2009 Annual Geotechnical Inspection
Perimeter Dams Tailing
Containment Area
Lupin Mine, Nunavut

Prepared For:

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Ref. No. 09-161

TBT ENGINEERING
CONSULTING GROUP

November 30, 2009
TBTE Ref. No. 09-161

Andrew Mitchell, P.Geo.
Development Manager - Canadian Operations
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200-1159 Alloy Drive
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Re: 2009 Annual Geotechnical Inspection
Perimeter Dams Tailings Containment Area
Lupin Mine, Nunavut

Introduction

As a part of the requirements for the Water Licence 2AM-LUP0914, Annual Geotechnical Inspections are to be undertaken for the perimeter dams of the Tailings Containment Area (TCA) at the Lupin Mine project. These inspections were undertaken by TBT Engineering Limited on August 26th, 2009. This report provides a summary of these inspections and documents the findings. Recommendations for upgrading and future investigations have been provided where appropriate.

The Lupin Mine is located 285 km southeast of Kugluktuk, Nunavut and 400 km north-northeast of Yellowknife, Northwest Territories on the south shore of Contwoyto Lake. Access to the mine in the summer months is by air only. Mine locations and layout have been illustrated on Enclosures 1-2.

The mine operates under Nunavut Water Board Licence 2AM-LUP0914 which was transferred from a previous owner to Lupin Mines Inc., a subsidiary of Wolfden Resources. Ownership of Wolfden was acquired by Zinifex Limited of Melbourne, Australia in 2007. In 2008, Zinifex merged with Oxiana Ltd. of Australia to form OZ Minerals Ltd. In 2009, the Canadian assets of OZ Minerals were sold to China Minmetals Ltd. The Canadian operating company set up after that transaction is MMG Resources Inc., which is a wholly owned subsidiary of Minerals and Metals Group Ltd. of Melbourne Australia. The mine continues to be held by the corporation Lupin Mines Inc., which is a wholly owned subsidiary of MMG Resources Inc.

The mine discontinued production in 2005 and is currently operated on care and maintenance status. There has been no tailings deposition since 2005.

The relevant conditions of the Nunavut Water Licence which apply to the annual inspection are:

- A freeboard limit of 1.0 m at Dam 1A should be maintained at all times
- Seepage from the TCA is to minimized
- Any seepage that occurs should be collected and returned to the TCA immediately
- Any erosion of the facilities should be addressed immediately
- Inspection of the dams and related infrastructure should be carried out weekly; and
- The Annual Inspection report should be forwarded to the Water Board within 60 days of the inspection date.

The 2009 inspection was undertaken following the authorization of and in the company of Andrew Mitchell of MMG. Conditions and any points of concern were reviewed on site.

Dam Inspection /Review History

Previous dam design, construction inspection and annual inspection reports should be reviewed for data regarding the design and history of prior recommendations for the dams. The following reports may be referenced:

Geocon (1982)	As built information regarding Dam 1A, 1B, 1C, 2 and 4A (later 4) Dams constructed to elev. 485 during 1981 Dams constructed of silty sand till with an upstream synthetic liner keyed to permafrost
Golder (1992)	Design information regarding Dams 4, 5, 6. Dams constructed of silty sand till with upstream liner keyed to permafrost Dam 4 liner extends 15 m upstream from toe. Dam 4 has a downstream rockfill toe drain All liners reported to extend to 0.5 below crest

Golder (2004)	Dam Safety Review Dam Failure Consequence reported to be Very Low for Dams 1A, 2 and 4 Failure Consequence reported to be Low for Dams 1B, 1C, 3, 5, and 6 Slope Stability analysis was carried out by Golder for Dams 1A, 2 and 4. Minimum Factory of Safety 1.6 for static conditions Minimum Factory of Safety 1.3 for seismic conditions An Operations, Maintenance and Surveillance Manual was included
BGC (2007)	2007 Annual Geotechnical Inspection of Perimeter Dams Perimeter embankments found to be in satisfactory condition Minor erosion gullies to be repaired No evidence of permafrost warming in available instrumentation Thermistor and pond level monitoring program suggested
BGC (2008)	2008 Annual Geotechnical Inspection of Perimeter Dams Perimeter embankment crests found to be in good condition Trend for increasing erosion noted. Erosion gullies to be repaired Thermistor and pond level monitoring program suggested Application to Water Board for revised monitoring program suggested

Tailings Containment Area

The tailings dams at the Lupin site consist of earth fill dams which rely on ground freezing (permafrost aggradation) to reduce seepage. A secondary liner was keyed into the underlying permafrost during construction. A system of thermistors has been installed in the dams to monitor the temperatures in the dam cores.

The Tailings Containment Area (TCA) uses several low dams to contain the tailings solids. The five cells at the site (illustrated on Figure 2) provide storage for historically deposited tailings and process water as well as accumulations of runoff water. Discharge to the environment from Pond 2 normally occurs every 1 or 2 years.

Prior to discharge, the quality of water is verified and the water treated if required, typically through the addition of lime to increase the pH. Discharge is through the siphons at Dam 2. When water levels in Pond 2 allow, water is transferred from Pond 1 using siphons at J Dam.

Tailings production and deposition ceased in 2005. The mine is currently closed and mine site activities are limited to maintenance of the water levels in the TCA. Water treatment and discharge were underway during our site visit.

Climatic Conditions

Climatic conditions at the site were recorded at the Lupin weather site until 2006. Since then, an automated system has been present at the site. However the nearest site with available climatic data is now located at Kugluktuk, approximately 250 km northwest. The historic Mean Average Annual Temperature (MAAT) at the site is reported to be -11.0 °C, with a long term MAAT of -10.6°C at Kugluktuk. The measured MAAT (Kugluktuk) for 2008 was -10.8 °C during 2008 which is consistent with long term averages.

Site Inspections

The perimeter dams at the Lupin Mine were inspected by TBT Engineering on August 26, 2009. The inspections were completed in the company of Andrew Mitchell of MMG Resources Inc. Each of the embankments was visually reviewed, photographed and a standardized site inspection form was completed. Areas of concern were discussed with the MMG representative on site. Pond water levels and crest elevation were obtained at many of the dam sites. The elevations as provided by MMG are included in individual site reports.

A number of thermistor string readings were taken by MMG during the inspection trip. The calibrated results of these readings have provided and have been attached in Appendix B.

Findings and Conclusions

Details of the various site inspections have been documented on the attached individual site reports (Appendix A). These have been updated in a standardized format to be consistent with previous Annual Inspections.

A review of the thermistor data indicates the dams continue to maintain frozen conditions below the active zone, located approximately 2 m below grade.

Except as noted blow, the inspections confirm the dams are generally in satisfactory condition with some minor erosion issues to be attended to.

An exception to the above is Dam 4, where slight seepage at the downstream toe was noted. There is evidence of minor sloughing of the slope at the toe and some staining of the soils consistent with seepage. The pH of the water contained along the downstream toe of the dam,

within the cofferdam enclosure was measured at 3.8, which is consistent with the pH inside Cell 4 on the upstream side of the dam. From this observation, it is possible that the water ponding on the downstream side of the dam originates from seepage through the dam and/or under the dam, through the foundation soils.

The geotechnical conditions at Dam 4 should be investigated to determine the in situ fill conditions and to measure pore water levels in the dam. Once conditions at the site are determined, remediation of the downstream slope should be undertaken. Remediation options may involve construction of suitable granular filter zones and / or construction of a suitable impermeable barrier to significantly reduce seepage losses. Widening of the base of the dam to fill the pond and attract the aggradation of permafrost conditions into the deep foundation of the dam should also be considered as a design alternative.

The investigation and design and approvals work should be undertaken in 2010. With suitable monitoring and some temporary remediation efforts, construction of the slope improvements may be scheduled for 2011. In the interim, the water contained between the cofferdam and the downstream toe of the dam should be pumped back over the dam and the level of water retained upstream in Cell 4 should be lowered to decrease the head across the dam. The conditions at Dam 4 should be monitored and the mine should be prepared to implement immediate temporary repair to the dam should conditions deteriorate.

In addition to the seepage issues at Dam 4 the following minor issues should be addressed as described on the individual inspection reports contained in Appendix A:

- Flatten slope of toe berm at Dam 1A
- Minor cracking of the downstream toe was noted at Dam 1C, further investigation and re-grading should be scheduled for spring of 2010.
- The small pond upstream of Dam 6 should be backfilled.
- The placement of riprap currently under way at Dam 2 should be completed.
- The upstream ditch and eroded storm gully at Dam 3 require minor improvements.

Clause D.6.f of the Water License (Clause D.6.f) requires weekly inspections of tailings dams, ponds (and associated infrastructure) be undertaken by site staff and records kept on these inspections. This is impractical given the closed condition of the site. However, there are

currently seepage issues at Dam 4, it should monitored regularily until such time as the issuie is resolved.

A revised inspection schedule should be considered once seepage at Dam 4 has been remediated, with an appropriate amendment to the Water Licence. In addition, revisions to the thermistor reading schedule are appropriate. A suggested schedule was provided in previous Annual Inspection Reports as follows:

- November to April – monthly would be helpful but not critical
- May to June – weekly
- July to October – every two weeks.

The monitoring data is to provide proactive assessment of potentially deteriorating performance of the dams. Instrumentation and monitoring data from the various dams should be reviewed immediately after collection.

Closure

We trust the above addresses your requirements at this time. We enjoyed working with you on this project. Please contact us at your convenience should you have any questions.

