

March 9, 2000

Philippe di Pizzo, Executive Director  
Nunavut Water Board  
P.O. Box 119  
Gjoa Haven, NT  
X0E 1J0

Dear Mr. di Pizzo;

Re: Cullaton Lake - Water Licence NWB1CUL9902

Pursuant to the terms of our Water Licence, we are pleased to submit the 1999 Annual Report. The report summarizes A & R activities undertaken at the Cullaton property during the past year, as well as water sampling results and thermistor data. A geotechnical inspection of the tailings impoundment was completed in 1999; the report is included as an Appendix. Summaries of the annual report and the geotechnical inspection, translated into Inuktitut, are also included.

I trust the above is satisfactory. Should you require additional information, or if you have any questions, please contact the undersigned.

Sincerely,  
HOMESTAKE CANADA INC.

Sharon Meyer  
Environmental Analyst

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	INAC, Water Resources, Iqaluit	1 copy

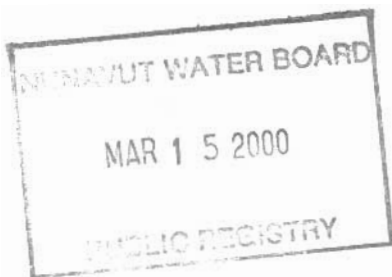
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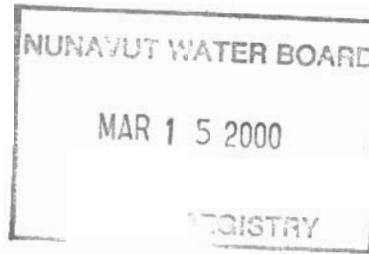
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# CULLATON LAKE GOLD MINES LTD

## WATER LICENCE NWB1CUL9902

### ANNUAL WATER LICENCE REPORT 1999

PREPARED BY:  
HOMESTAKE CANADA INC  
P.O. BOX 11115, 1100 - 1055 WEST GEORGIA STREET  
VANCOUVER, B.C.  
V6E 3P3

March 2000

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## **PREAMBLE**

Cullaton Lake Gold Mines Ltd. is wholly owned by Homestake Canada Inc. (Homestake).

The Cullaton Lake Gold Mines property is located in the southern part of the District of Keewatin in the Nunavut Territory. The property is 250 km west of Arviat, N.W.T., 400 km northwest of Churchill, Manitoba and 645 km north of Thompson, Manitoba. The mine was in operation for four years, from 1981 to 1985. Between September 1985 and summer 1991 the mine was in a care and maintenance phase.

Decommissioning began in 1991/92 with the rehabilitation of the Tailings Pond #1 dam including construction of a spillway in the dam, covering of the exposed tailings with water or with till/mine rock, and the elimination of Tailings Pond #2 (the polishing pond).

The fresh water intake, pump house and pipelines at the old diamond drill camp on the Kognak River were dismantled and removed in 1991. By 1993, all buildings and debris around the drill camp had been removed. In 1995 and 1996 the mill buildings were dismantled. Inert, non-salvageable material was crushed and placed in the quarry pit. In 1997, additional cover material was placed over the tailings cover and the tailings area was seeded and fertilized with a specialized arctic seed mix. The former mill site was also seeded and fertilized. During the winter of 1998/99 some salvageable equipment was removed from the site.

Homestake applied for a water licence renewal in April 1999. Licence NWB1CUL9902 was issued by the Nunavut Water Board effective September 1, 1999, expiring October 31, 2002.

As per this Water Licence, Homestake is required to file a yearly report outlining details on water use and/or waste disposal at Cullaton Lake Gold Mine.

## **1.0 HIGHLIGHTS**

Two site inspections, which included water sampling and thermistor readings, were completed in June and July 1999. During the June site inspection, Homestake personnel met with the INAC Water Resources Officer, who also inspected the site. During the July site inspections, a geotechnical inspection of the tailings dam was completed, as well as a visit by representatives of the Nunavut Water Board and local communities.

## **2.0 DETAILED SUMMARY**

### **2.1 WATER QUALITY MONITORING**

Water sampling continued at Cullaton Lake in 1999. Duplicate sampling is required at 7 stations, once in the spring peak flow period (June) and once again after August 1. For 1999, the second sampling date was changed to late July at the request of the Nunavut Water Board, in order to accommodate a site visit by representatives of the Board and the local communities (NWB to S. Meyer, July 5, 1999, See Appendix 2 for copy of letter). Therefore, samples were collected on June 17<sup>th</sup> and again on July 24<sup>th</sup>. See Appendix 1 for water quality results.

Station 940-2 (Pond #1 discharge to Pond #2) Duplicate water samples were taken during the summer season, in June and again in July. All parameters were well below the limits prescribed in the water licence.

Station 940-3 (Pond #2 discharge) Duplicate water samples were taken during the summer season, in June and again in July. All parameters were well below the limits prescribed in the water licence.

Station 940-18 (Pond #1 spillway) Duplicate water samples were taken during the summer season, in June and again in July. All parameters were well below the limits prescribed in the water licence.

Station 940-19 (Tailings #1) Duplicate water samples were taken during the summer season, in June and again in July. All parameters were well below the limits prescribed in the water licence.

Station 940-20 (Seepage at E side of tailings) Duplicate water samples were taken in June and in July. In July this area was almost dry. All parameters were well below the limits prescribed in the water licence.

Station 940-22 (Seepage at NE corner of tailings) was dry during 1999 and could not be sampled.

Station 940-Q (Quarry Pit) Water was sampled at the quarry pit as agreed. Duplicate water samples were taken in June and again in July. All sampling results were well within the limits prescribed in the water licence.

## **2.2 TAILINGS**

The June and July site inspections revealed that a number of grass species had established on the tailings, showing better survival in the protected furrows and tracks. Vegetation growth in 1999 was without the assistance of fertilizer.

## **2.3 THERMISTORS**

In order to prevent possible acid generation, reclamation of the tailings area has involved two oxygen-limiting methods; a water cover overlying the eastern portion of the tailings impoundment area and a till/mine-rock cover on the remaining Shear and B-Zone tailings area. The application of the till/mine-rock cover had a two-fold purpose; it was primarily intended to reduce oxygen infiltration and, as a Mine Environment Neutral Drainage (MEND) project, to test whether the level of permafrost in the tailings would rise to the top of the tailings if the tailings were covered. Thermistors were installed in the covered tailings in August 1991 in order to monitor any rise in permafrost levels.

Thermistor readings (Station 940-21) have been taken during the spring and late summer months since 1991. Before the application of a cover on the tailings the top 1.4 metres of tailings material thawed every summer. After the placement of cover, there was an initial rise in the permafrost levels and, by the end of the 1995 summer season, the depth of thaw in the tailings mass had been reduced to approximately 0.7 metres. However, the permafrost level remained at this depth during the summer of 1996. Our consultants suggested that placing an additional 0.6 m of cover material and 0.1 m of natural surface material with existing vegetative matter would reduce the duration of thaw, and promotion of vegetation on the surface would help shield the permafrost from summer heat, thereby promoting a further rise in the permafrost level. Therefore, additional cover was placed on the tailings in 1997 and the area was seeded with an arctic seed mix in order to encourage a resumption of the upward trend in permafrost levels.

Thermistor readings in 1998 indicated that the summer thaw zone was remaining at 1995 levels. In 1999 temperature readings were completed in June and July. (See Appendix 1 for results) Thermistor No. 2 could not be read in July due to a problem with equipment. The tailings still remain frozen at approximately 1995 levels.

Although the entire tailings mass has not become encapsulated in permafrost, placement of cover has been a partially successful experiment. Instead of the top 1.4 m of tailings material thawing each summer, as was happening before any cover was placed, now only the top 0.7 m of tailings material thaws for a short period each year. It is anticipated that, as the vegetation becomes more dense over the covered tailings, the permafrost level may resume its upward trend.

## **2.4 ROCK QUARRY**

A site inspection of the quarry pit in 1999 identified a number of small areas of subsidence where the non-salvageable materials were buried. Filling voids will be completed during the final cleanup of the site.

## **2.5 GEOTECHNICAL INSPECTION OF TAILINGS DAM**

Trow Consulting Engineers completed a geotechnical inspection of the Tailings Dam on July 24, 1999. The engineer's report concluded that the dam is stable. A copy of the report can be found in Appendix 2.

## **2.6 MILL SITE**

The buildings located at the mill site were removed in 1995/96, with the exception of the machine shop building, which was removed in 1998. In 1997/98 salvageable equipment was either flown to Thompson, Manitoba or Arviat, NWT, or remained stacked at the airstrip for removal by ice train. Some equipment was removed by ice train during the 1998/99 winter.

In 1997, the entire mill site was graded, seeded and fertilized with the same arctic seed mix used on the tailings area. Grasses now cover much of this area.

Salvageable equipment and scrap remains at the Shear Lake camp and will be removed during final cleanup.

## **2.7 FIELD OBSERVATIONS**

The two site inspections identified no erosion or sloughing of material from the tailings dam. No areas of acid generation or seepage were noted. Field pH and temperatures are presented in Appendix 1.

## **3.0 2000 PROPOSED WORK SCHEDULE**

Homestake Canada Inc. intended to complete the remaining decommissioning work by the end of 1999 and remove the remaining salvageable material during the winter of 1999/00. However, final cleanup and equipment removal could not be completed during 1999 and is now scheduled for 2000.

Once the final cleanup and equipment removal is achieved, a Company site inspection will be conducted to verify that the decommissioning work has been completed.

# APPENDIX 1

Water Quality Data  
Thermistor Data  
Field Data

## CULLATON LAKE GOLD MINES LTD.

### EFFLUENT WATER QUALITY REQUIREMENTS LICENCE NWB1CUL9902

All Waste discharged by the Licensee from the Tailings Containment Area shall meet the following effluent quality requirements.

Parameter	Maximum Average Concentration	Maximum Concentration of Any Grab Sample
Total Arsenic	0.30 mg/L	0.60 mg/L
Total Copper	0.20 mg/L	0.40 mg/L
Total Cyanide	0.80 mg/L	1.60 mg/L
Total Lead	0.20 mg/L	0.40 mg/L
Total Nickel	0.30 mg/L	0.60 mg/L
Total Zinc	0.30 mg/L	0.60 mg/L
Total Suspended Solids	25 mg/L	50 mg/L
Oil and Grease		Visible Sheen

The waste discharged shall have a pH between 6.0 and 9.5

**Water Quality 1998-1999**  
**Cullaton Lake**

**940-2: POND #1 DISCHARGE**

<u>DATE</u>	LAB PH <u>pH unit</u>	SUSPENDED SOLIDS <u>mg/l</u>	TOTAL ALKALINITY <u>mg/l</u>	TOTAL CYANIDE <u>mg/l</u>	TOTAL ARSENIC <u>mg/l</u>
06/26/CC98	7.7	2	50	0.066	0.0020
06/26/CC98	7.7	<2	51	0.072	0.0021
09/23/CC98	7.7	7	65	0.015	0.0037
09/23/CC98	7.7	6	65	0.015	0.0038
06/17/CC99	7.8	9		0.006	0.0035
06/17/CC99	7.8	8		0.004	0.0044
07/24/CC99	8.1	<3		0.002	0.0024
07/24/CC99	8.1	3		0.004	0.0026
<u>DATE</u>	TOTAL COPPER <u>mg/l</u>	TOTAL LEAD <u>mg/l</u>	TOTAL MERCURY <u>mg/l</u>	TOTAL NICKEL <u>mg/l</u>	TOTAL ZINC <u>mg/l</u>
06/26/CC98	0.003	<0.005	<0.0002	0.002	0.041
06/26/CC98	0.003	<0.005	<0.0002	<0.002	0.029
09/23/CC98	0.009	<0.005	<0.0002	0.005	0.048
09/23/CC98	0.008	<0.005	<0.0002	<0.002	0.016
06/17/CC99	0.003	<0.005	<0.0002	0.004	0.018
06/17/CC99	0.003	<0.005	<0.0002	0.005	0.015
07/24/CC99	0.005	<0.005	<0.0002	0.003	0.020
07/24/CC99	0.004	<0.005	<0.0002	0.003	0.029

**Water Quality 1998-1999**  
**Cullaton Lake**

**940-3: POND #2 DISCHARGE**

<u>DATE</u>	LAB PH <u>pH unit</u>	SUSPENDED SOLIDS <u>mg/l</u>	TOTAL ALKALINITY <u>mg/l</u>	TOTAL CYANIDE <u>mg/l</u>	TOTAL ARSENIC <u>mg/l</u>
06/26/CC98	7.7	<2	73	0.002	0.0042
06/26/CC98	7.7	<2	73	0.002	0.0042
09/23/CC98	7.6	5	92	0.002	0.0040
09/23/CC98	7.7	5	92	0.002	0.0023
06/17/CC99	7.6	8		<0.002	0.0043
06/17/CC99	7.7	9		<0.002	0.0044
07/24/CC99	8.4	4		<0.002	0.0040
07/24/CC99	8.4	4		<0.002	0.0039

<u>DATE</u>	TOTAL COPPER <u>mg/l</u>	TOTAL LEAD <u>mg/l</u>	TOTAL MERCURY <u>mg/l</u>	TOTAL NICKEL <u>mg/l</u>	TOTAL ZINC <u>mg/l</u>
06/26/CC98	0.006	<0.005	<0.0002	0.005	0.024
06/26/CC98	0.005	<0.005	<0.0002	0.005	0.017
09/23/CC98	0.006	<0.005	<0.0002	<0.002	0.034
09/23/CC98	0.007	<0.005	<0.0002	0.002	0.017
06/17/CC99	0.006	<0.005	0.0002	0.005	0.015
06/17/CC99	0.005	<0.005	<0.0002	0.005	0.013
07/24/CC99	0.004	<0.005	<0.0002	0.005	0.017
07/24/CC99	0.004	<0.005	<0.0002	0.005	0.019



**Water Quality 1998-1999**  
**Cullaton Lake**

**940-18: TAILINGS POND #1 SPILLWAY**

<u>DATE</u>	LAB PH <u>pH unit</u>	SUSPENDED SOLIDS <u>mg/l</u>	TOTAL ALKALINITY <u>mg/l</u>	TOTAL CYANIDE <u>mg/l</u>	TOTAL ARSENIC <u>mg/l</u>
06/26/CC98	7.8	3	55	0.024	0.0019
06/26/CC98	7.8	<2	55	0.025	0.0018
09/23/CC98	7.9	6	87	0.050	0.0022
09/23/CC98	7.9	3	86	0.047	0.0035
06/17/CC99	7.9	4		0.009	0.0022
06/17/CC99	7.9	5		0.002	0.0020
07/24/CC99	8.3	5		0.041	0.0027
07/24/CC99	8.3	8		0.039	0.0026

<u>DATE</u>	TOTAL COPPER <u>mg/l</u>	TOTAL LEAD <u>mg/l</u>	TOTAL MERCURY <u>mg/l</u>	TOTAL NICKEL <u>mg/l</u>	TOTAL ZINC <u>mg/l</u>
06/26/CC98	0.012	<0.005	<0.0002	<0.002	0.025
06/26/CC98	0.003	<0.005	<0.0002	<0.002	0.017
09/23/CC98	0.008	<0.005	<0.0002	0.015	0.030
09/23/CC98	0.002	<0.005	<0.0002	0.010	0.034
06/17/CC99	0.004	<0.005	<0.0002	0.003	0.017
06/17/CC99	0.004	<0.005	<0.0002	0.003	0.016
07/24/CC99	0.009	<0.005	<0.0002	0.006	0.024
07/24/CC99	0.010	<0.005	<0.0002	0.005	0.023

