BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

NANISIVIK MINE, A DIVISION OF CANZINCO LTD.

2007 ANNUAL GEOTECHNICAL INSPECTION

NANISIVIK MINE, NUNAVUT

FINAL

PROJECT NO.: 0255-016-03
DATE: MARCH 26, 2008

DISTRIBUTION LIST:

BREAKWATER RESOURCES	3 COPIES
BGC CALGARY	2 COPIES
BGC VANCOUVER	1 COPY

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
200, 1121 Centre Street NW
Calgary, AB
T2E 7K6

Project No. 0255-016-03
March 26, 2008

Mr. Bob Carreau
Vice President, CSR and Sustainability
Breakwater Resources Limited
Suite 950, 95 Wellington Street West
Toronto, ON
M5J 2N7

RE: 2007 ANNUAL GEOTECHNICAL INSPECTION
NANISIVIK MINE, NUNAVUT

Dear Bob:

Please find attached our above captioned report on the 2007 Annual Geotechnical Inspection undertaken at Nanisivik Mine. A memo outlining maintenance and monitoring requirements was previously left with Mr. Murray Markle, Site Manager.

If there are any questions or comments regarding this report, please contact the undersigned at your convenience.

Regards,
BGC ENGINEERING INC.
per:

Geoff Claypool, P.Eng.
Geological Engineer
(direct line 403/250-5185 ext. 104)

Enclosure: Report, Figures, Appendices

GKC/sf

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

APPENDIX II PHOTOS

LIMITATIONS OF REPORT

BGC Engineering Inc. (BGC) prepared this report for the account of CanZinco Ltd., A Division of Breakwater Resources. The material in it reflects the judgment of BGC staff in light of the information available to BGC at the time of report preparation. Any use which a third party makes of this report, or any reliance on decisions to be based on it are the responsibility of such third parties. BGC 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. Authorization for any use and/or publication of this report or any data, statements, conclusions or abstracts from or regarding our reports and drawings, through any form of print or electronic media, including without limitation, posting or reproduction of same on any website, is reserved pending BGC's written approval. If this report is issued in an electronic format, an original paper copy is on file at BGC Engineering Inc. and that copy is the primary reference with precedence over any electronic copy of the document, or any extracts from our documents published by others.

1.0 INTRODUCTION

Nanisivik Mine is wholly owned and operated by CanZinco Ltd., which is a division of Breakwater Resources Ltd. (Breakwater). Nanisivik Mine is located on the Borden Peninsula on northern Baffin Island, just south of Strathcona Sound, as shown on Figure 1.

Mining operations at Nanisivik ceased in September 2002. Site operations are currently conducted under Nunavut Water Board License NWB1NAN0208 (the License), dated October 1, 2002 which entitles CanZinco (the Licensee) to use water and dispose of waste associated with the closure and reclamation of the mine. Part H, Item 6 of the License states the following:

> "An inspection of the earthworks, the geological regime, and the hydrological regime of the West Twin Disposal Area, East Adit Treatment Facility, and fuel containment berms shall be carried out annually during the summer by a Geotechnical Engineer."

Additionally, the Nunavut Water Board's Letter of Approval (NWB 2004) states the following:

> "In addition to the requirements outlined in Part H, item 6, of the License, the Licensee shall include inspection of all portals, adits, mine openings, ventilation shafts associated with the mine and an examination of the area around the Industrial Complex ice lens."

Also, the approved Nanisivik Mine Reclamation and Closure Monitoring Plan (GLL 2004a) states that the annual geotechnical inspection will include "all earth structures, water diversions, rock slopes and soil covers by a professional engineer." As per the Monitoring Plan, "the engineers report will include a professional review and assessment of all thermal monitoring information and flow information relevant to a physical stability assessment."

In fulfillment of these regulatory requirements, Mr. Bob Carreau, Vice-President Environmental Affairs for Breakwater, requested that BGC Engineering Inc. (BGC), conduct an inspection visit. The current report provides a summary of the conditions observed and any resulting recommendations and maintenance issues. Table 1 provides a list of the structures that were included within the inspection.

Table 1 - Summary of Inspection Items

Facility Type	Inspection Item
Embankments and Containment Structures	West Twin Dike
	Test Cell Dike
	East Twin Creek Diversion Dike
	East Adit Treatment Facility
	Day Tank Farm Area
	Main Tank Farm Spill Containment Berm
	West Twin Outlet Channel
Thermal Covers	Surface Cell
	Test Cell
	Toe of Test Cell Dike
	Toe of West Twin Dike
	Landfill
	West Open Pit
	East Open Pit
	Oceanview Open Pit
	Area 14
	Upper Dump Pond
Mine Openings, Crown Pillars and Raises	00/01 Portals and crown pillar
	17 N Portal
	Oceanview Portal
	K-Baseline Portal
	Area 14 Portal
	9S Portal
	Lower Adit
	Shale Hill Raise
	Oceanview East and West Raises
	Area 14 Raise
Shale and Armour Borrow Areas	Mt. Fuji Shale Borrow Area
	West Twin Shale Borrow Area
	East Twin Shale Borrow Area
	Area 14 Shale Borrow Area
	Townsite Shale Borrow Area
	Shale Hill Shale Borrow Area
	Twin Lakes Delta Armour Borrow Area
	Kuhulu Lake Road Borrow Area
	09S/17N Armour Borrow Area
	Chris Creek Armour Borrow Area
Industrial Complex	Mill Foundation
	Former Portal to Mill Foundation
Other	Concentrate Storage Shed

All pre-1998 site investigation work, geotechnical design and construction monitoring of the West Twin and East Adit containment structures was carried out by Terratech, a division of SNC Inc. and Mr. Frank Tordon, P.Eng. Initial design work relating to the East Twin diversion dike and channel and the dump containment ponds was provided by Kilborn Engineering Ltd. Golder Associates Ltd. prepared the annual inspection reports for the waste containment dikes in 1998 and 1999, while BGC provided the annual inspection reports for 2000 through 2006. These other reports should be reviewed, in combination with this current report, for the sake of consistency regarding performance and maintenance issues.

2.0 MINE RECLAMATION ACTIVITIES

The Final Closure and Reclamation Plan was submitted to the Nunavut Water Board for review and approval in March 2004. The review process included a technical meeting in Yellowknife in May 2004 and a public hearing in Arctic Bay in June 2004. The Board conveyed its approval of the plan in a letter to Breakwater dated July 6, 2004.

The reclamation of the mine site has been ongoing since August 2004. Since then, the following reclamation activities related to the geotechnical inspection have been completed:

- Permafrost aggradation or "thermal" covers were constructed over tailings in the Surface Cell, Test Cell, toe of the Test Cell Dike, toe of the West Twin Dike and at the Upper Dump Pond.
- Thermal covers were constructed over waste rock in the West Open Pit, East Open Pit, Oceanview Pit and Area 14 Waste rock pile.
- A thermal cover was constructed over the Nanisivik Landfill.
- Portal plugs and thermal covers were constructed at the Oceanview Portal, K-Baseline Portal, 17 North Portal, 88 North Portal, 00 Portal and 01 Portal.
- A fill pillar was constructed beneath the 00/01 crown/rib pillar.
- The West Twin Dike Spillway was constructed to convey water from the Surface Cell to the Reservoir.
- The West Twin Outlet Channel was constructed to control the water level in the Reservoir.
- Additional armour was applied to a portion of the face of the East Twin Creek Diversion Berm.
- The East Adit Treatment Facility was decommissioned by breaching each of the dikes.
- The Day Tank Farm was decommissioned by removing the tanks, liner and berms.
- The Industrial Complex was demolished and the foundation was backfilled with metals contaminated soils.
- The Concentrate Storage Shed was demolished and a surficial cover was constructed over the concrete floor slab.

Reclamation items which remain uncompleted include the following:

- Construction of portal plugs at the 09 South and Lower Adit portals;
- Completion of the thermal cover over metals contaminated soils placed in the Mill Foundation;
- Breaching of the road between the Polishing Pond and the Reservoir and removal of the culverts and stop log control structure.

It is anticipated that these remaining items will be completed in 2008.

3.0 CLIMATE REVIEW

Climatic data has been collected by Environment Canada since 1976 at the Nanisivik Airport, which is located approximately 10 km south of the West Twin Disposal Area and approximately 250 m higher in elevation. The recorded climate data were analysed in Golder (1998) to provide a basis for deriving the existing climate parameters such as precipitation, air temperatures and lake evaporation at the project site. The following list is a summary of the main climatic parameters based on the data available in 1998:

- The mean annual air temperature was estimated to be -15.2°C.
- The mean annual precipitation totals was estimated to be 240 mm.
- The 24 hour Probable Maximum Precipitation (PMP) value was estimated to range from 140 to 210 mm.
- The mean annual lake evaporation value, as measured at the Nanisivik site, was approximately 200 mm.

Figure 2 illustrates the long-term mean monthly temperature values (Nanisivik Airport) versus the monthly values for 2006 and a portion of 2007. Figure 3 shows the long-term monthly total precipitation values as compared to the monthly values recorded in 2006 and a portion of 2007. Table 2 provides a summary of the climate data recorded at the Nanisivik airport since 2003.

Table 2 - Summary of Climate Data 2003-2006

Parameter	Nanisivik Averages (1977-2006)	2003	2004	2005	2006
Mean Annual Air Temperature	-14.8 ^{o}C	-13.3 ^{o}C	-15.7 ^{o}C	-13.5 ^{o}C	-12.4 ^{o}C
Total Annual Precipitation	282 mm	333.3 mm	304.7 mm	501.6 mm	455.4 mm

As can be seen, 2006 was an above average year for both air temperature and precipitation. The mean annual air temperature (MAAT) was approximately 2.4°C warmer than the long term average. Only the mean monthly temperature recorded in January and June were observed to be cooler than the long term monthly average. The remainder of the months had mean monthly temperatures equal to, or warmer than, the long term average for that month. The total annual precipitation was nearly double the long term average. This is related to high rainfall amounts experienced by the site in July.

Climate data collected to-date in 2007 indicates that the 2007 MAAT value will again, likely be above average. The mean monthly temperatures recorded at the Nanisivik Airport between January and September 2007 have been, on average, 1.5°C warmer than the long term average. Only the mean monthly air temperature recorded in March and May were observed to be cooler than the long term monthly average. The precipitation recorded between January, August and September 2007 was nominally equivalent to the long term average for these months. It should be noted that although 2006 and the first nine months of 2007 were observed to be warmer than average, the observed air temperatures were still significantly cooler than the "High Sensitivity" estimate for global warming, -10.1°C, used in the thermal cover design, as documented in BGC (2004b).

To further assess the thaw season climate data, the average monthly temperatures and thaw degree days between May and September for 2003 through 2007 are provided in Table 3.

Table 3 - Summary of Thaw Season Climate Data 2003-2007

Parameter	Average Monthly Air Temperatures (°C)					Average Air Temperature From May to September (°C)	Air Thawing Index (°C x Days)
	May	June	July	August	September		
Monthly Average (1977-2006)	-10.2	-0.3	5.0	1.7	-5.3	-1.8	208*
2003	-8.6	0.0	6.3	0.3	-5.1	-1.4	309**
2004	-9.2	-1.8	2.8	1.2	-4.8	-2.4	154**
2005	-11.3	1.4	4.6	4.1	-4.8	-1.2	337**
2006	-6.1	-1.7	5.7	4.7	-1.9	+0.1	352**
2007	-12.4	0.7	9.4	5.2	-5.4	-0.5	507**

* The long term average (1977-2006) value for Thaw Degree Days was calculated using mean monthly temperatures.

** Thaw Degree Day values for 2003 through 2007 were calculated using mean daily temperatures.

The data indicates that the average monthly temperature between May and September in 2007 was -0.5°C, approximately 1.3°C warmer than the long term average. This is slightly cooler than the average temperature recorded over the same time period in 2006. However, when the thaw season air temperatures are converted to air thawing indices (ATI), it is apparent that the summer months in 2007 were warmer than average. Because of its focus on the air temperatures during the thaw season, ATI are considered to be a better parameter to characterize thawing potential for each individual year than MAAT values.

The maximum rainfall intensity experienced by the covers since completion is provided in Table 4. These values are important because they provide an indication of the erosive effects the covers have been subjected to since construction.

Table 4 - Maximum Daily Rainfall Amounts 2005-2007

Year	Date	Maximum Daily Rainfall Amount (mm)
2005	July 6	17.2
2006	July 3	25.2
2007	August 1	11.4

As can be seen, the maximum total daily rainfall in 2007 was approximately 11.4 mm recorded on August 11. This is the lowest amount since completion of the covers in 2005. Additionally, it is significantly lower than the 1:100 year (41 mm), 1:500 year (51 mm) and Probable Maximum Precipitation (140 mm) 24 hour events estimated in the site hydrology study conducted by Golder (2002).

4.0 MINE DESCRIPTION

Mining was conducted at Nanisivik Mine between 1976 and 2002. During that time, mining was conducted at four small open pits (West Open Pit, East Open Pit, East Trench and Oceanview Open Pit) and underground (Main Lens, Area 14, Oceanview and K-Baseline). The location of each mining area is illustrated on Figure 1. The ore was processed at the mill and the tailings were transported to the West Twin Disposal Area (WTDA), located at West Twin Lake.

The WTDA is comprised of an upper, solids retention pond, named the Surface Cell, and a lower, water retention pond, called the Reservoir, as shown on Figure 4. The Surface Cell and Reservoir are separated by the West Twin Dike, a frozen-core, rockfill dike. Prior to construction of the West Twin Dike, tailings were deposited throughout the original West Twin Lake. After construction of the dike, tailings were primarily deposited into the Surface Cell. Excess water was then siphoned or pumped from the Surface Cell into the Reservoir from where it was reclaimed for use in the mill. The Reservoir was subsequently further separated by constructing the Test Cell Dike, creating additional tailings disposal capacity in what was known as the Test Cell.

The Reservoir and a final polishing pond were separated by a rockfill causeway and stop log structure. Water from the polishing pond was then discharged to Twin Lakes Creek at the decant structure located at the outlet from the pond. The decant structure was replaced in 2005 by the West Twin Outlet Channel.

Due to the extraction of potable water from nearby East Twin Lake, it is a requirement of the water licence that the Reservoir (formerly, West Twin Lake) elevation remain lower than the East Twin Lake level. Table 5 presents a summary of the month end lake levels recorded since September 2006:

**Table 5 - East Twin Lake and Reservoir Water Levels
September 2006 – September 2007**

Month	Month End Reservoir Elevation (m)	Month End East Twin Lake Elevation (m)
Sep.'06	370.35	372.04
Oct.'06	370.35	372.04
Nov. '06	370.35	372.02
Dec. '06	370.35	371.99
Jan. '07	370.35	371.97
Feb. '07	370.35	371.95
Mar. '07	370.35	371.91
Apr. '07	370.35	371.88
May '07	370.35	371.89
Jun. '07	370.43	372.29
Jul. '07	370.28	372.11
Aug. '07	370.26	372.12
Sep. '07	370.26	371.99

It should also be noted that the maximum observed Reservoir water level (370.43 m elev.) is higher than the design normal water level (370.2 m elev.) due to the continued presence of the culverts in the access road to East Twin Lake. Once these culverts are removed, and the road is breached, it is anticipated that the normal water level in the Reservoir will be 370.2 m, as designed for final closure conditions.

5.0 REVIEW OF 2006 MAINTENANCE RECOMMENDATIONS

The 2006 Annual Geotechnical Inspection Report (BGC 2007a) outlined a number of maintenance recommendations. These recommendations, and their status, as observed during the 2007 inspection, are provided in Table 6.

Table 6 - Summary and Status of 2006 Maintenance Recommendations

Inspection Item	Recommended Maintenance	Comments/ Actions
West Twin Dike Spillway	Level bottom of spillway.	Completed.
	Remove slide debris.	Completed.
	Repair thermokarst area near outlet with rockfill.	Completed.
	Rip rap left side of spillway down gradient of access ramp.	Completed.
	Re-slope/ repair area where debris falls into spillway.	Partially completed. Stabilization provided by riprap added to base of slope. Additional resloping may be required.
	Re-level access road.	No action yet undertaken.
	Re-grade/ fix up area near deflection berms.	No action yet undertaken.
Test Cell/ Test Cell Dike	Rip rap the bottom of the outlet trench.	Partially completed. Additional rip rap may be required.
	Rip rap the shoreline at the outlet.	Partially completed. Additional rip rap to be applied below water line.
	Apply additional compactive effort along north-south arm of Test Cell Dike.	No action yet undertaken.
Toe of West Twin Dike/ Toe of Test Cell Dike	Add rip rap to shoreline at Toe of West Twin Dike (30 cm lift).	Partially complete. Rip rap stockpiled along shoreline. Not yet spread.
Landfill	Complete spreading of armour on west face.	No action yet undertaken.
	Compact the armour surface.	No action yet undertaken.
West Open Pit	Additional compaction of armour material.	Completed.
East Open Pit/ East Trench	Complete armouring at toe at berm location.	Completed.
	Additional armouring at west edge of cover.	Completed.
Oceanview Pit	Improve gradient behind water deflection berm.	No action yet undertaken.
	Backfill small sinkhole.	Completed.
Area 14	Complete armouring of the portal.	Completed.
	Complete armouring along north edge of waste rock cover.	Completed.

Inspection Item	Recommended Maintenance	Comments/ Actions
Oceanview Portal	Improve drainage berm where it meets the portal cover.	No action yet undertaken.
	Repair settlement in SW corner.	No action yet undertaken.
Area 14 Raise	Construct surface mound.	Partially completed. Armour applied at surface but no mound constructed.
Main Tank Farm	Repair liner tears and cover exposed areas of liner.	No action yet undertaken.
Day Tank Farm	Repair liner tears and cover exposed areas of liner.	Tank farm was decommissioned in 2007. No additional maintenance required.
East Adit Retention Dike	Repair/Replace GCL on upstream side of dike.	Dike was breached in late 2006. No additional maintenance required.
East Adit Treatment Dike	Monitor water levels.	Dike was breached in late 2006. No additional maintenance required.

The maintenance items identified in 2006 that have yet to be addressed, or have only been partially addressed, have been carried forward as recommendations for 2007. More information regarding the 2007 maintenance requirements is provided in Section 6.

6.0 2007 INSPECTION CONDITIONS

Mr. Geoff Claypool, P.Eng., conducted the geotechnical site inspection between August 27 through 31, 2007. Each of the elements from Table 1 were inspected on foot. Pertinent observations concerning both the condition and seepage were recorded by photograph. The photographs and field notes constitute the field record which provides the basis for this formal report.

After completion of the site inspection tour, a memo (attached in Appendix I) was forwarded to Mr. Murray Markle, Site Manager, summarizing the conditions observed and the resulting recommendations.

6.1 Embankments and Containment Structures

Several embankments and containment structures were constructed at Nanisivik Mine throughout its history for various purposes. These include the following:

- West Twin Dike,
- Test Cell Dike,
- East Adit Treatment Pond Dike,
- East Adit Retention Pond Dike,
- Day Tank Farm Spill Containment Berm, and
- Main Tank Farm Spill Containment Berm.

The following sections provide a summary of the inspection conditions at each of the structures mentioned above. It should be noted that since the West Twin Dike and Test Cell Dike have been incorporated into the Surface Cell and Test Cell tailings covers, respectively. The inspection conditions for these structures are reviewed in Section 6.4 (Thermal Covers).

6.1.1 East Adit Treatment Facility Dikes

Construction Details

The East Adit Treatment Facility is located approximately 3 km east of the mill, downslope from the East Adit area, as shown on Figure 1. The facility is comprised of a Treatment Pond and a Retention Pond, both of which employed earthen dikes to retain surface water flow. Water that flows through this area is runoff water from the surrounding drainage basin, where the water quality is affected and/or impacted by natural mineralized soil and rock.

Both dikes are shale rockfill structures mixed with a combination of one or more of the following: regional talus, glacial till, marine clay and/or bentonitic clay. The Treatment Pond Dike is approximately 5 m above the surrounding ground surface. The Retention Pond Dike is approximately 3 m above the surrounding ground surface.

Both dikes were breached in late 2006. The breaches are approximately 5 m wide at the base and are sloped back to the remnant crest of the dikes at an angle of approximately 3(H):1(V).

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-1). The main observations made during the inspection are summarized by the following:

- Some ponding of water was noted in the East Adit Retention Pond.
- Some channelization of remnant sediments was observed in the East Adit Treatment Pond.

It was recommended that the drainage through the Retention Pond area be improved to prevent ponding.

6.1.2 Day Tank Farm Spill Containment Berm

Construction Details

The Day Tank Farm Spill Containment Berm was located just uphill from the Industrial Complex, as shown on Figure 1. The berm provided contingency storage for fuels should the day tanks leak or spill. The berm was approximately 4 m high, at its highest point, and had a crest width of approximately 2 m.

CanZinco (2004) details the reclamation plan for the facility which involves the following:

- The liner is to be removed and disposed of underground according to the Waste Disposal Plan.
- Hydrocarbon contaminated soils are to be relocated to the underground mine, in accordance with the Underground Waste Disposal Plan.
- The areas which are disturbed during reclamation are to be backfilled and/or contoured to their surroundings.

In 2007, the dank tank farm was decommissioned. According to site staff, the tanks, liner and berm were removed and transported to the underground mine workings. Site staff also indicated that some hydrocarbon contaminated soil was excavated and was also transported to the underground mine workings.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-2). The main observations made during the inspection are summarized by the following:

- The liner, berm and tanks had been completely removed as part of reclamation efforts.
- The area where the day tank farm used to be was well drained and no ponding of surface water was observed.

No additional maintenance was recommended for this area, in terms of geotechnical requirements. It is assumed that any and all geoenvironmental considerations have been addressed by other parties.

6.1.3 Main Tank Farm Spill Containment Berm

Construction Details

The Main Tank Farm Spill Containment Berm is located adjacent to the loading dock at Strathcona Sound, just west of the concentrate storage building (Figure 1). The purpose of the berm is to provide contingency storage for fuels should the fuel storage tanks leak or spill.

The berm is approximately 5 m high at its highest point and has a crest width of 1 to 3 m. The side slopes of the berm are approximately 1.5H:1V to 2H:1V.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-3). The main observations made during the inspection are summarized by the following:

- No seepage was observed at the toe of the berm.
- No erosion or sloughing of either the upstream or downstream face of the berm was observed.
- Some minor cracking was observed on the crest of the berm along the west side of the containment facility.
- A portion of the berm was removed adjacent to the hydrocarbon soils excavation outside the containment facility.
- The liner is exposed at several locations on the inside of the containment berm.

During the excavation of hydrocarbon contaminated soils in the dock area in 2006 and 2007, a portion of the main tank farm spill containment berm was affected. The affected area was approximately 20 m long (lateral distance along the berm), from the crest to the toe of the berm. The excavation has resulted in an oversteepening of the berm face and exposure of the GCL liner.

In general, the berm appears to be in a satisfactory condition, except for the area affected during excavation of nearby hydrocarbon soils. The affected area should be re-sloped to match the grade of the adjacent slopes and the GCL liner should be re-buried to prevent damage to the liner. It is also recommended that any area of exposed liner within the berm be covered to prevent damage from occurring. Also, any torn portions of the liner should be repaired.

It should be noted that the inspection of the Main Tank Farm area was limited to surficial observations of the dike. Due to practical limitations, no assessment of the integrity or effectiveness of the buried, internal liner was undertaken.

6.2 Water Conveyance Structures

Several water conveyance structures were constructed at Nanisivik Mine, both prior to, and during the reclamation process. These include the following structures:

- West Twin Dike Spillway;
- West Twin Outlet Channel; and
- East Twin Creek Diversion Berm and Channel.

The following sections provide a summary of the inspection conditions at each of the structures mentioned above.

6.2.1 West Twin Dike Spillway

Construction Details

The West Twin Dike Spillway is located at the south end of the Surface Cell, as show on Figure 4. The spillway conveys water from the Surface Cell to the Reservoir. The physical details of the spillway are summarized by the following:

- The spillway is approximately 550 m long.
- The bottom of the spillway is approximately 6 m wide.
- The grade of the spillway bottom varies from 0% at the inlet to 7% near the middle of the spillway and 2% at the outlet.
- The bottom of the spillway is founded on rock from the inlet to 100 m down gradient of the access ramp. The remainder of the spillway bottom is comprised of rockfill.
- The side slopes of the spillway vary from near vertical in rock to approximately 3H:1V in soil side slopes.
- Side slopes composed of poor quality rock or soil are armoured with rip rap.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-4). The main observations are summarized by the following:

- A small pond was observed at the spillway inlet on the Surface Cell cover. The maximum depth of the pond was estimated to be between 20 and 30 cm.
- The bottom of the spillway had been graded, as recommended in the 2006 inspection report.
- Additional rockfill was placed in the thermokarst feature in the spillway side wall near the outlet, as recommended in the 2006 inspection report.
- The left (north) side of the spillway was rip rapped between the access ramp and the spillway outlet, as recommended in the 2006 inspection report.
- Some minor erosion was occurring along the edge of the access ramp on the southwest side of the spillway.
- One settlement area was noted within the bottom of the spillway near the outlet.

- No slope debris was noted in the bottom of the channel as it had been during previous inspections. This may suggest the weathered diabase area is beginning to reach thermal equilibrium and the additional armouring applied to the north side of the channel has increased stability of this area.

The following maintenance items were recommended:

- Re-level the access road along the edge of the spillway channel to prevent ponding and improve long term stability.
- Place additional rockfill in the settlement area near the spillway outlet.
- Re-grade the rutted area near the deflection berms.
- Apply additional armour to the edge of the south side of the access ramp where erosion has been noted.
- General grading of the spillway area may be undertaken to improve the long term stability of the spillway channel.

6.2.2 West Twin Lake Outlet Channel

Construction Details

The West Twin Lake Outlet Channel is located in the northeast corner of the WTDA, as show on Figure 4. The channel conveys water from the Reservoir into Twin Lakes Creek. The channel replaces the former decant station located in the same area. The main design feature of the channel is a steel-reinforced, concrete wall which provides water retention and elevation control for the Reservoir. The physical details of the channel are summarized by the following:

- The concrete wall is approximately 17 m wide and 0.3 m thick.
- The central portion of the wall where the flow occurs is 7 m wide and has an elevation of approximately 370.2 m.
- The wall contains sloping side walls (4H:1V) and the top of the side walls is approximately 370.8 m.
- The concrete wall is founded into the underlying bedrock via a steel-reinforced, concrete footing.
- The channel is armoured to approximately 370.8 m elevation, upstream and downstream of the wall.
- A plunge pool is located downstream of the wall to provide energy dissipation during flooding events.

In 2007, a geosynthetic clay liner (GCL) was installed upstream of the concrete wall, as suggested in the 2006 inspection report. This was completed in response to observations of declining water levels upstream of the wall during periods of low inflows. The declining water levels were inferred to suggest seepage losses through the foundation of the wall. As such, the GCL approach was suggested as a way to limit the potential for these seepage losses.

The liner was extended approximately 10 m upstream of the wall and was double layered to limit damage from overlying rockfill. The liner was also embedded into the abutments of the wall, to limit the potential for seepage at these locations. Based on observations after the liner was installed, the seepage losses through the foundation of the wall have been reduced. During construction, additional rip rap was applied to the plunge pool, as recommended in the 2006 inspection report.

It should be noted that water flow from the Reservoir to the polishing pond area remains constrained by the culverts in the access road. Due to the low inflow into the Polishing Pond, the effect of seepage losses on the water level upstream of the wall has been magnified and is likely not representative of the effect of seepage losses on the entire system. As such, it is likely that the effect of minor seepage losses on the water level in the Reservoir will not be fully understood until the access road is breached, permitting a fully flow through system to develop. It should also be noted that although the water level upstream of the wall was approximately 0.2 m below the crest of the wall, the water level remained at or above the design low water level elevation of 370.0 m.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-5). The main observations are summarized by the following:

- The cracks observed in the concrete wall in 2006 were observed to be larger in 2007.
- Prior to the installation of the liner, the water level upstream of the wall was approximately 20 cm below the crest of the wall. As a result of the water flow being blocked at the culverts in the access road, no water had been flowing into the polishing pond area for approximately one week prior to the liner installation.

The following maintenance items were recommended:

- Continue to inspect the wall for further cracking.
- Monitor the water level upstream of the wall to assess continued seepage losses.

6.2.3 East Twin Creek Diversion Dike and Channel

Construction Details

The East Twin Creek Diversion Dike is located along Twin Lakes Creek between East Twin Lake and the West Twin Outlet Channel, as shown on Figure 4. The diversion dike and channel deflect flow from East Twin Lake away from its previous drainage course, which drained directly into West Twin Lake (the Reservoir). The flow from the diversion channel combines with the flow from the Reservoir downstream of the West Twin Outlet Channel.

The diversion dike is approximately 2 m above the adjacent ground level and is comprised of sand, gravel and cobbles derived from the nearby Twin Lakes sand and gravel deposit.
A portion of the dike was regraded during reclamation construction to be less susceptible to erosion. Additionally, the regraded portion of the dike was armoured with riprap to prevent future erosion from occurring.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-6). No indications of erosion of the dike were observed. The armoured portion of the dike was inspected and observed to be in satisfactory condition. No additional maintenance was recommended.

6.3 Thermal Covers

The following sections provide information regarding each of the thermal covers constructed at site. Each section provides details regarding the construction of each cover, a summary of the observations made during the 2007 inspection and reviews the monitoring data collected from each area in 2007. It should be noted that, in 2007, the instruments were monitored bi-weekly between May and October, and at other times periodically throughout the year. In addition to the information provided in the following sections, a summary of the significance of the data obtained from each instrument is provided in Table AIII-1. Also, the data collected from each individual instrument in 2007 is provided in graphical format in Appendix III.

An additional note on the interpretation of the geothermal monitoring data. For the purposes of interpretations made in this report, the following assumptions were made:

- In the active layer, ground conditions are considered “thawed” when ground temperatures of 0°C and warmer are observed.
- In the talik, ground conditions are considered “thawed” when ground temperatures of warmer than -0.5°C are observed. This is to account for freezing point depression effects which have been noted at the site.

6.3.1 Surface Cell Tailings Cover

Construction Details

A thermal cover was constructed over the tailings in the Surface Cell in 2004 and 2005. The thermal cover consists of a 1 m thick layer (minimum thickness) of granular shale overlain by a 0.25 m thick layer (minimum thickness) of armour material comprised of sand, gravel and cobbles. It should be noted that, due to surface grade considerations, increased shale thicknesses were applied to approximately 40% of the Surface Cell. Additionally, due to practical construction considerations related to the grain size distribution of the armour materials, the armour layer thickness regularly exceeded 0.25 m. The shale was sourced from the Mt. Fuji and Area 14 borrow areas (Figure 1). The armour material was sourced from the Twin Lakes Delta deposit (Figure 1). The Surface Cell tailings cover is drained by a series of swales which convey surface water to the spillway inlet located at the south end of the Surface Cell. The spillway transfers water draining off of the Surface Cell into the Reservoir. It should be noted that surface flow is not regularly observed on the Surface Cell and that the majority of the water flow occurs sub-surface due to the coarse nature of the cover materials.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-7). The main observations are summarized by the following:

- Some cracking of the cover along the east/west trench was observed, approximately to the same degree as was observed in 2006.
- A small pond was present at the spillway inlet, as it was in 2006. The maximum depth of water was approximately 20 to 30 cm.
- Some small thermokarst features were noted near the south edge of the cover, as shown on Figure 5.
- Surface water was observed to be running onto the cover along the south edge of the cover area
- No erosion of the cover materials was noted.

The following maintenance items were recommended:

- The thermokarst features observed near the south shoreline of the Surface Cell should be backfilled.

Monitoring Data

The Surface Cell is instrumented with ten thermistors, seven vibrating wire piezometers, six frost gauges and two monitoring wells. The location of each of these instruments is provided on Figure 5. Select plots providing the results of the monitoring are provided, for interpretation purposes, on Figures 6 through 10.

The instrumentation has two main purposes; monitor the depth of the active layer thaw and monitor the ground temperatures, pore pressures and water quality in the talik during freezeback.

Figure 6 provides data from the thermistors installed along the periphery of the Surface Cell talik. The graphs illustrate the following:

- The entire tailings profile along the periphery of the talik appears to be frozen (cooler than -0.5^{o}C).
- Cooling of ground temperatures continues throughout the entire profile, even at depth (i.e. 25 m at 03-07 and 18 m at 03-15).
- The rate of cooling increased in 2007, especially at depth (i.e. 03-20).

Figure 7 provides data from thermistors installed near the centre of the talik. The graphs illustrate the following:

- The upper 8 to 16 m of the ground profile appears to be frozen (cooler than -0.5^{o}C).
- The thickness of frozen ground increases towards the West Twin Dike and decreases towards the centre of the talik.
- The ground profile continues to cool with time.
- The ground temperatures in the centre of the talik, which were previously observed to be warming slightly, appear to have stabilized (i.e. 03-11).

Figure 8 provides data collected from some of the piezometers installed in the Surface Cell talik. The graphs indicate the following:

- The piezometers indicate that pore pressures within the Surface Cell talik are generally 4 to 7 m artesian. However, higher pore pressures have been periodically observed in piezometer BGC05-10.
- The high pore pressures observed at piezometer BGC05-10 are attributed to continued freezeback and reduction of the size of the talik in this area. The effect of the elevated pore pressures observed at BGC05-10 on the stability of the West Twin Dike was assessed in BGC (2007b). Based on the results of the analysis, the pore pressures are not considered to negatively impact the stability of the West Twin Dike.
- In general, the pore pressures within the talik are continuing to increase with time.
- The temperature of the unfrozen pore water continues to cool below 0^{o}C, confirming that the talik pore water exhibits a freezing point depression.
- The data from piezometer BGC03-12, located along the periphery of the talik, indicates that the piezometer tip froze when the tip temperature reached approximately -0.6°C. This provides an indication of the freezing point depression at this location within the talik.
- The data from piezometer BGC03-35, located near the centre of the talik, indicates that the thawed pore water at 14 m depth is approximately -1.2°C. This is likely related to a higher solute concentration within this portion of the talik.

Figures 9 and 10 provide data collected from thermistors and frost gauges important to monitoring active layer thaw and interpreting overall cover performance. The graphs indicate the following:

- The thaw depths indicated by the thermistors (Figure 9) were, on average, deeper than those indicated by the frost gauge data (Figure 10).
- The maximum thaw depth recorded by the frost gauges ranged from 1.0 to 1.3 m bgs (approximate average of 1.2 m bgs).
- The maximum active layer thaw depth interpreted from the thermistors on Figure 9 ranged from 1.4 to 1.6 m bgs. A thicker active layer was observed at Thermistor 05-15 located at the crest of the dike where shale fill thickness is increased. It should be noted that the interpretation of active layer thickness using thermistor data is based on a linear extrapolation between temperatures of the nodes located across the tailings/ cover interface. The geothermal profile across the tailings cover interface is non-linear (i.e. 05-15), due to the ice saturation within the base of the shale. As such, the interpretations of active layer thaw depths based on thermistor data are considered to be conservative and interpretation of active layer thickness from frost gauges is considered to be more accurate. It should also be noted that thermistor nodes actually located in tailings were generally observed to exhibit sub-zero ground temperatures.

The results of water quality testing undertaken on samples collected at the inlet of the West Twin Dike Spillway are also provided on Figure 10. As can be seen, the concentration of zinc in the water coming off the Surface Cell was significantly reduced in 2007, compared to 2005 and 2006. This suggests that the improved geothermal performance of the Surface Cell cover system observed in 2007 has had beneficial effects on the quality of the surface water runoff.

The results of the water quality testing completed on the samples collected from the monitoring wells installed in the Surface Cell talik are provided in Table 7.

Table 7 - Summary of Water Quality Monitoring Results from Surface Cell Monitoring Wells

Monitoring Well	Sample Date	Field Parameters		Total Metals Concentrations (mg/L)		
		pH	Conductivity (mS/cm)	Cadmium	Lead	Zinc
BGC05-11 (edge of talik)	October 13, 2005	10.94	3.23	<0.001	0.004	0.01
	August 27, 2006	11.29	3.69		0.058	0.08
	September 5, 2007*	10.5	3.18	0.0013	0.064	0.09
BGC05-12 (centre of talik)	October 13, 2005	10.28	4.92	0.004	0.628	0.54
	August 27, 2006	10.33	3.69		0.208	0.29
	September 5, 2007*	9.7	3.00	0.0037	0.127	0.17

* Note: pH and conductivity values were derived from separate samples collected on August 10, 2007.

The results from the water quality testing indicate the following:

- The metals concentration at the freezing front (BGC05-11, closer to the dike) are lower than they are in the centre of the talik (BGC05-12).
- The metals concentrations in the centre of the talik appear to be decreasing over time.
- The metals concentrations closer to the freezing front at the edge of the talik are increasing over time.

The increasing concentration of metals observed at the freezing front is likely related to rejection of metals as the pore water freezes, a process known as cryoconcentration. This process was expected to occur as the talik freezeback occurs. The elevated metal concentration has likely resulted in an increased freezing point depression in the centre of the talik. This is verified by the piezometer tip temperatures observed in BGC03-35, which is approximately -1.2°C.

6.3.2 West Twin Dike

Construction Details

The West Twin Dike is a frozen core, upstream constructed, earth fill dike that separates the Surface Cell and the Reservoir (Figure 4). The dike is constructed of frozen, compacted shale and founded on frozen, settled tailings. The dike is approximately 14 m high and the downstream face slopes at an angle of approximately 15°. The downstream face of the dike was surfaced with a 0.25 m thick layer (minimum thickness) of sand, gravel and cobbles sourced from the Twin Lakes Delta.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-8). The main observations made during the inspection are summarized by the following:

- No settlement or cracking of the crest was noted;
- The downstream face of the dike shows no indications of erosion or settlement;
- No seepage was noted on the face of the dike or at the toe of the dike.

In general, the dike appeared to be in a satisfactory condition and no maintenance was recommended.

Monitoring Data

The West Twin Dike is instrumented with five thermocouple cables installed within the dike and four thermistors and one vibrating wire piezometer installed from the crest of the dike. The location of each of these instruments is provided on Figures 5 and 11. Select plots providing the results of the monitoring, for interpretation purposes, are provided on Figures 11 through 13.

Figure 12 provides data from thermistors BGC03-33 and BGC03-34, which provide a continuous geothermal monitoring profile from 5 m below the crest of the dike to approximately 24 m bgs. The data indicates the following:

- The entire profile is cooling over time.
- Only a small zone of potentially thawed tailings remains between 22 and 24 m bgs.
- The thawed zone is cooling over time from both the top and bottom.
- The rate of cooling at depth (deeper than 21 m) appears to have increased in 2007.

Figure 13 provides data from additional thermistors installed from the crest of the dike, as well as one vibrating wire piezometer installed within the thawed zone at depth. The data indicates the following:

- The profile immediately upstream of the dike is frozen to approximately 20 m bgs.
- The pore pressures within the small thawed zone at depth are approximately 5 m artesian and continue to increase over time (an increase of approximately 1.5 m between September 2006 and September 2007).

Figure 14 provides data from the thermocouples installed within the dike. The data indicates that the dike and the immediate dike foundation remained in a frozen state throughout 2007. It should be noted that the thermocouple data is quite erratic and is only considered accurate to within 1°C. Hence, only nominal conclusions may be based on the data obtained from the thermocouples.

6.3.3 Test Cell Tailings Cover

Construction Details

A thermal cover was constructed over the Test Cell in 2004 and 2005. The thermal cover consists of a 1 m thick layer (minimum thickness) of granular shale overlain by a 0.25 m thick layer (minimum thickness) of armour material comprised of sand, gravel and cobbles. It should be noted that, due to surface grade considerations, increased shale thicknesses were applied to approximately 30% of the Test Cell. Additionally, due to practical construction considerations related to the grain size distribution of the armour materials, the armour layer thickness regularly exceeded 0.25 m. The shale was sourced from the Mt. Fuji, East Twin and Area 14 borrow areas (Figure 1). The armour material was sourced from the Twin Lakes Delta deposit (Figure 1). The Test Cell tailings cover is drained by a main swale which conveys surface water directly into the Reservoir.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-9). The main observations are summarized by the following:

- Rip rap was applied to the outlet of the Test Cell, as recommended in the 2006 inspection report. However, the rip rap was not placed below the water line to the required elevation.
- No erosion of the cover was observed.
- No ponding on the cover was observed.
- During the inspection, a test pit was excavated in the Test Cell thermal cover. The base of the shale fill was noted to be ice-saturated.

The following maintenance items were recommended:

- The rip rap at the Test Cell outlet should be extended below the water level to approximately 369.4 m elevation.

Monitoring Data

The Test Cell is instrumented with two thermistors, four vibrating wire piezometers, two frost gauges and two monitoring wells. The location of each of these instruments is provided on Figure 11. Select plots providing the results of the monitoring are provided on Figures 15 and 16.

Figure 15 provides geothermal and piezometric monitoring data collected from the Test Cell in 2007. The data indicates the following:

- The subsurface profile to 15 m depth in the Test Cell at the base of the West Twin Dike (BGC05-04) is colder than -2°C and is assumed to be frozen. The entire geothermal profile in this area continues to cool with time, even at a depth of 15 m where cooling of more than 1°C has been observed since 2006.
- The subsurface profile in the middle of the Test Cell (BGC05-19) appears to be frozen to a depth of approximately 8 m bgs. A significant amount of cooling (~1°C) was observed between 5 and 8 m bgs in 2007, indicating the downward migration of the freezing front is occurring. Below 8 m depth, the tailings remain thawed.
- The pore water pressures throughout the talik range from 1 to 4 m bgs.
- The temperature of the unfrozen pore water is generally between -0.2 and -0.3°C and continues to slowly cool with time. However, the pore water temperature recorded by instrument BGC05-24 is much cooler (-1.25°C), indicating the geothermal conditions within the Test Cell talik vary.
- When the piezometric monitoring data collected from piezometer BGC05-20 is compared to the water level in the Reservoir, a good correlation is observed. This indicates that the hydraulic connection between the Test Cell talik and the Reservoir remains.

Figure 16 provides data collected from thermistors and frost gauges important to monitoring active layer thaw in the Test Cell and interpreting overall cover performance. The graphs indicate the following:

- The maximum thaw depth recorded by the frost gauges ranged from 1.3 to 1.4 m bgs.
- The geothermal performance of the cover in 2007 is improved over the performance observed in 2006, as illustrated by the data from Frost Gauge 7.
- The active layer thaw depths calculated from the thermistor data from BGC05-04 nominally agree with the data collected from the frost gauges. This is as a result of node placement above and below the tailings/cover interface, in close proximity to the interface.
- The data from BGC05-19 illustrates the increased active layer thickness in areas of increased cover thickness. The data from thermistor BGC05-19 provides an example of the non-linearity of the thermal regime at the tailings/cover interface.

The results of the water quality testing completed on the samples collected from the monitoring wells installed in the Test Cell talik are provided in Table 8.

Table 8 - Summary of Water Quality Monitoring Results from Test Cell Monitoring Wells

Monitoring Well	Sample Date	Field Parameters		Total Metals Concentrations (mg/L)		
		pH	Conductivity (mS/cm)	Cadmium	Lead	Zinc
BGC05-21	August 27, 2006	9.43	4.92		0.501	0.950
	September 5, 2007*	9.5	6.74	0.0272	0.34	1.31
BGC05-23	August 27, 2006		>5.00		0.150	1.010
	September 5, 2007*	7.9	20.00	0.06	0.30	2.00

* Note: pH and conductivity values were derived from separate samples collected on August 10, 2007.

The data indicates the following:

- There is only a minor difference in the zinc concentrations at the edge of the talik (05-23) compared to the centre of the talik (05-21).
- Metals concentrations within the Test Cell talik appear to be increasing with time.
- The zinc concentrations in the Test Cell talik (1.3 to 2.0 mg/L) are higher than the concentrations observed in the Surface Cell talik (0.09 to 0.17 mg/L).

Data from the monitoring wells in the Test Cell should be reviewed with a note of caution. Since the wells are not artesian, they may not be as well developed as the wells in the Surface Cell. As such, the water quality parameters derived from the lab results may not be entirely representative of the pore water quality within the talik. Additionally, since only limited data is available, any temporal trends suggested by the data should also be viewed with caution.

6.3.4 Test Cell Dike

Construction Details

The Test Cell Dike is an earth fill dike that separates the Test Cell and the Reservoir (Figure 4). The dike is constructed of frozen, compacted shale and founded on frozen, settled tailings. The dike was approximately 4 m high. During reclamation, the top 2 m of the dike was removed and placed in the Test Cell as cover material. The remnant dike was surfaced with a layer of armour material, approximately 0.25 m thick. As such, the dike is now essentially integrated into the Test Cell cover.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-10). The main observation made during the inspection was that the surface of the north/south arm of the Test Cell dike was observed to be soft and undulating with some minor settlement. It was recommended that additional compaction be applied to the surface of the north/south arm of the dike.

Monitoring Data

The Test Cell Dike is instrumented with three thermistors. The location of each of these instruments is provided on Figure 11. Select plots providing the results of the monitoring are provided on Figure 17. The monitoring data indicates the following:

- The dike and foundation immediately beneath the dike remained in a frozen state throughout 2007.
- The foundation of the dike is frozen to between 17 and 20 m bgs.
- The subsurface profile beneath the dike continues to cool, even at depths of 20 m.
- The freezing front is migrating downwards, as shown by the data from BGC03-22 which illustrated the migration of the -0.5^{o}C isotherm from approximately 17 m bgs in 2003 to approximately 19 m bgs in 2007.

6.3.5 Toe of Test Cell Dike Tailings Cover

Construction Details

A thermal cover was constructed over the tailings at the toe of the Test Cell Dike in 2005. The thermal cover consists of a 1 m thick (minimal thickness) layer of granular shale overlain by a 0.25 m thick layer (minimal thickness) of armour material comprised of sand, gravel and cobbles. The shale was sourced from the Mt. Fuji and Area 14 borrow areas (Figure 1). The armour material was sourced from the Twin Lakes Delta deposit (Figure 1). The rip rap was sourced from the dolostone outcrop at the south end of the West Twin Dike.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-11). The main observations are summarized by the following:

- No erosion of the cover was observed.
- No erosion of the rip rap or disturbance due to ice plucking was observed.

In general, the tailings cover at the toe of the Test Cell Dike appears to be in satisfactory condition. As such, no maintenance was recommended.

Monitoring Data

The cover at the toe of the Test Cell Dike is instrumented with two thermistors, one vibrating wire piezometer and two frost gauges. The location of each of these instruments is provided on Figure 11. Select plots providing the results of the monitoring are provided on Figure 18. The graphs indicate the following:

- The subsurface profile at the toe of the Test Cell dike (BGC05-27) above 17 m bgs is colder than -0.5^{o}C and is assumed to be frozen. Based on the monitoring data, the geothermal profile above 17 m appears to be cooling with time. The upper portion of the subsurface profile is frozen, despite being along a shoreline which was periodically submerged in water during operations of the tailings disposal area. The fact that permafrost exists at this location, to the extent it does, is considered beneficial to the

overall Test Cell talik freezeback. This is because it exceeds expectations and assumptions made in the contaminant loading model (CanZinco 2004) which assumed a completely thawed tailings profile adjacent to the water.

- The monitoring data from piezometer BGC05-28 indicates piezometric elevation of approximately 370.2 m. This is nominally the elevation of the water level in the Reservoir. This demonstrates the hydraulic connectivity between the tailings at depth and the Reservoir remains intact.
- The frost gauges located in this portion of the cover fully thawed in 2007. This indicates an increased depth of thaw (greater than 2 m) at the toe of the Test Cell Dike. This could be related to the proximity to a heat source (the water in the Reservoir), a thicker shale fill thickness or the aspect/ slope angle of the cover. As stated previously, the tailings profile was assumed to be thawed within an area adjacent to the water in the contaminant loading model (CanZinco 2004). As such, the thick active layer observed at this location is not unexpected. As a result of the thawing, Frost Gauge 9 has leaked and will require replacement to continue monitoring.
- The geothermal performance of the cover at the toe of the Test Cell dike was inferred to be improved over the performance in 2006, based on the thermistor data. As illustrated on Figure 18, the temperature of the tailings near the cover/tailings interface was consistently frozen and cooler (by about -0.5^{o}C) in 2007 compared to 2006. This is despite the warmer than average air temperatures experienced by the site during the summer months in 2007.

6.3.6 Toe of West Twin Dike Tailings Cover

Construction Details

A thermal cover was constructed over the tailings at the toe of the West Twin Dike in 2005. The thermal cover consists of a 1 m thick layer (minimum thickness) of granular shale overlain by a 0.25 m thick layer (minimum thickness) of armour material comprised of sand, gravel and cobbles. The shale was sourced from the Mt. Fuji and Area 14 borrow areas (Figure 1). The armour material was sourced from the Twin Lakes Delta deposit (Figure 1). The rip rap was sourced from the dolostone outcrop at the south end of the West Twin Dike.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-12). The main observations are summarized by the following:

- No erosion of the cover was observed.
- Some thermokarst features were observed.
- Additional rip rap was stockpiled along the shoreline waiting to be placed, as recommended in the 2006 inspection report.
- No erosion of the rip rap along the shoreline was observed.

The following maintenance items were recommended:

- The rip rap stockpiled along the shoreline should be placed appropriately.
- The thermokarst features should be backfilled. It should be noted that this was partially completed during the inspection visit.

Monitoring Data

The tailings cover at the toe of the West Twin Dike is instrumented with two thermistors. The location of each of these instruments is provided on Figure 11. Select plots providing the results of the monitoring are provided on Figure 19. The graphs indicate the following:

- The subsurface profile between the bottom of the active layer and the bedrock surface is colder than -4^{o}C and is assumed to be frozen.
- The temperatures at depth measured by Thermistor BGC05-26 are warmer than those observed at the same depth by Thermistor BGC03-19. This is likely due to the fact that BGC05-26 was placed in the area where the decant water from the Surface Cell used to discharged. This was an area of consistent water cover (1 to 2 m deep) which likely resulted in a warmer geothermal profile at depth.
- The subsurface thermal regime is continuing to cool and the rate of cooling was observed to increase in 2007.
- The geothermal performance of the cover was inferred to be improved in 2007 compared to 2006 based on the thermistor data. As illustrated on Figure 19, the temperature of the tailings near the tailings/cover interface were consistently cooler (by about 1^{o}C) and frozen throughout 2007. This is despite the warmer than average air temperatures experienced by the site during the summer months in 2007.

West Twin Disposal Area Water Quality

As required in the current Water License, water quality sampling and testing were undertaken at the West Twin Outlet Channel throughout the open water period in 2007. This channel is considered the final discharge point for water from the WTDA before entering the environment in Twin Lakes Creek. Samples were collected weekly and subsequently forwarded to a laboratory for a variety of tests. Water samples were tested for pH, conductivity, Total Suspended Solids (TSS), total metal concentrations, and ammonia (NH_3). The total metal concentrations observed at the West Twin Outlet Channel throughout 2007 are illustrated on Figure 20. As can be seen, the total metal concentrations observed throughout 2007 met discharge criteria, as they had in 2005 and 2006. The data suggests that the thermal covers, and the water cover in the Reservoir, are effective in limiting metal loading to the water in the Reservoir.

6.3.7 Landfill Cover

Construction Details

A thermal cover was constructed over the Nanisivik Landfill in 2005. The thermal cover consists of a 2 m thick layer (minimum thickness) of granular shale overlain by a 0.25 m thick layer (minimum thickness) of armour material comprised of sand, gravel and cobbles. The shale was sourced from the Townsite Shale borrow area. The armour material was sourced from the Twin Lakes Delta deposit. The face of the landfill is sloped at approximately 3H:1V.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-13). The main observations are summarized by the following:

- No erosion of the cover was observed, either on the upper portion or on the face of the Landfill.
- No seepage was observed at the toe of cover during the time of the inspection.
- Some exposed shale was observed on the lower portion of the west face. This is due to an insufficient amount of armour material available for covering and is not related to erosion.
- The armour surface was observed to be very loose.
- No areas of significant settlement were observed in the cover.

The following maintenance items were recommended:

- Complete the spreading of the armour on the lower portion of the west face.
- Apply additional compaction to the armour surface.

Monitoring Data

The Landfill cover is instrumented with one thermistor and one frost gauge. The location of each of these instruments is provided on Figure 21. Select plots providing the results of the monitoring are provided on Figure 22. The graphs indicate the following:

- The landfill debris underlying the cover remained frozen throughout the year.
- The geothermal profile within the underlying landfill debris continues to cool with time.
- The active layer thaw did not penetrate into the underlying waste material.
- The thermal performance of the landfill cover was improved in 2007 compared to 2006. This is inferred from both the frost gauge and thermistor data provided on Figure 22. The frost gauge data indicates the active layer thickness in 2007 reached a maximum depth of approximately 1.8 m bgs. Additionally, the thermistor node located at 2.3 m bgs, near the cover/landfill debris interface, was observed to be consistently colder (by about 0.5^{o}C) and frozen in 2007.

6.3.8 West Open Pit Waste Rock Cover

Construction Details

A thermal cover was constructed over the West Open Pit in 2006. The thermal cover consists of a 2 m thick layer (minimum thickness) of granular shale overlain by a 0.25 m thick layer (minimum thickness) of armour material comprised of sand, gravel and cobbles. The shale was sourced from the Townsite Shale borrow area. The armour material was sourced from the local borrow source located along the road between the 09S portal and the 17 North Portal. The face of the West Open Pit cover is sloped at a maximum angle of approximately 3H:1V.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-14). The main observations are summarized by the following:

- Armouring of the cover was completed, including rockfill placed against the remnant highwall.
- The surficial shale cover and armouring was completed downslope of the access road.
- No erosion of the cover was observed.
- No significant areas of settlement were observed on the exposed portion of the shale cover.
- Some seepage was observed emanating from the toe of the main portion of the cover. The seepage water was then ponding on the surface of the access road between the main cover and the downslope surficial cover.

The following maintenance items were recommended:

- Complete the grading and armouring of the access road at the toe of the pit when regular road use is no longer required. This is required to prevent ponding and erosion of the materials in this area.

Monitoring Data

The West Open Pit cover was completed in October 2006, after the drilling equipment had been demobilized from site. As such, no instrumentation has been installed. Frost gauges should be installed to monitor the active layer thaw and a thermistor to monitor the freezeback of the underlying waste rock.

6.3.9 East Open Pit Waste Rock Cover

Construction Details

A thermal cover was constructed over the East Open Pit in 2005. The thermal cover consists of a 2 m thick layer (minimum thickness) of granular shale overlain by a 0.35 m thick layer (minimum thickness) of armour material comprised of sand, gravel and cobbles. The shale was sourced from the Shale Hill shale borrow area. The armour material was sourced from the local borrow source located along the road between the K-Baseline Portal and Kuhulu Lake. The face of the East Open Pit cover is sloped at a maximum angle of approximately 3H:1V. A remnant highwall exists along the south edge of the pit area. The remnant highwall ranges from 1 to 5 m high and is sloped back at an angle of approximately 60°. A bench exists between a portion of the remnant highwall and the main portion of the cover system.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-15). The main observations are summarized by the following:

- Armouring of the toe area surface water deflection berm was completed, as recommended in the 2006 inspection report.
- Additional armour was applied to the west edge of the cover, as recommended in the 2006 inspection report.
- Some minor surface erosion was noted on the upper portion of the cover.
- Some seepage was observed at intermediate levels on the cover surface and at the toe of the cover.
- Some loose rock was observed along a limited portion of the remnant highwall.
- Some thermokarsting was observed in the old haul road east of the cover limits.

In general, the East Open Pit cover appears to be in satisfactory condition. As such, no maintenance was recommended. The loose rock observed in the East Open Pit highwall will fall onto the adjacent bench.

Monitoring Data

The East Open Pit Waste Rock cover is instrumented with two thermistors and two frost gauges. The location of each of these instruments is provided on Figure 23. Select plots providing the results of the monitoring are provided on Figure 24. The graphs indicate the following:

- Data from Thermistor BGC05-02, installed in the area with a thin layer of waste rock backfill (approximately 3 m thick), indicates the waste rock has frozen back and continues to cool with time.
- Data from Thermistor BGC05-03, installed in the area with a thick layer of waste rock backfill (approximately 9 m thick), indicates the waste rock, and hydrocarbon contaminated soil buried at depth, has frozen back and continues to cool with time.

- The active layer thaw monitoring data from Thermistor BGC05-02 indicated that the thaw depth did not exceed 2 m. The data also suggests that the thermal performance of the cover in 2007 was better than it was in 2006, despite the warmer than average air temperatures experienced by the site during the summer months in 2007.
- The active layer monitoring data from Thermistor BGC05-03 indicated that the thaw depth reached approximately 3 m bgs, approximately 1 m into the underlying waste rock. This is 2 m less than what was observed in 2006, suggesting that ice-saturation of the underlying waste materials is occurring over time. It is expected that the depth of active layer thaw will continue to decrease over time as the underlying waste materials become ice saturated.
- Both frost gauges installed in the East Open Pit cover have become inoperative due to the leaking of the methyl blue solution. It is recommended that these instruments be replaced in 2008.

Water samples were collected from the toe of the East Open Pit cover regularly throughout 2007. The samples were primarily tested for hydrocarbons since some hydrocarbon contaminated soils were incorporated within the pit backfill. One sample was also tested for metals concentrations. The data are summarized in Table 9.

Table 9 - Summary of Water Quality Testing Parameters from the East Open Pit

Date	Cd Total (mg/L)	Pb Total (mg/L)	Zn Total (mg/L)	F1 (mg/L)	F2 (mg/L)	F3 (mg/L)	F4 (mg/L)	F1 BTEX (mg/L)
25-Jun-07				<0.2	<0.2	<0.2	<0.2	
12-Jul-07				<0.2	<0.2	<0.2	<0.2	<0.2
26-Jul-07				<0.2	<0.2	<0.2	<0.2	<0.2
9-Aug-07	0.0016	0.005	0.21					
Discharge Criteria*	**0.01**	**0.20**	**0.50**					

* Maximum Authorized Concentration in a grab sample.

As can be seen, no detectable levels of hydrocarbons were observed in water samples collected from the East Open Pit. Additionally, the concentration of dissolved metals were well below discharge criteria. It should be noted that the discharge criteria provided within the water license are applicable at the final discharge point. The final discharge point for the East Adit area is considered to be Station 159-17 located where Chris Creek discharges into Strathcona Sound. It is recommended that additional testing for metals concentrations be undertaken at the toe of the East Open Pit cover in 2008.

6.3.10 East Trench Waste Rock Cover

Construction Details

A thermal cover was constructed over the East Trench in 2005. The thermal cover consists of a 2 m thick layer (minimum thickness) of granular shale overlain by a 0.35 m thick layer (minimum thickness) of armour material comprised of sand, gravel and cobbles. The shale was sourced from the Shale Hill shale borrow area. The armour material was sourced from the local borrow source located along the road between the K-Baseline Portal and Kuhulu Lake. The face of the East Trench cover is sloped at an angle ranging between 4H:1V and 6H:1V.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-16). The main observations are summarized by the following:

- Minor surface erosion was observed near the upslope edge of the cover where surface water was observed to be running onto the surface of the cover.
- No flowing seepage was observed at the toe of cover.
- No areas of significant settlement or surface deformation were observed in the cover.

In general, the East Trench cover appears to be in satisfactory condition. As such, no maintenance was recommended.

6.3.11 Oceanview Open Pit Waste Rock Cover

Construction Details

A thermal cover was constructed over the Oceanview Open Pit in 2005. The thermal cover consists of a 2 m thick layer (minimum thickness) of granular shale overlain by a 0.35 m thick layer (minimum thickness) of armour material comprised of sand, gravel and cobbles. The shale was sourced from the Shale Hill borrow area (Figure 1). The armour material was sourced from the Chris Creek “A” borrow area (Figure 1). The face of the Oceanview Open Pit cover is sloped at a maximum angle of approximately 3H:1V. The surface of the cover in the bottom of the pit slopes to the north at a grade of approximately 3%.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-17). The main observations are summarized by the following:

- The thermokarst features observed in 2006 were backfilled, as recommended in the 2006 inspection report.
- One new small thermokarst feature was observed in the southeast corner of the pit. The thermokarst measured approximately 40 cm in diameter and 20 cm deep. No shale was observed to be exposed in the bottom of the thermokarst.
- No ponded water was observed on the surface of the cover.
- Some seepage was observed at the toe of the cover.

- Minor surface flow was observed running onto the surface of the cover at the south edge of the cover.
- Some staining was observed from surface water running onto east edge of cover from upslope. It appeared to be approximately the same level of staining as was observed in 2006.
- The upslope water deflection berm appeared to be effectively directing surface water away from the cover. This was inferred from signs of water flowing along the upstream edge of the berm.
- Minor surficial cracking and surface erosion was observed along the side slope in the southwest corner of the cover.

The following maintenance items were recommended:

- Backfill the observed thermokarst feature with armour material.

It should be noted that the minor erosion noted on the slope face was not unexpected. The armour material at this location contains a fine grained fraction that was expected to wash away with time. As such, the armour thickness at this location, and many others where alternative armour materials were used, was increased to 0.35 m. The coarse grained fraction of the armour material, which can be observed in Photo 52 on Figure II-17, is expected to limit the amount of erosion that can occur, without negatively effecting the geothermal performance of the cover.

Monitoring Data

The Oceanview Pit Waste Rock cover is instrumented with one thermistor and one frost gauge. The location of each of these instruments is provided on Figure 25. Select plots providing the results of the monitoring are provided on Figure 26. The graphs indicate the following:

- The waste rock underlying the cover has frozen back and remained completely frozen throughout 2007.
- The entire geothermal profile continues to cool with time.
- The maximum active layer thaw depth indicated by Thermistor BGC05-01 was estimated to be approximately 1.6 m bgs.
- The maximum active layer thaw depth indicated by Frost Gauge FG16 was measured to be approximately 1.4 m bgs.
- The geothermal performance of the cover improved in 2007 compared to 2006, despite the warmer than average air temperatures experienced by the site in the summer months in 2007.

6.3.12 Area 14 Waste Rock Cover

Construction Details

Area 14 is a satellite ore body situated on a west-facing slope, approximately 1 km to the east of East Twin Lake (Figure 1). A waste rock pile was created outside the portal during mining operations. In 1988, the waste rock pile was flattened and a thermal cover waste constructed over the top of the waste rock pile, but the face was left exposed.

In 2005, the thermal cover at the Area 14 waste rock pile was completed by constructing a cover over the exposed face and armouring the entire surface of the cover. The thermal cover consists of a 2 m thick layer (minimum thickness) of granular shale overlain by a 0.35 m thick layer (minimum thickness) of armour material comprised of sand, gravel and cobbles. All shale was sourced from the Area 14 shale borrow area (Figure 1). All armouring material was sourced from the hill side immediately north of the Area 14 portal.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-18). The main observations are summarized by the following:

- Additional armour material was applied to the north edge of the cover, as recommended in the 2006 inspection report.
- No erosion of the cover materials was observed.
- No areas of significant settlement were observed in the cover.
- No seepage was noted at the toe of the cover.

In general, the Area 14 waste rock cover appears to be in satisfactory condition. As such, no maintenance was recommended.

Monitoring Data

The Area 14 Waste Rock cover is instrumented with one thermocouple and one frost gauge; locations for each of these instruments are provided on Figure 27. Select plots providing the results of the monitoring are provided on Figure 28. The graphs indicate the following:

- The underlying waste rock remained frozen throughout 2007.
- The active layer thaw was limited to the upper 1.4 m of the cover and did not penetrate into the underlying waste rock in 2007.
- The geothermal performance of the cover in 2007 was nominally equivalent to the performance observed in 2006.

It should also be noted that the site staff has indicated that water quality monitoring data collected in Chris Creek, down gradient of the Area 14 waste rock pile, met regulatory criteria throughout 2007.

6.3.13 Upper Dump Pond Tailings Cover

Construction Details

The upper dump pond was an emergency tailings storage containment cell located between the water tank and the West Twin Disposal Area, as shown on Figure 1. A thermal cover was constructed over the tailings in the Upper Dump Pond in 2005. The thermal cover consists of a 2 m thick (minimal thickness) layer of granular shale overlain by a 0.25 m thick layer (minimal thickness) of armour material comprised of sand, gravel and cobbles. The shale was sourced from the Townsite shale borrow area (Figure 1). The armour material was sourced from the Twin Lakes Delta deposit (Figure 1).

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-19). The main observations from the inspection are summarized by the following:

- No erosion of the surface of the cover was observed.
- No seepage was noted at the toe of the cover.
- No areas of significant settlement were observed.

In general, the Upper Dump Pond tailings cover appears to be in a satisfactory state. As such, no maintenance was recommended.

Monitoring Data

The Upper Dump Pond tailings cover is instrumented with one frost gauge. The location of this instrument is provided on Figure 29. Select plots providing the results of the monitoring are provided on Figure 30. The graph indicates he following:

- The active layer thaw was limited to the upper 2 m of the cover and did not penetrate into the underlying tailings in 2007.
- The geothermal performance of the cover in 2007 was improved compared to the performance observed in 2006.

6.4 Mine Openings

6.4.1 00/01 Portals and Crown Pillar

Construction Details
00 Portal

The 00 Portal is located at the edge of the West Open Pit at western end of the mine, as illustrated on Figure 1. The 00 Portal was the principal access at the western extremity of the mine. The portal measured approximately 5 by 5 m in cross section. The brow immediately above the portal was approximately 4 to 5 m high.

In 2005, the portal was backfilled with waste rock. The backfill was placed approximately to within 1 m of the top of the portal and into the portal approximately 5 m from the entrance. The backfill extended outside the portal face and was sloped at an angle of approximately 3H:1V and graded into the overall backfill of the West Open Pit. A thermal cover was subsequently constructed over the waste rock as part of the West Open Pit thermal cover.

01 Portal

The 01 Portal was located at the western end of the mine, as shown on Figure 1. The 01 Portal housed the main ventilation fans during mining operations which were mounted in a plate steel bulkhead. The portal opening was approximately 22 m wide and 4 m high. The brow immediately above the portal was approximately 4 to 5 m high.

In 2005, the portal was backfilled with waste rock. The backfill was placed approximately to within 1 m of the top of the portal and into the portal up to the face of the bulkhead. The backfill extended outside the portal face and was sloped at an angle of approximately 3H:1V and graded into the overall backfill of the West Open Pit. A thermal cover was subsequently constructed over the waste rock as part of the West Open Pit thermal cover.

00/01 Crown Pillar

A stope connecting the 00 and 01 portals was located approximately 5 m behind the West Open Pit highwall. A portion of the rock between the 00 and 01 portals, known as the 00/01 rib pillar, was removed during later stages of mine development as part of the pillar recovery program. After the recovery of a portion of the rib pillar, a crack developed in the crown pillar above the area that had been mined. In 2005, a fill pillar was constructed beneath the cracked portion of the crown pillar to provide additional support and prevent development of an opening into the mine workings if the pillar were to collapse. The pillar was constructed out of waste rock and was constructed approximately to within 1 m of the top of the opening.

Inspection Conditions

The area of the West Open Pit cover where the portals had existed was inspected in August 2007. The observations are summarized by the following:

- No indications of surface deformation were observed.
- No indication of seepage from the mine workings was observed.

No maintenance of the portal plugs or the cover over the portal plugs was recommended.

The crown pillar was also inspected from surface. The observations are summarized by the following:

- No additional cracking was observed.
- Based on visual observations, the existing cracking did not seem to dilate further since 2006.
- No visually distinguishable deformation was observed in the crown pillar.

In general, the portal plugs constructed for the 00 and 01 portals and the 00/01 crown pillar appear to be in satisfactory condition. As such, no maintenance was recommended.

6.4.2 17 North Portal

Construction Details

The 17 North Portal was a culverted portal giving access to the Main Ore Zone. The location of the portal is illustrated on Figure 1. The 17 North Decline was approximately 5 by 5 m in cross section and the culvert was half round with a diameter of 5 m and a length of 28 m. The culvert was supported by a 0.25 m thick by 2 m high concrete wall on either side and extended 5 m inside the dolostone bedrock of the drift.

In 2005, the culvert was removed and the portal was backfilled with granular shale derived from the Shale Hill borrow area. The backfill was placed to within 1 m of the top of the portal and extended into the portal for approximately 4 m. The backfill extended outside the portal face and was sloped at an angle ranging between 4H:1V and 7H:1V and graded into the surrounding topography. A 0.35 m thick layer of armour material, derived from the Kuhulu Lake borrow area, was then applied to the surface of the shale backfill.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-20). The main observations are summarized by the following:

- One thermokarst feature (~1 m diameter) was observed near the upper edge of the cover area.
- No indications of erosion were observed. However, it was noted that local surface water flow tends to concentrate along the east edge of the cover area.
- No indication of seepage from the mine workings was observed.

It was recommended that the thermokarst feature be backfilled.

6.4.3 Oceanview Portal

Construction Details

The Oceanview Portal was a bare rock entrance into the north side of the Oceanview underground workings. The location of the portal is illustrated on Figure 1. The Oceanview decline had a cross section of approximately 5 by 5 m. The brow of the portal was approximately 5 m in height.

Prior to 2004, the portal had been backfilled with waste rock and covered over with locally derived overburden materials. In 2005, a thermal cover was constructed over the exiting portal plug. The cover consisted of a 2.0 m thick layer (minimum thickness) of granular shale overlain by a 0.35 m thick layer of armour material consisting of sand, gravel and cobbles. The shale was derived from the Shale Hill borrow area. The armour material was derived from the Chris Creek "A" deposit. The thermal cover was extended to the east and north of the portal entrance in an old ore stockpile area. Additionally, a water deflection berm was constructed upslope of the cover extension to prevent concentrated surface water from flowing over the cover area.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-21). The main observations are summarized by the following:

- Minor surficial erosion was observed the along east edge of portal cover. This was attributed to water collecting behind a low spot behind the water deflection berm and running along the edge of the portal cover.
- A small area of surficial settlement was observed near the southwest corner of the portal cover.
- Some minor cracking was noted along the east edge of the portal cover.
- No seepage was observed at the toe of the cover.

The following maintenance items were recommended:

- Improve the grade behind the drainage berm where it transitions into the portal cover to prevent ponding and subsequent erosion.
- Fix the area of settlement located in southwest corner of the portal cover by backfilling it with additional armour material.

6.4.4 K-Baseline Portal

Construction Details

The K-Baseline portal was a culverted entry used to access the K-Baseline ore body. The location of the portal is illustrated on Figure 1. The K-Baseline decline was approximately 5 by 5 m in cross section and the culvert was half round with a diameter of 5 m and a length of 28 m. The culvert was supported by two concrete pony walls, 1 m wide by 2.4 m high, on both sides. The concrete pony walls extended 3 m inside the dolostone bedrock of the drift.

In 2004, the culvert was removed and the portal was backfilled with waste rock. In 2005, a thermal cover was constructed over the waste rock portal plug. The cover consisted of a 2.0 m thick layer (minimum thickness) of granular shale overlain by a 0.35 m thick layer of armour material consisting of sand, gravel and cobbles. The shale was derived from the Shale Hill borrow area. The armour material was derived from the Chris Creek "A" deposit. An additional thermal cover was constructed over the area below the road immediately outside the portal where mineralized soils and additional waste rock were located. A surficial cover of shale was also constructed adjacent to the thermal cover to improve drainage conditions.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-22). The main observations are summarized by the following:

- No erosion of the cover was observed.
- No seepage was noted at the toe of the cover.
- No areas of significant settlement were observed in the cover.

In general, the K-Baseline portal appears to be in satisfactory condition. As such, no maintenance was recommended.

6.4.5 Area 14 Portal

Construction Details

The Area 14 Portal was a bare rock portal that provided access to the Area 14 underground workings. Mining ceased in this area around 1987 and the portal was backfilled with waste. The waste was covered and contoured with shale in 1987 and 1988.

In 2005, locally derived armour material was stockpiled adjacent to the portal cover for construction of the final armour layer. In late 2006, the stockpiled armour materials were spread over the portal area.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-23). The main observations are summarized by the following:

- No erosion of the cover was observed.
- No seepage was noted at the toe of the cover.
- No areas of significant settlement were observed in the cover.

In general, the Area 14 portal appears to be in satisfactory condition. As such, no maintenance was recommended.

6.4.6 09 South Portal

Construction Details

The 09 South Portal is located at the western end of the mine, as shown on Figure 2. The 09 South Portal is a culverted entry giving access to the Main Ore Zone. The 09 South drift is approximately 5 by 5 m in cross section. The culvert is round with a diameter of 5 m and a length of 28 m. The bottom of the culvert is filled with rockfill to provide a smooth floor. The culvert extends approximately 13 m inside the shale bedrock of 09 south drift, leaving 15 m exposed on surface, a portion of which is covered with talus from the slope above.

Presently, the 09 South Portal remains open to provide access to the underground workings for disposal of contaminated soils and demolition waste materials. The 09 South Portal is expected to remain open until the contaminated soils and underground waste disposal program are complete, likely sometime in 2008.

6.4.7 Lower Adit

Construction Details

The Lower Adit is located at the western end of the mine near the Industrial Complex, as illustrated on Figure 2. The Lower Adit provided the main access into the underground crusher and fine ore bin, as well as secondary access to the Main Ore Zone.

Presently, the Lower Adit remains open to provide ventilation to the underground mine workings. The Lower Adit is expected to remain open until the underground waste disposal program is complete, likely sometime in 2008.

6.4.8 Shale Hill Raise

Construction Details

The Shale Hill Raise provided ventilation for the underground workings in the Shale Hill area. The location of the raise is illustrated on Figure 1. The 3 m diameter raise was approximately 47 m deep. During mining operations, the raise was sealed with a 3 m diameter steel tank with the bottom cut out and with two adaptors in the top for 36 inch ventilation fans. The tank was fixed to a cemented collar at the top of the raise.

Prior to 2005, the surface structure was removed and, according to mine site records, the Shale Hill raise was backfilled with waste rock. A mound of shale was constructed at surface with side slopes of approximately 3H:1V. In 2005, a 0.35 m thick layer of locally derived armour material was applied to the surface of the mound to complete the remediation of this raise.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-24). During the inspection, the armour surface appeared to be stable with no visual indications of erosion or surface deformation. As such, no maintenance was recommended.

6.4.9 Oceanview East Raise

Construction Details

The Oceanview East Raise was situated at the extreme east end of the Oceanview underground workings. The location of the raise is illustrated on Figure 1. The 4 by 4 m raise was approximately 10 m deep and provided ventilation for the underground workings in the Oceanview area. During mining operations, the raise was covered with a wooden wind deflector with a locked door.

In 2002, the wooden deflector was removed and, according to mine site records, the raise was backfilled with waste rock. During backfilling, it was noted that an ice plug was present in the raise at a depth of approximately 1.5 m below ground surface. As such, waste rock was placed only to this depth. A 3 m high mound was placed on top of the raise to accommodate for possible future settlement of the ice plug. The mound was constructed of shale and surfaced with coarse rock.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-24). During the inspection, the armour surface appeared to be stable with no visual indications of erosion or surface deformation. As such, no maintenance was recommended.

6.4.10 Oceanview West Raise

Construction Details

The Oceanview West raise was located near the west end of the Oceanview underground workings, as shown on Figure 1. The 3 m diameter raise is approximately 26 m deep and provided ventilation for the underground workings. The raise was covered by a steel enclosure with a locked wooden cover.

In 2002, the steel enclosure was removed and, according to mine site records, the raise was backfilled with waste rock as part of the progressive reclamation of the mine site. During backfilling, it was noted that an ice plug was present in the raise at a depth of approximately 1.5 m below ground surface. As such, waste rock was placed only to this depth. A 3 m mound was placed on top of the raise to accommodate for possible future settlement of the ice plug. The mound was constructed of shale and surfaced with coarse rock.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-24). During the inspection, the armour surface appeared to be stable with no visual indications of erosion or surface deformation. As such, no maintenance was recommended.

6.4.11 Area 14 Raise

Construction Details

The location of the Area 14 Raise is illustrated on Figure 1. The raise had a cross section of 5 by 5 m and an approximate depth of 8 m. Mining ceased in this area around 1987 and the raise was completely backfilled to the floor of the underground workings. Backfilling was completed with waste rock and the surface was then covered and contoured with shale in the summer of 1987 and 1988.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-24). During the inspection, it was observed that armour material had been applied to the surface area but no surficial mound had been constructed. It was recommended that the surface mound be constructed.

6.5 Shale and Armour Borrow Areas

6.5.1 Shale Borrow Areas

Several shale borrow areas were developed during the reclamation process to provide material for construction of the thermal covers. The borrow areas include the following:

- Mt. Fuji
- Area 14
- West Twin
- East Twin
- Shale Hill
- Townsite

The borrow areas were reclaimed once no longer required. The reclamation efforts included regrading of slopes for stability and sufficient grading of the floor of each borrow area to provide for positive drainage of surface water.

Select photos from the inspection are provided in Appendix II (Figure II-25). The main observations are summarized by the following:

- Mt. Fuji
    - The benches are beginning to fill in from the ravelling of the remaining bench faces.
    - The instability observed at the crest in previous inspections does not appear to be retrogressing further up slope.
    - Only minor ponding was observed in the floor. The floor is considered well drained.
    - No issues requiring maintenance were observed.
- Area 14
    - In general, the re-graded pit walls appear to be stable.
    - One area of erosion is occurring at the north end of the borrow area where natural surface water discharge occurs into the pit. At this location, the overburden material has been eroded down to the top of the bedrock and has been deposited into the floor of the pit.

    - No ponding of water was observed at the time of the inspection, but there has been significant thermokarsting at the entrance to the pit. As such, it is likely that this impedes drainage at some point in the year. The material is sufficiently fractured that any ponded water likely drains when the ground thaws.
    - The surface water drainage should be reviewed in spring 2008, during run-off, to determine if any additional maintenance is required.
- West Twin
    - In general, the re-graded pit walls appear to be stable.
    - No ponding was observed in the floor of the pit.
    - No issues requiring maintenance were observed.
- East Twin
    - In general, the re-graded pit walls appear to be stable.
    - No ponding was observed in the floor of the pit.
    - No issues requiring maintenance were observed.
- Shale Hill
    - In general, the re-graded pit walls appear to be stable.
    - No ponding was observed in the floor of the pit.
    - No issues requiring maintenance were observed.
- Townsite
    - The upper portion of the pit walls remain to be re-sloped, although this appears to be occurring naturally as the remnant bench faces continue ravelling.
    - The re-graded portion of the pit walls appear to be stable.
    - Some stockpiled shale remains in the bottom of the pit, but much less than what was observed in 2006.
    - No ponding was observed in the floor of the pit.
    - It was recommended that the upper portion of the pit be re-sloped, as required, and that the bottom of the pit floor be graded once the borrow area is no longer required.

6.5.2 Armour Borrow Areas

Several armour borrow areas were developed during the reclamation process to provide material for construction of the thermal covers. The borrow areas include the following:

- Twin Lakes Delta deposit
- Chris Creek “A” and “B” deposits
- Kuhulu Lake Road deposit
- 09S/17N Road deposit
- Area 14

The borrow areas were reclaimed once no longer required. The reclamation efforts included sufficient grading of the floor of each borrow area to provide for positive drainage of surface water.

Select photos from the inspection are provided in Appendix II (Figure II-26). The main observations are summarized by the following:

- Twin Lakes Delta deposit
  - The floor of the quarry was, in general, well drained. The surface water flows to the north edge of the borrow area and then proceeds to flow west to the Reservoir.
  - Only isolated thermokarsting was observed in the floor of the quarry.
  - No issues requiring maintenance were observed. Although minor grading improvements could be made to improve drainage.
- Chris Creek “A” and “B” deposits
  - The floor of the quarry was observed to be well drained.
  - Some minor thermokarsting was observed in the floor of the quarry.
  - No issues requiring maintenance were observed.
- Kuhulu Lake Road deposit
  - The floor of the borrow area was graded in late 2006 in response to thermokarsting identified during the 2006 inspection. Since the grading in 2006, some additional minor thermokarsting has occurred, but to a much lesser degree than what was observed in 2006. In general, the borrow area appeared to be well drained and no additional maintenance was recommended.
- 09S/17N deposit
  - The face of the borrow area did not exhibit any indications of erosion or thermokarsting.
  - No issues requiring maintenance were observed.
- Area 14 deposit
  - Some minor thermokarsting was observed in the borrow area.
  - It was recommended that this area be regraded to limit the potential for ponding and further thermokarsting to occur.

6.6 Industrial Complex

6.6.1 Mill Foundation

Construction Details

Demolition of the Industrial Complex was completed in late 2006 and early 2007. Backfilling of the foundation with metals contaminated soils continued throughout 2007. Some shale fill from Mill area borrow area was stockpiled in the area for subsequent use as covering material. Formal placement of cover material had not yet started due to continue placement of metals contaminated soils.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-27). The main observations made during the inspection are summarized by the following:

- Backfilling of the Industrial Complex foundation with contaminated soils was observed to be proceeding. In general, the majority of the foundation of the Industrial Complex was backfilled, with most of the concrete walls being completely buried. One corner of the foundation remained exposed due to continued excavation of hydrocarbon contaminated soils. Once this operation is complete, it is expected that this area would be backfilled with metals contaminated soils and construction of the thermal cover could commence.

Since fill placement and cover construction had not yet been completed, no maintenance recommendations could be made. It was recommended that any additional fill placement occur as required in the Waste Rock and Open Pits Reclamation Plan (GLL 2004b) and that appropriate compaction be applied during backfilling. It is anticipated that completion of backfilling and construction of the thermal cover will occur in 2008.

6.6.2 Portal to Mill Foundation

Construction Details

A portal was driven beneath the Mill building in 1980 as part of emergency repair operations for the Mill. The portal is located approximately 70 m south of the Mill, adjacent to Twin Lakes Creek. The portal provided access to an ice lens which was present beneath the mill building. As part of the repair operations, the ice lens was mined out and concrete pillars were constructed to provide additional support for the Mill. After the repair operations were complete, the portal was plugged with shale rock fill.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-27). The main inspection observations are summarized by the following:

- No erosion of the shale portal plug was observed.
- No seepage was noted at the toe of the portal plug.

