C at 10:00 am with a 10 knot north wind, temperature continued to remain in the low 20's throughout the day. Low cloud cover throughout the day.

2.0 Drilling and Installations

The three thermistor locations on Dam 1A were drilled, with casings installed at two of the three locations, those on the crest of the dam. Two attempts were made at installing casing for the thermistor to be located at M Dam.

Seven pieces of 2.9 m long threaded PVC were placed into the two boreholes drilled in the crest of Dam 1A. The total hole depth and stickup were measured for these two boreholes.

Drilling at D1A-00-1, which is located on the crest of Dam 1A to the south of the siphons, was installed on the upstream side of the crest. Two attempts were made at installing the thermistor on the downstream side of the crest, but these sloughed at an approximate depth of 3 to 4 m. Sloughing appeared to be due to soft dry soil conditions.

Drilling at D1A-00-2, which is located on the crest of Dam 1A to the north of the siphons, on the upstream side of the crest of Dam 1A was successful on the first attempt.

Drilling at D1A-00-3 was unsuccessful, drilling on the upstream toe of Dam 1A. The driller noted that the soil was soft and wet in the upper 5 m of the borehole. The first attempted borehole was cleaned three times, but the soft wet soils continued to slough into the hole. During the attempted cleaning of the borehole, mud and free water was brought to the surface.

Two attempts were made at installing a thermistor in M Dam, one on each of the upstream and downstream side of the dam. The location of the drilling was previously marked by mine personnel, and is located near the mid point of M Dam. The attempt on the upstream side of the dam encountered very soft drilling conditions, soil sloughed into the hole. The first length of rod and the bit were stuck in the hole, due to sloughing of the sand around the rod. The attempt on the downstream side of the dam also encountered very soft soil conditions, and sloughing. The depth of the sloughing conditions on both the upstream and downstream side of the crest appeared to be within the upper 4 m to 5 m.

Table 1 provides the summary of the progress of the thermistor installation program. The borehole number referenced is the designation of the boreholes, as provided by mine personnel. The thermistor number referred in table 1 is located on a Brass tag attached to the thermistor string. Elevation data will be provided at a later date, when the thermistor string is installed.

Table 1 Thermistor Installation

Borehole	Thermistor Number	Installation Date	Ground Elevation	Depth to Bedrock	Depth of Installation	Comments
D1A-00-1		9 Nov 2000		15 m ?	18.85 m	
D1A-00-2		9 Nov 2000		8.5 m	20.20 m	
D1A-00-3					No install, 9 Nov 2000	Water and sloughing
D2-00-1				12 m	No install, 8 Nov 2000	Water and sloughing
D2-00-2		8 Nov 2000		6 m	20.10 m	
D2-00-3		8 Nov 2000		?	20 .00 m	
MD-00-1						
C1-00-1						
E-00-1						

Drilling started today at 6:30 am and was completed by 4:15 pm. 14 lengths of PVC and 2 threaded end caps were used for the installation of two casings.

3.0 Meetings Held and Decisions Made

All the boreholes and locations where casing was installed should be re-measured for both total depth and stickup. In addition, the location of the boreholes needs to be determined by use of a hand held GPS unit.

One additional attempt to clean out the borehole on M Dam will be made tomorrow.

4.0 Other Issues

The following items remain to complete installation of the thermistor strings:

1. attempt installation at M Dam
2. attempt installation at Cell 1
3. attempt installation at Esker
4. install the strings within the casings
5. grout/backfill the holes
6. determine the co-ordinates of the thermistors

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
1170, 840 – 7 Avenue SW, Calgary, Alberta, Canada. T2P 3G2
Phone (403) 250-5185 Fax (403) 250-5330

PROJECT MEMORANDUM

To:	**Echo Bay Mines Ltd.**	**Fax No.:**	**(780) 890-8814**
Attention:	**Dave Hohnstein**	**CC:**	**Jim Cassie, BGC**
			(403) 250-5330
From:	**Gerry Ferris**	**Date:**	**November 10, 2000**
Subject:	**Daily Drilling Report**		
No. of Pages (including this page): 3		**Project No:**	**0256-002-01**

1.0 Weather Conditions

Weather conditions were; –35°C at 6:00 am, -34°C at 8:00 am and slight breeze, temperatures reached upto high –20's during the day. Conditions were clear in the morning and fogging in during the day.