Yours truly,
For TBT Engineering

REGISTERED PROFESSIONAL ENGINEER
G.C. MAKI
LICENSEE
NWT/NU

Gordon Maki, P. Eng.
Manager of Geotechnical Engineering

Wayne Hurley
Vice-President

PERMIT TO PRACTICE
TBT ENGINEERING LIMITED
Signature
Date Dec 1 09
PERMIT NUMBER: P561
NWT/NU Association of Professional Engineers and Geoscientists

APPENDIX “A”

2009 GEOTECHNICAL INSPECTION
PERIMETER TAILINGS DAMS

DAM 1A

LOCATION:	West side of Pond 2.
FUNCTION:	Major perimeter closure for water retention; siphon pipes for water decant system on the crest of the dam. Pond level presently being lowered using siphons
LENGTH:	250 +/- m
MAX HEIGHT:	8 m +/- above d/s tundra.
AS-BUILT CREST ELEVATION:	486.27 m
CURRENT CREST ELEVATION:	486.1 – 486.4 m
POND ELEV.:	483.22 m
FREEBOARD :	2.88 – 3.18 m
CREST WIDTH AND CONDITION:	7 to 8 m; surfaced with esker material, but not traveled because of the siphons. No significant cracking evident; condition remains good.
RIPRAP:	Run of Mine rockfill; broadly graded; good condition.
BACKSLOPE:	Approx. 1.5H; 1V; variably armoured with cobbles and boulders; no evidence of cracking.
ACCESS ROAD TOE BERM	Longitudinal cracking, associated settlement and sinkhole formation is occurring on the downstream edge of the downstream access road berm, near the siphon valves.
SEEPAGE:	No evidence of seepage.
INSTRUMENTATION:	Thermistor D1A-00-1 is located in the crest, just south of the mid-point of the dam.
MAINTENANCE RECOMMENDATIONS:	Flatten slope of access road toe berm and provide additional coarse granular as erosion protection.
CONCLUSIONS:	The dam is in good condition with no evidence of seepage

Dam 1A: Downstream

Dam 1A: Downstream Access Road toe Berm

Dam 1A: Upstream

DAM 1B

LOCATION:	West side of Pond 2.
FUNCTION:	Major perimeter closure for water retention; pond level is below dam base elevation thus currently functioning only as a road embankment.
LENGTH:	250 +/- m
MAX HEIGHT:	2.5 +/- m above d/s tundra.
AS-BUILT CREST ELEVATION:	485.83 m
CURRENT CREST ELEVATION:	485.4 – 485.6 m
POND ELEV.:	483.22 m
FREEBOARD :	2.18 – 2.38 m
CREST WIDTH AND CONDITION:	5 to 6 m wide; surfaced with esker material. Downstream berm provides roadway for access around the perimeter of the TCA. Crest condition is good.
RIPRAP:	Run of Mine rockfill; variable sizes in good condition overall.
BACKSLOPE:	Approx. 1.5H; 1V with minor runoff erosion rills and a toe-of-slope roadway berm. No cracking observed..
SEEPAGE:	No seepage observed
INSTRUMENTATION:	Thermistor D1A-00-1 is located in the crest, just south of the mid-point of the dam.
MAINTENANCE RECOMMENDATIONS:	None currently required. Minor vegetation beginning to grow. Will need to be removed in future
CONCLUSIONS:	The structure is in good condition.

Dam 1B: Upstream

Dam 1B: Downstream

DAM 1C

LOCATION:	West side of Pond 2.
FUNCTION:	Major perimeter closure for water retention
LENGTH:	230 +/- m
MAX HEIGHT:	2.2 +/- m above d/s tundra.
AS-BUILT CREST ELEVATION:	485.88 m
CURRENT CREST ELEVATION:	485.3 m
POND ELEV.:	483.22 m
FREEBOARD :	2.08 m
CREST WIDTH AND CONDITION:	9 +/- wide; surfaced with esker material, this dam also functions as a roadway, Crest condition is good. Animals are starting to burrow into the dam body.
RIPRAP:	Run of Mine rockfill; Cracking noted over 2/3 of dam length, approx. 0.6 m above water level (see photo following page). Potentially due to thaw of subgrade with increase in pond water level.
BACKSLOPE:	Approx. 3H; 1V, smooth slope. Access road berm appears in good condition.
SEEPAGE:	No seepage observed.
INSTRUMENTATION:	Thermistor D1A-00-1 is located in the crest, just south of the mid-point of the dam.
MAINTENANCE RECOMMENDATIONS:	Review toe in spring. Re-grading and reshaping of toe likely required at that time.
CONCLUSIONS:	Other than as noted, the structure is in good condition. Spring review and maintenance of toe required.

Dam 1C: Upstream

Dam 1C: Upstream-Minor Cracking

Dam 1C: Downstream

DAM 2

LOCATION:	North end of Pond 2.
FUNCTION:	Major perimeter closure for water retention; natural pond downstream of the dam.
LENGTH:	350 +/- m
MAX HEIGHT:	5.5 +/- m above d/s tundra.
AS-BUILT CREST ELEVATION:	486.30 m
CURRENT CREST ELEVATION:	485.6 – 486.0 m
POND ELEV.:	483.22 m
FREEBOARD :	2.38 – 2.78 m
CREST WIDTH AND CONDITION:	Approx. 6 m; surfaced with esker material and used as the primary traffic route for TCA. Crest has recently been re-graded.
RIPRAP:	Run of Mine rock forms convex-upward, gently sloped upstream face. A small erosion scarp has formed on the upstream side of the dam near the waterline,
BACKSLOPE:	Variable materials but comprised mostly of esker granular material with minor rills; good condition.
SEEPAGE:	No seepage observed
INSTRUMENTATION:	Thermistor D2-00-02 is located at the north end of the crest.
MAINTENANCE RECOMMENDATIONS:	The areas of upstream erosion scarp currently being backfilled as per 2008 recommendations. This project should continue to establish corrected slope. .
CONCLUSIONS:	The dam is in satisfactory condition. Repair of upstream toe to be completed.

Dam 2: Upstream

Dam 2: Upstream

Dam 2: Upstream – New Riprap Material

Dam 2: Downstream

DAM 3

LOCATION:	East end of now-covered tailings storage area, east of Cells 1 and 2.
FUNCTION:	Minor perimeter closure for tailings retention; Boomerange Lake downstream of the dam. The dam retains tailings covered with an esker material cap
LENGTH:	600 +/- m
MAX HEIGHT:	2.5 +/- m above d/s tundra.
AS-BUILT CREST ELEVATION:	488.4 m
CREST WIDTH AND CONDITION:	Approx. 8 m; surfaced with esker material. A ditch constructed a long the upstream edge of the crest of the dam, which directs surface water to the downstream face has experienced some erosion and deposition of sediment in the ditch.
RIPRAP:	Not applicable: Inside slope buried with cover comprised of esker sand and gravel.
BACKSLOPE:	Variable in inclination; locally meets the shoreline of Boomerang Lake. Storm channel constructed in back slope has eroded exposing geotextile below channel riprap.
SEEPAGE:	None observed.
MAINTENANCE RECOMMENDATIONS:	The cracking on the crest of the dam should be re-graded and the ditch should also be re-graded to remove the accumulated material. The gully in the storm channel ditch also needs to be repaired and relined.
CONCLUSIONS:	The dam is in satisfactory condition but repair work to the cracking area and surface water conveyance ditch should be completed.

Dam 3: Upstream

Dam 3: Downstream

Dam 3: Downstream – Eroded Ditch

DAM 4

LOCATION:	South end of Cell 4 for K Dam sub-pond.
FUNCTION:	Perimeter closure for water retention at present; natural pond downstream of the dam at its west end. See photos in Figure 10.
LENGTH:	900 +/- m
MAX HEIGHT:	6 +/- m above u/s native ground elevation.
AS-BUILT CREST ELEVATION:	489.59 m
CURRENT CREST ELEVATION:	489.2 – 489.5 m
POND ELEV.:	484.94 m
FREEBOARD :	4.26 – 4.56 m
CREST WIDTH AND CONDITION:	Approximately 12 m wide crest width in generally good condition. Minor crest grading required at west abutment to prevent channelization of run-off.
RIPRAP:	Run of Mine rockfill in generally good condition on upstream slope. Occasional small void in rockfill riprap
BACKSLOPE:	Esker sand; slope steeper in upper portion and flattens in the lower portion, approximately 2H: 1V. Slumping of downstream slope noted in areas of seepage. Some areas have slumped to a near 1:1 slope. Evidence of piping beginning in sandier soils. Zones of geo-grid exposed between surficial esker fill and underlying rock fill.
SEEPAGE:	Evidence of seepage noted over 1/3 of dam length at area of coffer dam.
INSTRUMENTATION:	Three of the original four thermistors remain Dam 4. From east to west across the crest, the four cables are numbered TD4-1 to 4. Thermistor TD4-2 was reported destroyed.
MAINTENANCE RECOMMENDATIONS:	A geotechnical investigation is recommended to establish the causes of the seepage at the toe of Dam 4. Once the cause of the seepage/sloughing is determined, remediation measures should be designed to address the seepage and the resultant sloughing. Field investigations, design and permitting activities

should be scheduled for 2010. Construction of remediation measures may be scheduled for 20101, subject to some minor preventative measures being undertaken in 2011. A regular and more intensive monitoring program for Dam 4 should be initiated and documented. In addition, the water levels should be maintained as low as possible. The installation of a free draining granular flanking brem may be considered in the interim to improve stability. Collecting and pumping back seepage should be also be considered.

CONCLUSIONS: Areas of seepage and embankment sloughing should be invested and remediated. Monitoring frequency should be increased.

Dam 4: Downstream

Dam 4: Downstream, note seepage line

Dam 4: Downstream - sloughing zone

Dam 4: Downstream - exposed geogrid

Dam 4: Upstream

Dam 4: Upstream

DAM 5

LOCATION:	Southeast corner of Cell 3, just northwest of Dam 4.
FUNCTION:	Minor perimeter closure intended for future tails and water retention; currently functioning as a road embankment.
LENGTH:	250 +/- m
MAX HEIGHT:	1.5 +/- m above d/s tundra.
AS-BUILT CREST ELEVATION:	491.54 m
CREST WIDTH AND CONDITION:	Approximately 8 m wide and esker surfaced so that the dam may also function as roadway. Crest is in generally good condition.
RIPRAP:	Approximate slope of 3H:1V and in good condition.
BACKSLOPE:	About 1.5 to 2H:1V with till and esker sand. No cracking observed.
SEEPAGE:	No seepage observed. No water head being retained by the majority of structure. Small pond has developed near east end.
MAINTENANCE RECOMMENDATIONS:	None required.
CONCLUSIONS:	The dam is in good condition.