In general, the portal plug appears to be physically stable. It is recommended that the surface of the portal plug be armoured with appropriate material. This could be completed during the armouring of the Mill Foundation cover which is anticipated to occur in 2008. The face of the portal plug, once armoured, should be no steeper that 3H:1V.

6.7 Other Areas

6.7.1 Concentrate Storage Shed

Construction Details

Demolition of the Concentrate Storage Shed was completed in 2007. The concrete floor slab was left in-place and covered with a surficial cover of locally derived materials. According to mine site staff, the cover is approximately 30 cm thick, although this was not confirmed during the site inspection. The area adjacent to the Concentrate Storage Shed foundation, where metals contaminated soils had been excavated, was also backfilled and re-sloped to prevent ponding.

Inspection Conditions

Select photos from the inspection are provided in Appendix II (Figure II-28). The main observations made during the inspection are summarized by the following:

- No erosion of the cover materials was noted.
- No seepage from the cover area was noted.
- No ponding was noted on the surface of the cover or any areas immediately adjacent to the cover.
- The area was being used to store shipping containers

In general, the Concentrate Storage Shed surficial cover appears to be in satisfactory condition. As such, no maintenance was recommended.

6.8 Summary of 2007 Maintenance Recommendations

The maintenance items recommended throughout Section 6 are summarized in Table 10.

Table 10 - Recommended 2007 Maintenance Items

Inspection Item	Recommended Maintenance
West Twin Dike	• No maintenance required.
East Twin Creek Diversion Dike	• No maintenance required.
East Adit Treatment Area	• Dikes were breached in 2006, no dike maintenance required. • Improve drainage through Retention Pond.
Day Tank Farm spill containment berm	• Tanks, berm and liner removed, no maintenance required.
Main Tank Farm spill containment berm	• Repair the area of the containment berm affected during the adjacent hydrocarbon soils excavation. • Cover areas of exposed liner and repair any observed tears in the liner.
West Twin Dike Spillway	• Re-level access road. • Fix settlement area near spillway outlet. • Re-grade area near deflection berms.

Inspection Item	Recommended Maintenance
	• Apply additional armour to edge of south side access ramp. • General grading and rockfill placement may be undertaken to improve long term stability of the spillway channel.
West Twin Outlet Channel	• Monitor water level upstream of the wall to assess seepage losses. • Continue to inspect the wall for additional cracking.
East Twin Creek Diversion Channel	• No maintenance required.
Surface Cell Tailings Cover	• Backfill thermokarst feature observed along south edge of cover.
Test Cell/ Test Cell Dike Cover	• Place rip rap lower on the slope at the shoreline at the Test Cell outlet. • Apply additional compactive effort along north-south arm of Test Cell Dike.
Toe of West Twin Dike/ Toe of Test Cell Dike	• Spread rip rap currently stockpiled at shoreline at Toe of West Twin Dike. • Backfill thermokarst features observed at toe of West Twin Dike.
Landfill Cover	• Complete spreading of armour on west face. • Compact the armour surface.
West Open Pit Waste Rock Cover	• Apply armour to access road area at the front of the pit.
East Open Pit/ East Trench Waste Rock Cover	• Replace frost gauges at East Open Pit.
Oceanview Pit Waste Rock Cover	• Backfill small thermokarst feature observed in southeast corner of pit.
Area 14 Waste Rock Cover	• No maintenance required.
Upper Dump Pond	• No maintenance required.
00/01 Portals and crown pillar	• No maintenance required.
17 N Portal	• Backfill thermokarst feature.
Oceanview Portal	• Repair settlement in SW corner. • Improve grade behind surface water deflection berm to prevent ponding.
K-Baseline Portal	• No maintenance required.
9S Portal	• No maintenance required.
Lower Adit	• No maintenance required.
Shale Hill Raise	• No maintenance required.
Oceanview East and West Raises	• No maintenance required.
Area 14 Raise	• Construct surface mound.
Mt. Fuji Shale Borrow Area	• No maintenance required.
Townsite Shale Borrow Area	• Re-slope crest of pit (portion which remains near vertical). • Regrade floor of pit when material removal complete.
West Twin Shale Borrow Area	• No maintenance required.
East Twin Shale Borrow Area	• No maintenance required.

Inspection Item	Recommended Maintenance
Area 14 Shale Borrow Area	• Monitor during freshet to assess additional maintenance requirements.
Shale Hill Shale Borrow Area	• No maintenance required.
Twin Lakes Armour Borrow Area	• No maintenance required.
Kuhulu Lake Road Borrow Area	• No maintenance required.
Chris Creek Armour Borrow Area	• No maintenance required.
Area 14 Armour Borrow Area	• Regrade thermokarst area.
Mill Foundation	• Thermal cover to be completed in 2008.
Former Portal to Mill Foundation	• Armour surface of portal plug.
Concentrate Storage Shed	• No maintenance required.
Instrumentation/ Monitoring	• Replace Frost Gauge 9 in the Test Cell. • Replace Frost Gauges 13 and 14 in the East Open Pit. • Add more methyl blue solution to frost gauges that require it. • Install frost gauges and a thermistor at the West Open Pit. • Install frost gauges and a thermistor at the Industrial Complex. • Obtain more water quality samples for metals testing at the toe of the East Open Pit cover.

It is recommended that these maintenance items be completed in 2008 while resources and equipment are available on-site. A record of how and when the maintenance was completed should be kept for inclusion within the subsequent years annual geotechnical report.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Embankments

The affected area of the Main Tank Farm Spill Containment Berm should be repaired in 2008. The repair should consist of regrading and fill placement. The repair should be completed so that the liner does not get damaged and the affected side slope does not experience erosion or slope instability. The East Twin Creek Diversion berm is performing as anticipated and is considered fully remediated. The East Adit Treatment Facility Dikes were breached in 2007. The flow through the Treatment Pond was observed be relatively unimpeded. However, some ponding was observed in the Retention Pond. Additional grading should be completed to improve drainage through this area and prevent ponding. The Day Tank Farm was removed in 2007. As such, no maintenance was required in this area.

Hydraulic Structures

The West Twin Dike Spillway is functioning as intended and only minor deformation in the base and side slopes of the spillway has occurred. Maintenance was expected to be required for the spillway during the initial years following construction given the ground conditions encountered during construction. These maintenance items should be completed in 2008.

A small head pond develops in the Surface Cell cover at the spillway inlet. Since the majority of the water flow in the Surface Cell occurs sub-surface, the pond could be eliminated with the addition of more armour material in the area of ponding. The presence of the head pond is not considered to negatively affect the overall cover performance hence the elimination of the head pond is not considered necessary.

Rehabilitation of the West Twin Outlet Channel was undertaken during the 2007 site inspection. A GCL was installed beneath the rip rap and along the upstream face of the concrete wall. The channel should continue to be visually monitored in 2008 to assess if seepage losses continue. It is expected that once the access road separating the polishing pond and the Reservoir is breached, water levels behind the wall will regulate due to the creation of a complete flow through system.

Thermal Covers

The thermal covers appear to be physically stable with only minor erosion observed in isolated areas. The thermal performance of the covers has improved, compared to 2006. For the most part, the active layer thaw was contained within the thermal cover at most locations. This is despite the extremely warm air temperatures experienced by site over the summer months in 2007. Additional, test pits were excavated in the thermal covers at the West Twin Area during the site inspection. During the test pitting, visual observations of ice saturation at the base of the covers were made. Improvement has also been observed in the quality of the surface water runoff from the Surface Cell cover system. This is an indication of the beneficial impacts related to improved geothermal performance of the cover system. Additionally, the water quality observed at the final discharge point for the West Twin Disposal Area has also been observed to remain well below the discharge criteria.

It is anticipated that, over time, the ice saturation will continue to occur within the base of the cover materials. As this occurs, the geothermal performance of the covers will improve, further confining the active layer thaw within the cover.

Talik Freezeback

Talik freezeback is occurring as anticipated in the Surface Cell. Cooling of the subsurface profile is continuing, with the upper 10 to 20 m of the subsurface profile being frozen back. The ground temperatures in the middle of the talik appear to have stabilized after previously experiencing a slight warming trend. The pore pressures in the talik continue to increase, but have been shown to be lowest near the dike and highest in the centre of the talik. The water quality in the Surface Cell talik appears to be changing with time in response to freezeback of the tailings, as anticipated.

Talik freezeback in the Test Cell appears to be occurring, but at a slower rate than the Surface Cell talik. The subsurface profile beneath the old Test Cell dike appears to be frozen back down to a depth of approximately 20 m. The piezometers in the Test Cell have demonstrated that the Test Cell talik and Reservoir are hydraulically connected. This was expected based on the available information on the Test Cell talik (BGC 2004) and was assumed during the development of the contaminant loading model.

Mine Openings, Crown Pillars and Raises

The covers constructed over the mine openings appear to be physically stable. Minor maintenance recommendations were made at the Oceanview and 17N portals. The Area 14 Raise still requires a surface mound to be constructed. The 09 South and Lower Adit portal plugs have yet to be constructed, but it is anticipated that this will occur in 2008.

Shale and Armour Borrow Areas

In general, the shale and armour borrow areas appear to be physically stable and not causing any significant ponding to occur. Minor maintenance issues were recommended at the Area 14 armour borrow area. The Area 14 shale borrow area may require minor regrading pending additional observations in 2008.

Industrial Complex

It is currently anticipated that backfilling of the mill foundation will be completed in 2008 and a thermal cover will be constructed in 2008. The portal plug for the mill foundation portal appears to be stable and no seepage is originating from the portal plug. It was recommended that the face of the portal plug be armoured in 2008.

8.0 CLOSURE

This report provides a performance assessment of numerous structures at the Nanisivik Mine, based on a one-time visual observation and a review of monitoring instrumentation for some of the dikes and thermal covers.

We trust the information provided herein meets your present requirements. Thank you for allowing BGC to be of service, once again, to Nanisivik Mine. If you have any questions or require additional details, please contact the undersigned.

Respectfully submitted,
BGC ENGINEERING INC.

Geoff Claypool, P.Eng.
Geological Engineer

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

REFERENCES

BGC Engineering Inc. 2004a. Assessment of Surface Cell and Test Cell Taliks. Submitted to CanZinco Ltd. February 6, 2004.

BGC Engineering Inc. 2004b. Engineering Design of Surface Reclamation Covers. Submitted to CanZinco Ltd. February 6, 2004.

BGC Engineering Inc. 2005. 2005 Geotechnical Inspection, Waste Containment Dikes – Nanisivik Mine, NU. Submitted to CanZinco Ltd. October 20, 2005.

BGC Engineering Inc. 2007a. 2006 Annual Geotechnical Inspection, Nanisivik Mine, NU. Submitted to CanZinco Ltd. January 10, 2007.

BGC Engineering Inc. 2007b. Stability Analysis of West Twin Dike, Nanisivik Mine, NU. Submitted to Breakwater Resources Inc. October 10, 2007.

CanZinco Ltd. 2004. 2004 Reclamation and Closure Plan. Submitted to Nunavut Water Board. March 2004.

Gartner Lee Ltd. 2004a. Nanisivik Mine Reclamation and Closure Monitoring Plan. Report submitted to Nanisivik Mine, a Division of CanZinco Ltd., Project No.: 23-625, February 2004.

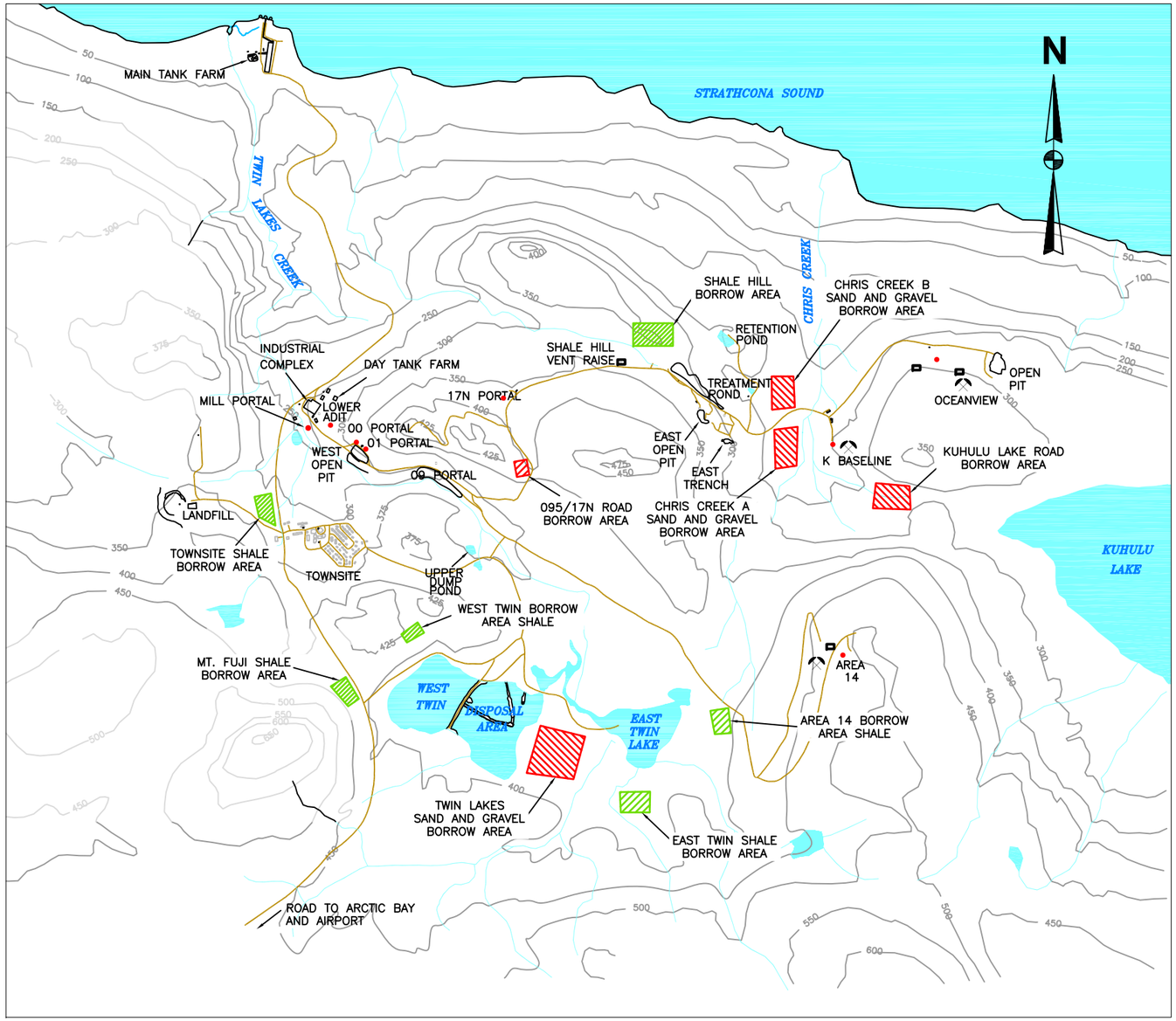
Gartner Lee Ltd. 2004b. Nanisivik Mine Rock Piles and Open Pits Closure Plan. Report submitted to Nanisivik Mine, a Division of CanZinco Ltd., Project No.: 23-625, February 2004.

Golder Associates Ltd. 1998. 1998 Geotechnical Inspection of Waste Containment Dykes, Nanisivik Mine, Baffin Island, NWT. Report submitted to Nanisivik Mine, a Division of CanZinco Ltd., Project No.: 982-2432.5100, October, 1998, 27 pages plus figures.

Golder Associates Ltd. 2002. Preliminary Hydrology Study Nanisivik Spillway Design. Report submitted to Breakwater Resources Ltd., Project No. 011-1838, February 2002.

Nunavut Water Board. 2004. Nunavut Water Board's Letter of Approval for Terms and Conditions Applying to the Nanisivik Mine 2004 Reclamation Plan and Closure Plan. Memorandum addressed to Breakwater Resources Ltd. July 6, 2004.

FIGURES



LEGEND

- ROAD
- GROUND CONTOUR (50 m INTERVAL)
- CREEKS, DRAINAGE, STREAMS, SHORELINE
- RAISE
- PORTAL

Scale 1:40000

800 0 800 1600 2400

metres

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE: AS SHOWN
DATE: MARCH 2008
DRAWN: JL
DESIGNED: GKC
CHECKED: GKC
APPROVED: JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: BREAKWATER RESOURCES LTD

PROJECT: NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

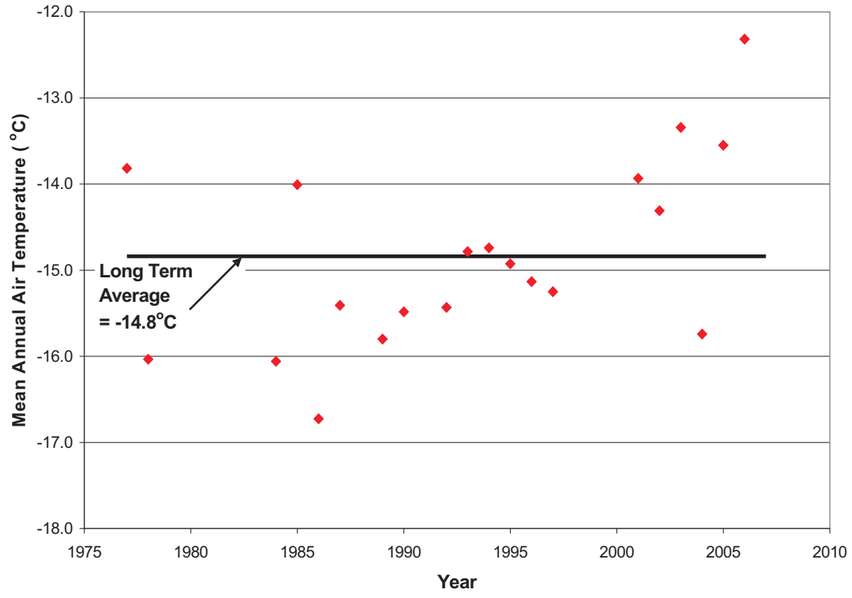
TITLE: SITE LOCATION PLAN

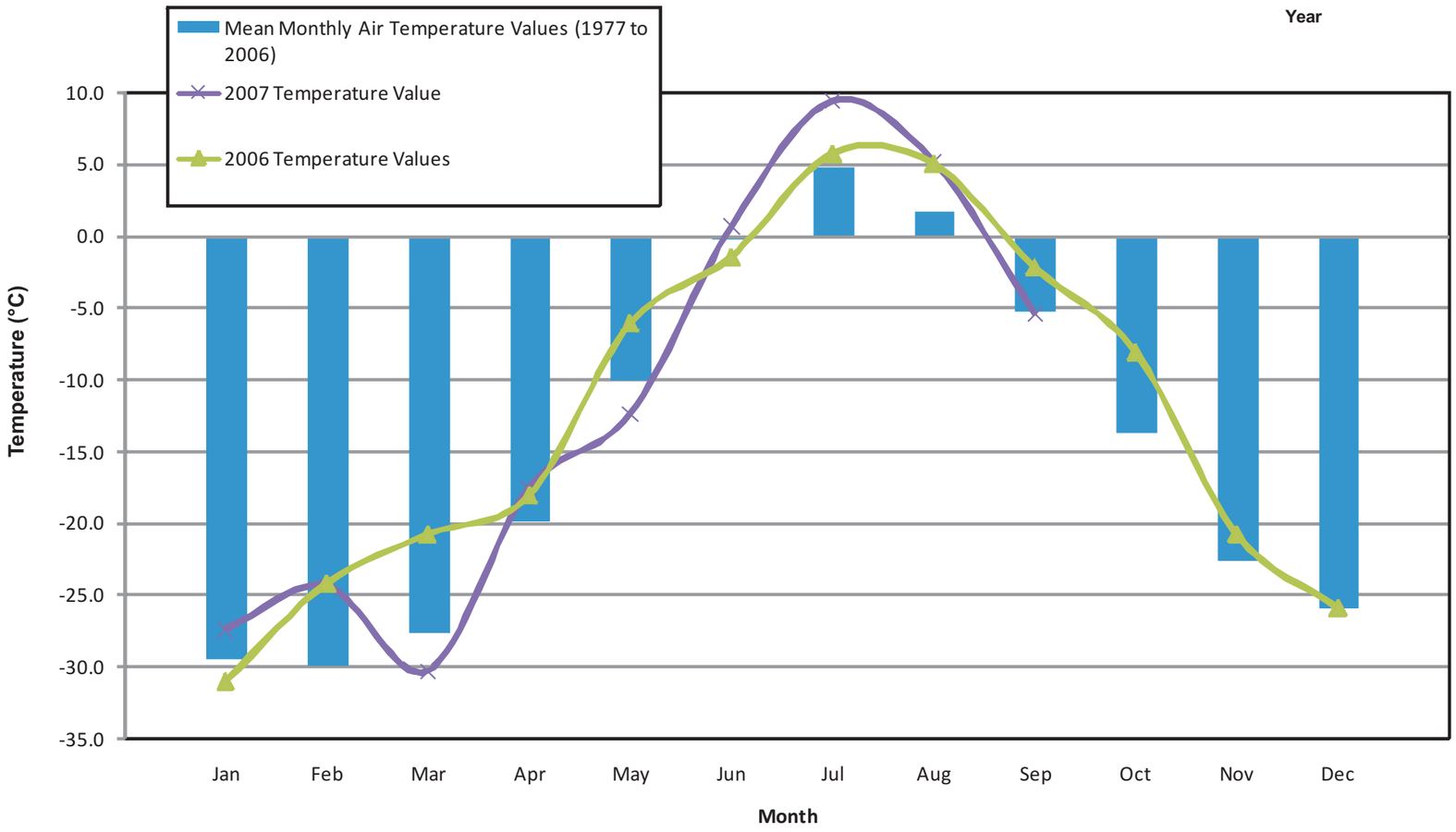
PROJECT No.: 0255-016-03

FIGRUE No.: 1

REV.:

K:\Projects\0255 Can2Inco\016 2007 Work\03 Annual Inspection\Graphics\Drawings\0255-016-03 Figure 1.dwg Layout: Figure 1 Plot Date: Feb 29 08 Time: 9:51 AM





CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

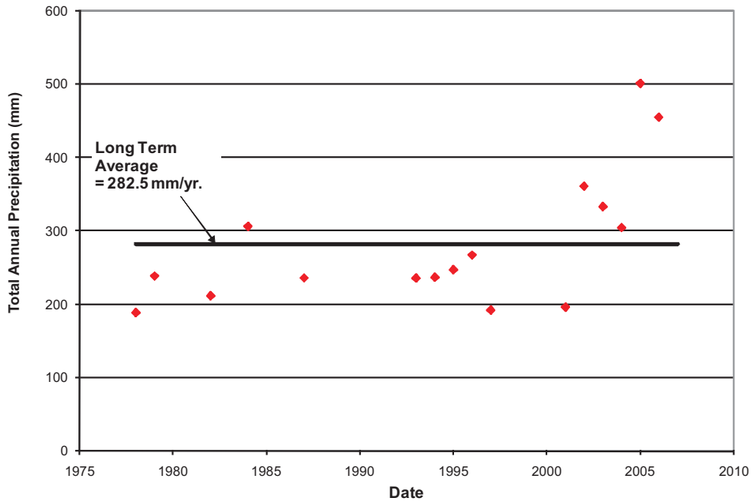
SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

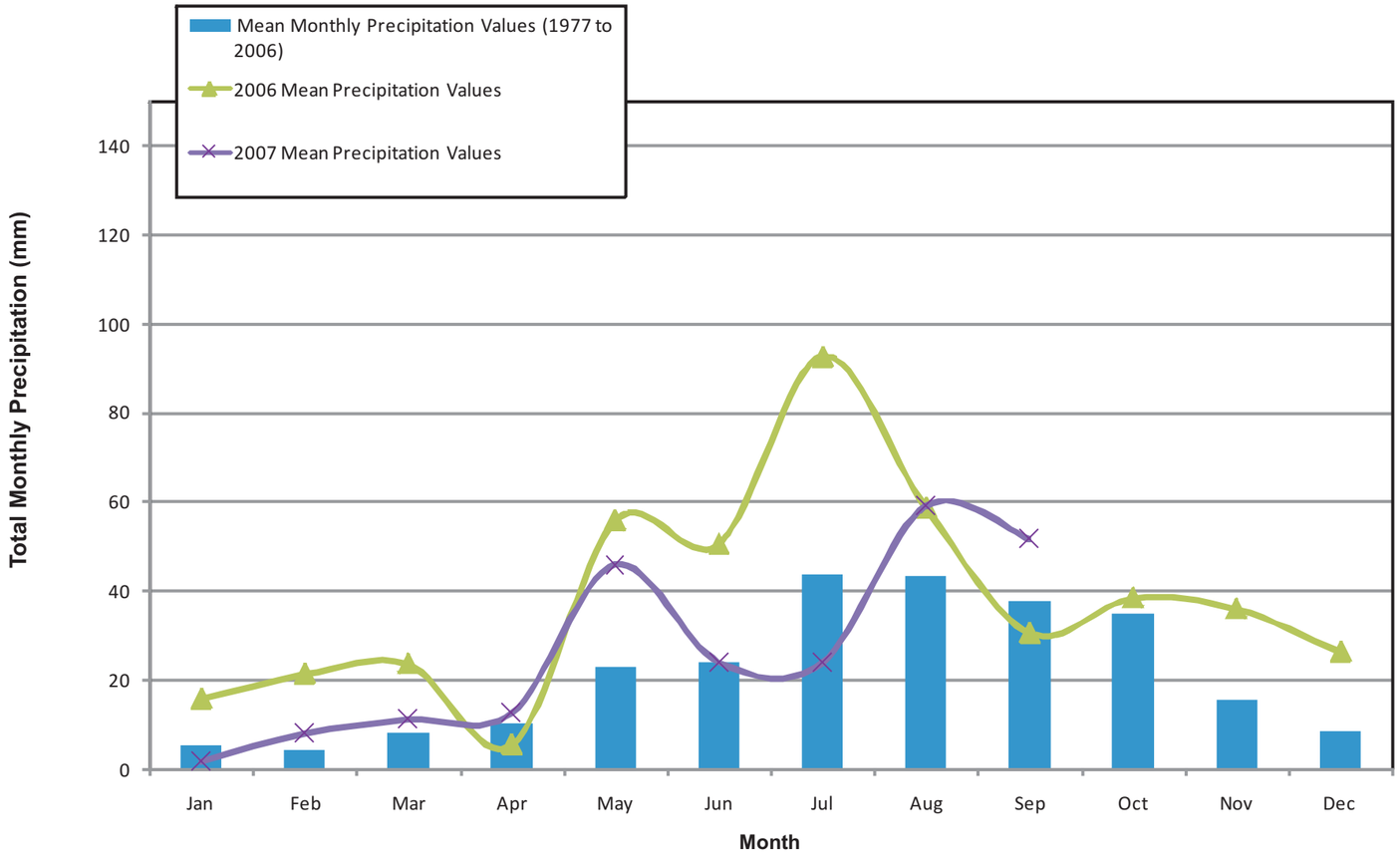
PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
COMPARISON OF MEAN MONTHLY AIR TEMPERATURE DATA

PROJECT No.	FIGURE No.	REV.
0255-016-03	2	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185





CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
COMPARISON OF
MEAN MONTHLY PRECIPITATION DATA

PROJECT No.	FIGURE No.	REV.
0255-016-03	3	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

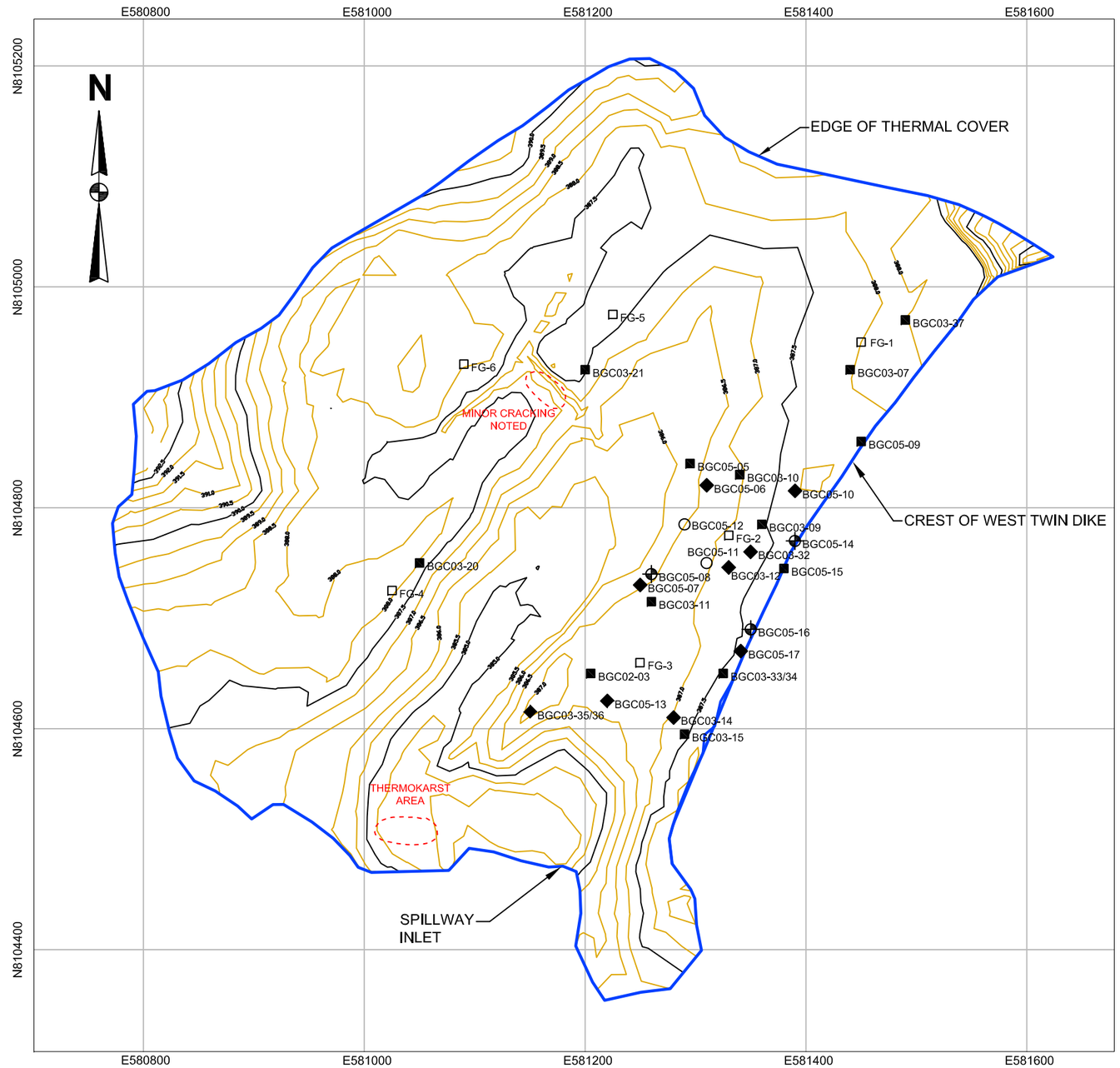
Approixmate Scale 1:12,500

Note:
1. Photo derived from Google Earth January 10, 2008
2. Approximate date of photo is July 2005.

DATE: MARCH 2008	DRAWN SLF	BGC ENGINEERING INC. AN APPLIED EARTH SCIENCES COMPANY Calgary, Alberta Phone: (403) 250-5185	PROJECT NANISIVIK MINE 2007 ANNUAL GEOTECHNICAL INSPECTION	
REFERENCED DRAWING DESCRIPTION			TITLE COMPONENTS OF WEST TWIN DISPOSAL AREA	
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.		CLIENT BREAKWATER RESOURCES LTD	PROJECT No. 0255-016-03	FIGURE No. 4 / REV. 0

LEGEND:

- THERMISTOR/ THERMOCOUPLE
- FROST GAUGE
- MONITORING WELL
- VW PIEZOMETER
- CONTINGENCY BOREHOLE



NOTES:

1. GRID BASED ON UTM NAD 83, ZONE 16 COORDINATES.
2. ELEVATIONS ARE IN METRES.
3. CONTOUR INTERVAL IS = 0.5 m.
4. SCALE IS APPROXIMATE.

Scale 1:4500

90 0 90 180 270

metres

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE: AS SHOWN
DATE: MARCH 2008
DRAWN: JL
DESIGNED: KFM
CHECKED: GKC
APPROVED: JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

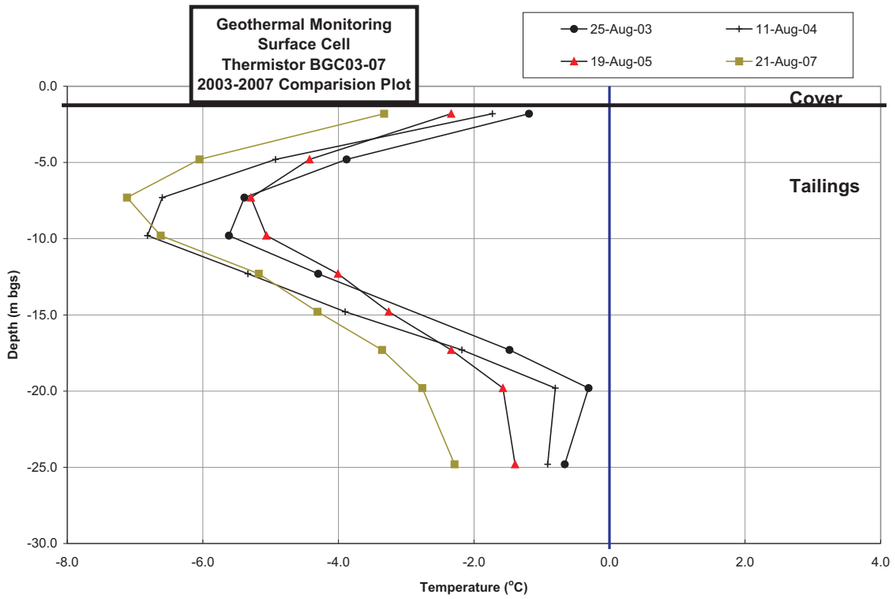
CLIENT: BREAKWATER RESOURCES LTD

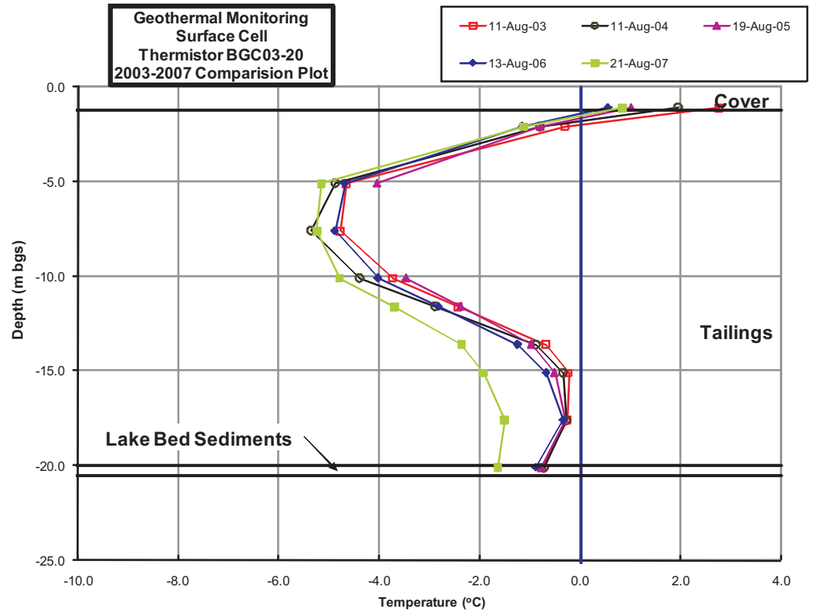
PROJECT: NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

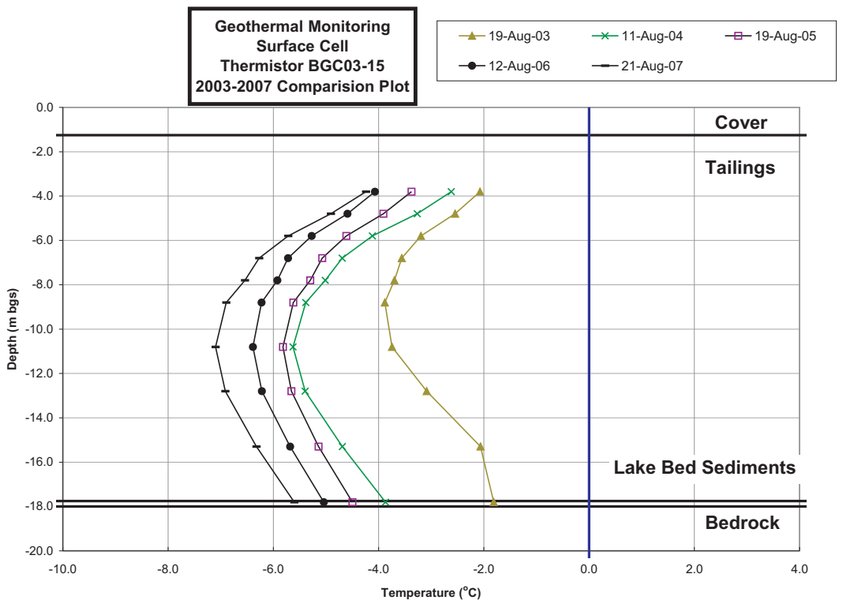
TITLE: SURFACE CELL TAILINGS COVER

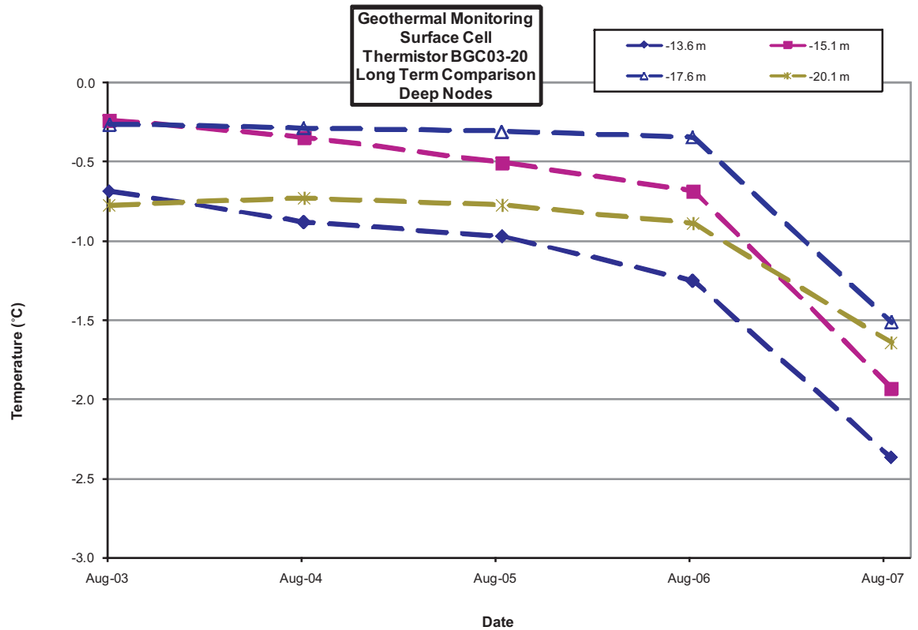
PROJECT No.:	FIGURE No.	REV.:
0255-016-03	5	

K:\Projects\0255 CanZinco\016 2007 Work\03 Annual Inspection\Graphics\Drawings\0255-016-03 Figure 5.dwg Layout: Figure 5 Plot Date: Feb 29 08 Time: 10:10 AM









CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

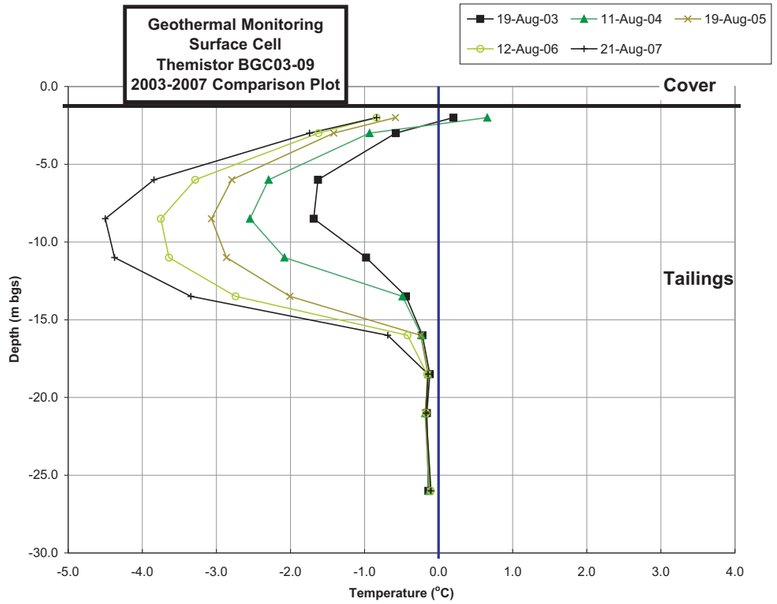
SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

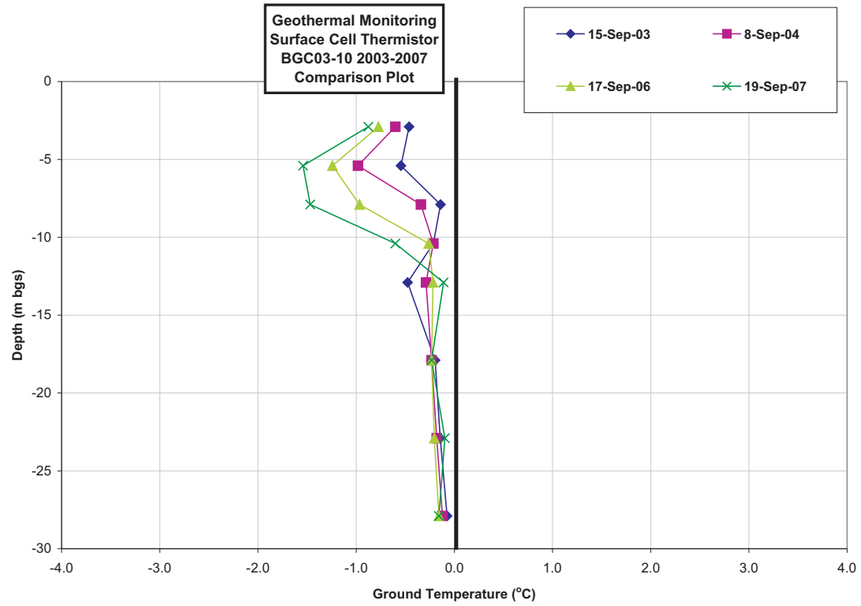
PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

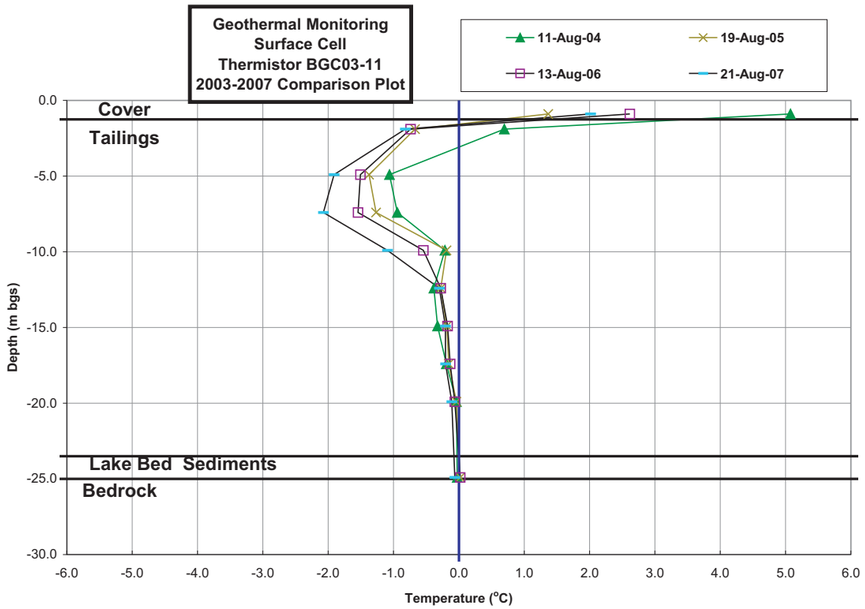
TITLE
SURFACE CELL TAILINGS COVER
GEOTECHNICAL MONITORING DATA 1

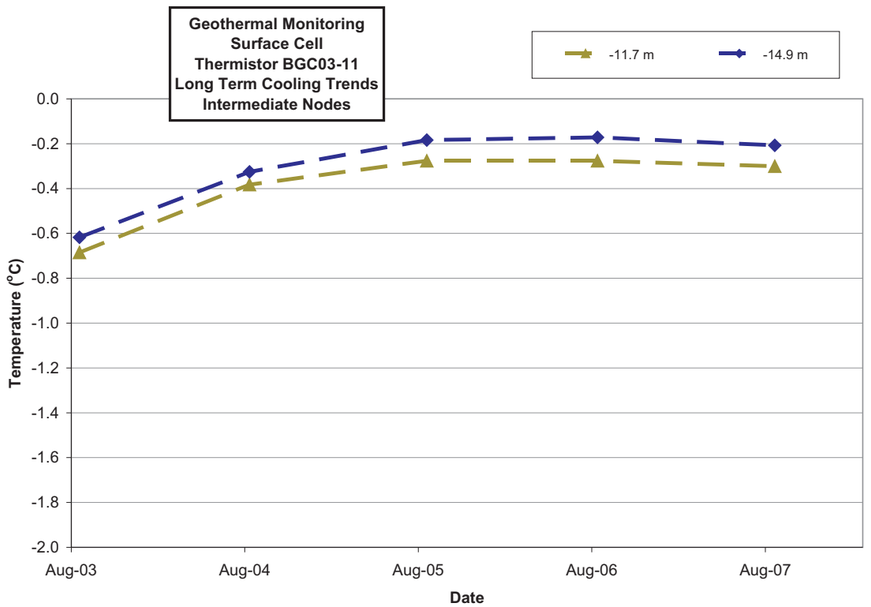
PROJECT No.	FIGURE No.	REV.
0255-016-03	6	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185









CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
.	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

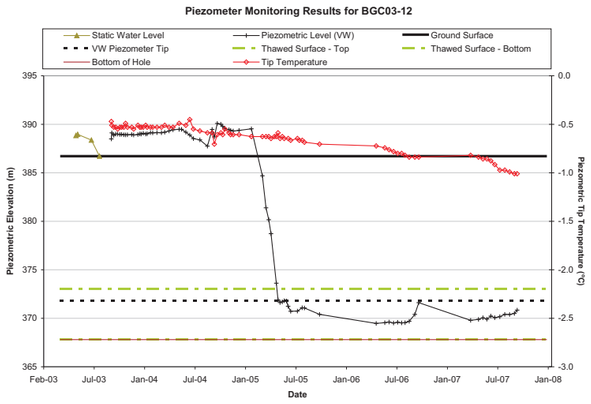
SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

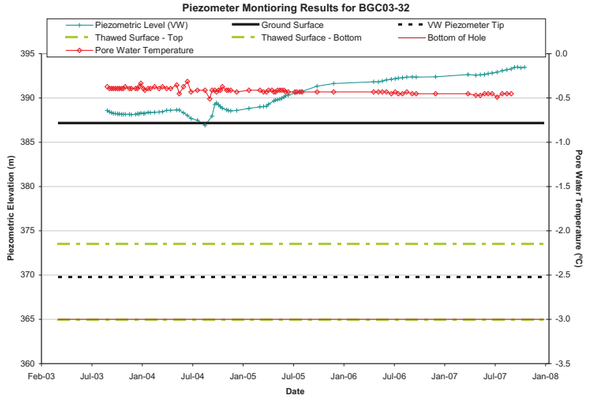
PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

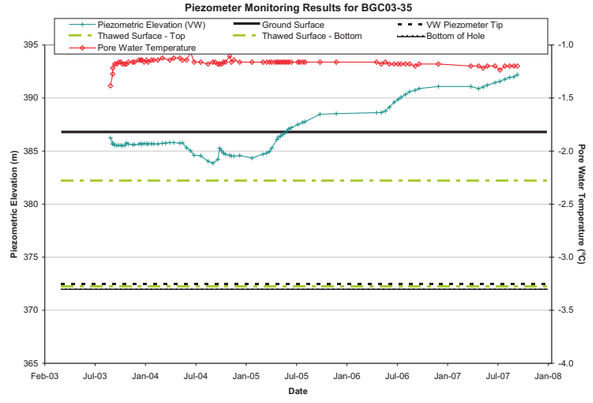
TITLE
SURFACE CELL TAILINGS COVER
GEOTECHNICAL MONITORING DATA 2

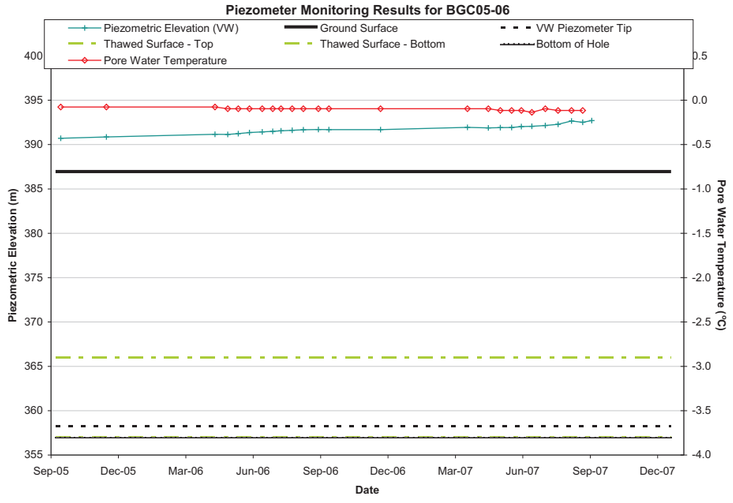
PROJECT No.	FIGURE No.	REV.
0255-016-03	7	0

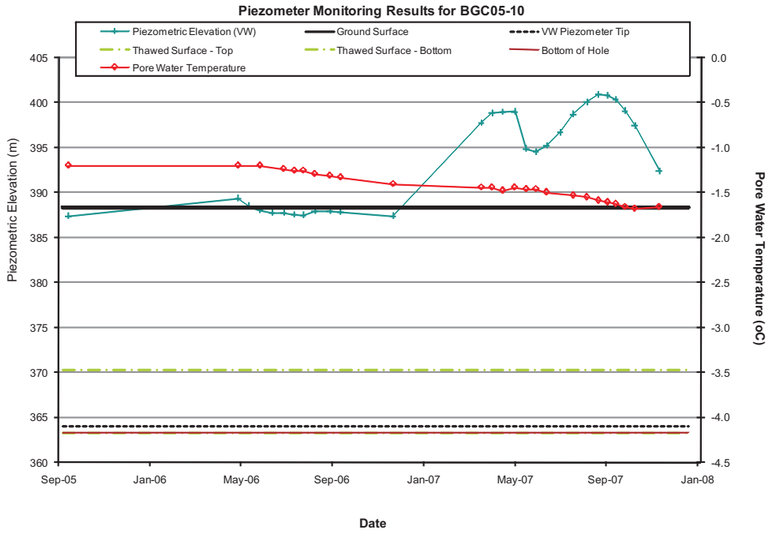
BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185











CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

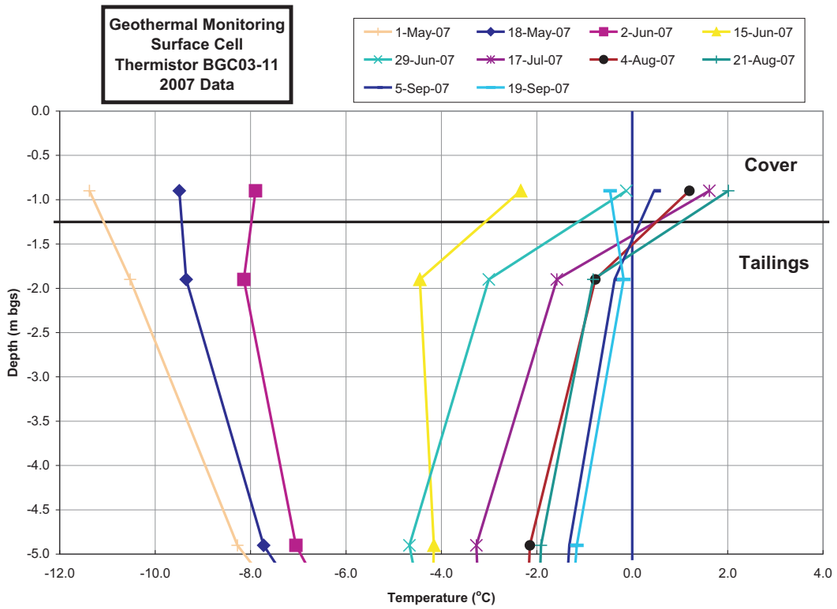
SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

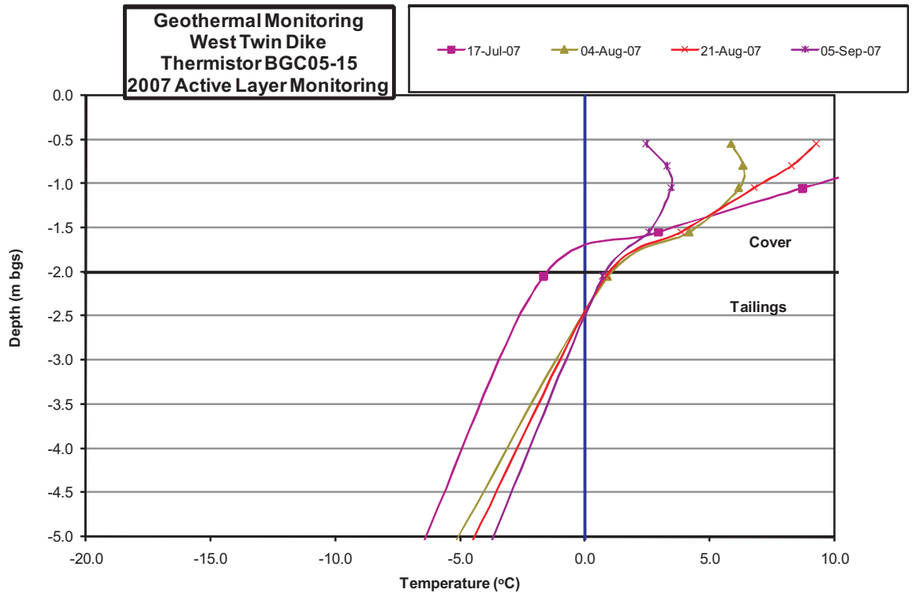
PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

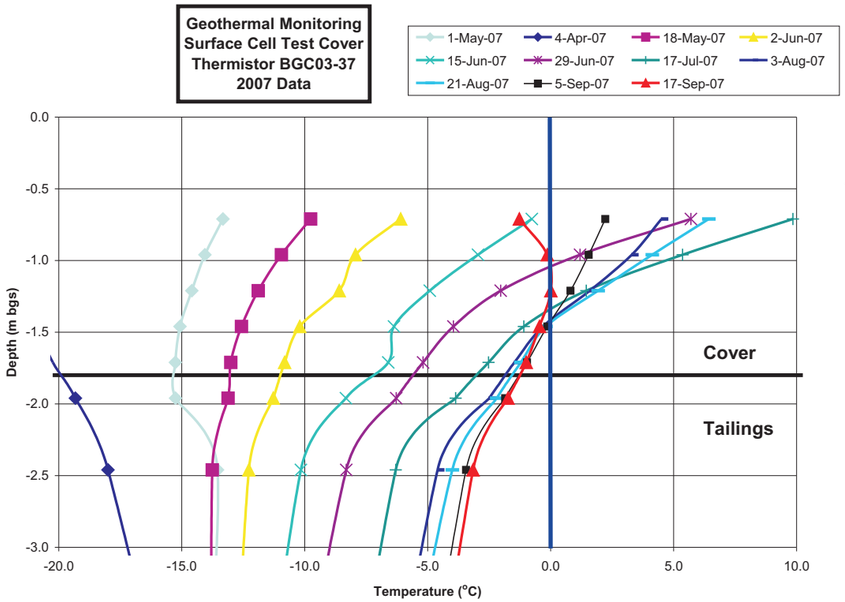
TITLE
SURFACE CELL TAILINGS COVER
GEOTECHNICAL MONITORING DATA 3

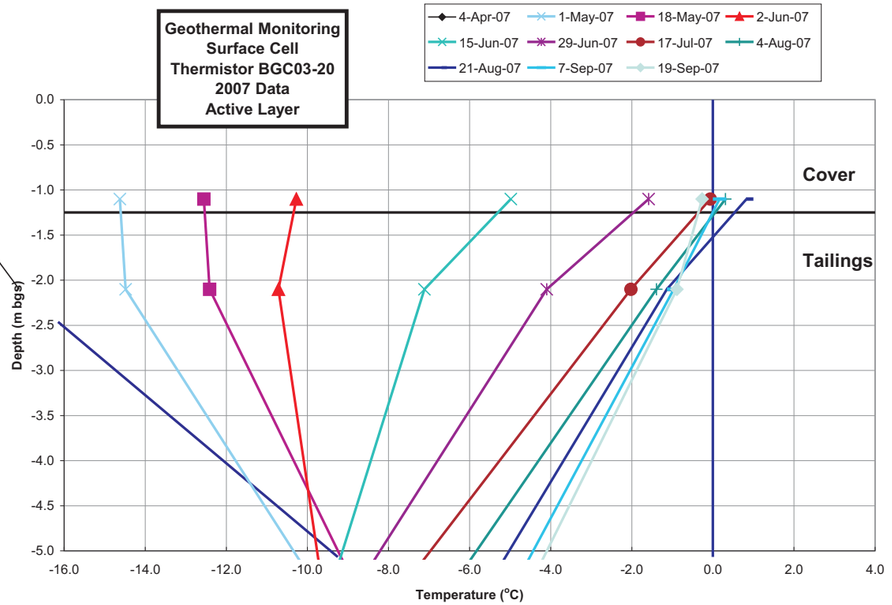
PROJECT No.	FIGURE No.	REV.
0255-016-03	8	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185









CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
.	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

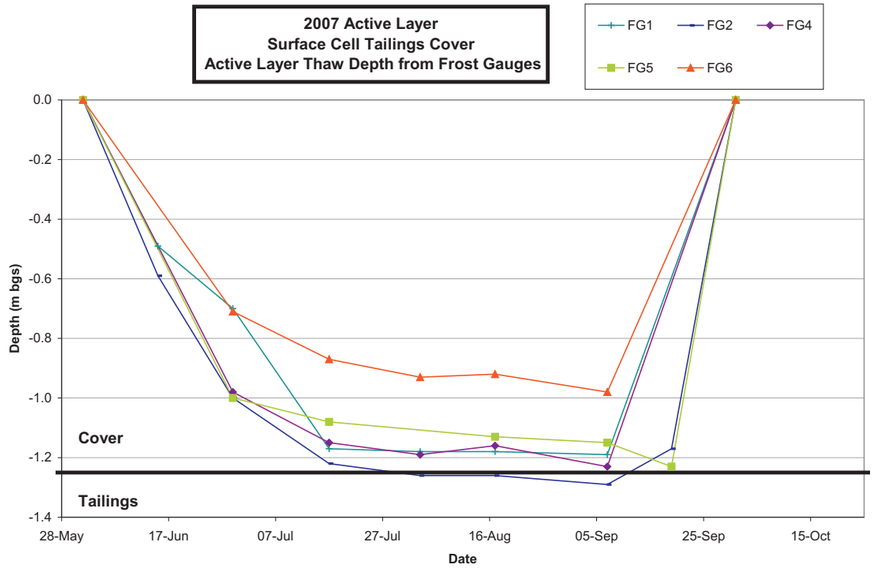
SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

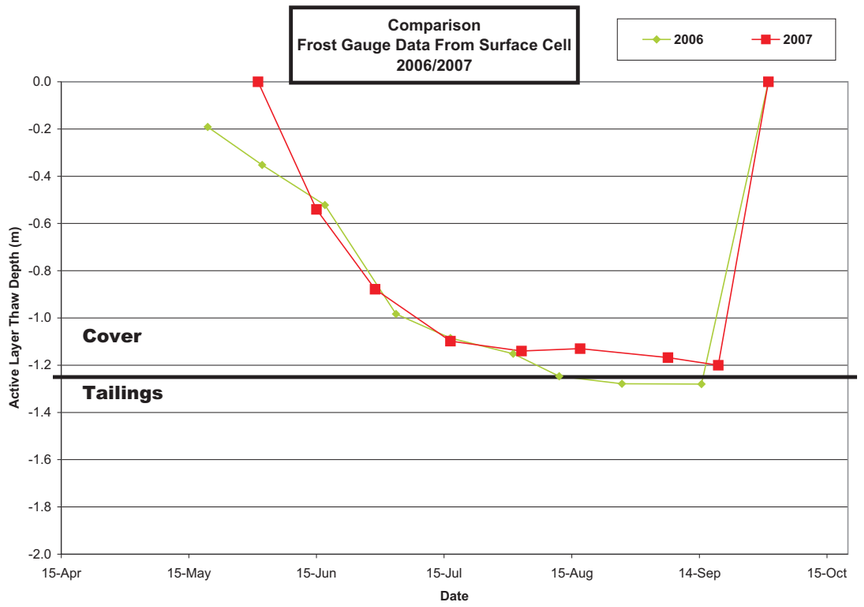
PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

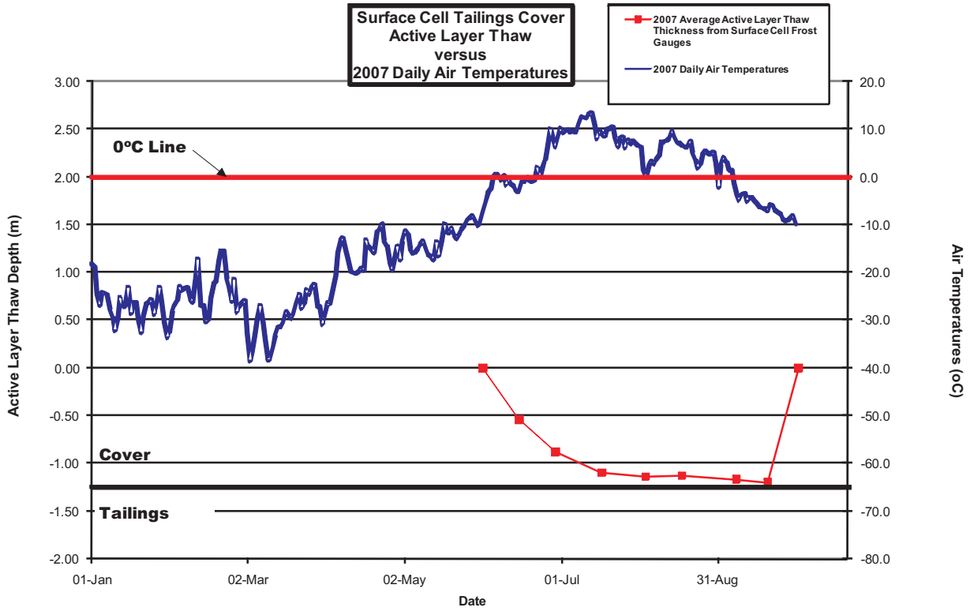
TITLE
SURFACE CELL TAILINGS COVER
GEOTECHNICAL MONITORING DATA 4

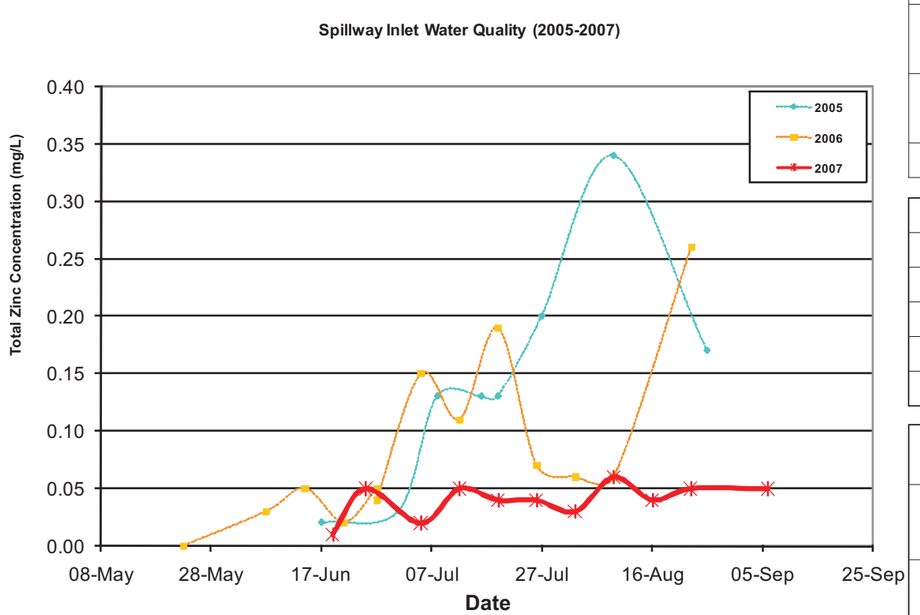
PROJECT No.	FIGURE No.	REV.
0255-016-03	9	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185









CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
.	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

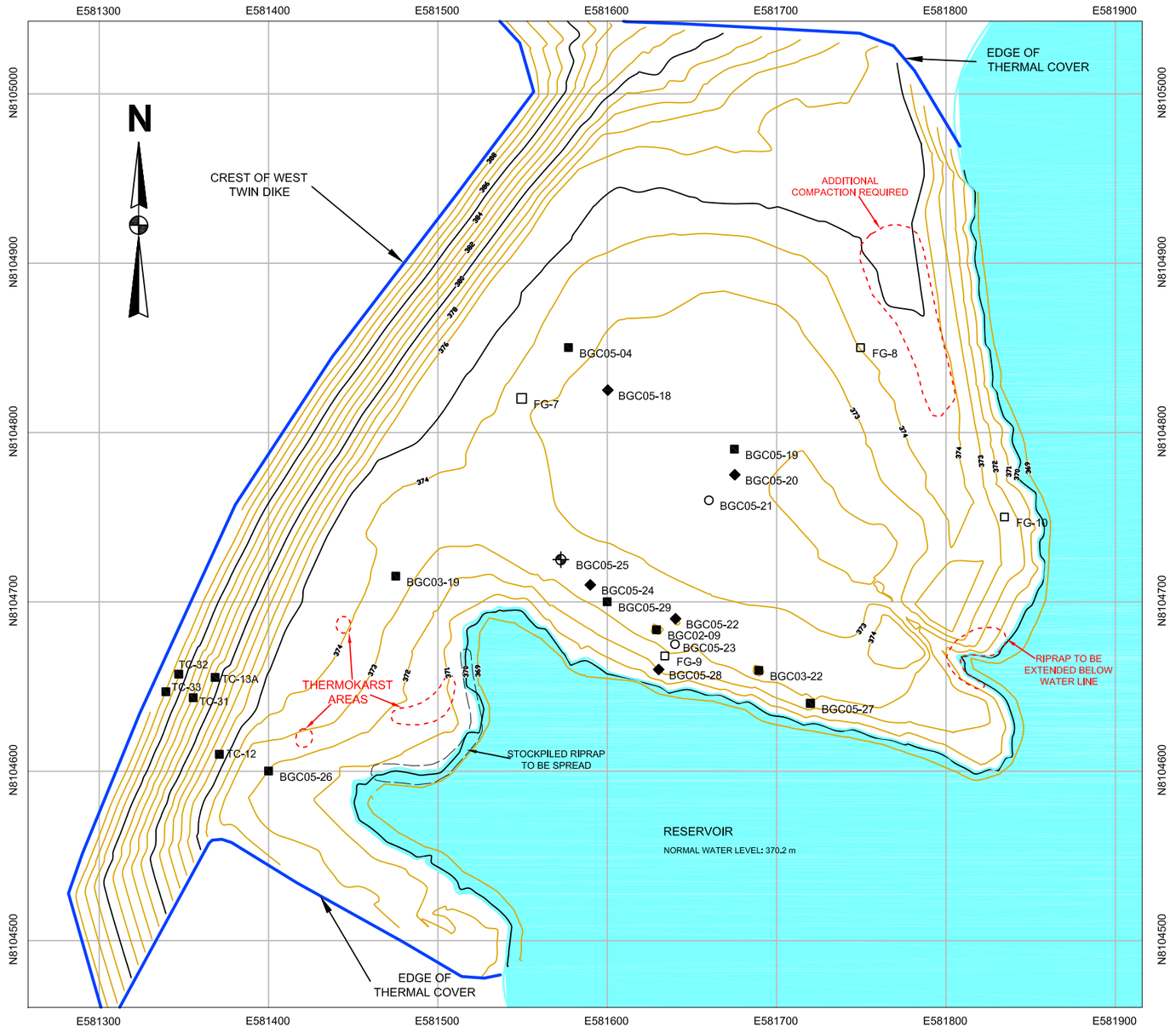
TITLE
SURFACE CELL TAILINGS COVER
GEOTECHNICAL MONITORING DATA 5

PROJECT No.	FIGURE No.	REV.
0255-016-03	10	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

LEGEND:

- THERMISTOR/ THERMOCOUPLE
- FROST GAUGE
- MONITORING WELL
- VW PIEZOMETER
- CONTINGENCY BOREHOLE



NOTES:

1. GRID BASED ON UTM NAD 83, ZONE 16 COORDINATES.
2. ELEVATIONS ARE IN METRES.
3. CONTOUR INTERVAL IS = 1.0 m.
4. SCALE IS APPROXIMATE.
5. THERMOCOUPLE LOCATIONS ARE APPROXIMATE.