**Water Quality 1998-1999**  
**Cullaton Lake**

**940-19: TAILINGS POND #1 PIESOMETER**

<u>DATE</u>	<u>LAB PH</u> <u>pH unit</u>	<u>SUSPENDED</u> <u>SOLIDS</u> <u>mg/l</u>	<u>TOTAL</u> <u>ALKALINITY</u> <u>mg/l</u>	<u>TOTAL</u> <u>CYANIDE</u> <u>mg/l</u>	<u>TOTAL</u> <u>ARSENIC</u> <u>mg/l</u>
06/26/CC98	7.7	19	51	0.080	0.0070
06/26/CC98	7.7	18	51	0.080	0.0031
09/23/CC98	7.8	<2	64	0.015	0.0038
09/23/CC98	7.8	3	64	0.015	0.0033
06/17/CC99	7.9	5		0.005	0.0024
06/17/CC99	7.9	6		0.005	0.0023
07/24/CC99	8.2	<3		0.002	0.0022
07/24/CC99	8.2	<3		0.004	0.0034

<u>DATE</u>	<u>TOTAL</u> <u>COPPER</u> <u>mg/l</u>	<u>TOTAL</u> <u>LEAD</u> <u>mg/l</u>	<u>TOTAL</u> <u>MERCURY</u> <u>mg/l</u>	<u>TOTAL</u> <u>NICKEL</u> <u>mg/l</u>	<u>TOTAL</u> <u>ZINC</u> <u>mg/l</u>
06/26/CC98	0.005	<0.005	<0.0002	0.005	0.022
06/26/CC98	0.003	<0.005	<0.0002	0.002	0.011
09/23/CC98	0.003	<0.005	<0.0002	<0.002	0.038
09/23/CC98	0.004	<0.005	<0.0002	0.010	0.033
06/17/CC99	0.003	<0.005	<0.0002	0.004	0.017
06/17/CC99	0.003	<0.005	<0.0002	0.004	0.015
07/24/CC99	0.003	<0.005	<0.0002	0.002	0.018
07/24/CC99	0.004	<0.005	<0.0002	0.003	0.023

**Water Quality 1998-1999**  
**Cullaton Lake**

**940-20: EAST SIDE OF TAILINGS POND #1**

<u>DATE</u>	LAB PH <u>pH unit</u>	SUSPENDED SOLIDS <u>mg/l</u>	TOTAL ALKALINITY <u>mg/l</u>	TOTAL CYANIDE <u>mg/l</u>	TOTAL ARSENIC <u>mg/l</u>
06/26/CC98	8.2	3	151	0.005	0.0026
06/26/CC98	8.2	5	152	0.005	0.0028
09/23/CC98	7.8	8	72	0.015	0.0037
09/23/CC98	7.7	11	72	0.006	0.0037
06/17/CC99	8.3	6		0.002	0.0031
06/17/CC99	8.3	6		<0.002	0.0030
07/24/CC99	8.2	4		0.002	0.0041
07/24/CC99	8.2	5		0.002	0.0044
<u>DATE</u>	TOTAL COPPER <u>mg/l</u>	TOTAL LEAD <u>mg/l</u>	TOTAL MERCURY <u>mg/l</u>	TOTAL NICKEL <u>mg/l</u>	TOTAL ZINC <u>mg/l</u>
06/26/CC98	0.008	<0.005	<0.0002	0.009	0.096
06/26/CC98	0.007	<0.005	<0.0002	0.005	0.010
09/23/CC98	0.003	<0.005	<0.0002	0.013	0.033
09/23/CC98	0.009	<0.005	<0.0002	0.013	0.017
06/17/CC99	0.007	<0.005	<0.0002	0.008	0.015
06/17/CC99	0.007	<0.005	<0.0002	0.008	0.030
07/24/CC99	0.011	<0.005	<0.0002	0.012	0.024
07/24/CC99	0.011	<0.005	<0.0002	0.013	0.027

**Water Quality 1998-1999**  
**Cullaton Lake**

**940-Q**

<u>DATE</u>	<u>LAB PH</u> <u>pH unit</u>	<u>SUSPENDED</u> <u>SOLIDS</u> <u>mg/l</u>	<u>TOTAL</u> <u>ALKALINITY</u> <u>mg/l</u>	<u>TOTAL</u> <u>CYANIDE</u> <u>mg/l</u>	<u>TOTAL</u> <u>ARSENIC</u> <u>mg/l</u>
06/26/CC98	7.6	10	36	0.001	0.0053
06/26/CC98	7.6	14	36	0.001	0.0056
09/23/CC98	8.0	17	136	0.006	0.0091
09/23/CC98	8.0	25	135	0.006	0.0085
06/17/CC99	7.6	11		<0.002	0.0038
06/17/CC99	7.6	9		<0.002	0.0032
07/24/CC99	8.2	5		0.002	0.0024
07/24/CC99	8.2	<3		0.002	0.0023

<u>DATE</u>	<u>TOTAL</u> <u>COPPER</u> <u>mg/l</u>	<u>TOTAL</u> <u>LEAD</u> <u>mg/l</u>	<u>TOTAL</u> <u>MERCURY</u> <u>mg/l</u>	<u>TOTAL</u> <u>NICKEL</u> <u>mg/l</u>	<u>TOTAL</u> <u>ZINC</u> <u>mg/l</u>
06/26/CC98	0.007	<0.005	<0.0002	0.009	0.219
06/26/CC98	0.008	<0.005	<0.0002	0.009	0.252
09/23/CC98	0.008	<0.005	<0.0002	0.022	0.105
09/23/CC98	0.008	<0.005	<0.0002	0.015	0.101
06/17/CC99	0.003	<0.005	<0.0002	0.005	0.044
06/17/CC99	0.003	<0.005	<0.0002	0.005	0.035
07/24/CC99	0.003	<0.005	<0.0002	0.003	0.054
07/24/CC99	0.003	<0.005	<0.0002	0.003	0.051

## Thermistor Temperatures (°C) – 1999 (940-21)

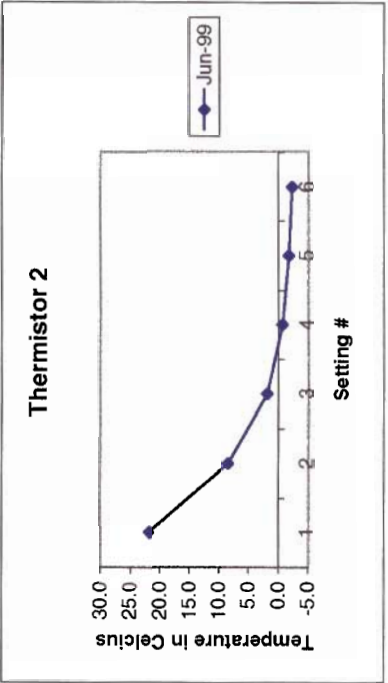
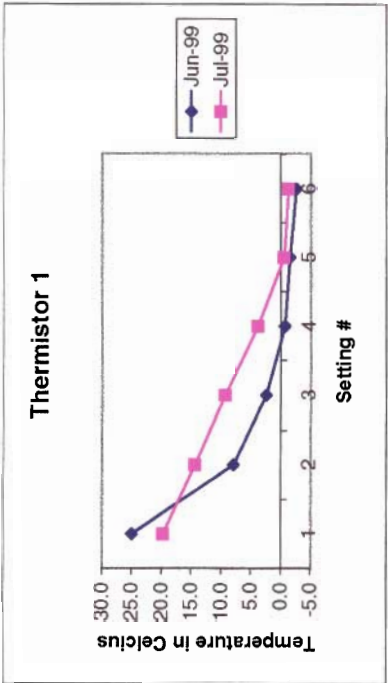
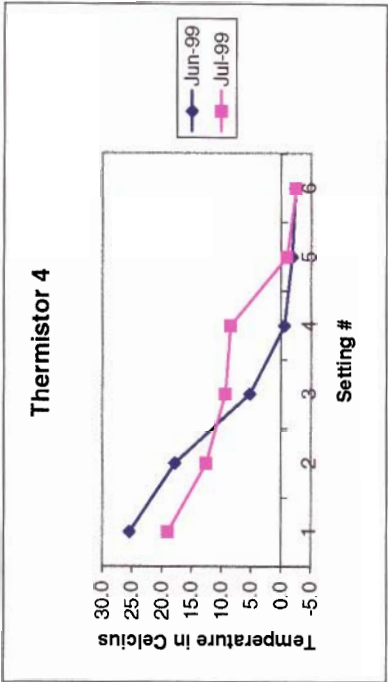
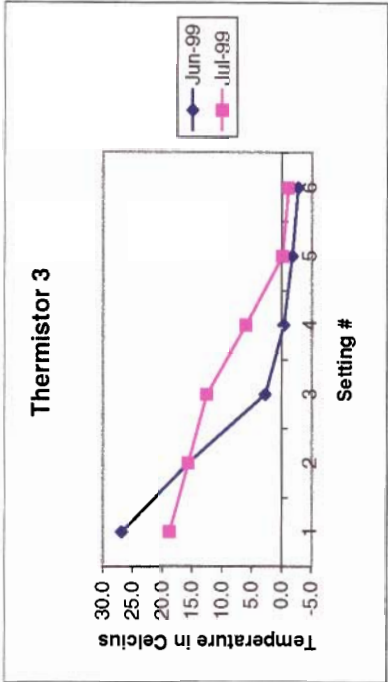
Thermistor	Date	1	2	3	4	5	6
No. 1							
	17 June	25.0	7.9	2.4	-0.7	-1.6	-2.6
	24 July	19.8	14.4	9.3	3.8	-0.6	-1.3
No.2							
	17 June	22.0	8.5	1.9	-0.7	-1.8	-2.3
	24 July	No readings taken					
No.3							
	17 June	26.9	15.7	2.8	-0.4	-1.8	-2.7
	24 July	18.8	15.7	12.6	6.0	-0.2	-1.1
No.4							
	17 June	25.5	17.8	5.2	-0.6	-1.9	-2.4
	24 July	19.5	12.6	9.3	8.5	-1.0	-2.5

### Depth below Surface (from top of cover)

Setting 1	0.3 metres
Setting 2	0.8 metres
Setting 3	1.3 metres
Setting 4	1.8 metres
Setting 5	2.3 metres
Setting 6	2.8 metres

Thermistor Temperatures - 1999

Depth Below Surface	
1	0.3 metres
2	0.8 metres
3	1.3 metres
4	1.8 metres
5	2.3 metres
6	2.8 metres



### Cullaton Lake Field Data 1999

Station	Date	pH	Temperature C°
940-2	June	7.8	12.5
	July	7.8	15.0
940-3	June	7.4	14.0
	July	7.8	13.0
940-18	June	7.8	16.5
	July	8.0	19.0
940-19	June	7.8	12.5
	July	7.6	17.0
940-20	June	7.9	18.4
	July	7.8	18.0
940-22	June	no seepage	no seepage
	July	no seepage	no seepage
Quarry Pit	June	6.5	10.5
	July	7.8	14.5

## APPENDIX 2

Geotechnical Inspection  
Letter from Nunavut Water Board  
Photographs





**Trow Consulting Engineers Ltd.**  
**Thunder Bay Branch**

**807 Harold Crescent**  
**Thunder Bay, Ontario**  
**P7C 5H8**

Telephone: (807) 623-9495  
Facsimile: (807) 623-8070  
e-mail: thunderbay@trow.com

October 13, 1999

**Reference F90132**

Ms. Sharon Meyer  
Homestake Canada Inc.  
P.O. Box 11115  
Suite 1100-1055 West Georgia St.  
Vancouver, BC  
V6E 3P3

Dear Ms. Meyer:

**1999 Tailings Dam Examination**  
**Cullaton Lake Gold Mine, Nunavut**

Further to your authorization, we have carried out a visual examination of the tailings impoundment facility at the above noted site. For your convenience, copies of the reports covering the 1994 and 1996 inspections are appended. These reports contain the most recently available site mapping.

The field examination was carried out by Mr. Demetri Georgiou, P.Eng. on July 24, 1999. Photos 1 and 2, attached, show oblique views of the site taken from the air on the date of the site examination, July 24, 1999. The tailings area, marked 1. in the foreground of Photo 1, has been covered with local till as reported in Trow's previous inspection reports. Vegetation on the tailings is small and sparse.

**Tailings Dam No. 1**

Photos 3 and 4 show views of the dam and spillway, respectively. Typically, the embankment which is constructed principally with local cohesionless till, is irregular in section and surface grade. Average side slopes of the upstream and downstream sides were typically about 3H:1V and 6H:1V, respectively. Some small erosion scars were observed on both the upstream and downstream sides. This is likely due to adjustment of the fill that was placed several years ago during the flattening of the side slopes. The crest width varies but is in the order of 15 m. No seepages were observed on the day of inspection. Based on our 1999 examination and our previous involvement with the project, the dam is considered to be stable.

The pond level was estimated to be at an elevation of about 93.7 m, approximately 0.3 m below the spillway crest level and no spillway flow was occurring. This is slightly lower than that observed in the 1994 and 1996 examinations when the levels were at about 94.0 m. The slight drop in water level, compared to what was observed previously is likely due to natural seasonal hydrologic variations, including precipitation, infiltration, runoff and evaporation. Within the tailings pond itself, no unsubmerged tailings were observed.

### Tailings Dam No. 2


Photos 5 and 6 show views of the dam and spillway, respectively. As with the No. 1 dam, the principal construction material is local cohesionless till. The dam section and surface grade is irregular, although less so than the No. 1 dam. The crest width varies but is in the order of 15 m. No seepages were observed on the day of examination. Based on our 1999 examination and our previous involvement with the project, the dam is considered to be stable.

We trust that this information meets your current requirements. Should you have any questions or require additional information, please contact me.

Yours truly,

**Trow Consulting Engineers Ltd.**

Prepared by,



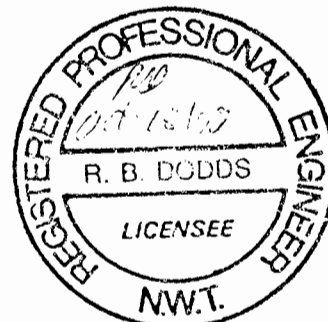
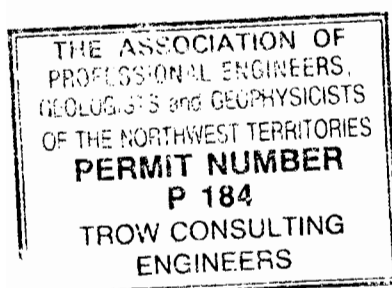
Demetri N. Georgiou, MSc., P.Eng.  
Branch Manager/Principal Engineer

Reviewed by,



Robert B. Dodds, Ph.D., P.Eng.

attachments    photos, 1994 and 1996 reports



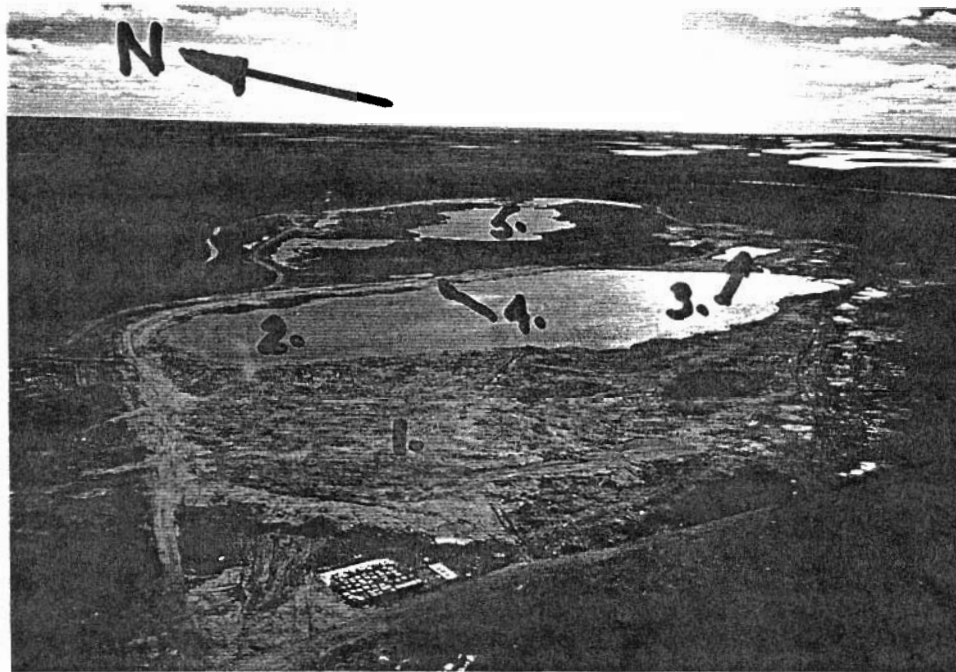


Photo 1. Oblique view of tailings impoundment looking east.