Dam 5: Upstream

Dam 5: Downstream

DAM 6

LOCATION:	West side of Cell 3 retaining tailings.
FUNCTION:	Minor perimeter closure. Retaining some tailing beach and ponded water on the northern portion of the dam.
LENGTH:	300 +/- m
MAX HEIGHT:	2.5 +/- m above d/s tundra.
AS-BUILT CREST ELEVATION:	490.25 m previously
CREST WIDTH AND CONDITION:	Approximately 10 m wide and esker surfaced to function as a roadway. Crest in good condition.
RIPRAP:	Not applicable for most of dam. Upstream side tailings have been covered with esker sand and gravel. No rip rap in area of small upstream pond. Pond understood to be scheduled for backfilling. Otherwise rip rap should be provided.
BACKSLOPE:	About 2H:1V with till and esker sand; no erosion gullies observed on the downstream toe.
SEEPAGE:	No seepage observed.
MAINTENANCE RECOMMENDATIONS:	Backfilling of ponded area should be scheduled.
CONCLUSIONS:	The dam is in good condition,.

Dam 6: Upstream

Dam 6: Upstream

Dam 6: Down stream

REFERENCES

BGC Engineering Inc.,2008 Geotechnical Inspection fo Perimeter Tailings Dams, Lupin Mine Nunavut, Report submitted to OZ Minerals Canada Ltd., Project No. 0385-007-03, December 17, 2008, 14 pages plus figures and appendices.

BGC Engineering Inc.,2007 Geotechnical Inspection fo Perimeter Tailings Dams, Lupin Mine Nunavut, Report submitted to Zinafex Canada Inc., Project No. 0385-006-03, October 31, 2007, 14 pages plus figures and appendices

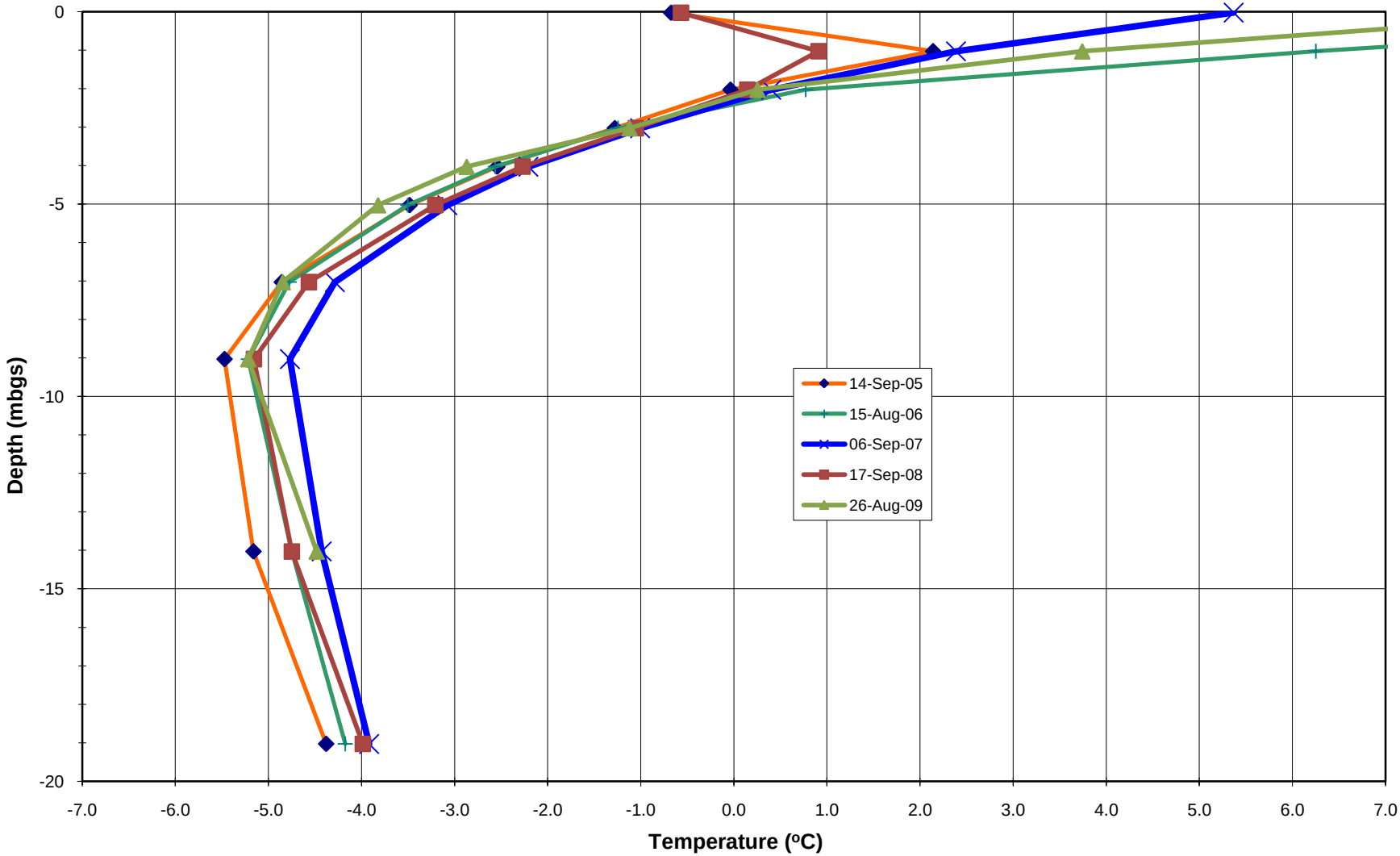
BGC Engineering Inc. 2003. Dam 6 Site Investigation and Raise Design, Lupin Mine, Nunavut. Report submitted to Kinross Gold Corporation, Project No. 0256-006, July 25, 2003, 31 pages plus figures and appendicies.

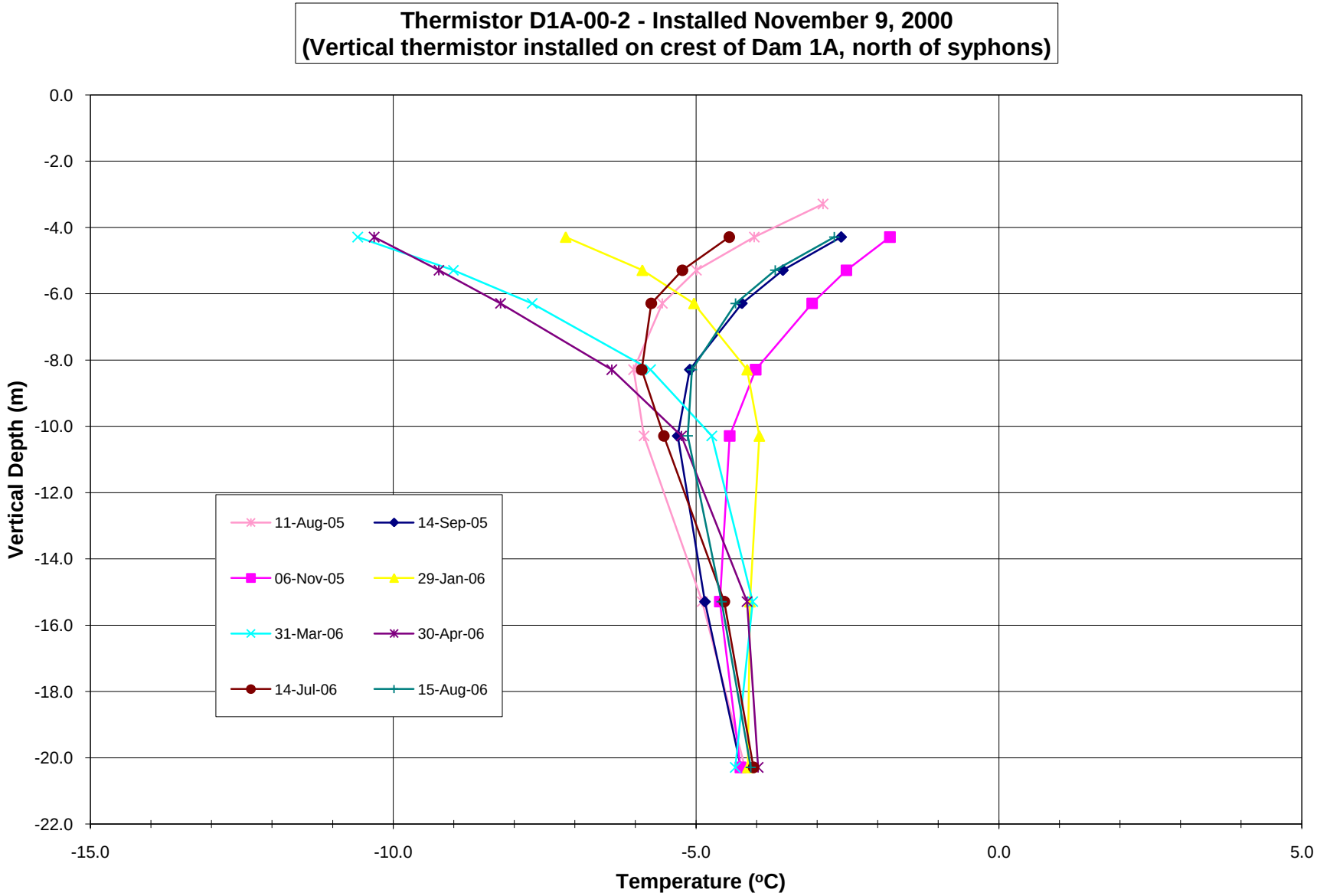
Golder Associated Ltd. 2004. 2004 Dam Safety Review, Perimeter Tailings Dams, Lupin Mine, Nunavut. Report submitted to Kinross Gold Corporation, Project No. 04-1321-022,December 2004, 36 pages plus figures and appendix.