Scale 1:3000

60 0 60 120 180

metres

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE: AS SHOWN
DATE: MARCH 2008
DRAWN: JL
DESIGNED: KFM
CHECKED: GKC
APPROVED: JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

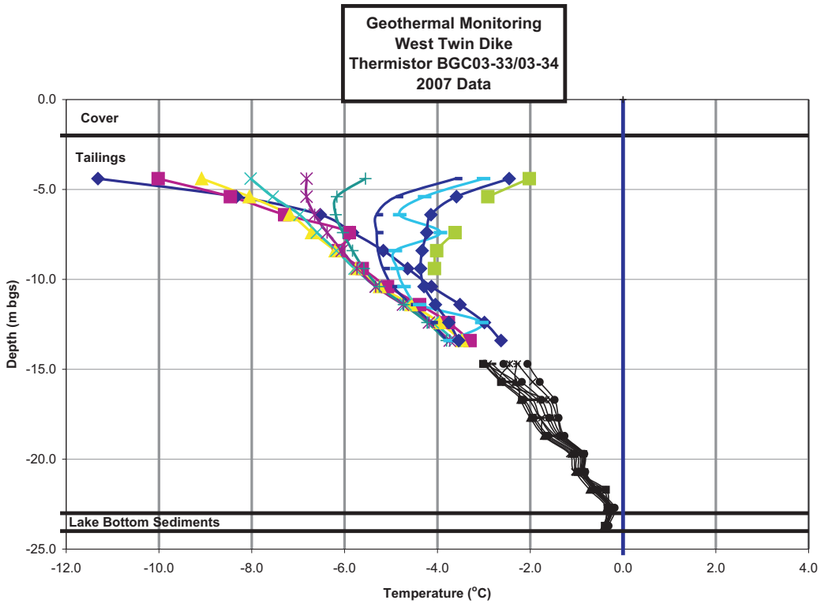
CLIENT: BREAKWATER RESOURCES LTD

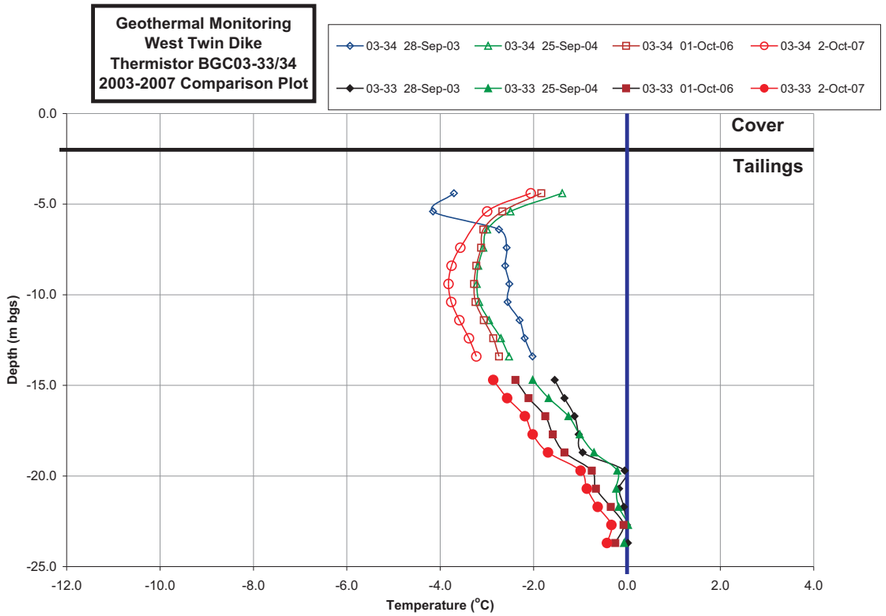
PROJECT: NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

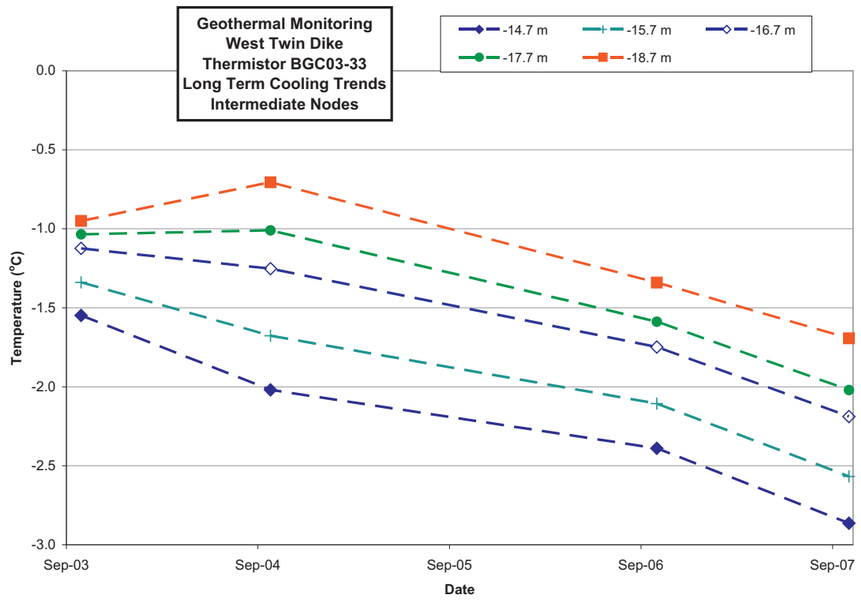
TITLE: TEST CELL TAILINGS COVER

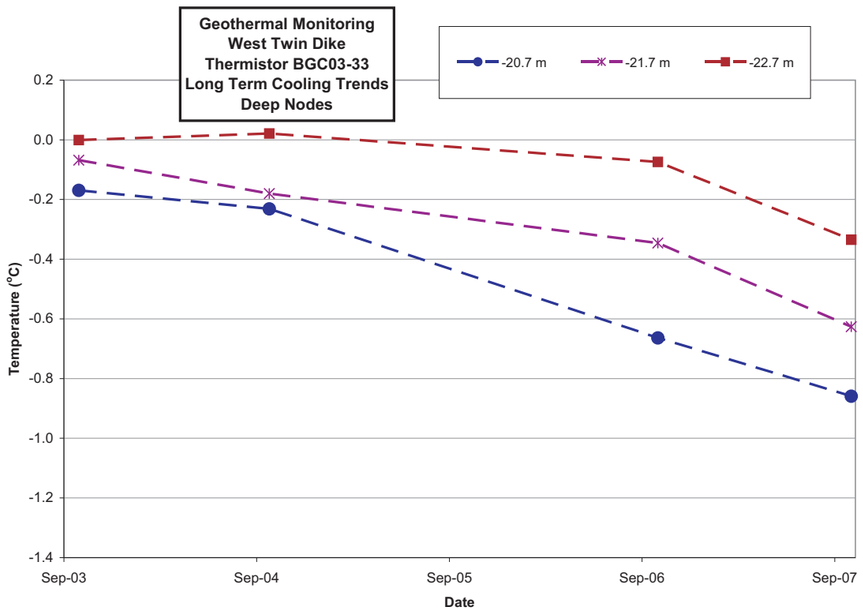
PROJECT No.:	FIGURE No.	REV.:
0255-016-03	11	

K:\Projects\0255 Can Zinc\016 2007 Work\03 Annual Inspection\Graphics\Drawings\0255-016-03 Figure 11.dwg Layout: Figure 11 Plot Date Feb 29 08 Time: 10:55 AM









CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
.	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

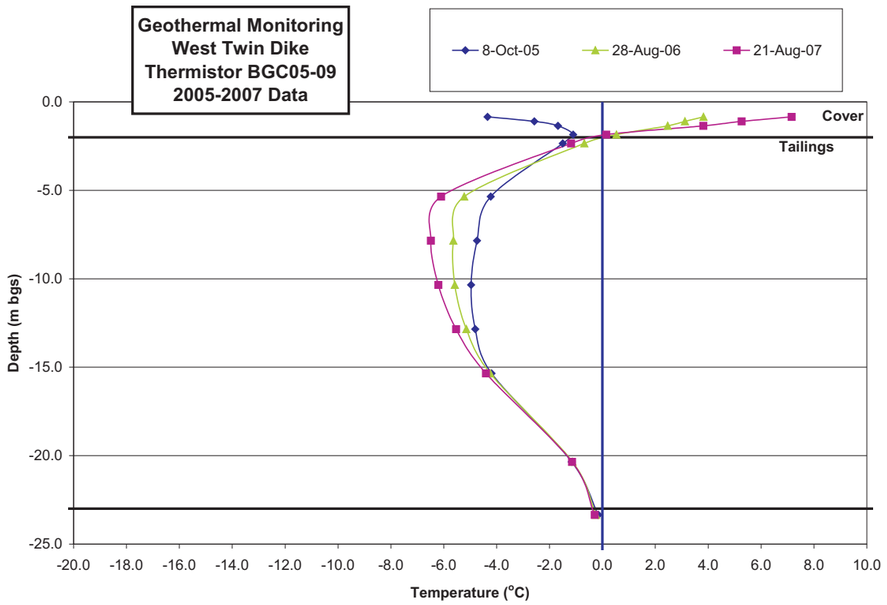
SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

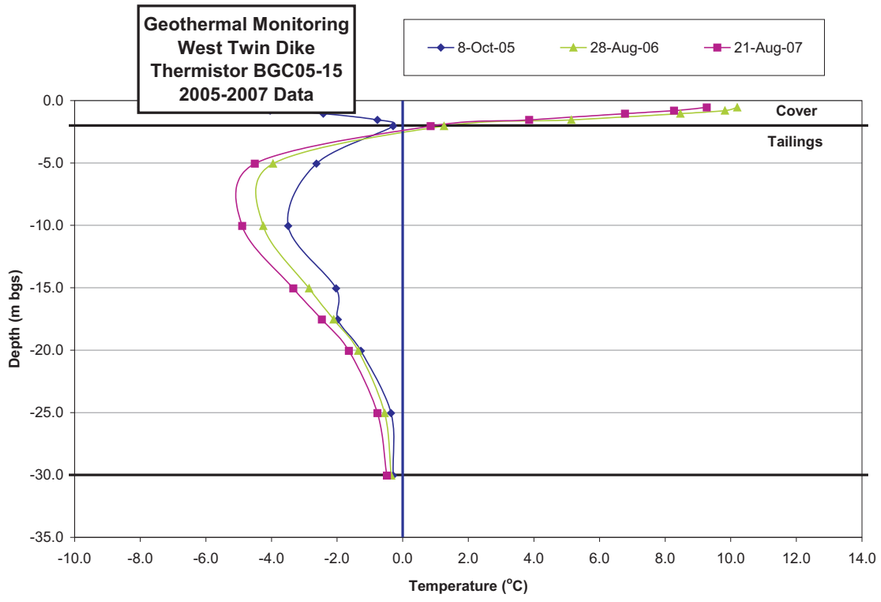
PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

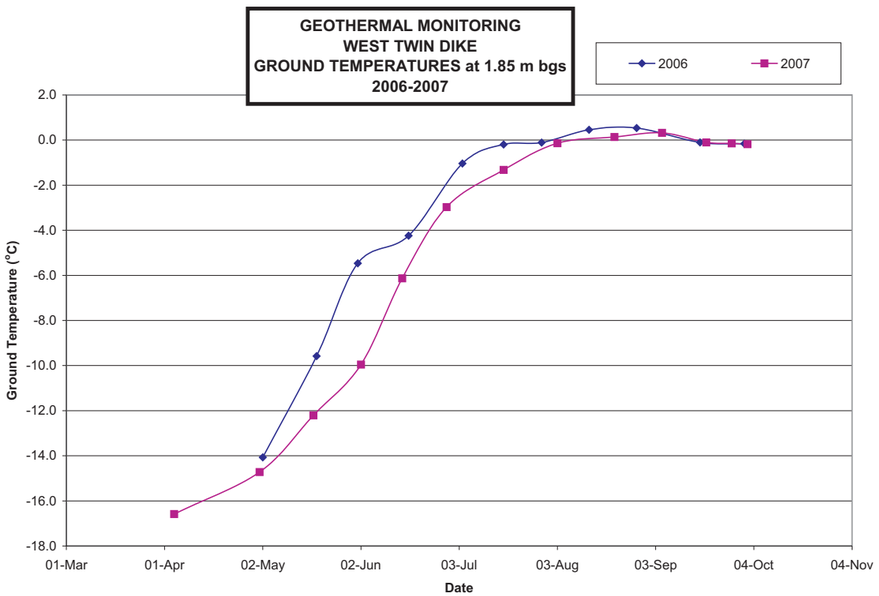
TITLE
WEST TWIN DIKE
GEOTECHNICAL MONITORING DATA 1

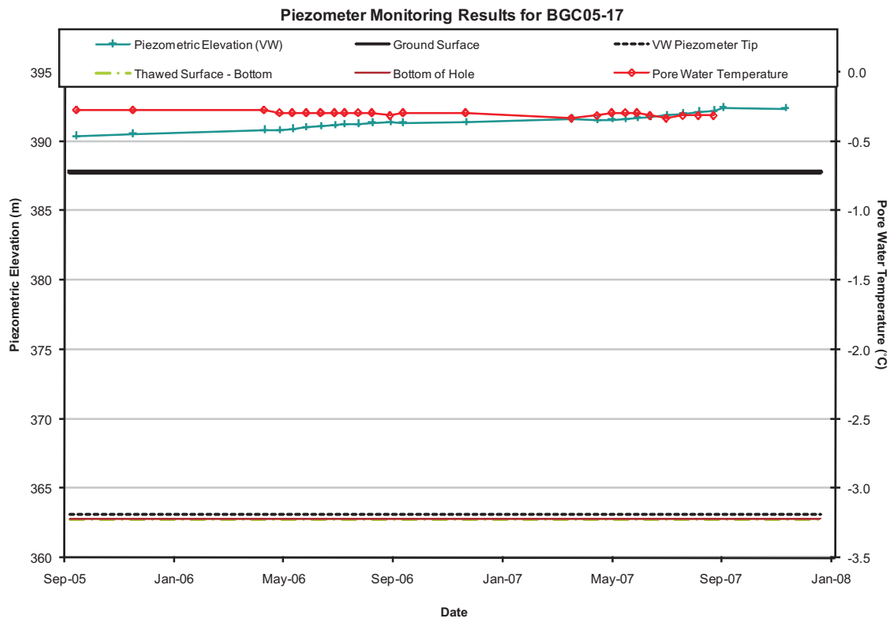
PROJECT No.	FIGURE No.	REV.
0255-016-03	12	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185









CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

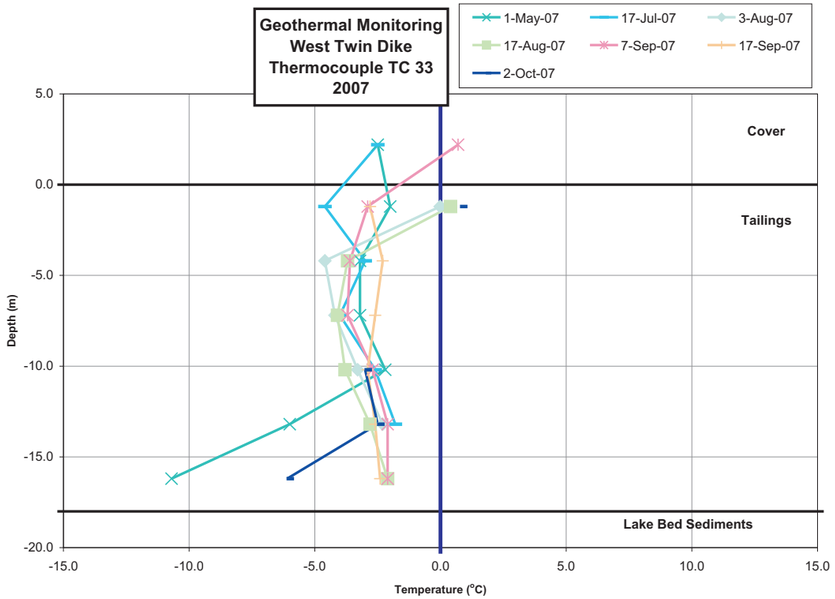
SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

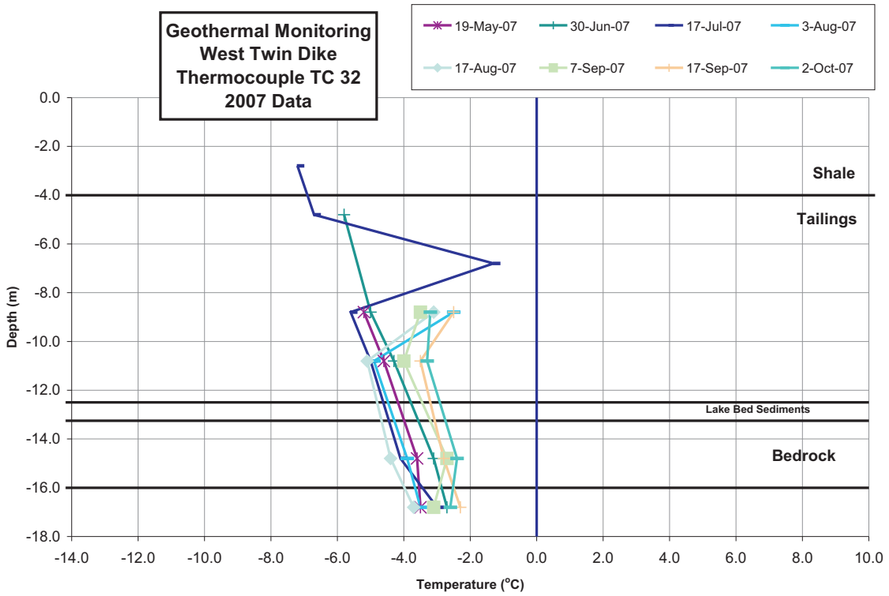
PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

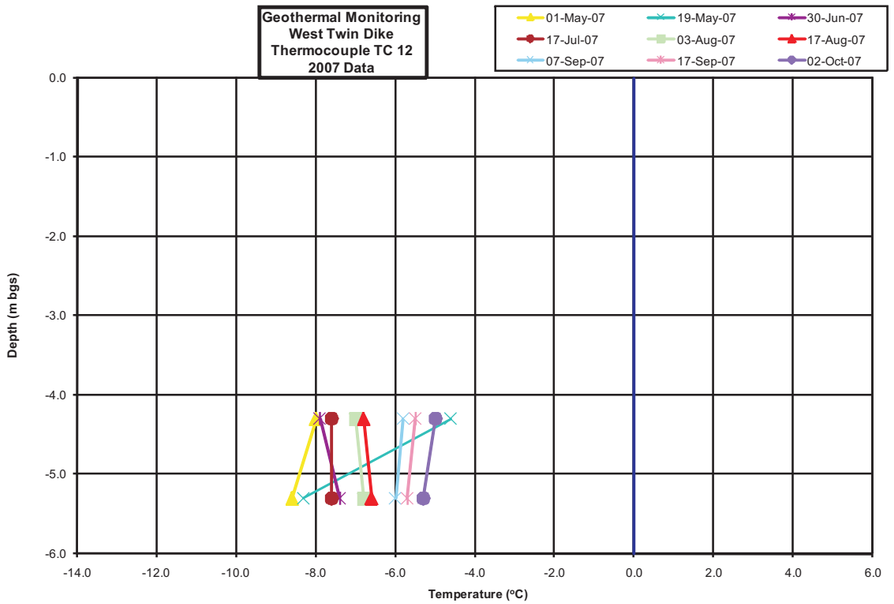
TITLE
WEST TWIN DIKE
GEOTECHNICAL MONITORING DATA 2

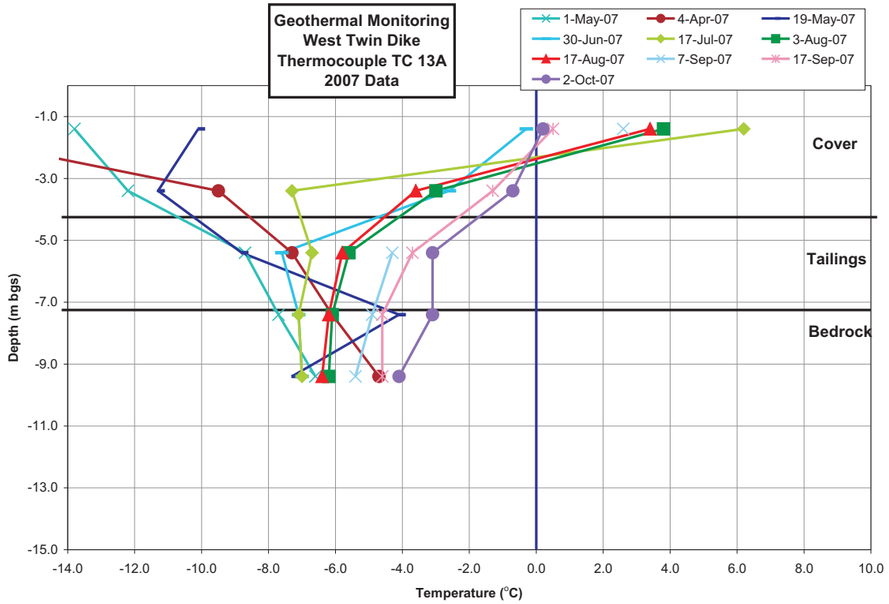
PROJECT No.	FIGURE No.	REV.
0255-016-03	13	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185









CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

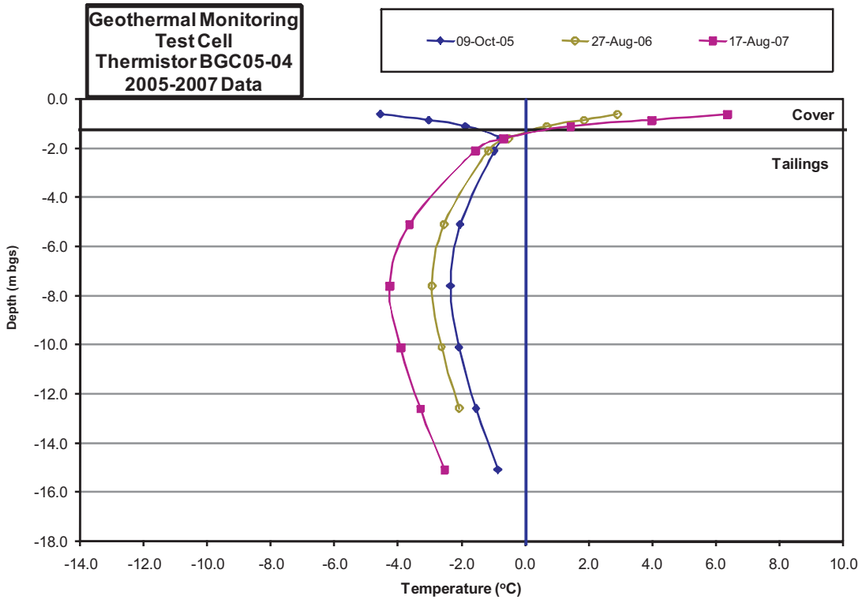
SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

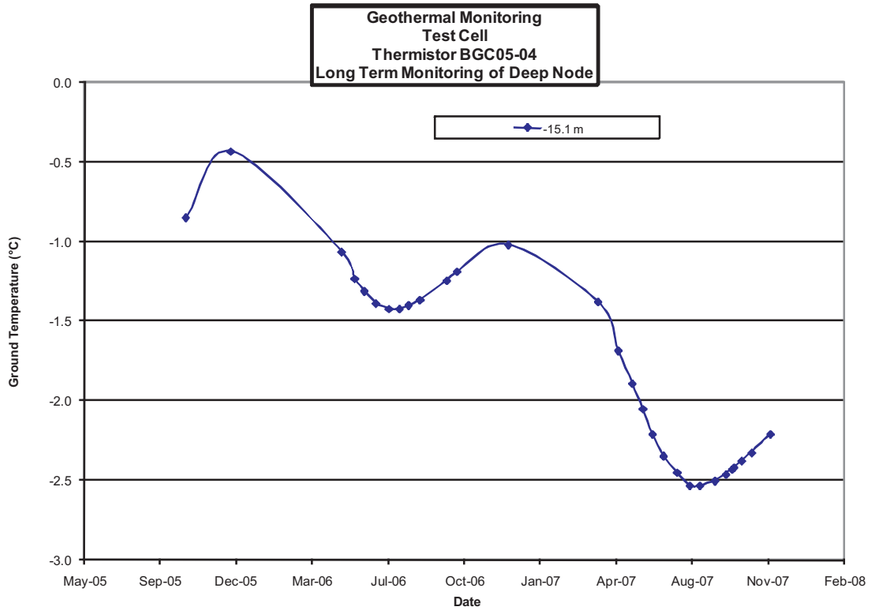
PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

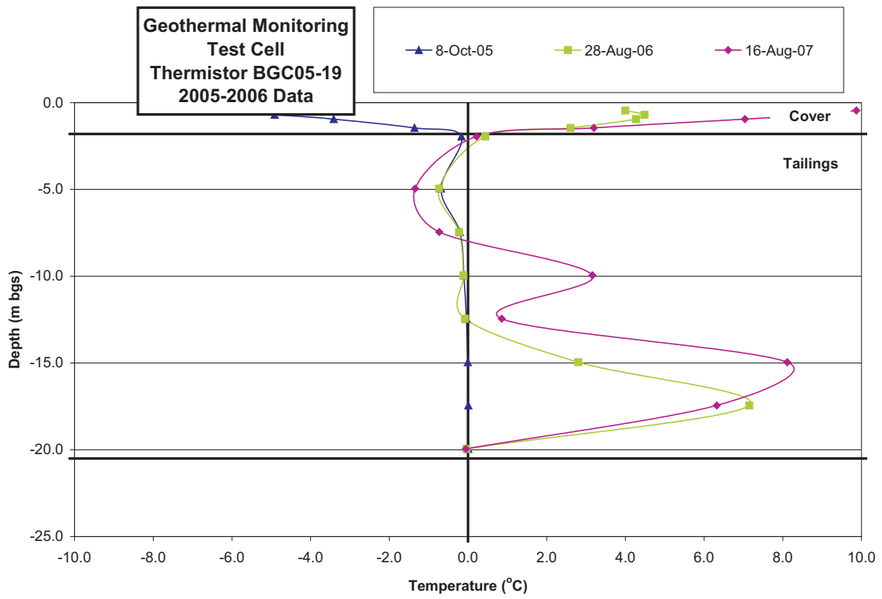
TITLE
WEST TWIN DIKE
GEOTECHNICAL MONITORING DATA 3

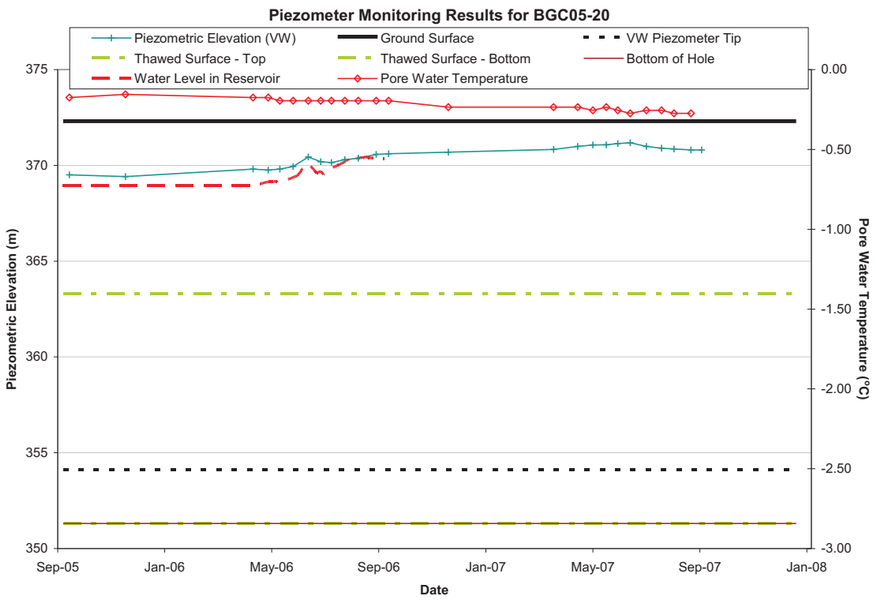
PROJECT No.	FIGURE No.	REV.
0255-016-03	14	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185









CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
.	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

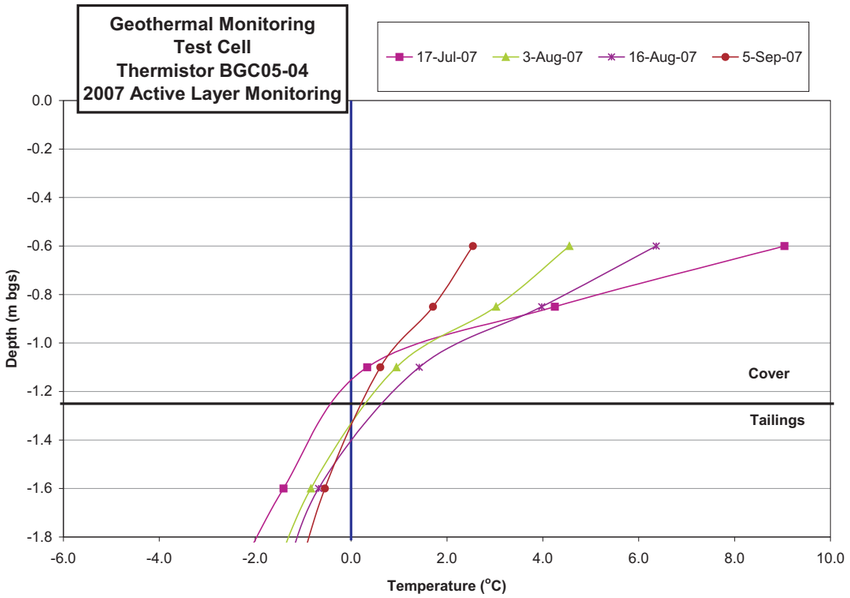
SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

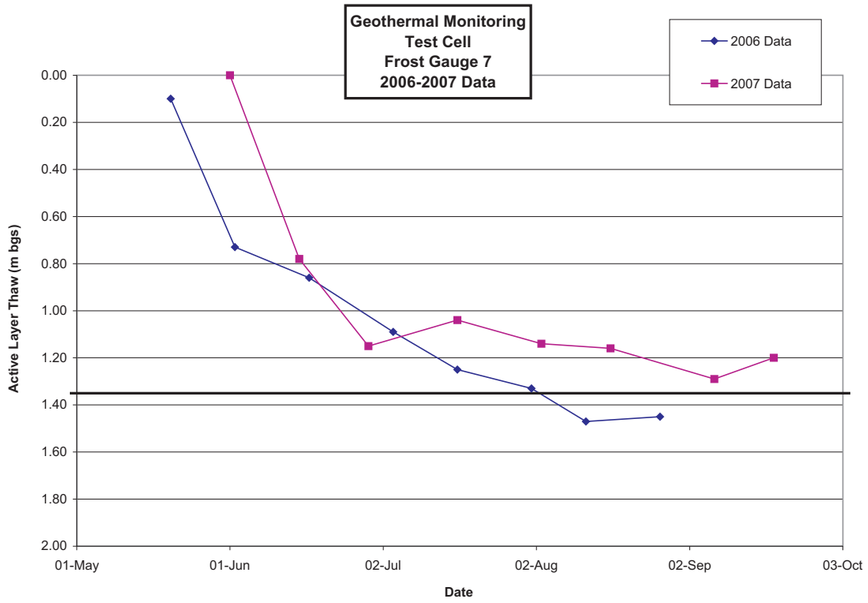
PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

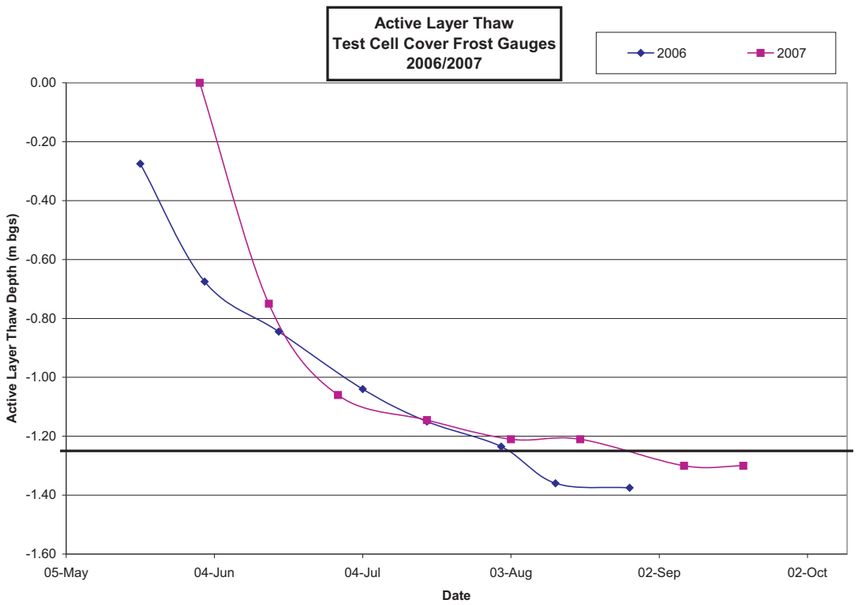
TITLE
TEST CELL TAILINGS COVER
GEOTECHNICAL MONITORING DATA 1

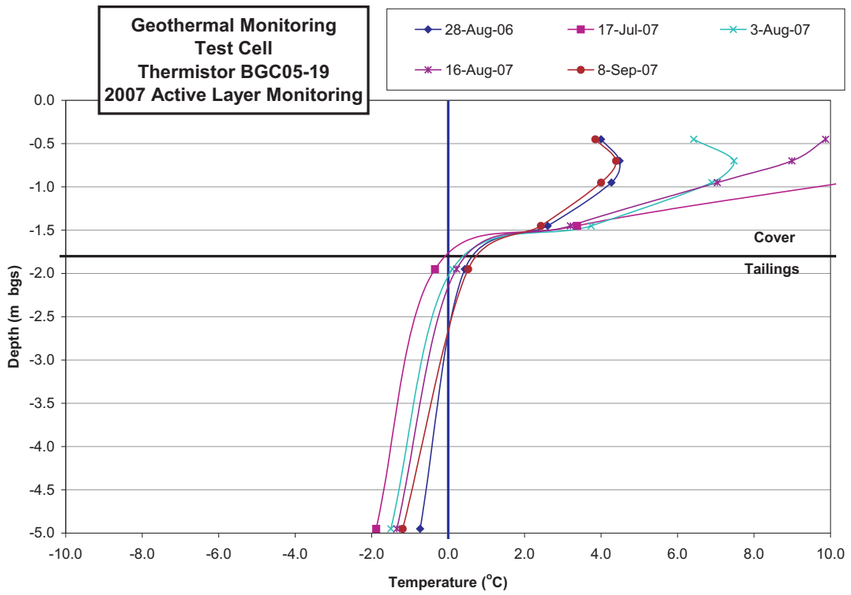
PROJECT No.	FIGURE No.	REV.
0255-016-03	15	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185









CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

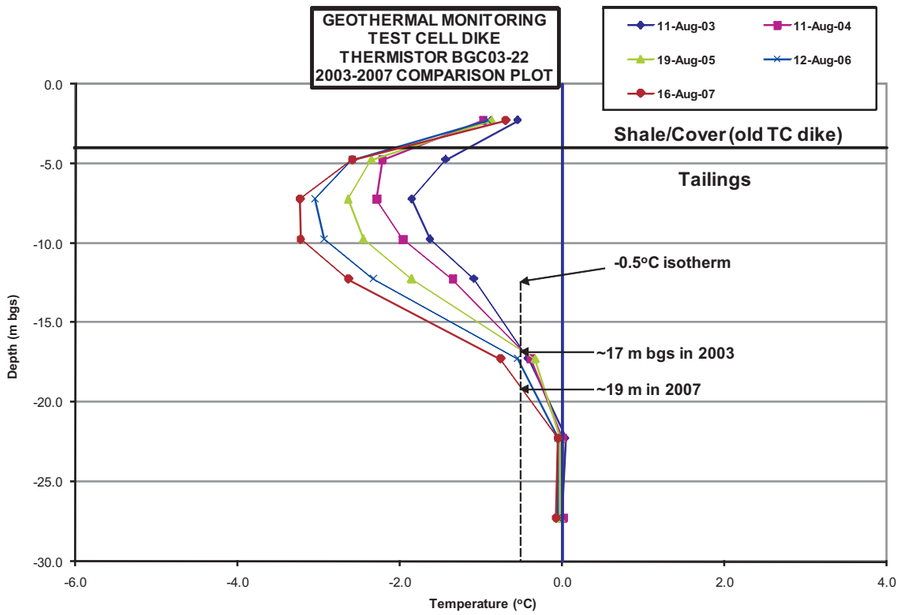
SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

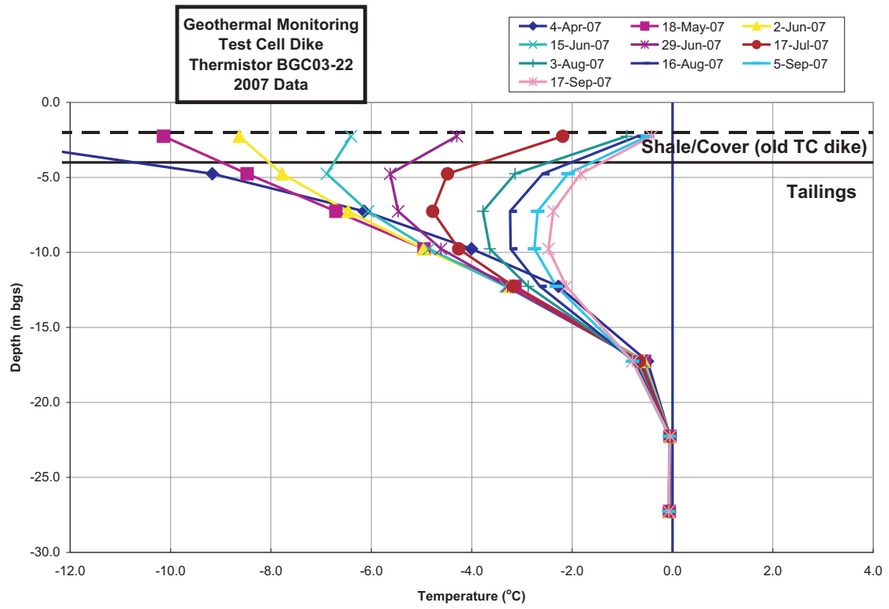
PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

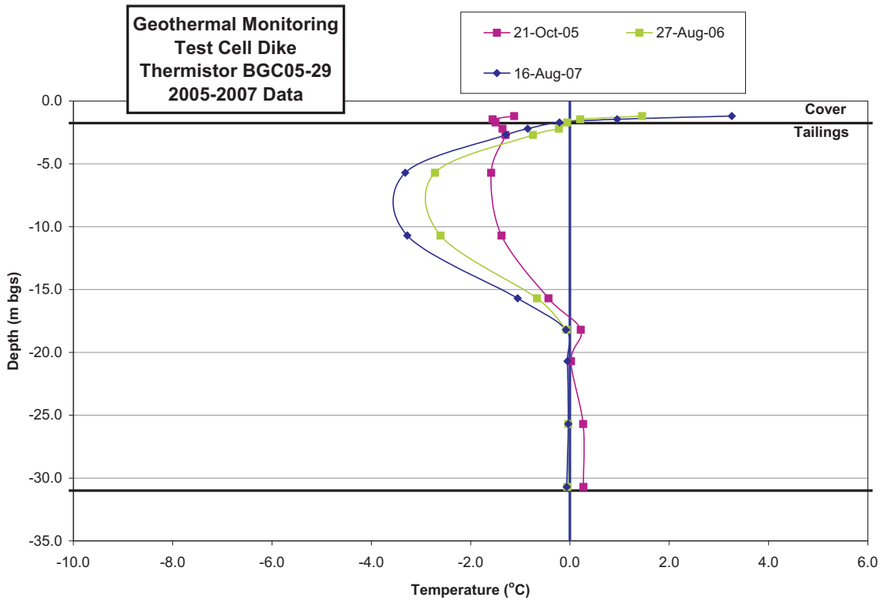
TITLE
TEST CELL TAILINGS COVER
GEOTECHNICAL MONITORING DATA 2

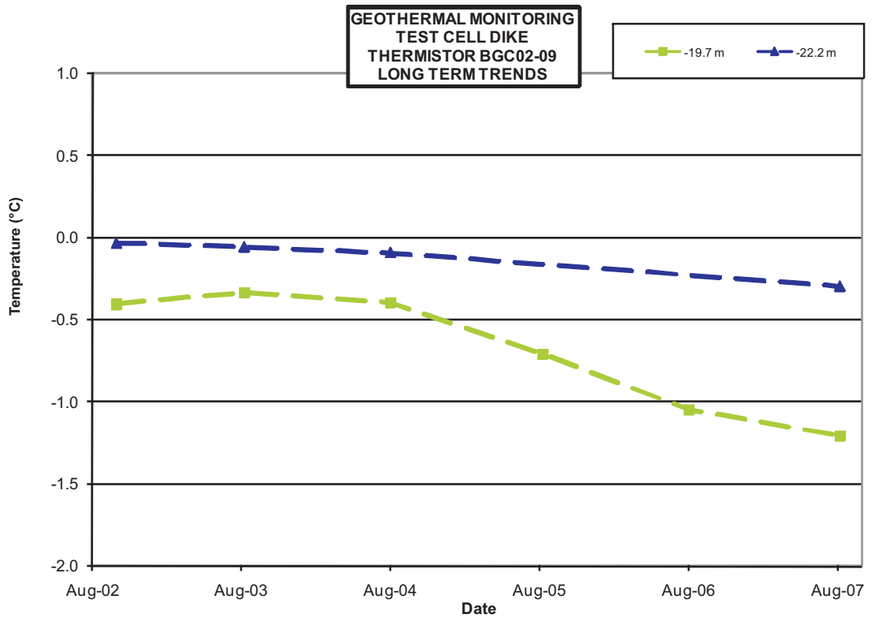
PROJECT No.	FIGURE No.	REV.
0255-016-03	16	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185









CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

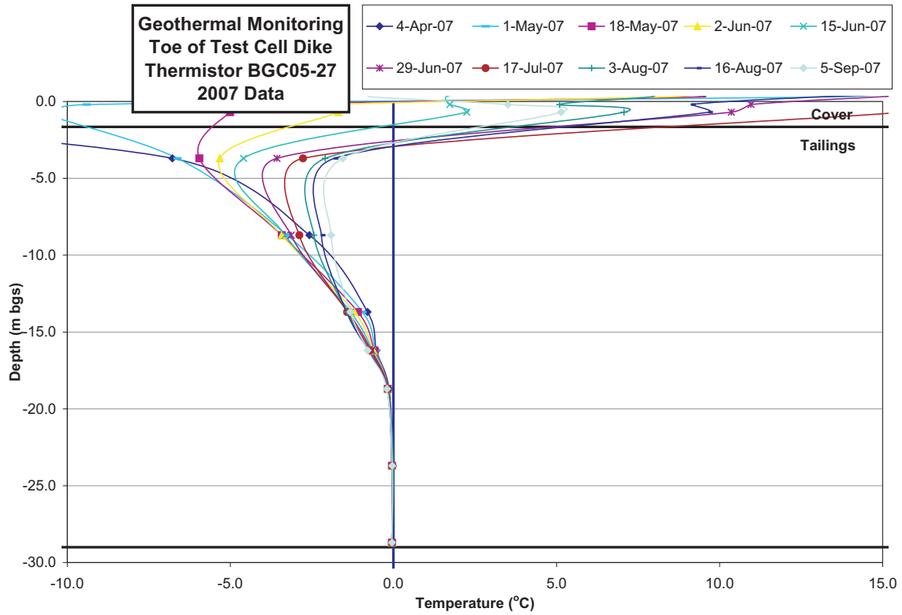
SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

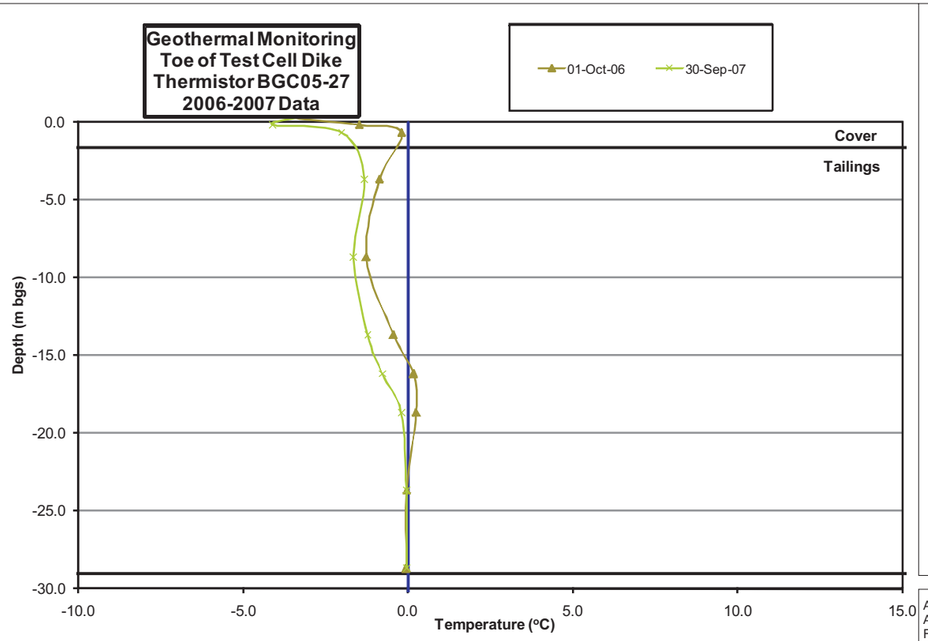
PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
TEST CELL DIKE
GEOTECHNICAL MONITORING DATA

PROJECT No.	FIGURE No.	REV.
0255-016-03	17	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

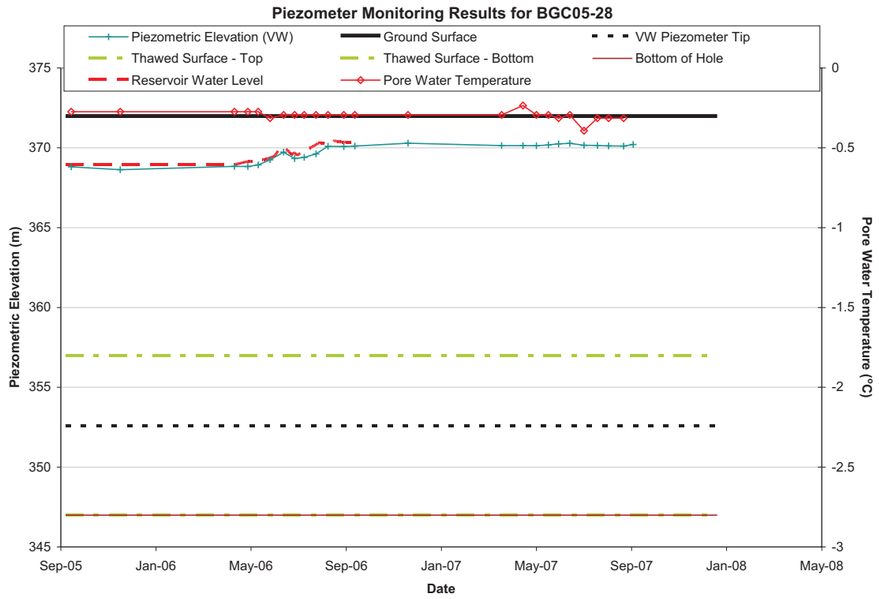


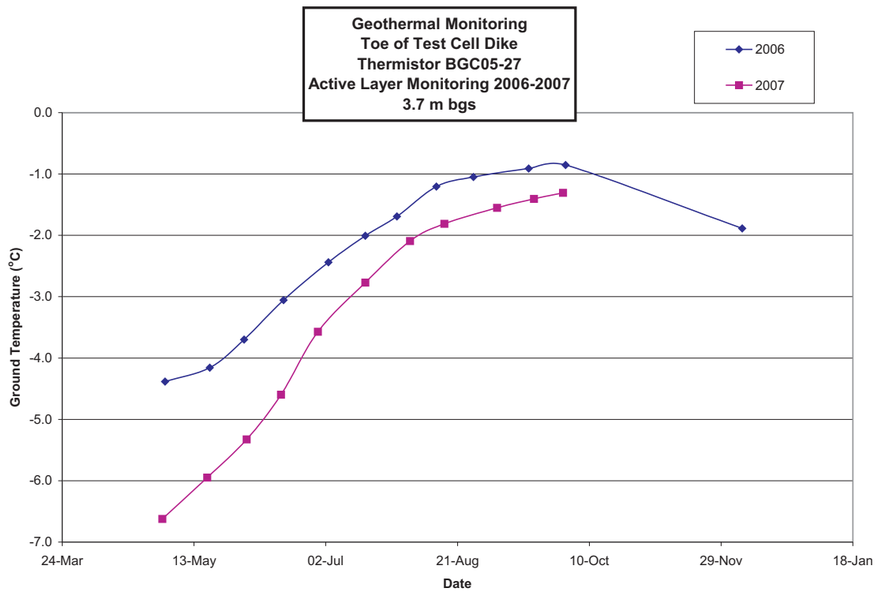


CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
.	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-





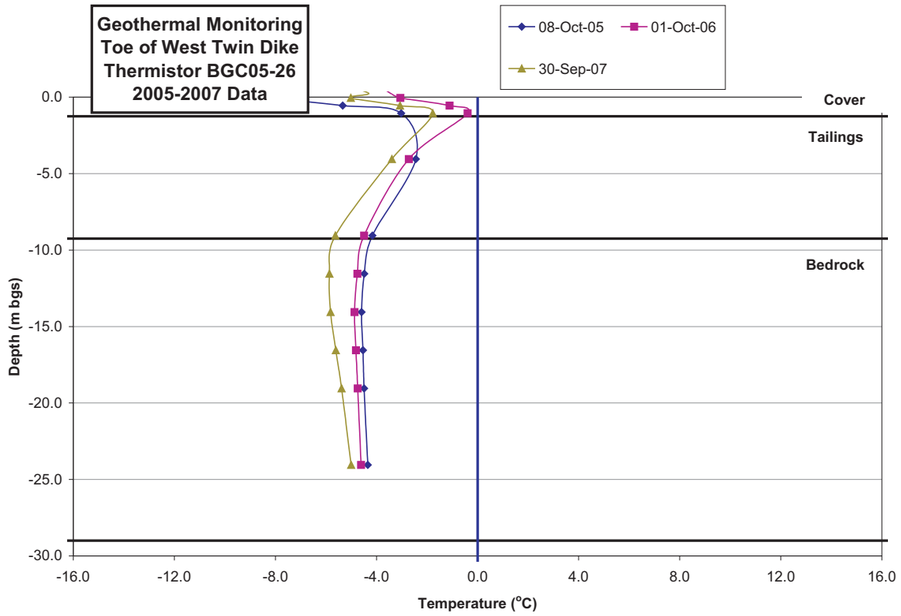
SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

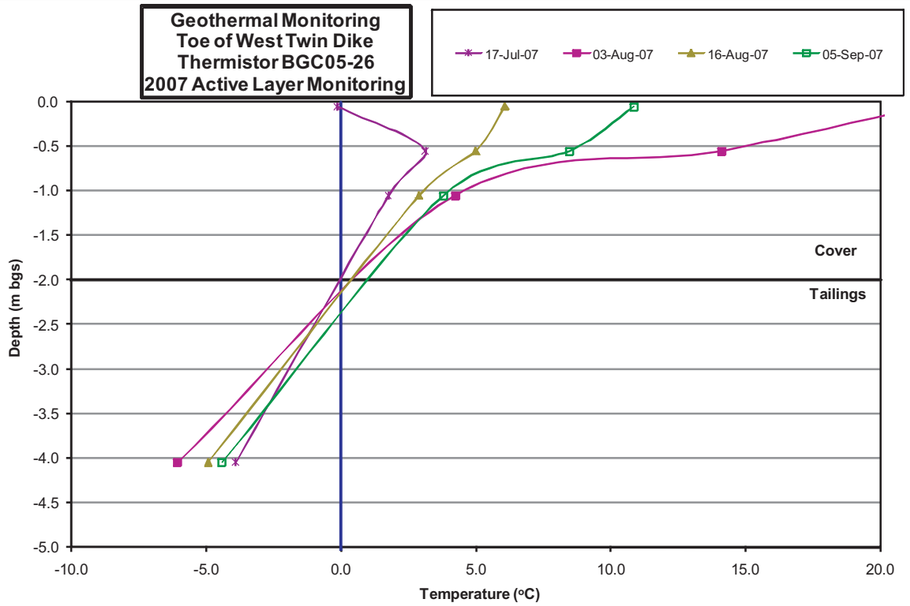
PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

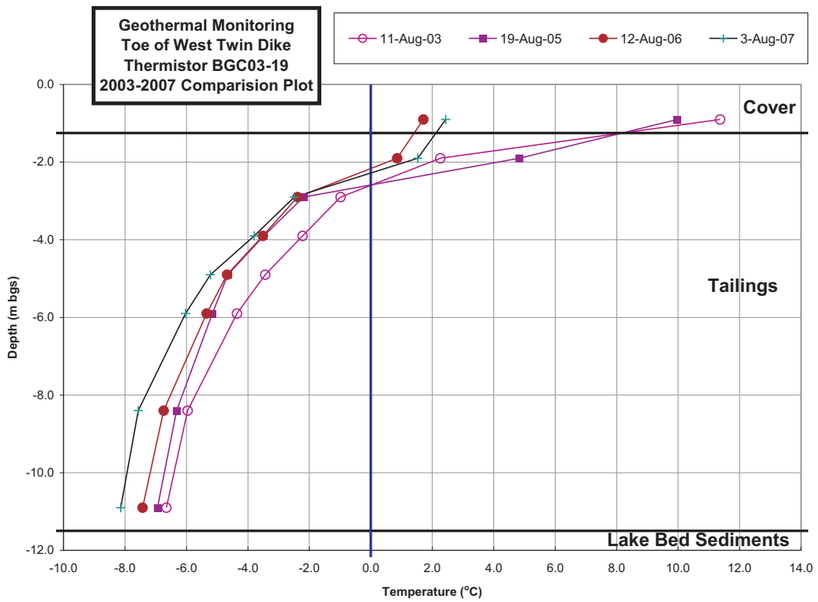
TITLE
TOE OF TEST CELL DIKE TAILINGS COVER
GEOTECHNICAL MONITORING DATA

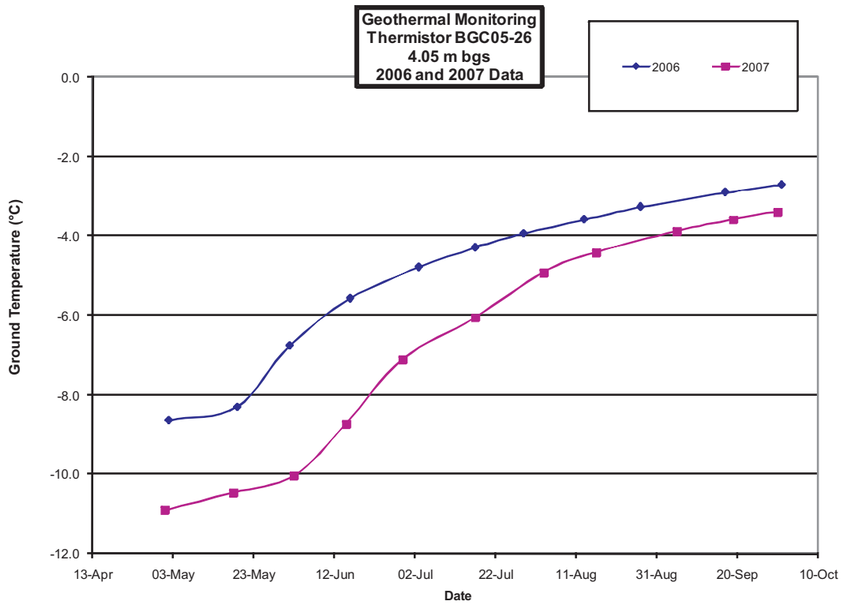
PROJECT No.	FIGURE No.	REV.
0255-016-03	18	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185









CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
.	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

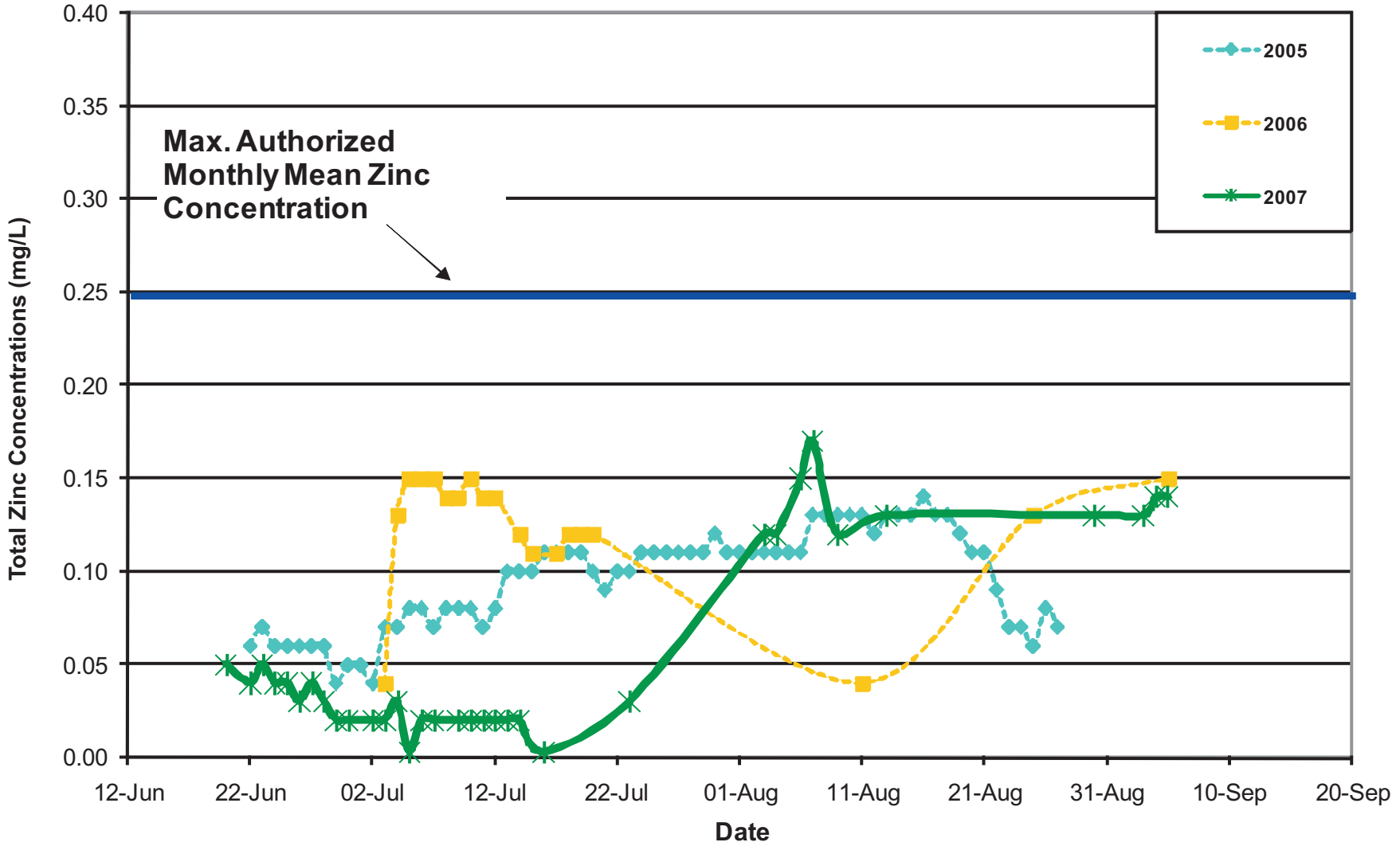
PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
TOE OF WEST TWIN DIKE TAILINGS COVER
GEOTECHNICAL MONITORING DATA

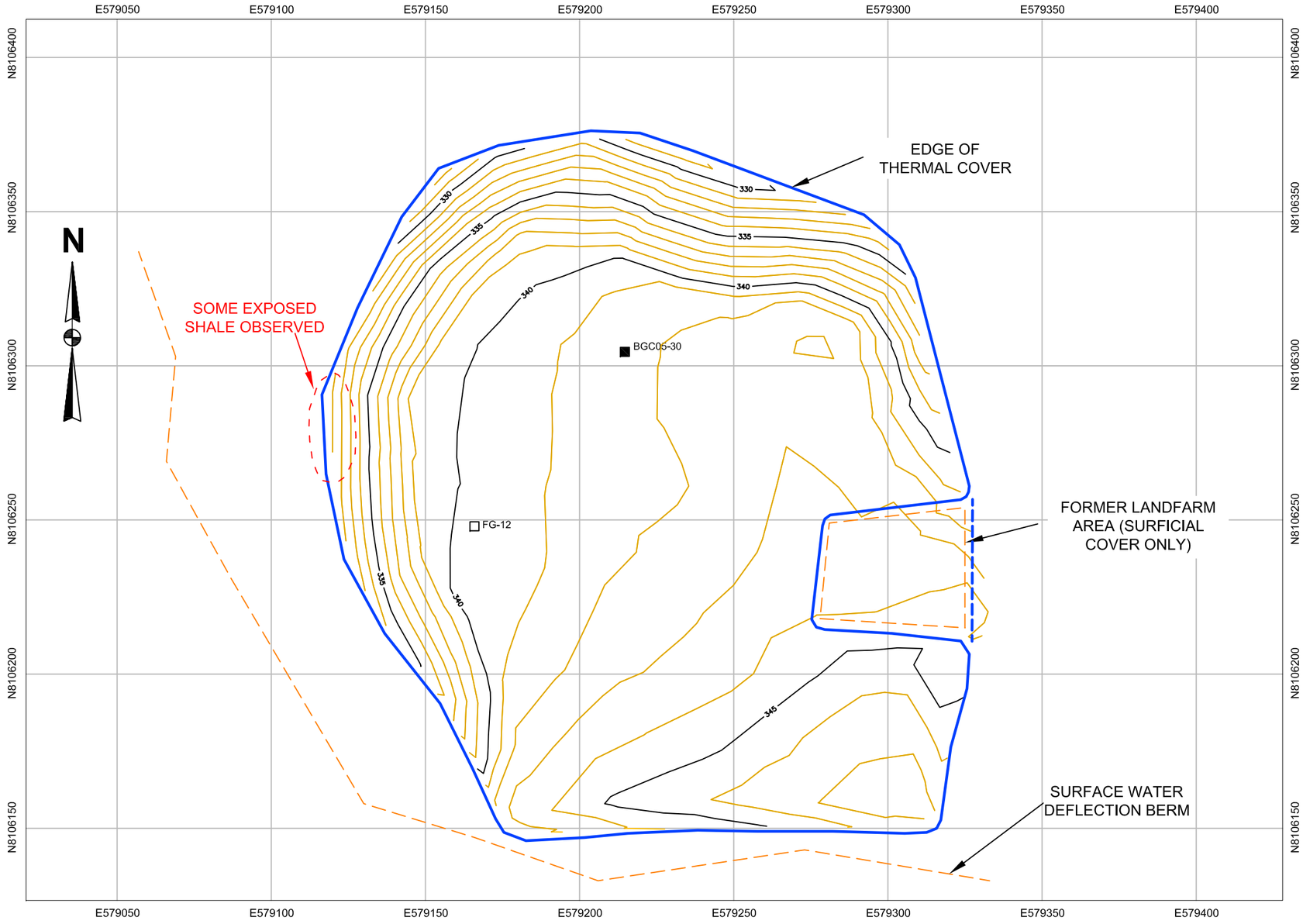
PROJECT No.	FIGURE No.	REV.
0255-016-03	19	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

Station 159-4 - West Twin Outlet Channel



DATE: MARCH 2008	DRAWN SLF	BGC ENGINEERING INC. AN APPLIED EARTH SCIENCES COMPANY Calgary, Alberta Phone: (403) 250-5185	PROJECT NANISIVIK MINE 2007 ANNUAL GEOTECHNICAL INSPECTION	
REFERENCED DRAWING DESCRIPTION			TITLE WEST TWIN DISPOSAL AREA WATER QUALITY DATA	
CLIENT BREAKWATER RESOURCES LTD			PROJECT No. 0255-016-03	FIGURE No. 20 / REV. 0



NOTES:

1. GRID BASED ON UTM NAD 83, ZONE 16 COORDINATES.
2. ELEVATIONS ARE IN METRES.
3. CONTOUR INTERVAL IS = 1.0 m.
4. SCALE IS APPROXIMATE.

LEGEND:

- THERMISTOR
- FROST GAUGE

Scale 1:1500

30 0 30 60 90

metres

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	MARCH 2008
DRAWN:	JL
DESIGNED:	KFM
CHECKED:	GKC
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

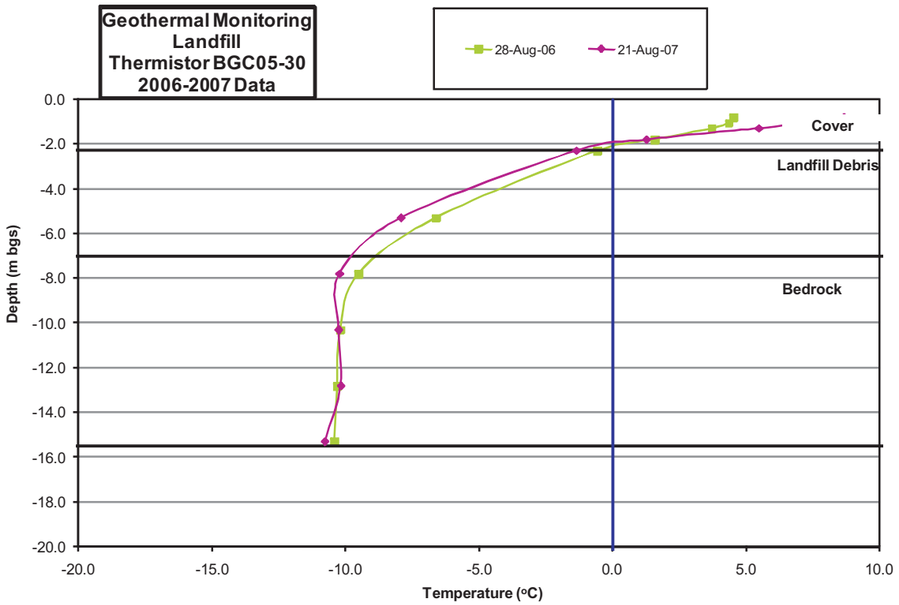
CLIENT: BREAKWATER RESOURCES LTD

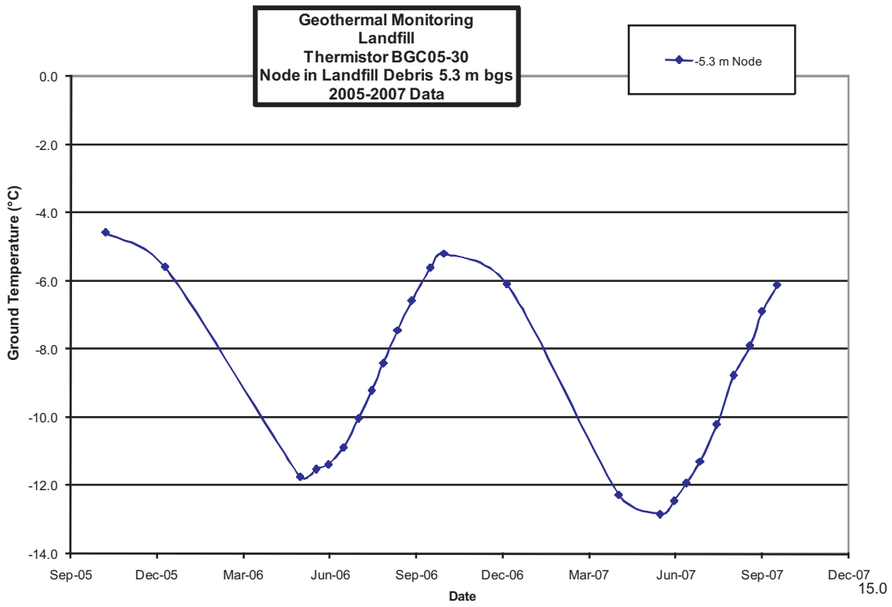
PROJECT: NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

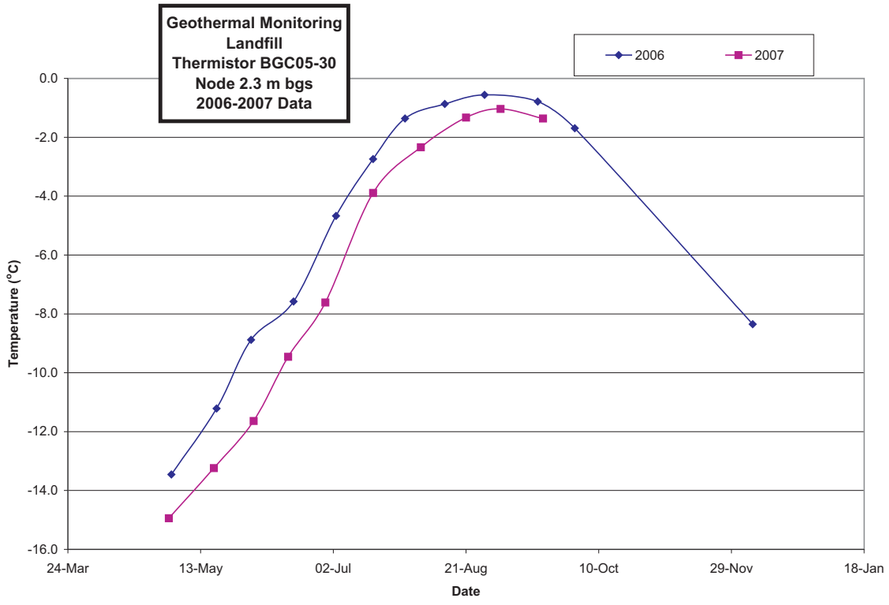
TITLE: LANDFILL COVER

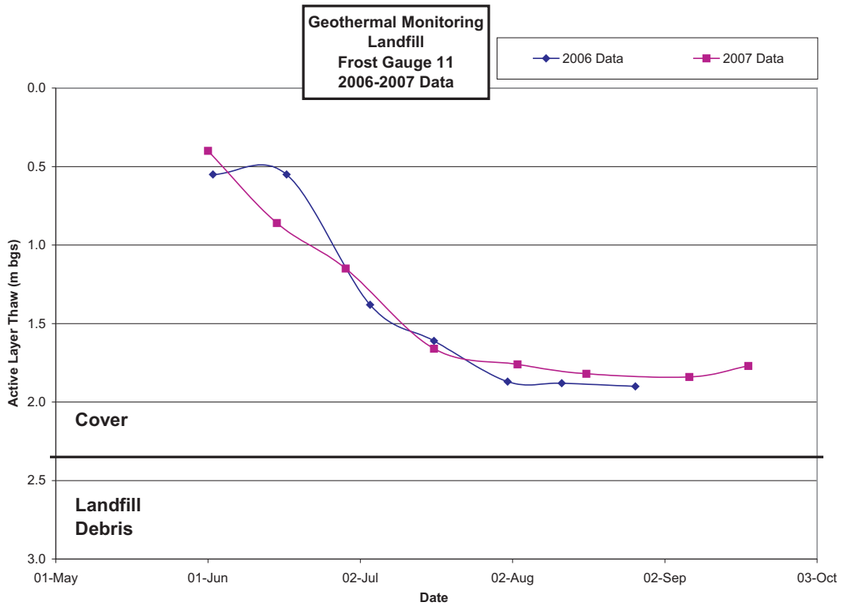
PROJECT No.:	FIGURE No.	REV.:
0255-016-03	21	

K:\Projects\0255 CanZinco\016 2007 Work\03 Annual Inspection\Graphics\Drawings\0255-016-03 Figures 21,23,25.dwg Layout: Figure 21 Plot Date: Feb 29 08 Time: 11:05 AM









CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

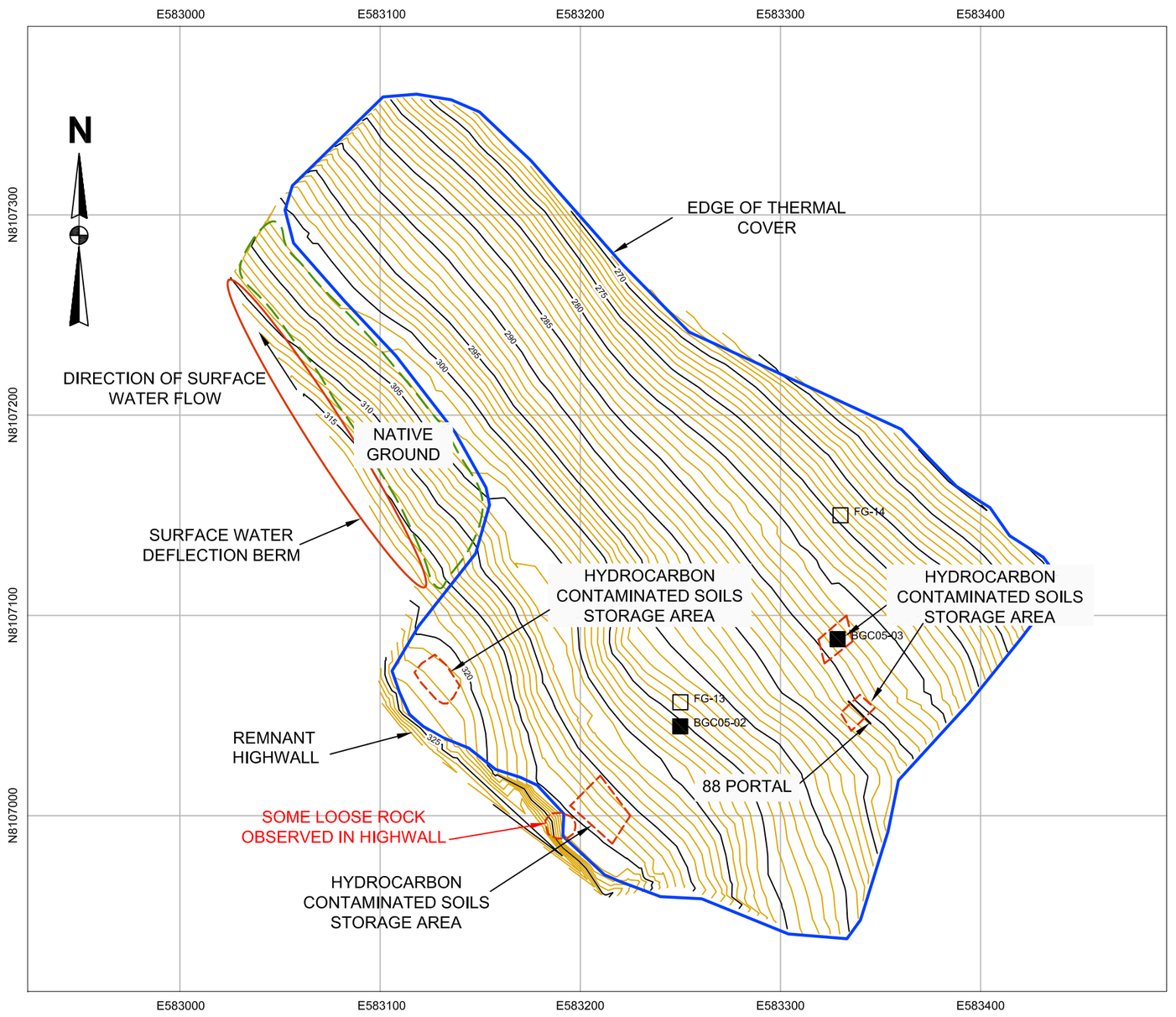
SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
LANDFILL COVER
GEOTECHNICAL MONITORING DATA

PROJECT No.	FIGURE No.	REV.
0255-016-03	22	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185



NOTES:

1. GRID BASED ON UTM NAD 83, ZONE 16 COORDINATES.
2. ELEVATIONS ARE IN METRES.
3. CONTOUR INTERVAL IS = 1.0 m.
4. SCALE IS APPROXIMATE.

LEGEND:

- THERMISTOR
- FROST GAUGE

Scale 1:2500

50 0 50 100 150

metres

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	MARCH 2008
DRAWN:	JL
DESIGNED:	KFM
CHECKED:	GKC
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

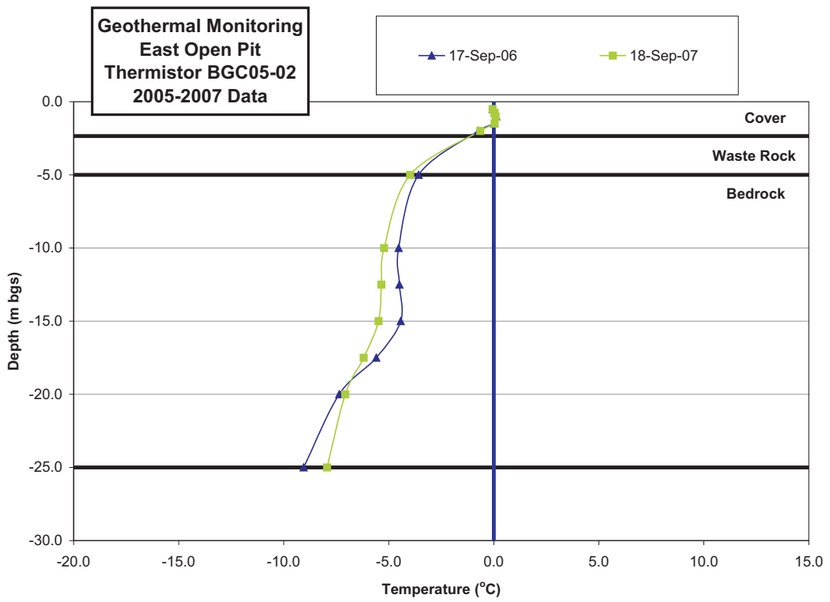
CLIENT: BREAKWATER RESOURCES LTD

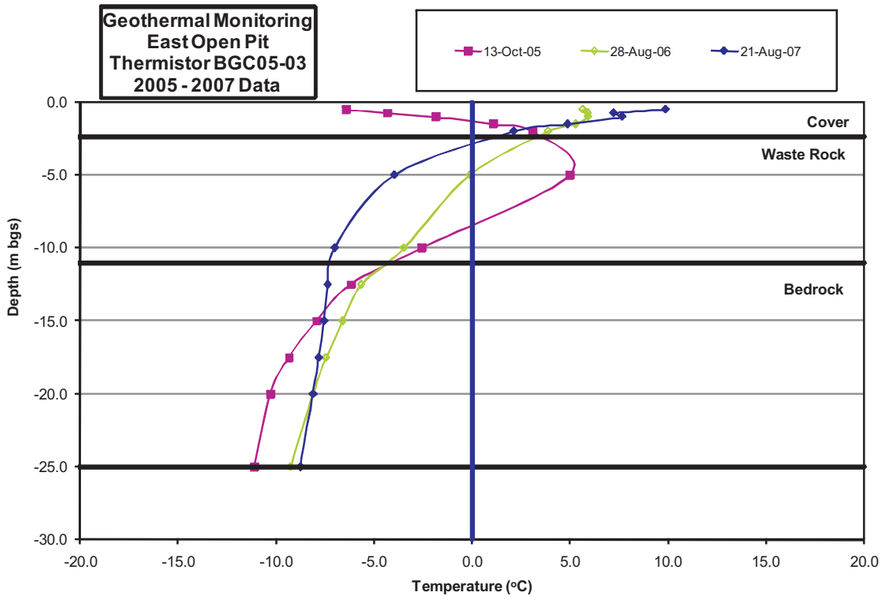
PROJECT: NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

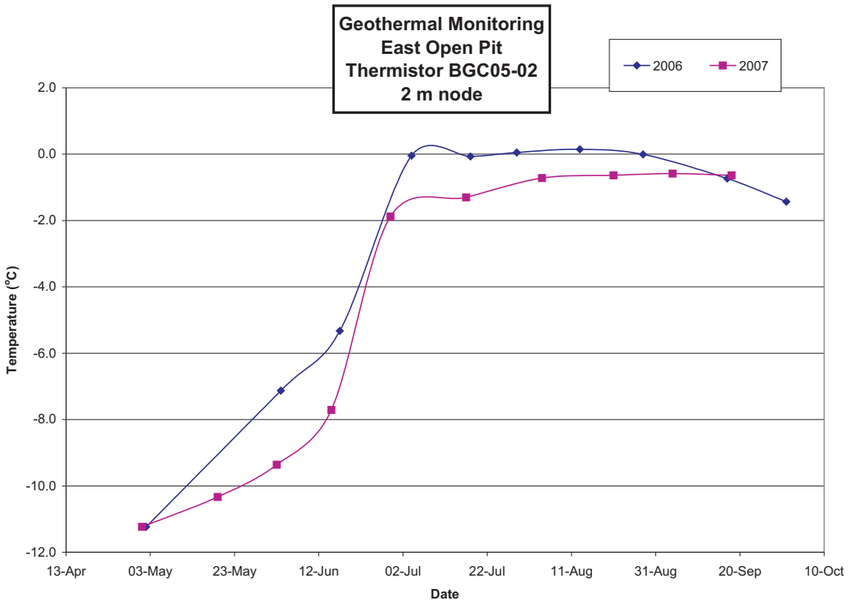
TITLE: EAST OPEN PIT WASTE ROCK COVER

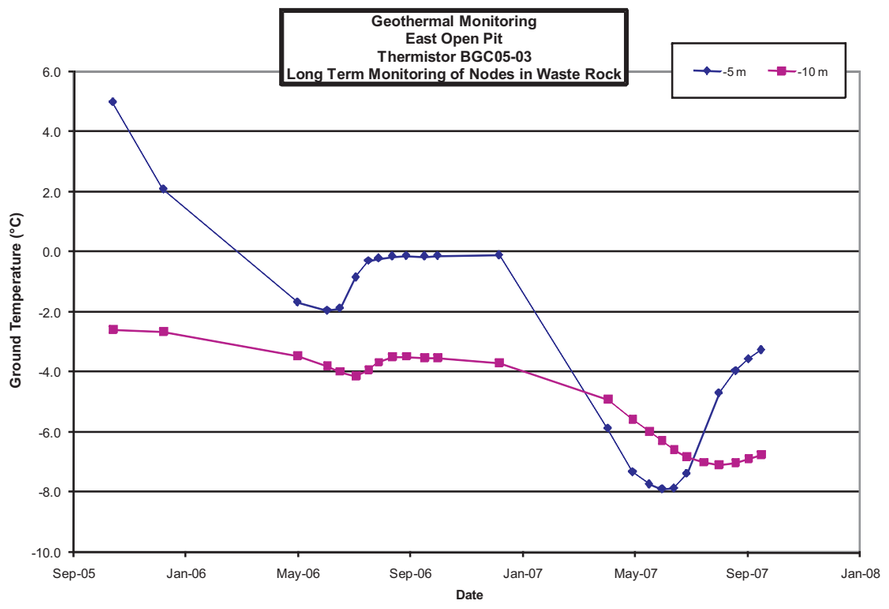
PROJECT No.:	FIGURE No.	REV.:
0255-016-03	23	

K:\Projects\0255 Can\Znco\016 2007 Work\03 Annual Inspection\Graphics\Drawings\0255-016-03 Figures 21,23,25.dwg Layout: Figure 23 Plot Date Apr 2 08 Time: 9:14 AM









CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
.	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

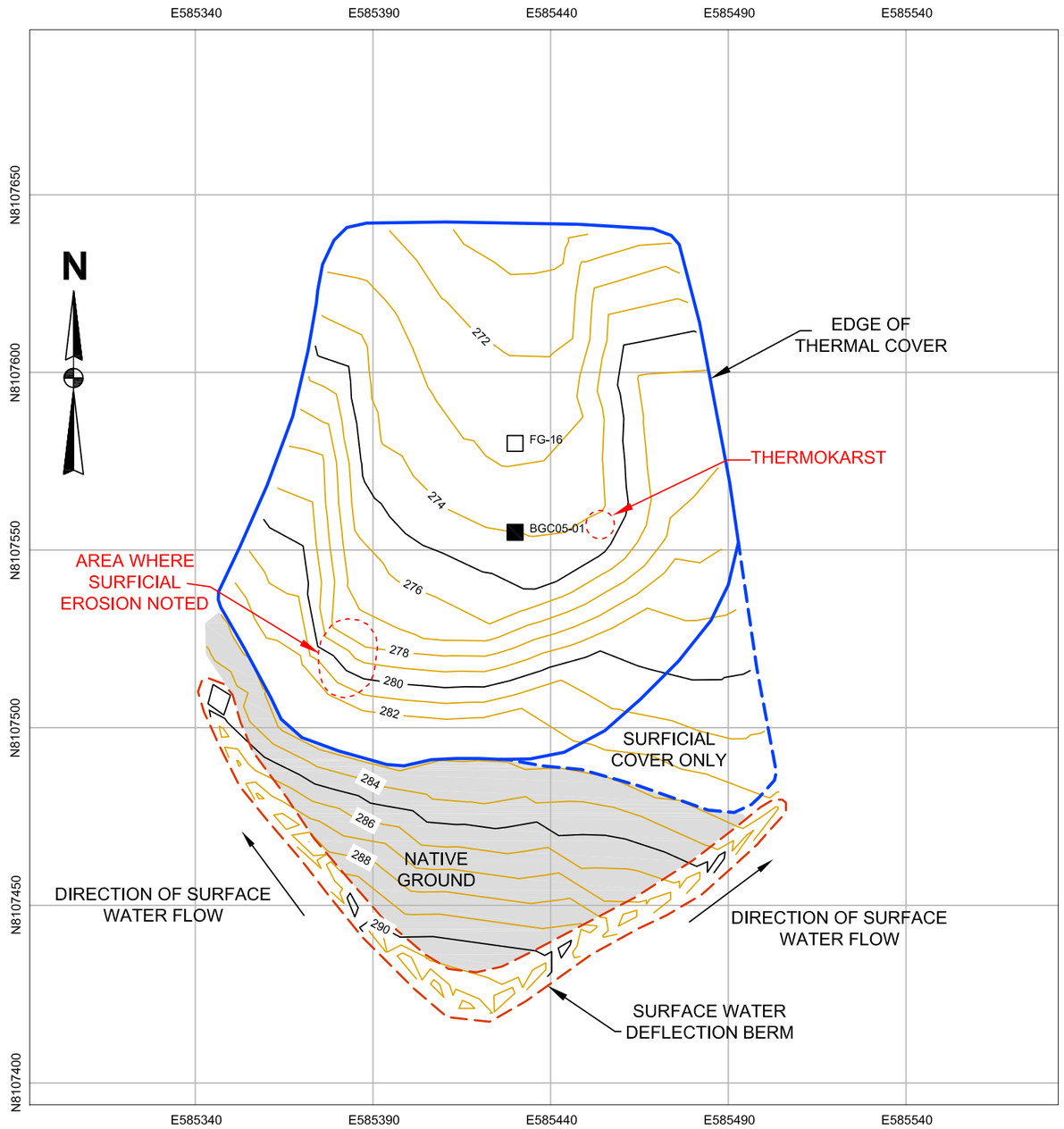
TITLE
EAST OPEN PIT WASTE ROCK COVER
GEOTECHNICAL MONITORING DATA

PROJECT No.	FIGURE No.	REV.
0255-016-03	24	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

LEGEND:

- THERMISTOR
- FROST GAUGE



NOTES:

1. GRID BASED ON UTM NAD 83, ZONE 16 COORDINATES.
2. ELEVATIONS ARE IN METRES.
3. CONTOUR INTERVAL IS = 1.0 m.
4. SCALE IS APPROXIMATE.