2.0 Drilling and Installations

A second attempt was made at drilling the thermistor location on M Dam. Attempts were made at drilling the thermistor location in Cell 1. And the thermistor casing was installed in the esker.

Six pieces of 2.9 m long threaded PVC were placed into the one borehole drilled in the esker. The total hole depth and stickup was measured for this borehole.

Drilling at MD-00-1, located on the downstream side of the crest continued from the previous day. The borehole was advanced to its full depth, but on removal of the rods the hole was only open 4.3 m, and upon a second cleaning only open to 3.1 m. Sloughing appeared to be due to soft dry soil conditions.

Drilling in the cell 1 area was located near the existing TC-04 thermistor location. At this location approximately 1 m of esker cover has been added, in 2000, to the previous tailings cover. Drilling at the first borehole advanced to an approximate depth of 8.5 m, when soft soil and water "came up" into the rods filling them and blocking the air flow. Drilling could not continue with the air flow blocked. The material froze into the rods and drilling did not continue until the material frozen in the rods could be thawed out and the rods cleared. The material frozen into the centre of the rods was tailings. Two further attempts at drilling on the raised surface of the cover resulted in extensive sloughing of the surface sand and gravel. The drilling

conditions were very soft, and the soils sloughed into the borehole, leaving approximately 1 m of open hole.

Two separate boreholes were drilled at the esker, the first located to the south of the main road, and a second one approximately 70 m south of the road. Drilling the first hole revealed that there was approximately 4 m of soil cover over bedrock. The second borehole encountered bedrock at 12.3 m. The second borehole had a casing installed to an approximate depth of 17. 3 m depth.

Table 1 provides the summary of the progress of the thermistor installation program. The borehole number referenced is the designation of the boreholes, as provided by mine personnel. The thermistor number referred in table 1 is located on a Brass tag attached to the thermistor string. Elevation data will be provided at a later date, when the thermistor string is installed.

Table 1 Thermistor Installation

Borehole	Thermistor Number	Installation Date	Ground Elevation	Depth to Bedrock	Depth of Installation	Comments
D1A-00-1		9 Nov 2000		15 m ?	18.85 m	
D1A-00-2		9 Nov 2000		8.5 m	20.20 m	
D1A-00-3				unable to determine	No install, 9 Nov 2000	Water and sloughing
D2-00-1				12 m	No install, 8 Nov 2000	Water and sloughing
D2-00-2		8 Nov 2000		6 m	20.10 m	
D2-00-3		8 Nov 2000		unable to determine	20 .00 m	
MD-00-1				5.8 m	No install, 10 Nov 2000	Soft soil and sloughing
C1-00-1				not reached by 8.2 m depth	No install, 10 Nov 2000	Soft soil and sloughing
E-00-1		10 Nov 2000		12.3 m	17 m	

Drilling started today at 6:30 am and was completed by 3:30 pm. 6 lengths of PVC and 1 threaded end caps was used for the installation of one casing.

3.0 Meetings Held and Decisions Made

Today is the last day that the drill rig is available for the thermistor program. Any drilling needs to be completed today. Therefore attempts need to be made at all of the proposed locations.

As discussed with Dave Hohnstein the surface drill used during this drilling program has been sold, and will be leaving the site on the winter road this year. The latest the rig will be available to work on a follow –up program will be March.

As discussed with Dave Hohnstein, and noted in section 2, two boreholes were drilled at the esker. The first one which was located to the south of the main road encountered bedrock at approximately 4 m depth. The purpose of installing a thermistor at the esker was to determine the depth of active layer development in the esker material. Therefore a second borehole was drilled in order to measure a greater thickness of the esker material.