APPENDIX “B”

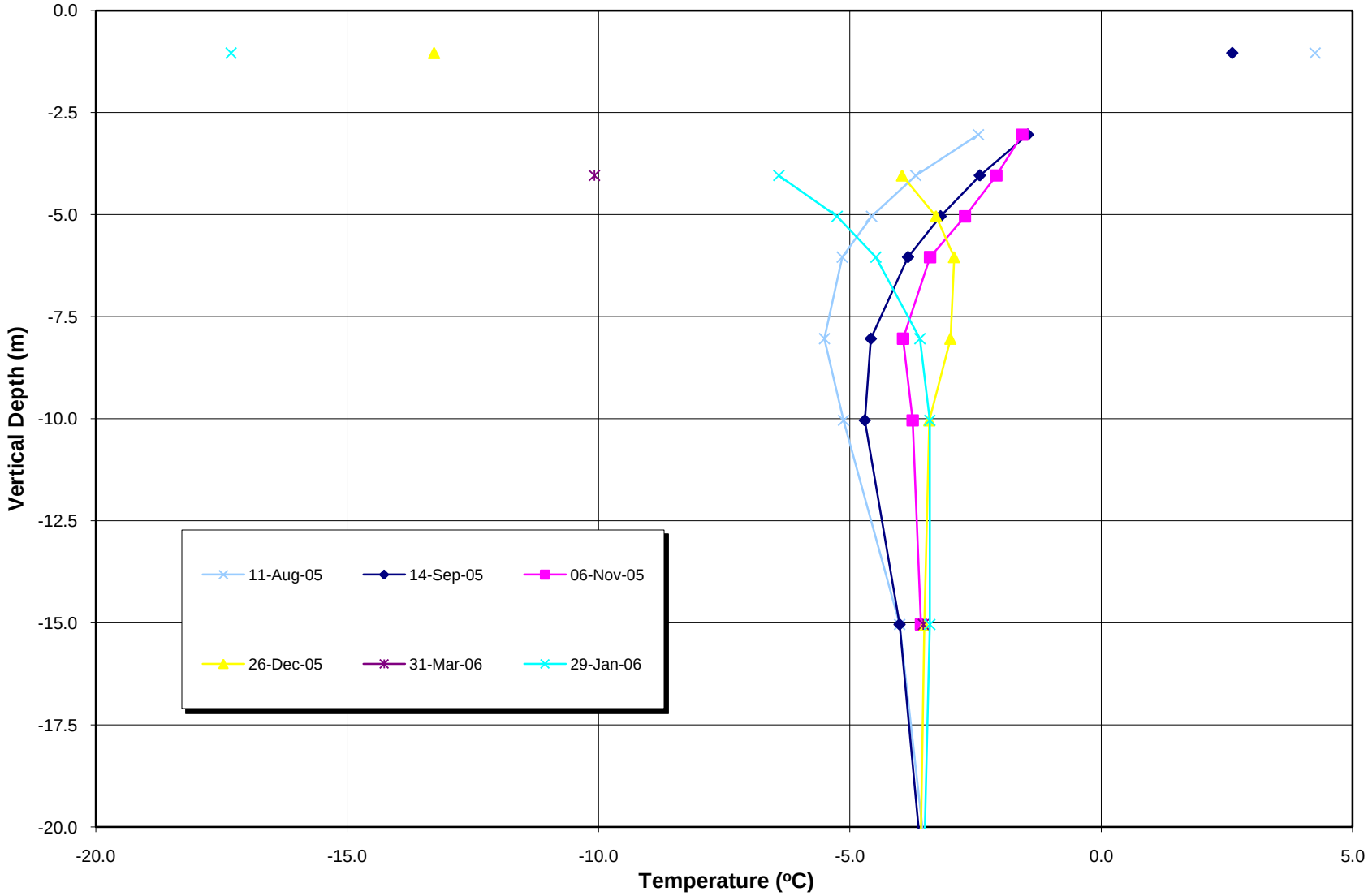
THERMISTOR DATA

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

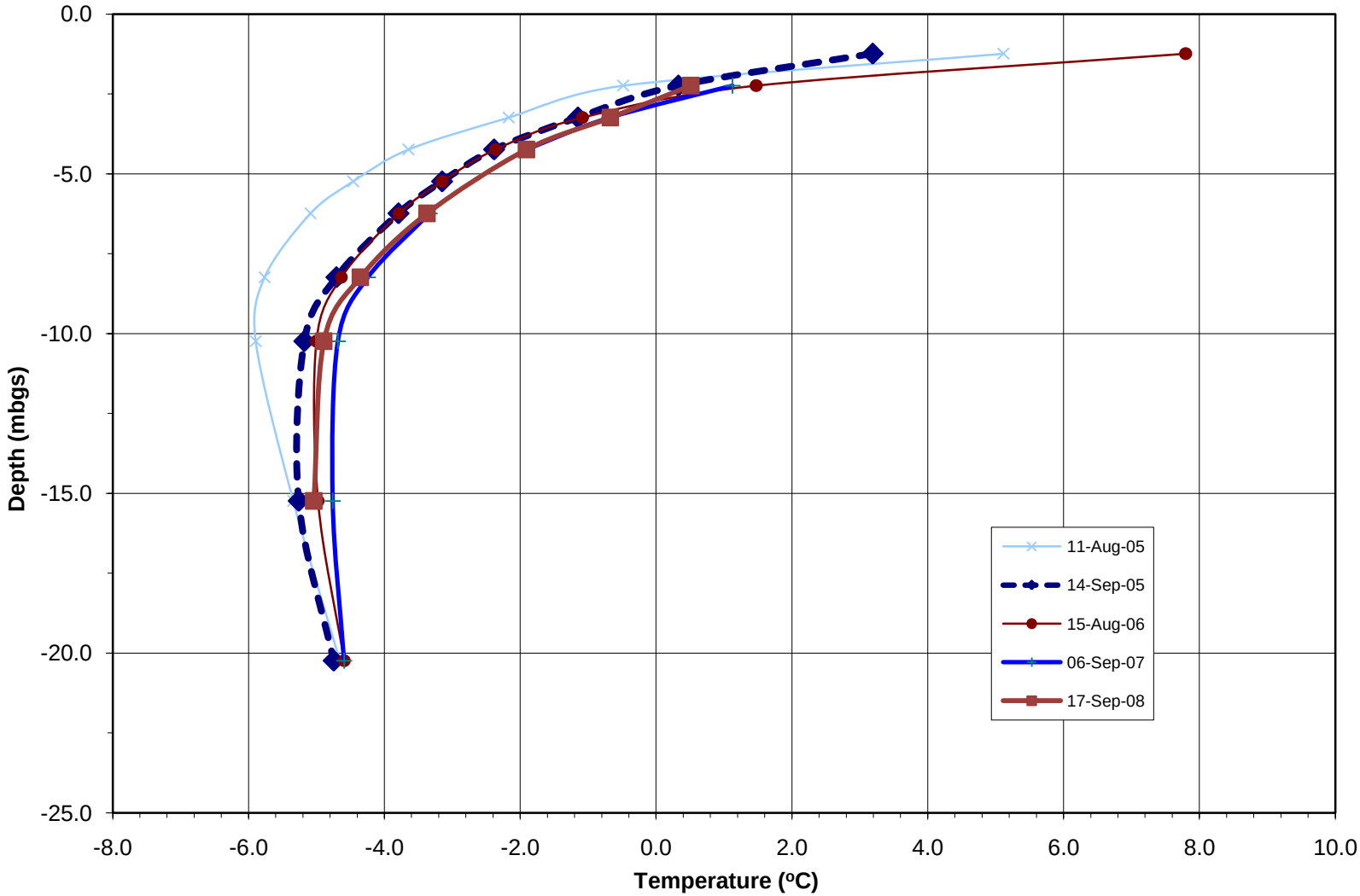


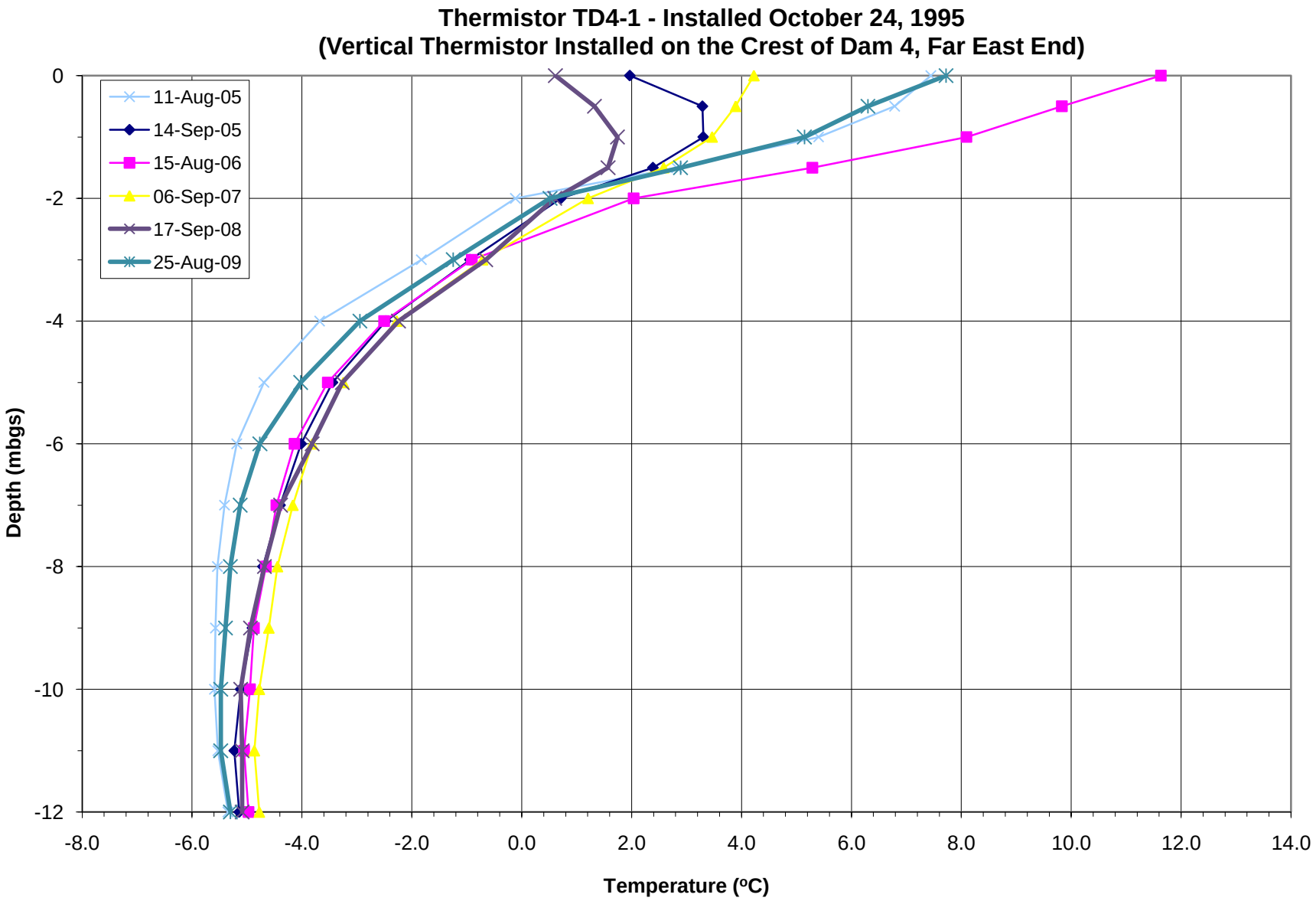

Thermistor D1A-00-2 - Installed November 9, 2000
(Vertical thermistor installed on crest of Dam 1A, north of syphons)
Vertical Depth (m)
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-14.0
-16.0
-18.0
-20.0
-22.0
-15.0
-10.0
-5.0
0.0
5.0
Temperature (ºC)
11-Aug-05
14-Sep-05
06-Nov-05
29-Jan-06
31-Mar-06
30-Apr-06
14-Jul-06
15-Aug-06

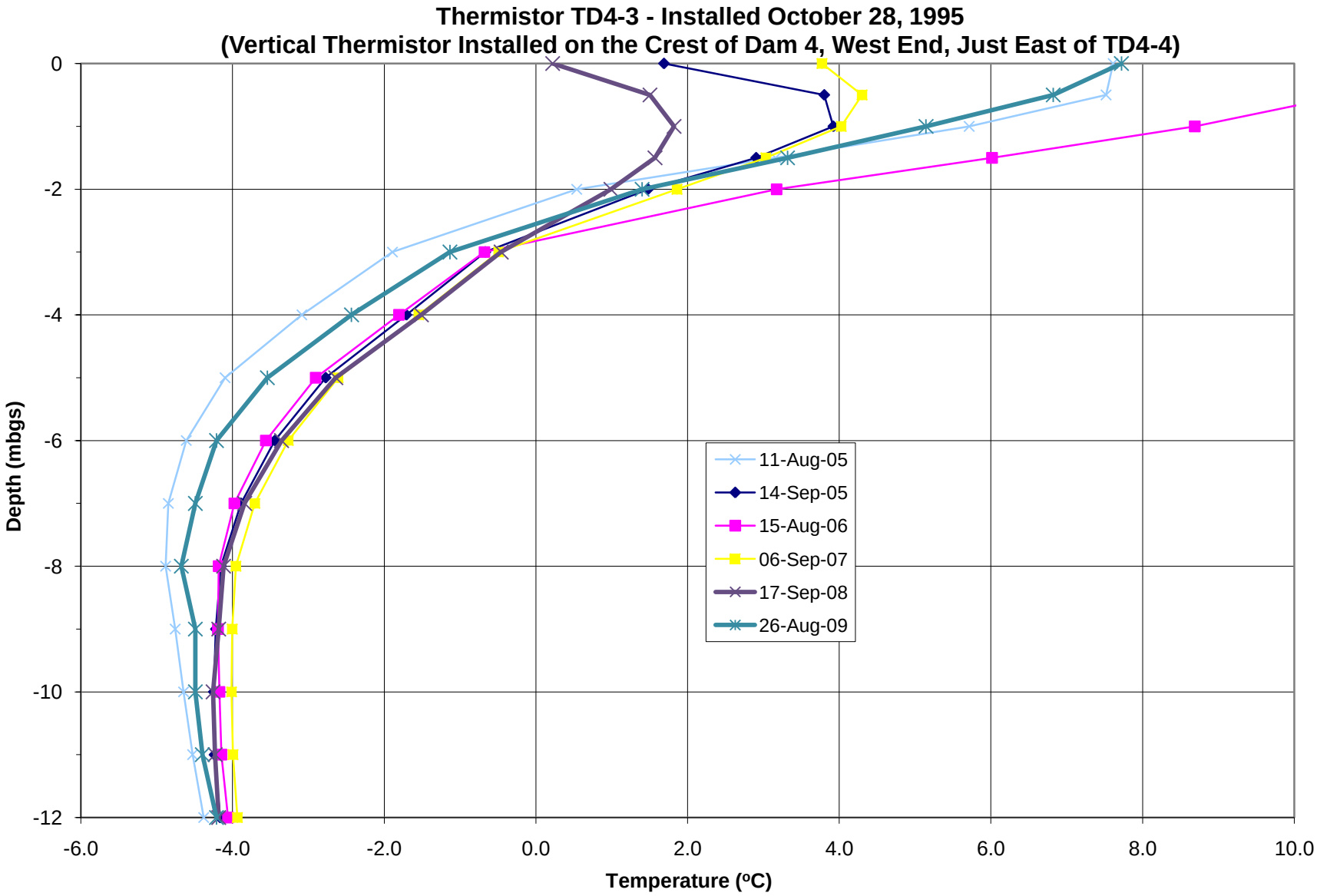
Thermistor D2-00-3 - Installed November 8, 2000
(Vertical Thermistor Installed on the crest of Dam 2, at the mid/north of dam)