Scale 1:1500

30 0 30 60 90

metres

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	MARCH 2008
DRAWN:	JL
DESIGNED:	KFM
CHECKED:	GKC
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

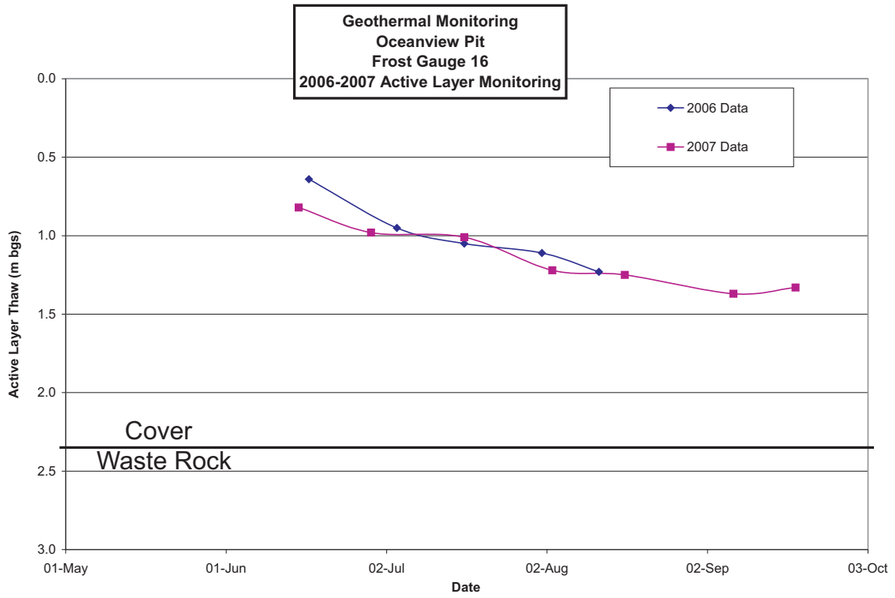
CLIENT: BREAKWATER RESOURCES LTD

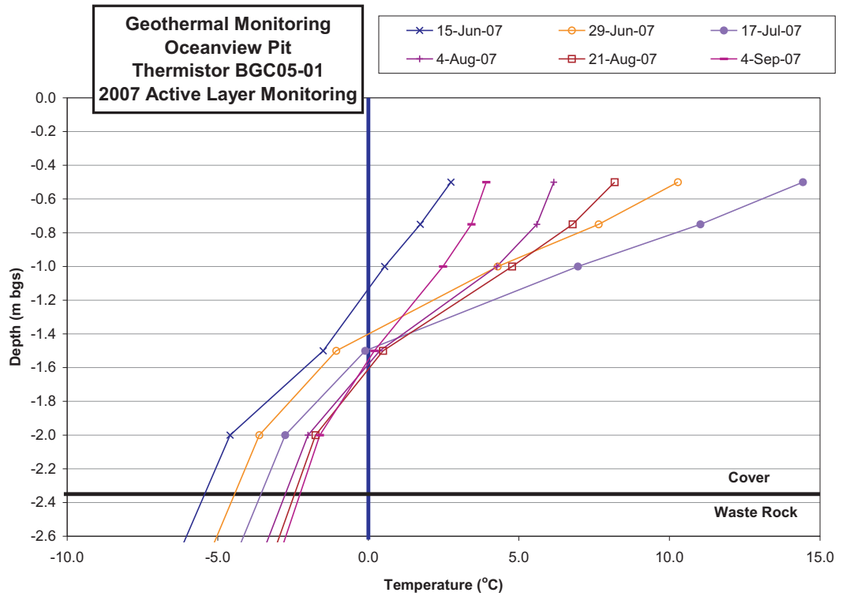
PROJECT: NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

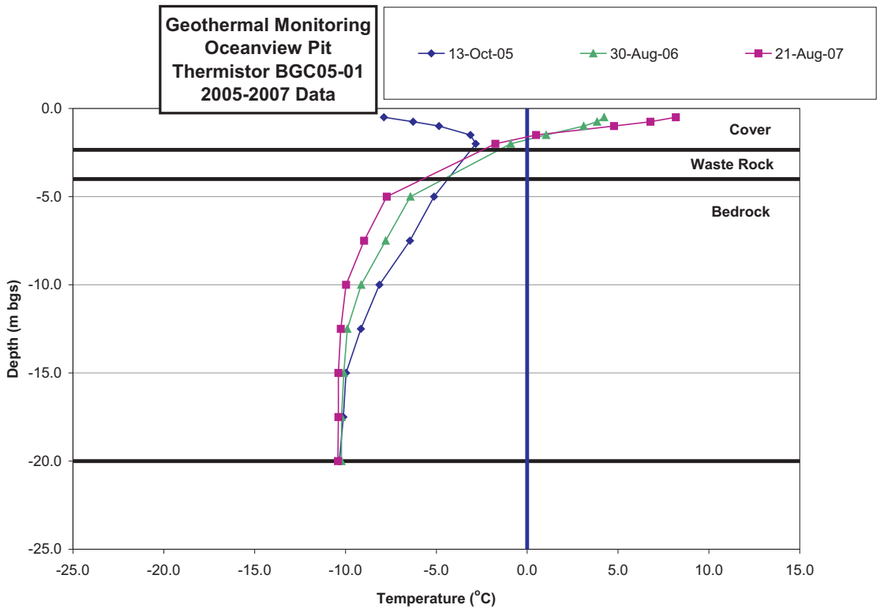
TITLE: OCEANVIEW OPEN PIT WASTE ROCK COVER

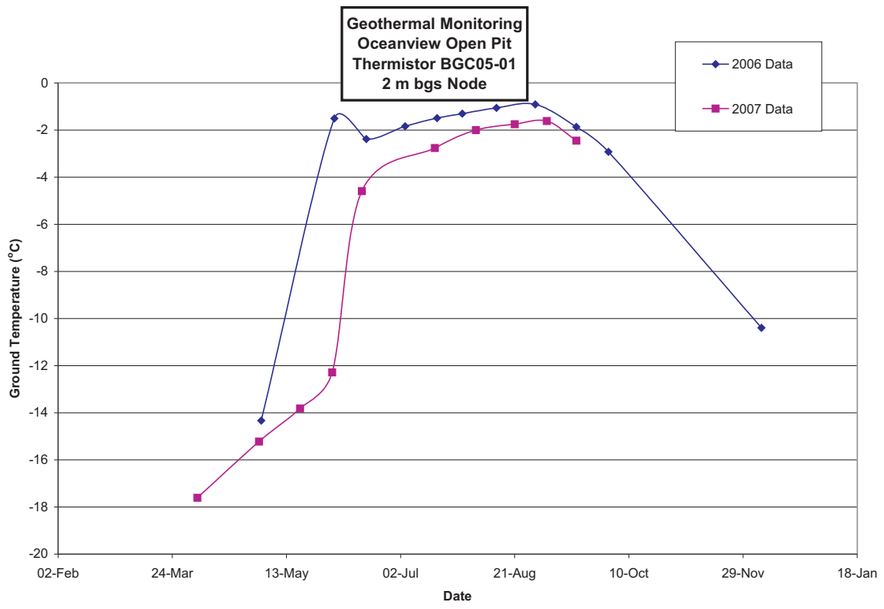
PROJECT No.:	FIGURE No.	REV.:
0255-016-03	25	

K:\Projects\0255 CanZinco\016 2007 Work\03 Annual Inspection\Graphics\Drawings\0255-016-03 Figures 21,23,25.dwg Layout: Figure 25 Plot Date: Feb 29 08 Time: 1:41 PM









CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
.	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

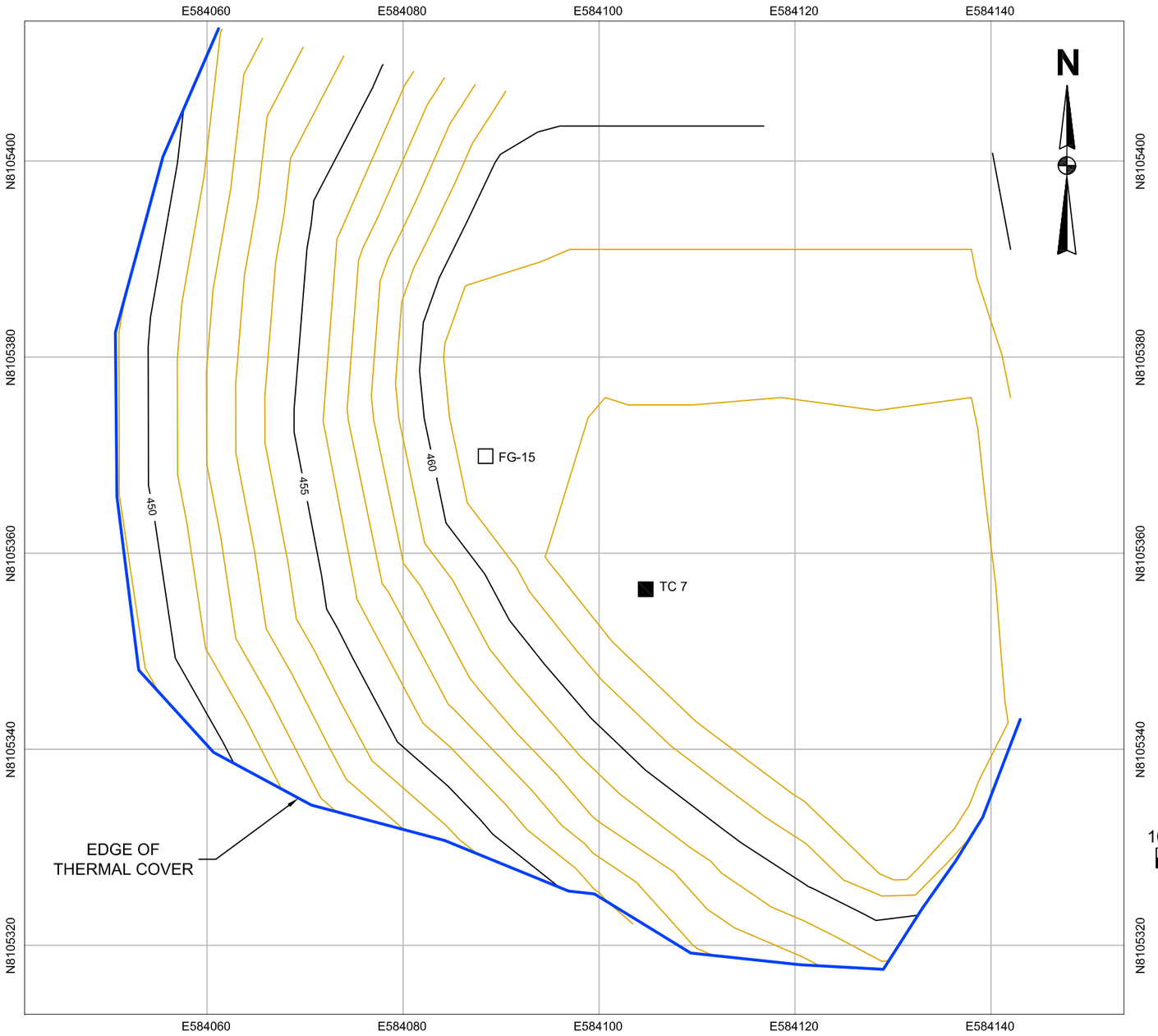
TITLE
OCEANVIEW OPEN PIT WASTE ROCK COVER GEOTECHNICAL MONITORING DATA

PROJECT No.	FIGURE No.	REV.
0255-016-03	26	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

LEGEND:

- ■ THERMOCOUPLE
- □ FROST GAUGE



NOTES:

1. GRID BASED ON UTM NAD 83, ZONE 16 COORDINATES.
2. ELEVATIONS ARE IN METRES.
3. CONTOUR INTERVAL IS = 1.0 m.
4. SCALE IS APPROXIMATE.

Scale 1:500

10 0 10 20 30

metres

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	MARCH 2008
DRAWN:	JL
DESIGNED:	KFM
CHECKED:	GKC
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

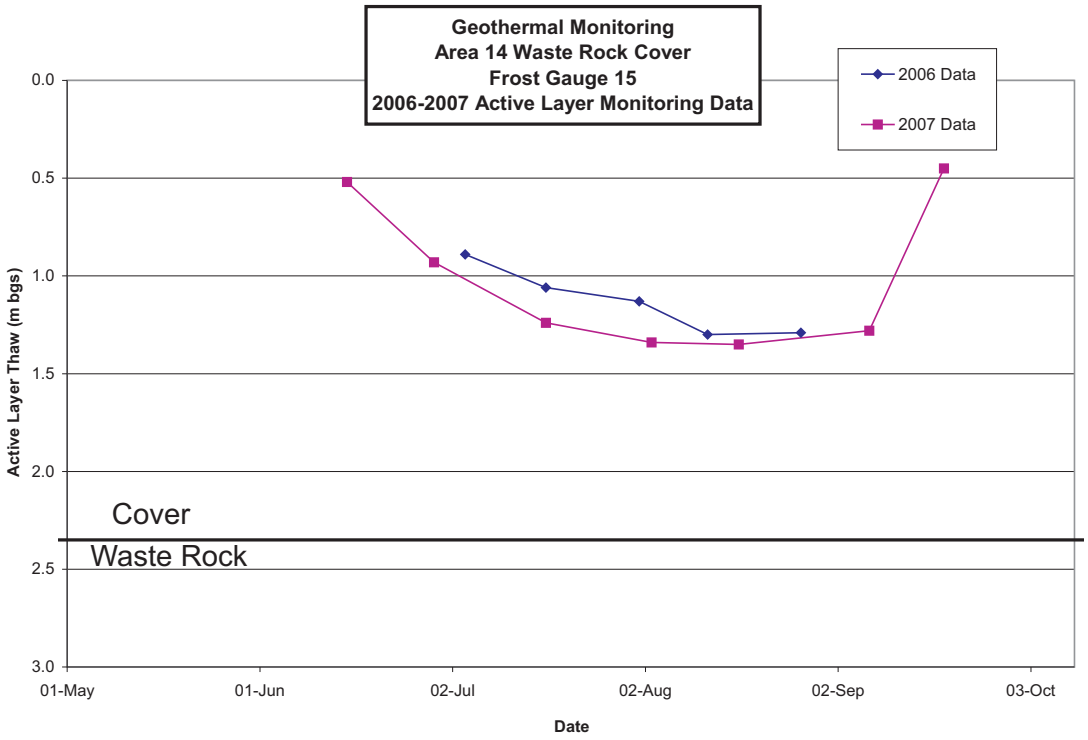
CLIENT: BREAKWATER RESOURCES LTD

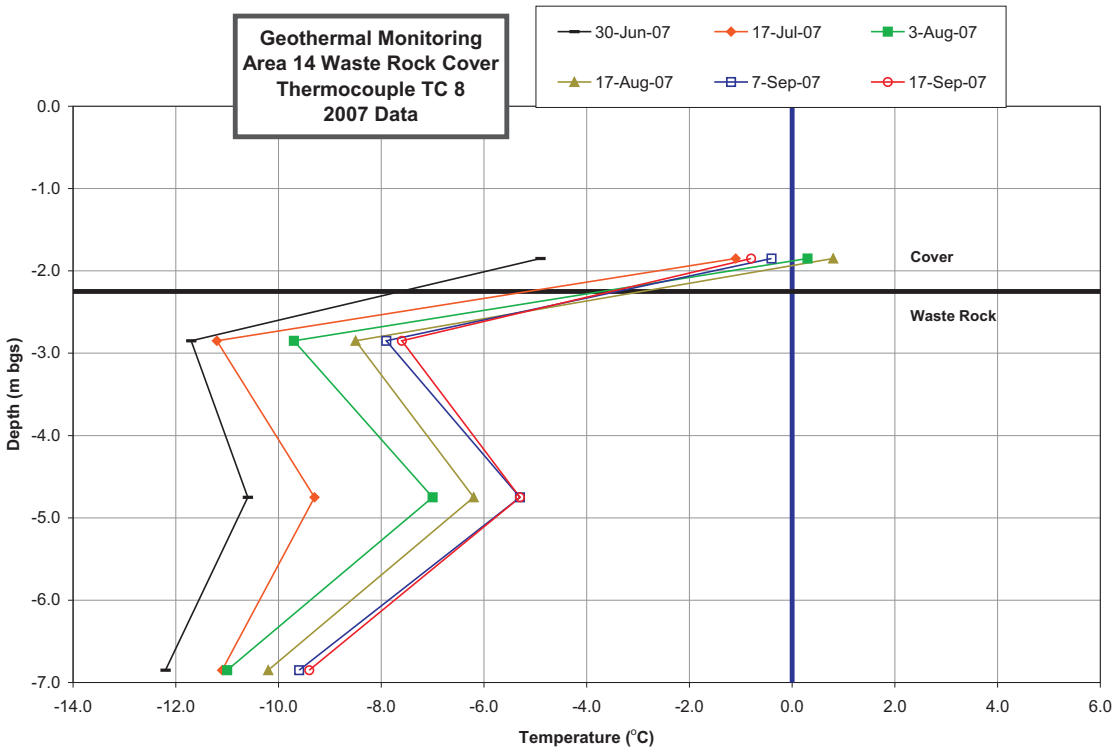
PROJECT: NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE: AREA 14 WASTE ROCK COVER

PROJECT No.:	FIGURE No.	REV.:
0255-016-03	27	

K:\Projects\0255 CanZinco\016 2007 Work\03 Annual Inspection\Graphics\Drawings\0255-016-03 Figure 27.dwg Layout: Figure 27 Plot Date Feb 29 08 Time: 1:52 PM





SCALE:	N/A	DESIGNED:	GKC
DATE:	MARCH 2008	CHECKED:	GKC
DRAWN:	SLF	APPROVED:	JWC

CLIENT: BREAKWATER RESOURCES LTD

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta. Phone: (403) 250-5185

PROJECT: NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE: AREA 14 WASTE ROCK COVER GEOTECHNICAL MONITORING DATA

PROJECT No.	FIGURE No.	REV.
0255-016-03	28	0

NOTES:

1. GRID BASED ON UTM, NAD 83, ZONE 16 COORDINATES.
2. ELEVATIONS ARE IN METRES.
3. CONTOUR INTERVAL IS = 0.2 m.
4. SCALE IS APPROXIMATE.

Scale 1:400

8 0 8 16 24

metres

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	MARCH 2008
DRAWN:	JL
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

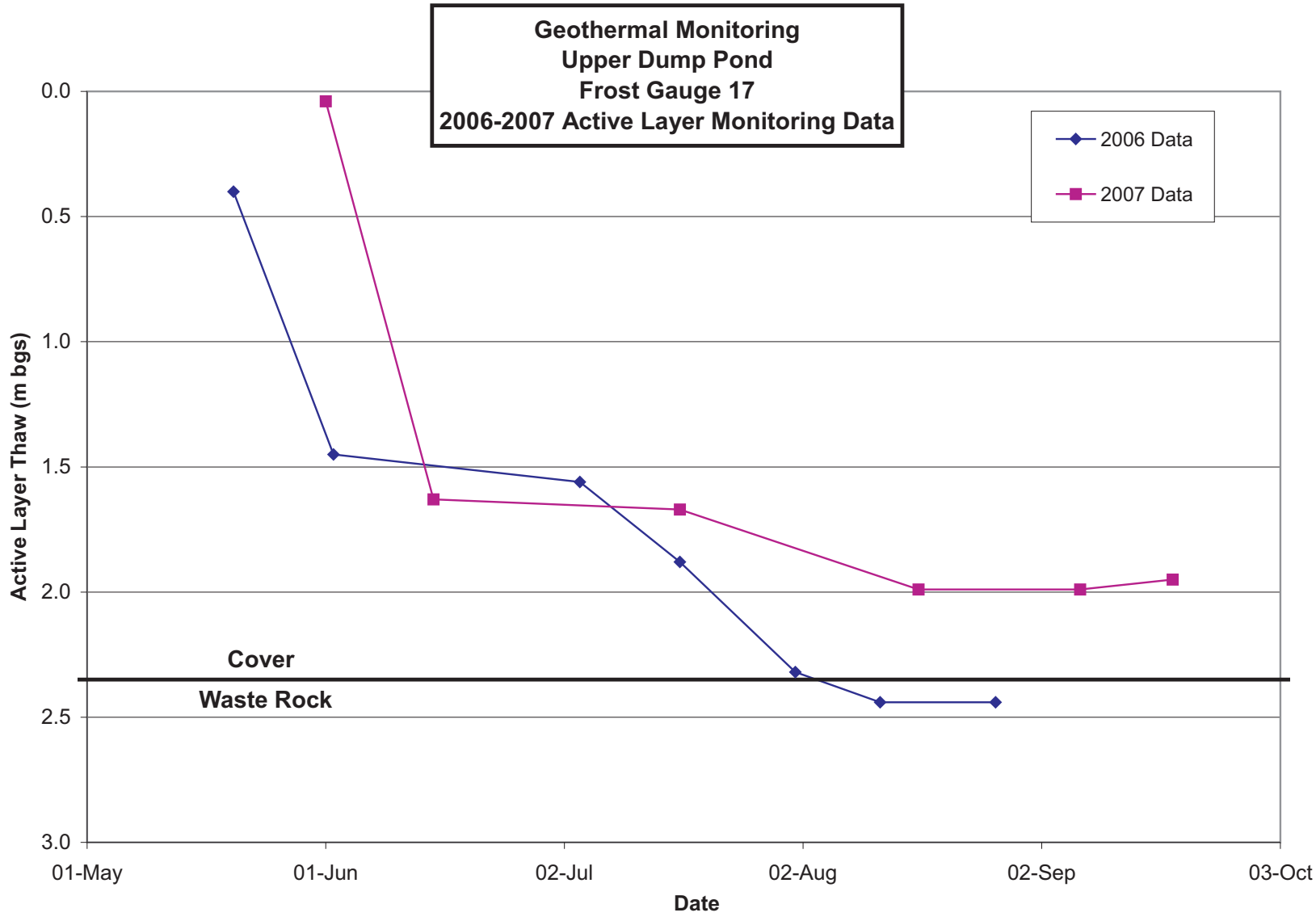
CLIENT: BREAKWATER RESOURCES LTD

PROJECT: NANISIVIK MINE RECLAMATION
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE: UPPER DUMP POND TAILINGS COVER

PROJECT No.:	FIGURE No.	REV.:
0255-016-03	29	

K:\Projects\0255 Can Zinco\016 2007 Work\03 Annual Inspection\Graphics\Drawings\0255-016-03 Figure 29.dwg Layout: Figure 29 Plot Date: Feb 29 08 Time: 2:19 PM



DATE: MARCH 2008	DRAWN SLF	BGC ENGINEERING INC. AN APPLIED EARTH SCIENCES COMPANY Calgary, Alberta Phone: (403) 250-5185	PROJECT NANISIVIK MINE 2007 ANNUAL GEOTECHNICAL INSPECTION
REFERENCED DRAWING DESCRIPTION			TITLE UPPER DUMP POND TAILINGS COVER GEOTECHNICAL MONITORING DATA
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.		CLIENT BREAKWATER RESOURCES LTD	PROJECT No. 0255-016-03 / FIGURE No. 30 / REV. 0

APPENDIX I
INSPECTION MEMO

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
200, 1121 Centre Street NW, Calgary, Alberta, Canada. T2E 7K6
Phone (403) 250-5185 Fax (403) 250-5330

PROJECT MEMORANDUM

To:	**Nanisivik Mine**	**Fax No.:**	**Via email**
Attention:	**Murray Markle**	**CC:**	
From:	**Geoff Claypool (Ext. 104)**	**Date:**	**September 11, 2007**
Subject:	**Nanisivik Mine Geotechnical Inspection – August 2007**		
No. of Pages (including this page): 9		**Project No:**	**0255-016-03**

BGC completed the annual geotechnical inspection of waste containment facilities and reclamation covers at Nanisivik Mine between August 27 and 31, 2007. The significant observations and maintenance recommendations for each site are summarized below.

Oceanview Open Pit

Observations:

- No ponded water observed on cover.
- Upslope water deflection berm appears to be more effective this year in directing surface water away from cover. Inferred from signs of water flowing along upstream edge of berm.
- Minor surface erosion noted along side slope at south end of cover. Erosion of fines from surface resulting in self armouring within 5 cm of cover surface.
- Some seepage noted at the toe of the cover (pH = 7.6, Conductivity = 1450 µS).
- Some seepage water noted running onto cover surface at south end of cover (pH = 7.7, Conductivity = 510 µS).
- One thermokarst feature observed in southeast corner.
- Some staining observed running on east edge of cover originating from upslope, appears about the same as observed in 2006.
- The thermokarst features observed in 2006 were backfilled, as recommended in the 2006 inspection report.

Recommended Maintenance:

- Backfill new small thermokarst feature in SE corner of pit.

Oceanview Portal

Observations:

- Minor surficial erosion along east edge of portal cover, as was observed in 2006.
- Settlement feature observed along west edge of cover near south corner, as was observed in 2006.
- No seepage observed at the toe of the cover.

Recommended Maintenance:

- Improve grade behind drainage berm where it meets the portal cover.
- Fix settlement feature in SW corner of portal cover.

Oceanview East and West Raises

Observations:

- No erosion or deformation of surface mounds noted.

Recommended Maintenance:

- No maintenance required.

K Baseline Portal

Observations:

- No surface erosion observed.
- No seepage noted at toe of cover.

Recommended Maintenance:

- No maintenance required.

Kuhulu Lake Borrow Area

Observations:

- Floor of borrow area was regraded in 2006, as recommended in 2006 inspection report.
- Some additional smaller thermokarst features observed in floor of borrow area.
- No ponding observed.

Recommended Maintenance:

- No maintenance required.

Chris Creek Borrow Area

Observations:

- No significant degradation of floor of borrow area noted.

Recommended Maintenance:

- No maintenance required.

East Trench

Observations:

- Only minor surface erosion observed near upslope edge of cover where surface water observed running onto surface of cover.
- No seepage observed at toe of cover.

Recommended Maintenance:

- No maintenance required.

East Open Pit

Observations:

- Some very minor surface erosion noted in upper portion of cover.
- Some seepage observed at the toe of the cover and at intermediate areas of the cover.
- Some loosening of rock in remnant highwall observed.
- Toe area surface water deflection berm armouring completed, as recommended in 2006 inspection report.
- Additional armour applied to west edge of cover, as recommended in 2006 inspection report.
- Some thermokarsting observed in the old haul road east of the cover limits.

Recommended Maintenance:

- No maintenance required.

East Adit Treatment Pond Dike

Observations:

- Dike breached in 2006.
- No ponding observed in 2007.
- Some channelization of sediments upstream of breach has occurred.

Recommended Maintenance:

- No maintenance recommended.

East Adit Retention Pond Dike

Observations:

- Dike breached in 2006.
- Some ponding of water observed in NW corner of area.
- Some channelization of sediments upstream of breach observed.

Recommended Maintenance:

- Improve drainage to prevent ponding.

Shale Hill Quarry

Observations:

- No erosion of regraded slopes noted.
- Minor thermokarsting in quarry floor, no ponding observed.

Recommended Maintenance:

- No maintenance required.

Shale Hill Raise

Observations:

- No erosion or deformation of surface mound noted.

Recommended Maintenance:

- No maintenance required.

17 N Portal

Observations:

- No significant erosion observed.
- Minor thermokarst feature observed near upslope edge of cover.
- No seepage observed at toe of cover.
- Surface flow appear to occur along east edge of cover during freshet.

Recommended Maintenance:

- Backfill small thermokarst feature.

Upper Dump Pond

Observations:

- No significant erosion observed.
- No seepage observed at toe of cover.

Recommended Maintenance:

- No maintenance required.

West Open Pit

Observations:

- Armouring of cover was completed including rockfill placed against remnant highwall.
- Surficial shale cover and armouring completed downslope of access road.
- No erosion of armour surface observed.
- Seepage water observed collecting on surface of access road at toe of WOP.
- Some cracking was observed in the West Open Pit crown pillar. This is the same cracking that has been observed in previous inspections and there does not appear to have been additional extension or widening of the cracking, based on visual comparisons.

Recommended Maintenance:

- Complete armouring of access road at toe of pit when regular road use no longer required.

West Twin Dike

Observations:

- No erosion or settlement of the cover was observed.
- No seepage was noted at the toe of the dike.

Recommended Maintenance:

- No maintenance required.

Test Cell/ Toe of WT Dike

Observations:

- No erosion of cover observed.
- No ponding on cover observed.
- Cover very undulating along north/south arm of remnant Test Cell dike.
- Outlet of Test Cell armoured to the normal water line.
- Some settlement areas were observed in the cover at the Toe of the West Twin Dike cover.

Recommended Maintenance:

- Extend rip rap along the shoreline at the Test Cell outlet below water level to approximately 369.4 m elev.
- Apply additional compactive effort to the north-south arm of remnant Test Cell dike.
- Backfill settlement areas in cover at the Toe of the West Twin Dike.
    - Note this was partially completed during the inspection.

Surface Cell

Observations:

- Some cracking and settlement of cover in east/west trench, approximately to same degree as observed in 2006.
- Small head pond at spillway inlet (approx. 20 cm deep) (pH = 7.3, Conductivity = 2850 μS).
- Some thermokarst features noted near south edge of cover (581034N, 8104483E).
- Some surface water was observed running onto the edge of the cover at the south edge of the Surface Cell (pH = 7.6, Cond = 634 μS)

Recommended Maintenance:

- Backfill thermokarst features.

Reservoir Shoreline

Observations:

- No erosion of rip rap observed.
- Additional rip rap stockpiled along shoreline at toe of WT Dike.

Recommended Maintenance:

- Spread stockpiled rip rap along shoreline at toe of WT Dike.

Reservoir Breaches

Observations:

- The water depth in breaches estimated to be approximately 0.5 m below current water surface. The water level during the inspection was estimated to be about 370.5 m.

Recommended Maintenance:

- Lower bottom of breach by approx. 0.3 m.

West Twin Outlet

Observations:

- No erosion of rip rap observed.
- Some cracking of concrete observed.
- GCL liner installed upstream of outlet wall, as recommended in 2006 inspection report.
- Additional large rip rap placed in plunge pool, as recommended in the 2006 inspection report.

Recommended Maintenance:

- Continue to inspect wall for further cracking.
- Continue to monitor water level on polishing pond side of wall to assess seepage losses.

Twin Lakes Creek Diversion Berm

Observations:

- No erosion of rip rap observed.

Recommended Maintenance:

- No maintenance required.

Twin Lakes sand and gravel deposit

Observations:

- Some minor thermokarsting of floor of the borrow area observed, no more than observed in 2006.
- Quarry floor observed to be draining into Reservoir.

Recommended Maintenance:

- No maintenance required.

Area 14 Waste Rock Cover, Portal Cover and Raise Cover

Observations:

- No erosion of covers noted.
- Additional armour rock applied to north edge of waste rock cover, as recommended in 2006 inspection reports.
- Armour rock applied to portal plug surface, as recommended in 2006 inspection reports.
- Armour rock applied to surface of raise area, but no mound constructed.

Recommended Maintenance:

- Construct a mound over the Area 14 Raise.

Area 14 Armour and Shale Quarries

Observations:

- Thermokarsting of shale quarry entrance is continuing.
- Erosion of highwall in shale quarry continues at northeast corner where ephemeral flow occurs into pit.
- No ponding noted in shale quarry floor.
- Some thermokarsting in armour borrow area observed.

Recommended Maintenance:

- Monitor shale quarry during freshet to assess need for future maintenance.
- Re-grade surface of armour borrow area to prevent ponding.

Spillway

Observations:

- Small pond at inlet on Surface Cell cover, depth between 20 and 30 cm.
- Bottom of spillway was graded, as recommended in the 2006 inspection report.
- Rockfill was placed in the thermokarst in the spillway side wall near outlet, as recommended in the 2006 inspection report.
- Left (north) side of spillway was rip rapped between access ramp and spillway outlet, as recommended in the 2006 inspection report.
- Some erosion of access ramp occurring on southwest side.
- No debris falling into spillway bottom from diabase area, as has been observed previously.
- One settlement area observed in spillway bottom near outlet.

Recommended Maintenance:

- Re-level access road.
- Place additional rockfill in settlement area near spillway outlet.
- Re-grade area near deflection berms.
- Apply additional armour to edge of south side of access ramp.

Industrial Complex

Observations:

- Backfilling of foundation with metals contaminated soils was ongoing.
- Some shale was stockpiled along east edge of the foundation.
- No erosion of the portal plug beneath the Industrial Complex was noted. However, it remains unarmoured.

Recommended Maintenance:

- Completion of backfilling anticipated in 2008.
- Construction of thermal cover to be completed after backfilling complete.
- The surface of the Industrial Complex portal plug should be armoured in 2008.

Landfill

Observations:

- No erosion observed on surface of cover.
- No seepage observed at toe of cover.
- Some shale observed exposed on lower portion of west face of cover.
- Armour on surface of cover loose and un-compact.

Recommended Maintenance:

- Complete spreading of armour on west face.
- Apply additional compaction to armour surface.

Townsite Shale Borrow Area

Observations:

- No ponding observed in quarry floor.
- No erosion of surface observed.
- Full reclamation of quarry not complete as quarry is still occasionally in use.

Recommended Maintenance:

- Complete re-sloping of quarry walls when use of quarry is complete.

Mt. Fuji Shale Borrow Area

Observations:

- No significant ponding observed in quarry floor.
- Quarry benches beginning to fill in.

Recommended Maintenance:

- No maintenance required.

Instrumentation

The frost gauges were each examined during the inspection. Some of the frost gauges were observed to be low in methyl blue fluid. Others were observed to be completely drained. It is recommended that FG9 in the Test Cell and FG's 13 and 14 at the East Open Pit be replaced in 2008. As such, the frost gauges currently installed at the EOP should be removed over the winter months and the PVC pipes should be cleared of fluid and ice. Additionally, the other frost gauges may be topped up with methyl blue in 2008 and re-sealed at the top to permit continued use for monitoring during the closure period. The current practice of swabbing the PVC pipes during reading of the frost gauges should be continued.

The original instrumentation plan included frost gauges and thermistors at the West Open Pit. If a drill can be access from ongoing construction activities in Arctic Bay, it is recommended that these instruments be installed in the West Open Pit cover in 2008. Consideration may also be given to installing instrumentation in the Industrial Complex cover.

Closure

We trust the enclosed information is sufficient for your present purposes. Please contact the undersigned should you have any questions or comments.

Respectfully submitted
BGC Engineering Inc.
per:

Geoff Claypool, P.Eng.
Geological Engineer

APPENDIX II
INSPECTION PHOTOS

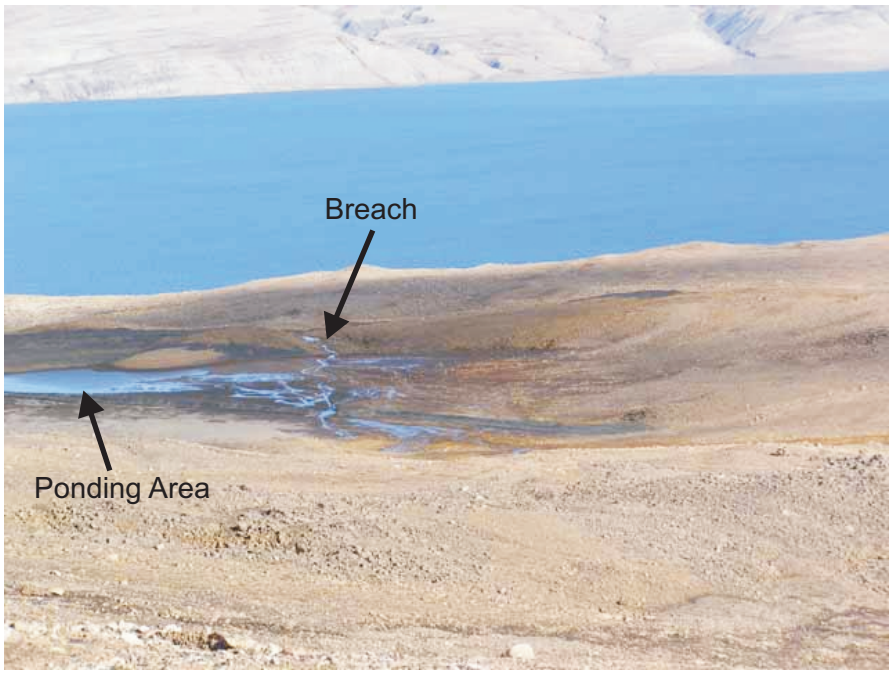


Photo 1
East Adit Retention Pond.
Note ponding in northwest corner of area.

Photo 2
East Adit Treatment Pond.
Note channelization of remnant sediments upstream of breach.

SCALE:	N/A	DESIGNED:	ALF
DATE:	MARCH 2008	CHECKED:	GKC
DRAWN:	SLF	APPROVED:	JWC

CLIENT: BREAKWATER RESOURCES LTD

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta. Phone: (403) 250-5185

PROJECT: NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE: EAST ADIT TREATMENT FACILITY

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-1	0

Photo 3
Industrial Complex as seen from Stol Port.
Note location of former Day Tank Farm.

Photo 4
Former location of Day Tank Farm.
Note berms have been excavated and liner and tanks have been removed.

SCALE:	N/A	DESIGNED:	ALF
DATE:	MARCH 2008	CHECKED:	GKC
DRAWN:	SLF	APPROVED:	JWC

CLIENT: BREAKWATER RESOURCES LTD

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta. Phone: (403) 250-5185

PROJECT: NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE: DAY TANK FARM AREA

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-2	0

Photo 5
Main Tank Farm at the port area.
Note water retained in retention pond.

Photo 6
Cracking in crest of containment berm along west side of containment area.

Photo 7
Exposures and tears of the internal liner.

Photo 8
Affected area of Main Tank Farm berm which was partially excavated during reclamation of contaminated soils.

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	ALF
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
MAIN TANK FARM
SPILL CONTAINMENT BERM

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-3	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

Photo 9
Flow through entrance area of West Twin Dike Spillway.

Photo 10
Bottom of spillway looking downslope.
Note left (north) side of spillway has been riprapped as recommended in 2006.

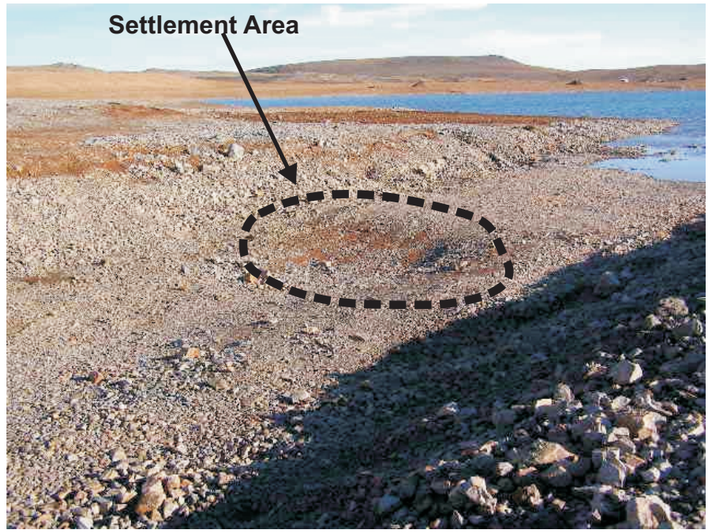


Photo 11
Settlement depression near spillway outlet.

Photo 12
Access ramp into spillway. Note drainage path along edge of access ramp where flow enters the spillway.

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
.	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	ALF
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
WEST TWIN DIKE SPILLWAY

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-4	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta Phone: (403) 250-5185

Photo 13
West Twin Outlet Channel prior to GCL installation.
Note water level on upstream side of wall approximately 20 cm below crest of wall.

Photo 14
Crack in West Twin Outlet wall.
View looking at downstream face of the concrete wall.

Photo 15
GCL installed upstream of outlet wall to reduce seepage losses.
Note embedment of liner in wall abutments.

Photo 16
West Twin Outlet Channel after GCL installation.
Note rising water level upstream of wall.

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	ALF
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
WEST TWIN LAKE OUTLET CHANNEL

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-5	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

Photo 17
Flow through East Twin Creek Diversion Channel. View looking upstream.

Photo 18
Flow through East Twin Creek Diversion Channel.
Note area of channel rehab where light coloured armour rock was placed.

SCALE:	N/A	DESIGNED:	ALF
DATE:	MARCH 2008	CHECKED:	GKC
DRAWN:	SLF	APPROVED:	JWC

CLIENT: BREAKWATER RESOURCES LTD

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta. Phone: (403) 250-5185

PROJECT: NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE: EAST TWIN LAKE CREEK DIVERSION DIKE

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-6	0

Photo 19
Small pond on Surface Cell cover at entrance to West Twin Dike Spillway.

Photo 20
Thermokarst feature at south edge of Surface Cell cover.

Photo 21
East/West drainage swale.
Note minor cracking along edge of swale.

Photo 22
Drainage swale in west portion of Surface Cell cover.

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	ALF
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
SURFACE CELL TAILINGS COVER

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-7	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

Photo 23
Face of West Twin Dike. View looking south.

Photo 24
Crest of West Twin Dike. View looking south.

SCALE:	N/A	DESIGNED:	ALF
DATE:	MARCH 2008	CHECKED:	GKC
DRAWN:	SLF	APPROVED:	JWC

CLIENT: BREAKWATER RESOURCES LTD

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta. Phone: (403) 250-5185

PROJECT: NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE: WEST TWIN DIKE

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-8	0

Photo 25
Surface of Test Cell cover.

Photo 26
Rip rapped Test Cell outlet.
Note riprap only applied to edge of water.

Photo 27
Test Cell cover as seen from high point south of West Twin Disposal Area.

Photo 28
Test pit excavated through Test Cell cover.
Note ice in shale at bottom of test pit.

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	ALF
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
TEST CELL TAILINGS COVER

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-9	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

Photo 29
Surface of north/south arm of Test Cell dike.
Note un-eveness and settlement of surface.

SCALE:	N/A	DESIGNED:	ALF
DATE:	MARCH 2008	CHECKED:	GKC
DRAWN:	SLF	APPROVED:	JWC

CLIENT: BREAKWATER RESOURCES LTD

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta. Phone: (403) 250-5185

PROJECT: NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE: TEST CELL DIKE

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-10	0

Photo 30
Toe of Test Cell Dike cover along remnant north/south arm of Test Cell Dike.

Photo 31
Riprap along shoreline of remnant east/west arm of Test Cell Dike.

SCALE:	N/A	DESIGNED:	ALF
DATE:	MARCH 2008	CHECKED:	GKC
DRAWN:	SLF	APPROVED:	JWC

CLIENT: BREAKWATER RESOURCES LTD

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta. Phone: (403) 250-5185

PROJECT: NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE: TOE OF TEST CELL DIKE
TAILINGS COVER

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-11	0

Photo 32
Thermokarst features adjacent to Thermistor 05-26 at toe of West Twin Dike.
Note this was an area of excessive shale fill thickness.

Photo 33
Toe of West Twin Dike tailings cover as seen from rock outcrop at south abutment of West Twin Dike.

Photo 34
Riprap stockpiled along shoreline of tailings cover at the toe of the West Twin Dike.

Photo 35
Toe of West Twin Dike tailings cover as seen from high point south of West Twin Disposal Area.

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	ALF
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
TOE OF WEST TWIN DIKE
TAILINGS COVER

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-12	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

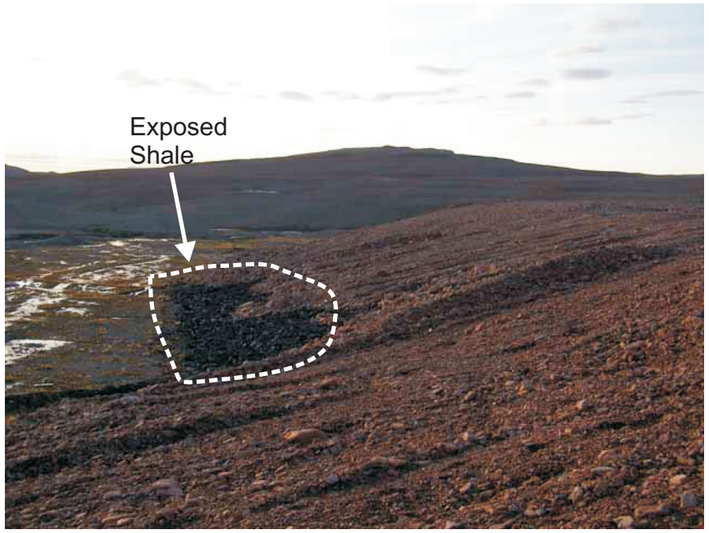


Photo 36
Toe of Landfill cover. Note exposed shale at toe of cover.

Photo 37
Surface of Landfill cover.

Photo 38
Landfill cover as seen from Stol Port.

Photo 39
Surface of Landfill cover as seen from Cross Mountain.

CLIENT:

BREAKWATER
RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	ALF
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
LANDFILL COVER

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-13	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

Photo 40
West Open Pit waste rock cover as seen from Stol port.

Photo 41
Crack in bench above West Open Pit highwall.

Photo 42
Surface of West Open Pit cover looking west.

Photo 43
Surficial cover at toe of West Open Pit cover.
Note ponding on access road.

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	ALF
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
WEST OPEN PIT
WASTE ROCK COVER

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-14	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

Photo 44
Middle portion of East Open Pit cover.

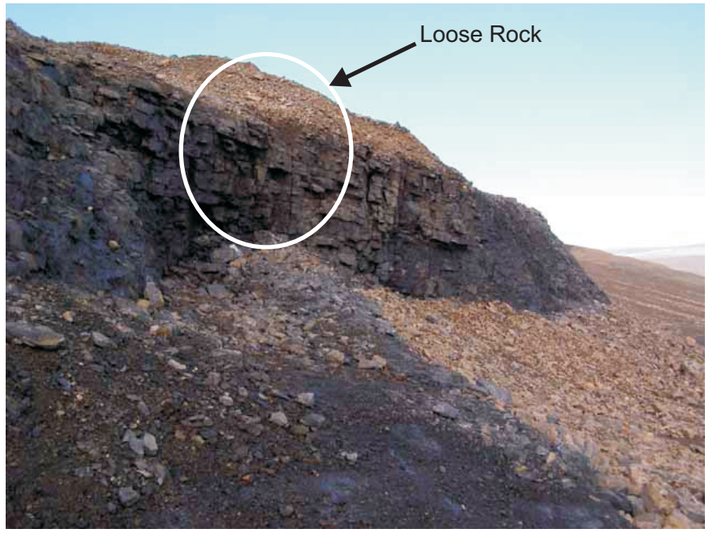


Photo 45
Area along highwall were some loose rock was noted.

Photo 46
Looking upslope along steepest area of East Open Pit cover.
Note no surface erosion observed.

Photo 47
Intermediate level of East Open Pit Cover.
Note dark area where seepage exits on face of cover.

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
.	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	ALF
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
EAST OPEN PIT
WASTE ROCK COVER

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-15	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

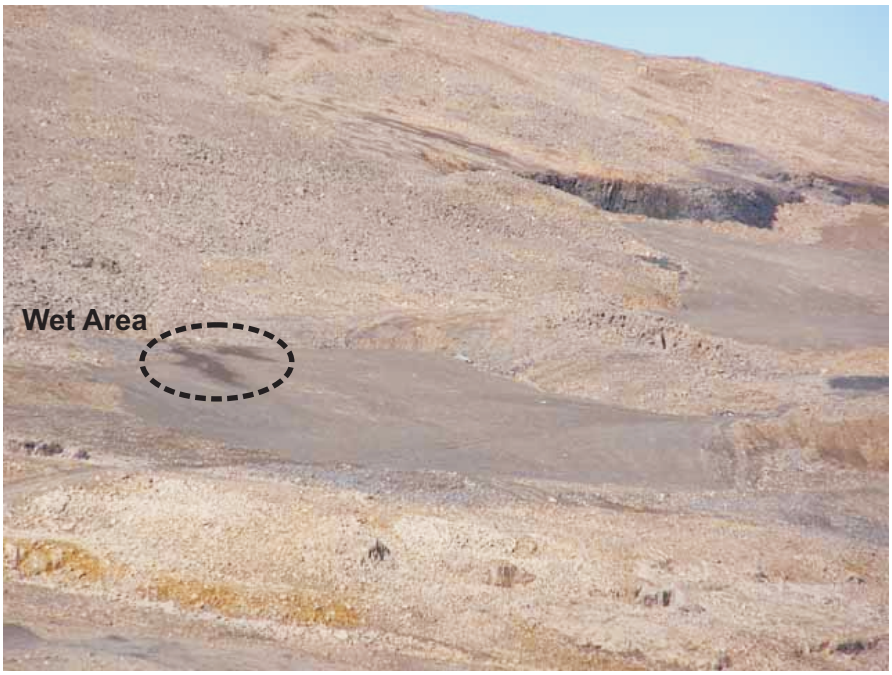


Photo 48
East Trench cover as seen from Kuhulu Lake road.
Note the wet area near the top of the cover indicating some minor surface flow.

Photo 49
Very minor rill erosion on surface of East Trench cover.

SCALE:	N/A	DESIGNED:	ALF
DATE:	MARCH 2008	CHECKED:	GKC
DRAWN:	SLF	APPROVED:	JWC

CLIENT: BREAKWATER RESOURCES LTD

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta. Phone: (403) 250-5185

PROJECT: NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE: EAST TRENCH
WASTE ROCK COVER

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-16	0

Photo 50
Oceanview Open Pit cover as seen from south edge of the cover. View looking north.

Photo 51
Cracking in southwest corner of Oceanview Open Pit cover.

Photo 52
Minor rill erosion in southwest corner of Oceanview Open Pit cover. Note self armouring occurring.

Photo 53
Small thermokarst feature in southeast corner of Oceanview Open Pit cover.

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	ALF
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
OCEANVIEW OPEN PIT
WASTE ROCK COVER

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-17	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

Photo 54
Area 14 waste rock cover.
View looking north from Area 14 access road.

Photo 55
Armour placed at north edge of Area 14 waste rock cover.

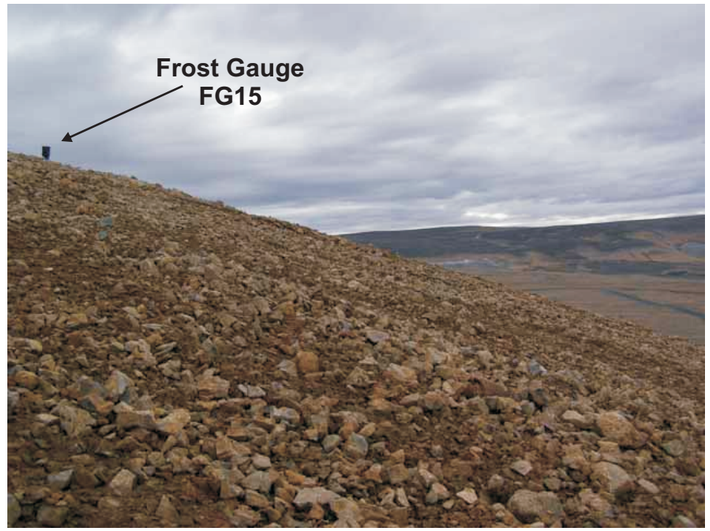


Photo 56
Face of Area 14 waste rock cover.
View looking south.
Note frost gauge instrument at crest of slope.

Photo 57
Area 14 waste rock cover as seen from Area 14 access road.

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	ALF
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
AREA 14
WASTE ROCK COVER

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-18	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

Photo 58
Upper Dump Pond tailings cover as seen from road to 17N Portal.

Photo 59
Surface of Upper Dump Pond tailings cover.
Note frost gauge FG17 on surface of cover.

SCALE:	N/A	DESIGNED:	ALF
DATE:	MARCH 2008	CHECKED:	GKC
DRAWN:	SLF	APPROVED:	JWC

CLIENT: BREAKWATER RESOURCES LTD

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta. Phone: (403) 250-5185

PROJECT: NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE: UPPER DUMP POND
TAILINGS COVER

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-19	0

Photo 60
Surface of the 17N Portal Cover as seen from upslope vantage point.

Photo 61
Thermokarst feature in 17N Portal Cover.

SCALE:	N/A	DESIGNED:	ALF
DATE:	MARCH 2007	CHECKED:	GKC
DRAWN:	SLF	APPROVED:	JWC

CLIENT: BREAKWATER RESOURCES LTD

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta. Phone: (403) 250-5185

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
17 NORTH PORTAL COVER

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-20	0

Photo 62
Settlement depression at the southwest corner of the Oceanview Portal cover.

Photo 63
Oceanview Portal cover as seen from the upslope edge of the cover. Note minor cracking along the right (east) edge of the cover.

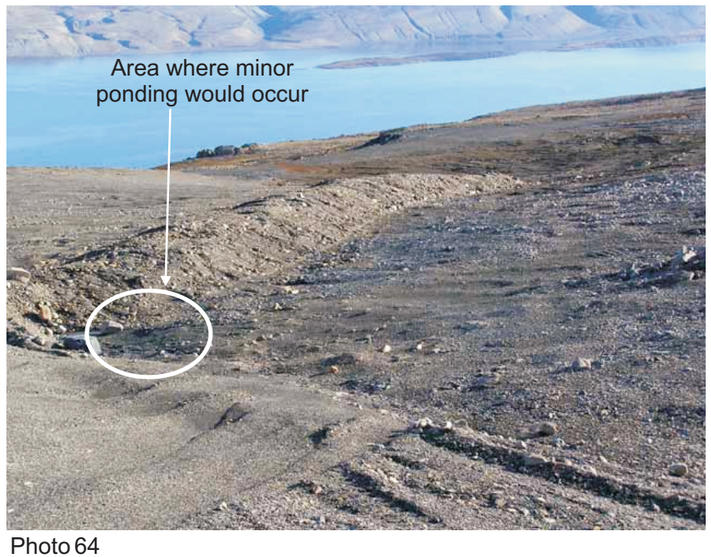


Photo 64
Water deflection berm at the Oceanview Portal cover.

Photo 65
Minor erosion downslope of the upper corner of the surface water deflection berm.

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	ALF
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
OCEANVIEW PORTAL COVER

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-21	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

Photo 66
K-Baseline cover as seen from East Trench.

Photo 67
Surface of K-Baseline cover.

SCALE:	N/A	DESIGNED:	ALF
DATE:	MARCH 2008	CHECKED:	GKC
DRAWN:	SLF	APPROVED:	JWC

CLIENT: BREAKWATER RESOURCES LTD

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta. Phone: (403) 250-5185

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
K-BASELINE PORTAL COVER

PROJECT No.	FIGURE No.	REV.
0255-016-06	II-22	0

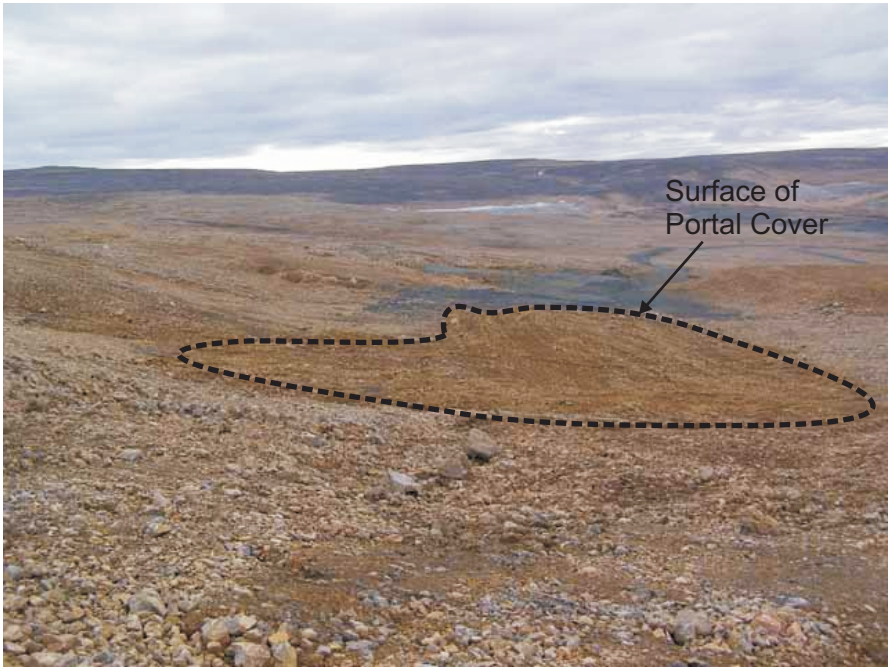


Photo 68
Armoured surface of Area 14 Portal Plug.

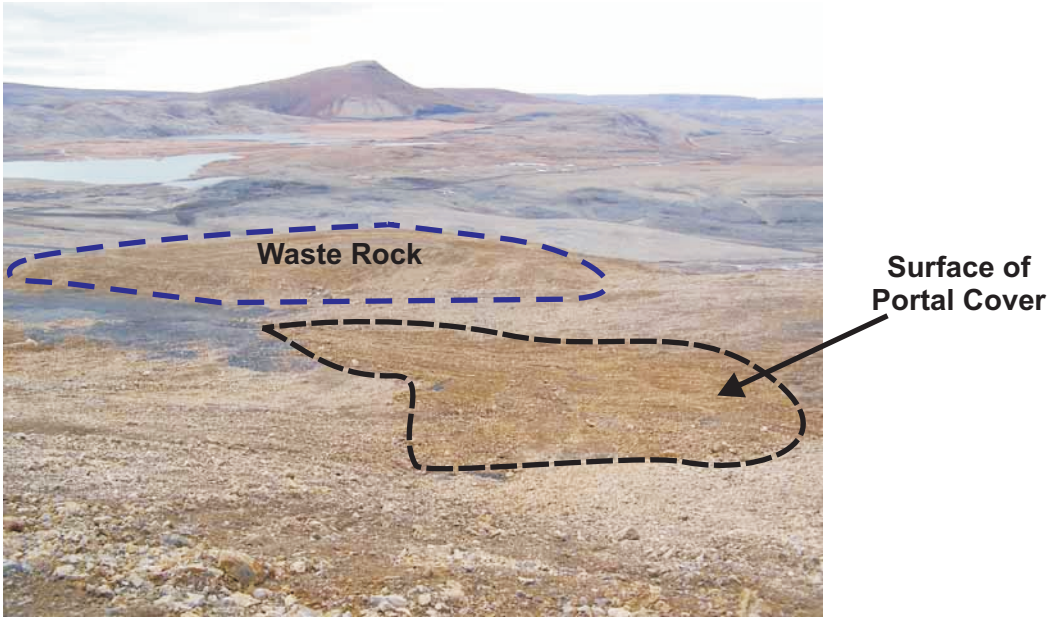


Photo 69
Area 14 waste rock cover and portal plug as seen from upslope vantage point above portal.

SCALE:	N/A	DESIGNED:	ALF
DATE:	MARCH 2008	CHECKED:	GKC
DRAWN:	SLF	APPROVED:	JWC

CLIENT: BREAKWATER RESOURCES LTD

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta. Phone: (403) 250-5185

PROJECT: NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE: AREA 14 PORTAL COVER

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-23	0

Photo 70
Shale Hill Raise cover.

Photo 71
Oceanview East Raise cover.

Photo 72
Oceanview West Raise cover.

Photo 73
Area 14 Raise Cover.
Note armour material applied to surface but no mound constructed.

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	ALF
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
MINE RAISE COVERS

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-24	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

Photo 74
East Twin Shale borrow area as seen from Area 14.

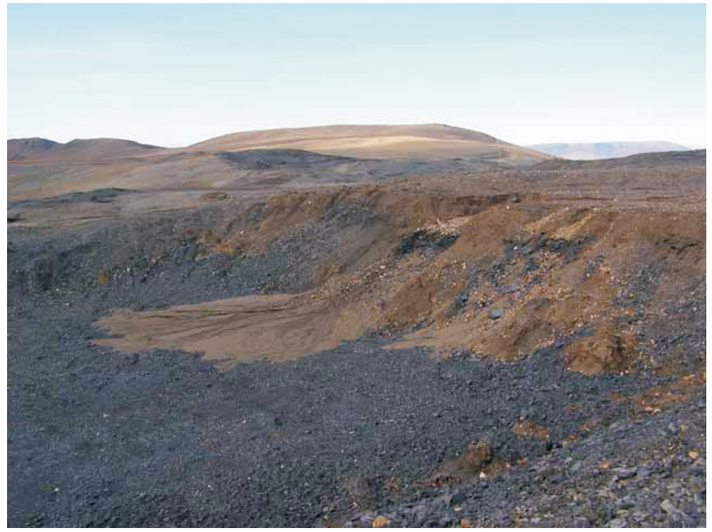


Photo 75
Area 14 Shale borrow area.
Note erosion and subsequent deposition of overburden into bottom of pit. Similar to conditions observed in 2006.

Photo 76
Interior of Shale Hill shale borrow area.

Photo 77
Mount Fuji shale borrow area as seen from Surface Cell cover.

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	ALF
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
SHALE BORROW AREAS

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-25	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

Photo 78
Minor thermokarsting at Area 14 armour borrow area.

Photo 79
Chris Creek A armour borrow area.

Photo 80
Floor of Twin Lakes armour borrow area.

Photo 81
Kuhulu Lake Road armour material borrow area.
Note floor of borrow area has been regraded.

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	GKC
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
ARMOUR BORROW AREAS

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-26	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

Photo 82
Industrial Complex as seen from Stol Port.
Note all infrastructure has been removed and backfilling with metals contaminated soils is ongoing.

Photo 83
Stockpiled shale fill on top of metals contaminated soils in Industrial Complex foundation.

Photo 84
Northwest corner of Industrial Complex.
Note hydrocarbon contaminated soil excavation ongoing in this area at the time of the inspection.

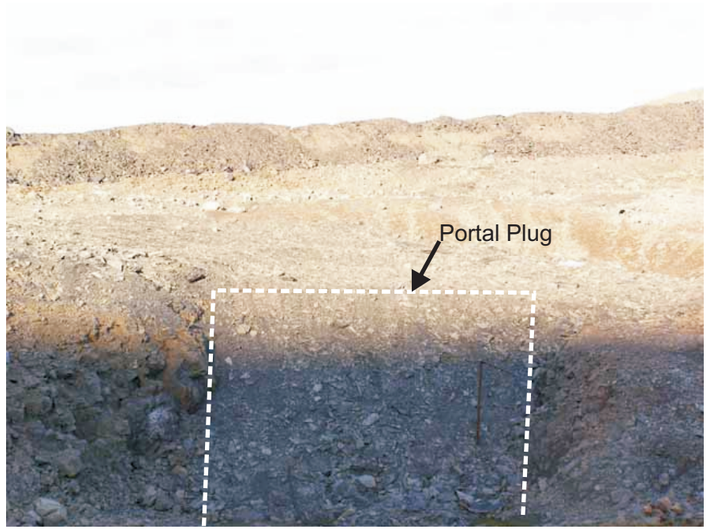


Photo 85
Mill foundation portal plug.
Note no armour material has been applied to the face of the plug.

CLIENT:

BREAKWATER RESOURCES LTD

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

SCALE:	N/A
DATE:	MARCH 2008
DRAWN:	SLF
DESIGNED:	ALF
CHECKED:	GKC
APPROVED:	JWC

PROJECT
NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE
INDUSTRIAL COMPLEX

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-27	0

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta
Phone: (403) 250-5185

Photo 86
Surface of Concentrate Storage Shed surficial cover.
Note this area was being used as a loading area for shipping supplies during the time of the inspection.

Photo 87
Side slope of Concentrate Storage Shed surficial cover.

SCALE:	N/A	DESIGNED:	ALF
DATE:	MARCH 2008	CHECKED:	GKC
DRAWN:	SLF	APPROVED:	JWC

CLIENT: BREAKWATER RESOURCES LTD

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta. Phone: (403) 250-5185

PROJECT: NANISIVIK MINE
2007 ANNUAL GEOTECHNICAL INSPECTION

TITLE: CONCENTRATE STORAGE SHED
SURFICIAL COVER

PROJECT No.	FIGURE No.	REV.
0255-016-03	II-28	0

APPENDIX III
2007 GEOTECHNICAL MONITORING DATA

Table AIII-1 - Instrumention Program and Monitoring Requirements

Summary of Instrument Readings Requirements									
Instrument Label	Instrument Type	Location	Easting	Northing	Thawed Interval (warmer than -0.5°C)	Max. Active Layer Thickness	Pore Pressures	Comments	Recommended 2008 Monitoring Frequency
West Twin Dike									
TC12	Thermocouple	Dike Face	N/A	N/A	NONE	N/A	N/A	Dike foundation remained frozen throughout 2007.	Quarterly
TC13A	Thermocouple	Dike Face	N/A	N/A	NONE	2.5 m	N/A	Dike foundation remained frozen throughout 2007.	Quarterly
TC31	Thermocouple	Dike Face	N/A	N/A	NONE	N/A	N/A	Dike foundation remained frozen throughout 2007.	Quarterly
TC32	Thermocouple	Dike Face	N/A	N/A	NONE	N/A	N/A	Dike foundation remained frozen throughout 2007	Quarterly
TC33	Thermocouple	Dike Face	N/A	N/A	NONE	2 m	N/A	Dike foundation remained frozen throughout 2007.	Quarterly
BGC03-33	Thermistor	Dike Crest	581325	8104650	>21 m	N/A	N/A	Continued cooling throughout profile in 2007. May remain thawed between 21 and 24 m bgs.	Quarterly
BGC03-34	Thermistor	Dike Crest	581325	8104650	NONE	N/A	N/A	Frozen profile observed in 2007. Continued cooling observed throughout profile.	Quarterly
BGC05-09	Thermistor	Dike Crest	581450	8104860	> 22 m	2.0 m	N/A	Profile below 22 m appears to be thawed.	Quarterly Bi-weekly June 1 - Sept 30
BGC05-15	Thermistor	Dike Crest	581390	8104770	> 20 m	2.5 m	N/A	Profile above 30 m appears to be frozen.	Quarterly Bi-weekly June 1 - Sept 30
BGC05-17	VW Piezo.	Dike Crest	581350	8104690	N/A	N/A	+4.6 m	Approximately 4.6 m artesian. Pore water temperature ~ -0.3°C and stable.	Quarterly Bi-weekly June 1 - Sept 30
Surface Cell									
BGC02-03	Thermistor	Surface Cell	581205	8104650	N/A	N/A	N/A	Thermistor cable now inoperative.	Discontinue
BGC03-07	Thermistor	Surface Cell	581440	8104925	NONE	N/A	N/A	Frozen profile observed throughout 2007. Continued cooling throughout most of profile.	Quarterly
BGC03-09	Thermistor	Surface Cell	581360	8104785	> 17 m	N/A	N/A	Appears to remain thawed below 17 m. -0.5°C isotherm migrated from ~16 m in 2006 to ~17 m in 2007.	Quarterly
BGC03-10	Thermistor	Surface Cell	581340	8104830	> 11 m	N/A	N/A	Cooling of ground temperatures to 11 m bgs observed. Warming of ground temperatures observed at 13 m. Temperatures below 16 m stable near 0°C.	Quarterly
BGC03-11	Thermistor	Surface Cell	581260	8104720	> 11 m	1.6 m	N/A	Temperature at 1.9 m bgs cooler in 2007 than 2005 and 2006. Cooling of ground temperatures to 10 m bgs observed in 2006. Ground temperatures at intermediate depths (between 11 and 17 m bgs), seem to have stabilized and may be starting to cool. Some cooling observed at depth (20 - 25 m).	Quarterly Bi-weekly June 1 - Sept 30
BGC03-12	Vibrating Wire Piezometer	Surface Cell	581325	8104675	N/A	N/A	NONE	Piezometer tip frozen in. Continue monitoring quaterly to record ground temperatures.	Quarterly
BGC03-14	Vibrating Wire Piezometer	Surface Cell	581280	8104610	N/A	N/A	NONE	Piezometer tip frozen in. Continue monitoring quaterly to record ground temperatures.	Quarterly
BGC03-15	Thermistor	Surface Cell	581290	8104600	NONE	N/A	N/A	Frozen profile observed in 2007. Continued cooling observed throughout entire profile.	Quarterly Bi-weekly June 1 - Sept 30
BGC03-20	Thermistor	Surface Cell	581050	8104750	> 20 m	1.4 m	N/A	Significant cooling throughout profile in 2007. Entire tailings profile now likely frozen.	Quarterly Bi-weekly June 1 - Sept 30
BGC03-21	Thermistor	Surface Cell	581200	8104925	NONE	N/A	N/A	Frozen profile observed in 2007. Entire profile 0 to 17.5 m continues to cool.	Quarterly
BGC03-32	Vibrating Wire Piezometer	Surface Cell	581350	8104760	N/A	N/A	+6 m	Approximately 6 m artesian, and continues steady increase. Pore water temperature approximately -0.45 °C.	Quarterly Bi-weekly June 1 - Sept 30
BGC03-35	Vibrating Wire Piezometer	Surface Cell	581150	8104615	N/A	N/A	+5 m	Approximately 5 m artesian, and continues to increase. Increase generally observed during summer months. Pore water temperature approximately -1.2°C.	Quarterly Bi-weekly June 1 - Sept 30
BGC03-36	Thermocouple	Surface Cell	581150	8104615	10-14 m	N/A	N/A	Profile continues to cool with time.	Quarterly
BGC03-37	Thermistor	Surface Cell	581490	8104970	NONE	1.4 m	N/A	Data indicates continued cooling of near surface tailings (5 to 7 m bgs) with time. Active layer depth of 1.4 m in area of increased cover thickenss (1.8 m bgs).	Quarterly Bi-weekly June 1 - Sept 30
BGC05-05	Thermistor	Surface Cell	581295	8104840	unknown	2.4 m	N/A	Instrument malfunctioning (long time to get stable readings), only monthly readings collected. Cooling observed in tailings profile between 5 and 10 m (bgs).	Quarterly
BGC05-06	VW Piezo.	Surface Cell	581310	8104820	N/A	N/A	+6 m	Approximately 6 m artesian, and continues steady increase. Pore water temperature approximately -0.1°C.	Quarterly Bi-weekly June 1 - Sept 30
BGC05-07	VW Piezo.	Surface Cell	581250	8104730	N/A	N/A	+5.5 m	Approximately 5.5 m artesian, and continues steady increase. Pore water temperature approximately -0.3°C.	Quarterly Bi-weekly June 1 - Sept 30
BGC05-08	Contingency	Surface Cell	581260	8104740	N/A	N/A	N/A	No instrument installed.	None at this time.

Table AIII-1 - Instrumention Program and Monitoring Requirements

Summary of Instrument Readings Requirements									
Instrument Label	Instrument Type	Location	Easting	Northing	Thawed Interval (warmer than -0.5°C)	Max. Active Layer Thickness	Pore Pressures	Comments	Recommended 2008 Monitoring Frequency
Surface Cell									
BGC05-10	VW Piezo.	Surface Cell	581390	8104815	N/A	N/A	+6-12 m	Pore pressures fluctuating between 6 and 12 m artesian. Pore water temperature ~ -1.7°C.	Quarterly Bi-weekly June 1 - Sept 30
BGC05-11	Monitoring Wel	Surface Cell	581290	8104785	N/A	N/A	N/A	0.09 mg/L Zn, 0.064 mg/L Pb	Once per summer.
BGC05-12	Monitoring Wel	Surface Cell	581320	8104760	N/A	N/A	N/A	0.17 mg/L Zn, 0.127 mg/L Pb	Once per summer.
BGC05-13	VW Piezo.	Surface Cell	581220	8104625	N/A	N/A	+2.5 m	Approximately 3.5 m artesian, and continues steady increase. Pore water temperature ~ -1°C.	Quarterly Bi-weekly June 1 - Sept 30
BGC05-14	Contingency	Surface Cell	581390	8104770	N/A	N/A	N/A		None at this time.
BGC05-16	Contingency	Surface Cell	581350	8104690	N/A	N/A	N/A		None at this time.
FG-1	Frost Gauge	Surface Cell	518450	8104950	N/A	1.2 m	N/A	Thaw contained within cover throughout 2007.	Bi-weekly (June 1 - Sept 15)
FG-2	Frost Gauge	Surface Cell	581330	8104775	N/A	1.3 m	N/A	Thaw contained within cover throughout 2007.	Bi-weekly (June 1 - Sept 15)
FG-3	Frost Gauge	Surface Cell	581250	8104650	N/A	>1.7 m	N/A	Frost gauge fully thawed in August 2007. Still operational.	Bi-weekly (June 1 - Sept 15)
FG-4	Frost Gauge	Surface Cell	581025	8104725	N/A	1.2 m	N/A	Thaw contained within cover throughout 2007.	Bi-weekly (June 1 - Sept 15)
FG-5	Frost Gauge	Surface Cell	581225	8104975	N/A	1.2	N/A	Thaw contained within cover throughout 2007.	Bi-weekly (June 1 - Sept 15)
FG-6	Frost Gauge	Surface Cell	581090	8104930	N/A	1.0 m	N/A	Thaw contained within cover throughout 2007.	Bi-weekly (June 1 - Sept 15)

Notes:
Quarterly readings to be taken during December, Late April, Early July, Late August.
Frost Gauges to be read weekly between June 1 and Sept. 15.

Table AIII-1 - Instrumention Program and Monitoring Requirements

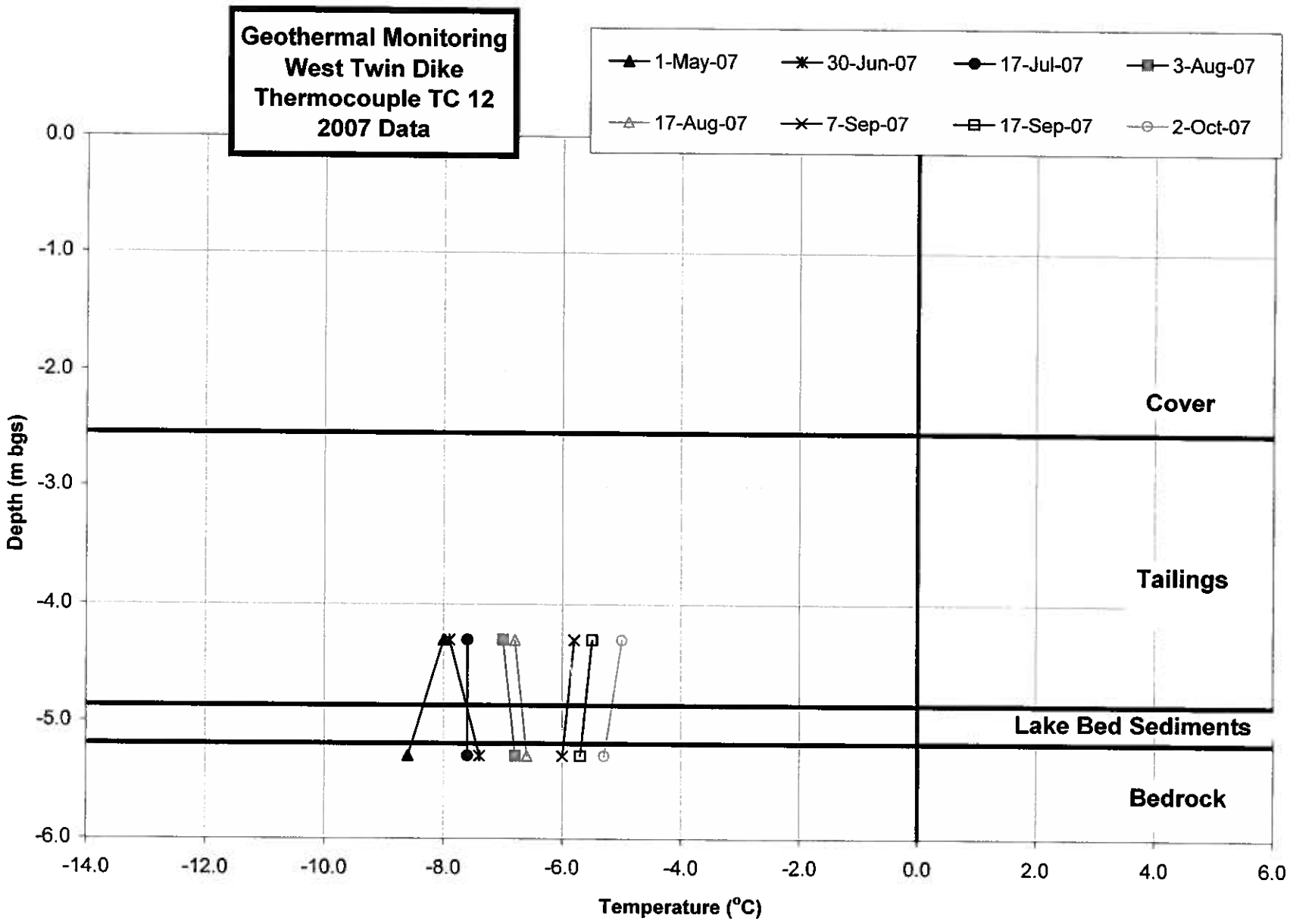
Summary of Instrument Readings Requirements									
Instrument Label	Instrument Type	Location	Easting	Northing	Thawed Interval (warmer than -0.5°C)	Max. Active Layer Thickness	Pore Pressures	Comments	Recommended 2008 Monitoring Frequency
Toe of West Twin Dike									
BGC03-18	Thermocouple	Toe of West Twin Dike	581440	8104660	NONE	N/A	N/A	Tailings near surface (4 m bgs) continue cooling.	Quarterly
BGC03-19	Thermistor	Toe of West Twin Dike	581475	8104715	NONE	> 2 m	N/A	Entire profile beneath active layer frozen. Entire profile continues cooling. Active layer thaw > 2 m (increased cover thickness).	Quarterly Bi-weekly June 1 - Sept 30
BGC05-26	Thermistor	Toe of West Twin Dike	581400	8104600	NONE	2.4 m	N/A	(0-25 m bgs). Near surface thermistors nodes not placed appropriately for accurate monitoring of active layer	Quarterly Bi-weekly June 1 - Sept 30
Test Cell									
BGC05-04	Thermistor	Test Cell	581575	8104850	NONE	1.4 m	N/A	Entire profile frozen to 15 m bgs. Profile continues to cool over time with a lot of cooling observed in 2007. Both near surface (~ 2 m) and deep (~15 m) nodes continue significant cooling.	Quarterly Bi-weekly June 1 - Sept 30
BGC05-18	VW Piezo.	Test Cell	581600	8104825	N/A	N/A	-2 m bgs	Approximately 2 m bgs, and slowly increasing. Pore water temperature approximately -0.2°C and stable.	Quarterly Bi-weekly June 1 - Sept 30
BGC05-19	Thermistor	Test Cell	581675	8104790	> 10 m	2.7 m	N/A	Ground profile appears to be thawed below 10 m. Cooling observed in upper portion of profile between 5 and 8 m (bgs).	Quarterly Bi-weekly June 1 - Sept 30
BGC05-20	VW Piezo.	Test Cell	581675	8104775	N/A	N/A	-2 m bgs	Approximately 1.5 m bgs, and slowly increasing. Pore water temperature approximately -0.3°C and stable.	Quarterly Bi-weekly June 1 - Sept 30
BGC05-21	Monitoring Wel	Test Cell	581660	8104760	N/A	N/A	N/A	1.31 mg/L Zn, 0.34 mg/L Pb	Once per summer.
BGC05-22	VW Piezo.	Test Cell	581640	8104690	N/A	N/A	-3.5 m bgs	Approximately 3.5 m bgs, and slowly increasing. Pore water temperature approximately -0.3°C and stable.	Quarterly Bi-weekly June 1 - Sept 30
BGC05-23	Monitoring Wel	Test Cell	581640	8104675	N/A	N/A	N/A	2.00 mg/L Zn, 0.30 mg/L Pb	Once per summer.
BGC05-24	VW Piezo.	Test Cell	581590	8104710	N/A	N/A	-2 m bgs	Approximately 2-4 m bgs, and fluctuating. Pore water temperature approximately -1.2°C and fluating and decreasing.	Quarterly Bi-weekly June 1 - Sept 30
BGC05-25	Contingency	Test Cell	581575	8104725	N/A	N/A	N/A		None at this time.
FG-7	Frost Gauge	Test Cell	581550	8104820	N/A	1.3 m	N/A	Thaw contained within cover throughout 2007.	Bi-weekly (June 1 - Sept 15)
FG-8	Frost Gauge	Test Cell	581750	8104850	N/A	1.3 m	N/A	Thaw contained within cover throughout 2007.	Bi-weekly (June 1 - Sept 15)
Test Cell Dike									
BGC02-09	Thermistor	Test Cell Dike	581600	8104680	> 22 m	N/A	N/A	Entire profile continues cooling trend.	Quarterly
BGC03-22	Thermistor	Test Cell Dike	581660	8104650	> 20 m	N/A	N/A	Ground profile appears to be thawed below 20 m. Significant cooling observed between 5 and 17 m. Some cooling observed between 18 and 27 m.	Quarterly
BGC05-29	Thermistor	Test Cell Dike	581600	8104700	> 17 m	1.7 m	N/A	Frozen to approximately 17 m. Profile continues to cool, especially above 17 m. Active layer confined within shale fill at 1.6 m bgs.	Quarterly Bi-weekly June 1 - Sept 33
Toe of Test Cell Dike									
BGC05-27	Thermistor	Toe of Test Cell Dike	581720	8104540	> 17 m	N/A	N/A	Profile frozen below active layer to approximately 17 m bgs. Significant cooling observed between 5 and 17 m. Near surface thermistors nodes not placed appropriately for accurate monitoring of active layer thaw.	Quarterly Bi-weekly June 1 - Sept 30
BGC05-28	VW Piezo.	Toe of Test Cell Dike	581630	8104660	N/A	N/A	-2 m bgs	Approximately 2 m bgs, and slowly increasing. Pore water temperature approximately -0.3°C and stable.	Quarterly Bi-weekly June 1 - Sept 30
FG-9	Frost Gauge	Toe of Test Cell Dike	581600	8104685	N/A	>1.4 m	N/A	Thaw front migrated through cover between late July and Late August. Fluid from frost gauge has leaked, instrument now considered inoperational.	Bi-weekly (June 1 - Sept 15)
FG-10	Frost Gauge	Toe of Test Cell Dike	581635	8104750	N/A	>1.6 m	N/A	Thaw front migrated through cover between late July and Late August. Fluid from frost gauge has leaked, instrument now considered inoperational.	Bi-weekly (June 1 - Sept 15)

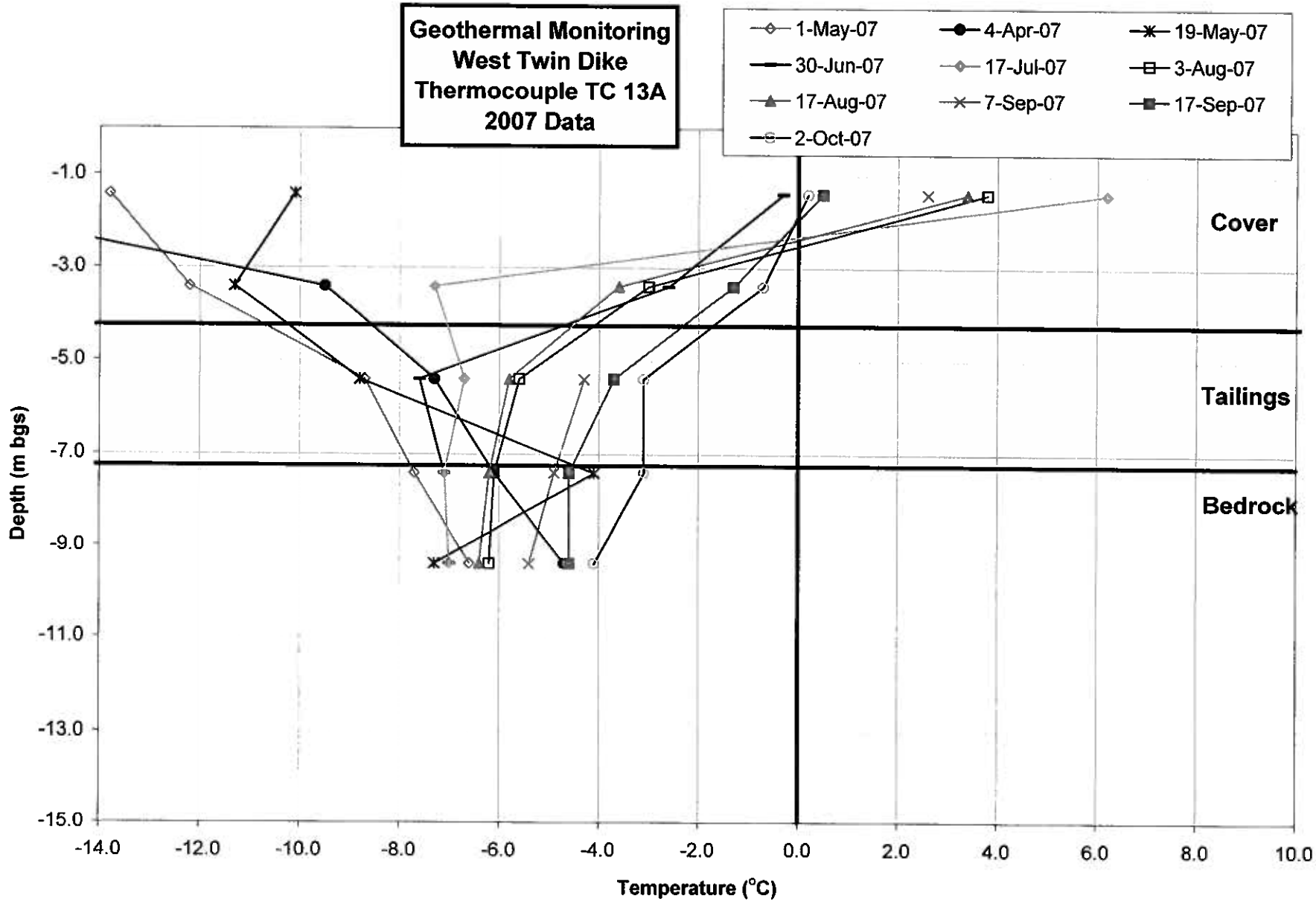
Table AIII-1 - Instrumention Program and Monitoring Requirements

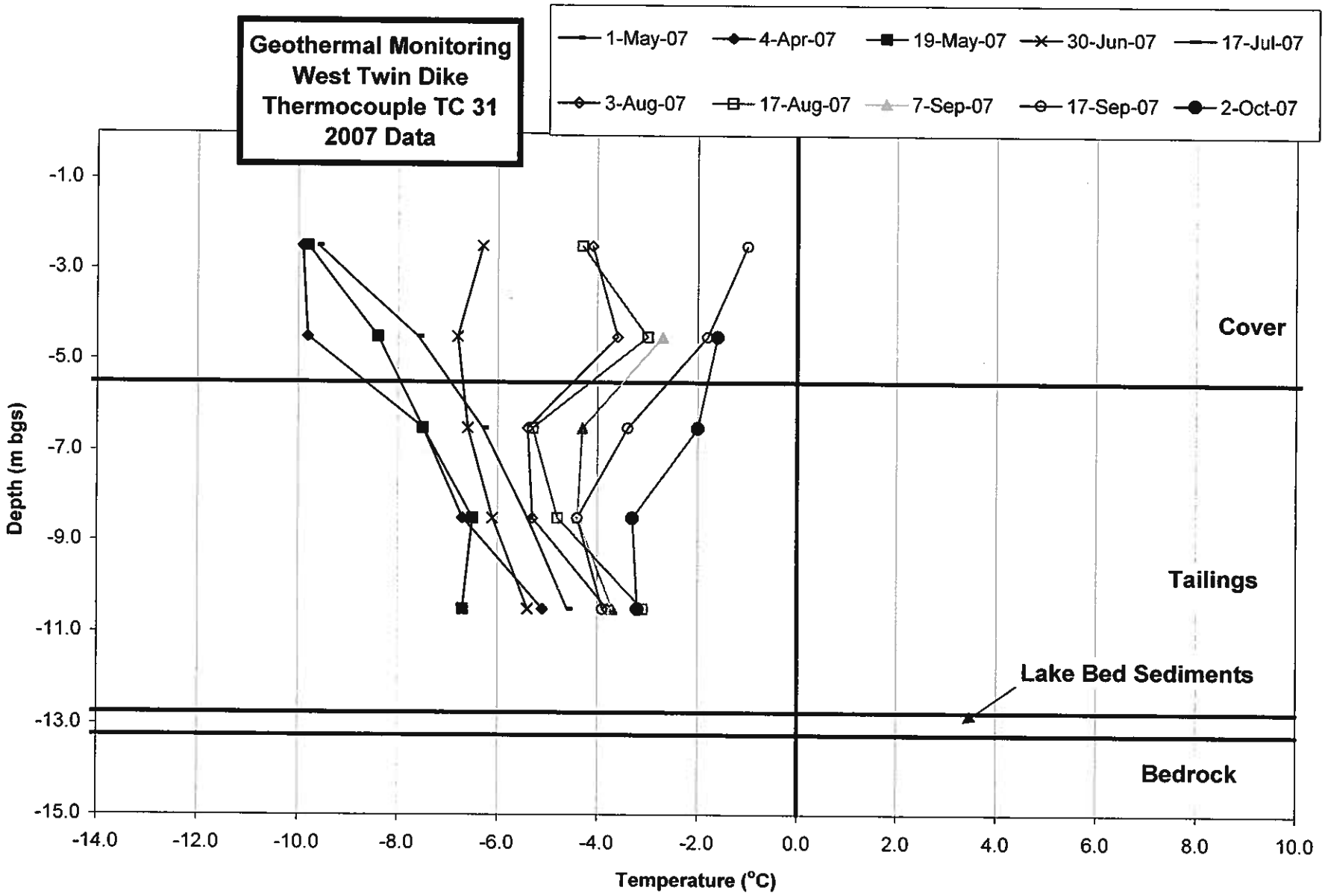
Summary of Instrument Readings Requirements									
Instrument Label	Instrument Type	Location	Easting	Northing	Thawed Interval (warmer than -0.5°C)	Max. Active Layer Thickness	Pore Pressures	Comments	Recommended 2008 Monitoring Frequency
Oceanview Pit									
BGC05-01	Thermistor	Oceanview Pit	579250	8106310	NONE	1.6 m	N/A	Entire profile continues cooling trend. Geothermal performance of cover improved comared to 2007.	Quarterly Bi-weekly June 1 - Sept 30
FG-16	Frost Gauge	Oceanview Pit	585440	8107580	N/A	1.4 m	N/A	Thaw contained within cover throughout 2007.	Bi-weekly (June 1 - Sept 15)
East Open Pit									
BGC05-02	Thermistor	East Open Pit	583250	8107045	NONE	1.8 m	N/A	Active layer contained within cover throughout 2007, waste rock backfill remained frozen throughout 2007. Geothermal performance of cover improved compared to 2006.	Quarterly Bi-weekly June 1 - Sept 30
BGC05-03	Thermistor	East Open Pit	583320	8107090	NONE	3 m	N/A	Significant freezeback of waste rock in 2007. Geothermal performance of cover improved compared to 2006.	Quarterly Bi-weekly June 1 - Sept 30
FG-13	Frost Gauge	East Open Pit	583250	8107050	N/A	N/A	N/A	Thaw front migrated through cover between late July and Late August. Fluid from frost gauge has leaked, instrument now considered inoperational.	Bi-weekly (June 1 - Sept 15)
FG-14	Frost Gauge	East Open Pit	583330	8107150	N/A	2.3 m	N/A	Thaw contained within cover throughout 2007.	Bi-weekly (June 1 - Sept 15)
Landfill									
BGC05-30	Thermistor	Landfill	579165	8106300	NONE	2.0 m	N/A	Continued cooling observed throughout landfill debris profile. Thaw continaed within cover throughout 2007. Geothermal performance of cover improved in 2007 compared to 2006.	Quarterly Bi-weekly June 1 - Sept 30
FG-11	Frost Gauge	Landfill	579253	8106323	N/A	1.8 m	N/A	Thaw contained within cover throughout 2007.	Bi-weekly (June 1 - Sept 15)
FG-12	NOT INSTALLED								
Area 14									
TC7	Thermocouple	Area 14	N/A	N/A	NONE	2 m	N/A	Thaw contained within cover throughout 2007.	Quarterly
FG-15	Frost Gauge	Area 14	584130	8105360	N/A	1.3 m	N/A	Thaw contained within cover throughout 2007.	Bi-weekly (June 1 - Sept 15)
Upper Dump Pond									
FG-17	Frost Gauge	Upper Dump Pond			N/A	2 m	N/A	Thaw contain within cover throughout 2007. Geothermal performance of cover improved in 2007 compared to 2006.	Bi-weekly (June 1 - Sept 15)

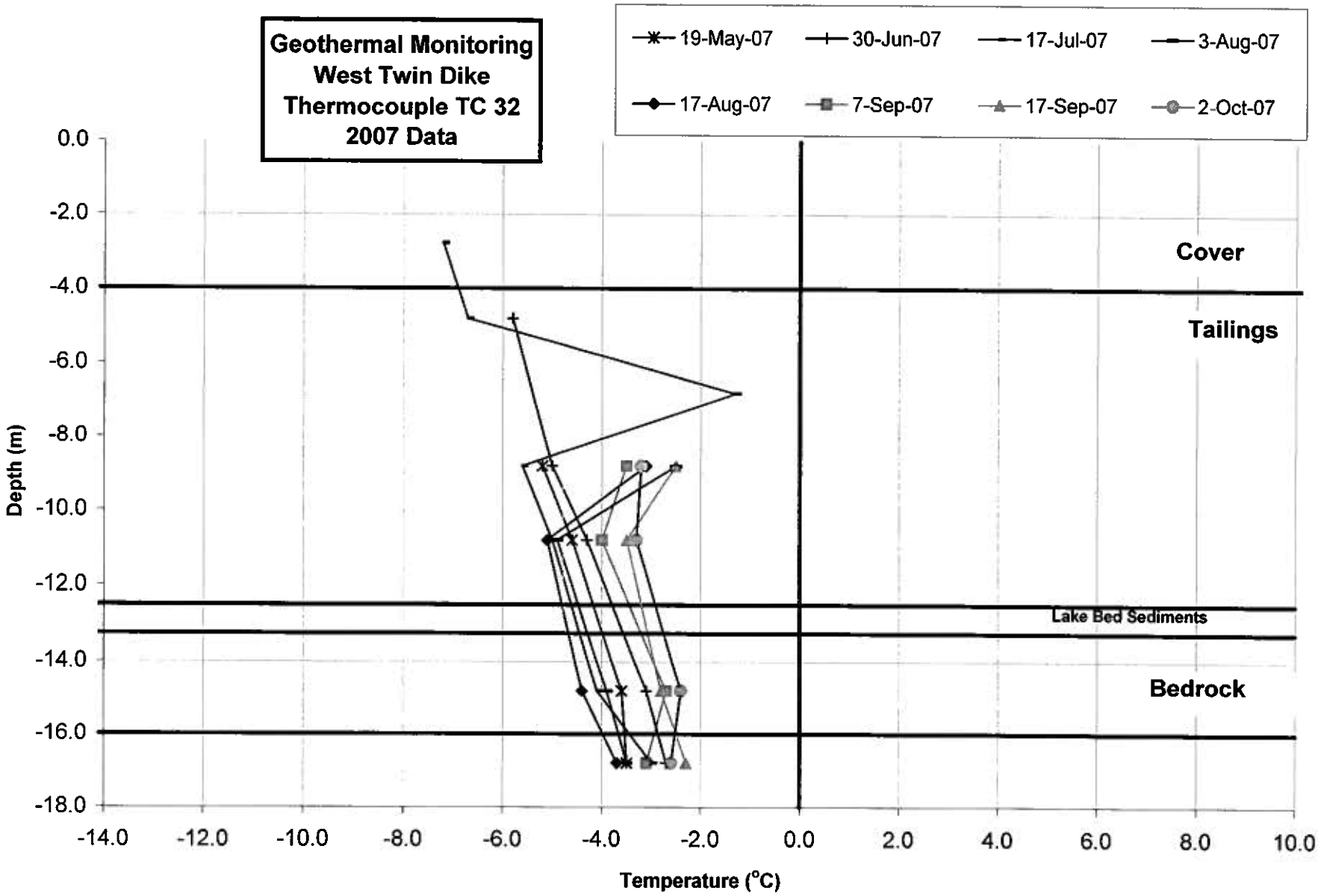
Notes:
Quarterly readings to be taken during December, Late April, Early July, Late August.
Frost Gauges to be read weekly between June 1 and Sept. 15.