1. Covered Tailings, 2. Pond, 3. Quarry, 4. Dam 1 and Spillway 1, 5. Pond 2



Photo 2. Oblique view of tailings impoundment looking west.

1. Pond 1, 2. Pond 2, 3. Dam 2 & Spillway 2



Photo 3. Tailings Dam No. 1 looking north.



Photo 4. Spillway No. 1 looking upstream (west). Note flow measurement weir.



F-90132  
Photos July 24, 1999



Photo 5. Tailings Dam No. 2 looking north, north of Spillway.



Photo 6. Spillway No. 2 looking upstream (west).



Thunder Bay Branch

Trow Consulting Engineers Ltd.  
807 Harold Crescent, Thunder Bay  
Ontario, Canada. P7C 5H8  
Telephone: (807) 623-9495  
Facsimile: (807) 623-8070

February 1, 1995

Homestake Canada Ltd.  
1000 – 700 West Pender Street  
Vancouver, B.C.  
V6C 1G8

Attention: Mr. Bill Napier, Manager Environmental Affairs

RE: Cullaton Lake Gold Mine  
Our Reference No. F-90132-B/E

Dear Mr. Napier,

## 1.0 INTRODUCTION

The undersigned visited the Cullaton Lake Gold Mine during the period of June 25 to June 28, 1994 to examine the Tailings Containment Area and to conduct a topographic survey of this area.

## 2.0 SURVEY

A topographic survey was conducted to accurately establish the water elevations in the Tailings Pond and Polishing Pond, the size of the tailings pond, the depth of cover material, typical cross sections of the dams, locations of the thermistors and monitoring wells and locations of the mill buildings and shops. The elevations of these features are referenced to a temporary bench mark established on a concrete slab at the northeast corner of the mill building and given an assumed elevation of 100.00 m. Details are shown on Drawing No. 1. Typical sections of the tailings dams are shown on Drawing No.s 2 and 3.

### 3.0 THERMISTORS

Readings of the previously installed thermistors were recorded by Mr. Rodney McKay of McKay Environmental Industries Ltd. The results are given in the following table and are shown graphically on Drawings, No.s 4 through 7 along with readings from previous years.

Thermistor No.	Readings (June 27, 1994)					
	0	1	2	3	4	5
1	7.67 15.51	9.37 11.26	12.68 5.03	16.51 -0.21	18.17 -2.07	19.40 (kilohms) -3.33 (°C)
2	7.71 15.40	7.76 15.26	10.31 9.27	14.49 2.35	17.31 -1.13	19.04 (kilohms) -2.97 (°C)
3	7.71 15.40	8.52 13.27	11.67 6.72	16.47 -0.16	18.05 -1.94	19.20 (kilohms) -3.13 (°C)
4	7.74 15.32	8.37 13.65	11.53 6.97	16.24 0.10	17.87 -1.74	19.40 (kilohms) -3.33 (°C)

The comparative results from the four thermistor installations indicate that there is an upward trend in the level of permafrost. The average depth of frost was approximately 400 mm below the tailings ground surface during the time of this study. This compares to a frost level of a 800 mm below the ground surface during a similar time period in 1992 (July 6, 1992). It should be noted, however, that the greatest depth of thaw occurs at the end of the summer season which will lower the level of frost to the greatest seasonal depth. To obtain the level of maximum thaw, thermistor readings should be taken sometime in the month of September. A more accurate level of permafrost can then be recorded. At the current rate of

rise in frost levels, it is expected that the covered tailings area will be in a permanently frozen state (permafrost) in 2 to 3 more years.

#### 4.0 TAILINGS AREAS

A visual examination was conducted on the dams for Tailing Area No.s 1 and 2. The average water elevations measured on Dam No.s 1 and 2 are approximately 94.0 m and 89.4 m, respectively. There was no evidence of any seepage on the downstream side of each of the dams.

A visual examination of Tailings Dam No. 1 indicates that the dam is stable under current conditions. A stability analysis was carried out on this dam in Trow's, "Abandonment and Restoration Plan", dated May 7, 1991 prior to closure. The dams have since been lowered and the face flattened which increases the stability (see Trow report of July 19, 1993). The current water elevation of 94.0 m is controlled by the spillway constructed on the east side of the dam.

The spillways at each of the two dams appear to be in good condition. However, some levelling of some small rock piles immediately adjacent to the spillway in Dam No. 2 would provide a better appearance and provide better control of surface runoff. A slight trickle of water was noted through the rock fill in the spillway on Dam No. 1. Photographs, No.s 1 and 2 show the conditions of the two spillways.

Attempts were made to determine the profile of the bottom of Tailings Pond No. 1 by depth soundings using a canoe. Unfortunately, strong wind conditions during this field study proved to be too dangerous to take soundings with a canoe. Topographic information from a 1990 survey by H I W Surveys Ltd. was used in combination with our survey to provide a profile of Tailings Pond No. 1. Based on



this combined survey information, there is a maximum water depth of approximately 3.0 m (10 ft.) in Tailings Pond No. 1.

There was no evidence of any exposed tailings in Tailings Area No. 1. Field measurements from a September 1990 site visit indicate that the maximum depth of seasonal thawing (active zone) is estimated to be 1.4 m. Measurements from a subsequent field visit of August 11, 1992 show that the cover material over the tailings is approximately 1.2 m thick. Photographs, No.s 3 and 4 show the covered tailings area.

A small section of the dam in the northwest corner of Tailings Dam No. 2 is not well defined. It is assumed that this section was disturbed when material was being used to cover the exposed tailings in Tailings Area No. 1. A stockpile of waste rock immediately adjacent to this area could be used to shape the dam to the conditions similar to the rest of the dam. Mr. Rodney McKay stated that this would be done during this site visit.

Based on our examination, the structures associated with the former tailings disposal system are stable. A visual inspection of Tailings Dam No. 1 shows that the dam is stable under current conditions. There is no evidence of seepage from the dams in Tailings Pond No. 1. The water level in Tailings Pond No. 1 is remaining stable at the level of the invert of the spillway (El 94.1 m). The permafrost level is rising in the covered tailings as predicated.

If there are any questions or comments regarding this information, please contact us at your convenience.

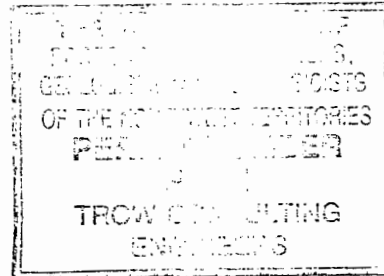
Yours truly,  
TROW CONSULTING ENGINEERS LTD.


*Feb. 2/95*  
*Robert B. Dodds*

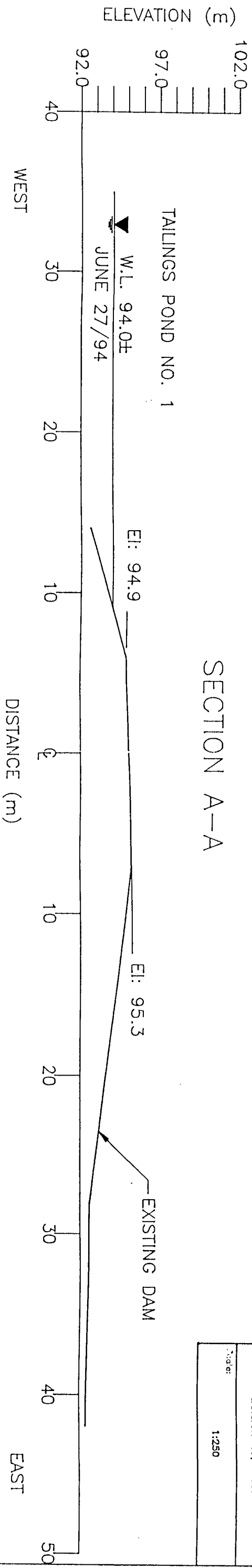
Donald E. Kaluza, P. Eng.

Robert B. Dodds, Ph.D., P.Eng.  
Thunder Bay Branch Manager

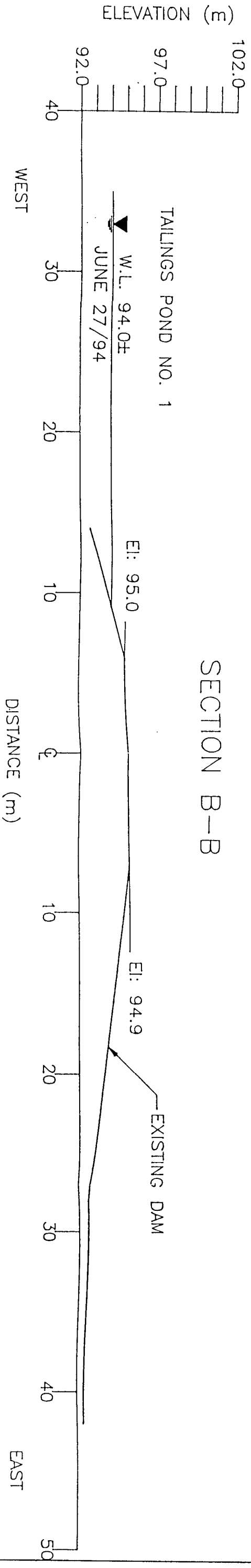
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 TROW CONSULTING ENGINEERS LTD. Thunder Bay, Ontario, Canada	
Client	HOMESTAKE CANADA
Project	CULLATON LAKE MINE CLOSURE
Title	CROSS SECTIONS TAILINGS DAM NO. 1
Project No.	Dwg. No.: F-90132-A/E 2
Drawn By: D.T.	Reviewed By: D.K.
Date:	JANUARY 19, 1995.
Scale:	1:250



HORIZONTAL SCALE: 1:250  
VERTICAL SCALE: 1:250



Client: HOMESTAKE CANADA

Project: CULLATON LAKE MINE CLOSURE

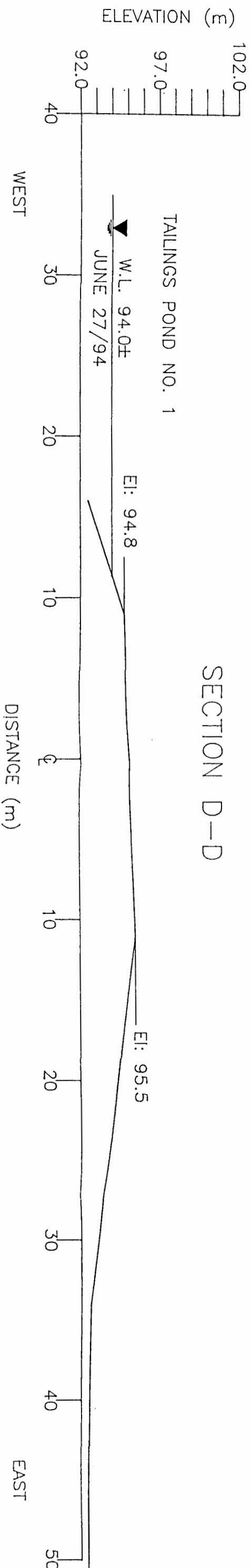
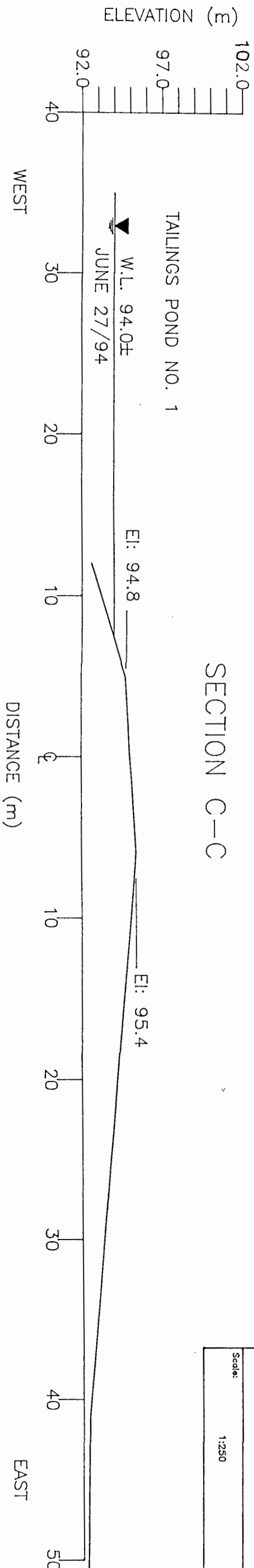
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TAILINGS DAM NO. 1