4.0 Other Issues

Following drilling of the two boreholes at the esker the co-ordinates of each hole and the elevation of the boreholes were determined by a hand held GPS unit. The co-ordinates of the first hole are UTM 12490982, W 7286814 with an elevation of 483 m. At this hole bedrock was encountered at a depth of 4 m. The co-ordinates of E-00-1 were determined to be UTM 12490974, W 7286642 with an elevation of 486 m. At this hole the bedrock was encountered at a depth of 12.3 m. It should be noted that these two boreholes should be surveyed by conventional survey. Note: By inspection the elevation of E-00-1 is slightly less than that of the first hole, not 3 m higher.

The following items remain to complete installation of the thermistor strings:
1. install the strings within the casings
2. grout/backfill the holes
3. determine the co-ordinates of the thermistors

BGC ENGINEERING INC.

AN APPLIED EARTH SCIENCES COMPANY

1170, 840 – 7 Avenue SW, Calgary, Alberta, Canada. T2P 3G2
Phone (403) 250-5185 Fax (403) 250-5330

PROJECT MEMORANDUM

To:	**Echo Bay Mines Ltd.**	**Fax No.:**	**(780) 890-8814**
Attention:	**Dave Hohnstein**	**CC:**	**Jim Cassie, BGC**
			(403) 250-5330
From:	**Gerry Ferris**	**Date:**	**November 11, 2000**
Subject:	**Daily Drilling Report**		
No. of Pages (including this page): 3		**Project No:**	**0256-002-01**

1.0 Weather Conditions

Weather conditions were; -25°C with light winds. Weather warmed throughout the day, conditions were overcast.

2.0 Drilling and Installations

The following tasks were completed today:

- Measurement of the total hole depth
- Measurement of the PVC casing stick-up
- Installation of the thermistor strings
- Placement and compaction of approximately 1.5 m of cuttings at each thermistor installation
- Backfilling of thermistor E-00-1
- Placement of the initial 20 to 40 litres of grout for thermistors on Dams 1A and 2
- An initial reading was collected at the E-00-1 thermistor.

Table 1 provides the summary of the progress of the thermistor installation program. The borehole number referenced is the designation of the boreholes, as provided by mine personnel. The thermistor number referred in table 1 is located on a Brass tag attached to the thermistor string. Elevation data was obtained from a hand held GPS system, and its stated accuracy is ±6 m. The elevation of the thermistors should be determined by a conventional survey.

Table 1 Thermistor Installation

Borehole	Thermistor Number	Installation Date	Ground Elevation	Depth to Bedrock	Depth of Installation	Comments
D1A-00-1	0256-002-4	9 Nov 2000	468 m	15 m ?	18.85 m	
D1A-00-2	0256-002-5	9 Nov 2000	480 m	8.5 m	20.20 m	
D1A-00-3				unable to determine	No install, 9 Nov 2000	Water and sloughing
D2-00-1				12 m	No install, 8 Nov 2000	Water and sloughing
D2-00-2	0256-002-2	8 Nov 2000	477 m	6 m	20.10 m	
D2-00-3	0256-002-3	8 Nov 2000	486 m	unable to determine	20 .00 m	
MD-00-1				5.8 m	No install, 10 Nov 2000	Soft soil and sloughing
C1-00-1				not reached by 8.2 m depth	No install, 10 Nov 2000	Soft soil and sloughing
E-00-1	1995 Therm	10 Nov 2000	480 m	12.3 m	17 m	

Table 2 is a summary of the total borehole depth, measured casing stick-up, measured length of thermistor string installed (measured according to top of pipe) and the co-ordinates of the installed thermistors. All dimensions given in table 2 are in metres.

Table 2 Thermistor installation measurements

Borehole	Total Depth	Stick-up	Installed Length	Co-ordinates	Co-ordinates	Elevation
D1A-00-1	18.80	1.60	20.63	12485985	W7289706	468
D1A-00-2	19.98	0.21	20.50	12485939	W7289793	480
D2-00-2	20.03	0.38	20.52	12486322	W7290481	477
D2-00-3	19.80	0.26	20.30	12486278	W7290408	480
E-00-1	17.26	0.20	14.50	12490982	W7286642	480

The casing for E-00-1 was backfilled with a combination of drill cuttings and coarse sand taken from the surface of the esker.

Two 40 kg bags of type 30 cement and 1/3 25 kg bag of bentonite gel were used in preparing the grout used.