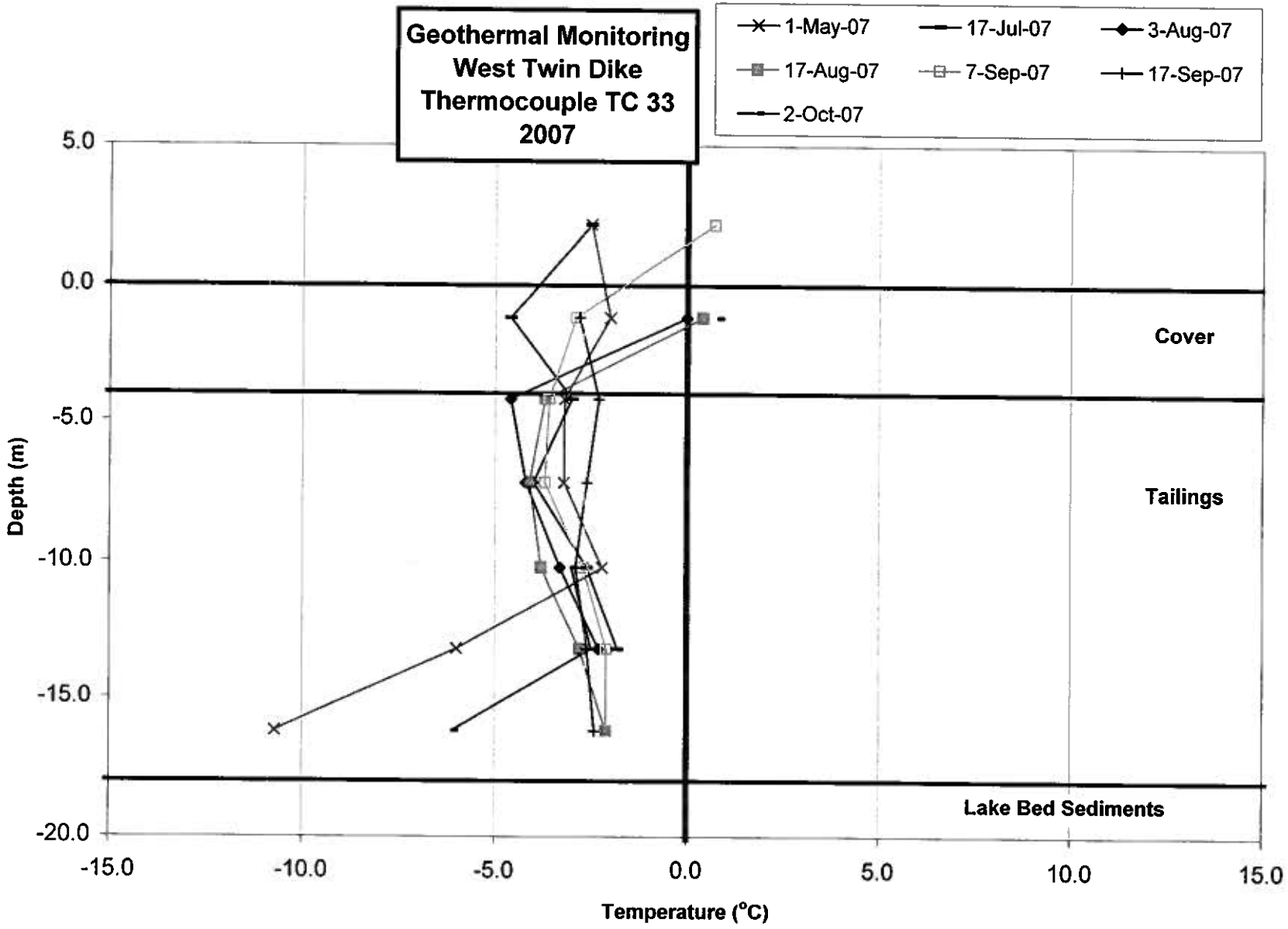
West Twin Dike


Geothermal Monitoring
West Twin Dike
Thermocouple TC 12
2007 Data
1-May-07
30-Jun-07
17-Jul-07
3-Aug-07
17-Aug-07
7-Sep-07
17-Sep-07
2-Oct-07
Depth (m bgs)
0.0
-1.0
-2.0
-3.0
-4.0
-5.0
-6.0
Cover
Tailings
Lake Bed Sediments
Bedrock
-14.0
-12.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0
Temperature (°C)

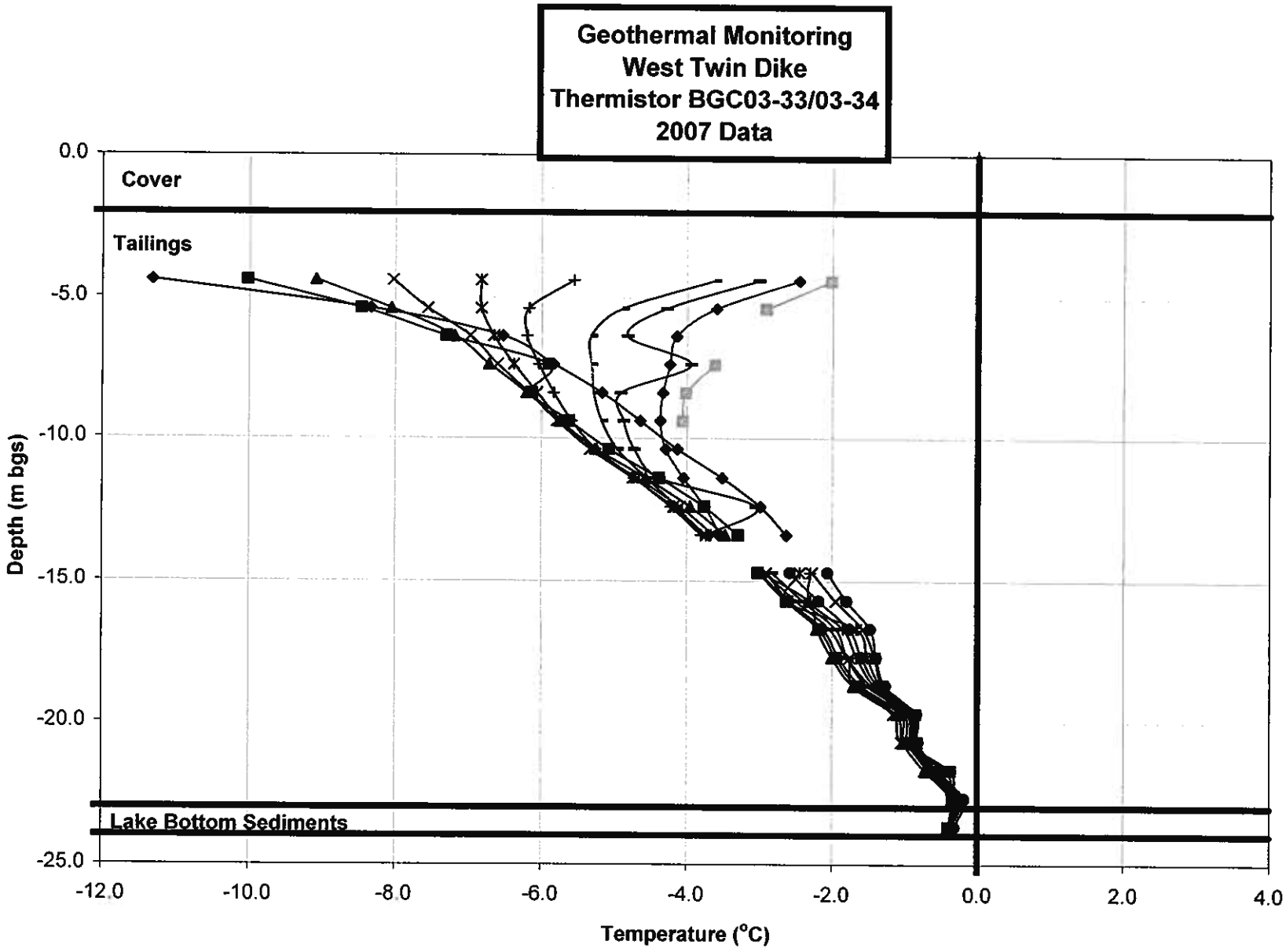

Geothermal Monitoring
West Twin Dike
Thermocouple TC 13A
2007 Data
1-May-07
4-Apr-07
19-May-07
30-Jun-07
17-Jul-07
3-Aug-07
17-Aug-07
7-Sep-07
17-Sep-07
2-Oct-07
Cover
Tailings
Bedrock
Depth (m bgs)
-1.0
-3.0
-5.0
-7.0
-9.0
-11.0
-13.0
-15.0
-14.0
-12.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0
8.0
10.0
Temperature (°C)

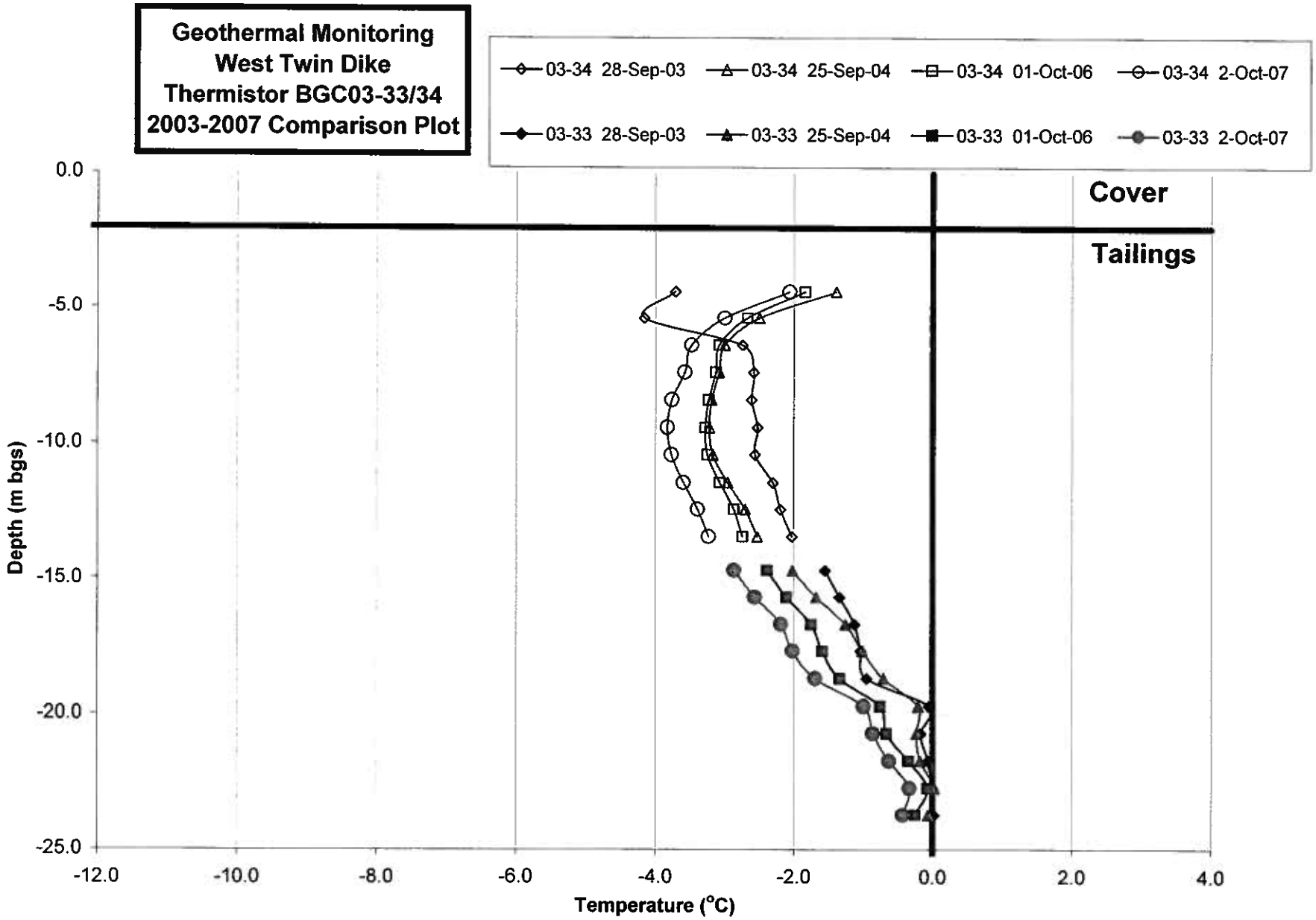

Geothermal Monitoring
West Twin Dike
Thermocouple TC 31
2007 Data
1-May-07
4-Apr-07
19-May-07
30-Jun-07
17-Jul-07
3-Aug-07
17-Aug-07
7-Sep-07
17-Sep-07
2-Oct-07
Depth (m bgs)
-1.0
-3.0
-5.0
-7.0
-9.0
-11.0
-13.0
-15.0
Cover
Tailings
Lake Bed Sediments
Bedrock
-14.0
-12.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0
8.0
10.0
Temperature (°C)


Geothermal Monitoring
West Twin Dike
Thermocouple TC 32
2007 Data
19-May-07
30-Jun-07
17-Jul-07
3-Aug-07
17-Aug-07
7-Sep-07
17-Sep-07
2-Oct-07
Cover
Tailings
Lake Bed Sediments
Bedrock
Depth (m)
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-14.0
-16.0
-18.0
-14.0
-12.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0
8.0
10.0
Temperature (°C)

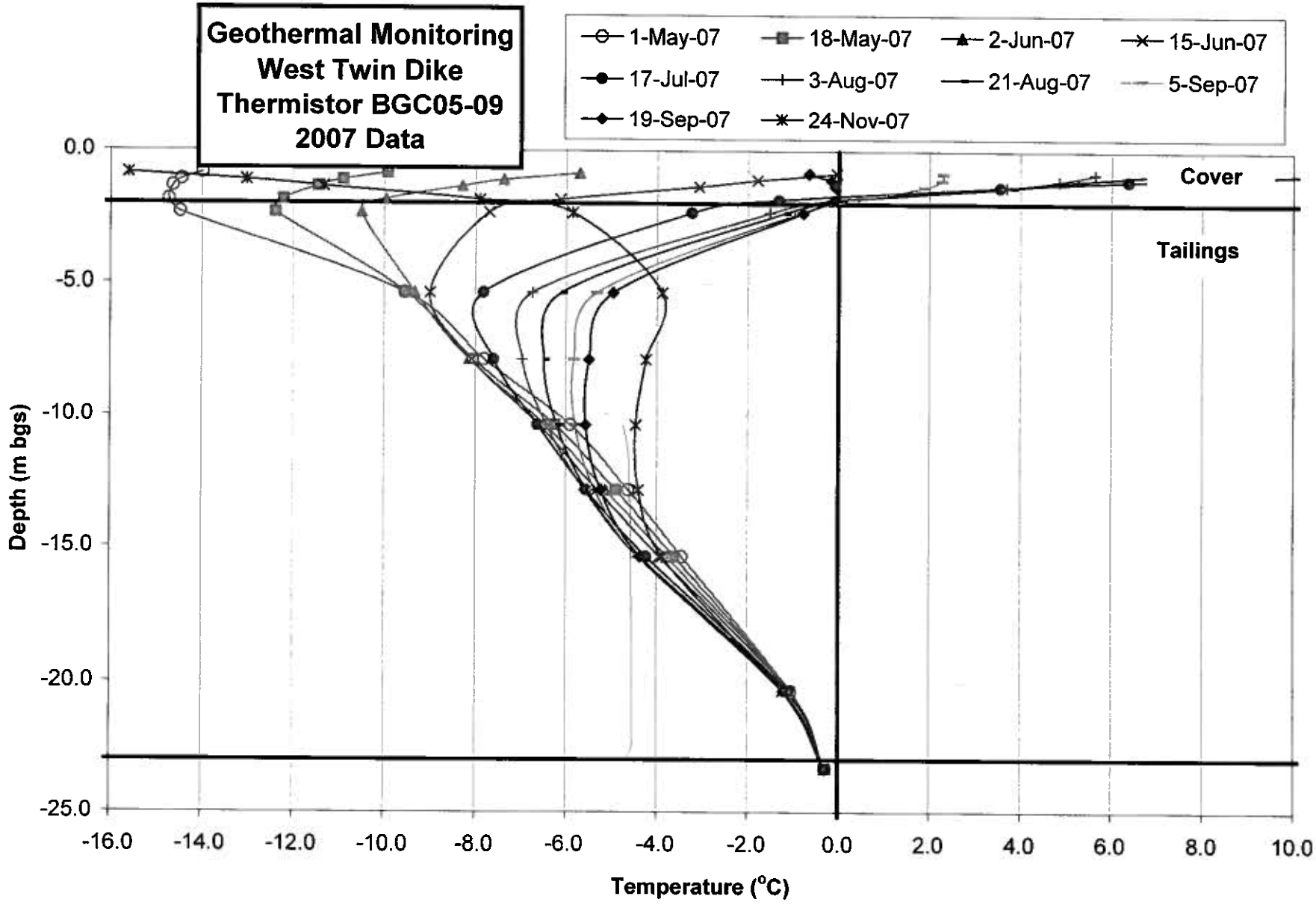


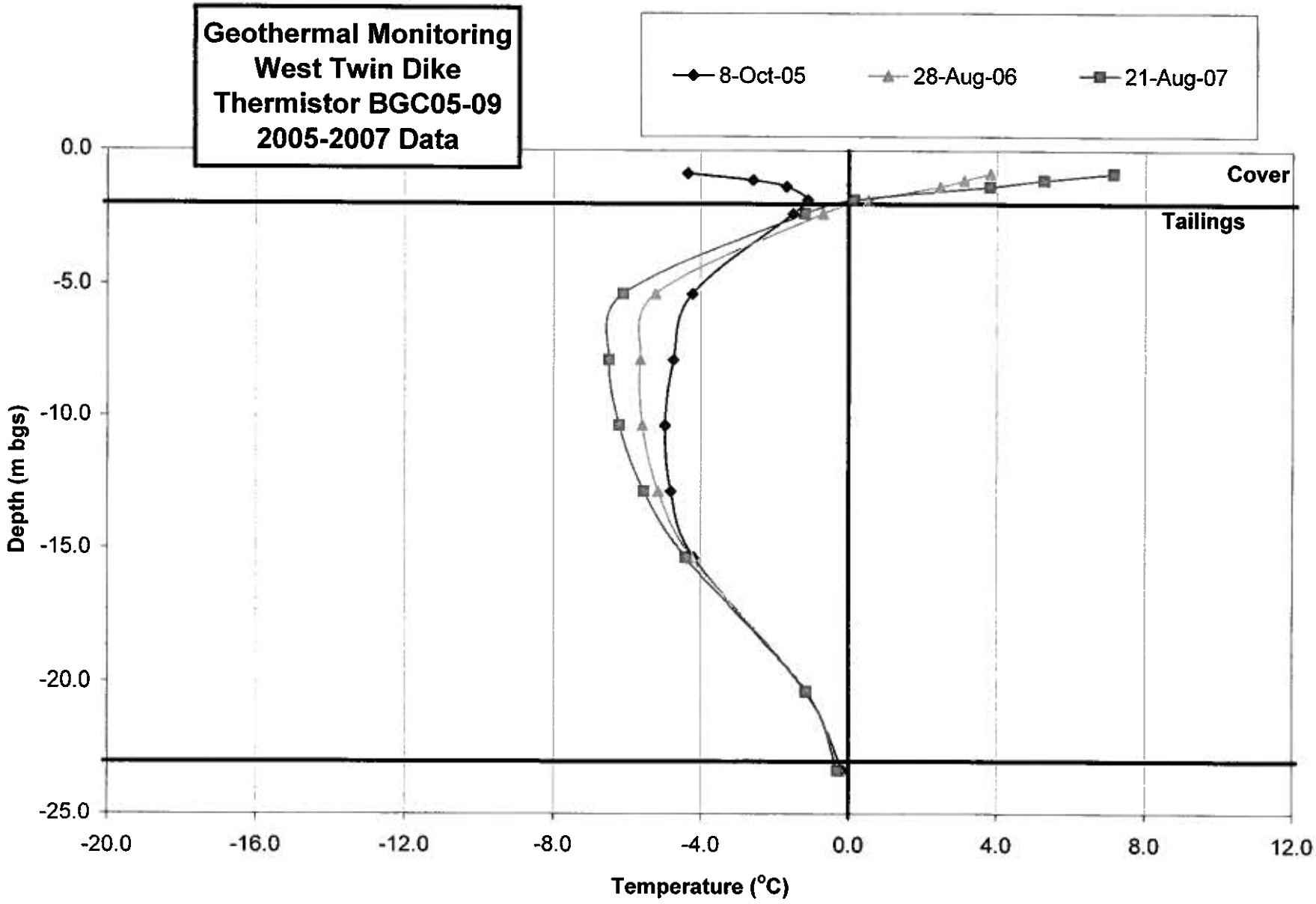
WT Dike.xls
TC#33 trmp

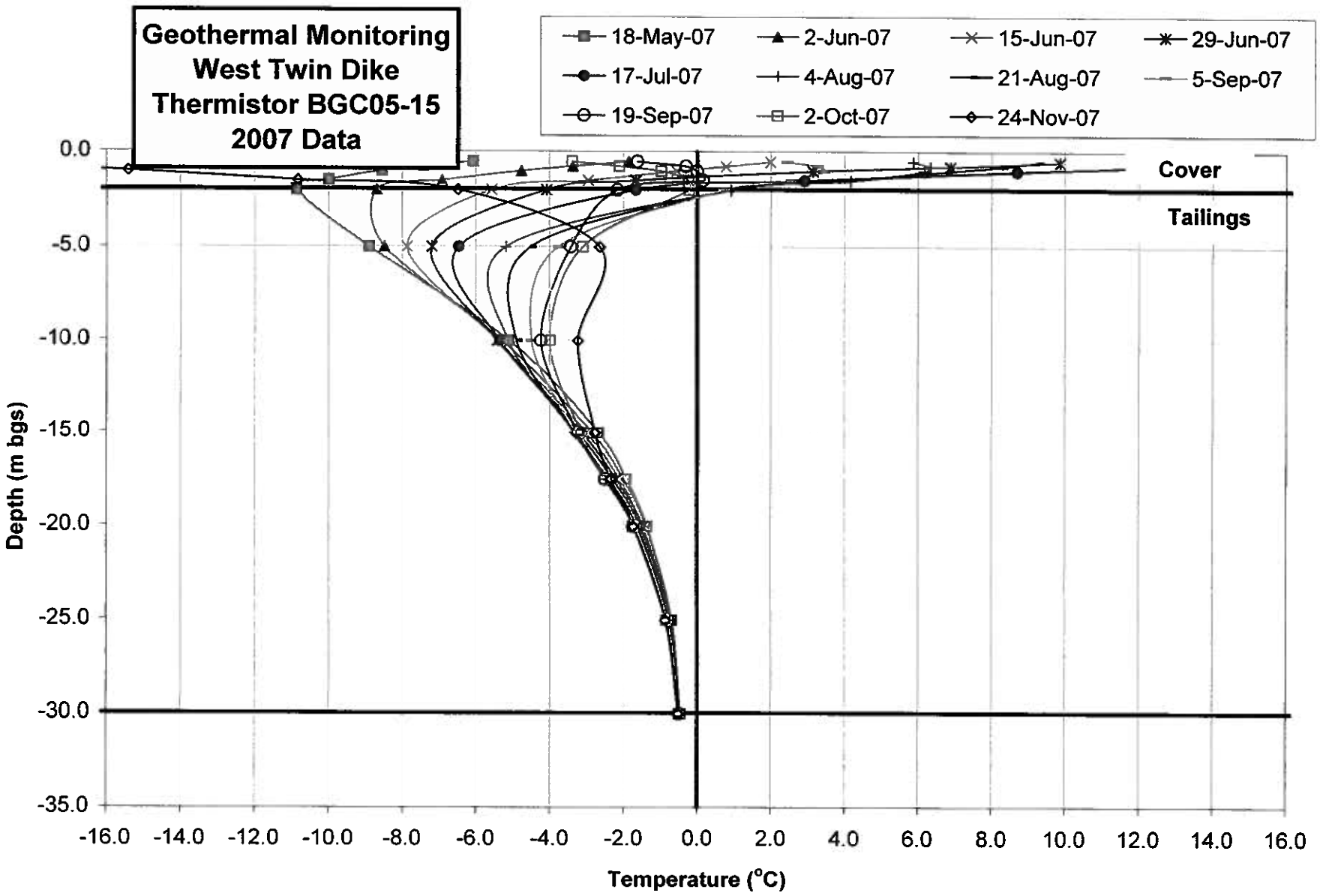

Geothermal Monitoring
West Twin Dike
Thermistor BGC03-33/03-34
2007 Data
Cover
Tailings
Lake Bottom Sediments
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-12.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
Temperature (°C)

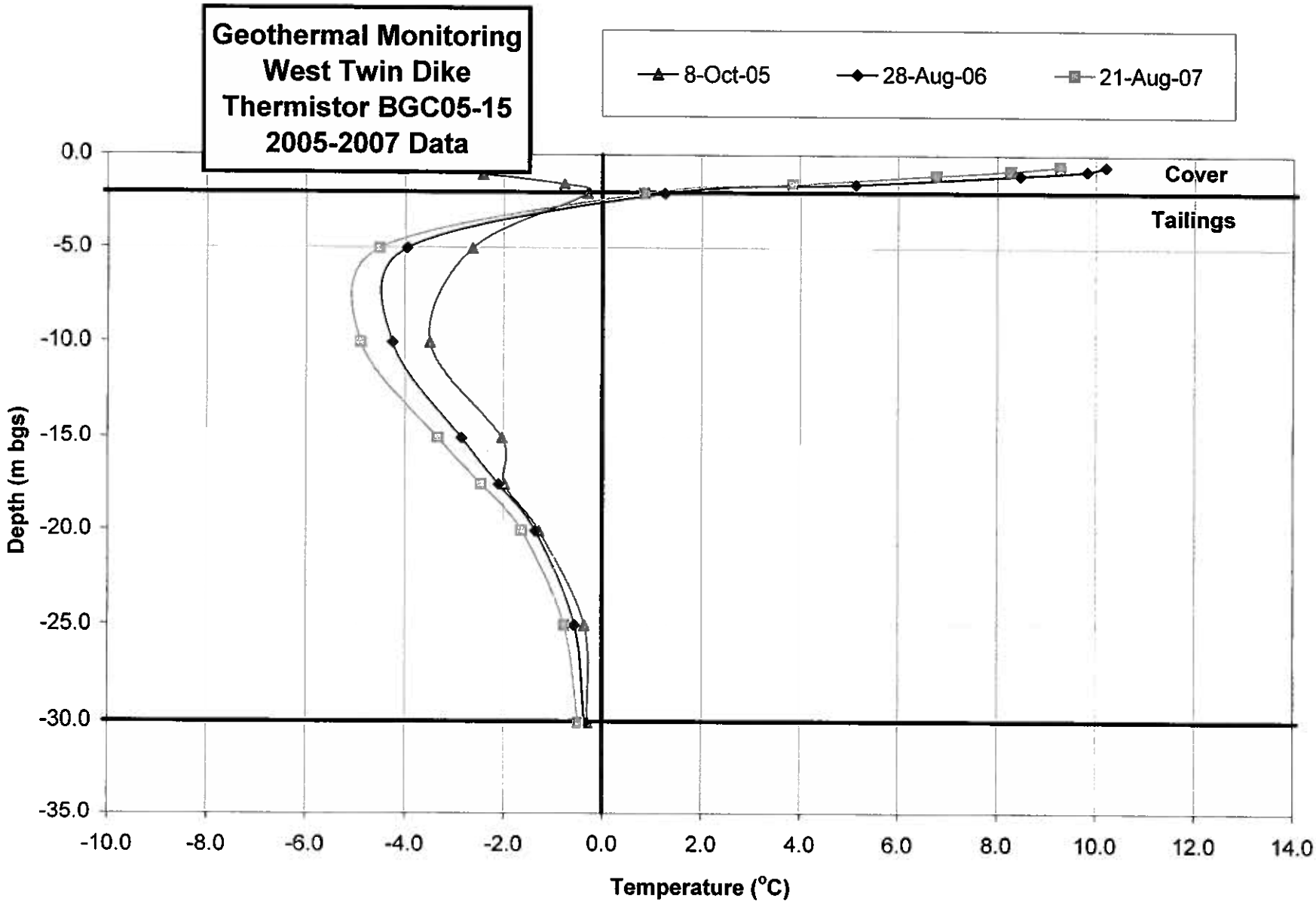


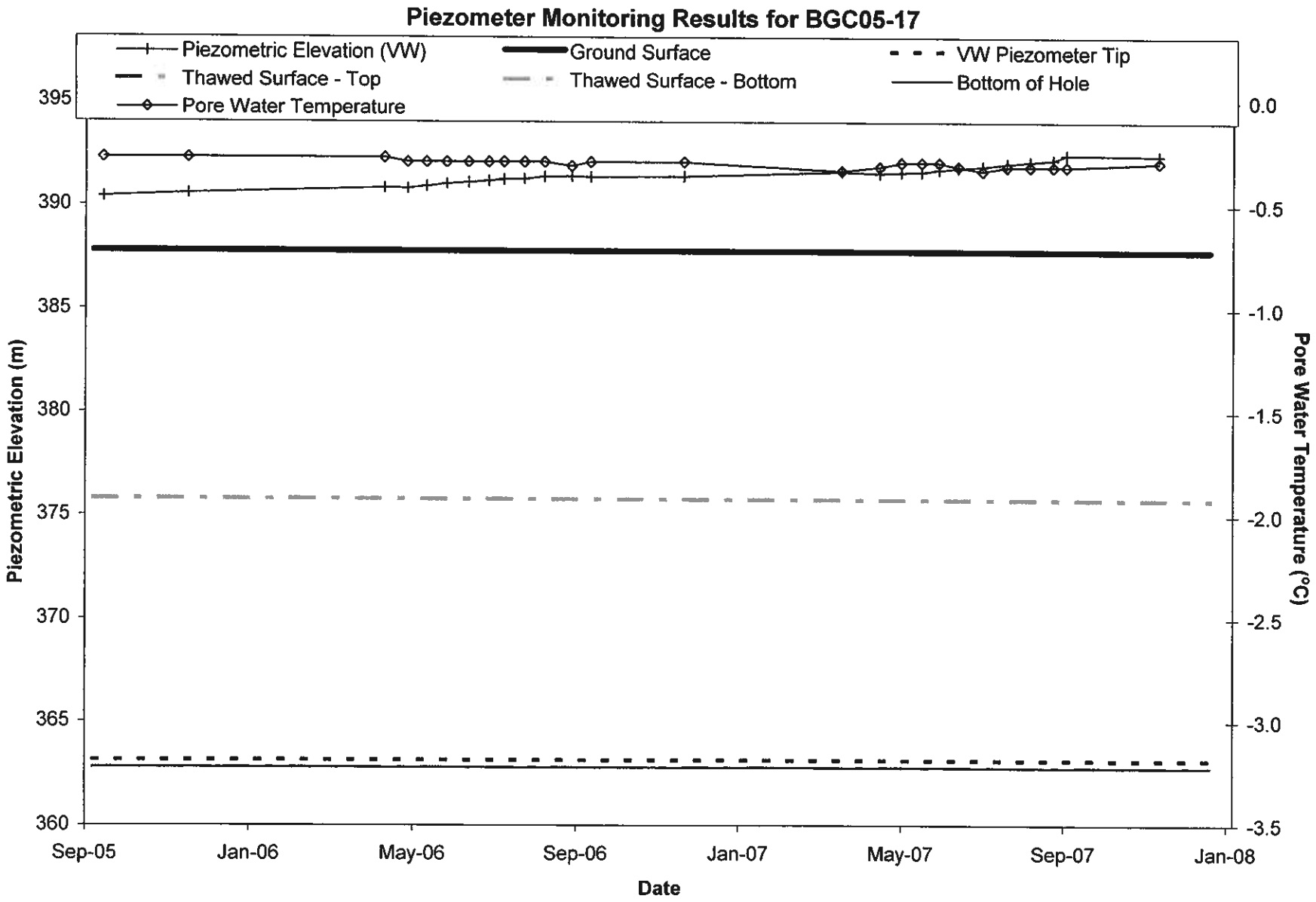
WT Dike.xls
03-33and34 TR Comp


Geothermal Monitoring
West Twin Dike
Thermistor BGC05-09
2007 Data
1-May-07
18-May-07
2-Jun-07
15-Jun-07
17-Jul-07
3-Aug-07
21-Aug-07
5-Sep-07
19-Sep-07
24-Nov-07
Cover
Tailings
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-16.0
-14.0
-12.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0
8.0
10.0
Temperature (°C)

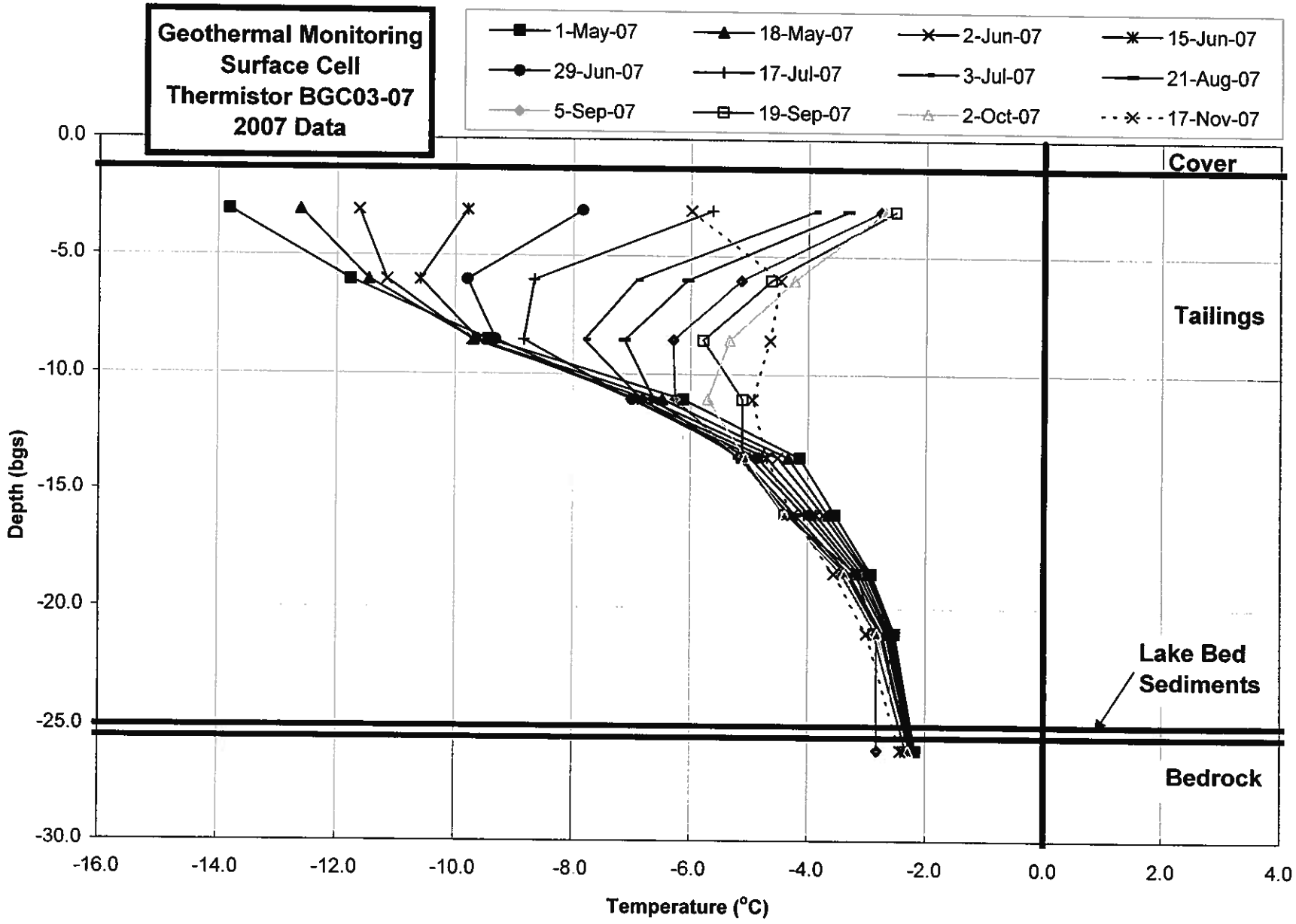

Geothermal Monitoring
West Twin Dike
Thermistor BGC05-09
2005-2007 Data
8-Oct-05
28-Aug-06
21-Aug-07
Cover
Tailings
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-20.0
-16.0
-12.0
-8.0
-4.0
0.0
4.0
8.0
12.0
Temperature (°C)

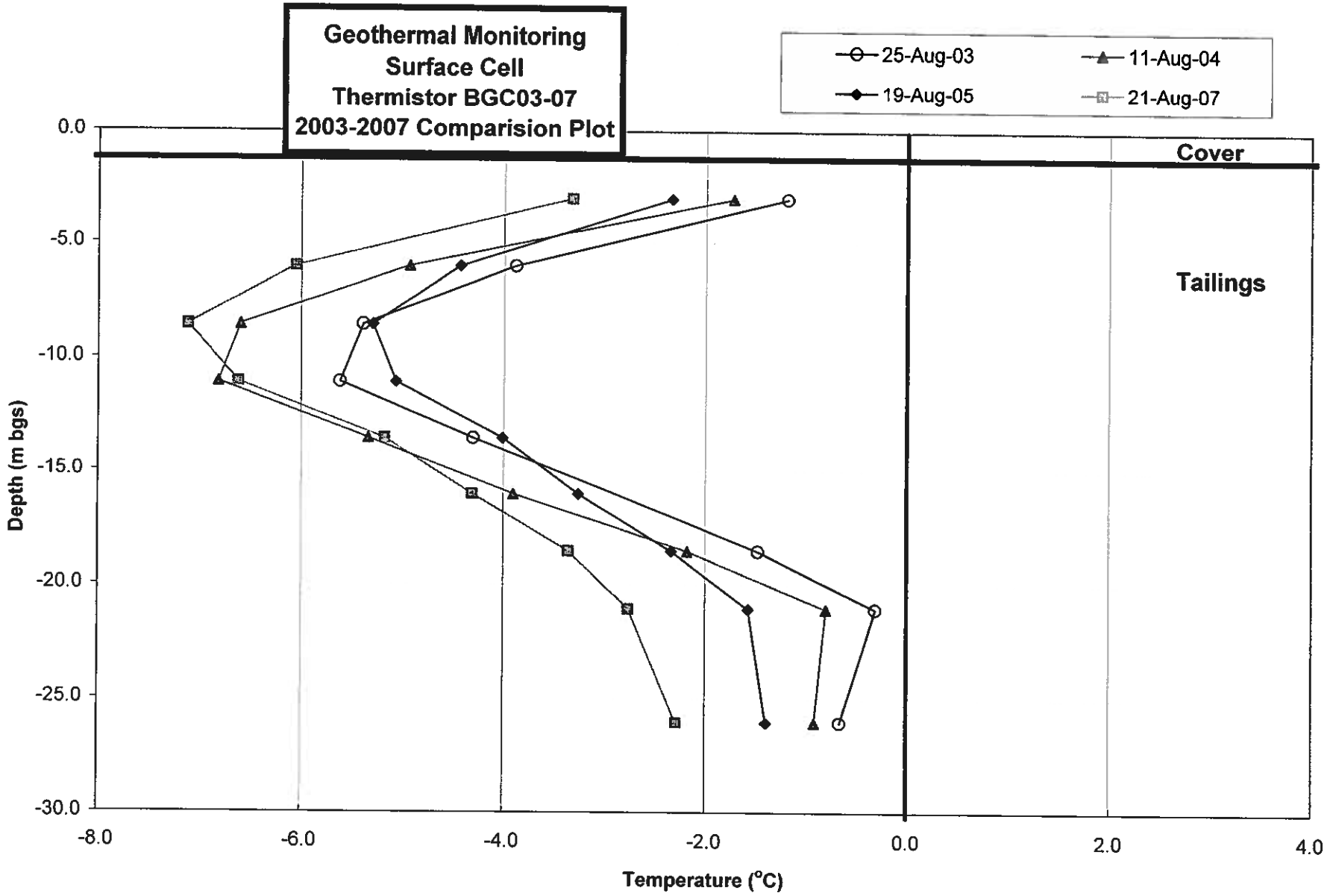

Geothermal Monitoring
West Twin Dike
Thermistor BGC05-15
2007 Data
18-May-07
2-Jun-07
15-Jun-07
29-Jun-07
17-Jul-07
4-Aug-07
21-Aug-07
5-Sep-07
19-Sep-07
2-Oct-07
24-Nov-07
Cover
Tailings
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-16.0
-14.0
-12.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
Temperature (°C)

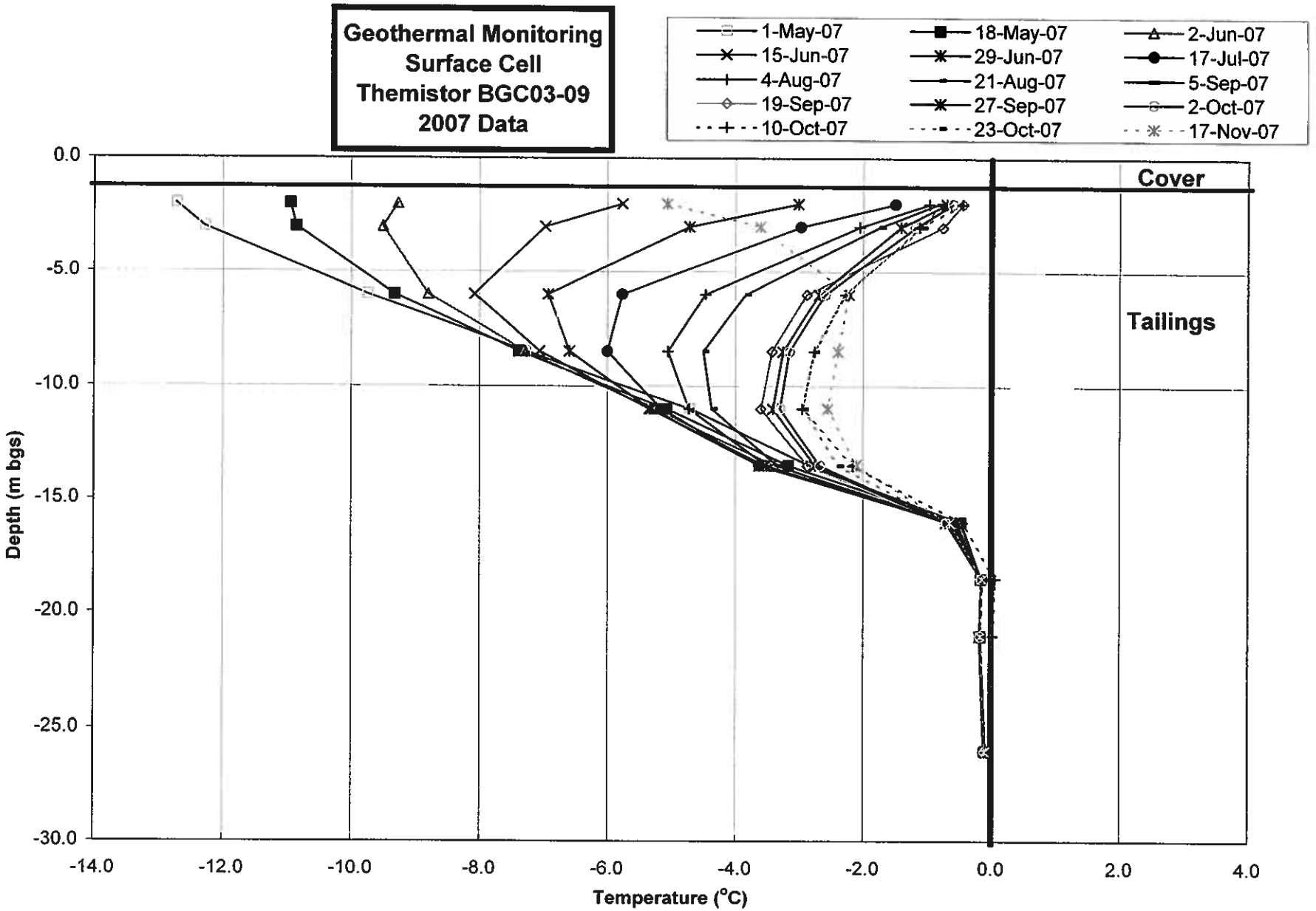

Geothermal Monitoring
West Twin Dike
Thermistor BGC05-15
2005-2007 Data
8-Oct-05
28-Aug-06
21-Aug-07
Cover
Tailings
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Temperature (°C)

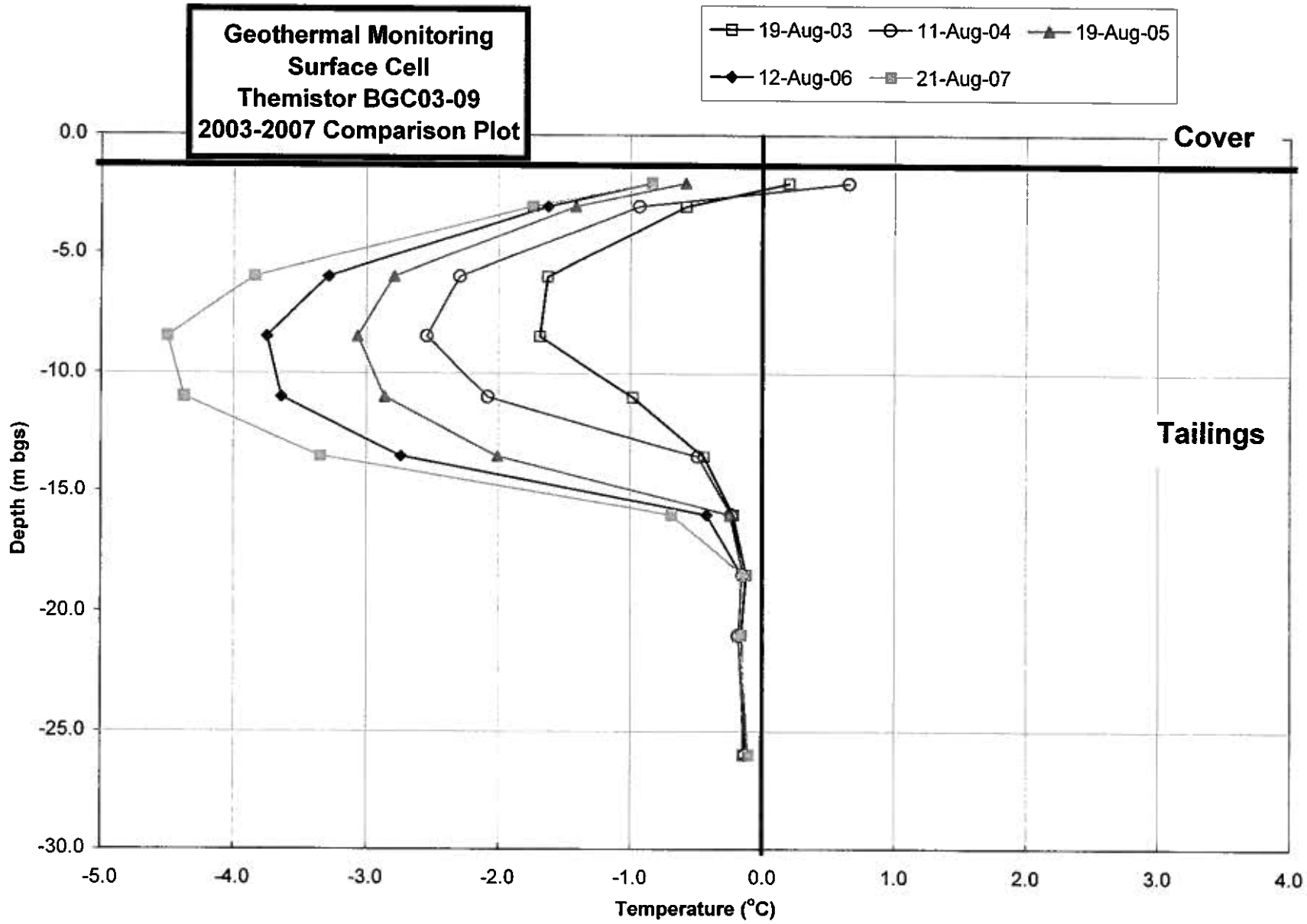

Piezometer Monitoring Results for BGC05-17
Piezometric Elevation (VW)
Ground Surface
VW Piezometer Tip
Thawed Surface - Top
Thawed Surface - Bottom
Bottom of Hole
Pore Water Temperature
Piezometric Elevation (m)
Pore Water Temperature (°C)
395
390
385
380
375
370
365
360
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
Sep-05
Jan-06
May-06
Sep-06
Jan-07
May-07
Sep-07
Jan-08
Date

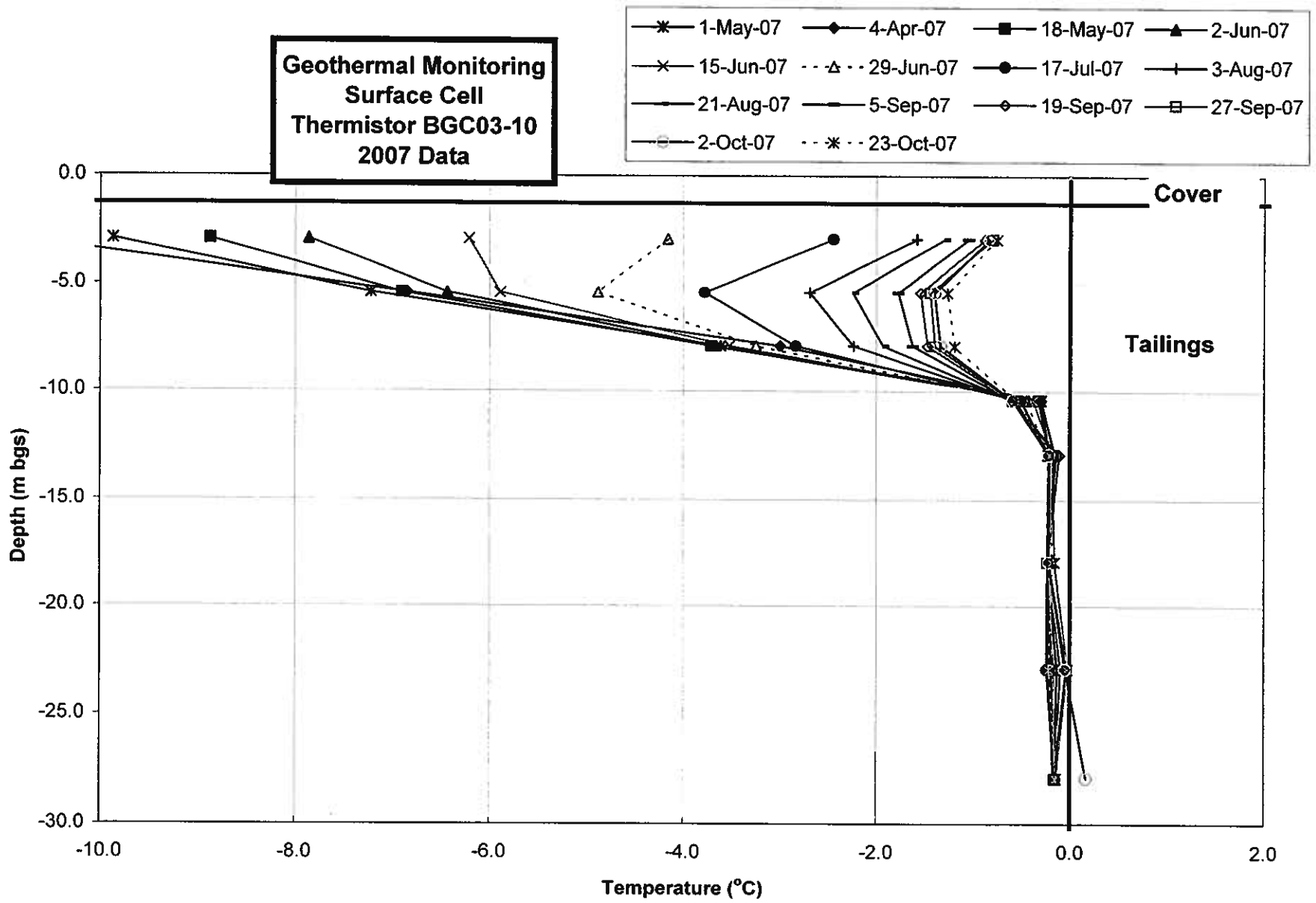
Surface Cell

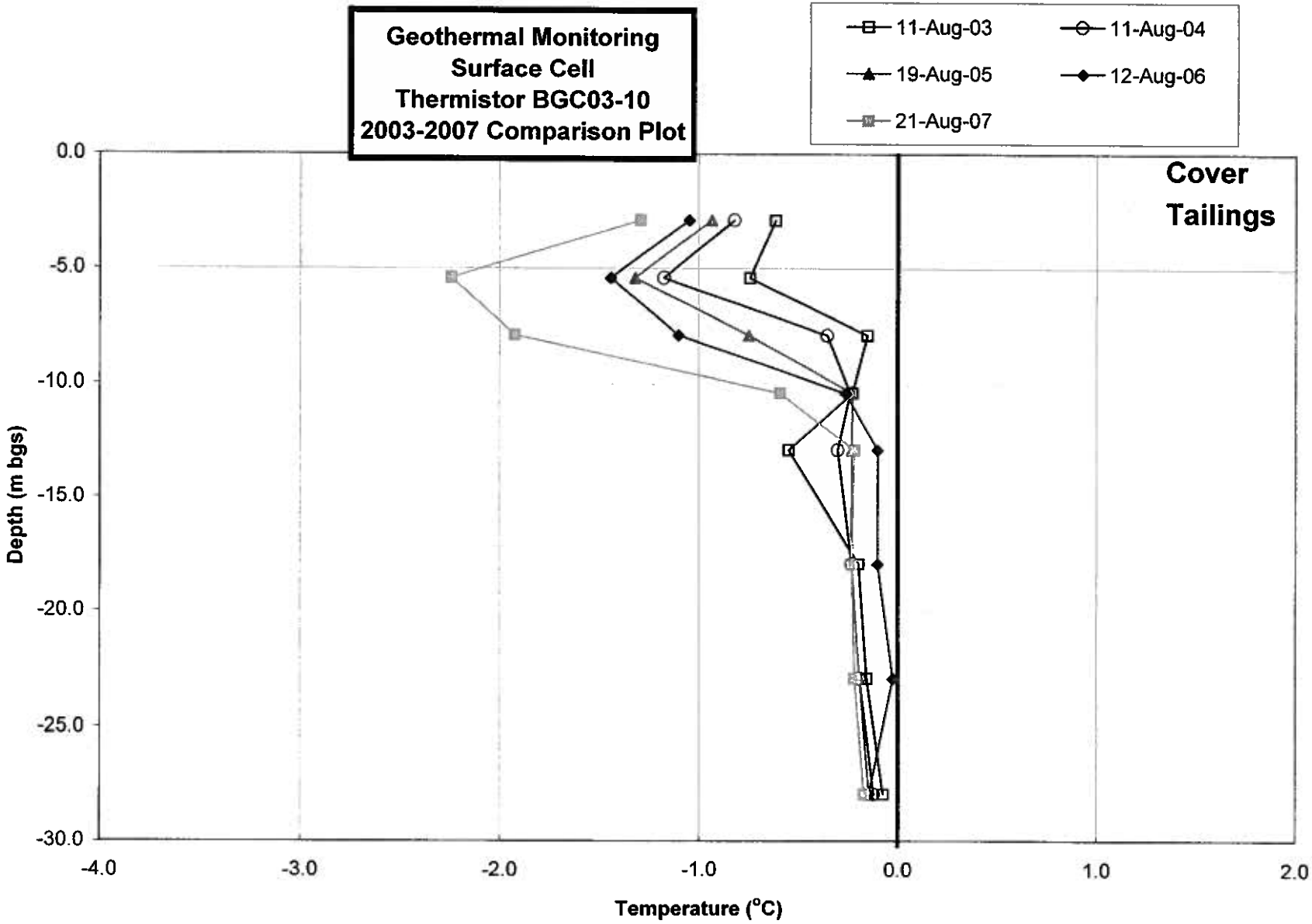

Geothermal Monitoring
Surface Cell
Thermistor BGC03-07
2007 Data
1-May-07
18-May-07
2-Jun-07
15-Jun-07
29-Jun-07
17-Jul-07
3-Jul-07
21-Aug-07
5-Sep-07
19-Sep-07
2-Oct-07
17-Nov-07
Cover
Tailings
Lake Bed
Sediments
Bedrock
Depth (bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-16.0
-14.0
-12.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
Temperature (°C)

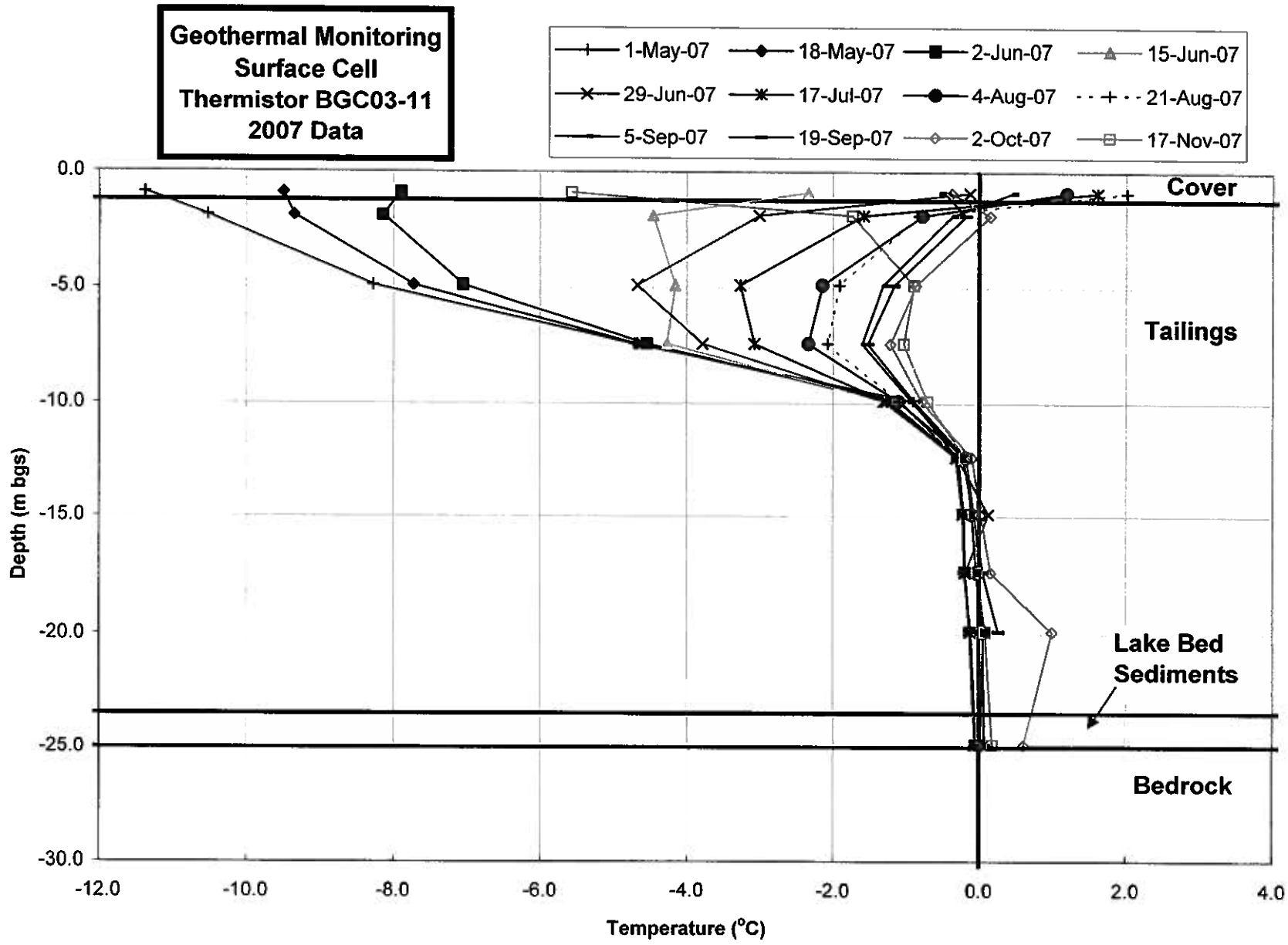

Geothermal Monitoring
Surface Cell
Thermistor BGC03-07
2003-2007 Comparision Plot
25-Aug-03
11-Aug-04
19-Aug-05
21-Aug-07
Cover
Tailings
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
Temperature (°C)

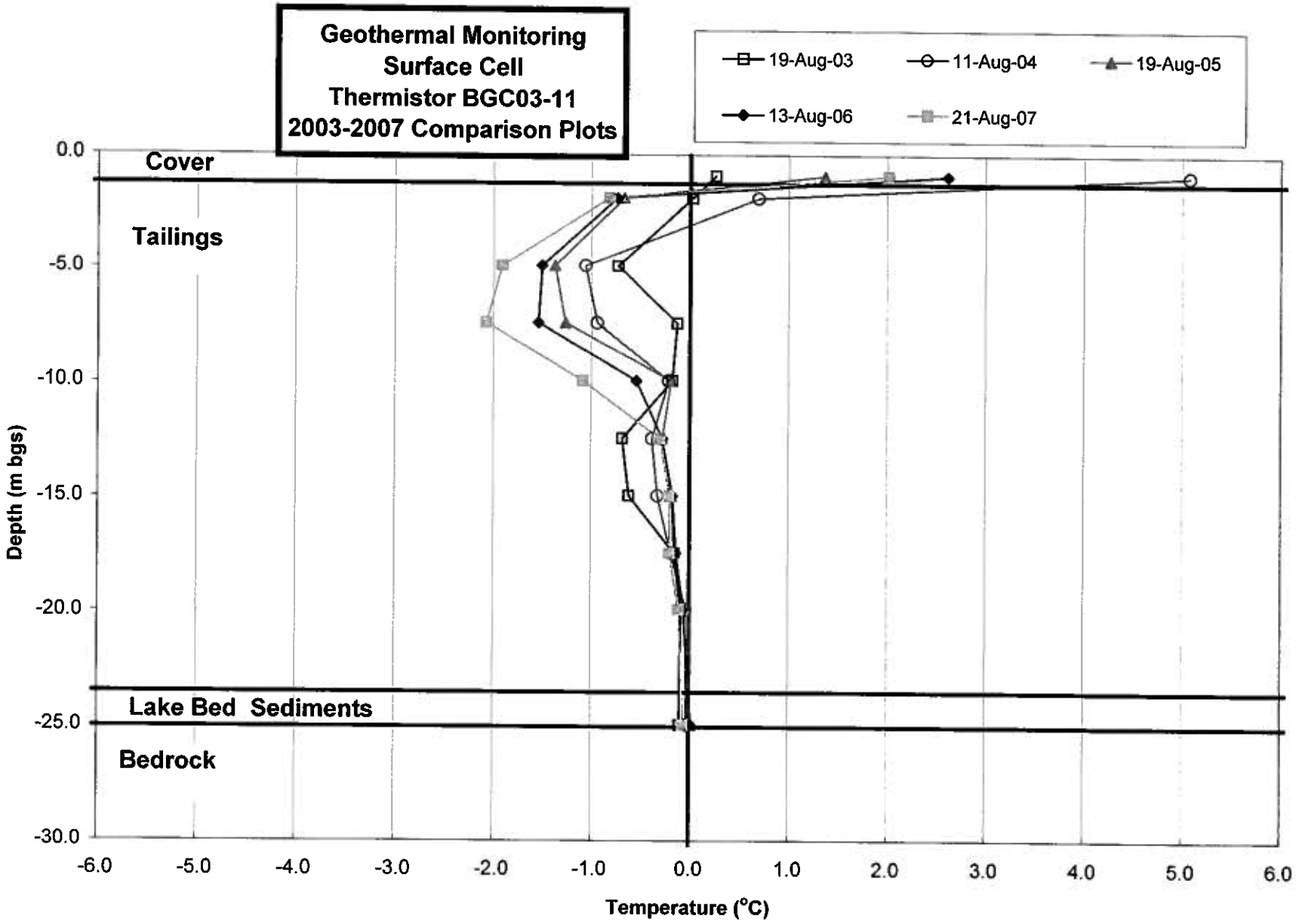

Geothermal Monitoring
Surface Cell
Themistor BGC03-09
2007 Data
1-May-07
18-May-07
2-Jun-07
15-Jun-07
29-Jun-07
17-Jul-07
4-Aug-07
21-Aug-07
5-Sep-07
19-Sep-07
27-Sep-07
2-Oct-07
10-Oct-07
23-Oct-07
17-Nov-07
Cover
Tailings
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-14.0
-12.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
Temperature (°C)

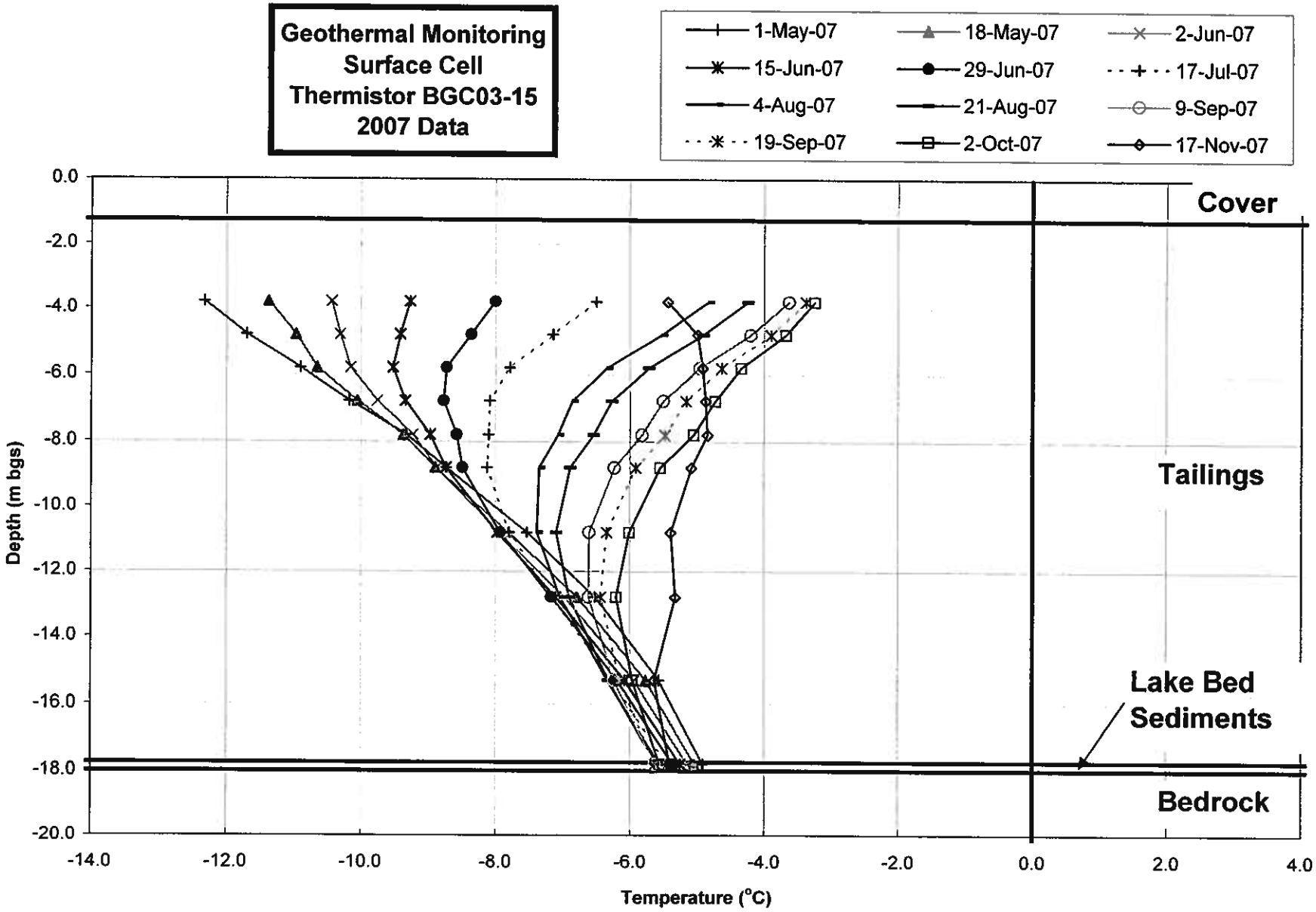

Geothermal Monitoring
Surface Cell
Themistor BGC03-09
2003-2007 Comparison Plot
19-Aug-03
11-Aug-04
19-Aug-05
12-Aug-06
21-Aug-07
Cover
Tailings
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-5.0
-4.0
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
Temperature (°C)

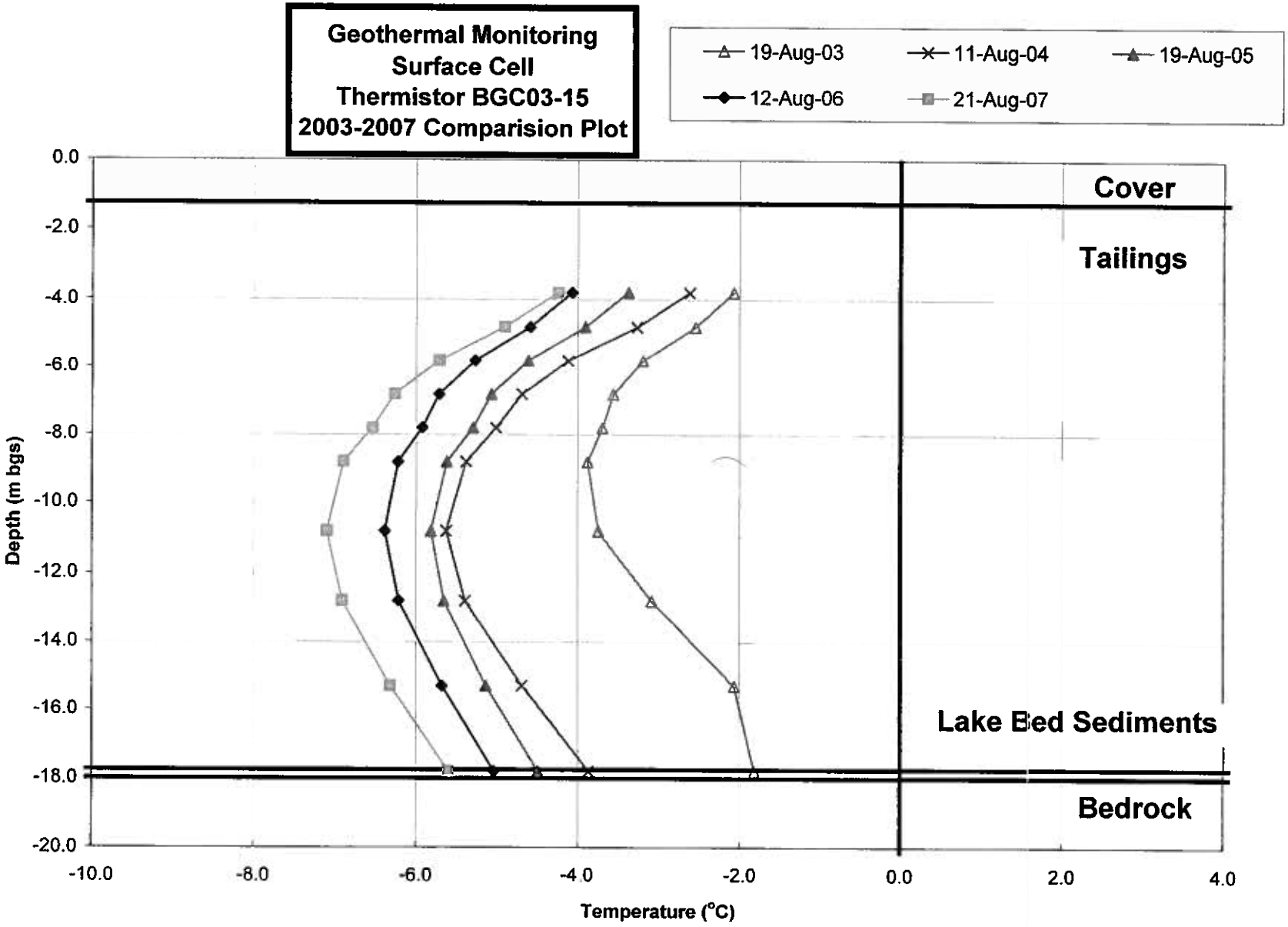

Geothermal Monitoring
Surface Cell
Thermistor BGC03-10
2007 Data
1-May-07
4-Apr-07
18-May-07
2-Jun-07
15-Jun-07
29-Jun-07
17-Jul-07
3-Aug-07
21-Aug-07
5-Sep-07
19-Sep-07
27-Sep-07
2-Oct-07
23-Oct-07
Cover
Tailings
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
Temperature (°C)