Project No. Dwg. No.:  
F-90132-A/E 3

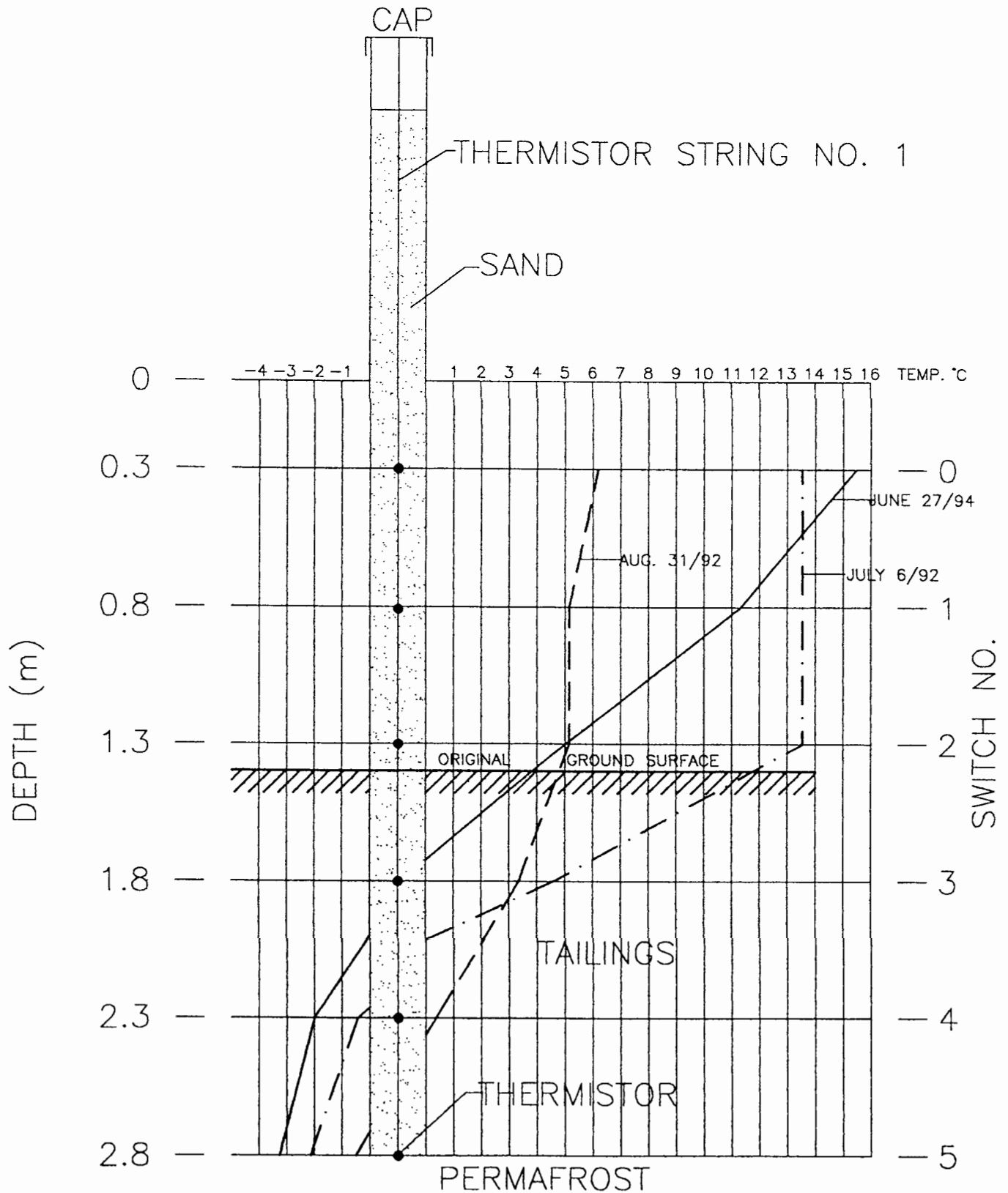
Drawn By: D.I.T. Reviewed By: D.K.

Date: JANUARY 19, 1995.

Scale: 1:250

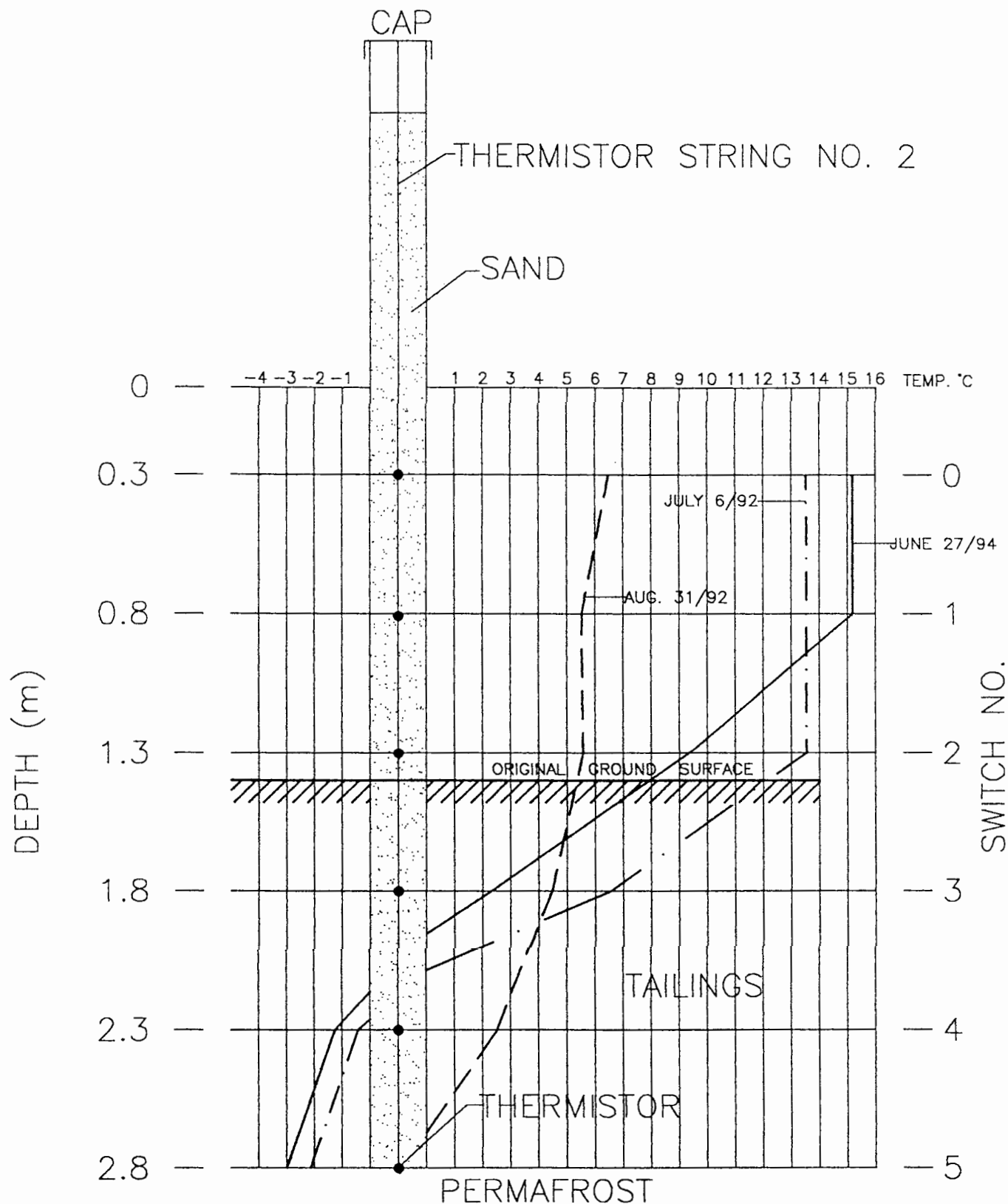


HORIZONTAL SCALE: 1:250  
VERTICAL SCALE: 1:250



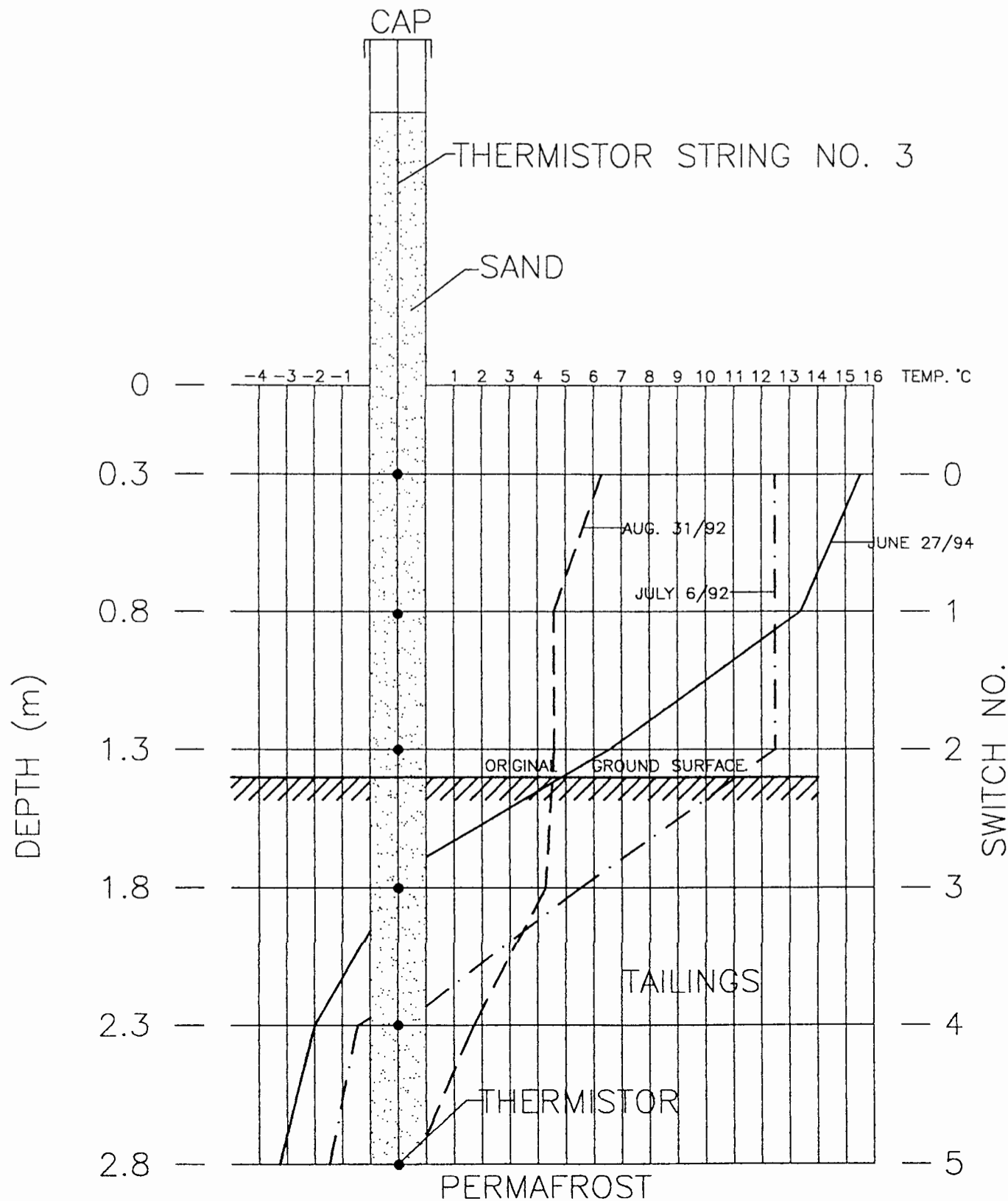
## THERMISTOR STRING CONFIGURATION

INSTALLED AUGUST 23, 1991



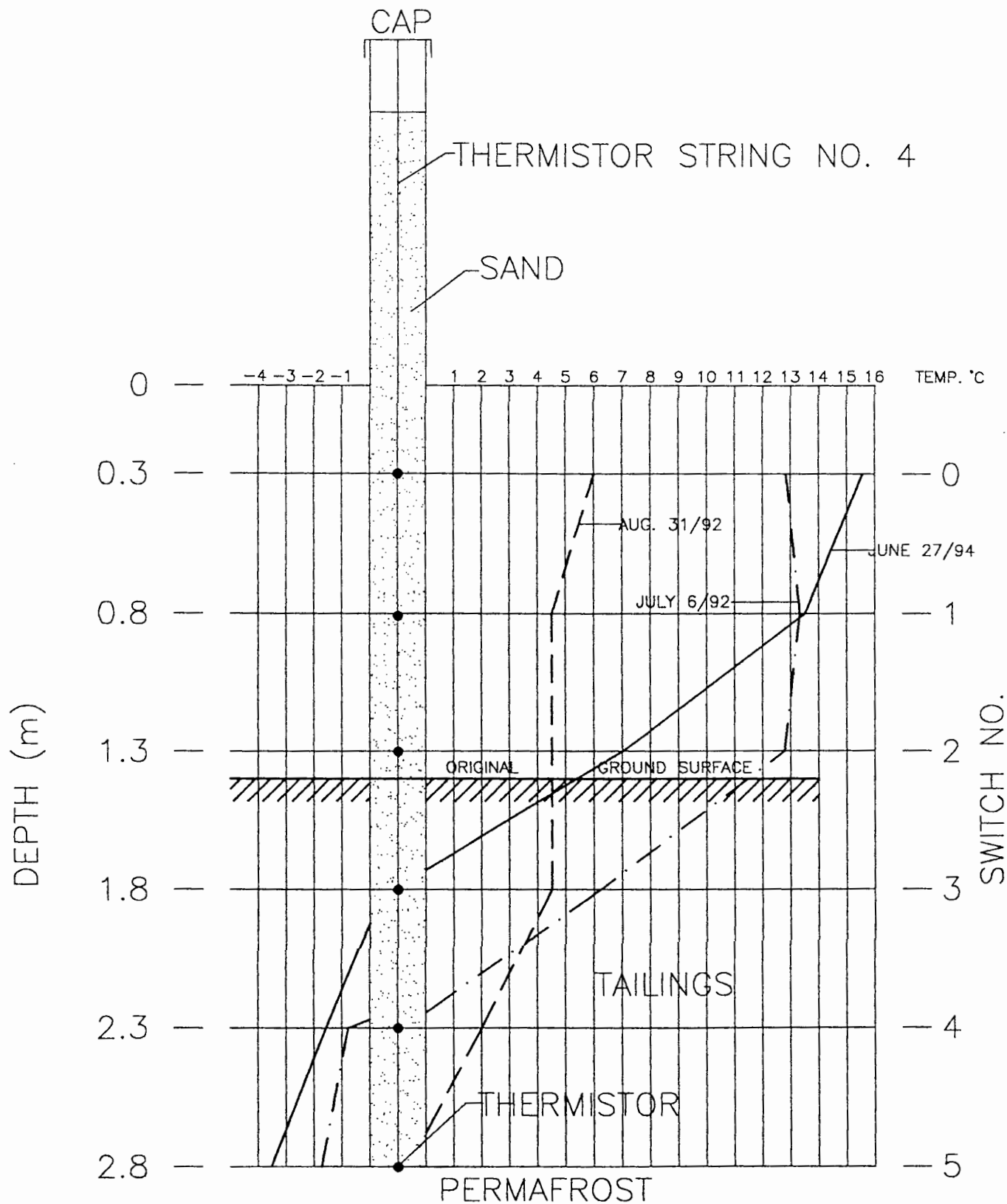
## THERMISTOR STRING CONFIGURATION

INSTALLED AUGUST 23, 1991



## THERMISTOR STRING CONFIGURATION

INSTALLED AUGUST 23, 1991



## THERMISTOR STRING CONFIGURATION

INSTALLED AUGUST 23, 1991





**Photograph No. 1**  
**Spillway at Tailings Dam No. 1**



**Photograph No. 2**  
**Spillway at Tailings Dam No. 2**



**Photograph No. 3**  
**Covered Tailings at Tailings Pond No. 1**  
**View Looking South**



**Photograph No. 4**  
**Covered Tailings at Tailings Pond No. 1**  
**View Looking North**



Thunder Bay Branch

Trow Consulting Engineers Ltd.  
807 Harold Crescent, Thunder Bay  
Ontario, Canada. P7C 5H8  
Telephone: (807) 623-9495  
Facsimile: (807) 623-8070

November 27, 1996

Reference No. F-90132-B/E

Homestake Canada Ltd.  
1000-700 West Pender Street  
Vancouver, B.C.  
V6C 1G8

**Attention: Sharon Meyer**

**RE: Cullaton Lake Gold Mine**

Dear Ms. Meyer:

At your request, Trow Consulting Engineers Ltd. visited the Cullaton Lake Gold Mine property during the period of September 15 - 18, 1996 to examine the tailings containment area and to measure the depth of permafrost in the covered tailings area.