3.0 Meetings Held and Decisions Made

Upon a complete inspection of the 1995 thermistor, bought in 1995 and stored on site until now, it was discovered that the thermistor string was 14 m total length when measured from the first to the last bead location. As discussion with Dave Hohnstein, this thermistor will be suspended in the 17 m long casing.

4.0 Other Issues

The following items remain to complete installation of the thermistor strings:

1. grout/backfill the boreholes
2. collect an initial reading for each thermistor string
3. move a quadropod to the esker where it will mark the thermistor location

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
1170, 840 – 7 Avenue SW, Calgary, Alberta, Canada. T2P 3G2
Phone (403) 250-5185 Fax (403) 250-5330

PROJECT MEMORANDUM

To:	Echo Bay Mines Ltd.	Fax No.:	(780) 890-8814
Attention:	Dave Hohnstein	CC:	Jim Cassie, BGC
			(403) 250-5330
From:	Gerry Ferris	Date:	November 12, 2000
Subject:	Daily Drilling Report		
No. of Pages (including this page): 1		Project No:	0256-002-01

1.0 Weather Conditions

Weather conditions were; -9°C with 30 knot winds. Temperature cooled off throughout the day to –22.5°C and the wind reduced.

2.0 Drilling and Installations

The following tasks were completed today:

- Completed grouting of D2-00-2, D2-00-3 and D1A-00-1
- Grouted and backfilled the attempted thermistor locations associated with the D1A-00-1 and D2-00-3.

Materials used for the grouting today consisted of four and half 40 kg bags of type 30 cement, one 25 kg bag of bentonite gel and two thirds 25 kg bag of bentonite pellets were used in the grouting and backfilling.

3.0 Meetings Held and Decisions Made

Due to the high winds throughout the night snow drifting had occurred, winds remained strong until approximately 11:00 am. Due to the windy conditions work did not begin until light.

4.0 Other Issues

The following items remain to complete installation of the thermistor strings:

1. grout/backfill the boreholes
2. collect an initial reading for each thermistor string
3. move a quadropod to the esker where it will mark the thermistor location

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
1170, 840 – 7 Avenue SW, Calgary, Alberta, Canada. T2P 3G2
Phone (403) 250-5185 Fax (403) 250-5330

PROJECT MEMORANDUM

To:	**Echo Bay Mines Ltd.**	**Fax No.:**	**(780) 890-8814**
Attention:	**Dave Hohnstein**	**CC:**	**Jim Cassie, BGC**
			(403) 250-5330
From:	**Gerry Ferris**	**Date:**	**November 13, 2000**
Subject:	**Daily Drilling Report**		
No. of Pages (including this page): 1		**Project No:**	**0256-002-01**

1.0 Weather Conditions

Weather conditions were; -15°C to -24°C with light winds and fog.

2.0 Drilling and Installations

The following tasks were completed today:
- Completed grouting/backfilling of the remaining boreholes
- Collected an initial reading set from all the thermistors

Materials used for the grouting today consisted of three 40 kg bags of type 30 cement, two thirds of a 25 kg bag of bentonite gel and one half of a 25 kg bag of bentonite pellets were used in the grouting and backfilling.

3.0 Meetings Held and Decisions Made

None noted.

4.0 Other Issues

Scheduled to leave Lupin on tonight's plane.

The following items remain to complete installation of the thermistor strings:
1. move a quadropod to the esker where it will mark the thermistor location

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
1170, 840 – 7 Avenue SW, Calgary, Alberta, Canada. T2P 3G2
Phone (403) 250-5185 Fax (403) 250-5330

PROJECT MEMORANDUM

To:	**Echo Bay Mines Ltd.**	**Fax No.:**	**(780) 890-8814**
Attention:	**Dave Hohnstein**	**CC:**	**Jim Cassie, BGC**
			(403) 250-5330
From:	**Gerry Ferris**	**Date:**	**November 14, 2000**
Subject:	**Daily Drilling Report**		
No. of Pages (including this page): 1		**Project No:**	**0256-002-01**

1.0 Weather Conditions

Weather conditions were; -19°C with light winds and fog.