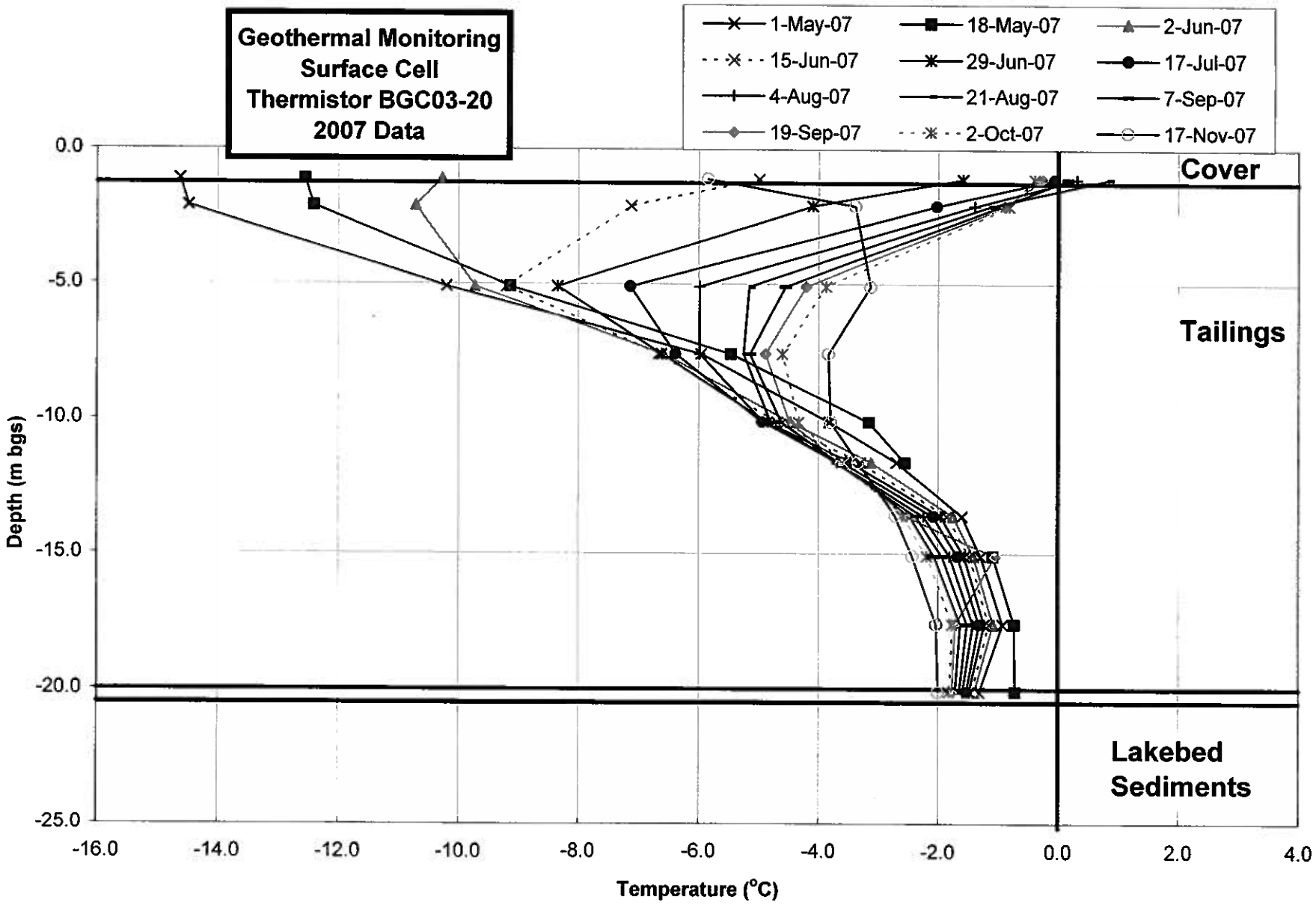

Geothermal Monitoring
Surface Cell
Thermistor BGC03-10
2003-2007 Comparison Plot
11-Aug-03
11-Aug-04
19-Aug-05
12-Aug-06
21-Aug-07
Cover
Tailings
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-4.0
-3.0
-2.0
-1.0
0.0
1.0
2.0
Temperature (°C)

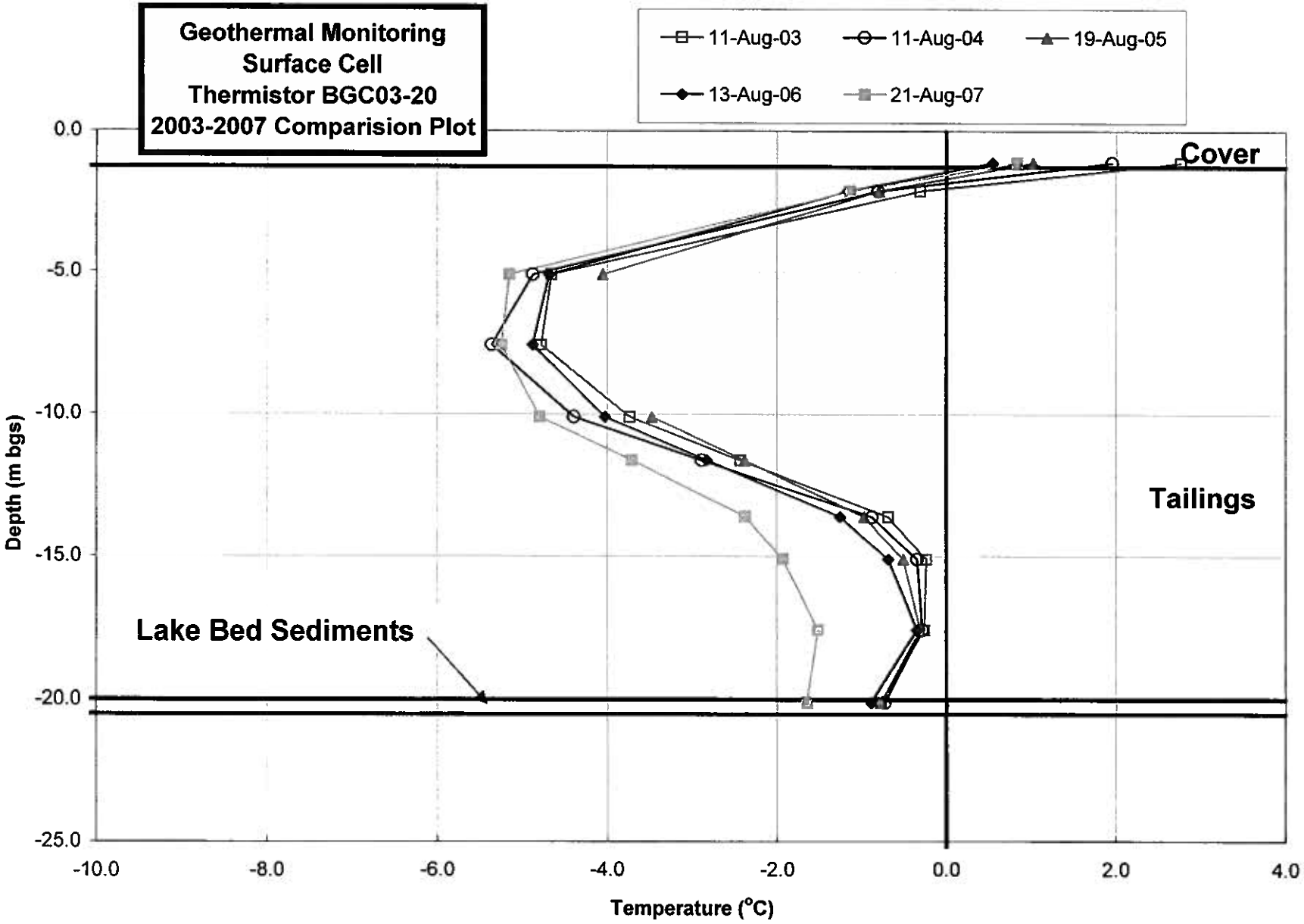

Geothermal Monitoring
Surface Cell
Thermistor BGC03-11
2007 Data
1-May-07
18-May-07
2-Jun-07
15-Jun-07
29-Jun-07
17-Jul-07
4-Aug-07
21-Aug-07
5-Sep-07
19-Sep-07
2-Oct-07
17-Nov-07
Cover
Tailings
Lake Bed
Sediments
Bedrock
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-12.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
Temperature (°C)

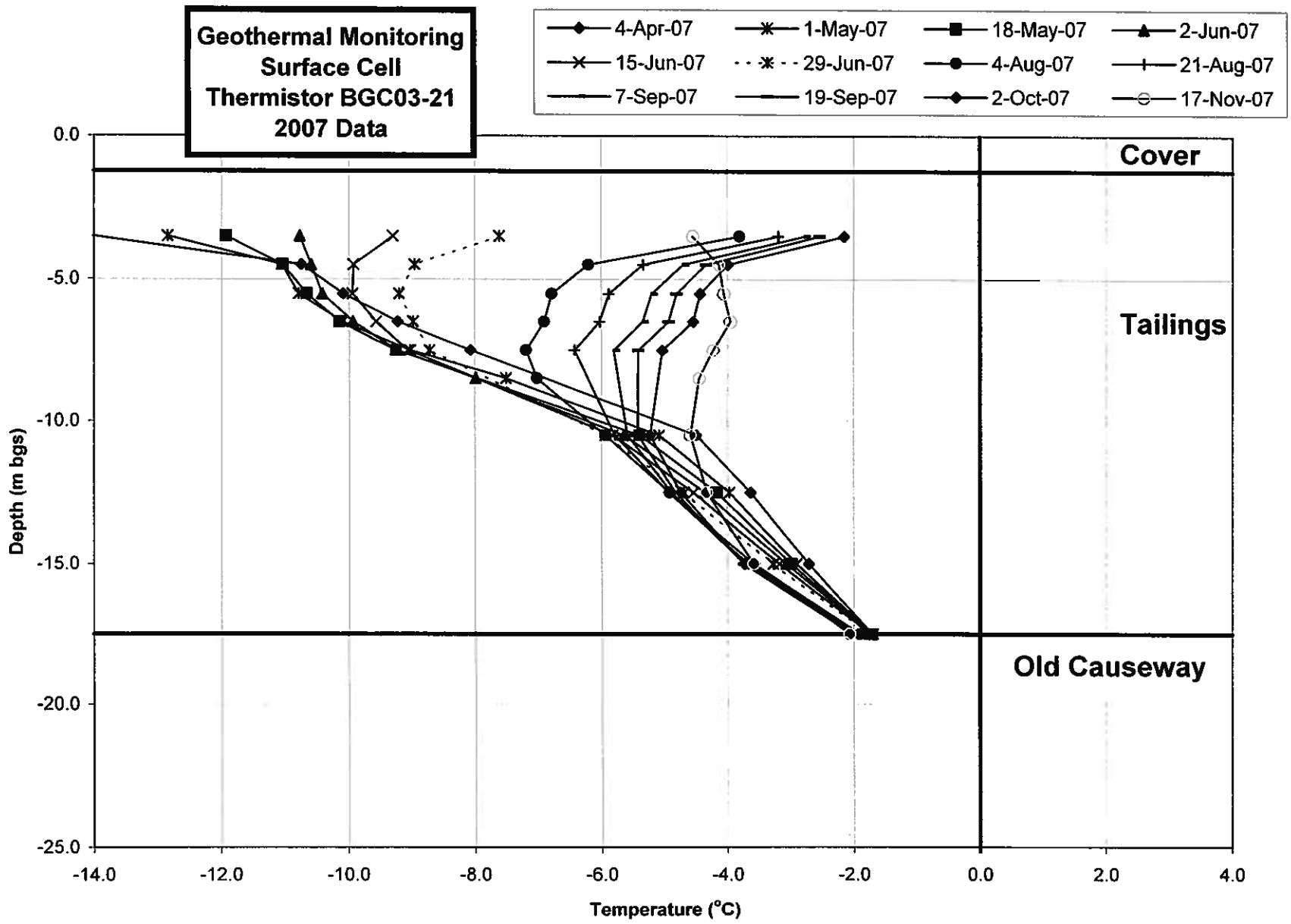

Geothermal Monitoring
Surface Cell
Thermistor BGC03-11
2003-2007 Comparison Plots
19-Aug-03
11-Aug-04
19-Aug-05
13-Aug-06
21-Aug-07
Cover
Tailings
Lake Bed Sediments
Bedrock
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-6.0
-5.0
-4.0
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
Temperature (°C)

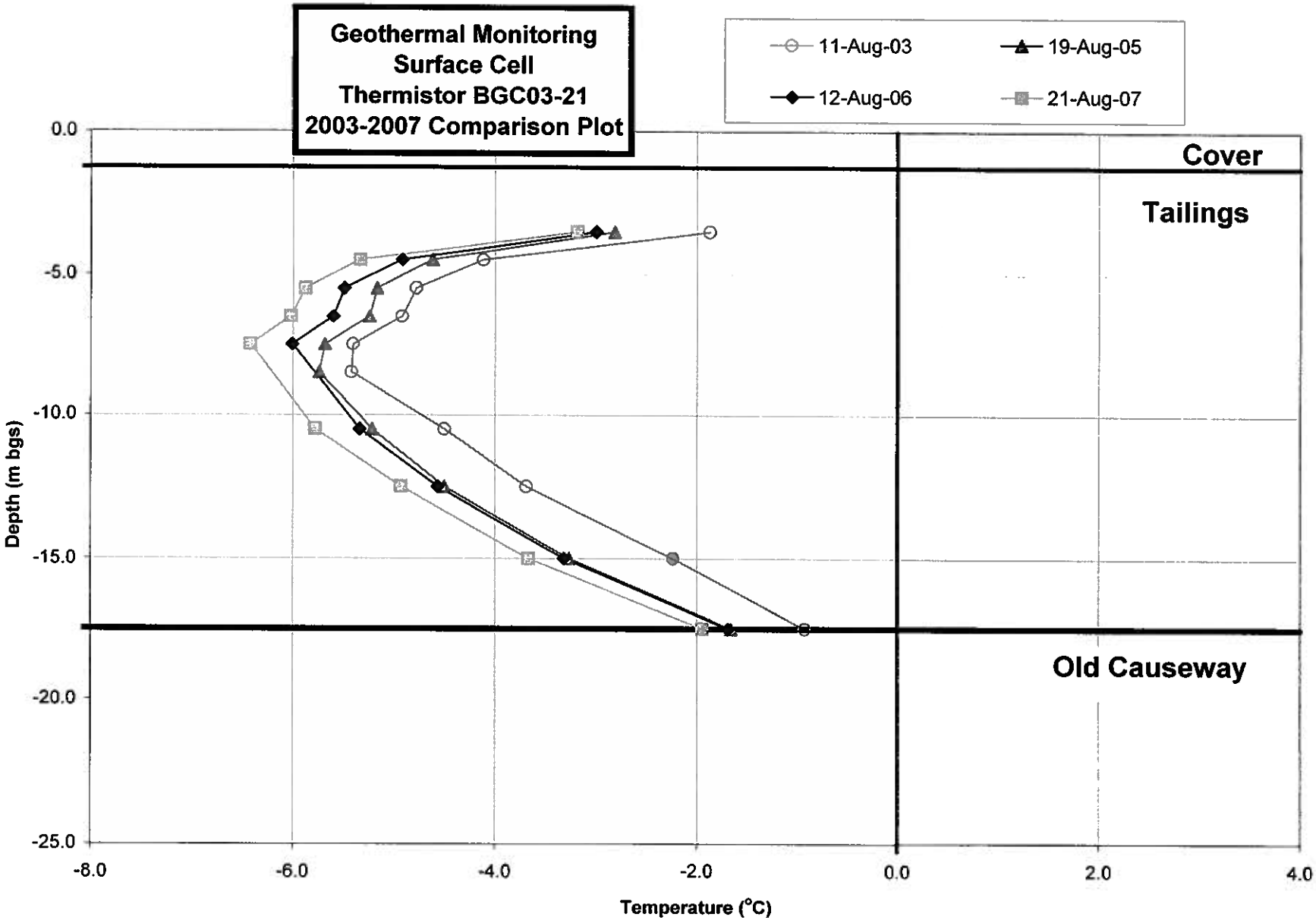

Geothermal Monitoring
Surface Cell
Thermistor BGC03-15
2007 Data
1-May-07
18-May-07
2-Jun-07
15-Jun-07
29-Jun-07
17-Jul-07
4-Aug-07
21-Aug-07
9-Sep-07
19-Sep-07
2-Oct-07
17-Nov-07
Cover
Tailings
Lake Bed
Sediments
Bedrock
Depth (m bgs)
Temperature (°C)
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-14.0
-16.0
-18.0
-20.0
-14.0
-12.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0

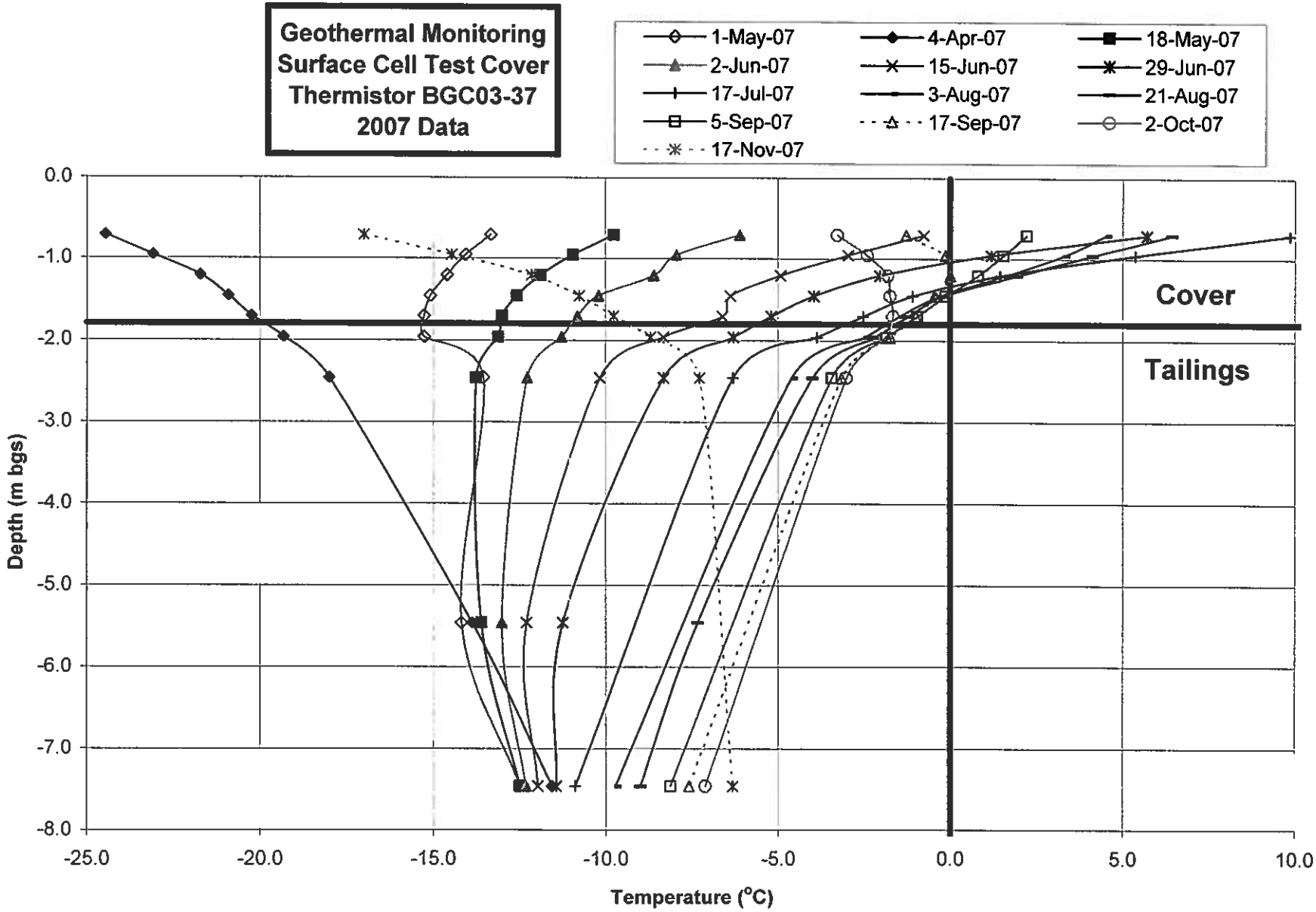

Geothermal Monitoring
Surface Cell
Thermistor BGC03-15
2003-2007 Comparision Plot
19-Aug-03
11-Aug-04
19-Aug-05
12-Aug-06
21-Aug-07
Cover
Tailings
Lake Bed Sediments
Bedrock
Depth (m bgs)
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-14.0
-16.0
-18.0
-20.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
Temperature (°C)


Geothermal Monitoring
Surface Cell
Thermistor BGC03-20
2007 Data
1-May-07
18-May-07
2-Jun-07
15-Jun-07
29-Jun-07
17-Jul-07
4-Aug-07
21-Aug-07
7-Sep-07
19-Sep-07
2-Oct-07
17-Nov-07
Cover
Tailings
Lakebed
Sediments
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-16.0
-14.0
-12.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
Temperature (°C)

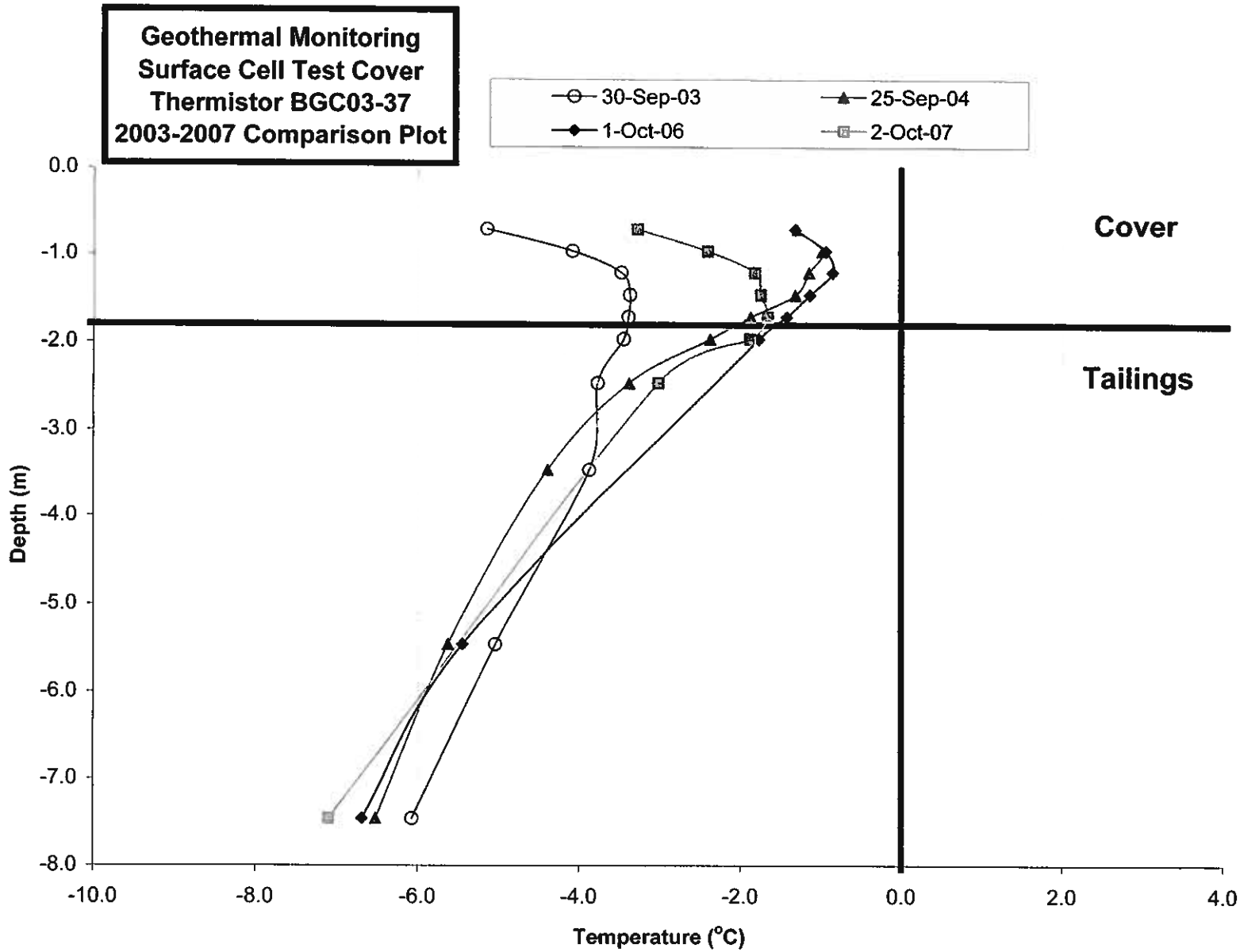

Geothermal Monitoring
Surface Cell
Thermistor BGC03-20
2003-2007 Comparision Plot
11-Aug-03
11-Aug-04
19-Aug-05
13-Aug-06
21-Aug-07
Cover
Tailings
Lake Bed Sediments
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
Temperature (°C)


Geothermal Monitoring
Surface Cell
Thermistor BGC03-21
2007 Data
4-Apr-07
1-May-07
18-May-07
2-Jun-07
15-Jun-07
29-Jun-07
4-Aug-07
21-Aug-07
7-Sep-07
19-Sep-07
2-Oct-07
17-Nov-07
Cover
Tailings
Old Causeway
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-14.0
-12.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
Temperature (°C)

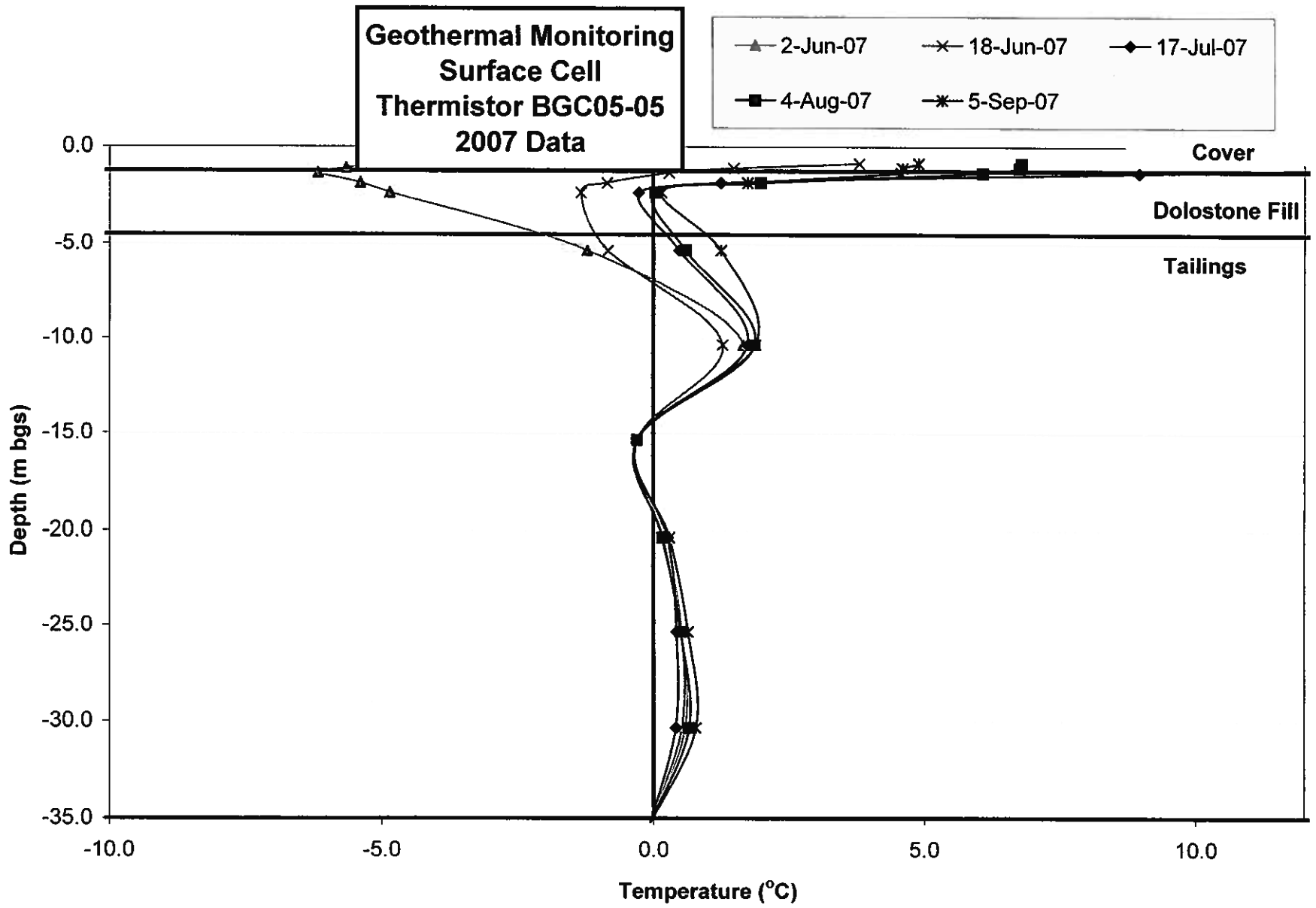

Geothermal Monitoring
Surface Cell
Thermistor BGC03-21
2003-2007 Comparison Plot
11-Aug-03
19-Aug-05
12-Aug-06
21-Aug-07
Cover
Tailings
Old Causeway
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
Temperature (°C)

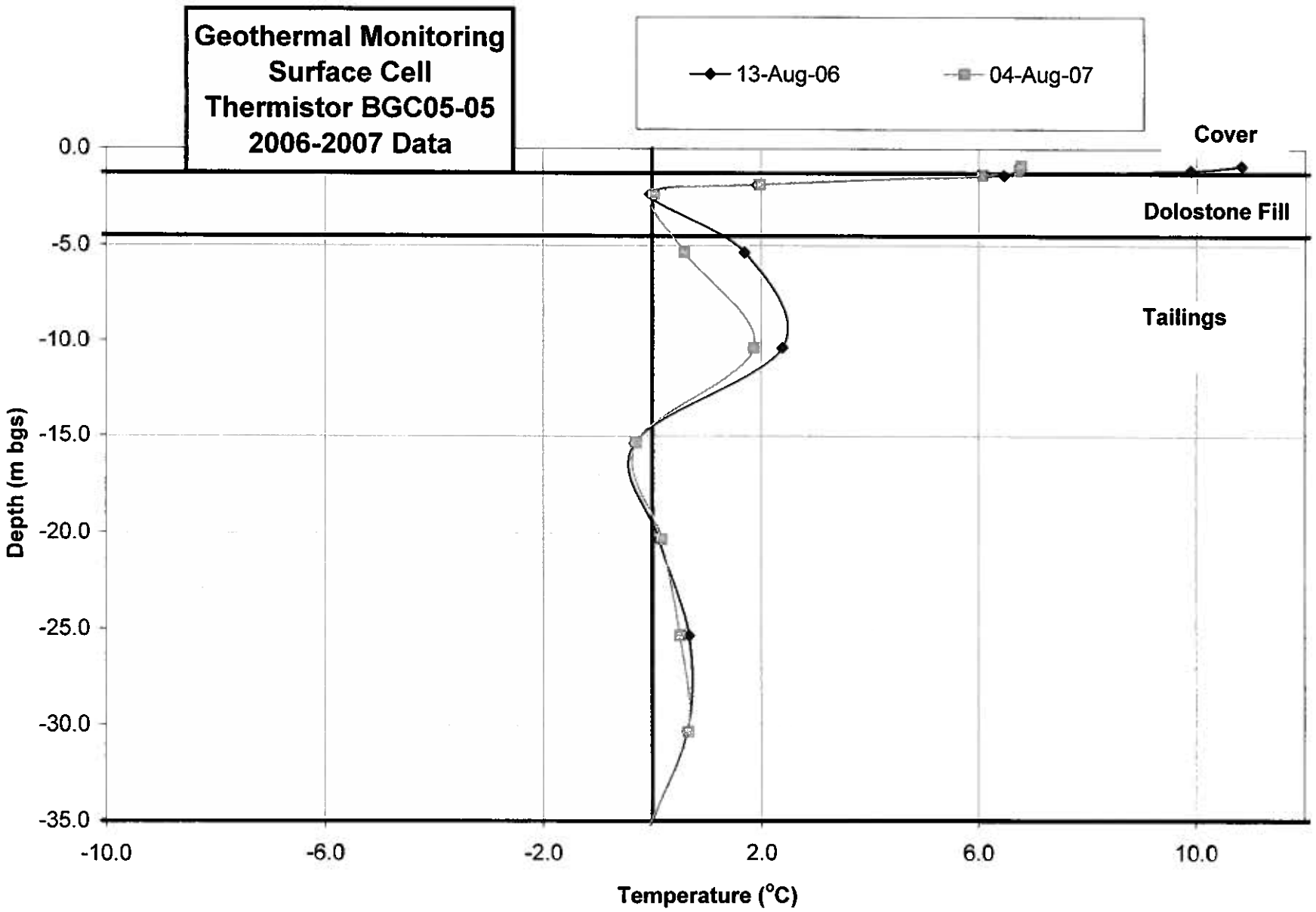


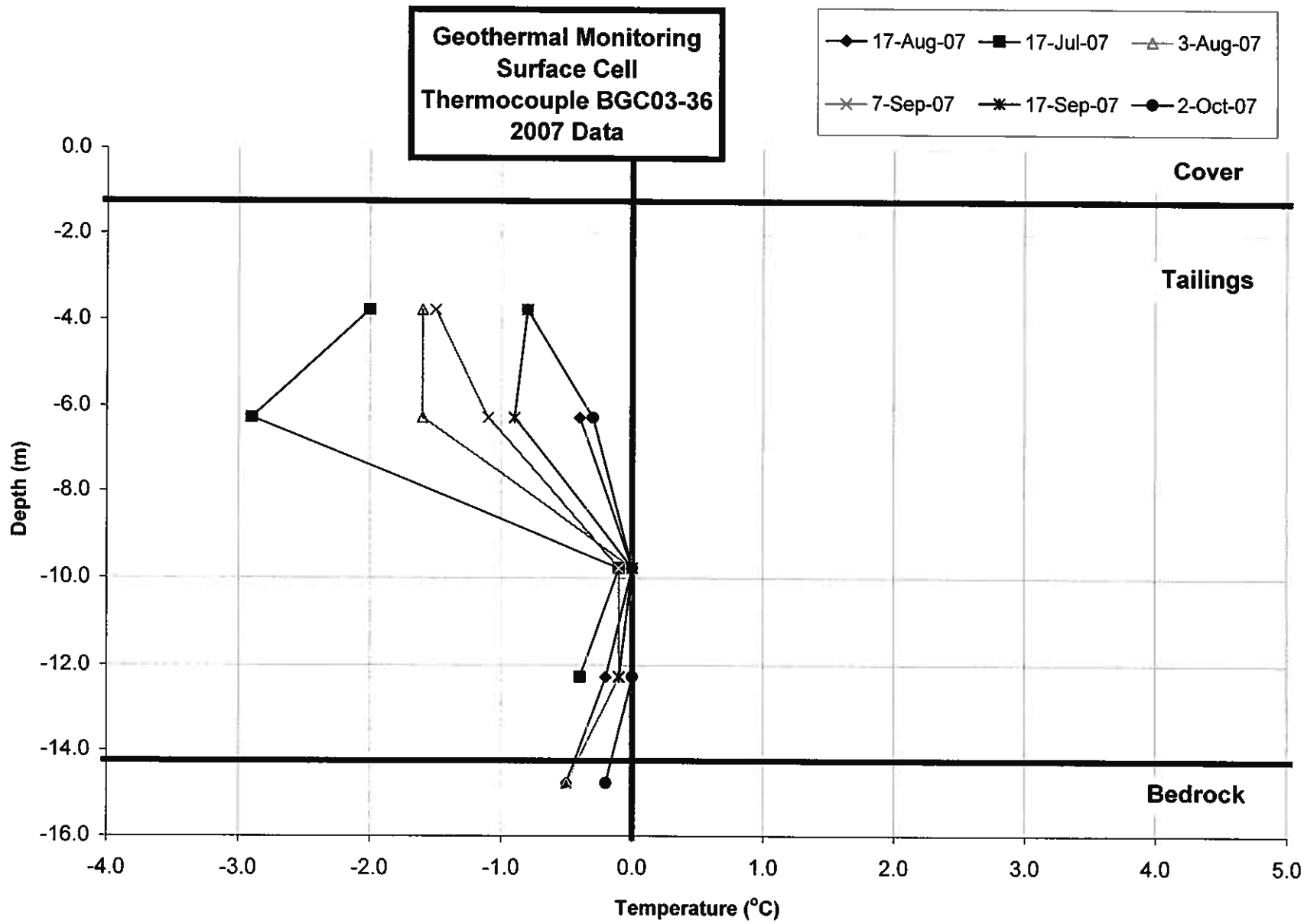
Surface Cell.xls
03-37 2007 Trumpet



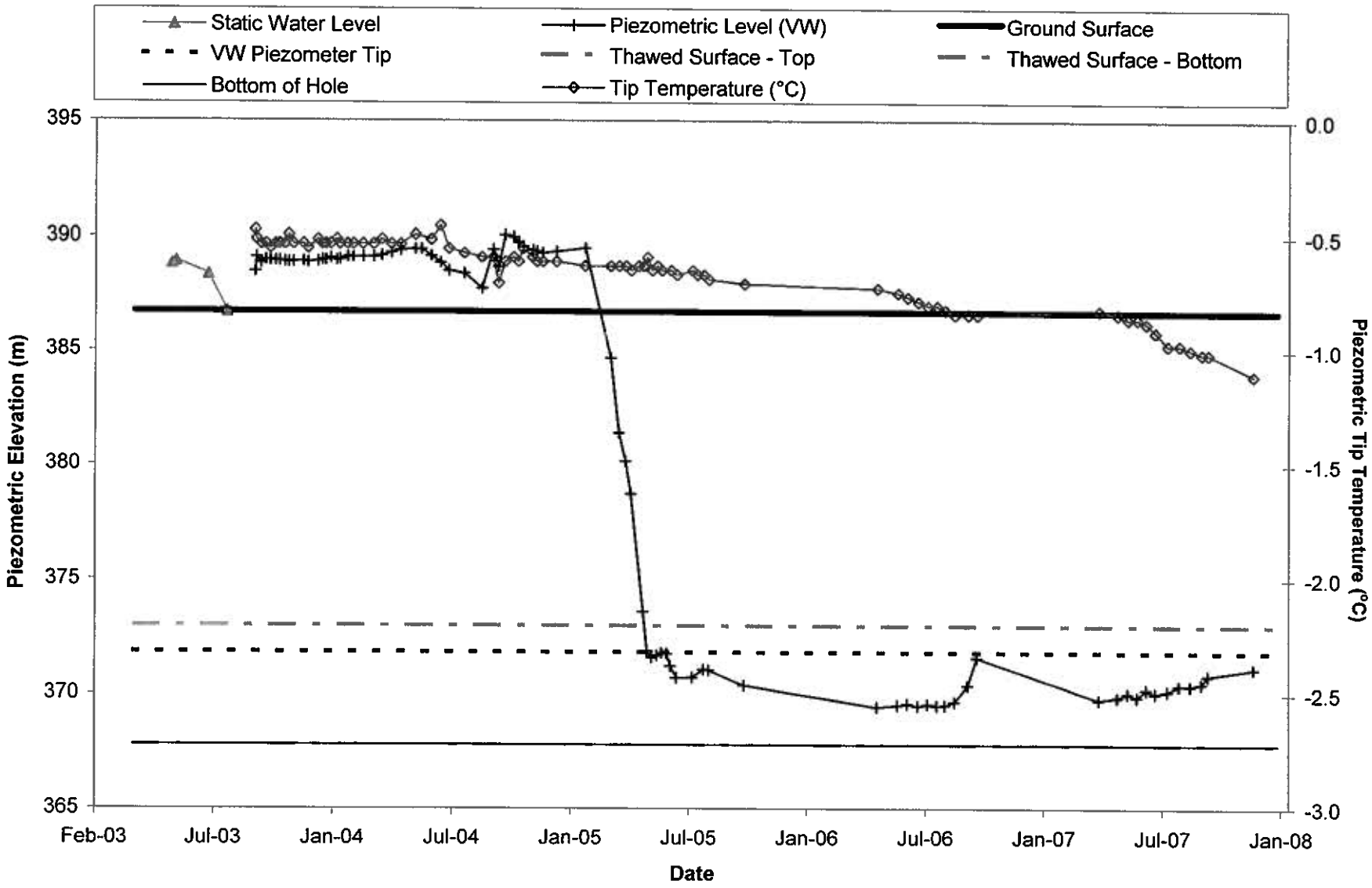
Surface Cell.xls
03-37 TR Comp


Geothermal Monitoring
Surface Cell
Thermistor BGC05-05
2007 Data
2-Jun-07
18-Jun-07
17-Jul-07
4-Aug-07
5-Sep-07
Cover
Dolostone Fill
Tailings
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-10.0
-5.0
0.0
5.0
10.0
Temperature (°C)

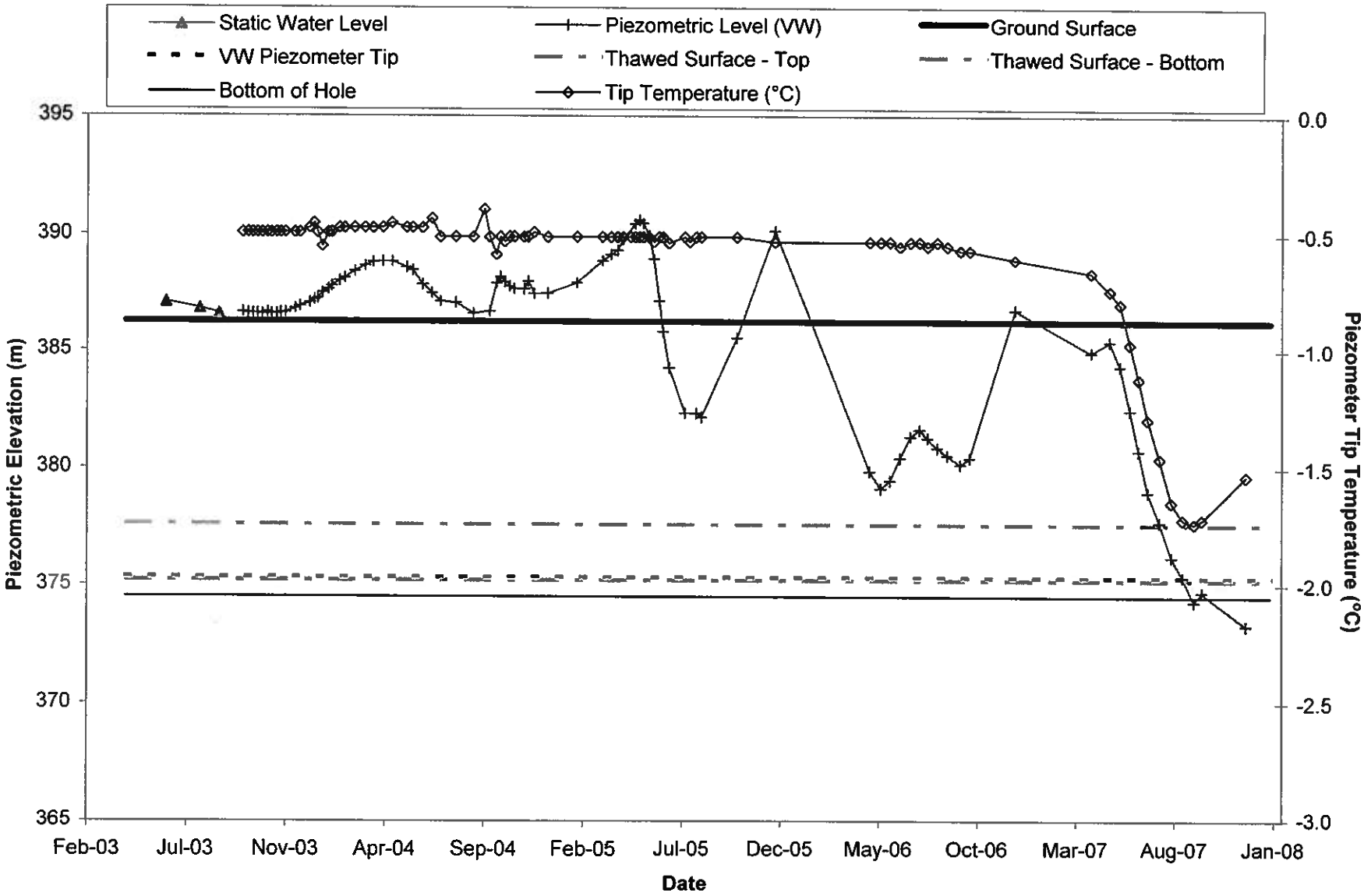

Geothermal Monitoring
Surface Cell
Thermistor BGC05-05
2006-2007 Data
13-Aug-06
04-Aug-07
Cover
Dolostone Fill
Tailings
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-10.0
-6.0
-2.0
2.0
6.0
10.0
Temperature (°C)

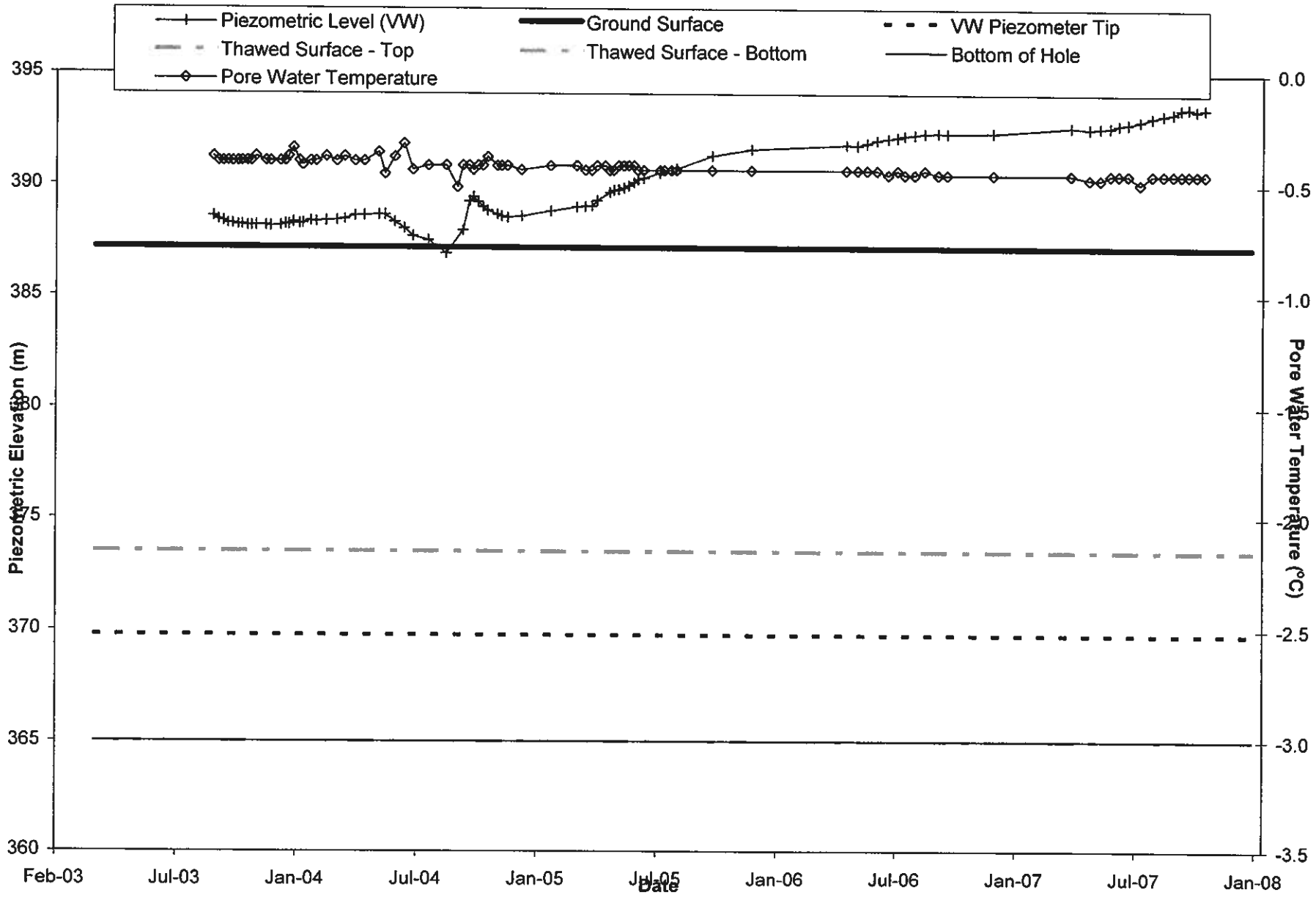

Geothermal Monitoring
Surface Cell
Thermocouple BGC03-36
2007 Data
17-Aug-07
17-Jul-07
3-Aug-07
7-Sep-07
17-Sep-07
2-Oct-07
Cover
Tailings
Bedrock
Depth (m)
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-14.0
-16.0
-4.0
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Temperature (°C)

Piezometer Monitoring Results for BGC03-12



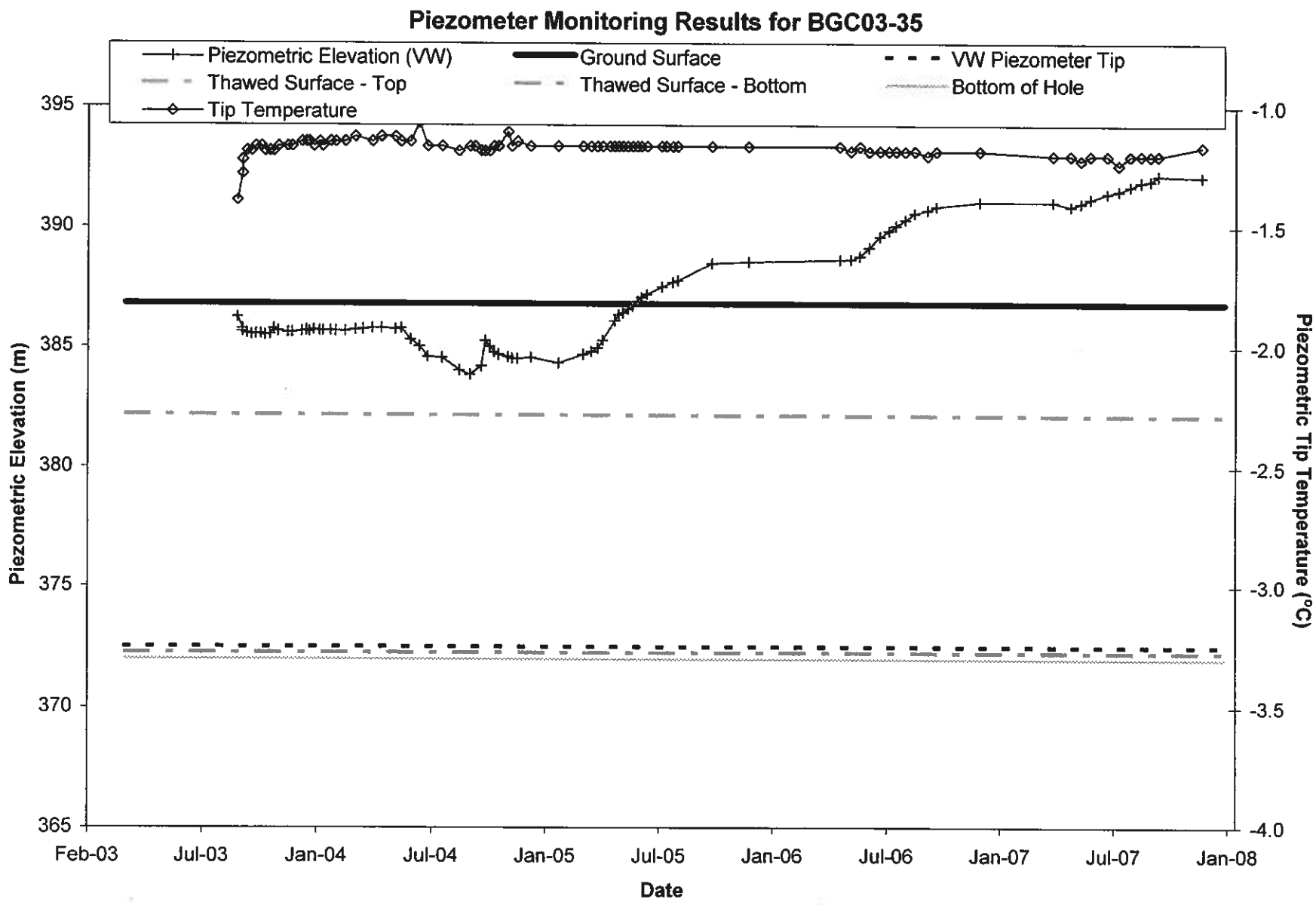
Piezometer Monitoring Results for BGC03-14

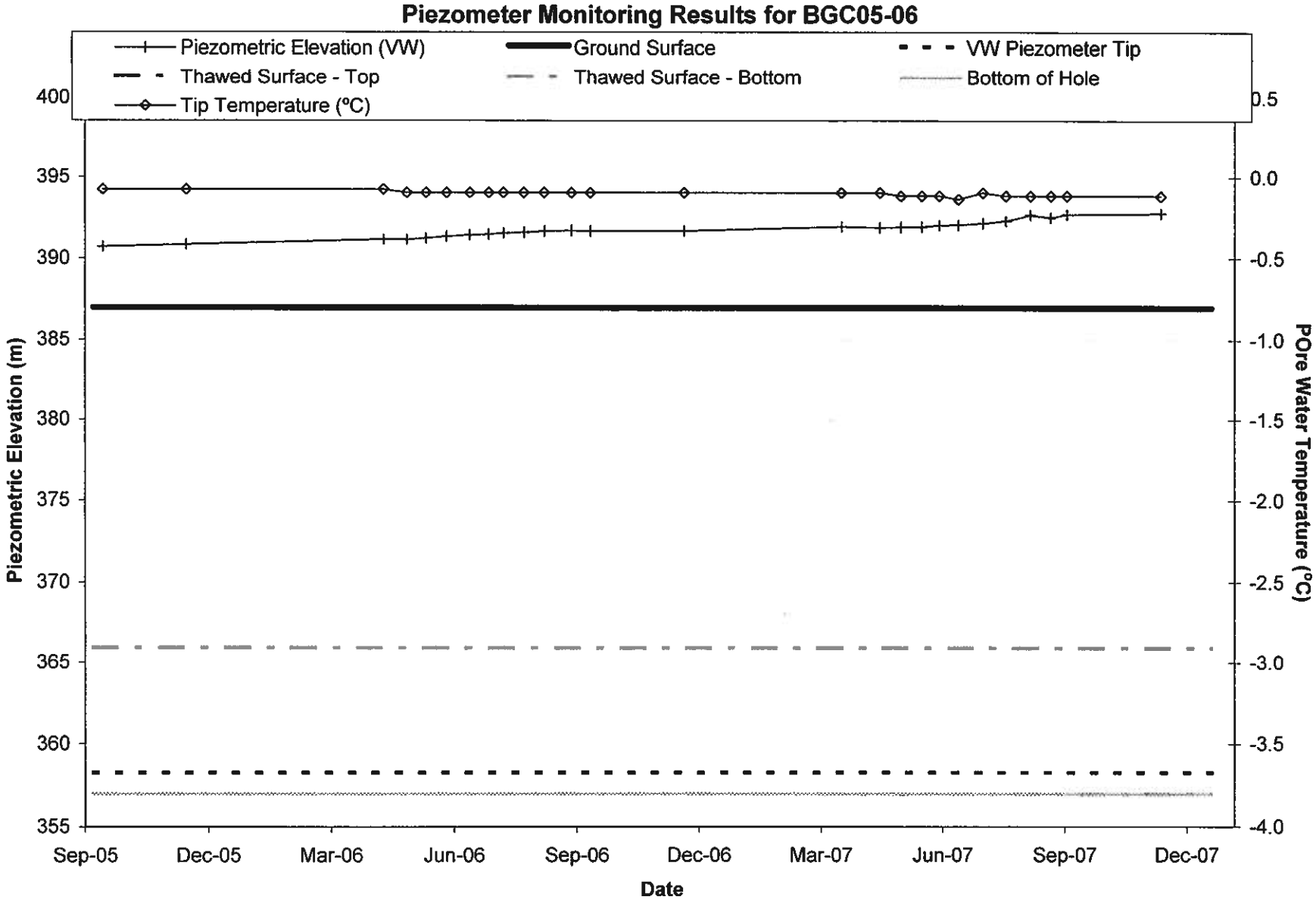


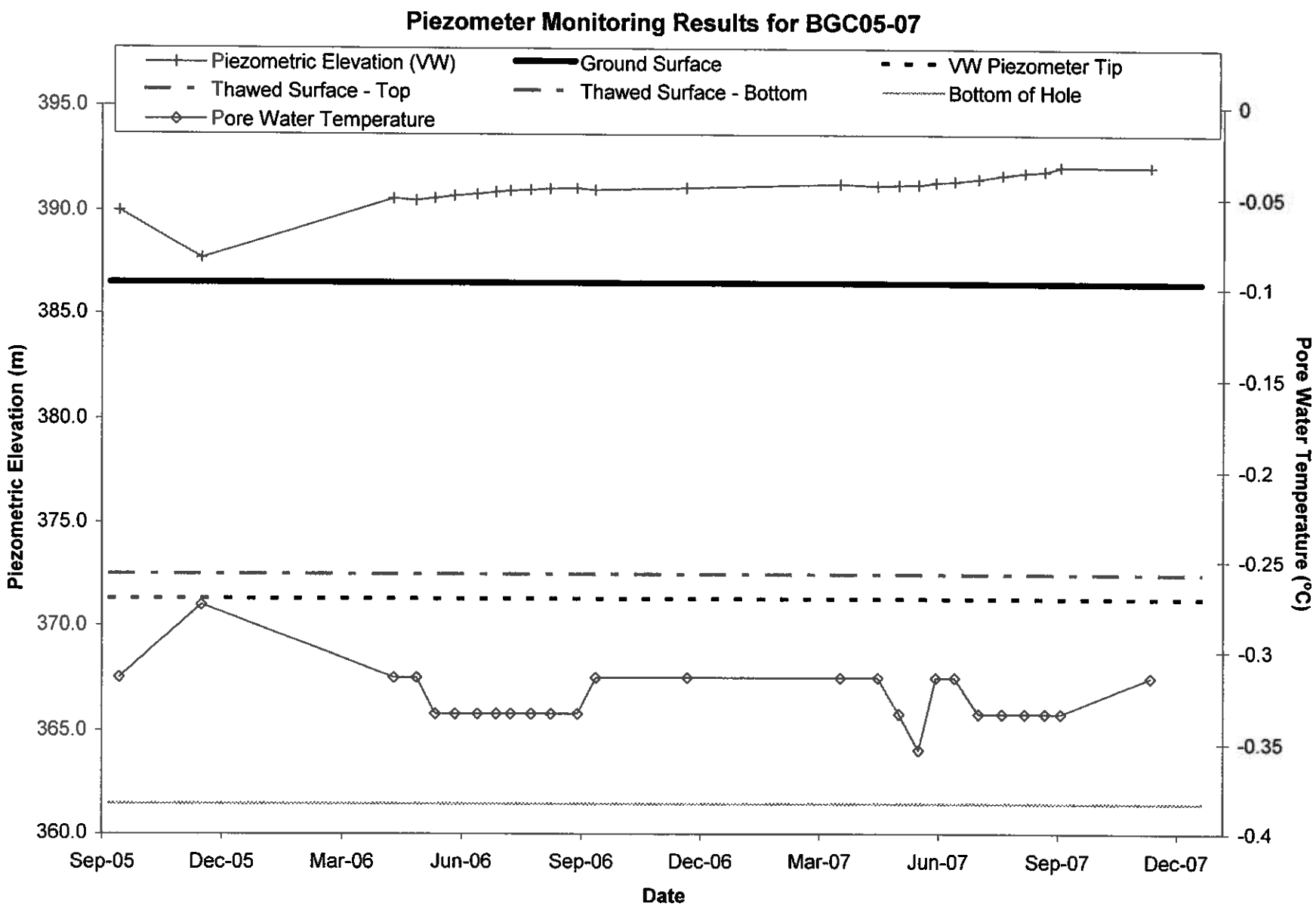


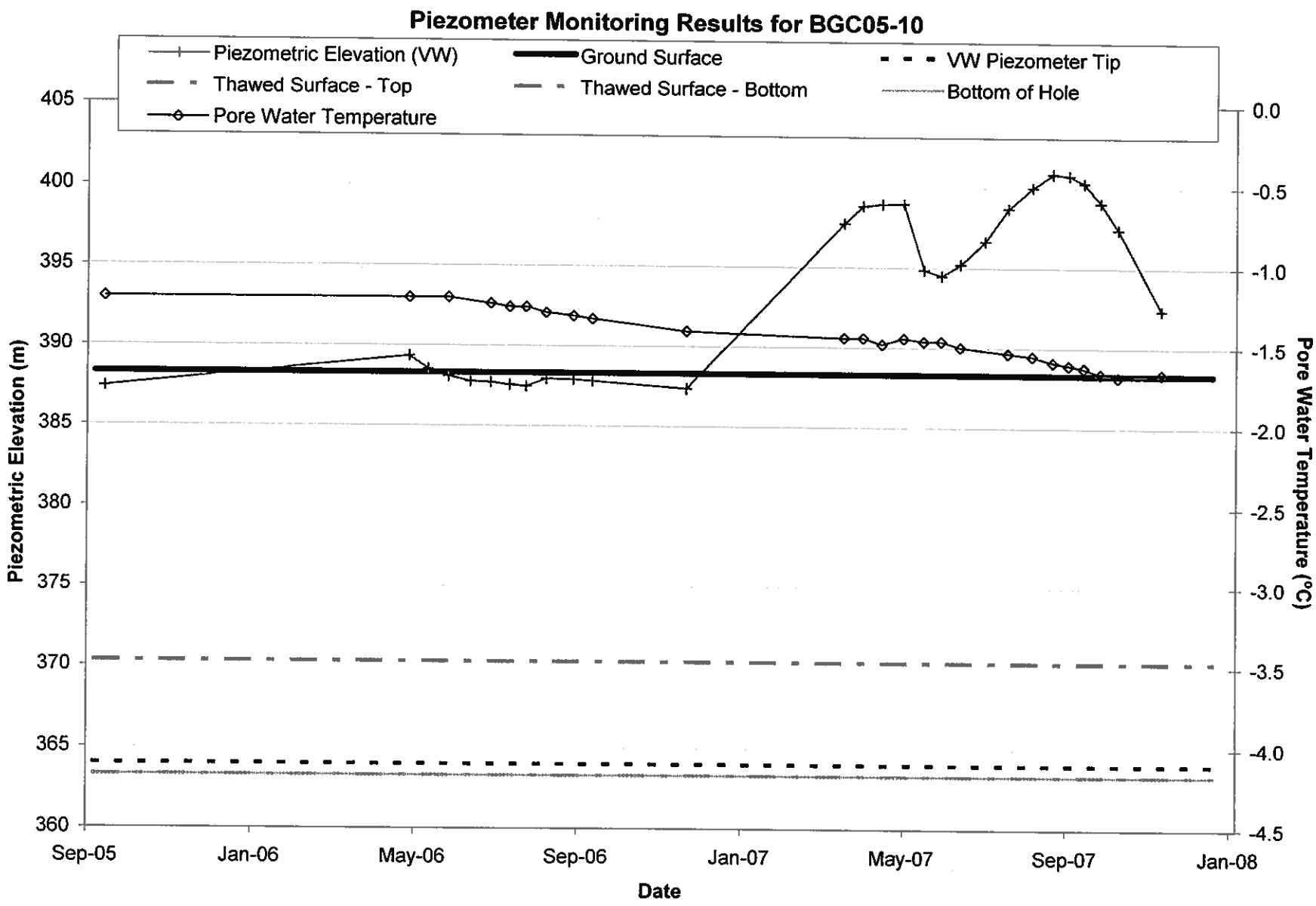
Surface Cell.xls
03-32 plot

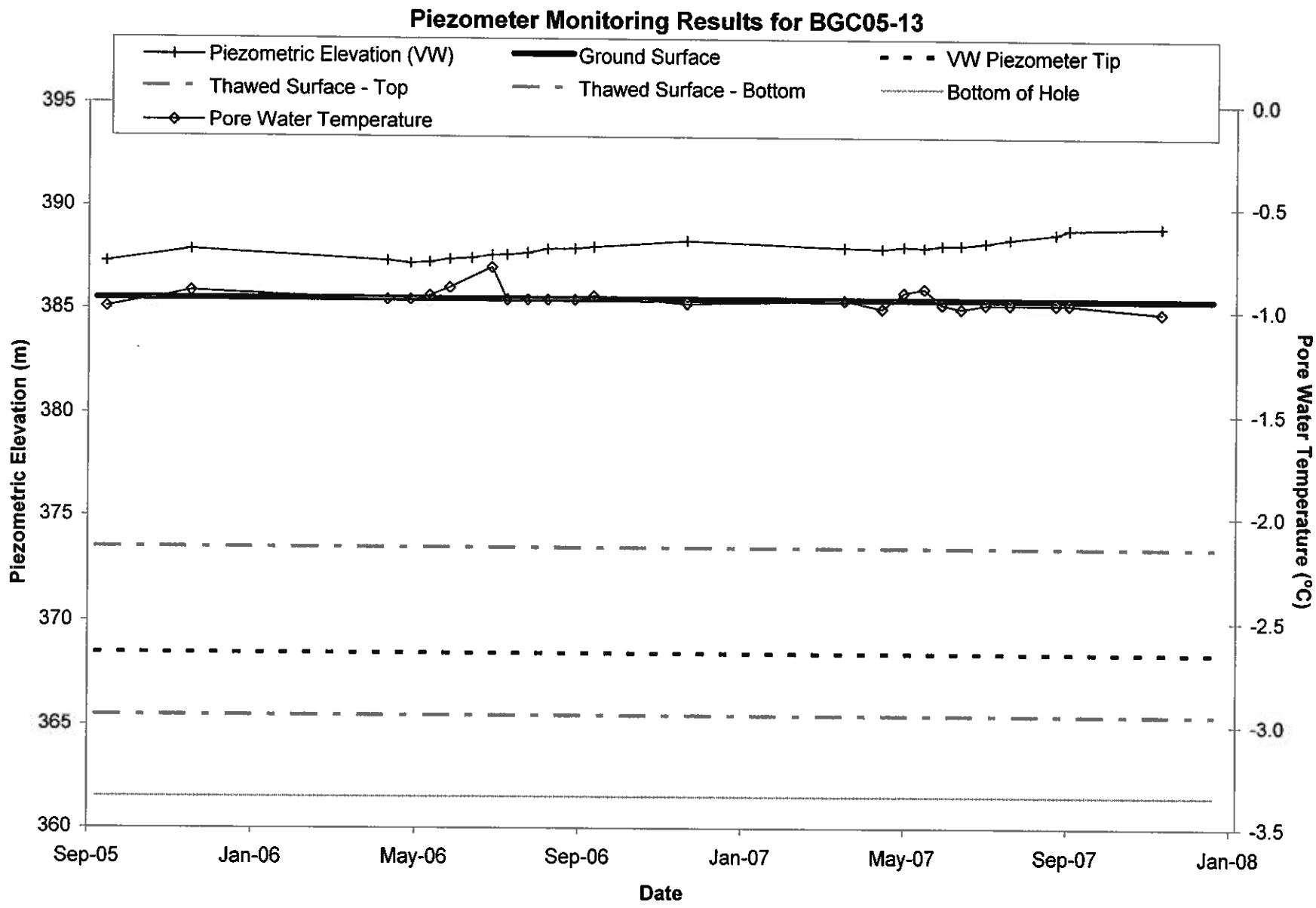
BGC Engineering Inc.

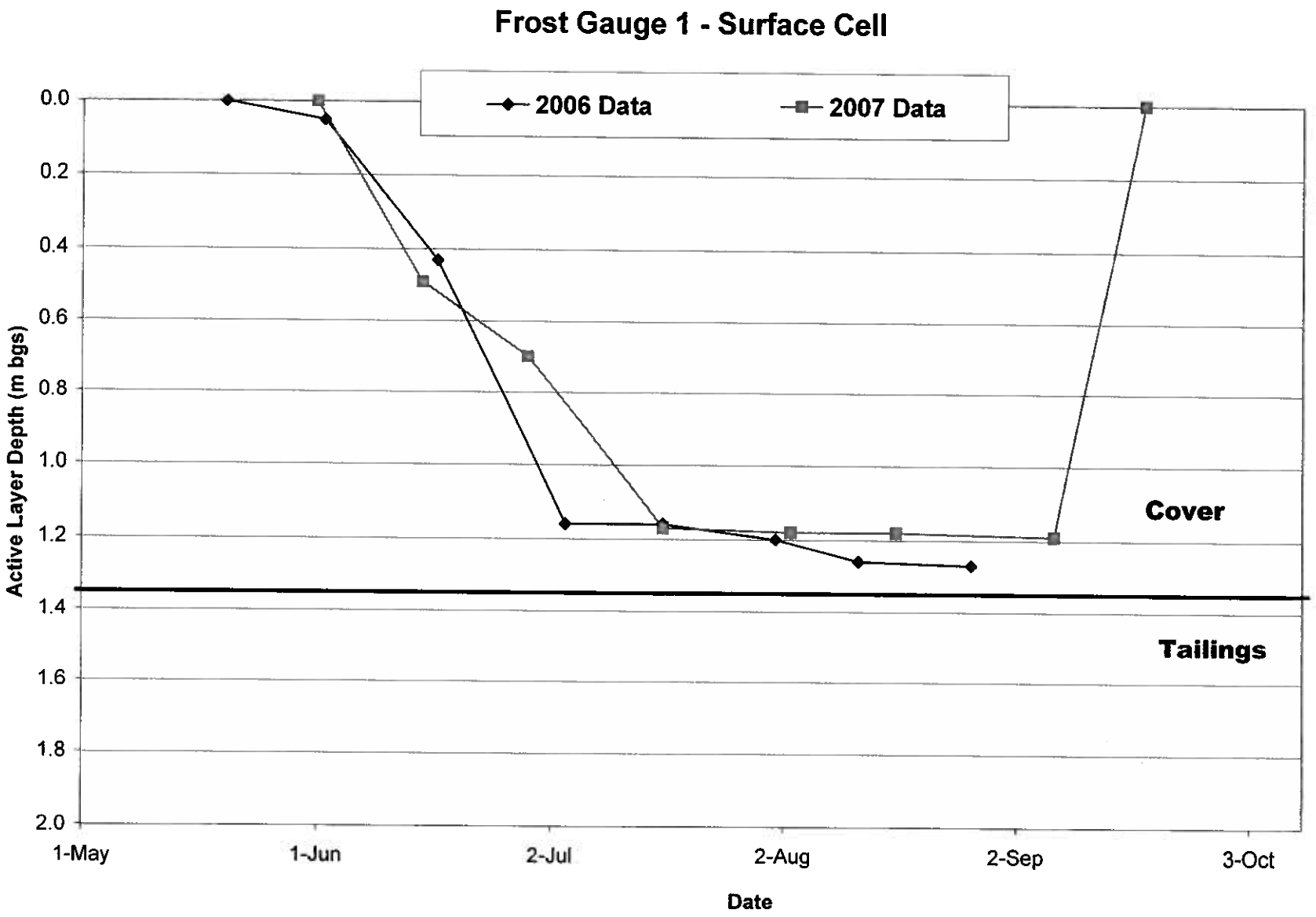

Piezometer Monitoring Results for BGC03-35
Piezometric Elevation (VW)
Ground Surface
VW Piezometer Tip
Thawed Surface - Top
Thawed Surface - Bottom
Bottom of Hole
Tip Temperature
Piezometric Elevation (m)
Piezometric Tip Temperature (°C)
395
390
385
380
375
370
365
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
Feb-03
Jul-03
Jan-04
Jul-04
Jan-05
Jul-05
Jan-06
Jul-06
Jan-07
Jul-07
Jan-08
Date

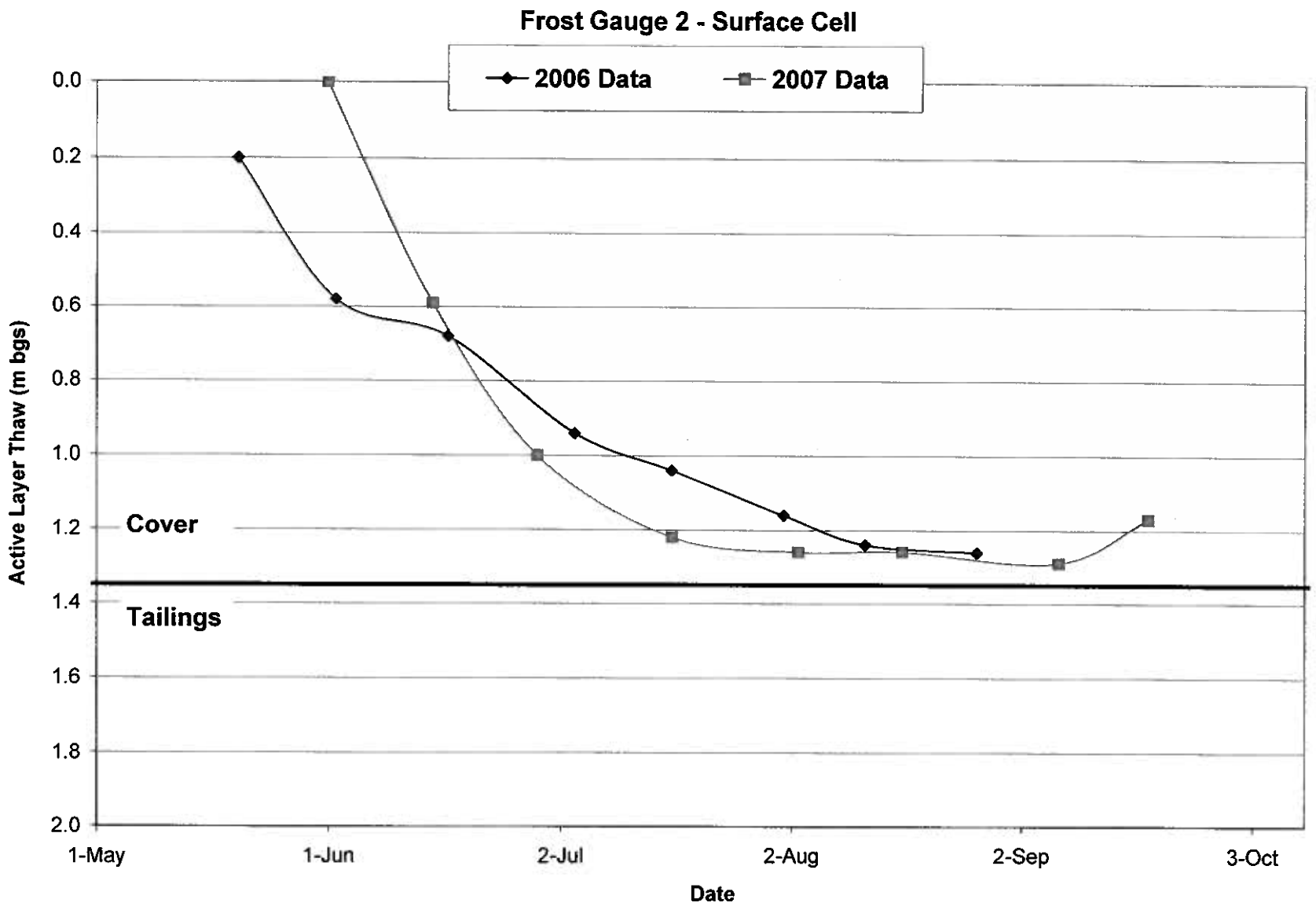

Piezometer Monitoring Results for BGC05-06
Piezometric Elevation (VW)
Ground Surface
VW Piezometer Tip
Thawed Surface - Top
Thawed Surface - Bottom
Bottom of Hole
Tip Temperature (°C)
Piezometric Elevation (m)
POre Water Temperature (°C)
400
395
390
385
380
375
370
365
360
355
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
Sep-05
Dec-05
Mar-06
Jun-06
Sep-06
Dec-06
Mar-07
Jun-07
Sep-07
Dec-07
Date

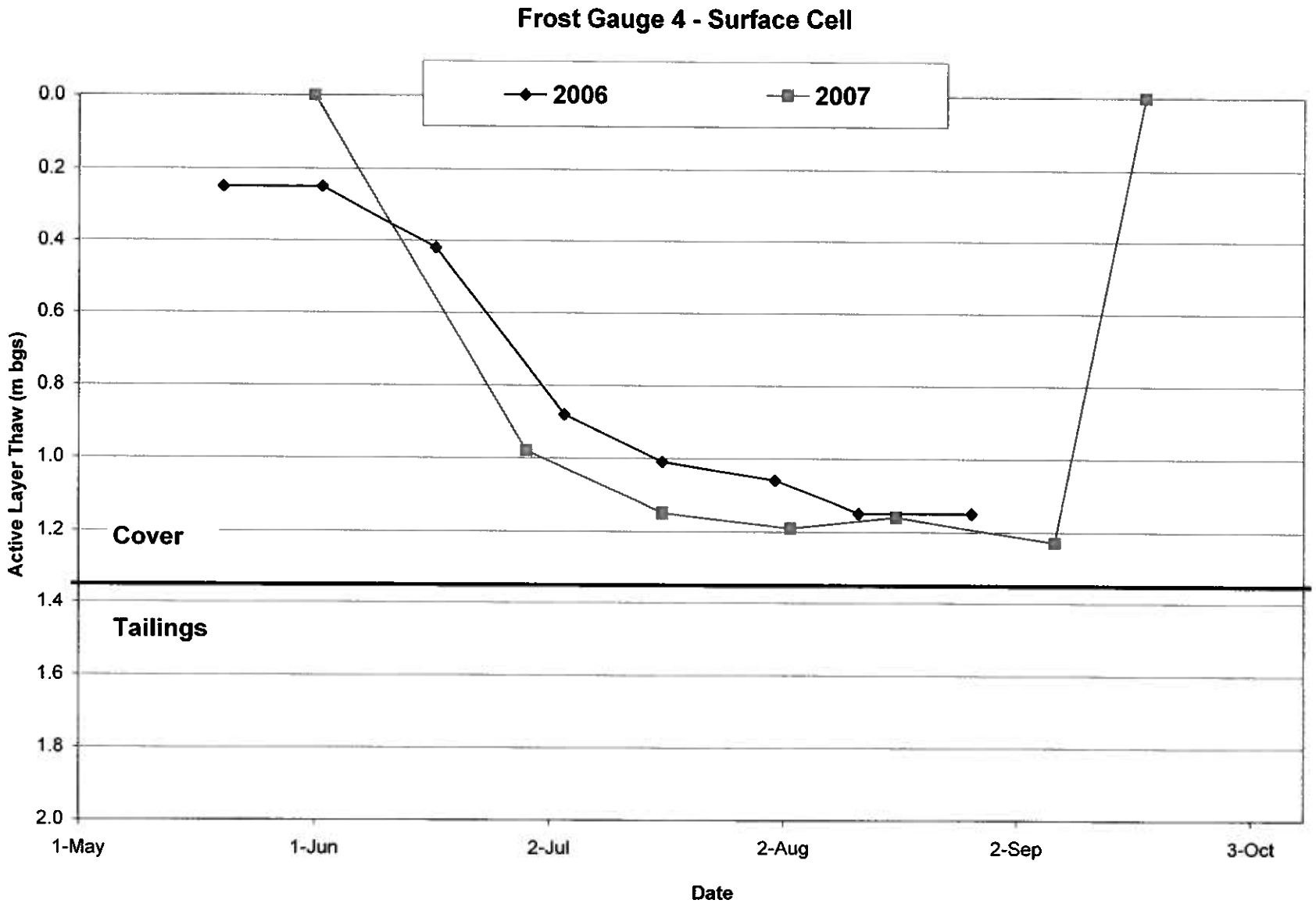

Piezometer Monitoring Results for BGC05-07
Piezometric Elevation (VW)
Ground Surface
VW Piezometer Tip
Thawed Surface - Top
Thawed Surface - Bottom
Bottom of Hole
Pore Water Temperature
395.0
390.0
385.0
380.0
375.0
370.0
365.0
360.0
Piezometric Elevation (m)
0
-0.05
-0.1
-0.15
-0.2
-0.25
-0.3
-0.35
-0.4
Pore Water Temperature (°C)
Sep-05
Dec-05
Mar-06
Jun-06
Sep-06
Dec-06
Mar-07
Jun-07
Sep-07
Dec-07
Date