## **TAILINGS AREAS**

### **Tailings Pond Area No. 1**

A visual examination around Tailings Area No. 1 was carried out. The containment dam appears to be in good condition with no signs of distress or erosion. Some small wet areas were present on the downstream toe at the south end of the tailings area. However, it is unclear if the wet areas are due to seepage or the large amount of rainfall which had fallen prior to this site visit. There is no evidence of soil loss in these wet areas and they do not present any instability to the dam. The approximate location of these wet areas are shown on Drawing No. 1.

The spillway appears to be in good condition with the exception of a small area on the south upstream side where the liner is exposed. A trickle of water was flowing over the spillway during this time. The water elevation was approximately 94.0 m<sup>1</sup>, which is at the same level it was during our site visit in June of 1994. Although this only compares two time periods, it is an indicator that the drainage area has a positive water balance.

---

<sup>1</sup> Elevations are referenced to a temporary benchmark located on a concrete slab at the east corner of the mill building with a local elevation of 100.00 m, previously established by HIW Surveys Ltd. in 1990.

There were no exposed tailings in the pond, shoreline, or covered areas. However, the tailings were within approximately 150 mm of the water surface on the western shoreline, adjacent to the covered tailings area near the interface between the B-zone and Shear zone tailings. There appear to be some pockets of tailings which may be near the surface of the water in centre of the pond. Unfortunately, a boat was not available to measure the water depth. It is understood that an attempt will be made to measure the water depth when the pond is ice covered. Photographs 1 and 2 show evidence of the tailings being close to the surface of the water.

It appears that some thaw settlement may have occurred in the B-zone covered tailings area. The area was ponded with water and stained reddish brown during this site visit. The settled area is shown on Photographs 3 and 4.

## **Tailings Area 2**

Since the dams in Tailings Area 2 are not required, much of the material which was used for the dams has been removed and was used for cover over the former tailings beach near the mill building in Tailings Area 1. There was some material still available which could be used for additional cover material, if needed.

The water level in Tailings Pond No. 2 was low during this site visit and appeared to be at a similar elevation to what was measured in 1994 (elev: 89.4 m). It is expected that the water level will remain low under the present conditions.

A long stretch of liner (approx. 75 m) in the dam has been exposed and damaged at the northwest end of Tailings Area 2. Since the amount of material in the dam has been reduced, it is expected that more of this liner could be exposed as a result of erosion. Consideration could be given to removing some of the exposed liner and filter cloth and burying it in the quarry to ensure it does not become air-borne and present a hazard to wildlife, for instance.

## **PERMAFROST**

### **Thermistors**

Thermistor readings were recorded by Don Kaluza, P. Eng. of Trow on September 19, 1996. The results are given in the following table.

Therm. No.		THERMISTOR READINGS (SEPT. 19, 1996)					
		Setting 0	Setting 1	Setting 2	Setting 3	Setting 4	Setting 5
1	(kΩ)	11.02	11.76	11.14	12.85	14.92	16.48
	(°C)	8.0	6.5	7.7	4.7	1.7	-0.2
2	(kΩ)	10.90	11.57	12.13	13.85	15.75	16.88
	(°C)	8.0	6.8	6.0	3.2	0.7	-0.7
3	(kΩ)	10.70	11.23	11.80	13.80	15.76	16.74
	(°C)	8.5	7.6	6.5	3.2	0.7	-0.4
4	(kΩ)	10.22	11.15	11.48	13.23	15.30	16.70
	(°C)	9.5	7.6	7.0	4.2	1.3	-0.4

The results of the thermistor readings indicate that the active zone (greatest seasonal thaw) is at or very near the lowest nested thermistor (at Setting 5).

A test pit was excavated within 3 m of each thermistor installation to measure the permafrost level and compare it with the thermistor readings. The cover material was first removed using a CAT 950 loader. The permafrost levels were then estimated by driving a section of drill steel through the exposed tailings to refusal. At least two areas within each test pit were probed with the drill steel to ensure that the refusal was due to permafrost and not due to cobbles or boulders.

One additional test pit was excavated using a CAT D8 in the native undisturbed soil adjacent to the tailings area. The subsurface conditions in this test pit generally consisted of approximately 0.1 m of organic soil at the surface which was underlain by wet silty sand till. The till contained several cobbles and boulders throughout.

Generally, permafrost depths ranged between 1.75 m and 1.90 m in the covered tailings area and 2.0 m in the undisturbed native soil.

Assuming that each of the thermistor installations were installed to a depth of 1.4 m below the tailings surface, the thermistor readings show the permafrost level to be about 0.3 m lower than actual site conditions. This difference may be the result of heat being conducted down the PVC protective casing. Cover thicknesses ranged from 0.6 m near Thermistor No. 1 to 1.1 m near Thermistor No. 2. It should be noted, however, that approximately 0.45 m of cover material was mounded locally around Thermistor No. 2. Additional estimates of the cover material thickness were provided by Mr.

Ronald V. Nicholson of BEAK Consultants Limited. The BEAK field study conducted in 1996 indicates that the cover material is approximately 0.67 m thick over the Shear zone tailings and approximately 0.89 m thick over the B-zone tailings. The locations of the BEAK test hole locations are shown on Drawing 2. A comparison of the permafrost depth measurements are shown on Drawings 3 through 6 and in the following table.

PERMAFROST DEPTH MEASUREMENTS (SEPTEMBER 16, 1996)			
Thermistor No.	Estimated Permafrost Depth (m)	Thermistor Reading Permafrost Depth (m)	Cover Material Thickness (m)
1	1.90	1.95	0.6
2	1.85	2.25	1.1
3	1.85	2.10	0.9
4	1.75	2.10	0.8

notes:

- 1) estimated permafrost depths are based on probe refusal and are measured from the existing ground surface as of Sept. 16, 1996;
- 2) thermistor reading permafrost depths assume each of the thermistors were originally installed with the bottom at 1.4 m below the surface of the tailings.

## Thermal Analysis

Although the thermistor readings have shown there has been some increase in the permafrost level, based on previous work and Trow reports there has been no significant increase in the level of permafrost over the past few seasons. A thermal analysis was used to model the conditions in the tailings area to help explain the thermistor results and make recommendations for the future.

Prior to covering the exposed tailings, an estimate of the active layer was obtained on September 20, 1990 by probing through the tailings and measuring the refusal depth. During this time, a maximum refusal depth of 1.4 m was recorded. Based on this measure of the active layer thickness, covering the exposed tailings with 1.4 m of on site material should have resulted in a 1.4 m rise in the permafrost level. Based upon the thermistor readings and the test pits of September 19, 1996, this has not been the case.

Assuming a linear temperature distribution in the thawed zone, a prediction of the original thaw depth in the tailings may be obtained by the following equation<sup>2</sup>.

$$X = \sqrt{\frac{2k_u T_s}{L}} \sqrt{t} \quad (1)$$

where: X = the depth of thaw (m)  
 $k_u$  = average thermal conductivity (W/m °C)  
 $T_s$  = average surface temperature (°C)  
 L = soil volumetric latent heat (kJ/m<sup>3</sup>)  
 t = time (in days)

Air temperature values from Cullaton Lake and Ennadai Lake were provided by Indian and Northern Affairs Canada and Environment Canada. The thermal conductivities were estimated from Fig. 318 and Fig. 319 in the Appendix of this report. The following assumptions were also made:

1. Air temperatures recorded at Ennadai Lake are similar to what is at Cullaton Lake;
2. The dry density and moisture content for the tailings is 1400 kg/m<sup>3</sup> and 32% respectively;
3. The dry density and moisture content for the cover material is 2100 kg/m<sup>3</sup> and 10% respectively;
4. The latent heat for water at 0°C is 333.7 kJ/kg;
5. The unfrozen water content, at and below the frozen zone, is very small.

A graph comparing air temperature data from Cullaton Lake and Ennadai Lake in May and June of 1995 is shown on Drawing No. 7. The comparison indicates that there are definite trends in the temperature but the temperatures at Cullaton Lake are on average, about 1.5°C lower. The graph also indicates that thawing begins towards the end of May and the beginning of June when average daily temperatures are greater than 0°C. On the basis of this comparison, it is considered appropriate to use air temperature data recorded at Ennadai Lake for this model with reasonable confidence. However, a small downward adjustment in the average air temperature should be made to approximate Cullaton Lake air temperatures.

Since air temperatures were not recorded at Cullaton Lake until 1994, the thaw depth was estimated from air temperatures recorded at Ennadai Lake in 1991. From this data, and the assumptions established for the on-site conditions at Cullaton Lake, the following information was obtained.

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<sup>2</sup> Studies by Nixon and McRoberts (1973), Geotechnical Engineering for Cold Regions, Andersland, Anderson, 1978

$k_u = 1.8 \text{ W/m } ^\circ\text{C}$  (for the tailings)  
 $T_s = 8.5^\circ\text{C}$  (average annual air temperature)  
 $L = 163500 \text{ kJ/m}^3$   
 $t = 123 \text{ days}$  (number of degree days above zero, supplied by Environment Canada)

Based on these data, the maximum depth of thaw, X in Equation 1, in the tailings in 1991 was 1.41 m. This compares favourably to the maximum depth of thaw estimated at 1.4 m on September 20, 1990.

Since the cover material has different thermal properties than the tailings, a two-layer problem must be considered. The time required to thaw the cover material can be solved by the following equation:

$$t_0 = \frac{H^2 L_1}{2k_1 T_s} \quad (2)$$

where:  $t_0$  = time (in seconds)  
 $H$  = layer thickness (m)  
 $L_1$  = soil volumetric latent heat ( $\text{kJ/m}^3$ )  
 $k_1$  = average thermal conductivity ( $\text{W/m } ^\circ\text{C}$ )  
 $T_s$  = average surface temperature ( $^\circ\text{C}$ )

Based on the air temperatures from Cullaton Lake in 1995, shown on Drawing 6, thawing at the ground surface began around June 1. The average air temperature above  $0^\circ\text{C}$  recorded at Cullaton Lake over the first three weeks of June was  $7.9^\circ\text{C}$ . Based on the above equation, the time required to thaw the existing 0.9 m cover material is approximately 13 days.

A comparative summary of the frost levels using the readings in Thermistor #3 and the model from the two equations is presented in the following table.



ESTIMATES OF PERMAFROST DEPTHS (m)			
Date	Thermistor Value	Model	Probe Estimate
Sept 91	N.A.	1.4	1.4
Sept 4/94	2.2	2.5	N.A.
July 17/95	1.5	1.4	N.A.
June 21/96	1.1	1.2	N.A.
Sept 16/96	2.1	2.3	1.85

The model and thermistor readings give permafrost depths which are greater than field estimates would indicate. To obtain more accurate data for the model, additional field information would be required throughout the season. However, if the assumptions in this model are correct, it is clear that permafrost levels would not rise to the level of the tailings surface with the added 1.4 m of cover unless the cover material had the same properties as the tailings. The natural moisture content of the material, the existing on-site moisture conditions, and the density of the material affect the depth of thaw considerably.

Using the information presented in this analysis, it is estimated that up to 2.0 m of additional cover material would be required to raise the permafrost level to the surface of the underlying tailings.

### Cover Material and Vegetation

Based on our field measurements and topographic survey, combined with information provided by Mr. Ron Nicholson from BEAK Consultants Ltd., an average of 0.67 m of cover exists over the Shear Zone tailings and 0.88 m over the B-Zone tailings. This is approximately 0.5 m less cover material than we recommended for cover over the B-Zone tailings<sup>3</sup>. A revised topographic survey plan which combines the HIW survey information and the former tailings beach area and our recent survey is shown on Drawing No. 6.

Due to the limited amount of available material, placing an additional 2.0 m of cover material may not be achievable. However, placing an additional 0.6 m of cover material and 0.1 m of natural surface material with existing vegetative matter will reduce the duration of the thaw in the underlying tailings considerably. Promotion of vegetation on the surface will help shield the permafrost from

<sup>3</sup> Abandonment and Restoration Plan, Cullaton Lake Gold Mines Ltd., Reference No. F-90132-A/E, May 7, 1991.

solar heat during the summer period thereby reducing thermal degradation of the frozen ground and raise the permafrost level<sup>4</sup>.

Placing the additional cover material should prevent the underlying tailings from thaw until towards the end of July, or later. Using the model equations and average seasonal conditions, the tailings will thaw to a depth of about 1.0 m. However, with vegetation on the surface, the tailings may not be exposed to thaw until the end of August and may then only thaw to a depth of about 0.4 m. The type and coverage of vegetation will influence the effect it has on the permafrost level. From a field study conducted by Trow in June of 1990<sup>5</sup>, the following plant species were known to grow at Cullaton Lake.

PLANT SPECIES, CULLATON LAKE	
Identification	Common Name
Rhododendron lapponicum (L.) Wahlenb.	Arctic Rosebay
Betula glandulosa Michx.	Dwarf or Ground Birch
Empetrum nigrum L. ssp. hermaphroditum (Lge.) Bocher	Crawberry
Vaccinium uliginosum L. s. lat.	Bilberry
Salix sp	Willow Special
Picea mariana (Mill) B.S.P.	Black Spruce

To allow a quicker rise in the permafrost level, the additional cover material should be placed when the underlying soil is still frozen at the end of May or beginning of June.

## SUMMARY

The tailings dams are presently stable under the current site conditions. Some minor repair work around the main spillway should be addressed to cover the exposed liner. Consideration should be given to removing the exposed and damaged sections of liner in Tailings Area 2.

The water level in Tailings Pond No. 1 was the same this year as it was in June, 1992 and there were no exposed tailings in the area.

<sup>4</sup> U.S. Army Corps of Engineers, 1966; Linell 1973.

<sup>5</sup> Letter to Mr. Bill Napier, Corona Corporation, September 21, 1990.

Homestake Canada Ltd.  
Cullaton Lake Gold Mine

Reference No. F-90132-B/E  
November 27, 1996

The permafrost was estimated at an average depth of 1.85 m by probing in the test pits in the covered tailings area. Based on the thermal analysis model and the less than expected amount of cover material, the permafrost will not rise to the expected level. To reduce the exposure time the tailings will be in a thawed state, combining additional cover and vegetation on the surface is recommended in the B-Zone tailings area.