2.0 Drilling and Installations

The following tasks were completed today:

- Moved the quadropod over the thermistor located at the esker, E-00-1

3.0 Meetings Held and Decisions Made

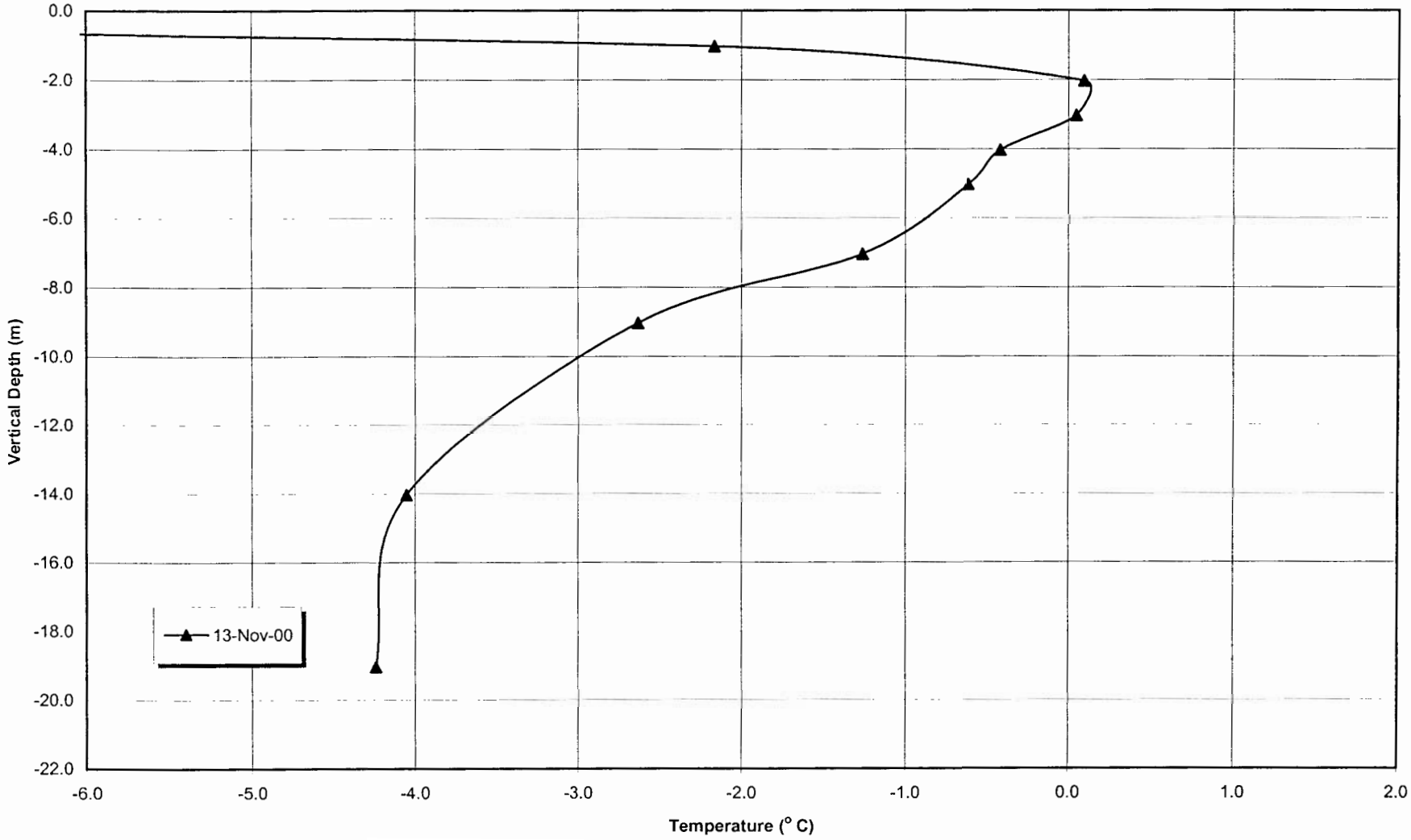
None noted.