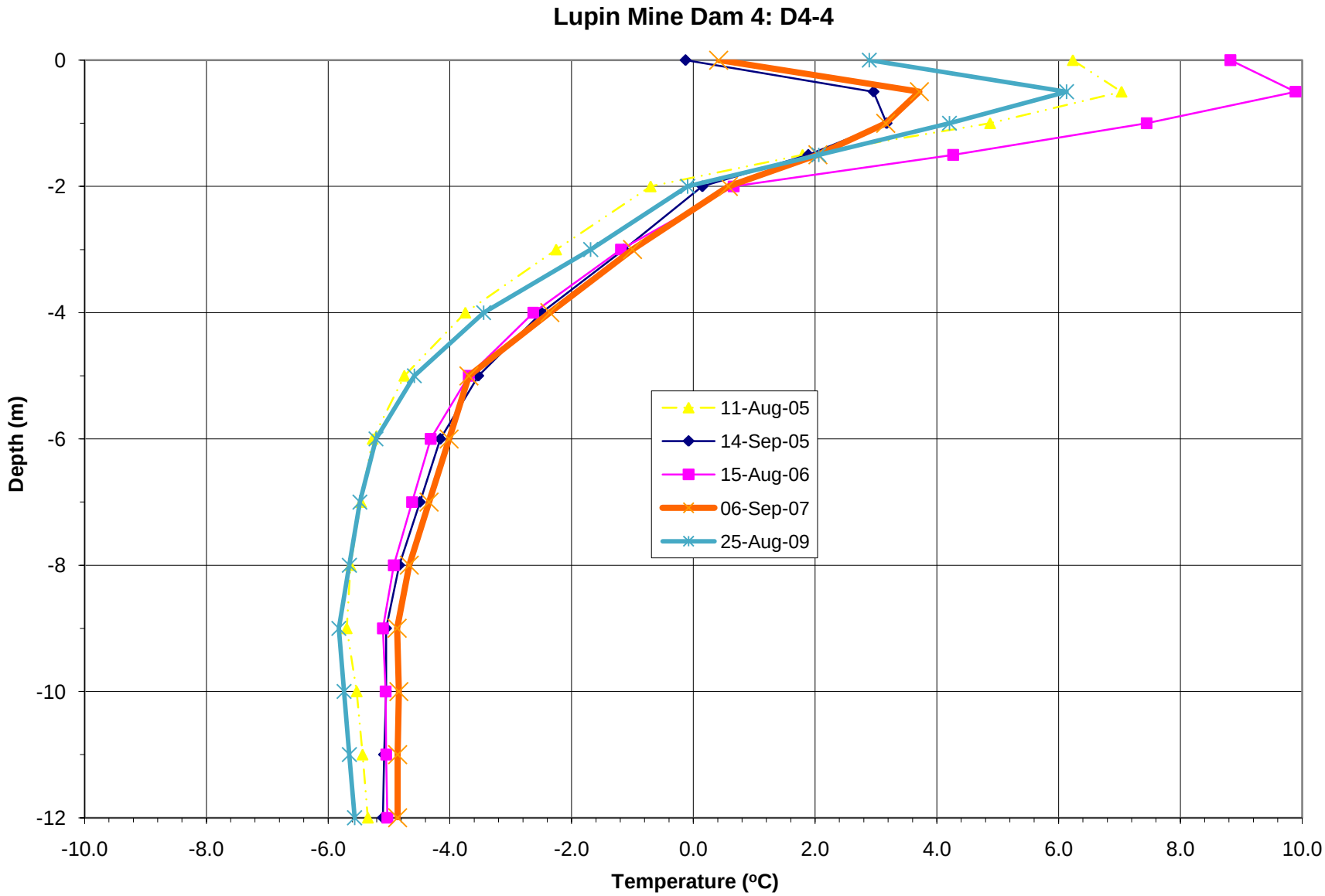


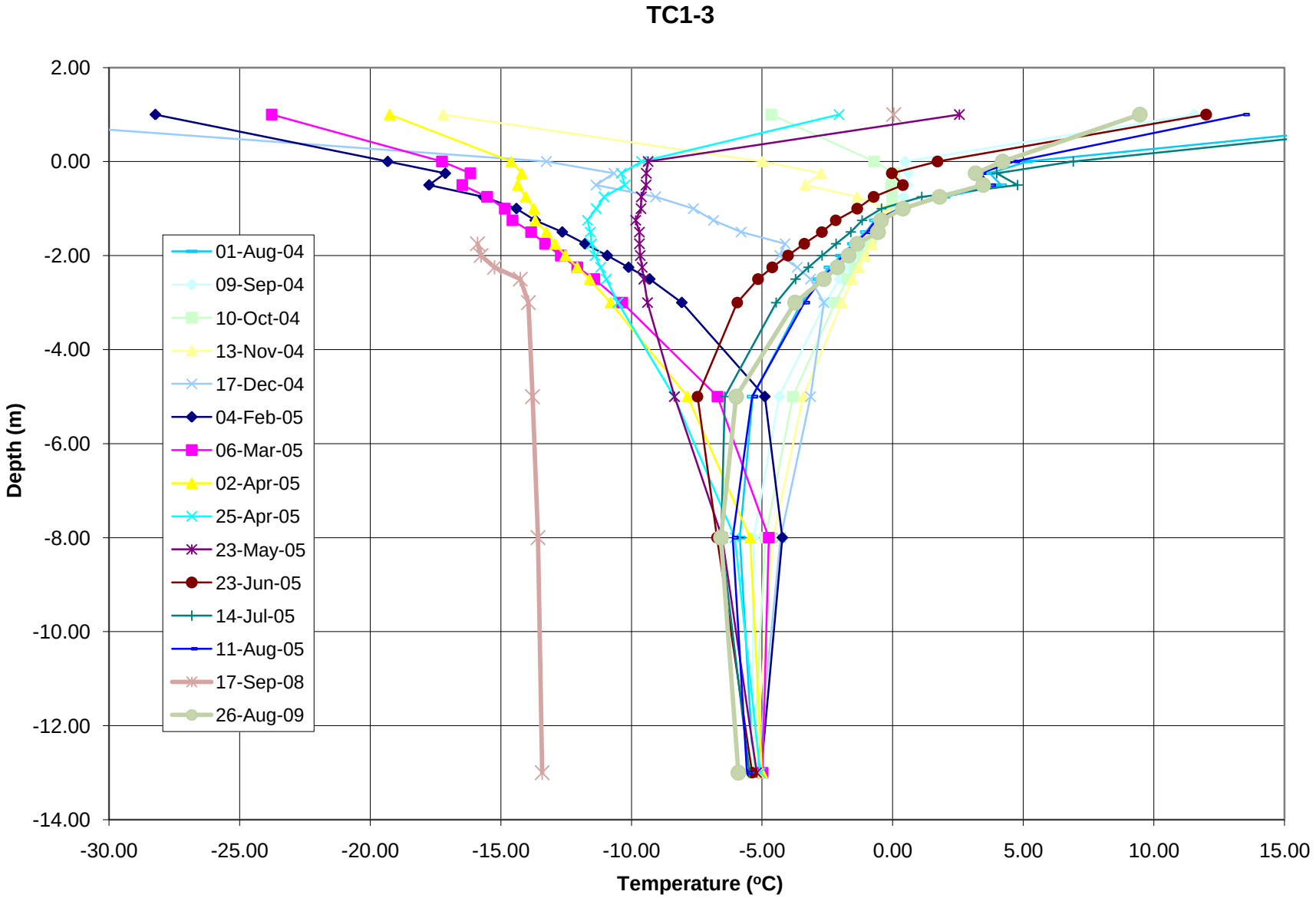
Thermistor D2-00-2 - Installed November 8, 2000
(Vertical Termistor Installed on the crest of Dam 2, at the north end)