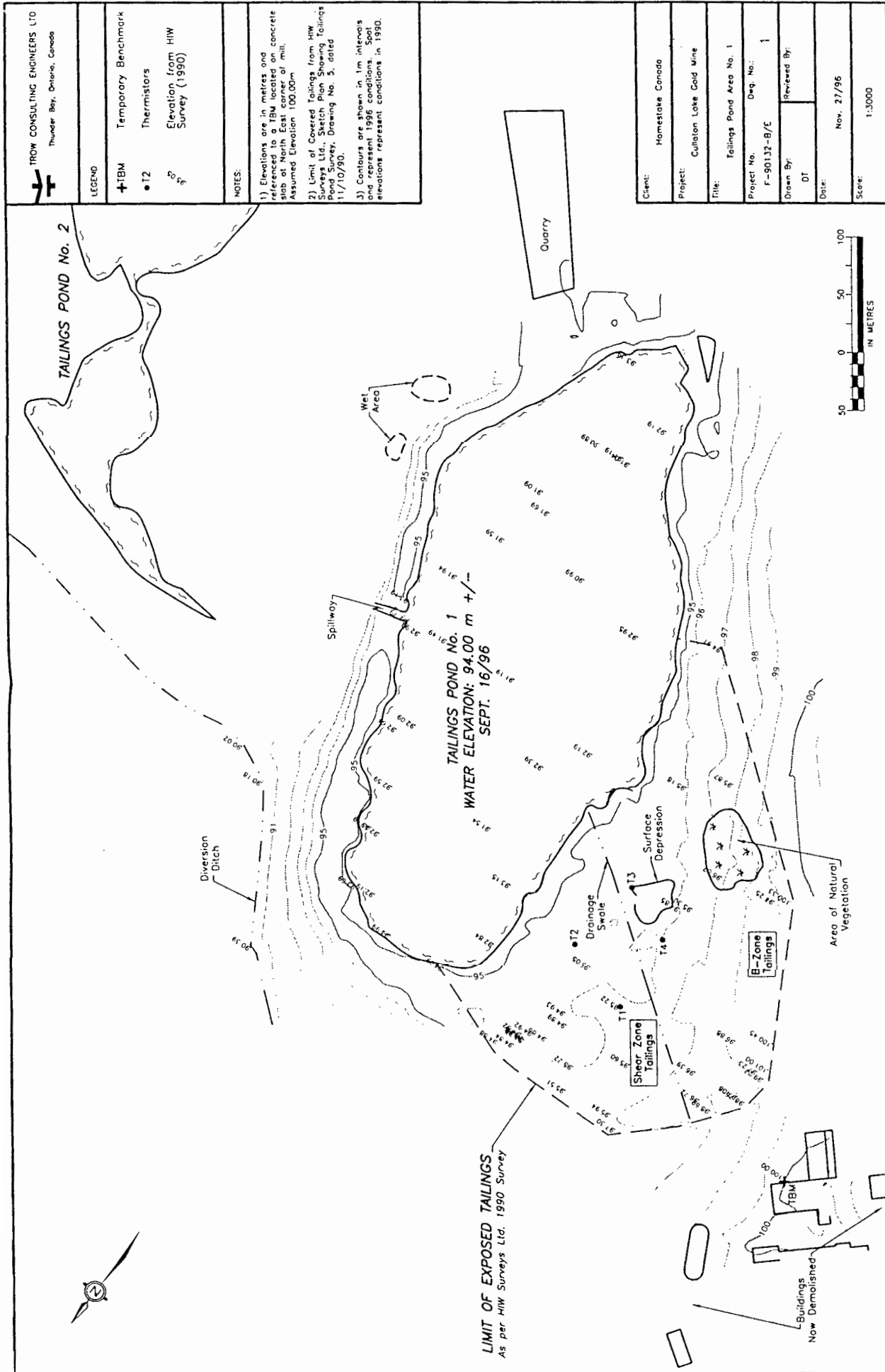
If you have any comments or questions regarding this letter, please contact us at your convenience.

Yours truly,  
TROW CONSULTING ENGINEERS LTD.

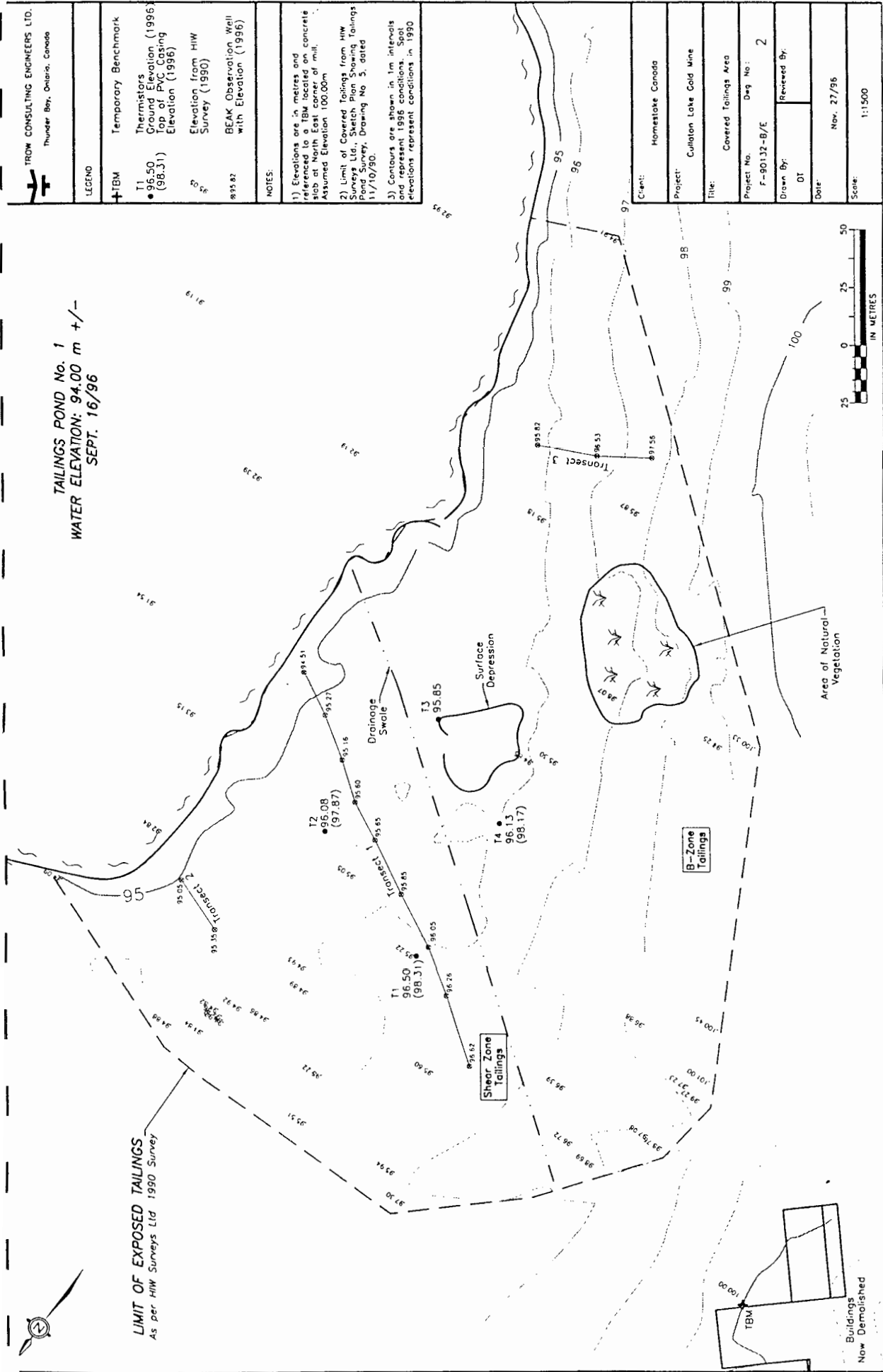
Don Kaluza, P. Eng.

R.B. Dodds, PhD., P. Eng.

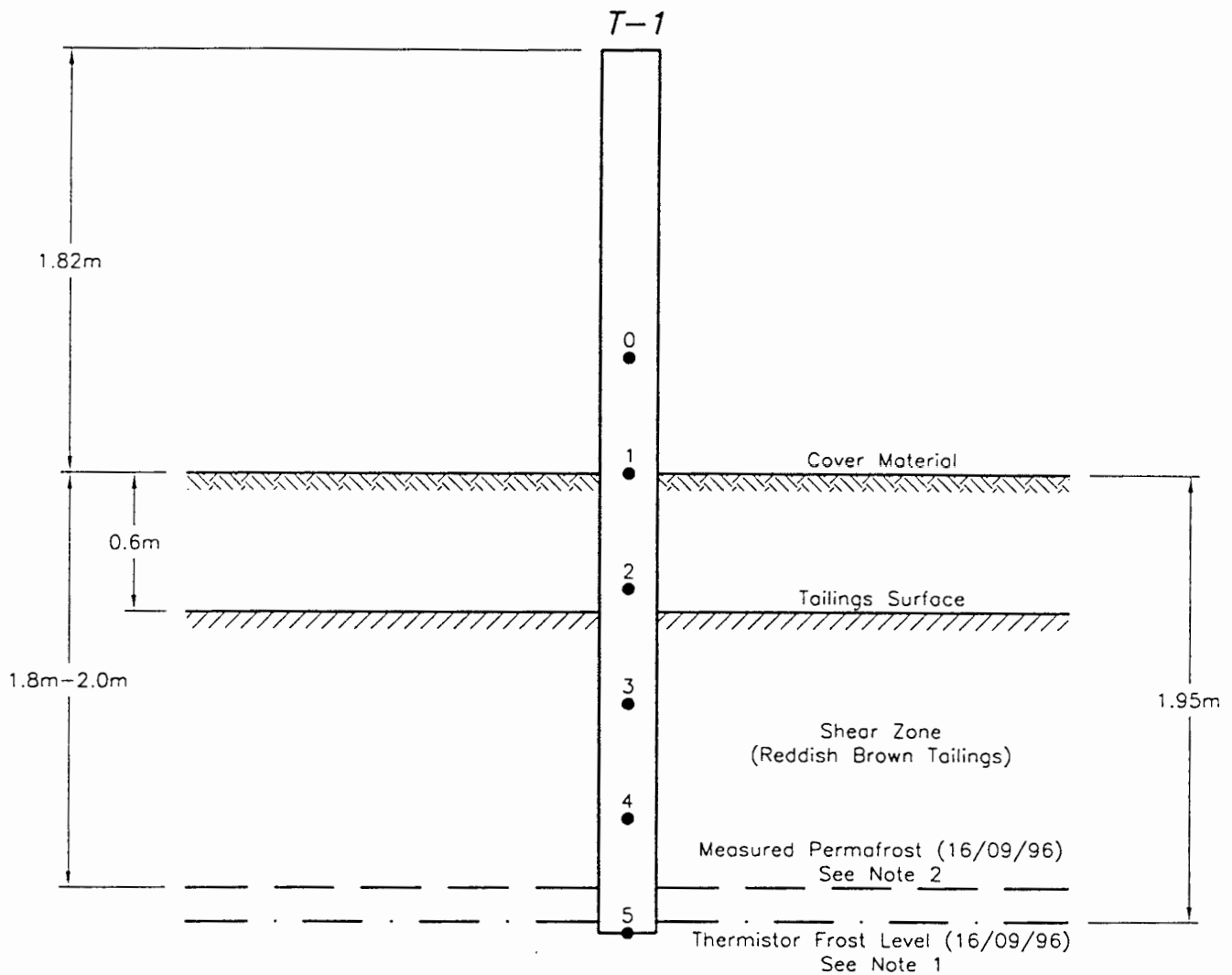
Demetri Georgiou, MAsC., P. Eng.  
Branch Manager



\* - Saled down from 11" x 17" to 8 1/2" x 11" for fax only





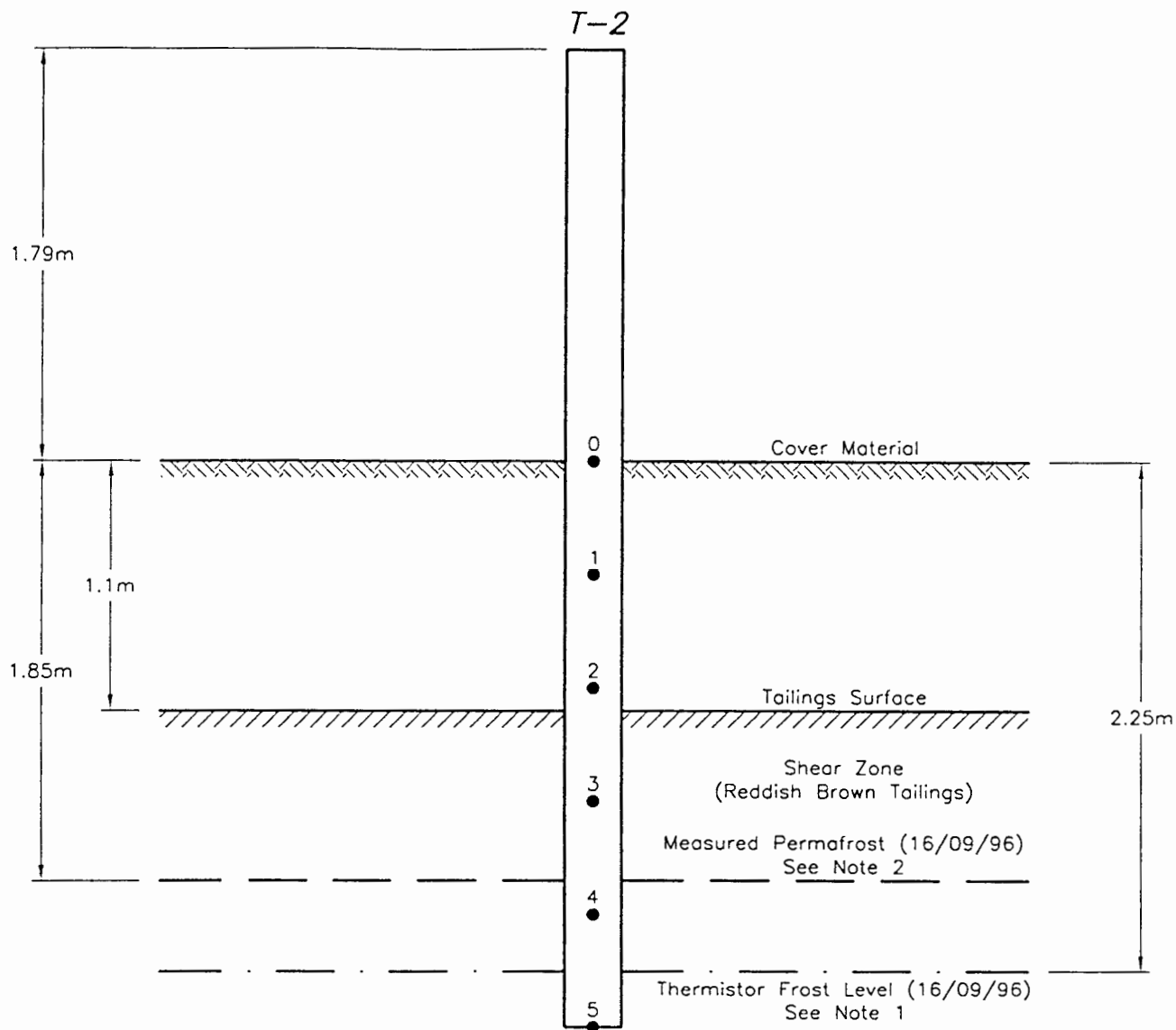
\* Sharon - This drawing was scaled down from 11" x 17" to 8 1/2" x 11" for fax only



**Note:**



- 1) The thermistor frost level assumes that the lowest Thermistor #5 was installed at a depth of 1.4m below the tailings surface.
- 2) Measured permafrost levels were obtained by hand digging and probing with a steel bar.