4.0 Other Issues

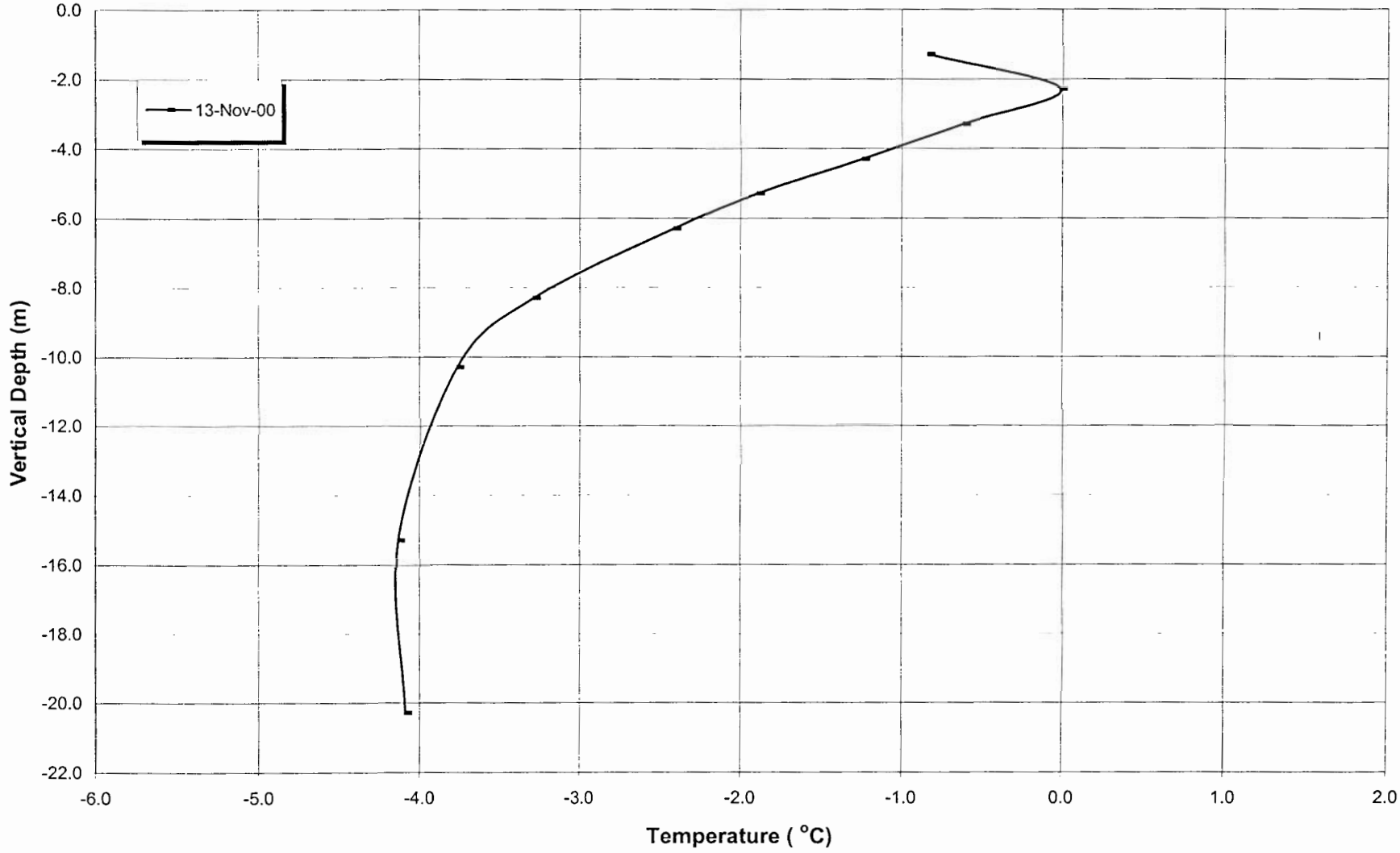
Scheduled to leave Lupin on tonight's plane.