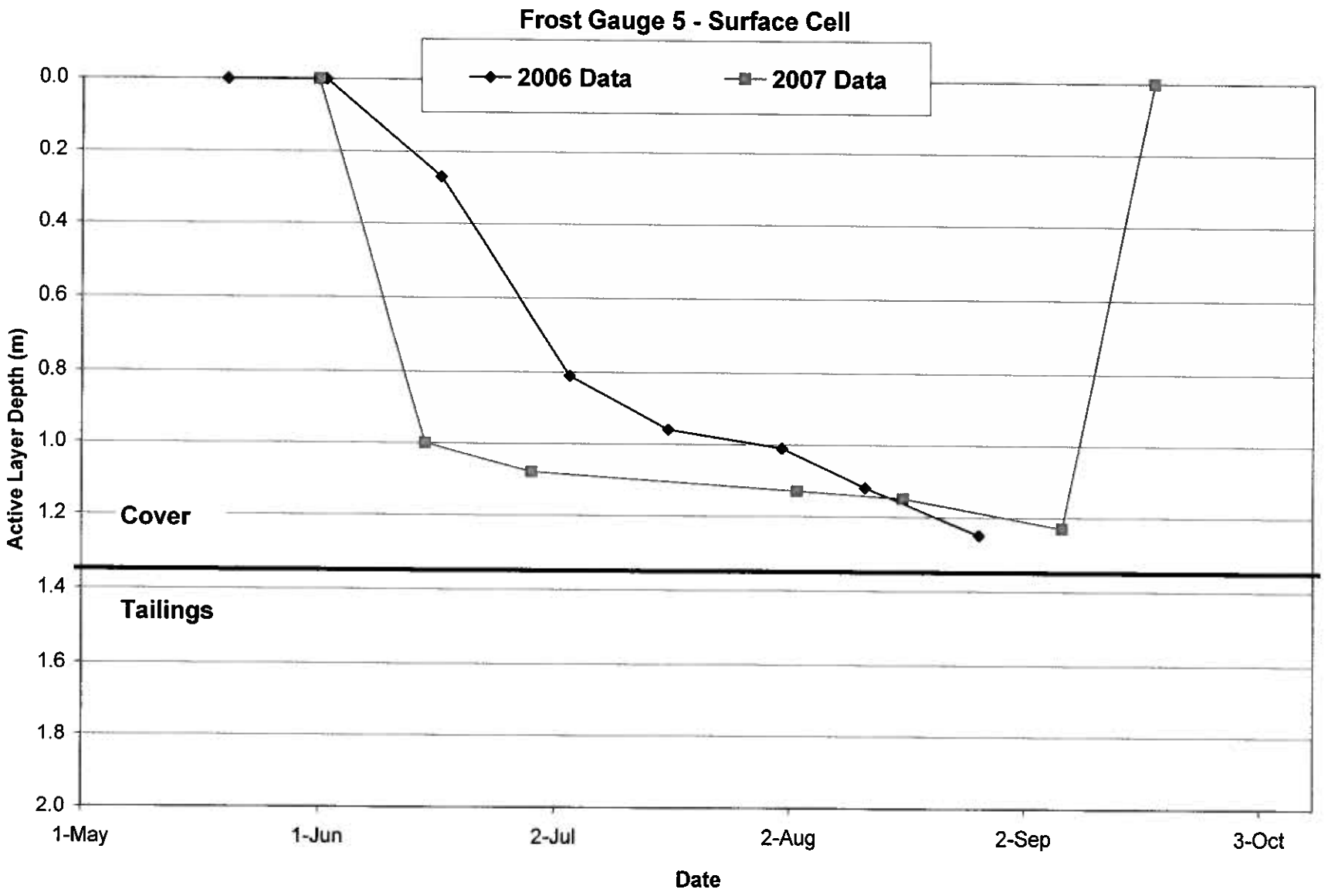

Piezometer Monitoring Results for BGC05-10
Piezometric Elevation (VW)
Ground Surface
VW Piezometer Tip
Thawed Surface - Top
Thawed Surface - Bottom
Bottom of Hole
Pore Water Temperature
Piezometric Elevation (m)
Pore Water Temperature (°C)
405
400
395
390
385
380
375
370
365
360
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
-4.5
Sep-05
Jan-06
May-06
Sep-06
Jan-07
May-07
Sep-07
Jan-08
Date

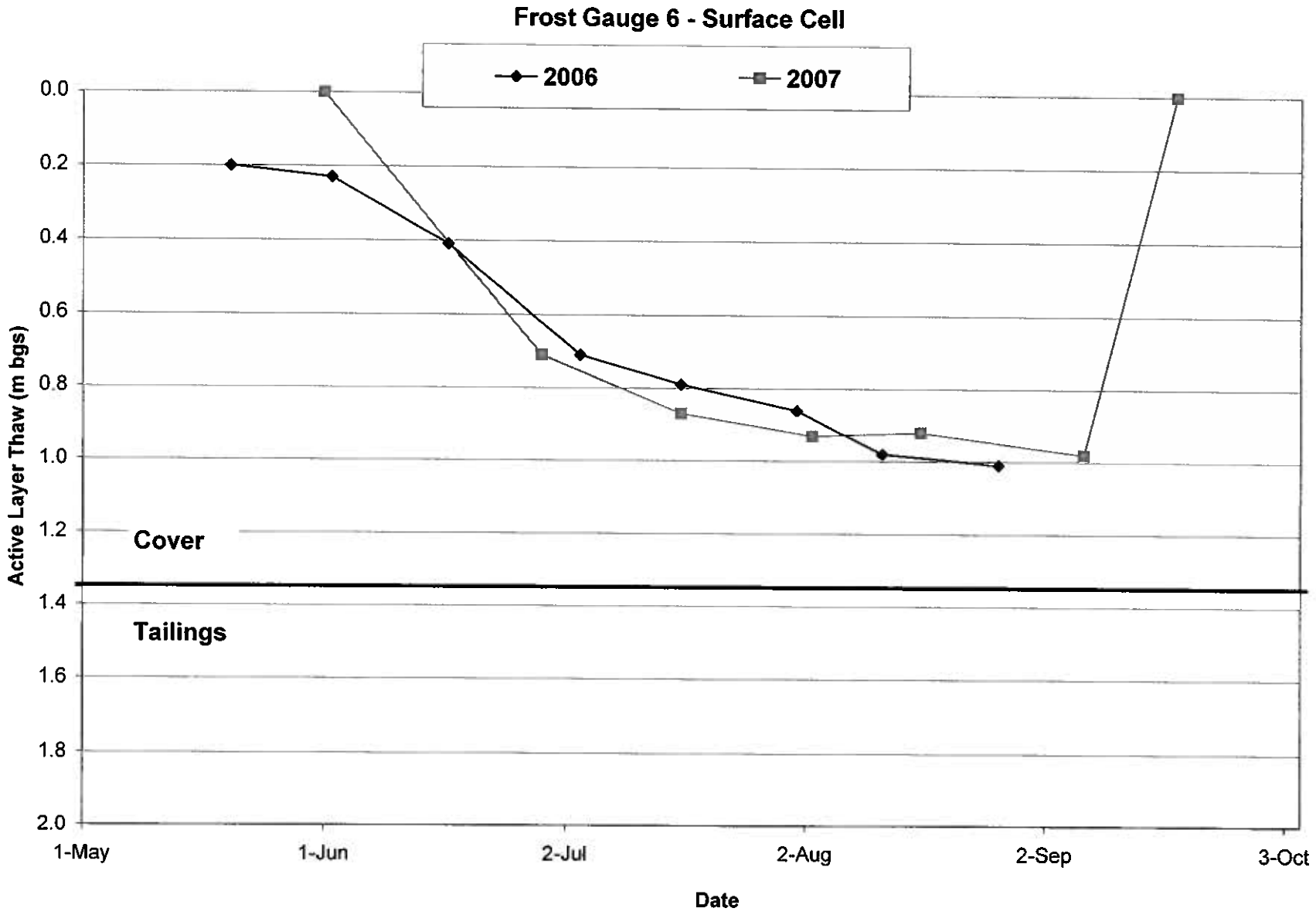

Piezometer Monitoring Results for BGC05-13
Piezometric Elevation (VW)
Ground Surface
VW Piezometer Tip
Thawed Surface - Top
Thawed Surface - Bottom
Bottom of Hole
Pore Water Temperature
Piezometric Elevation (m)
Pore Water Temperature (°C)
395
390
385
380
375
370
365
360
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
Sep-05
Jan-06
May-06
Sep-06
Jan-07
May-07
Sep-07
Jan-08
Date


Frost Gauge 1 - Surface Cell
2006 Data
2007 Data
Active Layer Depth (m bgs)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
Cover
Tailings
1-May
1-Jun
2-Jul
2-Aug
2-Sep
3-Oct
Date

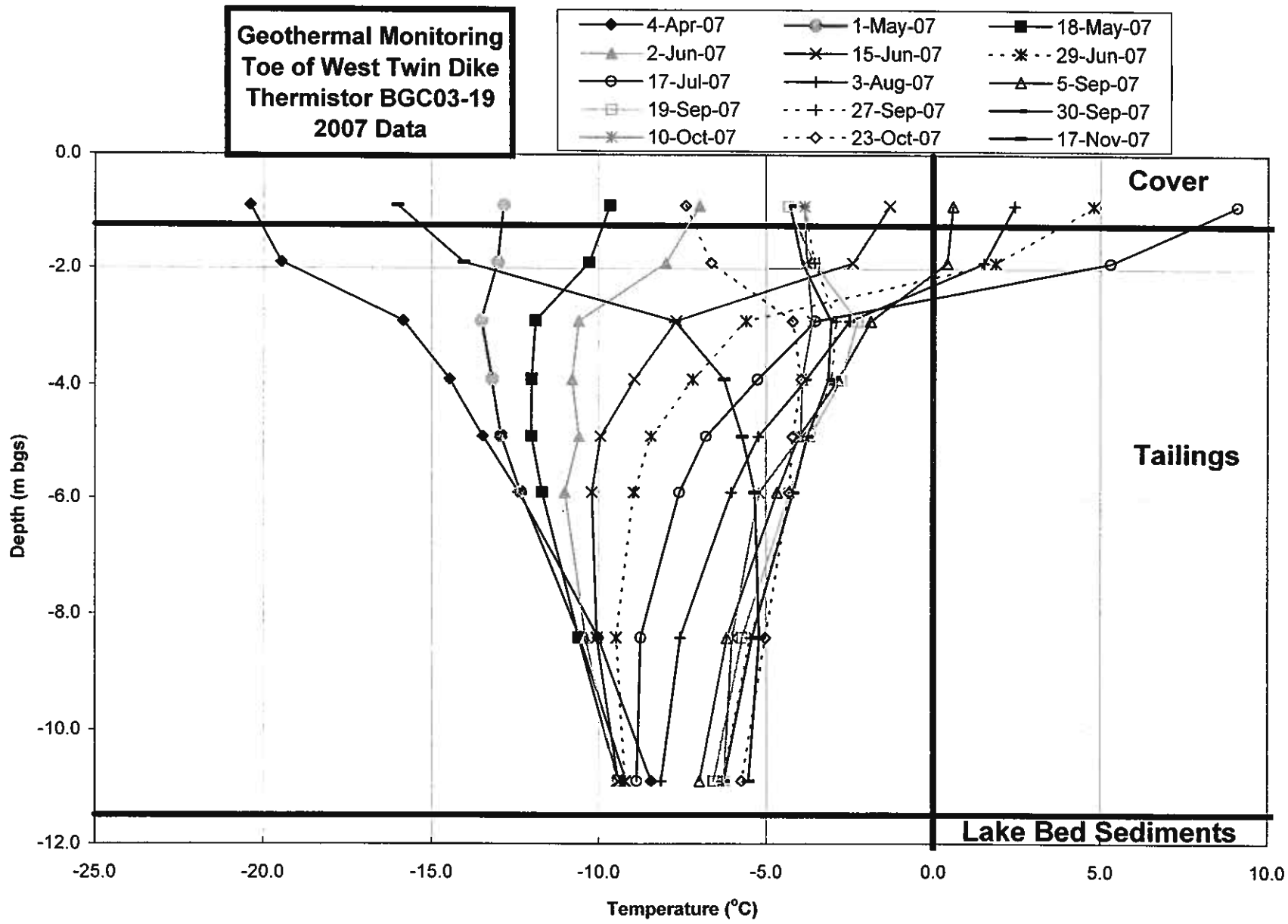

Frost Gauge 2 - Surface Cell
2006 Data
2007 Data
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
Active Layer Thaw (m bgs)
Cover
Tailings
1-May
1-Jun
2-Jul
2-Aug
2-Sep
3-Oct
Date

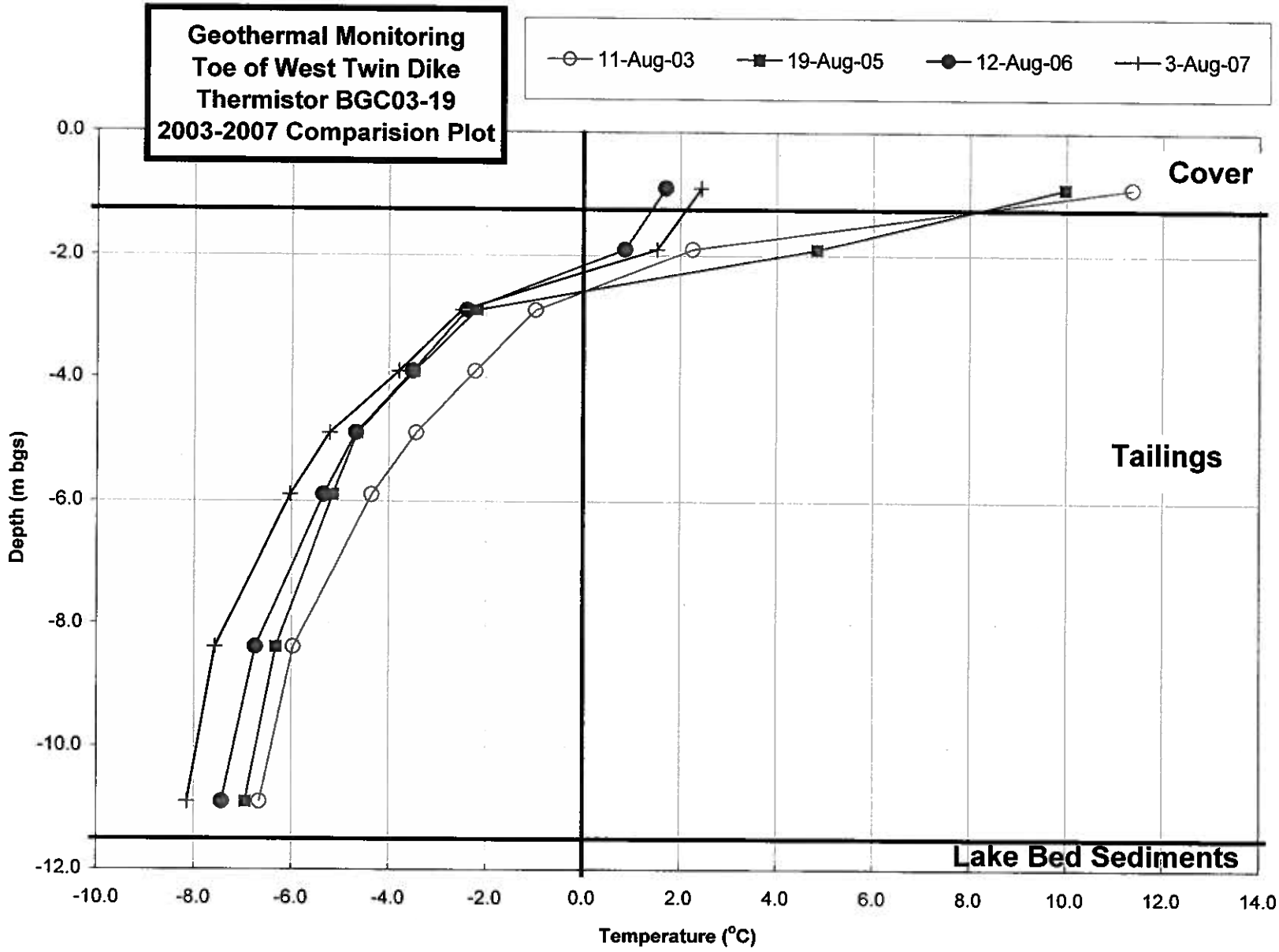

Frost Gauge 4 - Surface Cell
2006
2007
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
Active Layer Thaw (m bgs)
Cover
Tailings
1-May
1-Jun
2-Jul
2-Aug
2-Sep
3-Oct
Date

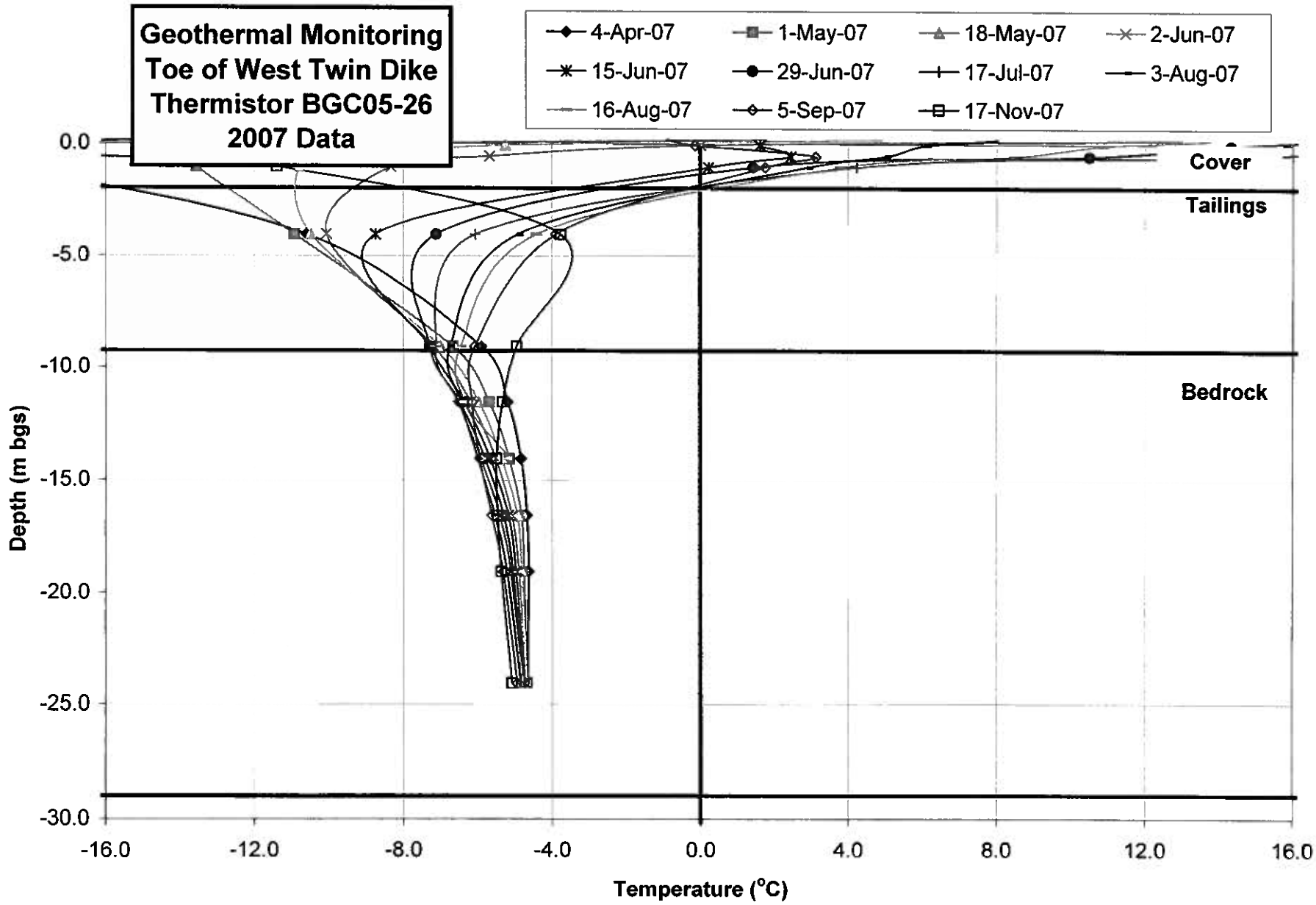

Frost Gauge 5 - Surface Cell
2006 Data
2007 Data
Active Layer Depth (m)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
Cover
Tailings
1-May
1-Jun
2-Jul
2-Aug
2-Sep
3-Oct
Date

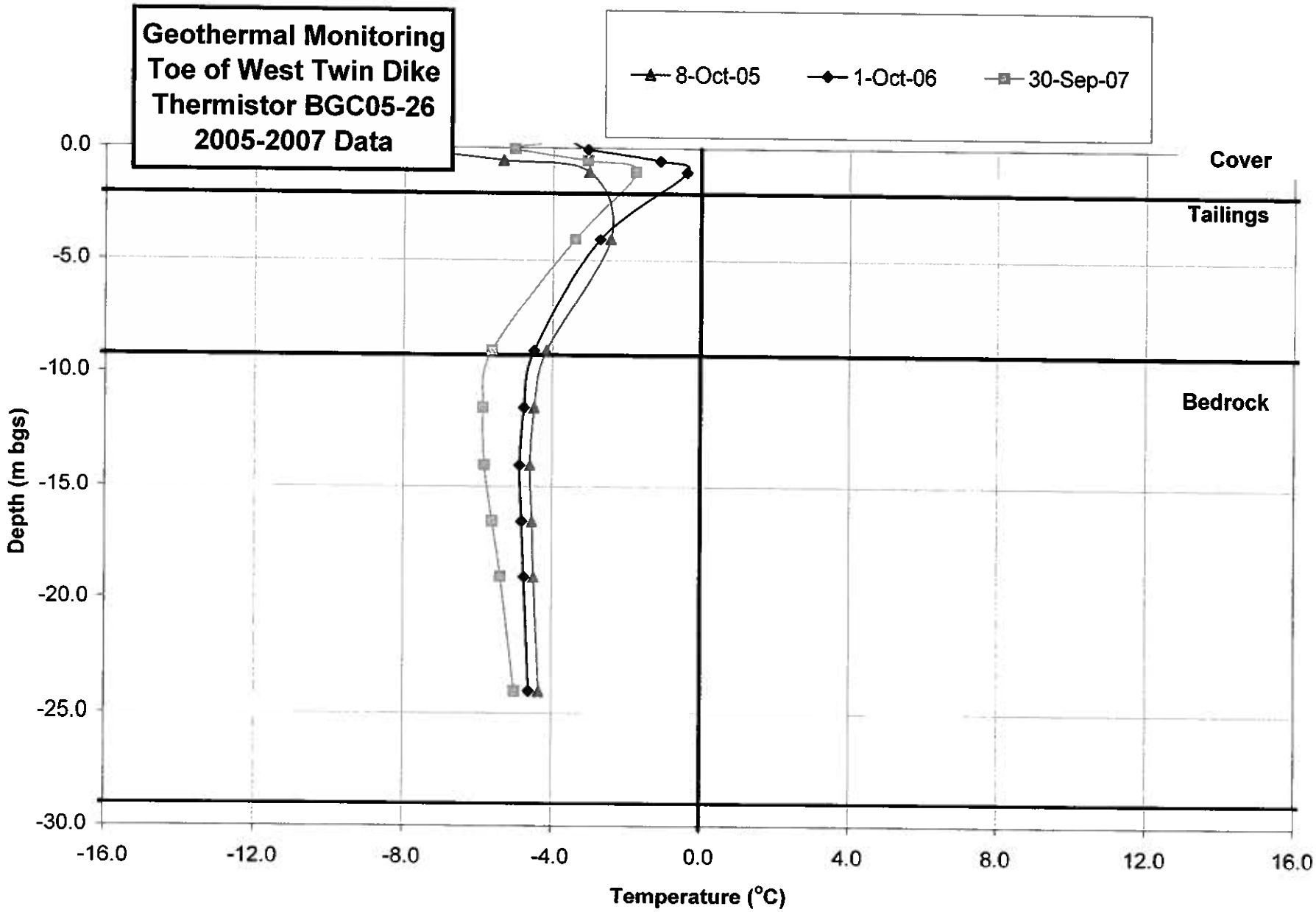

Frost Gauge 6 - Surface Cell
2006
2007
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
Active Layer Thaw (m bgs)
Cover
Tailings
1-May
1-Jun
2-Jul
2-Aug
2-Sep
3-Oct
Date

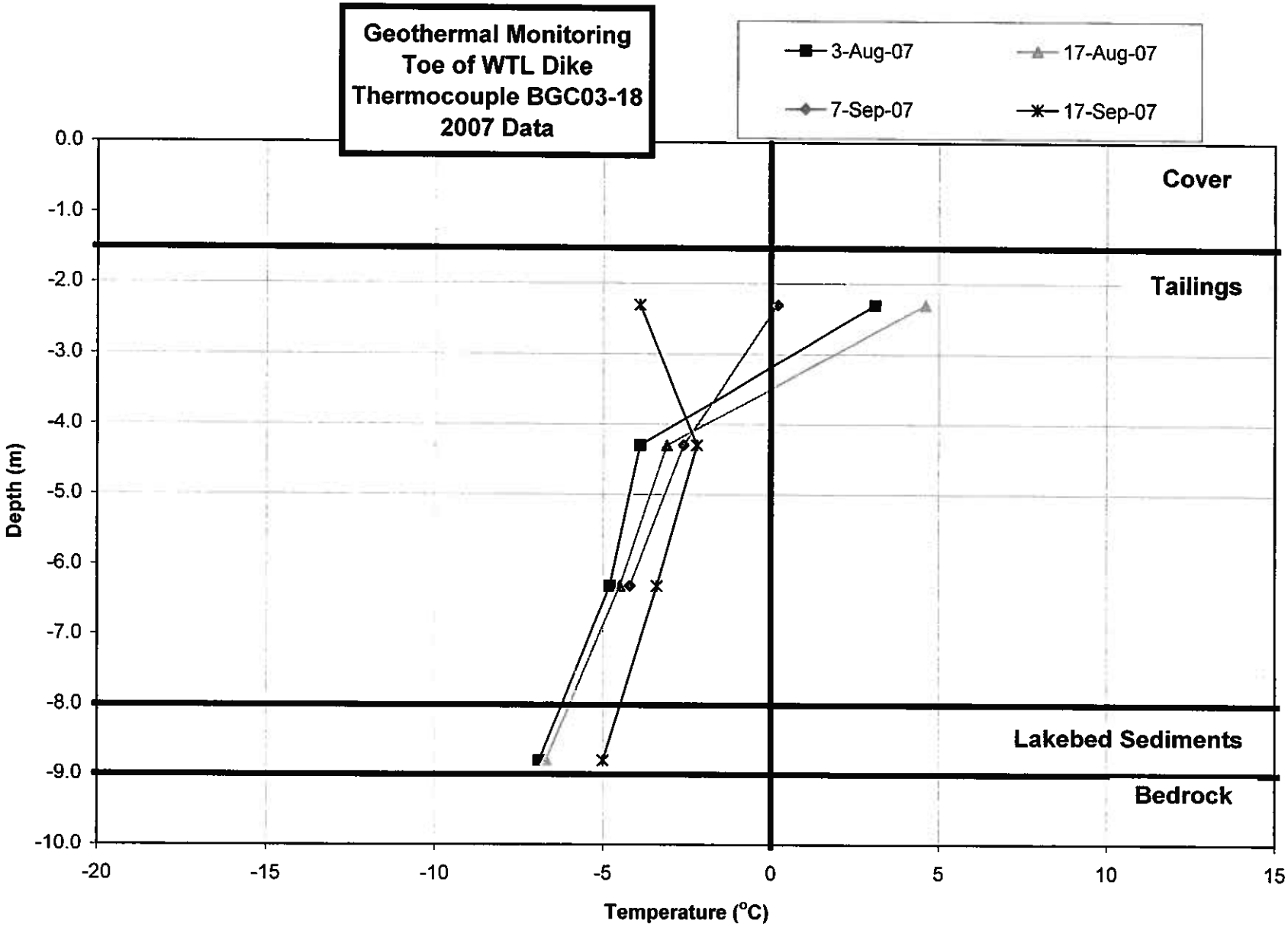
Toe West Twin Dike


Geothermal Monitoring
Toe of West Twin Dike
Thermistor BGC03-19
2007 Data
4-Apr-07
1-May-07
18-May-07
2-Jun-07
15-Jun-07
29-Jun-07
17-Jul-07
3-Aug-07
5-Sep-07
19-Sep-07
27-Sep-07
30-Sep-07
10-Oct-07
23-Oct-07
17-Nov-07
Cover
Tailings
Lake Bed Sediments
Depth (m bgs)
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-25.0
-20.0
-15.0
-10.0
-5.0
0.0
5.0
10.0
Temperature (°C)

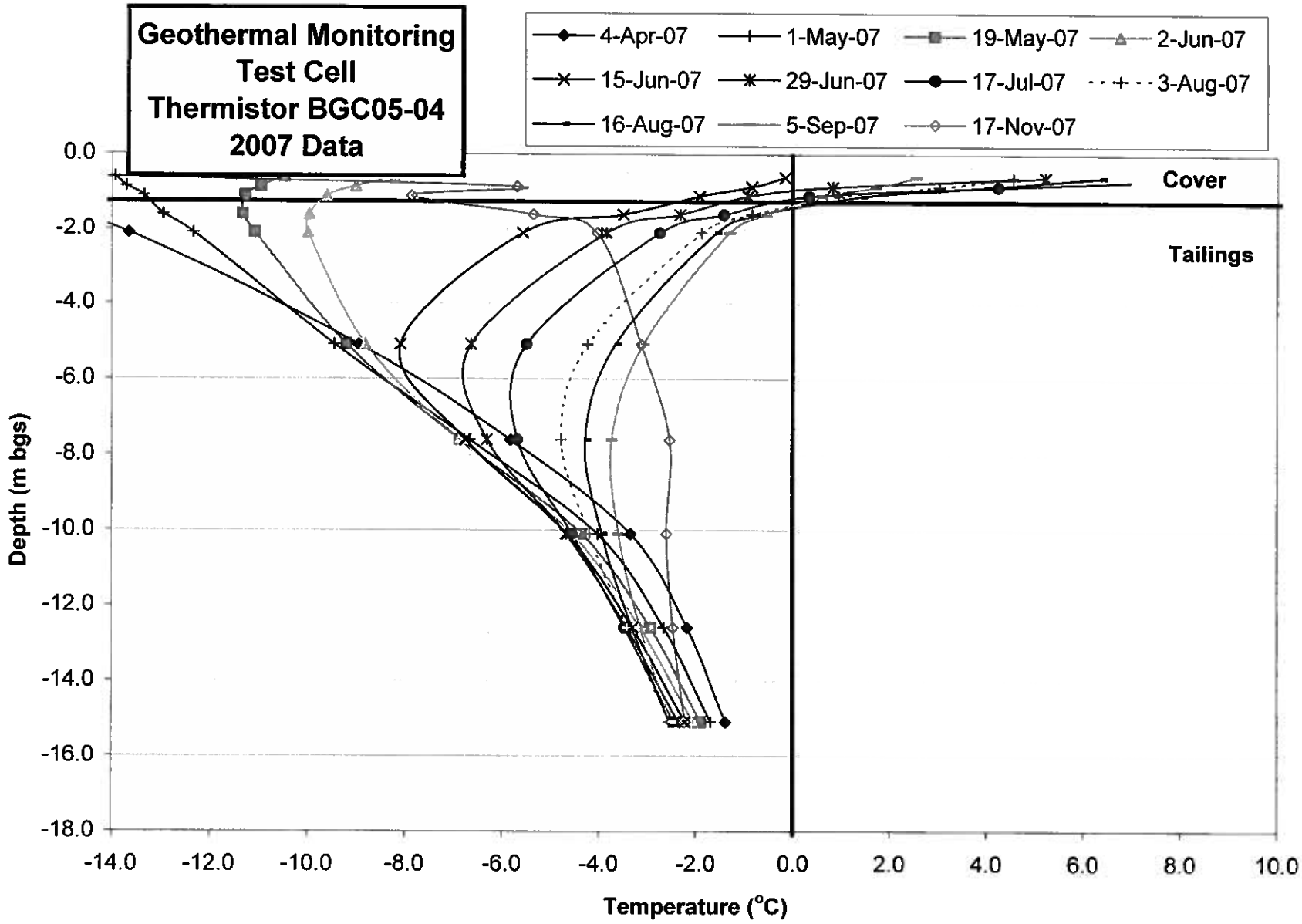

Geothermal Monitoring
Toe of West Twin Dike
Thermistor BGC03-19
2003-2007 Comparision Plot
11-Aug-03
19-Aug-05
12-Aug-06
3-Aug-07
Cover
Tailings
Lake Bed Sediments
Depth (m bgs)
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Temperature (°C)

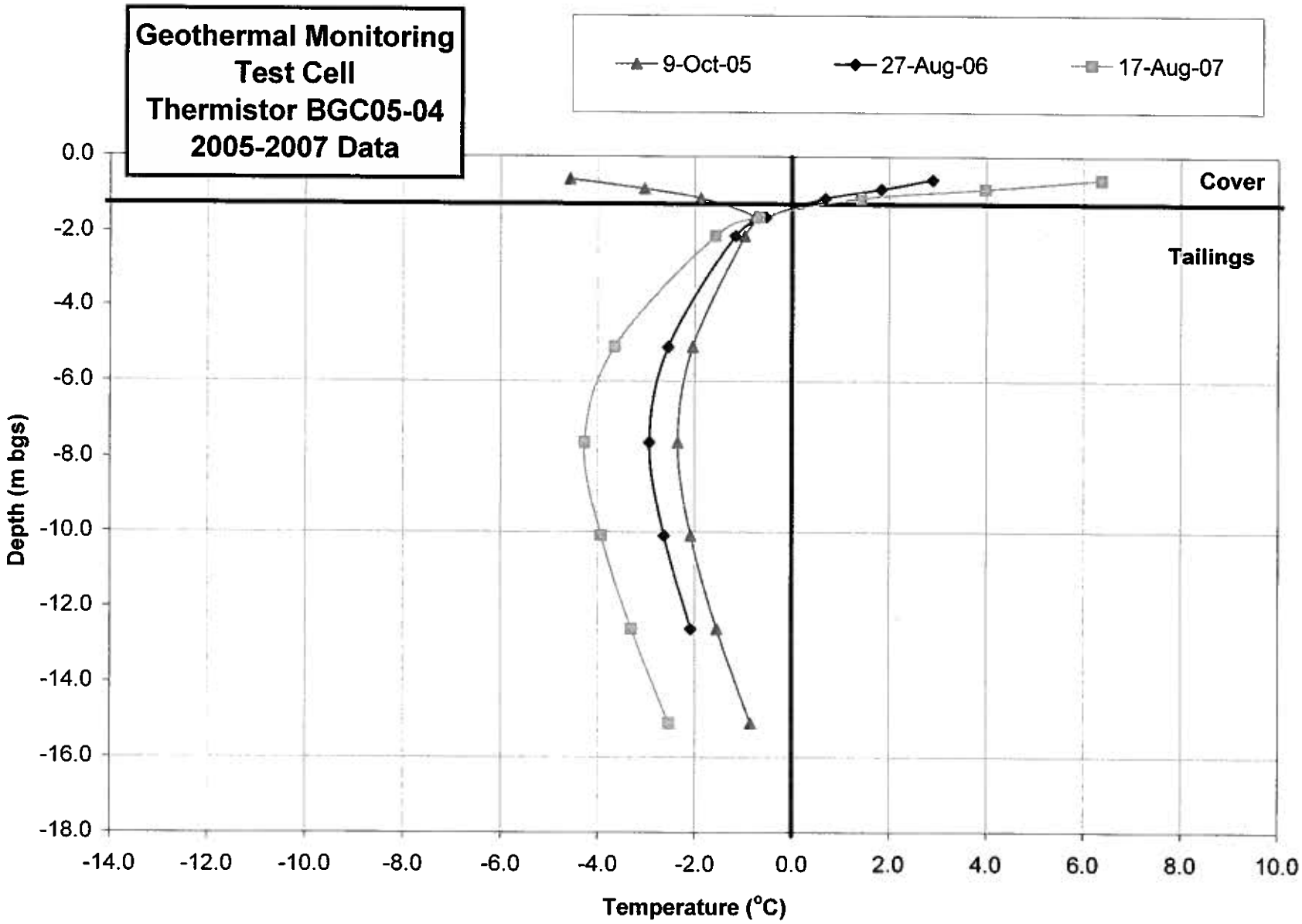

Geothermal Monitoring
Toe of West Twin Dike
Thermistor BGC05-26
2007 Data
4-Apr-07
1-May-07
18-May-07
2-Jun-07
15-Jun-07
29-Jun-07
17-Jul-07
3-Aug-07
16-Aug-07
5-Sep-07
17-Nov-07
Cover
Tailings
Bedrock
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-16.0
-12.0
-8.0
-4.0
0.0
4.0
8.0
12.0
16.0
Temperature (°C)

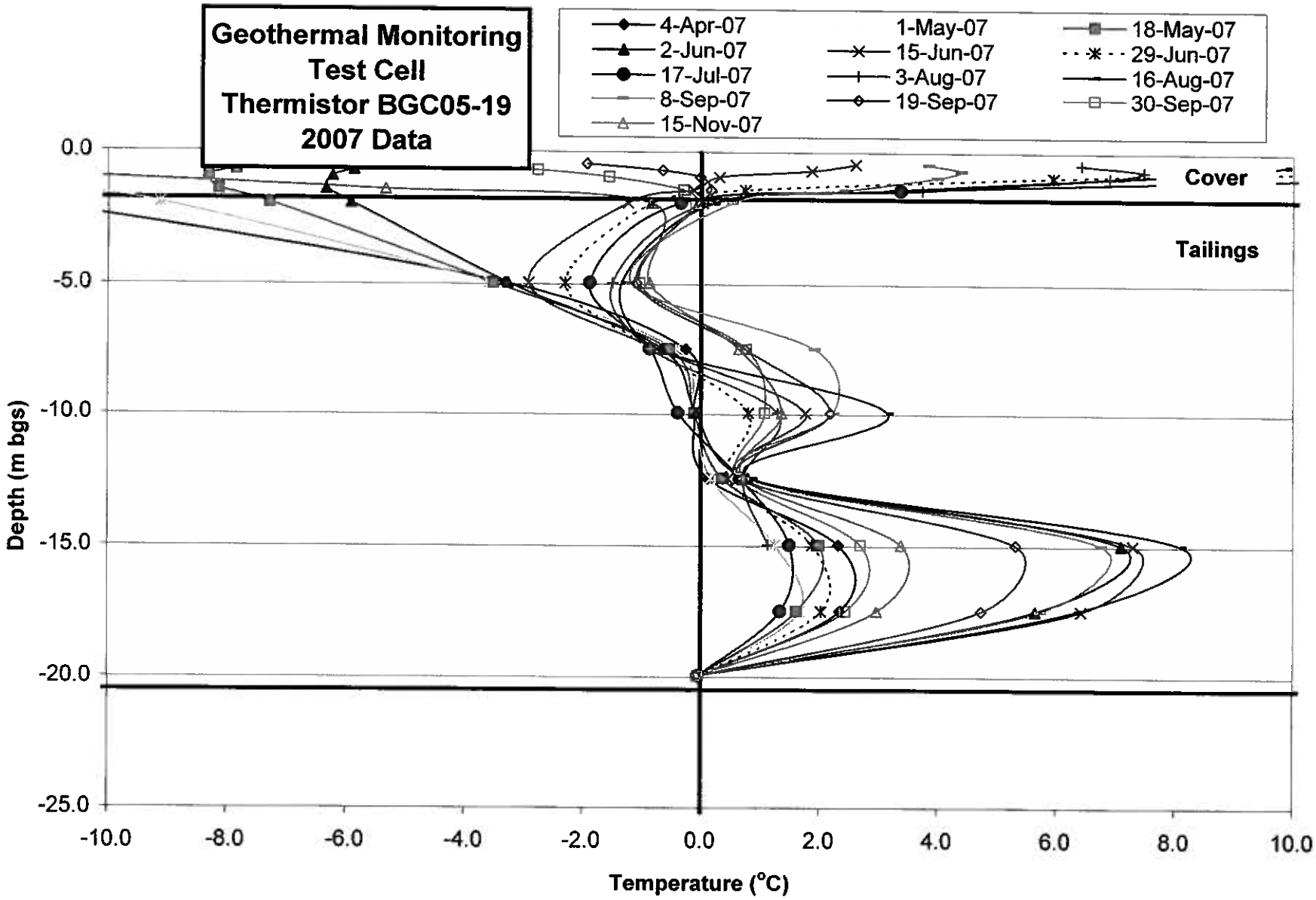

Geothermal Monitoring
Toe of West Twin Dike
Thermistor BGC05-26
2005-2007 Data
8-Oct-05
1-Oct-06
30-Sep-07
Cover
Tailings
Bedrock
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-16.0
-12.0
-8.0
-4.0
0.0
4.0
8.0
12.0
16.0
Temperature (°C)

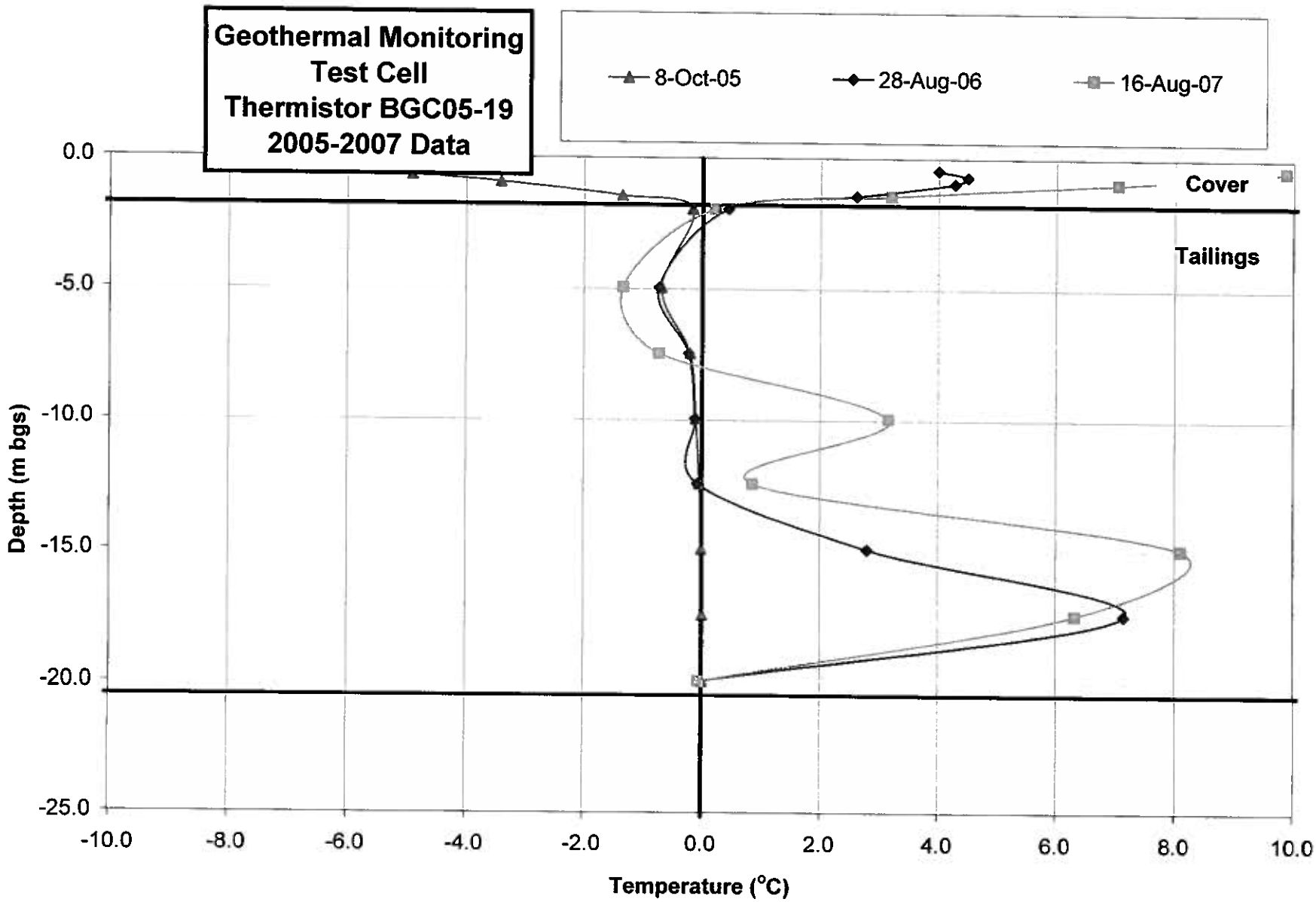

Geothermal Monitoring
Toe of WTL Dike
Thermocouple BGC03-18
2007 Data
3-Aug-07
17-Aug-07
7-Sep-07
17-Sep-07
Cover
Tailings
Lakebed Sediments
Bedrock
Depth (m)
0.0
-1.0
-2.0
-3.0
-4.0
-5.0
-6.0
-7.0
-8.0
-9.0
-10.0
-20
-15
-10
-5
0
5
10
15
Temperature (°C)

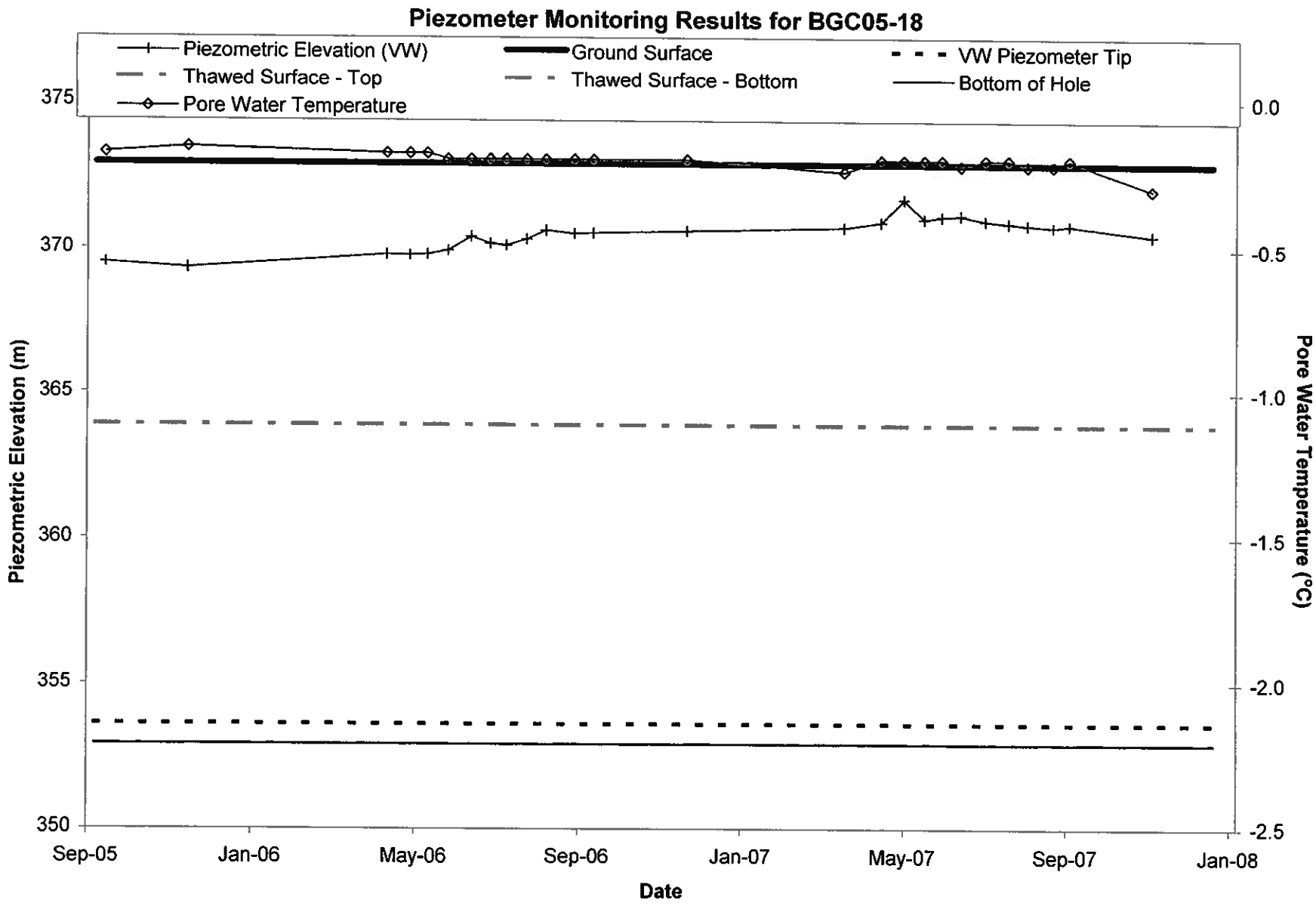
Test Cell

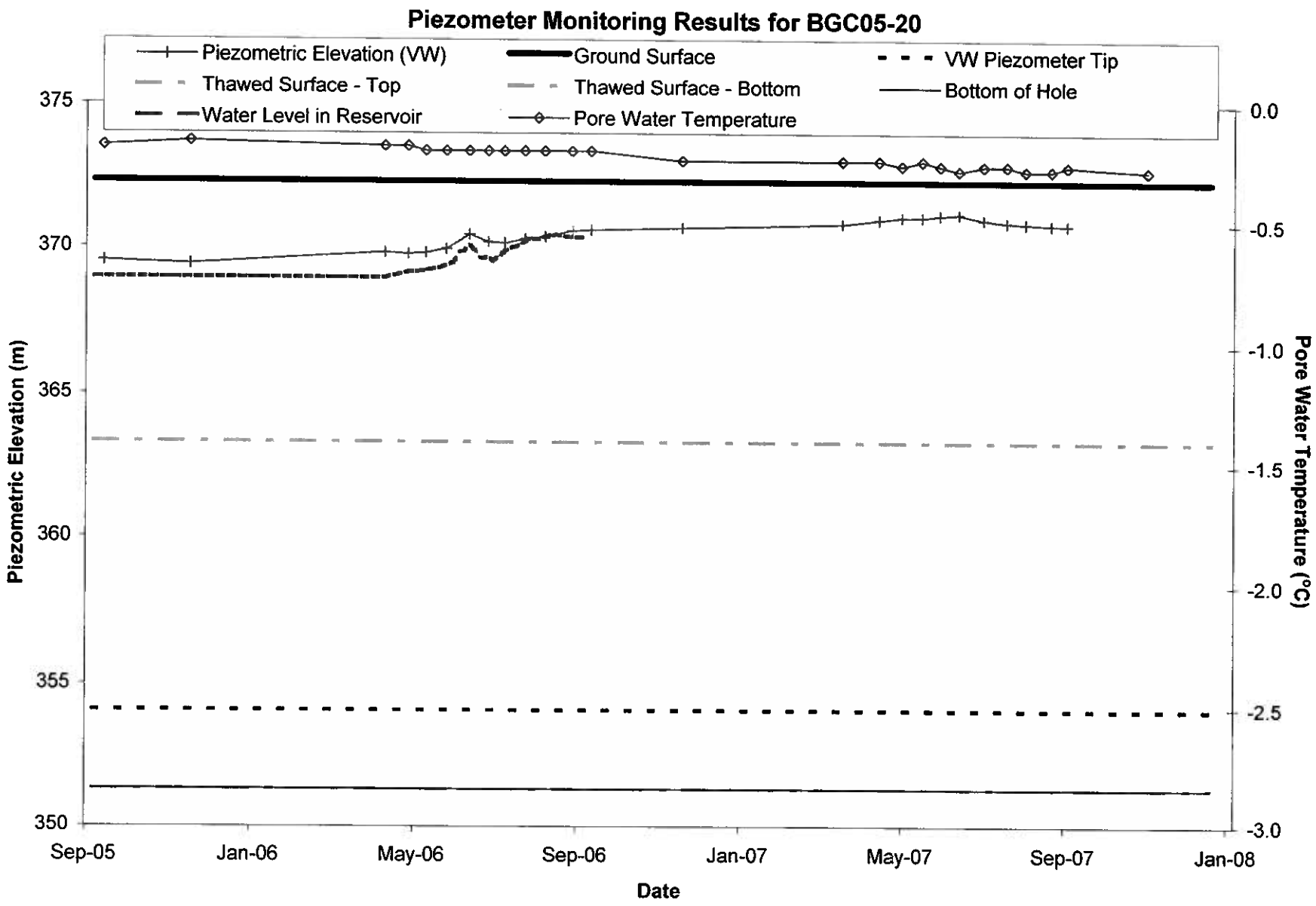

Geothermal Monitoring
Test Cell
Thermistor BGC05-04
2007 Data
4-Apr-07
1-May-07
19-May-07
2-Jun-07
15-Jun-07
29-Jun-07
17-Jul-07
3-Aug-07
16-Aug-07
5-Sep-07
17-Nov-07
Cover
Tailings
Depth (m bgs)
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-14.0
-16.0
-18.0
-14.0
-12.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0
8.0
10.0
Temperature (°C)

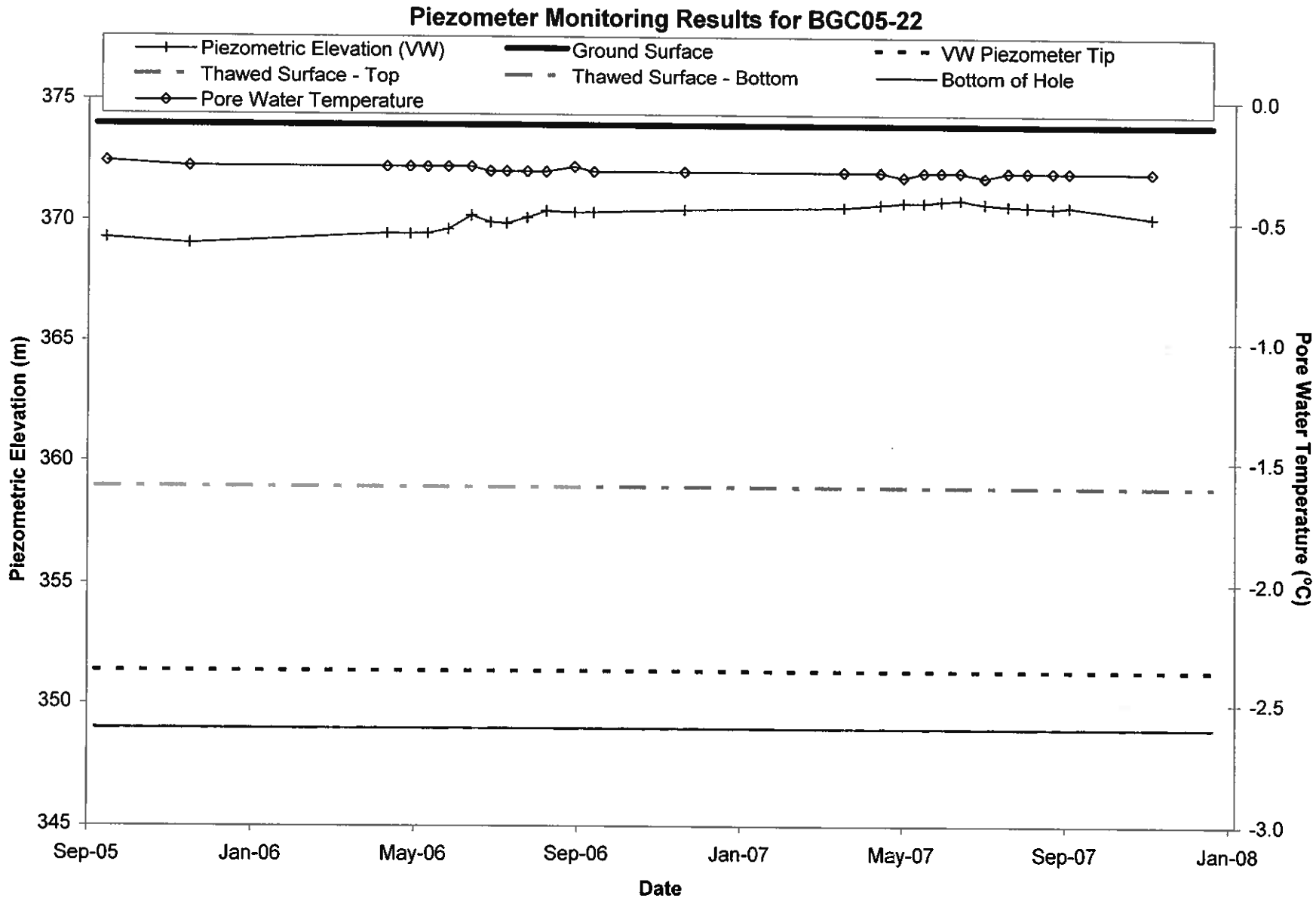

Geothermal Monitoring
Test Cell
Thermistor BGC05-04
2005-2007 Data
9-Oct-05
27-Aug-06
17-Aug-07
Cover
Tailings
Depth (m bgs)
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-14.0
-16.0
-18.0
-14.0
-12.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0
8.0
10.0
Temperature (°C)


Geothermal Monitoring
Test Cell
Thermistor BGC05-19
2007 Data
4-Apr-07
1-May-07
18-May-07
2-Jun-07
15-Jun-07
29-Jun-07
17-Jul-07
3-Aug-07
16-Aug-07
8-Sep-07
19-Sep-07
30-Sep-07
15-Nov-07
Cover
Tailings
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0
8.0
10.0
Temperature (°C)

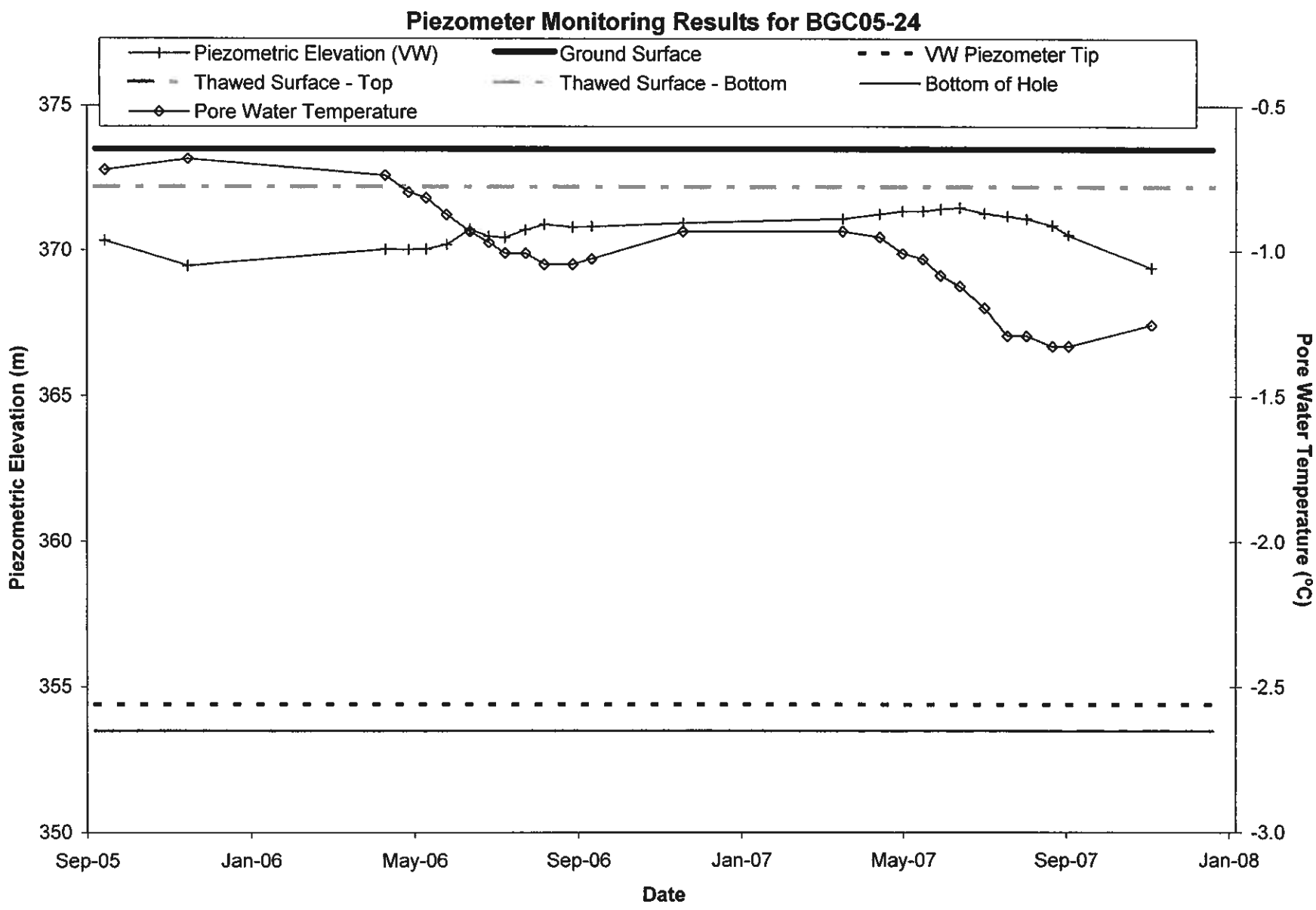

Geothermal Monitoring
Test Cell
Thermistor BGC05-19
2005-2007 Data
8-Oct-05
28-Aug-06
16-Aug-07
Cover
Tailings
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0
8.0
10.0
Temperature (°C)

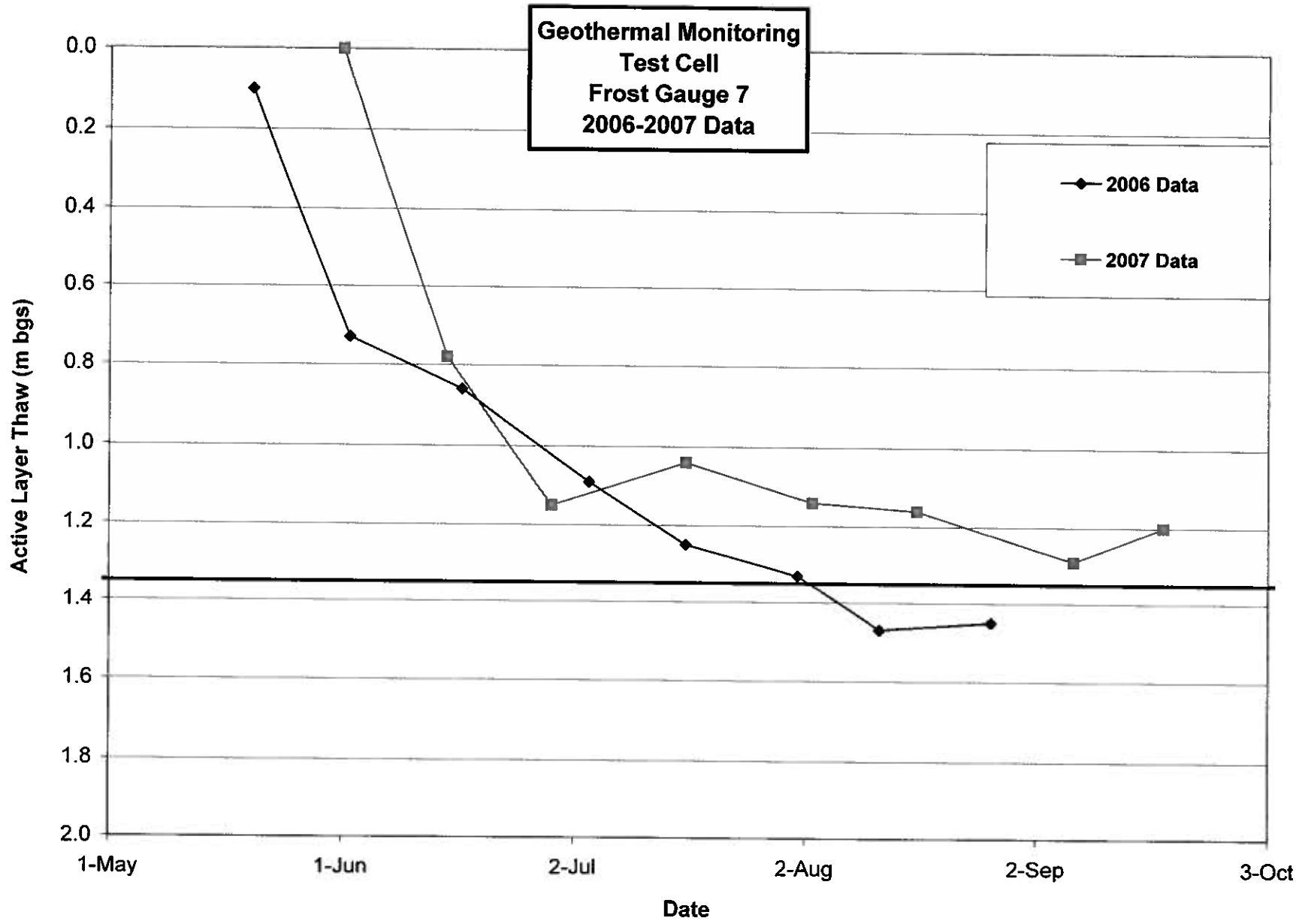

Piezometer Monitoring Results for BGC05-18
Piezometric Elevation (VW)
Ground Surface
VW Piezometer Tip
Thawed Surface - Top
Thawed Surface - Bottom
Bottom of Hole
Pore Water Temperature
375
370
365
360
355
350
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
Piezometric Elevation (m)
Pore Water Temperature (°C)
Sep-05
Jan-06
May-06
Sep-06
Jan-07
May-07
Sep-07
Jan-08
Date


Piezometer Monitoring Results for BGC05-20
Piezometric Elevation (VW)
Ground Surface
VW Piezometer Tip
Thawed Surface - Top
Thawed Surface - Bottom
Bottom of Hole
Water Level in Reservoir
Pore Water Temperature
375
370
365
360
355
350
Piezometric Elevation (m)
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
Pore Water Temperature (°C)
Sep-05
Jan-06
May-06
Sep-06
Jan-07
May-07
Sep-07
Jan-08
Date



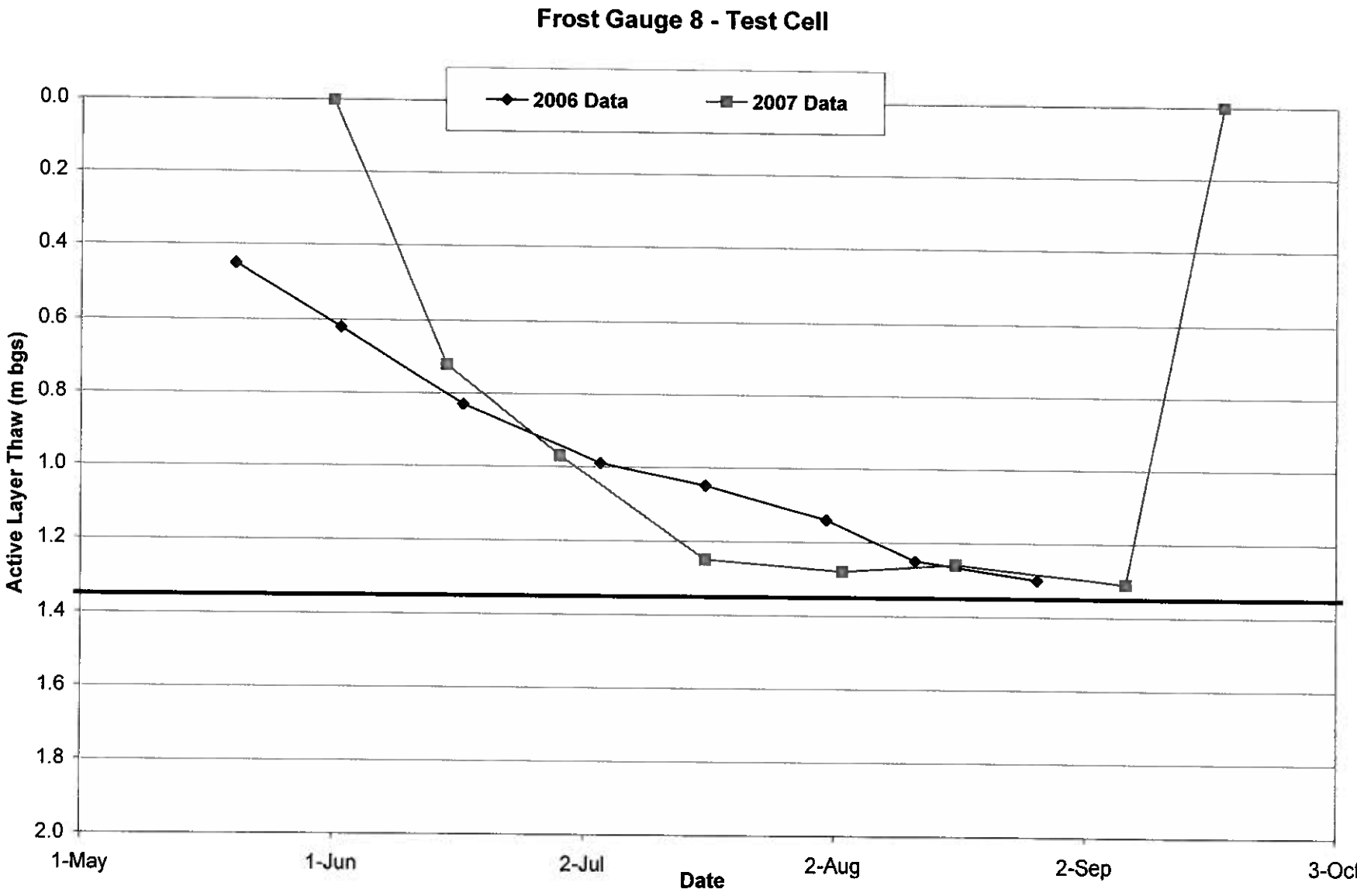
Test Cell.xls
BGC05-22 Plot


Piezometer Monitoring Results for BGC05-24
Piezometric Elevation (VW)
Ground Surface
VW Piezometer Tip
Thawed Surface - Top
Thawed Surface - Bottom
Bottom of Hole
Pore Water Temperature
375
370
365
360
355
350
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
Piezometric Elevation (m)
Pore Water Temperature (°C)
Sep-05
Jan-06
May-06
Sep-06
Jan-07
May-07
Sep-07
Jan-08
Date

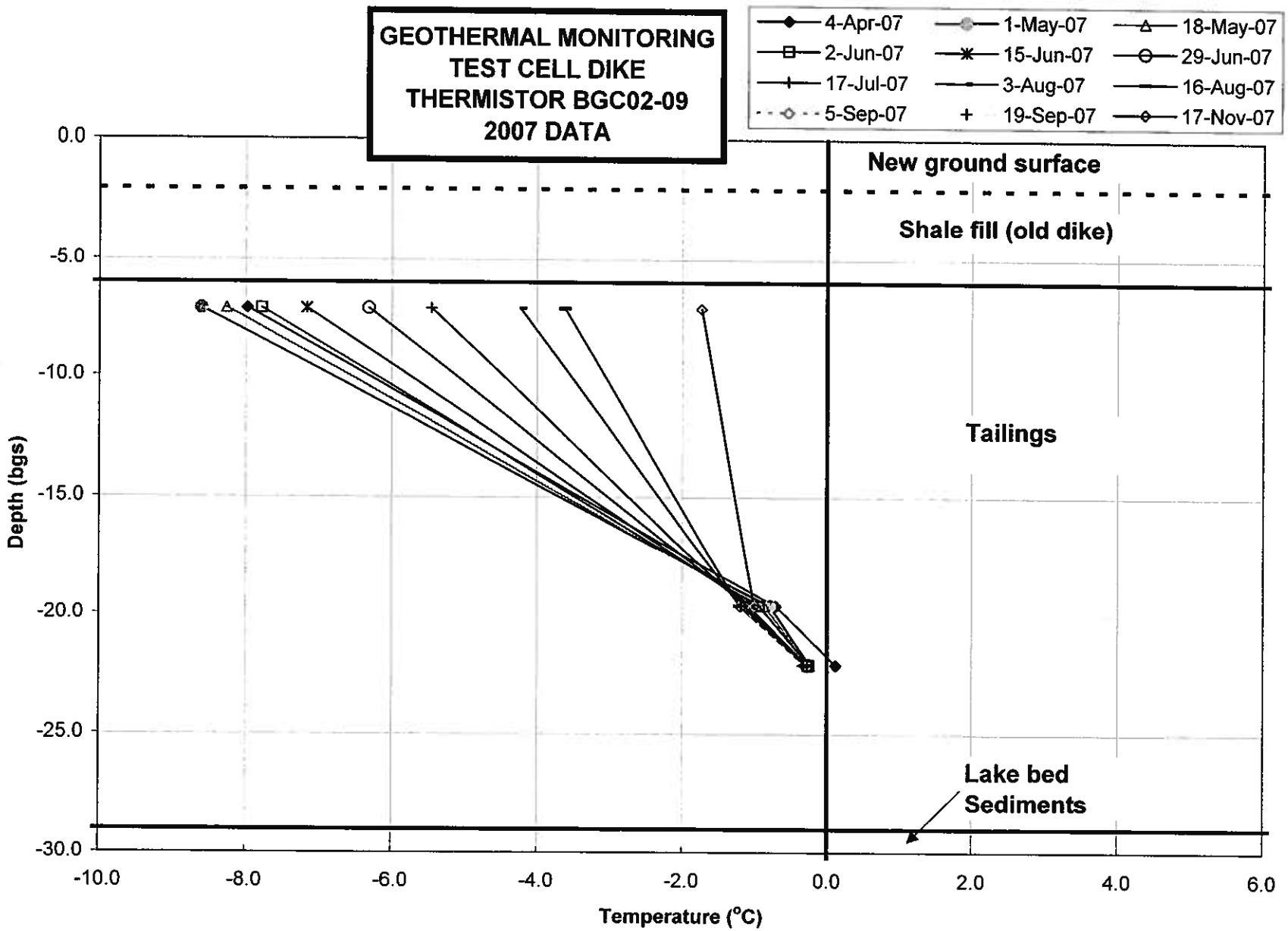


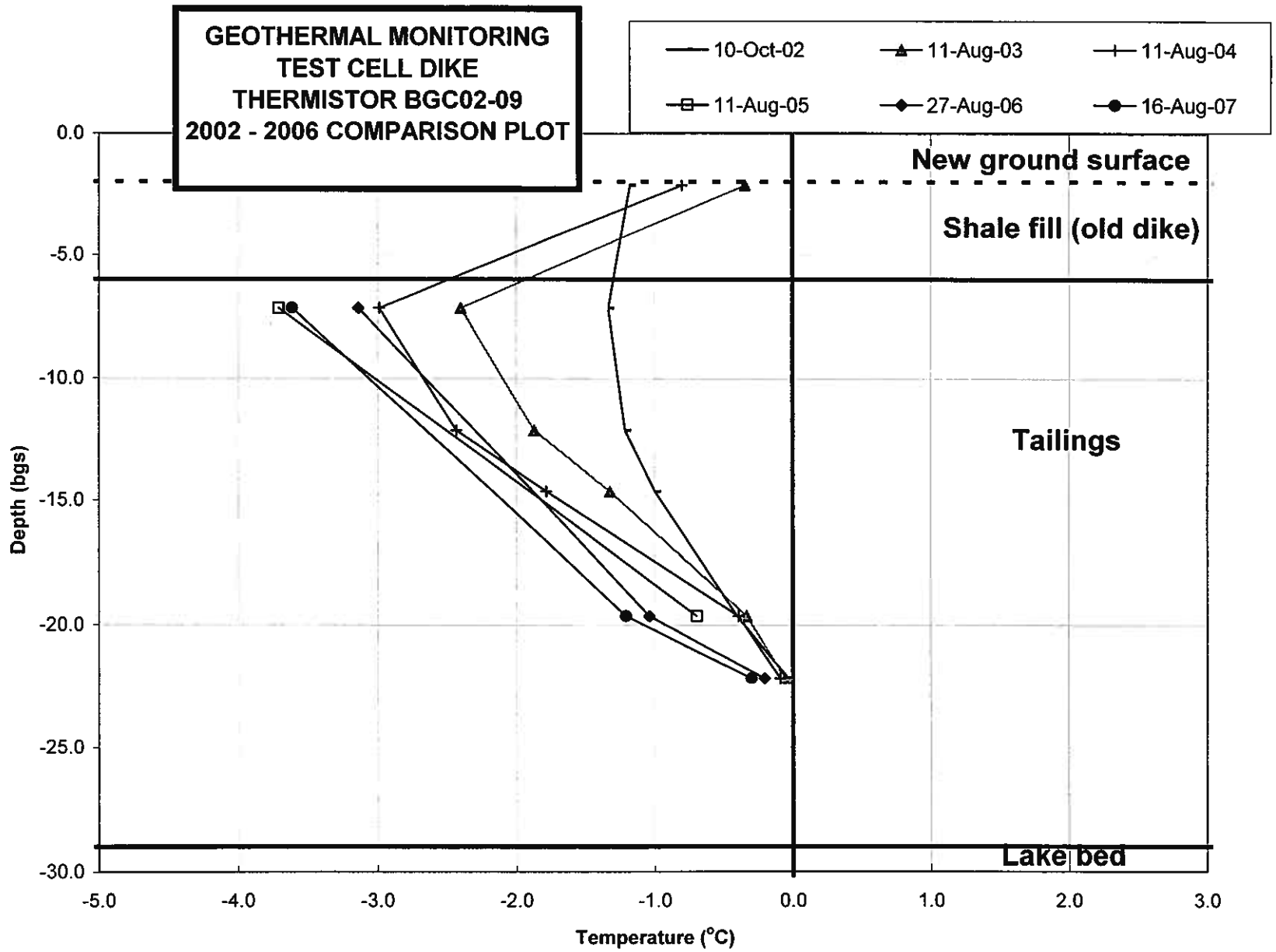
Test Cell.xls
FG7 comp chrt

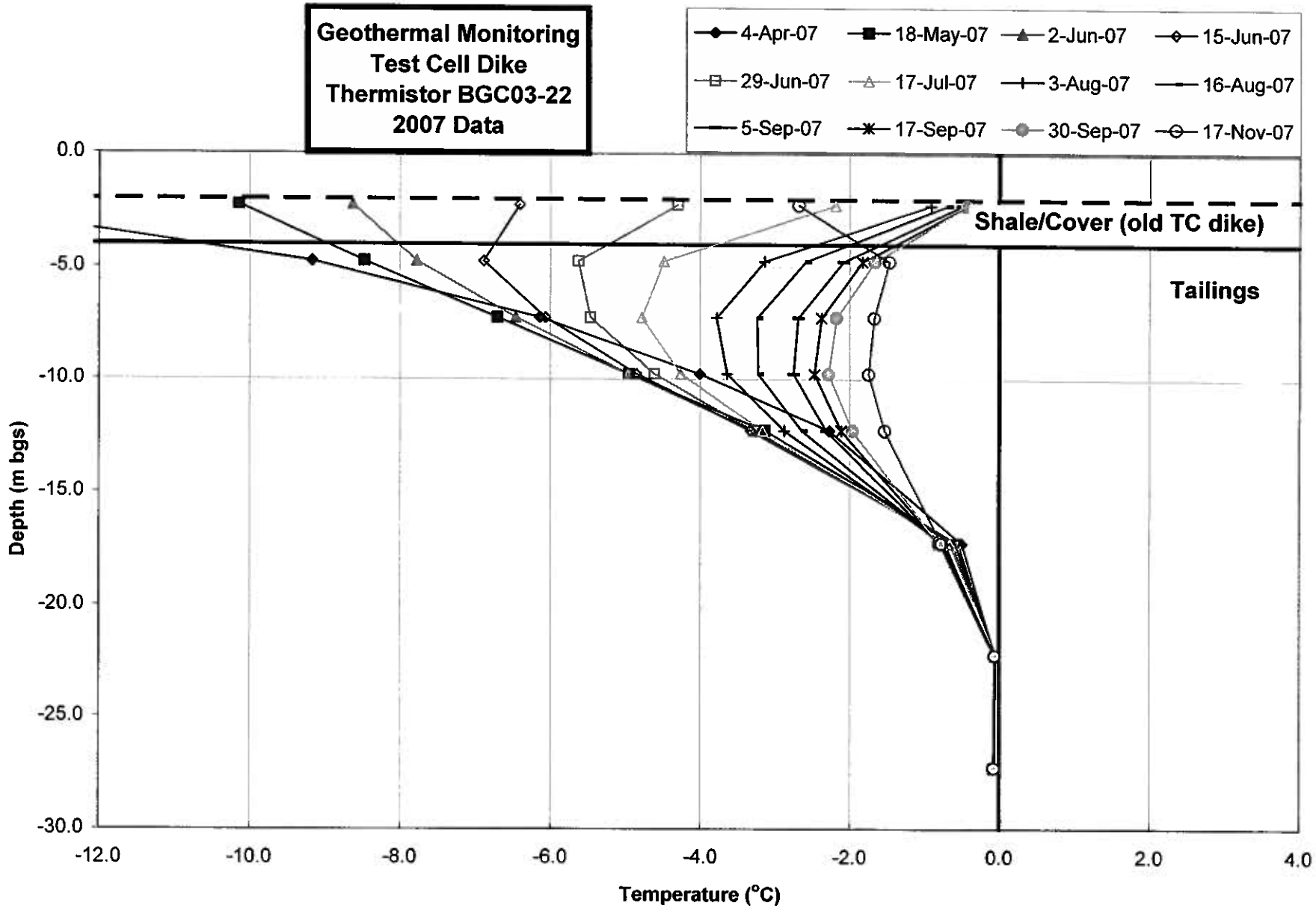
BGC Engineering Inc.