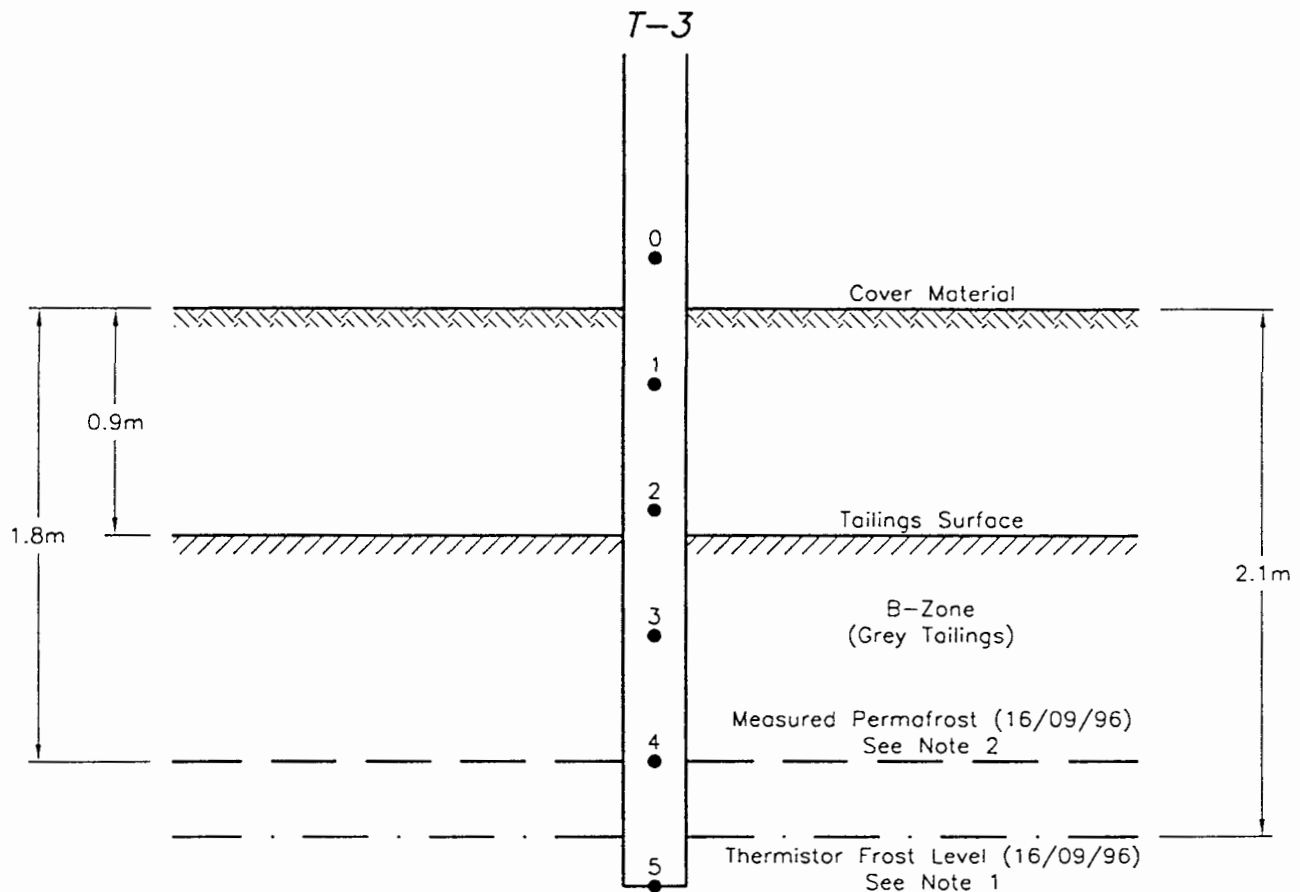
 <b>TROW CONSULTING ENGINEERS LTD.</b> Thunder Bay, Ontario, Canada	DRAWN BY: DT		DATE: Oct. 29/96	
	APR. BY:		REVISED:	
CLIENT: Homestake Canada	SCALE: NTS			
PROJECT: Cullaton Lake Gold Mine	TROW FILE NO.		DWG. NO:	REV.
DWG TITLE: Thermistor String Configuration (T-1)	F-90132-B/E		3	



**Note:**

- 1) The thermistor frost level assumes that the lowest Thermistor #5 was installed at a depth of 1.4m below the tailings surface.
- 2) Measured permafrost levels were obtained by hand digging and probing with a steel bar.

 <b>TROW CONSULTING ENGINEERS LTD.</b> Thunder Bay, Ontario, Canada	DRAWN BY: DT		DATE: Oct. 29/96	
	APR. BY:		REVISED:	
CLIENT: Homestake Canada	SCALE: NTS			
PROJECT: Cullaton Lake Gold Mine	TROW FILE NO.		DWG. NO:	REV.
DWG TITLE: Thermistor String Configuration (T-2)	F-90132-B/E		4	



**Note:**

- 1) The thermistor frost level assumes that the lowest Thermistor #5 was installed at a depth of 1.4m below the tailings surface.
- 2) Measured permafrost levels were obtained by hand digging and probing with a steel bar.



**TROW CONSULTING ENGINEERS LTD.**

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SCALE: NTS

CLIENT: Homestake Canada

TROW FILE NO.

DWG. NO:

REV.

PROJECT: Cullaton Lake Gold Mine

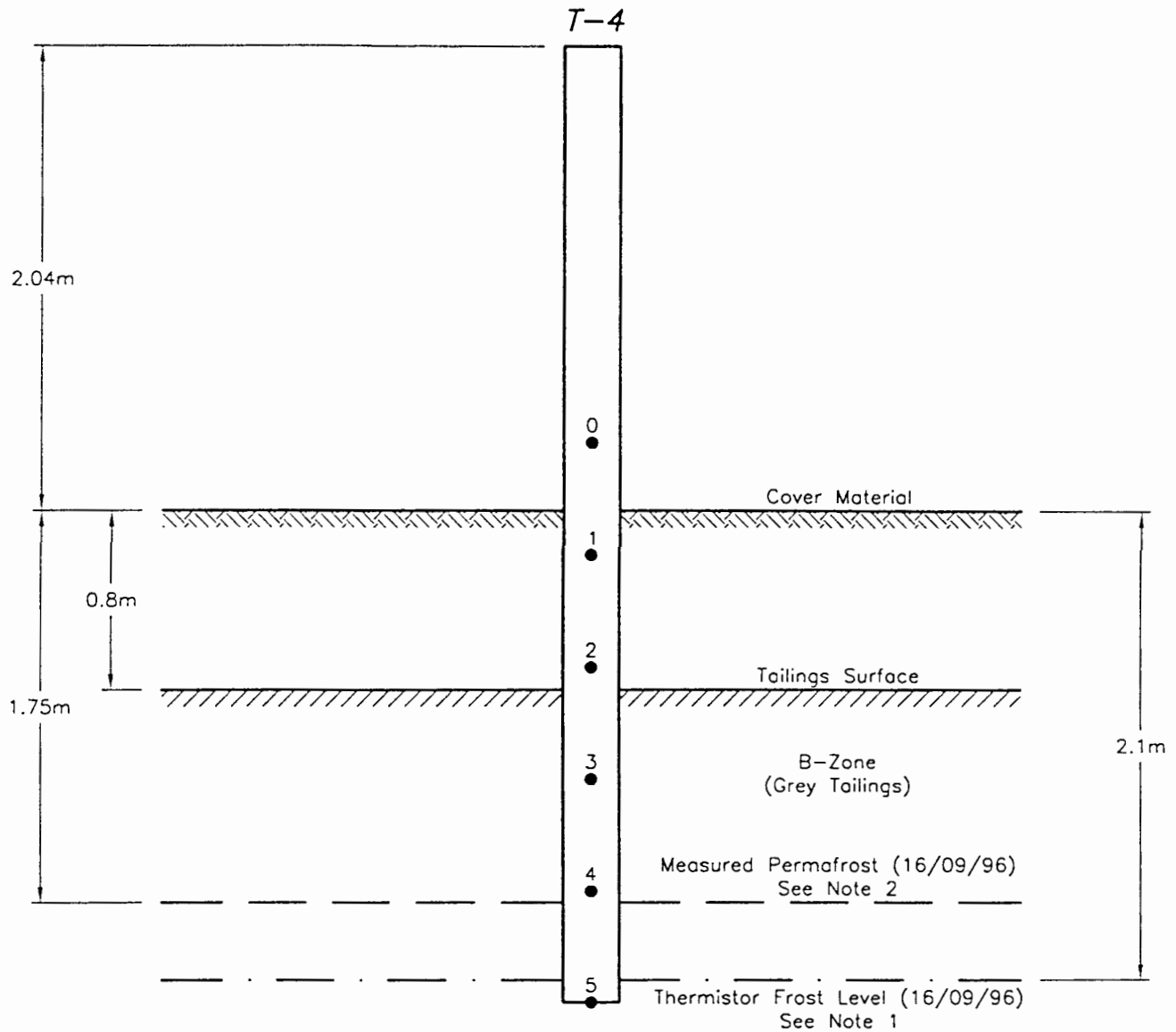
F-90132-B/E

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DWG TITLE: Thermistor String Configuration (T-3)







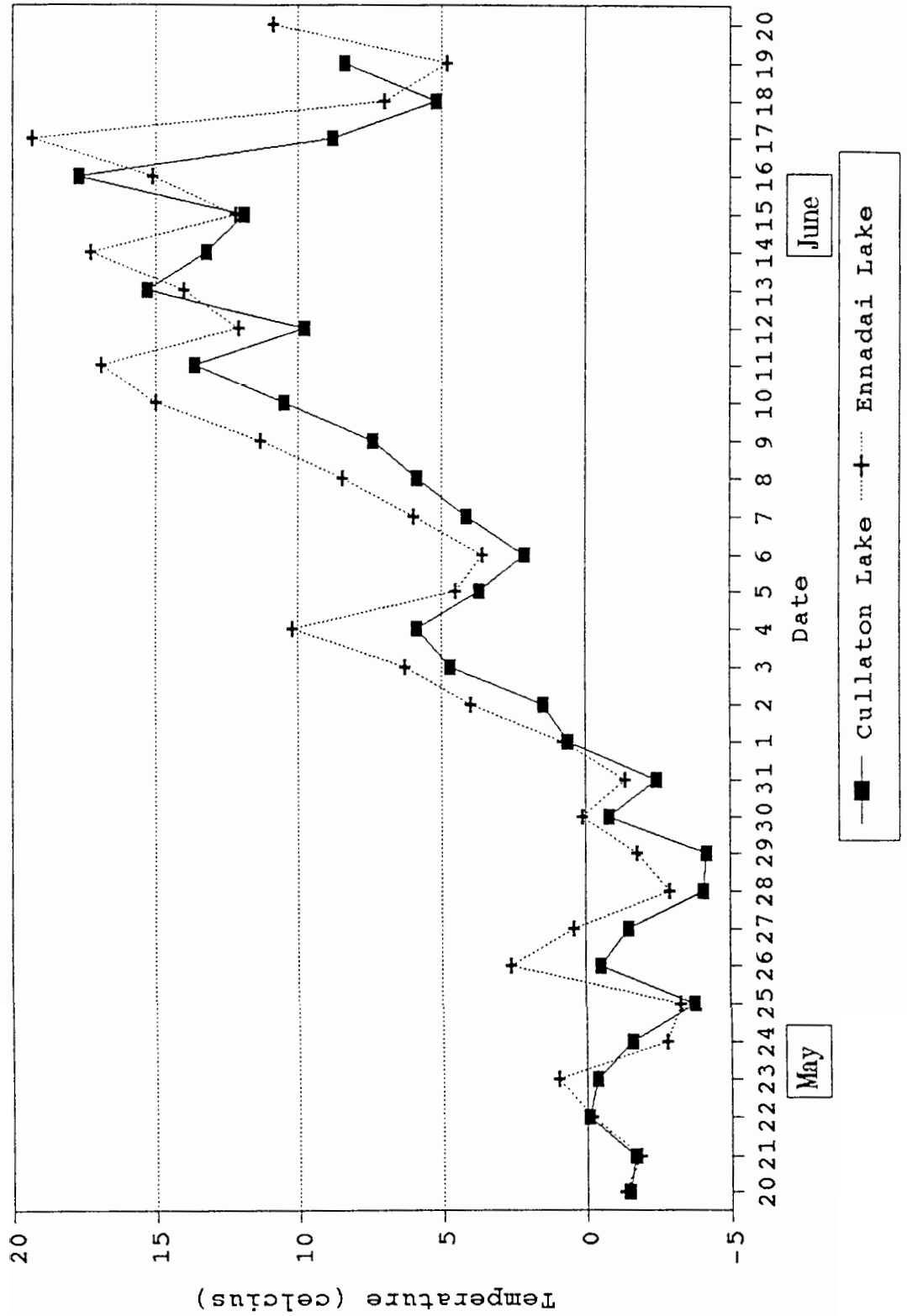


**Note:**

- 1) The thermistor frost level assumes that the lowest Thermistor #5 was installed at a depth of 1.4m below the tailings surface.
- 2) Measured permafrost levels were obtained by hand digging and probing with a steel bar.

 <b>TROW CONSULTING ENGINEERS LTD</b> Thunder Bay, Ontario, Canada	DRAWN BY: DT		DATE: Oct. 29/96	
	APR. BY:		REVISED:	
CLIENT: Homestake Canada	SCALE: NTS			
PROJECT: Cullaton Lake Gold Mine	TROW FILE NO.		DWG. NO:	REV.
DWG TITLE: Thermistor String Configuration (T-4)	F-90132-B/E		6	

# Air Temperature Comparison Cullaton Lake vs Ennadai Lake, 1995



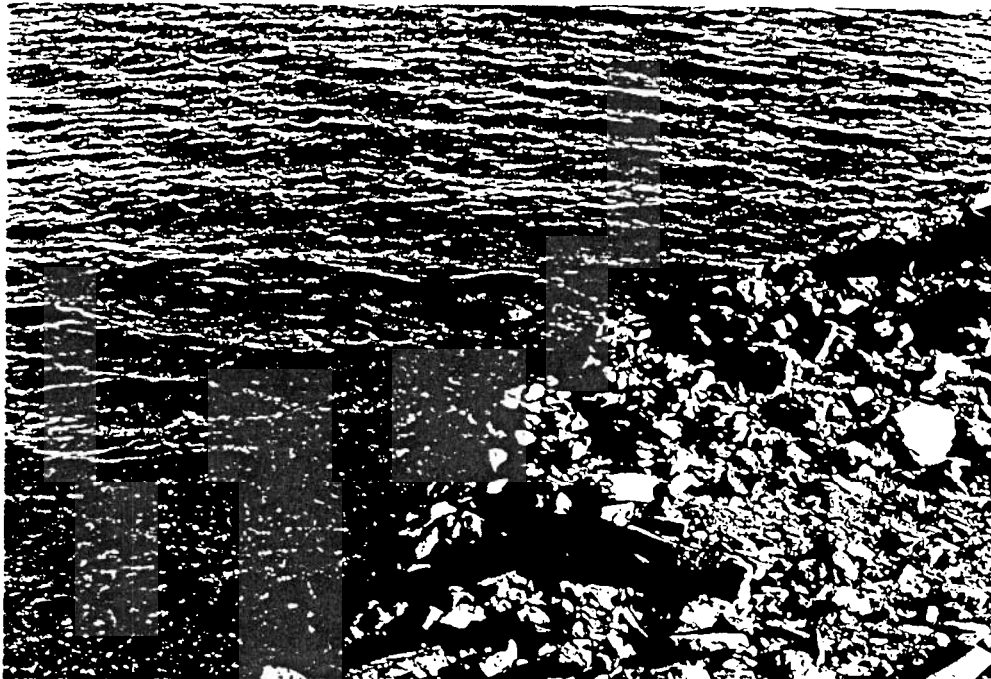


Figure 1: Tailings near surface at west shoreline.



Figure 2: Tailings near surface of water; aerial view looking west.