Thermistor Plots

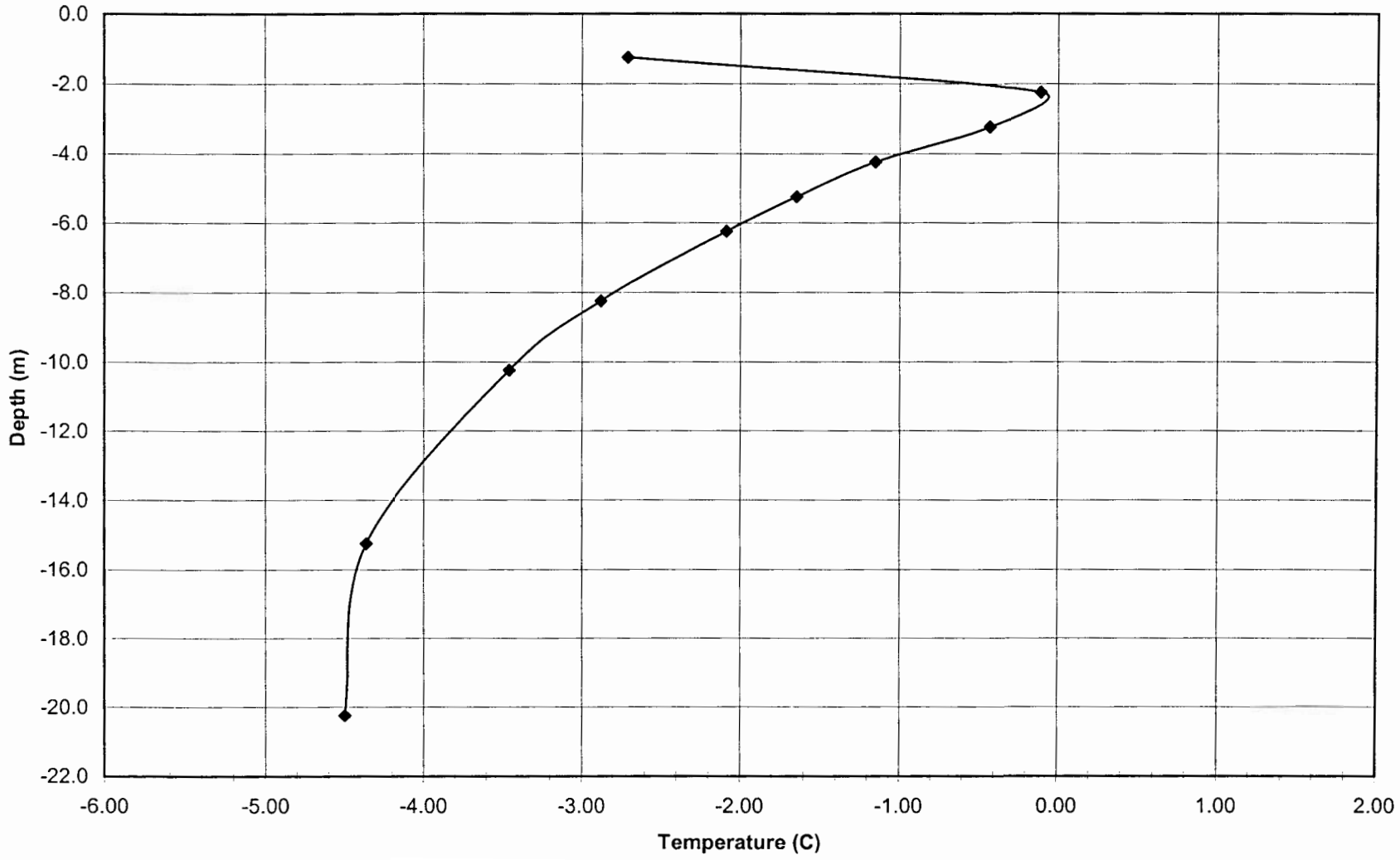
Thermistor D1A-00-01 - Installed November 9, 2000
(Vertical Thermistor installed on the crest of Dam 1A, south of Siphons)