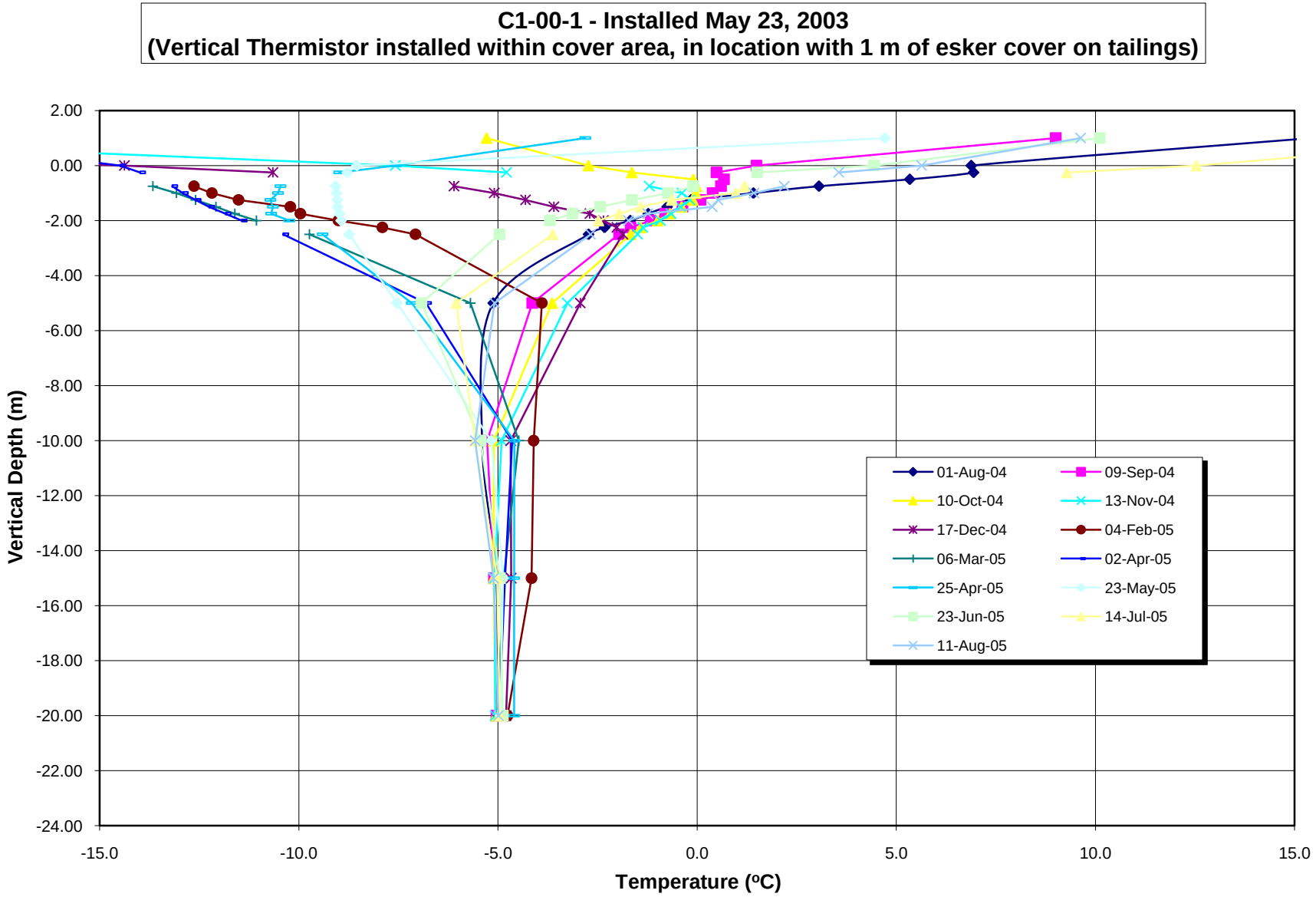


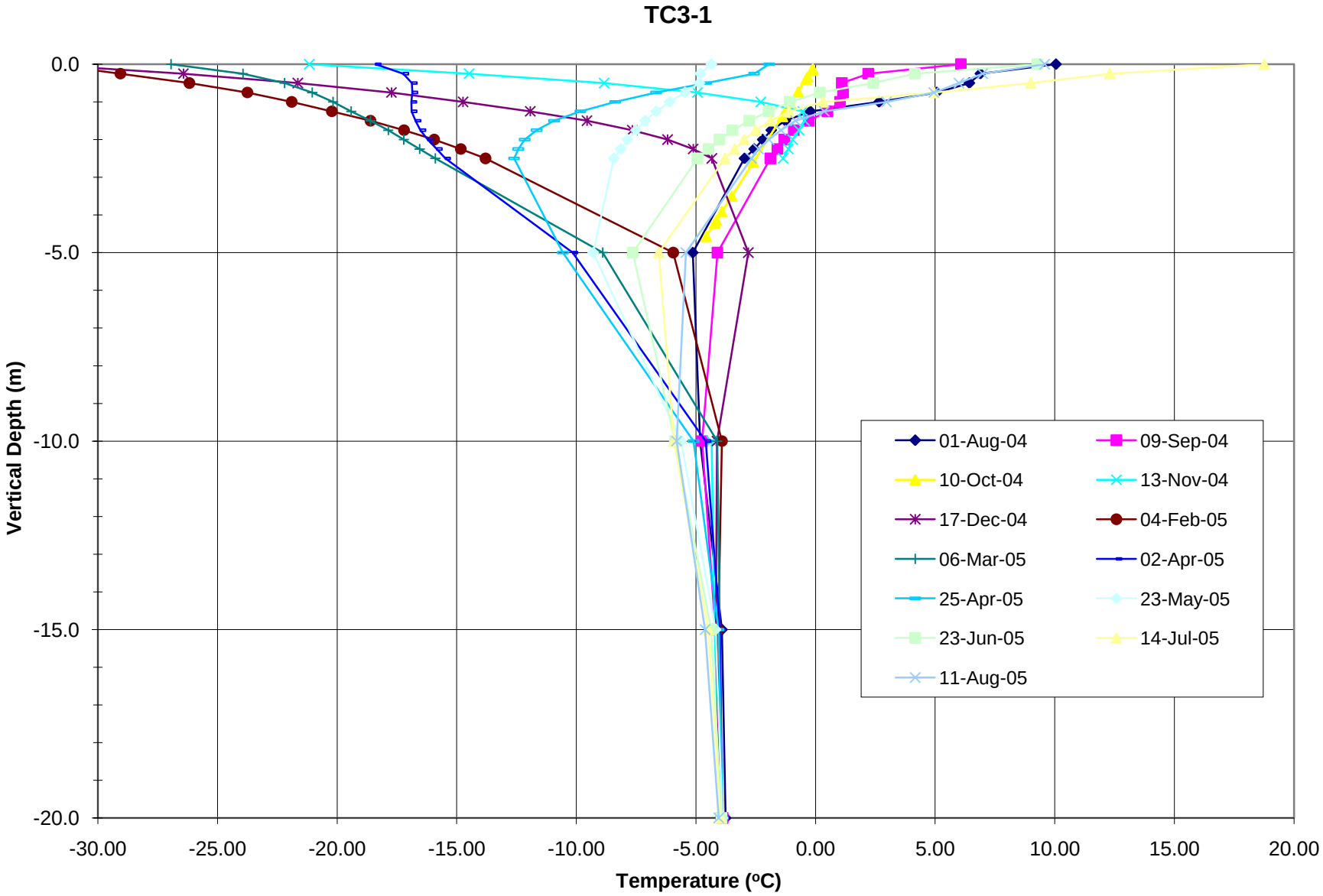

Thermistor TD4-1 - Installed October 24, 1995
(Vertical Thermistor Installed on the Crest of Dam 4, Far East End)
11-Aug-05
14-Sep-05
15-Aug-06
06-Sep-07
17-Sep-08
25-Aug-09
Depth (mbgs)
0
-2
-4
-6
-8
-10
-12
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Temperature (ºC)

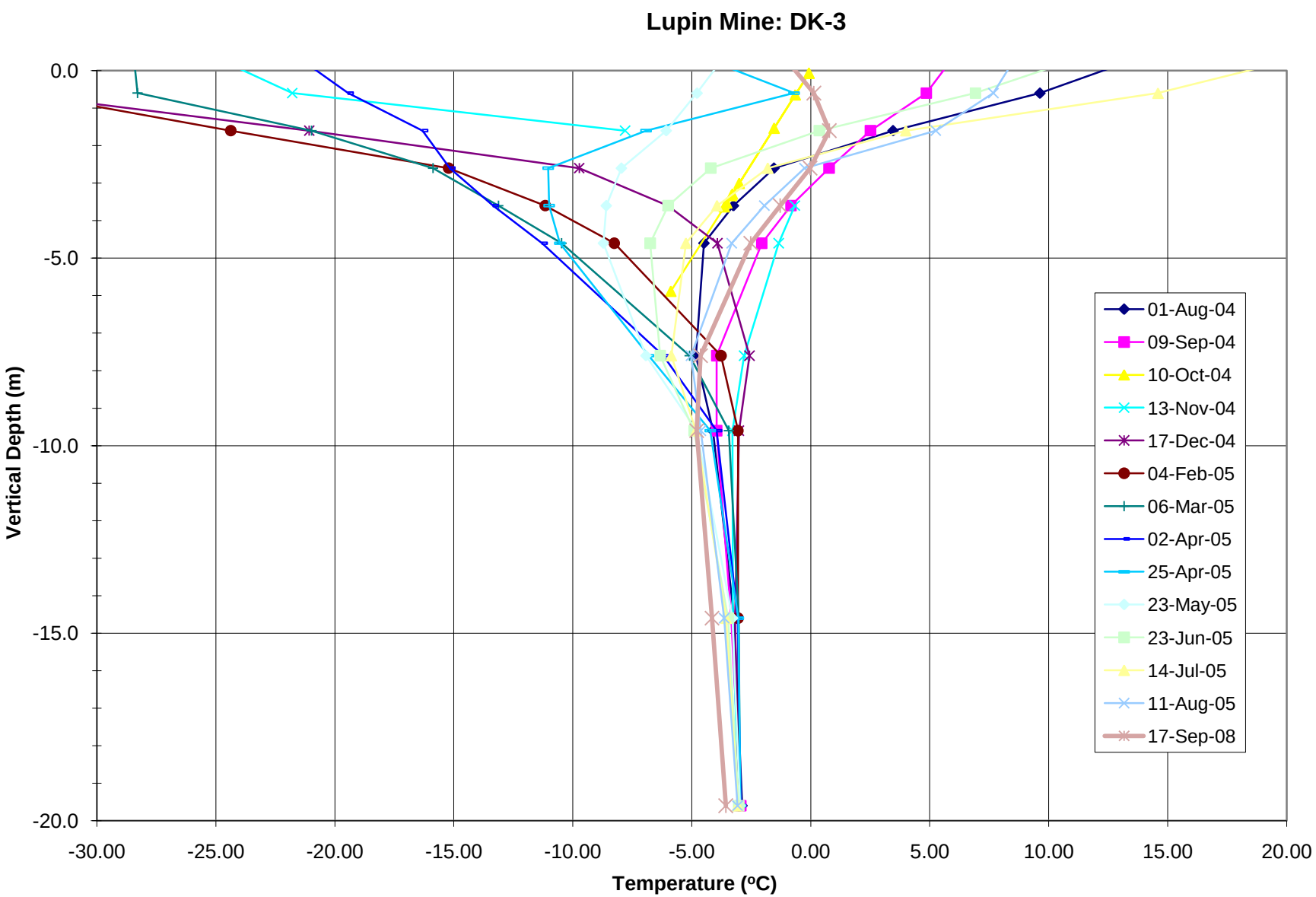

Thermistor TD4-3 - Installed October 28, 1995