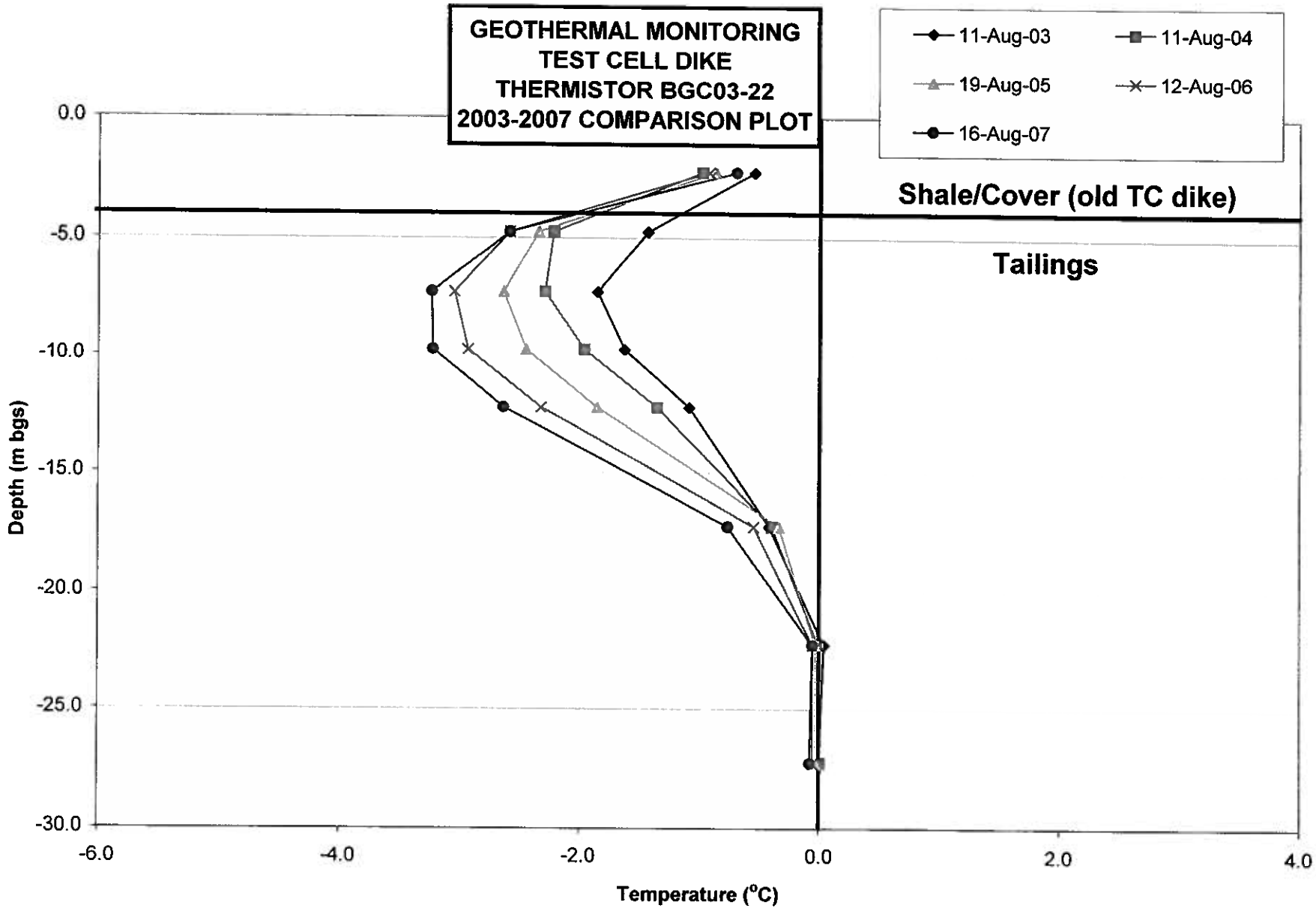

Frost Gauge 8 - Test Cell
2006 Data
2007 Data
Active Layer Thaw (m bgs)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1-May
1-Jun
2-Jul
2-Aug
2-Sep
3-Oct
Date

Test Cell Dike

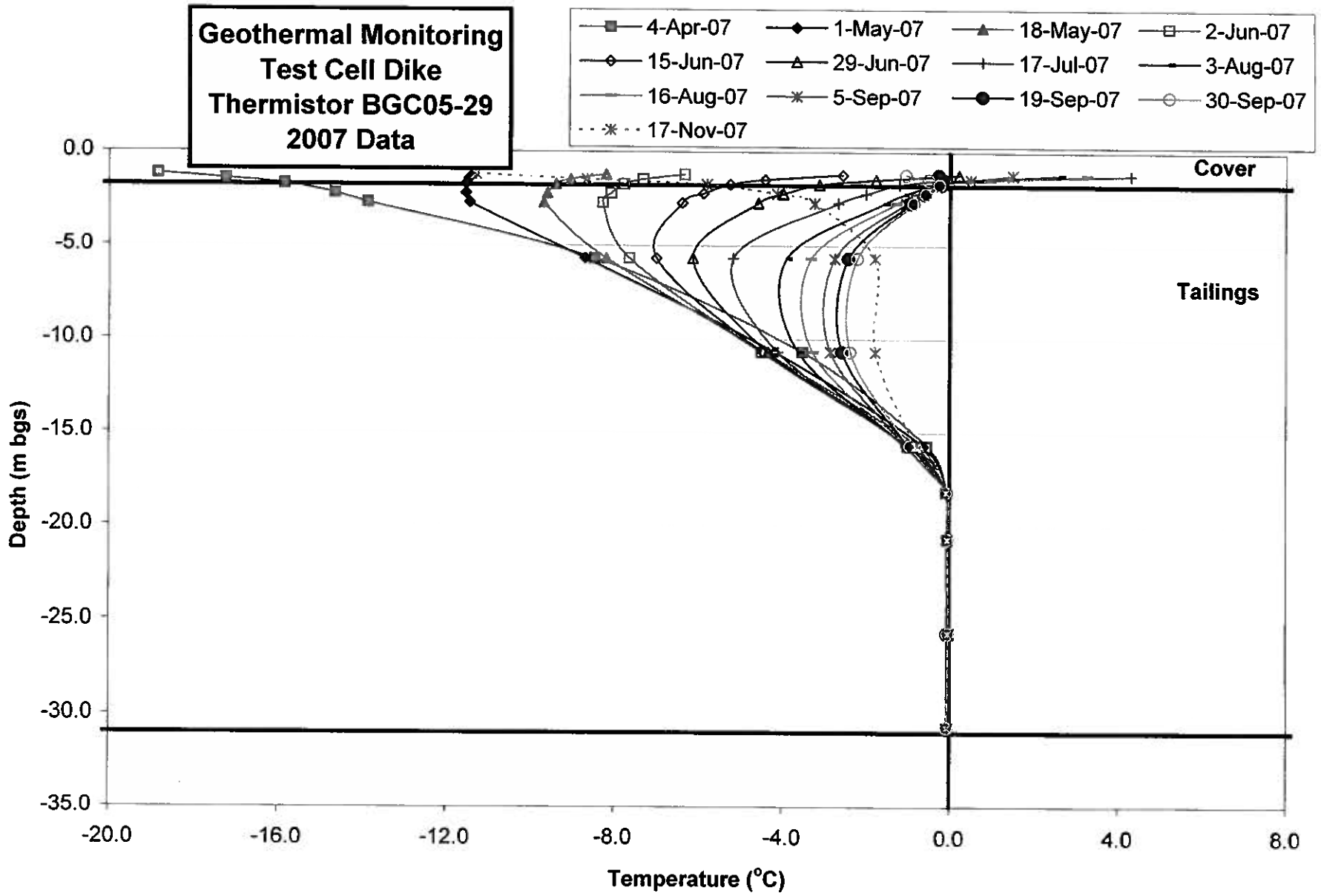

GEOTHERMAL MONITORING
TEST CELL DIKE
THERMISTOR BGC02-09
2007 DATA
4-Apr-07
1-May-07
18-May-07
2-Jun-07
15-Jun-07
29-Jun-07
17-Jul-07
3-Aug-07
16-Aug-07
5-Sep-07
19-Sep-07
17-Nov-07
New ground surface
Shale fill (old dike)
Tailings
Lake bed
Sediments
Depth (bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0
Temperature (°C)

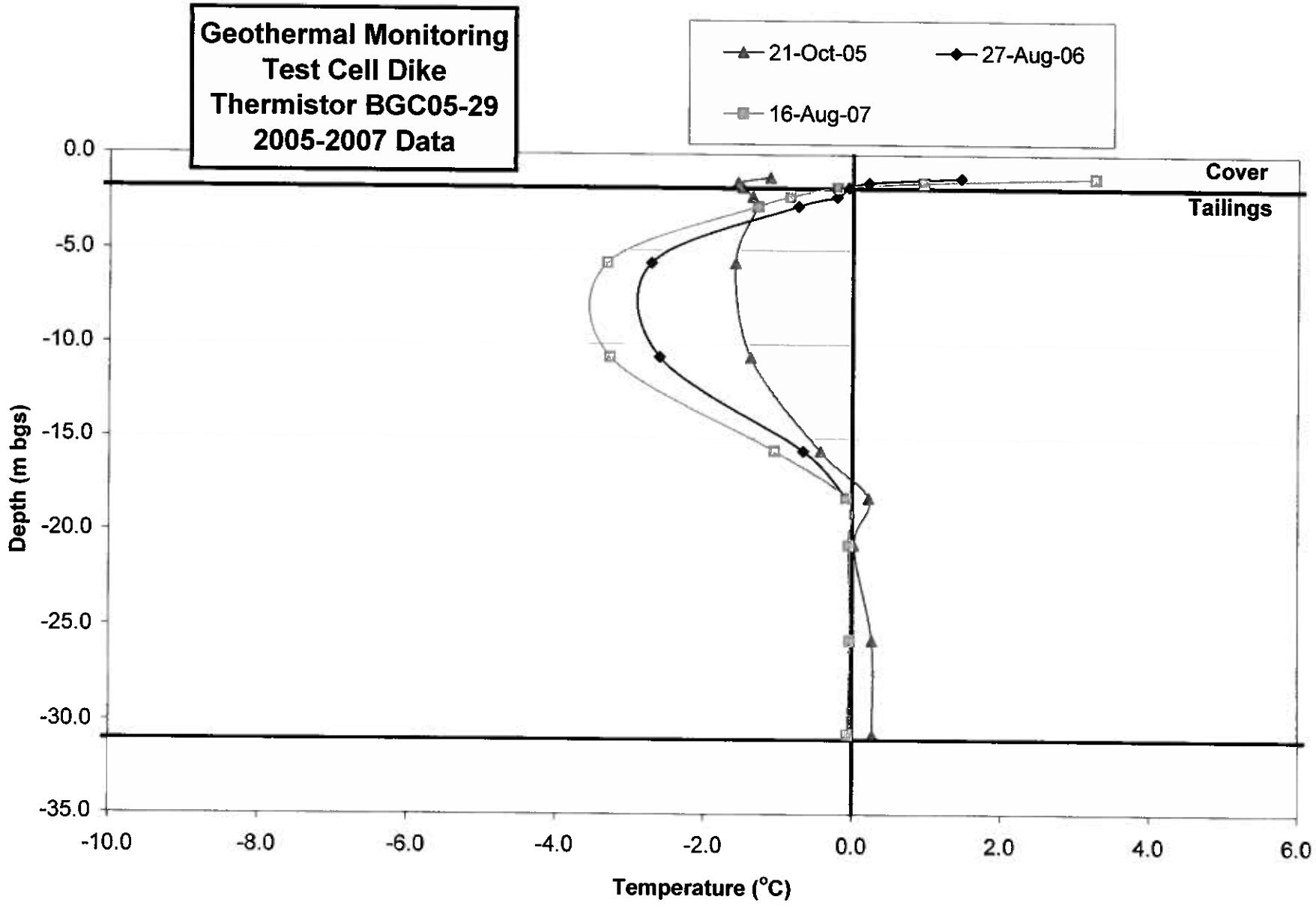

GEOTHERMAL MONITORING
TEST CELL DIKE
THERMISTOR BGC02-09
2002 - 2006 COMPARISON PLOT
10-Oct-02
11-Aug-03
11-Aug-04
11-Aug-05
27-Aug-06
16-Aug-07
New ground surface
Shale fill (old dike)
Tailings
Lake bed
Depth (bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-5.0
-4.0
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
Temperature (°C)


Geothermal Monitoring
Test Cell Dike
Thermistor BGC03-22
2007 Data
4-Apr-07
18-May-07
2-Jun-07
15-Jun-07
29-Jun-07
17-Jul-07
3-Aug-07
16-Aug-07
5-Sep-07
17-Sep-07
30-Sep-07
17-Nov-07
Shale/Cover (old TC dike)
Tailings
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-12.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
Temperature (°C)

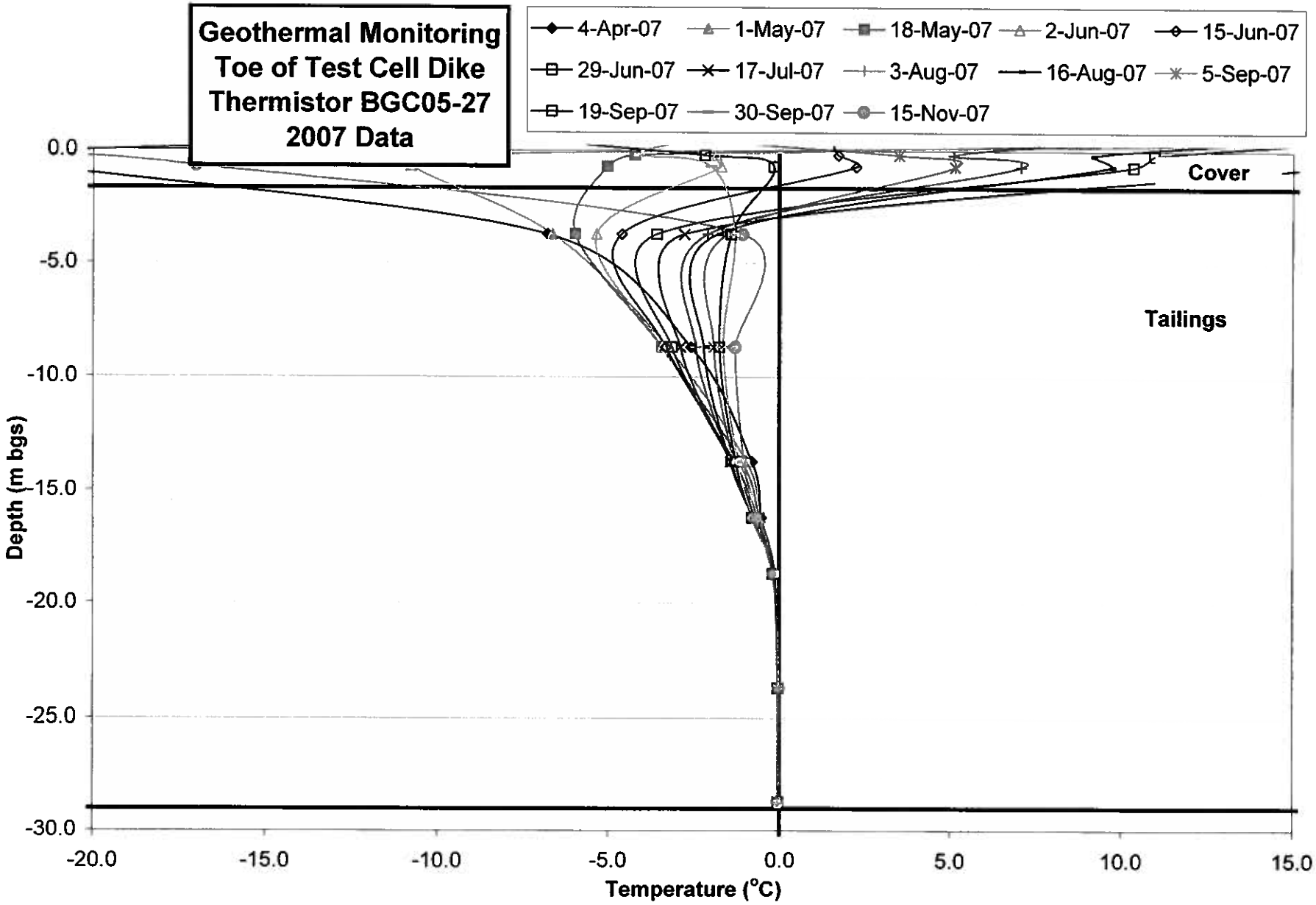


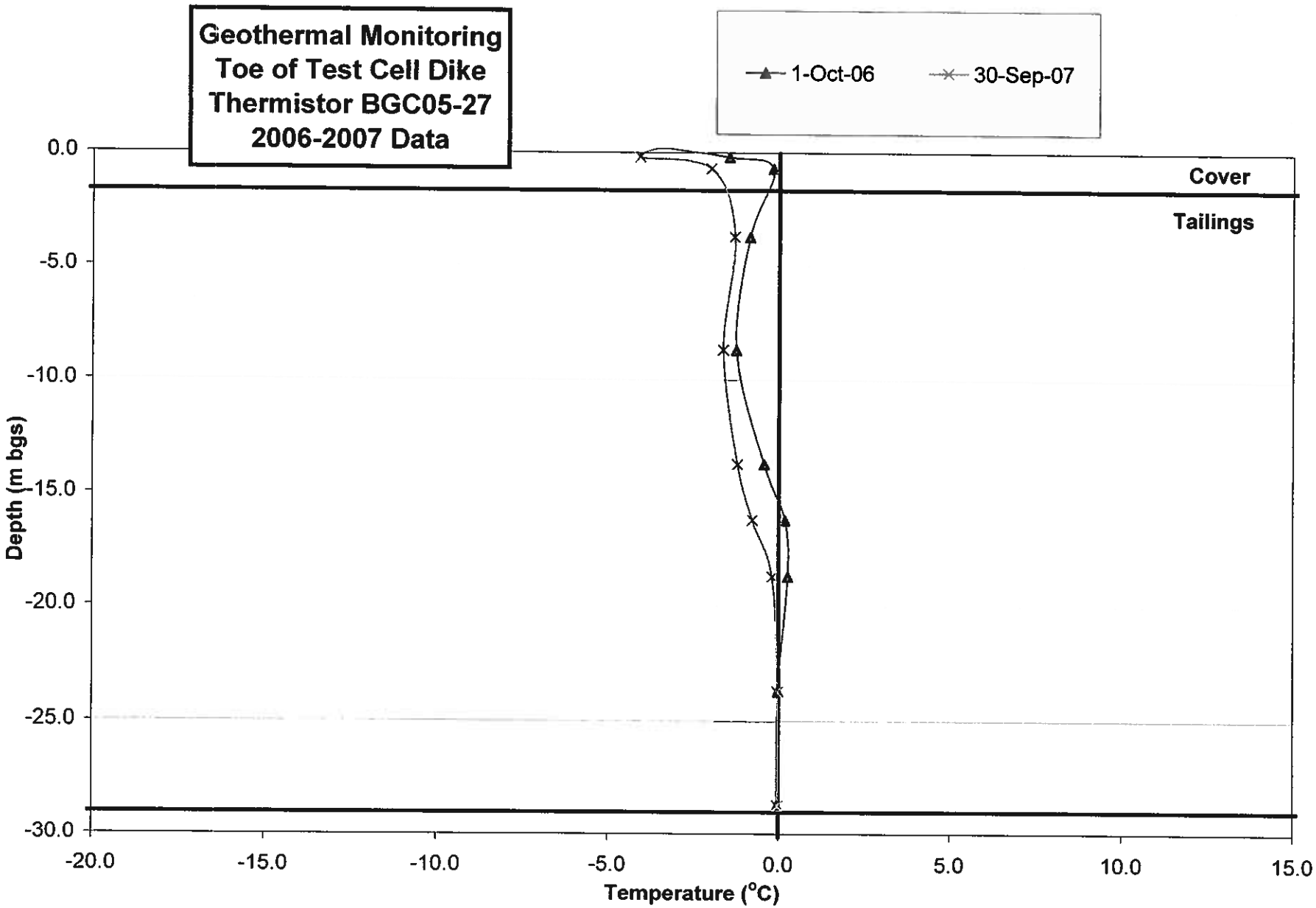
TC Dike.xls
03-22 TR Comp

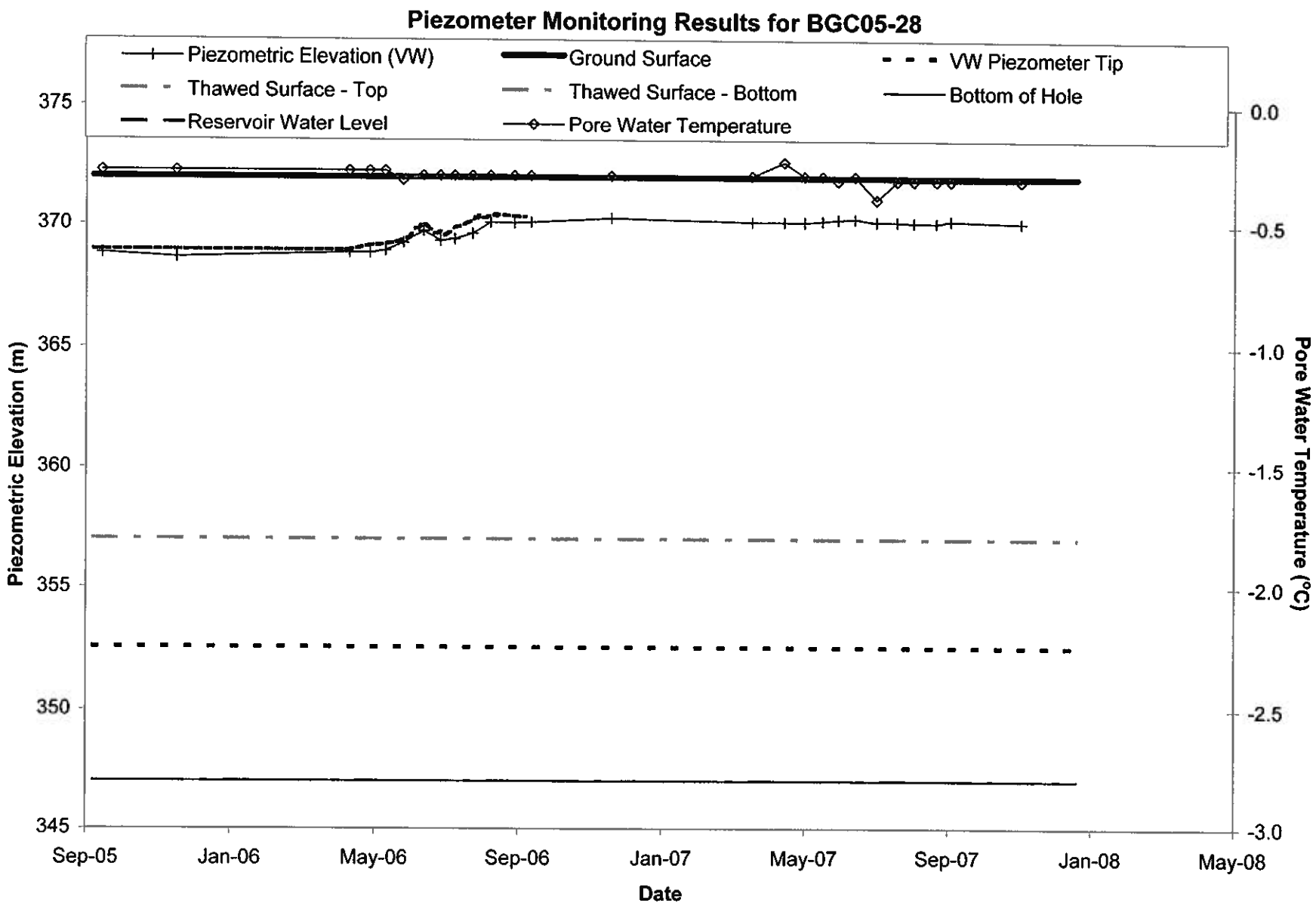

Geothermal Monitoring
Test Cell Dike
Thermistor BGC05-29
2007 Data
4-Apr-07
1-May-07
18-May-07
2-Jun-07
15-Jun-07
29-Jun-07
17-Jul-07
3-Aug-07
16-Aug-07
5-Sep-07
19-Sep-07
30-Sep-07
17-Nov-07
Cover
Tailings
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-20.0
-16.0
-12.0
-8.0
-4.0
0.0
4.0
8.0
Temperature (°C)


Geothermal Monitoring
Test Cell Dike
Thermistor BGC05-29
2005-2007 Data
21-Oct-05
27-Aug-06
16-Aug-07
Cover
Tailings
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0
Temperature (°C)

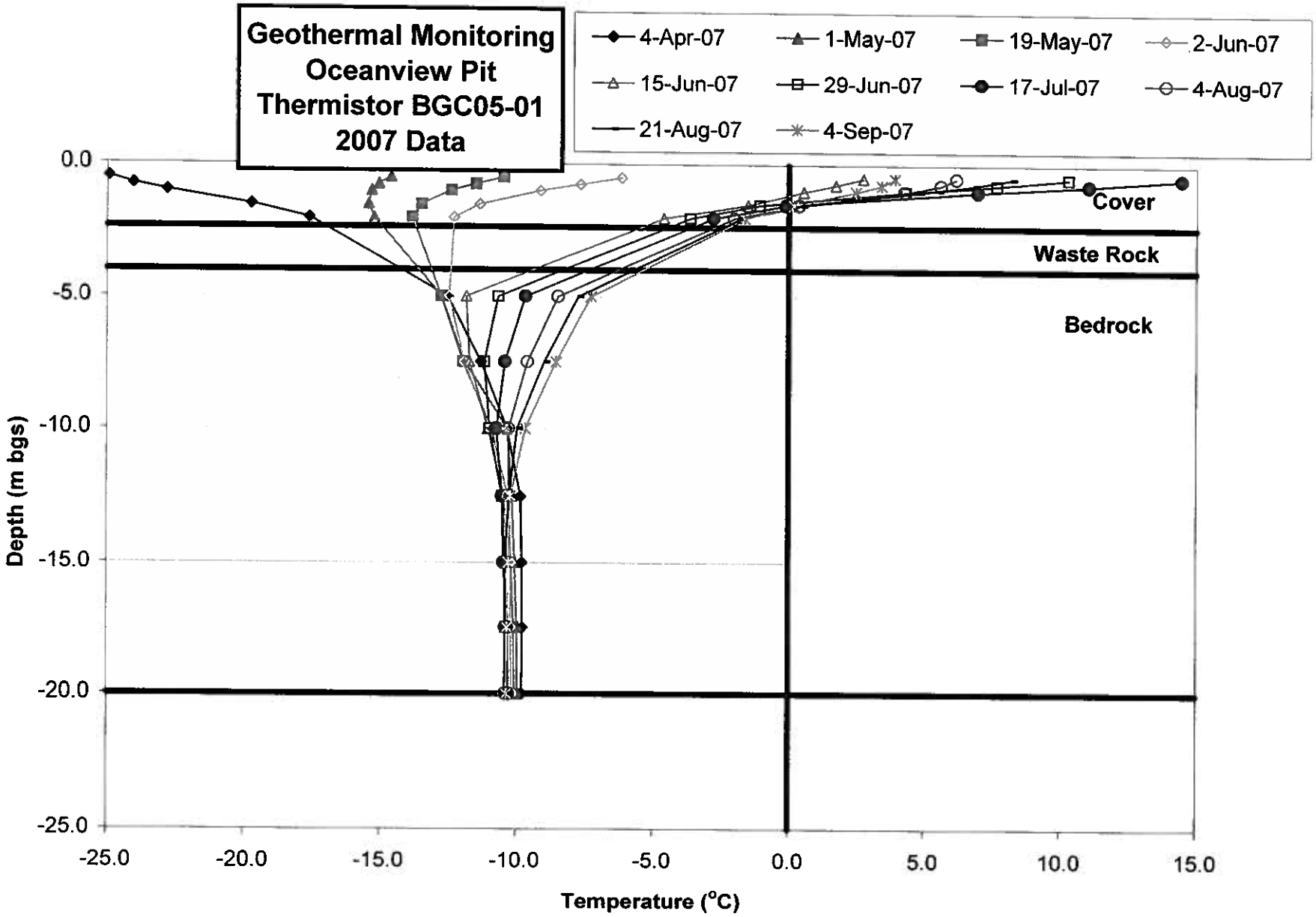
Toe of Test Cell Dike

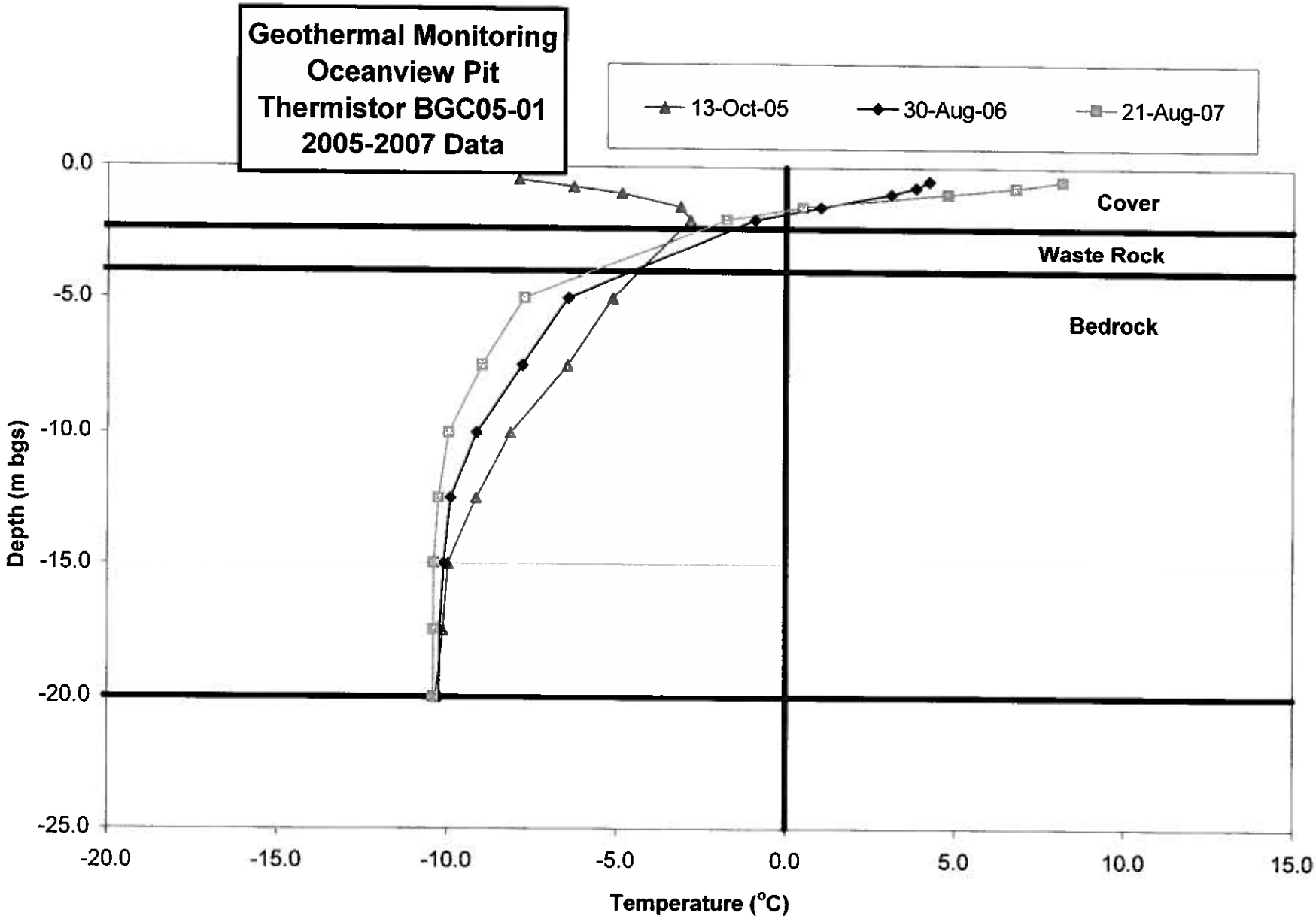

Geothermal Monitoring
Toe of Test Cell Dike
Thermistor BGC05-27
2007 Data
4-Apr-07
1-May-07
18-May-07
2-Jun-07
15-Jun-07
29-Jun-07
17-Jul-07
3-Aug-07
16-Aug-07
5-Sep-07
19-Sep-07
30-Sep-07
15-Nov-07
Cover
Tailings
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-20.0
-15.0
-10.0
-5.0
0.0
5.0
10.0
15.0
Temperature (°C)

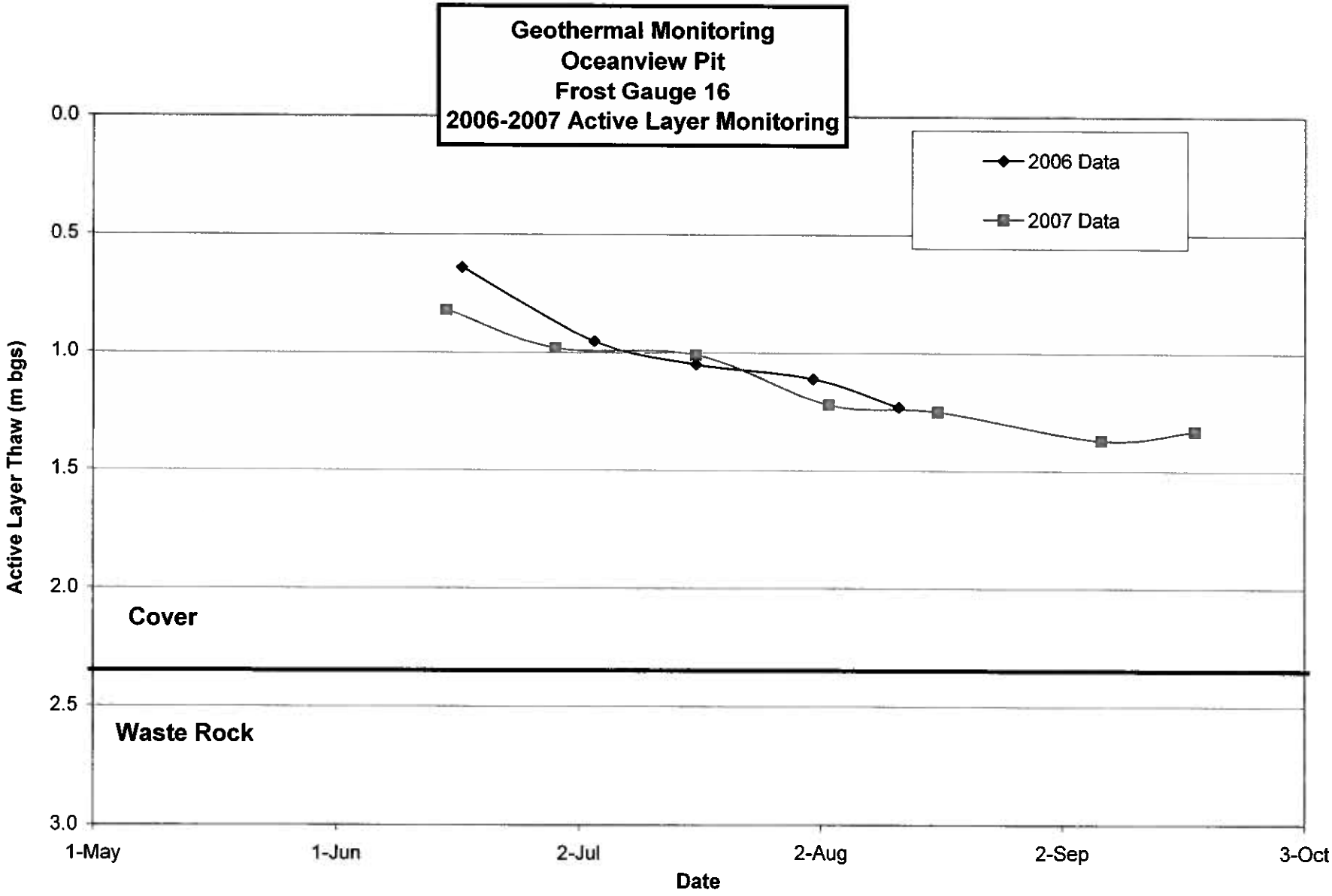

Geothermal Monitoring
Toe of Test Cell Dike
Thermistor BGC05-27
2006-2007 Data
1-Oct-06
30-Sep-07
Cover
Tailings
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-20.0
-15.0
-10.0
-5.0
0.0
5.0
10.0
15.0
Temperature (°C)


Piezometer Monitoring Results for BGC05-28
Piezometric Elevation (VW)
Ground Surface
VW Piezometer Tip
Thawed Surface - Top
Thawed Surface - Bottom
Bottom of Hole
Reservoir Water Level
Pore Water Temperature
Piezometric Elevation (m)
375
370
365
360
355
350
345
Pore Water Temperature (°C)
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
Sep-05
Jan-06
May-06
Sep-06
Jan-07
May-07
Sep-07
Jan-08
May-08
Date

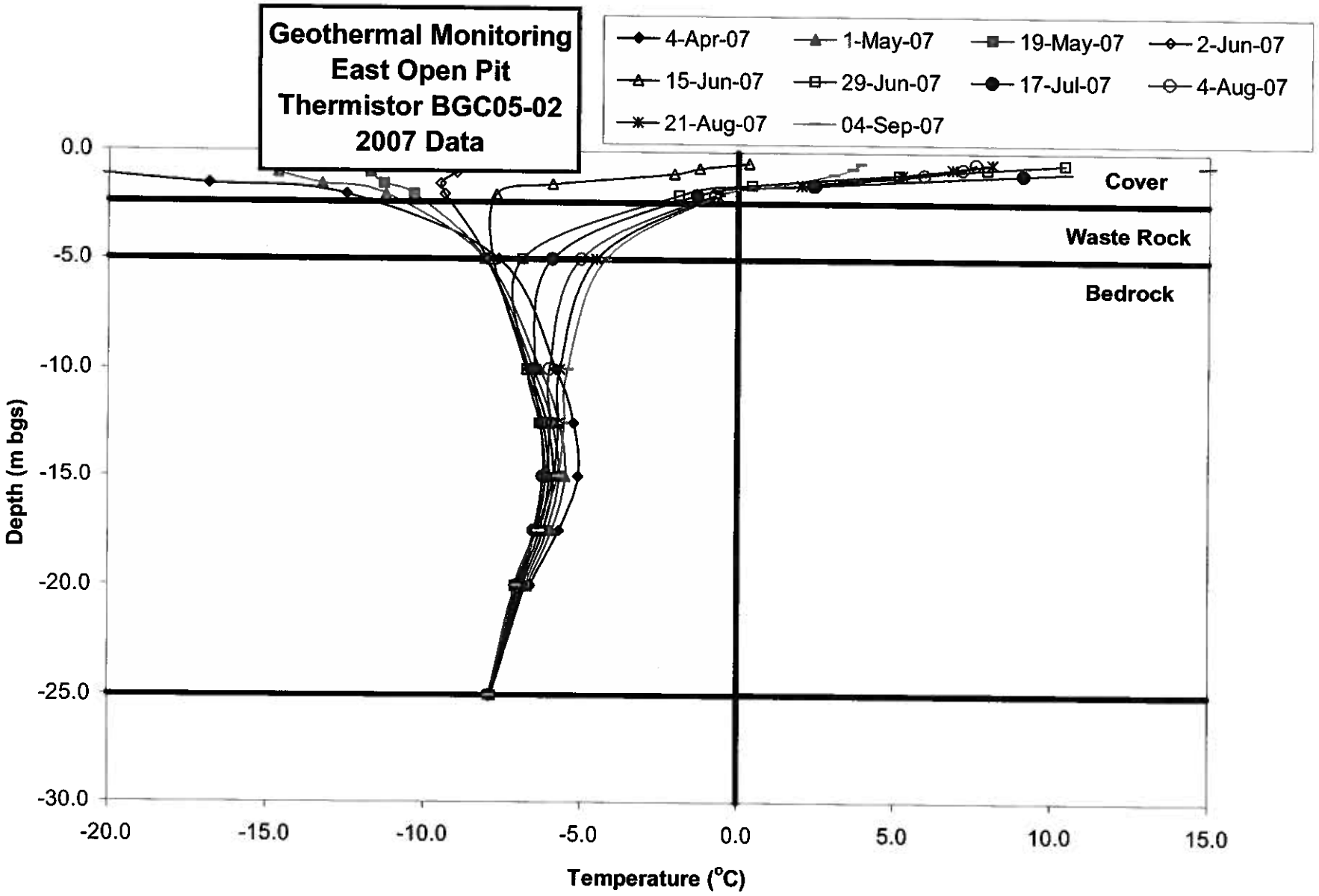
Oceanview Pit

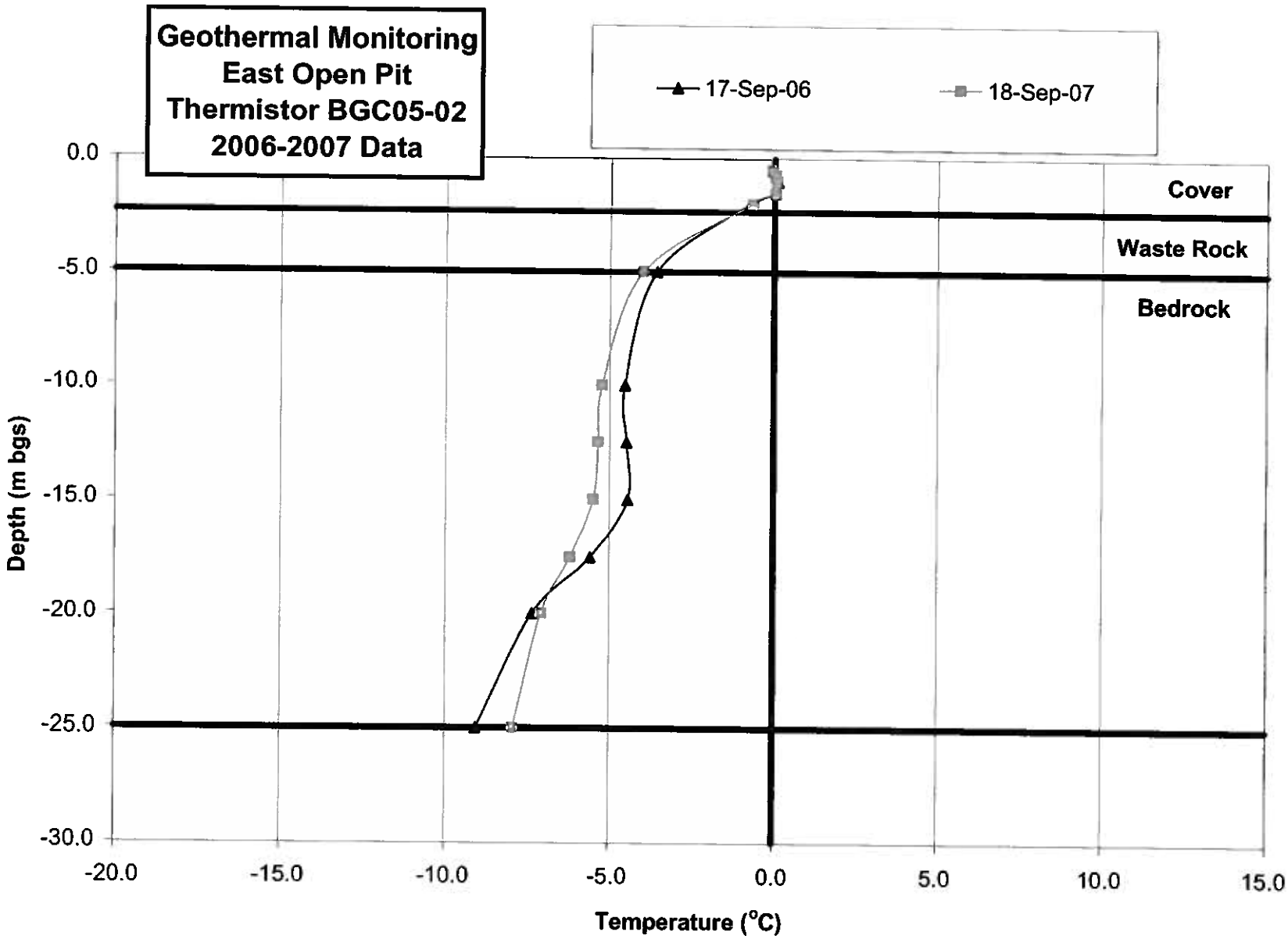

Geothermal Monitoring
Oceanview Pit
Thermistor BGC05-01
2007 Data
4-Apr-07
1-May-07
19-May-07
2-Jun-07
15-Jun-07
29-Jun-07
17-Jul-07
4-Aug-07
21-Aug-07
4-Sep-07
Cover
Waste Rock
Bedrock
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-25.0
-20.0
-15.0
-10.0
-5.0
0.0
5.0
10.0
15.0
Temperature (°C)

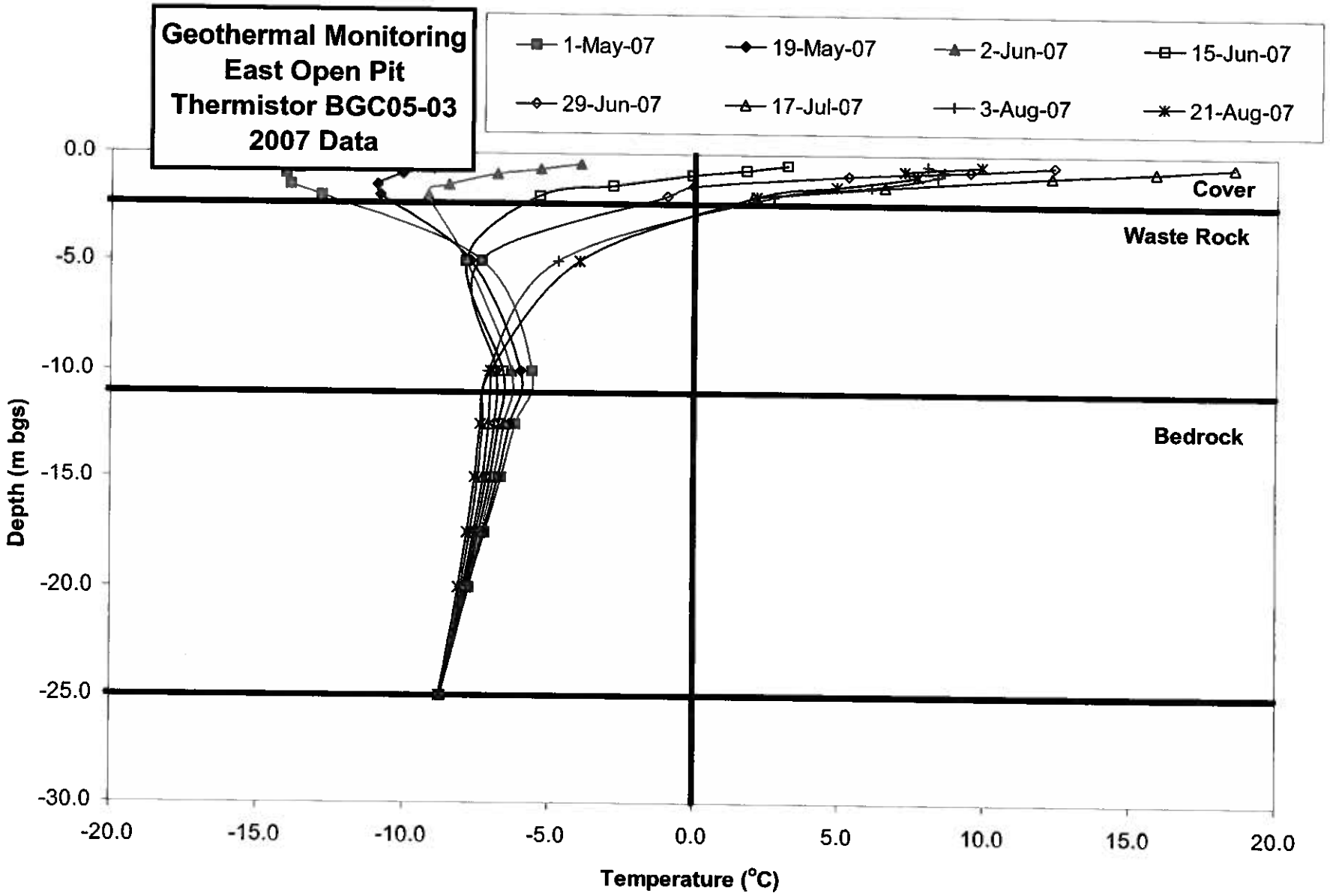

Geothermal Monitoring
Oceanview Pit
Thermistor BGC05-01
2005-2007 Data
13-Oct-05
30-Aug-06
21-Aug-07
Cover
Waste Rock
Bedrock
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-20.0
-15.0
-10.0
-5.0
0.0
5.0
10.0
15.0
Temperature (°C)

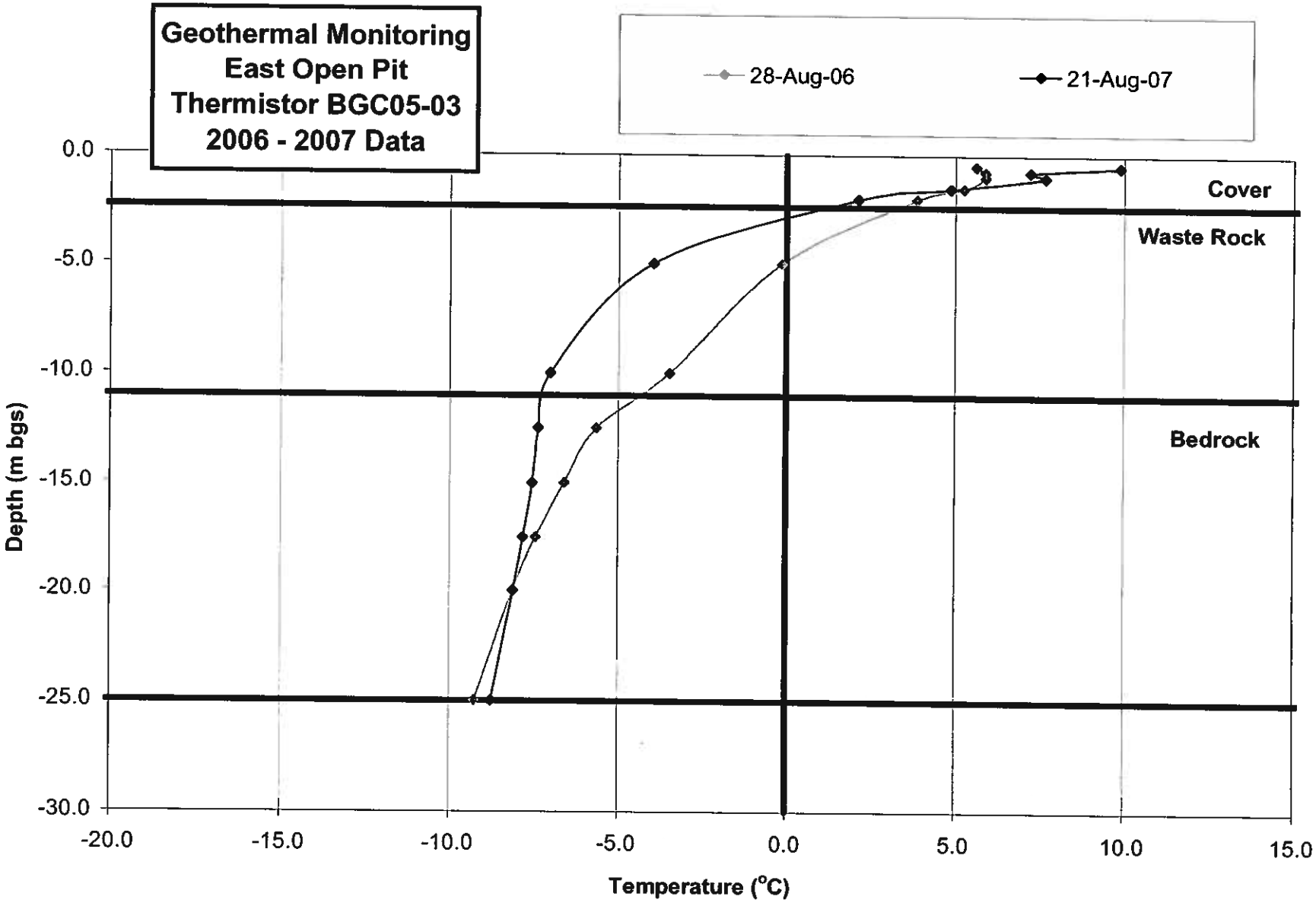

Geothermal Monitoring
Oceanview Pit
Frost Gauge 16
2006-2007 Active Layer Monitoring
2006 Data
2007 Data
Active Layer Thaw (m bgs)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Cover
Waste Rock
1-May
1-Jun
2-Jul
2-Aug
2-Sep
3-Oct
Date

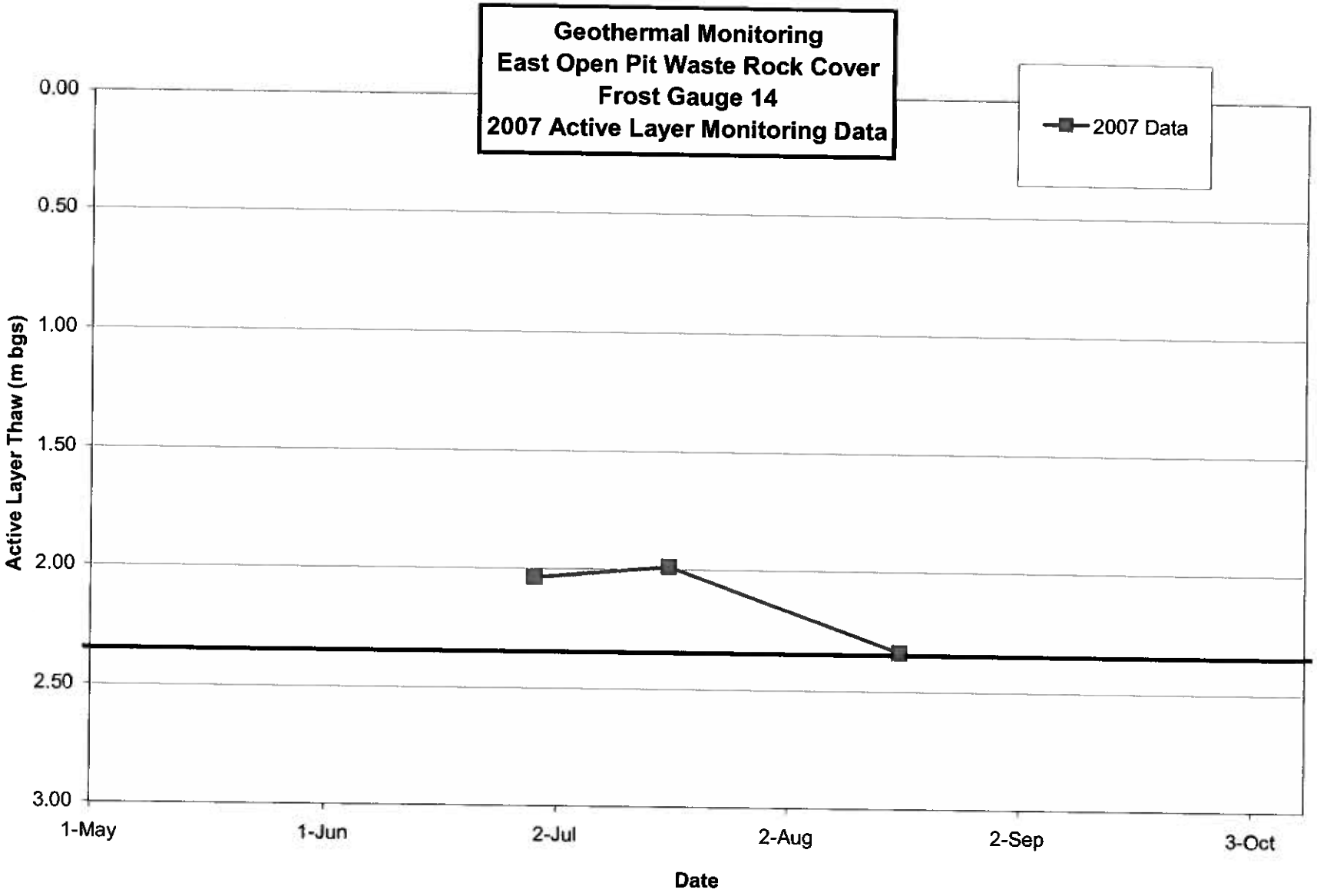
East Open Pit


Geothermal Monitoring
East Open Pit
Thermistor BGC05-02
2007 Data
4-Apr-07
1-May-07
19-May-07
2-Jun-07
15-Jun-07
29-Jun-07
17-Jul-07
4-Aug-07
21-Aug-07
04-Sep-07
Cover
Waste Rock
Bedrock
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-20.0
-15.0
-10.0
-5.0
0.0
5.0
10.0
15.0
Temperature (°C)

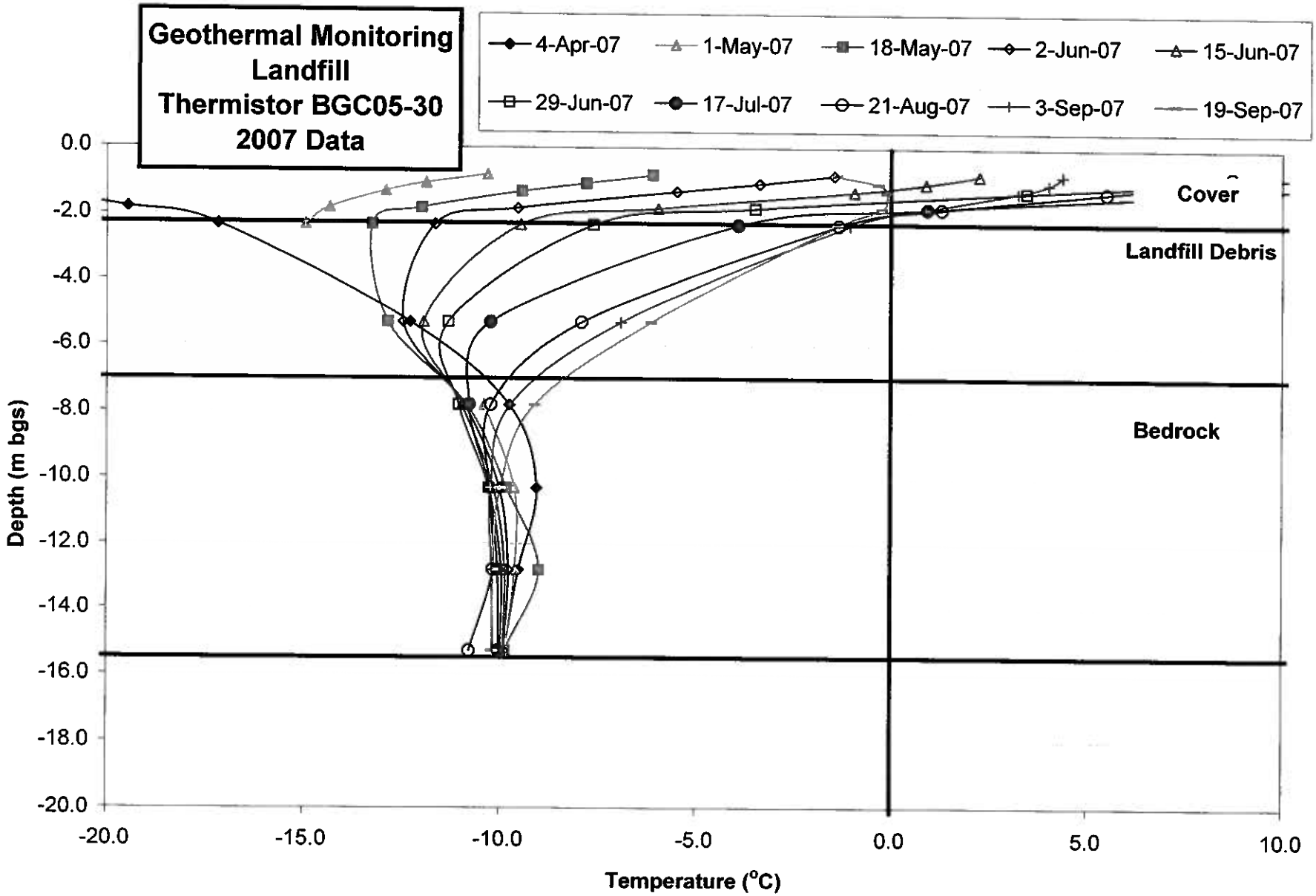

Geothermal Monitoring
East Open Pit
Thermistor BGC05-02
2006-2007 Data
17-Sep-06
18-Sep-07
Cover
Waste Rock
Bedrock
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-20.0
-15.0
-10.0
-5.0
0.0
5.0
10.0
15.0
Temperature (°C)

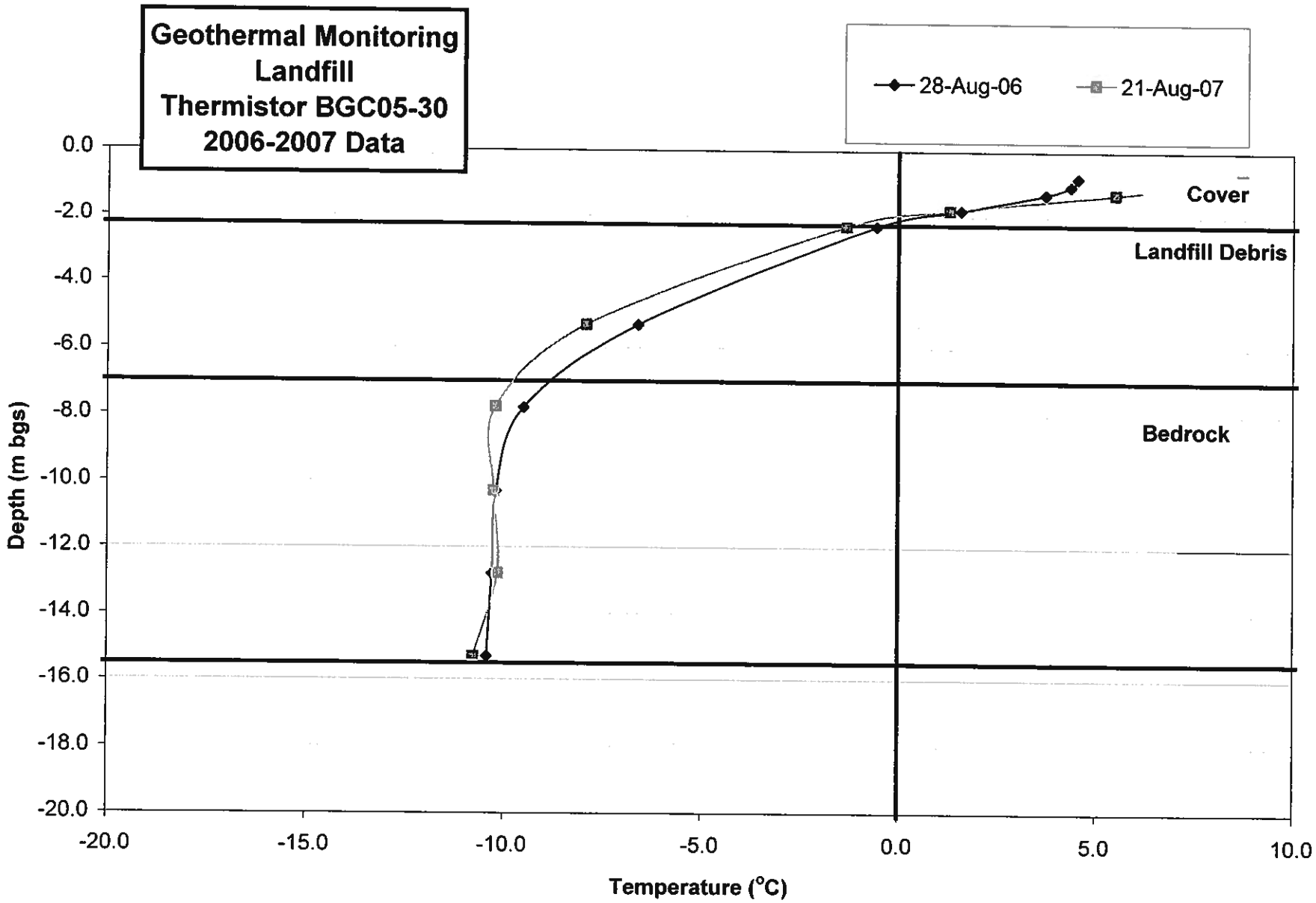

Geothermal Monitoring
East Open Pit
Thermistor BGC05-03
2007 Data
1-May-07
19-May-07
2-Jun-07
15-Jun-07
29-Jun-07
17-Jul-07
3-Aug-07
21-Aug-07
Cover
Waste Rock
Bedrock
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-20.0
-15.0
-10.0
-5.0
0.0
5.0
10.0
15.0
20.0
Temperature (°C)

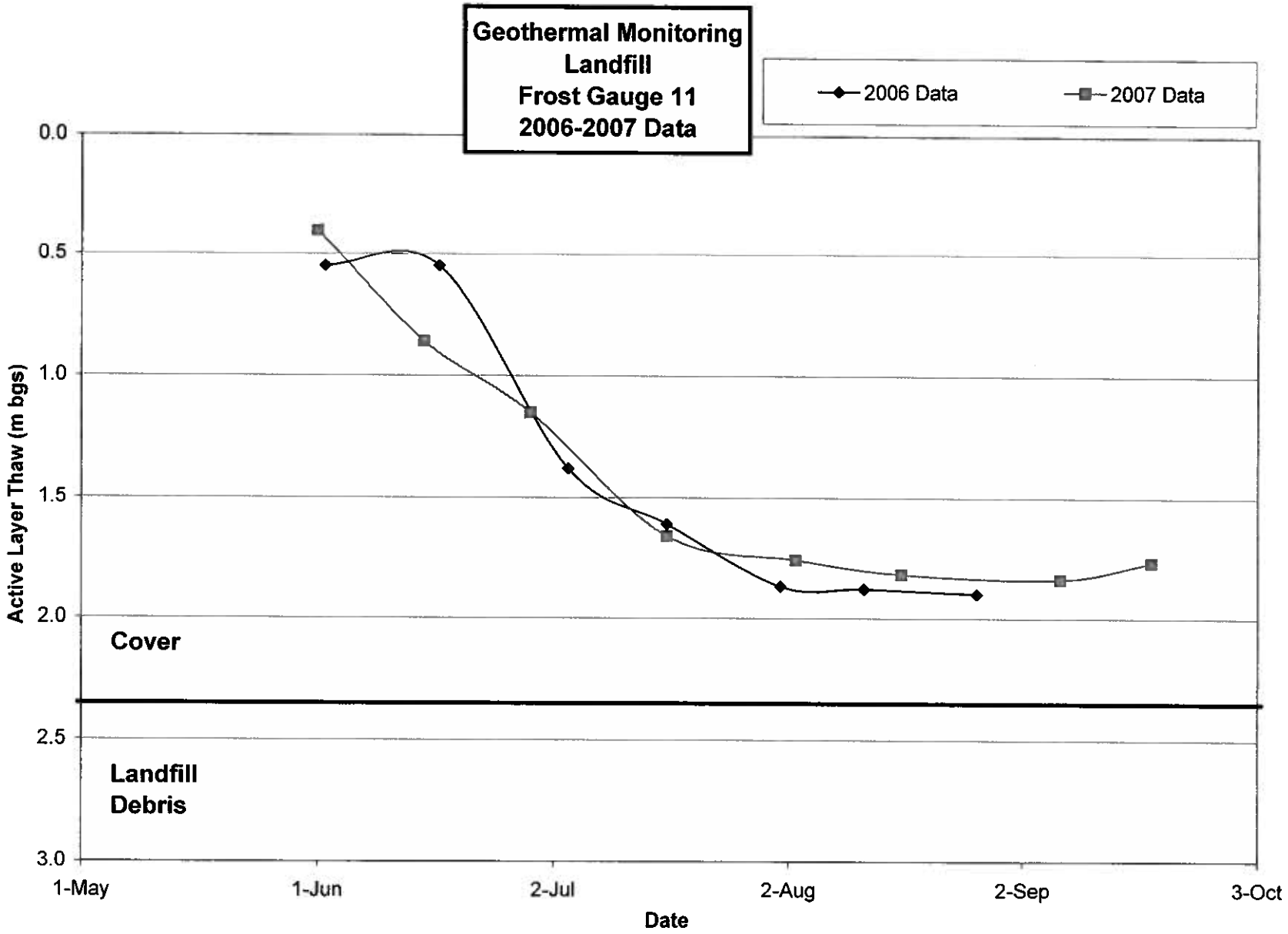

Geothermal Monitoring
East Open Pit
Thermistor BGC05-03
2006 - 2007 Data
28-Aug-06
21-Aug-07
Cover
Waste Rock
Bedrock
Depth (m bgs)
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-20.0
-15.0
-10.0
-5.0
0.0
5.0
10.0
15.0
Temperature (°C)


Geothermal Monitoring
East Open Pit Waste Rock Cover
Frost Gauge 14
2007 Active Layer Monitoring Data
2007 Data
Active Layer Thaw (m bgs)
0.00
0.50
1.00
1.50
2.00
2.50
3.00
1-May
1-Jun
2-Jul
2-Aug
2-Sep
3-Oct
Date

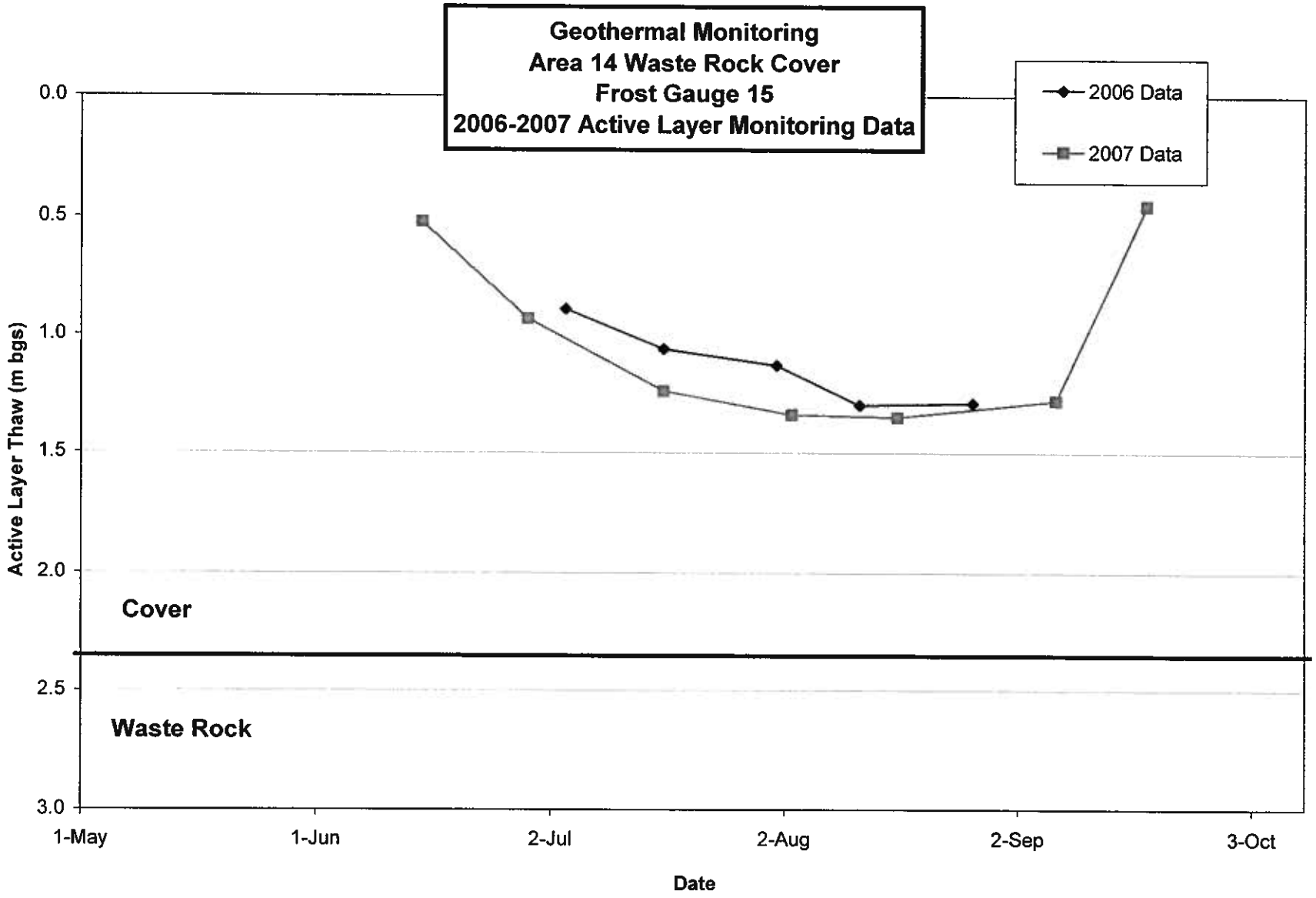
Landfill

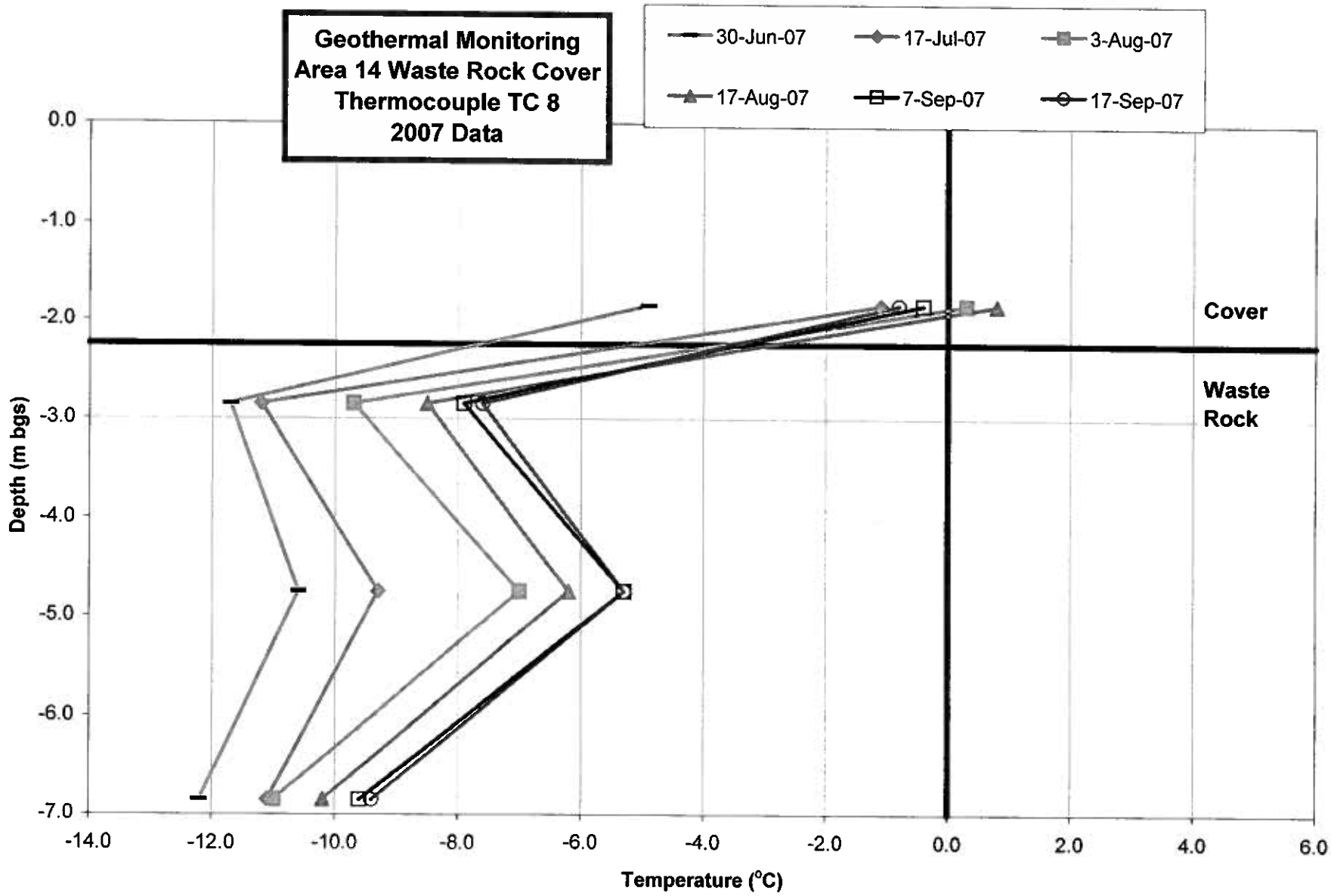

Geothermal Monitoring
Landfill
Thermistor BGC05-30
2007 Data
4-Apr-07
1-May-07
18-May-07
2-Jun-07
15-Jun-07
29-Jun-07
17-Jul-07
21-Aug-07
3-Sep-07
19-Sep-07
Cover
Landfill Debris
Bedrock
Depth (m bgs)
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-14.0
-16.0
-18.0
-20.0
-20.0
-15.0
-10.0
-5.0
0.0
5.0
10.0
Temperature (°C)


Geothermal Monitoring
Landfill
Thermistor BGC05-30
2006-2007 Data
28-Aug-06
21-Aug-07
Cover
Landfill Debris
Bedrock
Depth (m bgs)
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-14.0
-16.0
-18.0
-20.0
-20.0
-15.0
-10.0
-5.0
0.0
5.0
10.0
Temperature (°C)

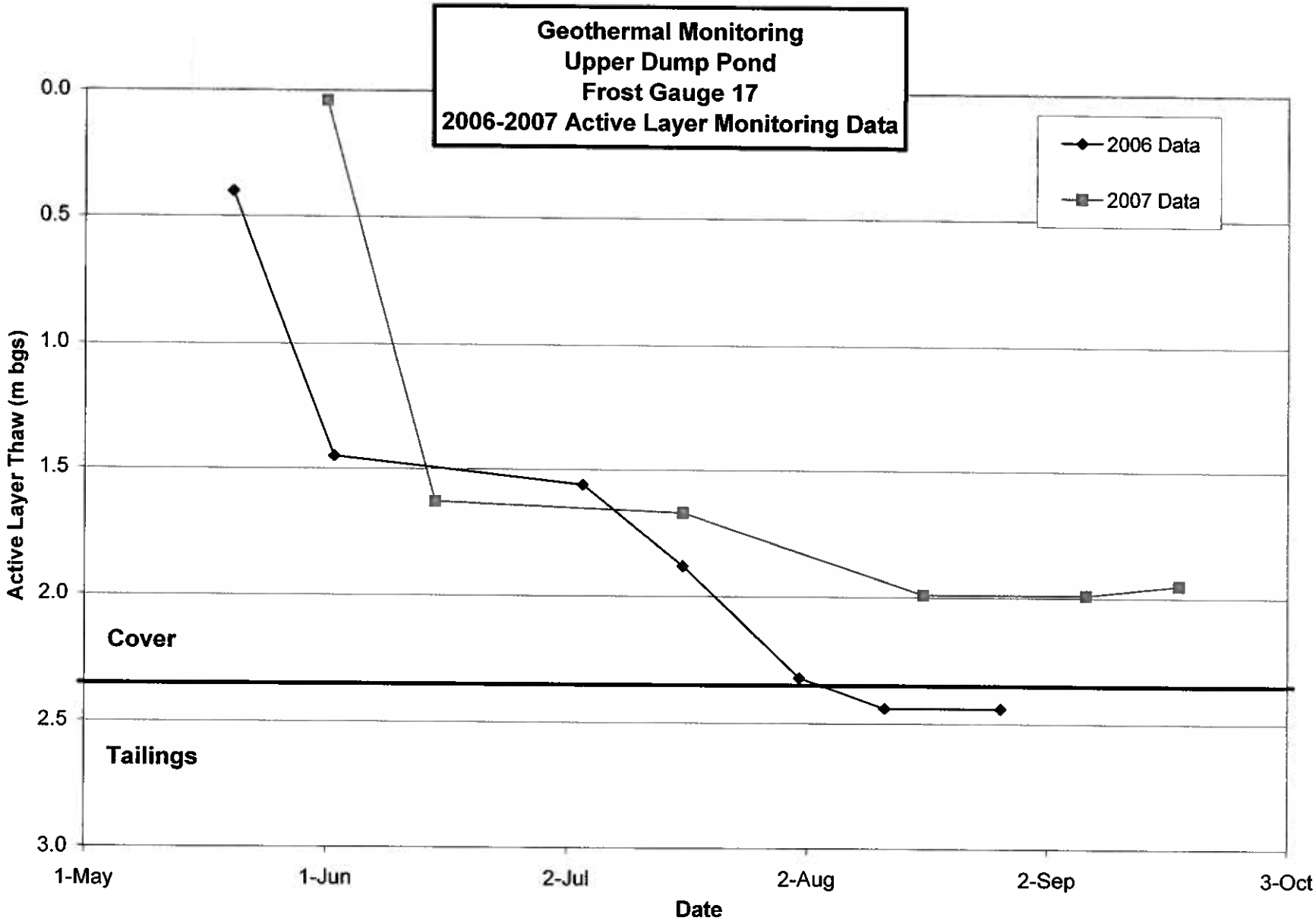

Geothermal Monitoring
Landfill
Frost Gauge 11
2006-2007 Data
2006 Data
2007 Data
Active Layer Thaw (m bgs)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Cover
Landfill
Debris
1-May
1-Jun
2-Jul
2-Aug
2-Sep
3-Oct
Date

Area 14


Geothermal Monitoring
Area 14 Waste Rock Cover
Frost Gauge 15
2006-2007 Active Layer Monitoring Data
2006 Data
2007 Data
Active Layer Thaw (m bgs)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Cover
Waste Rock
1-May
1-Jun
2-Jul
2-Aug
2-Sep
3-Oct
Date


Geothermal Monitoring
Area 14 Waste Rock Cover
Thermocouple TC 8
2007 Data
30-Jun-07
17-Jul-07
3-Aug-07
17-Aug-07
7-Sep-07
17-Sep-07
Cover
Waste Rock
Depth (m bgs)
0.0
-1.0
-2.0
-3.0
-4.0
-5.0
-6.0
-7.0
-14.0
-12.0
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0
Temperature (°C)

Upper Dump Pond


Geothermal Monitoring
Upper Dump Pond
Frost Gauge 17
2006-2007 Active Layer Monitoring Data
2006 Data
2007 Data
Active Layer Thaw (m bgs)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Cover
Tailings
1-May
1-Jun
2-Jul
2-Aug
2-Sep
3-Oct
Date