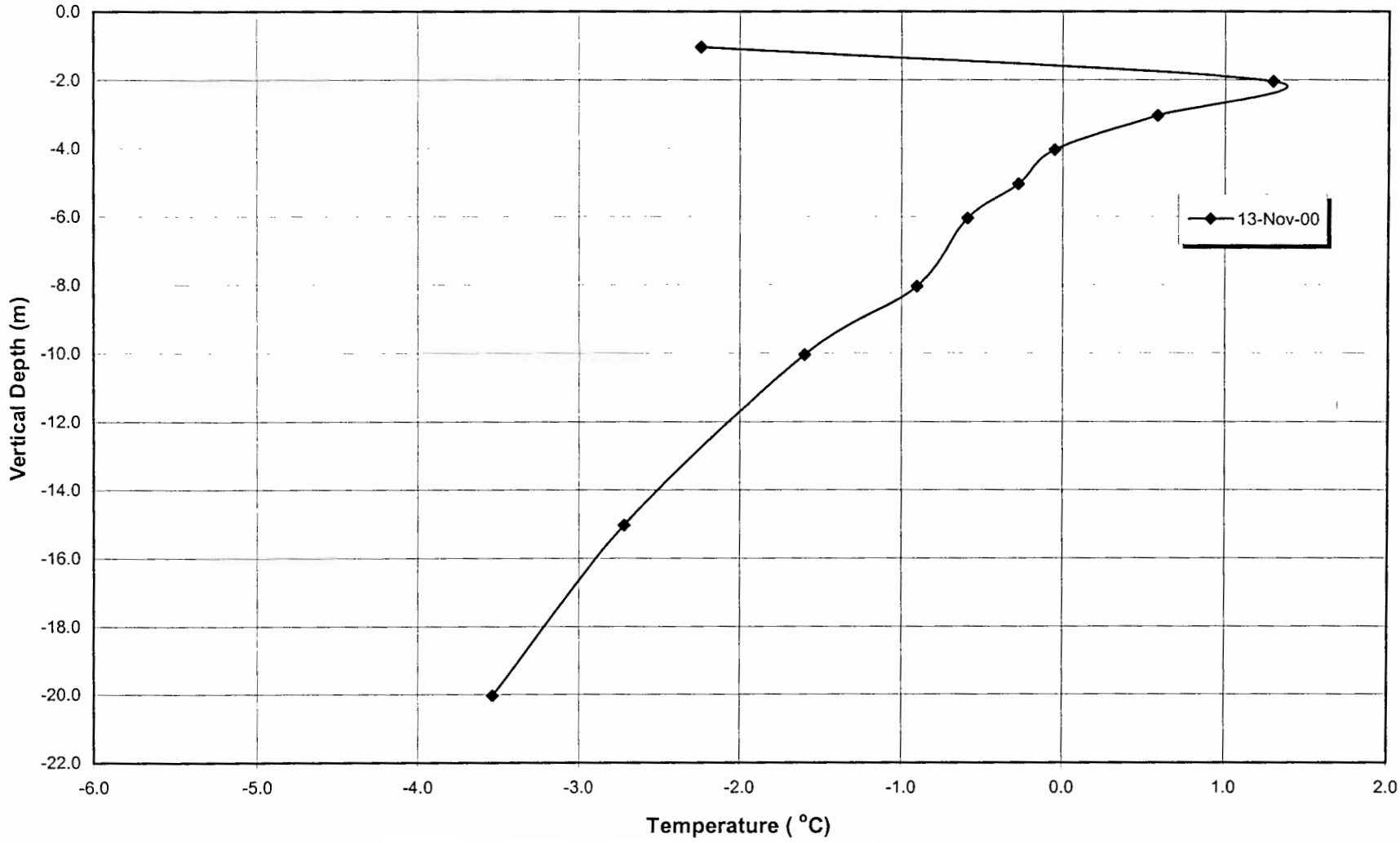
Thermistor D1A-00-2 - Installed November 9, 2000
(Vertical thermistor installed on crest of Dam 1A, north of the siphons)



Thermistor D2-00-2 - Installed November 8, 2000
(Vertical Termistor Installed on the crest of Dam 2, at the north end)



Thermistor D2-00-3 - Installed November 8, 2000
(Vertical Thermistor Installed on the crest of Dam 2, at the mid/north of dam)



Thermistor E-00-1 - Installed November 10, 2000
(Vertical Thermistor installed within Esker, Bedrock at 12.3 m)