(Vertical Thermistor Installed on the Crest of Dam 4, West End, Just East of TD4-4)
Depth (mbgs)
0
-2
-4
-6
-8
-10
-12
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0
8.0
10.0
Temperature (ºC)
11-Aug-05
14-Sep-05
15-Aug-06
06-Sep-07
17-Sep-08
26-Aug-09

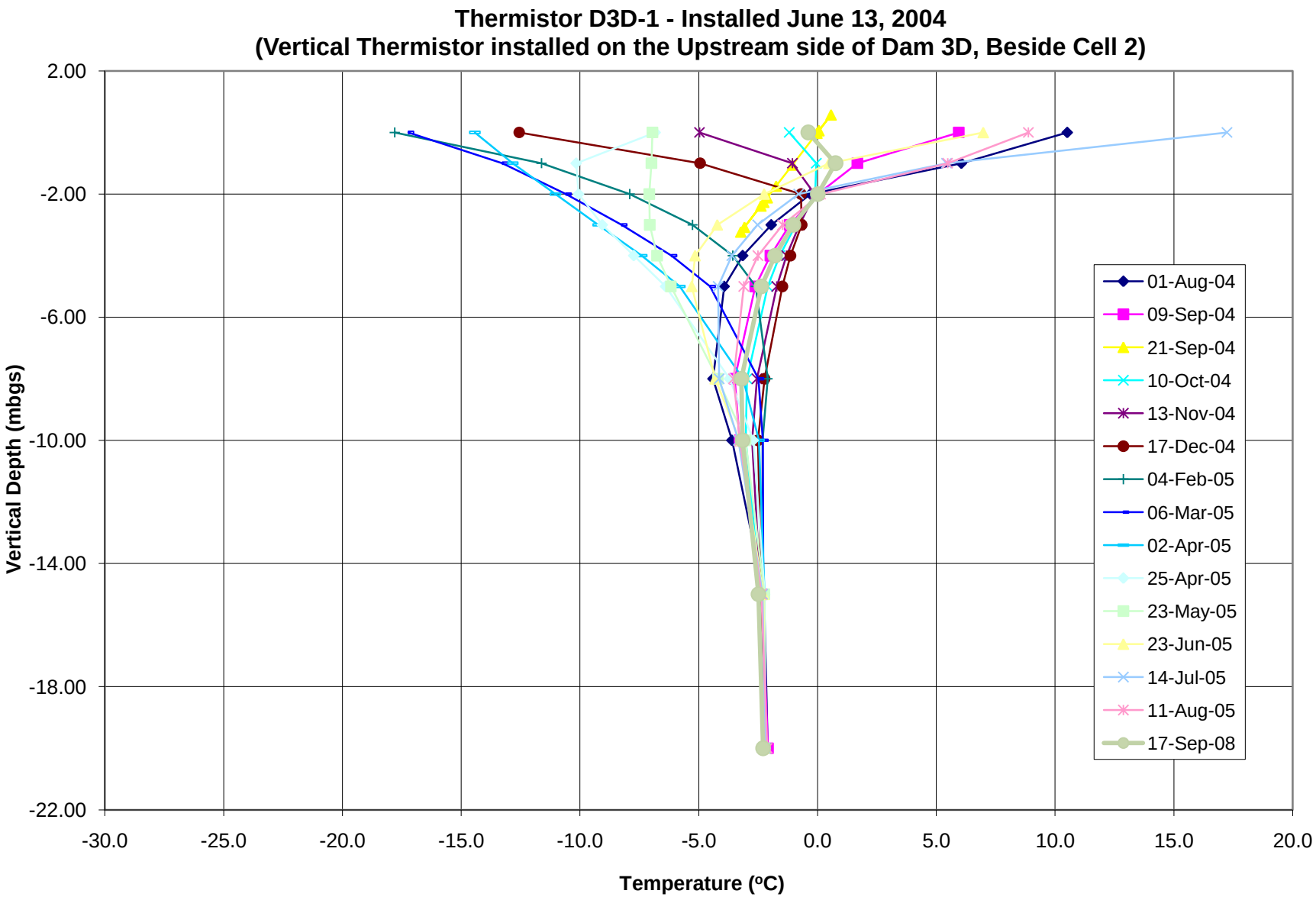

Lupin Mine Dam 4: D4-4
Depth (m)
0
-2
-4
-6
-8
-10
-12
-10.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0
8.0
10.0
Temperature (ºC)
11-Aug-05
14-Sep-05
15-Aug-06
06-Sep-07
25-Aug-09