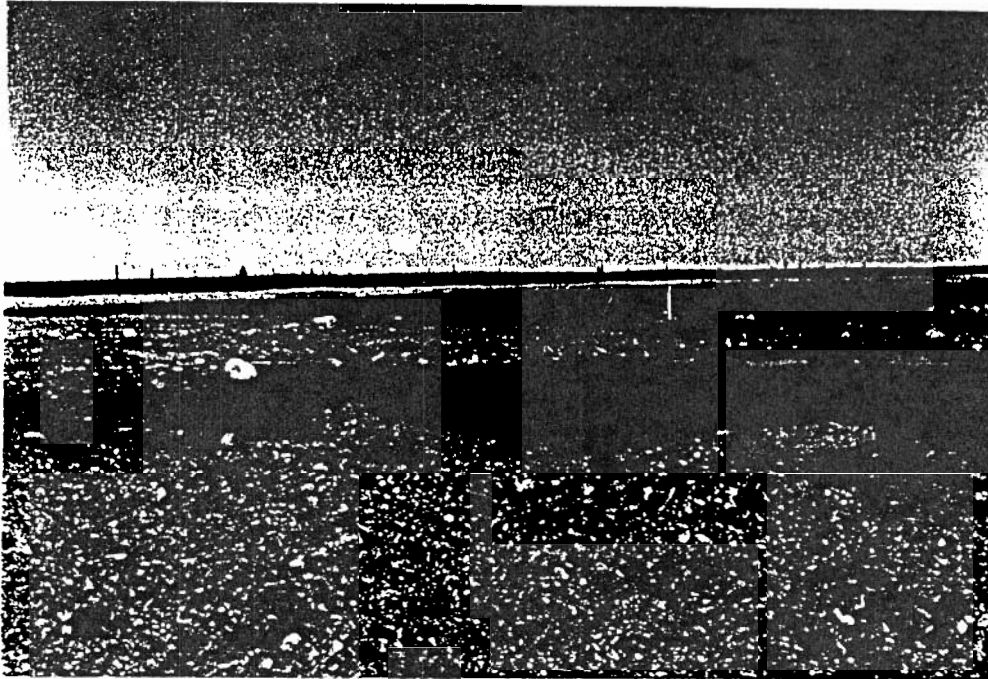


Figure 3: Surface depression in B-zone covered tailings area.

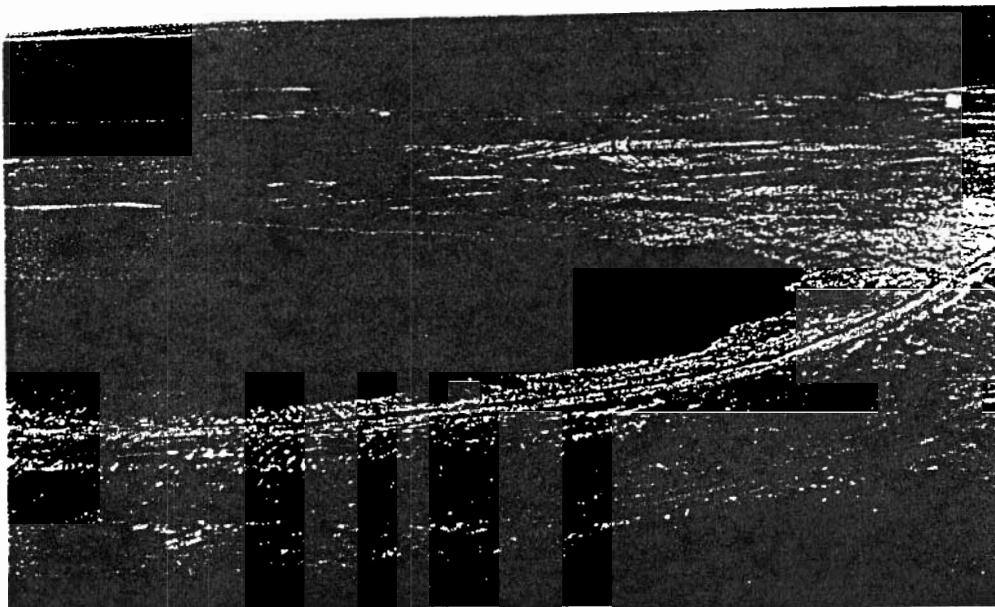


Figure 4: Aerial view of surface depression in B-zone covered tailings area.

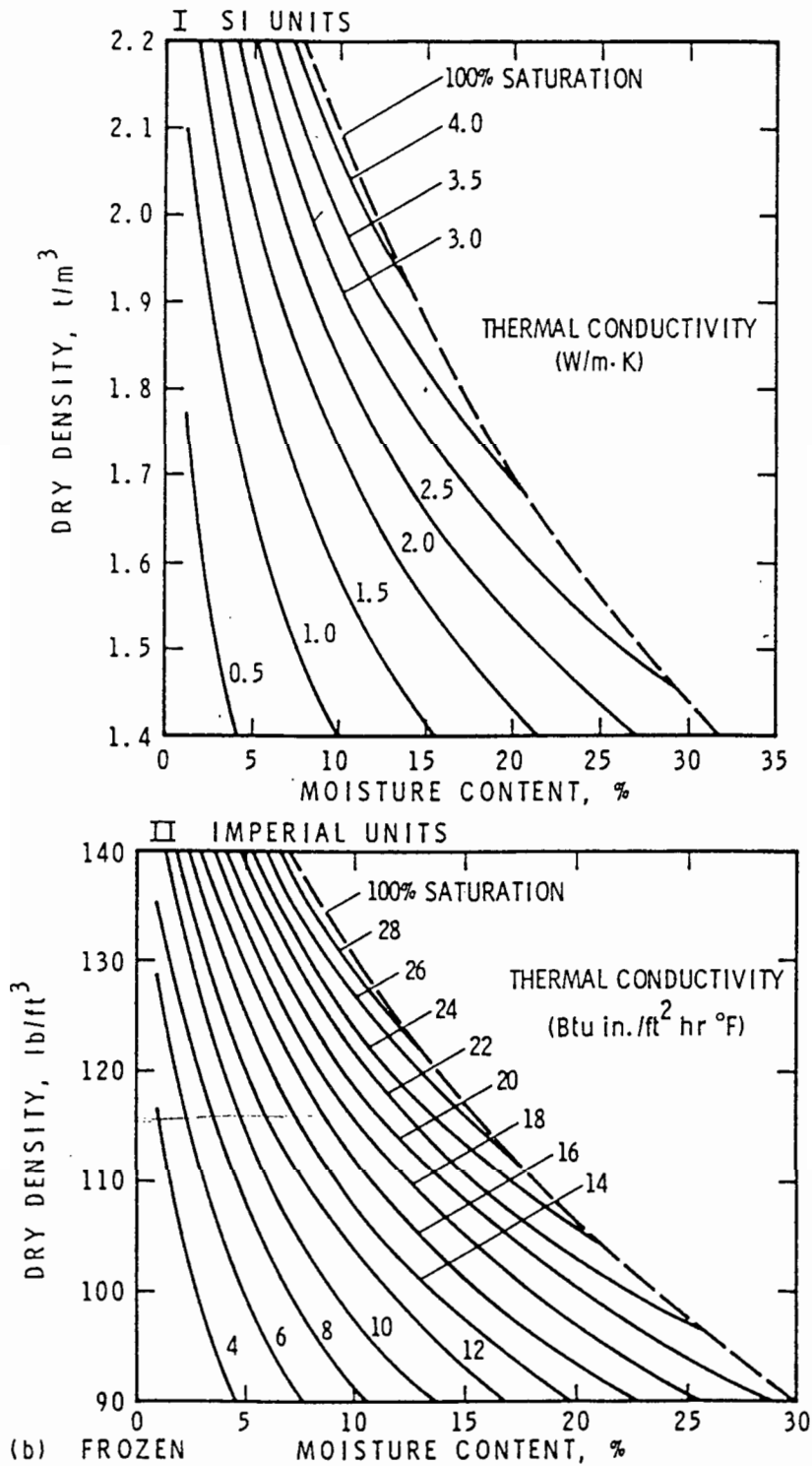


FIG. 3.19 (b) Thermal conductivities of frozen coarse-grained soils (After Kersten 1949).

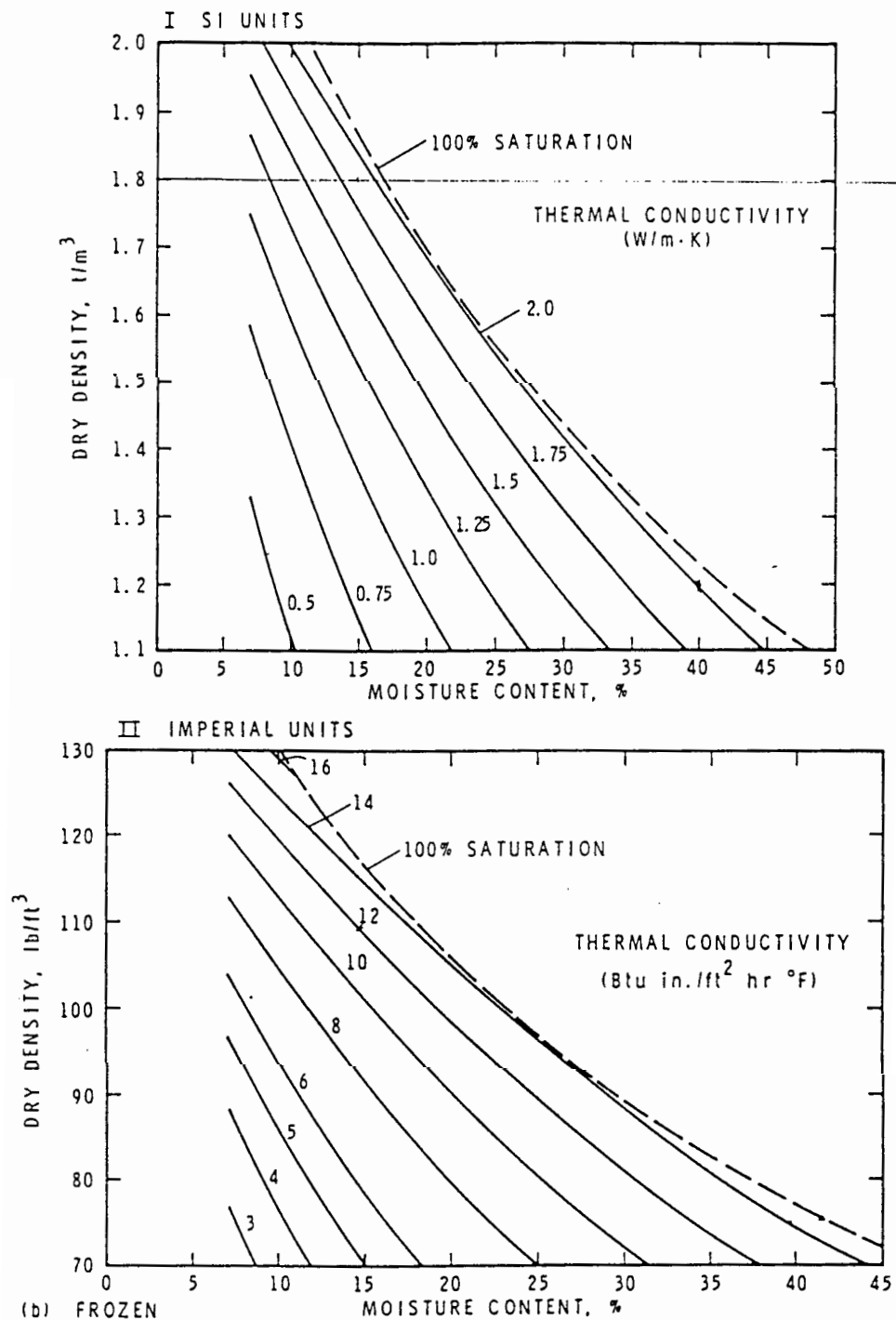
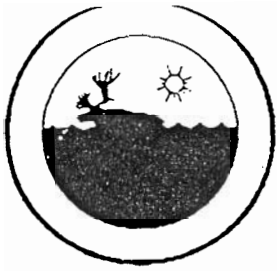


FIG. 3.18 (b) Thermal conductivities of frozen fine-grained soils (After Kersten 1949).



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NUNAVUT WATER BOARD  
NUNAVUT IMALIRIYIN KATIMAYINGI

3220

July 5, 1999

Sharon Meyer  
Environmental Specialist  
Homestake Canada Inc.  
P.O. Box 11115  
1100 - 1055 West Georgia St.  
Vancouver, BC V6E 3P3

Dear Sharon:

Re: Cullaton Lake SNP - Water Licence N6L2-0940

The NWB has approved your request to change sampling dates for SNP Stations 940-2, 940-3, 940-18, 940-19, 940-20 and 940-22. The NWB authorizes sampling to take place, once in June during peak flow and once after July 20 for the 1999 sampling season.

Should you require clarification please do not hesitate to contact me.

Sincerely,

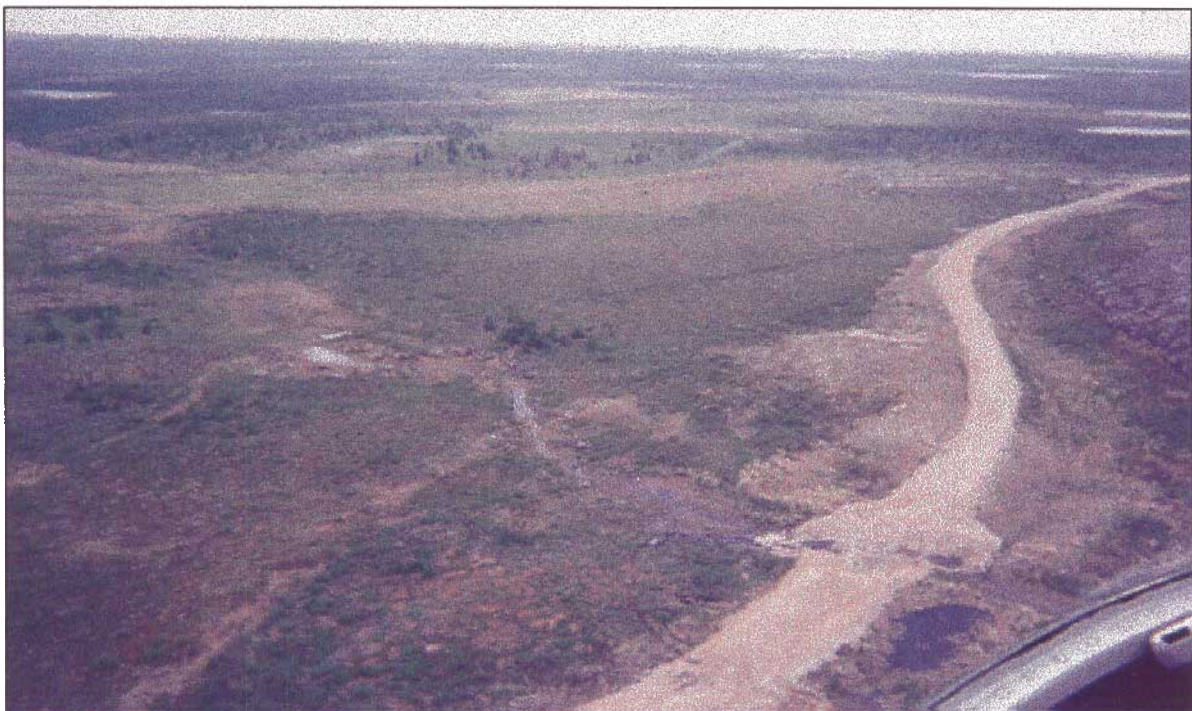
Dionne Filiatrault  
Technical Advisor

cc. DIAND Inspector





Grasses on the former mill site, looking toward the tailings area.



Culvert removed from roadways.





Shear Lake camp remains on site.



Caribou near former mill site.