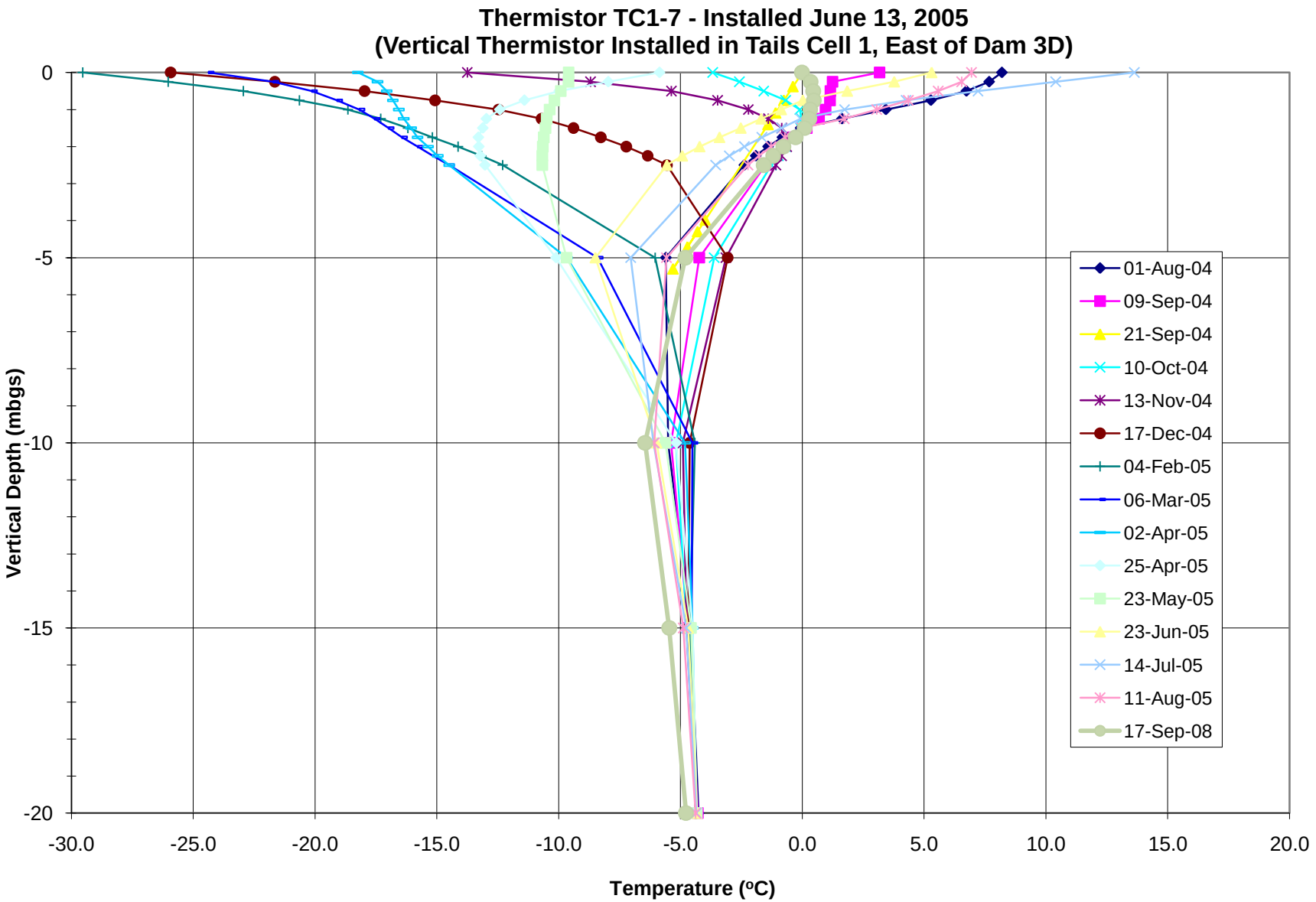

TC1-3
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00
Depth (m)
-30.00
-25.00
-20.00
-15.00
-10.00
-5.00
0.00
5.00
10.00
15.00
Temperature (ºC)
01-Aug-04
09-Sep-04
10-Oct-04
13-Nov-04
17-Dec-04
04-Feb-05
06-Mar-05
02-Apr-05
25-Apr-05
23-May-05
23-Jun-05
14-Jul-05
11-Aug-05
17-Sep-08
26-Aug-09

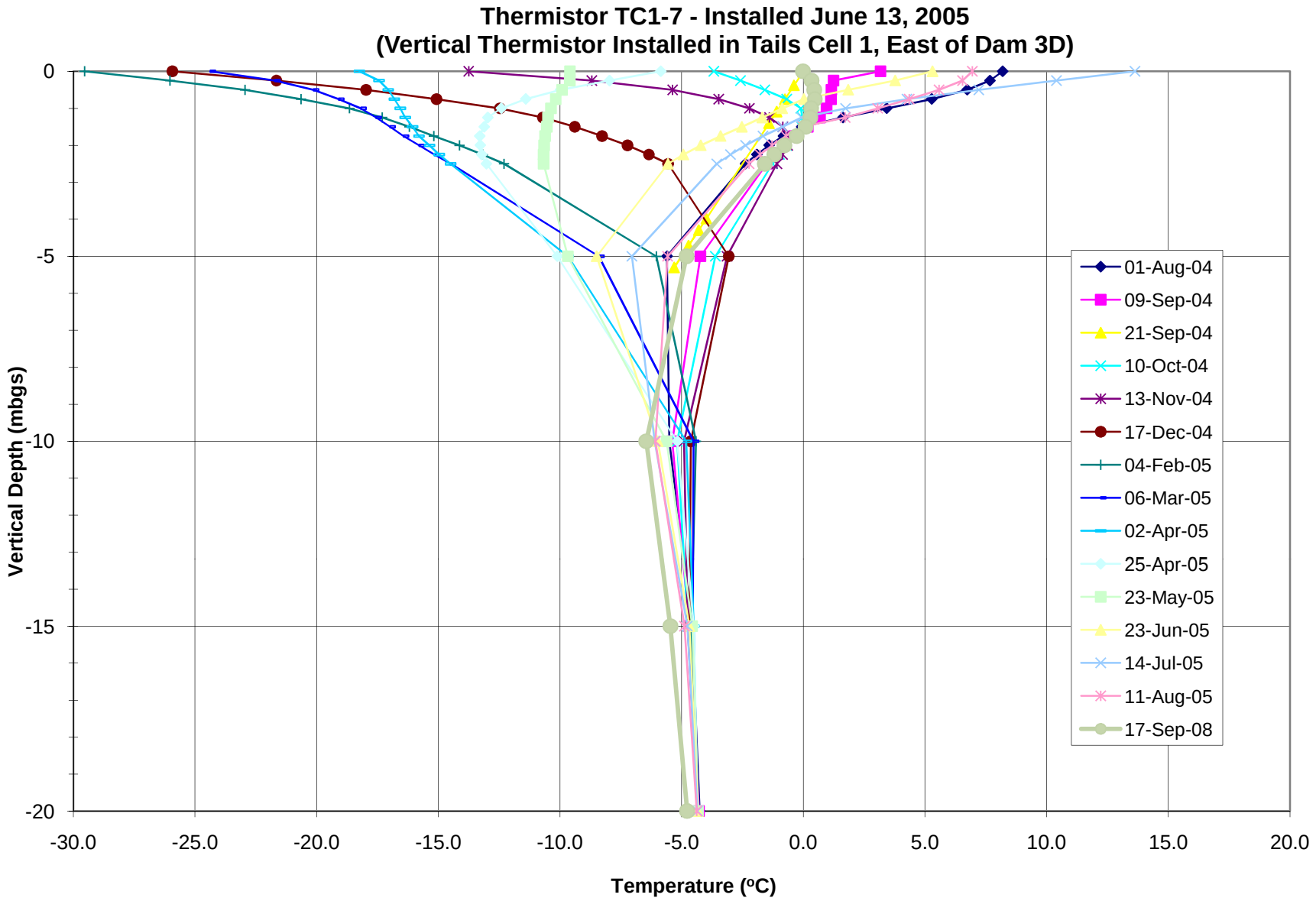

C1-00-1 - Installed May 23, 2003
(Vertical Thermistor installed within cover area, in location with 1 m of esker cover on tailings)
Vertical Depth (m)
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00
-16.00
-18.00
-20.00
-22.00
-24.00
-15.0
-10.0
-5.0
0.0
5.0
10.0
15.0
Temperature (ºC)
01-Aug-04
09-Sep-04
10-Oct-04
13-Nov-04
17-Dec-04
04-Feb-05
06-Mar-05
02-Apr-05
25-Apr-05
23-May-05
23-Jun-05
14-Jul-05
11-Aug-05


TC3-1
Vertical Depth (m)
0.0
-5.0
-10.0
-15.0
-20.0
-30.00
-25.00
-20.00
-15.00
-10.00
-5.00
0.00
5.00
10.00
15.00
20.00
Temperature (ºC)
01-Aug-04
09-Sep-04
10-Oct-04
13-Nov-04
17-Dec-04
04-Feb-05
06-Mar-05
02-Apr-05
25-Apr-05
23-May-05
23-Jun-05
14-Jul-05
11-Aug-05


Lupin Mine: DK-3
Vertical Depth (m)
0.0
-5.0
-10.0
-15.0
-20.0
-30.00
-25.00
-20.00
-15.00
-10.00
-5.00
0.00
5.00
10.00
15.00
20.00
Temperature (ºC)
01-Aug-04
09-Sep-04
10-Oct-04
13-Nov-04
17-Dec-04
04-Feb-05
06-Mar-05
02-Apr-05
25-Apr-05
23-May-05
23-Jun-05
14-Jul-05
11-Aug-05
17-Sep-08

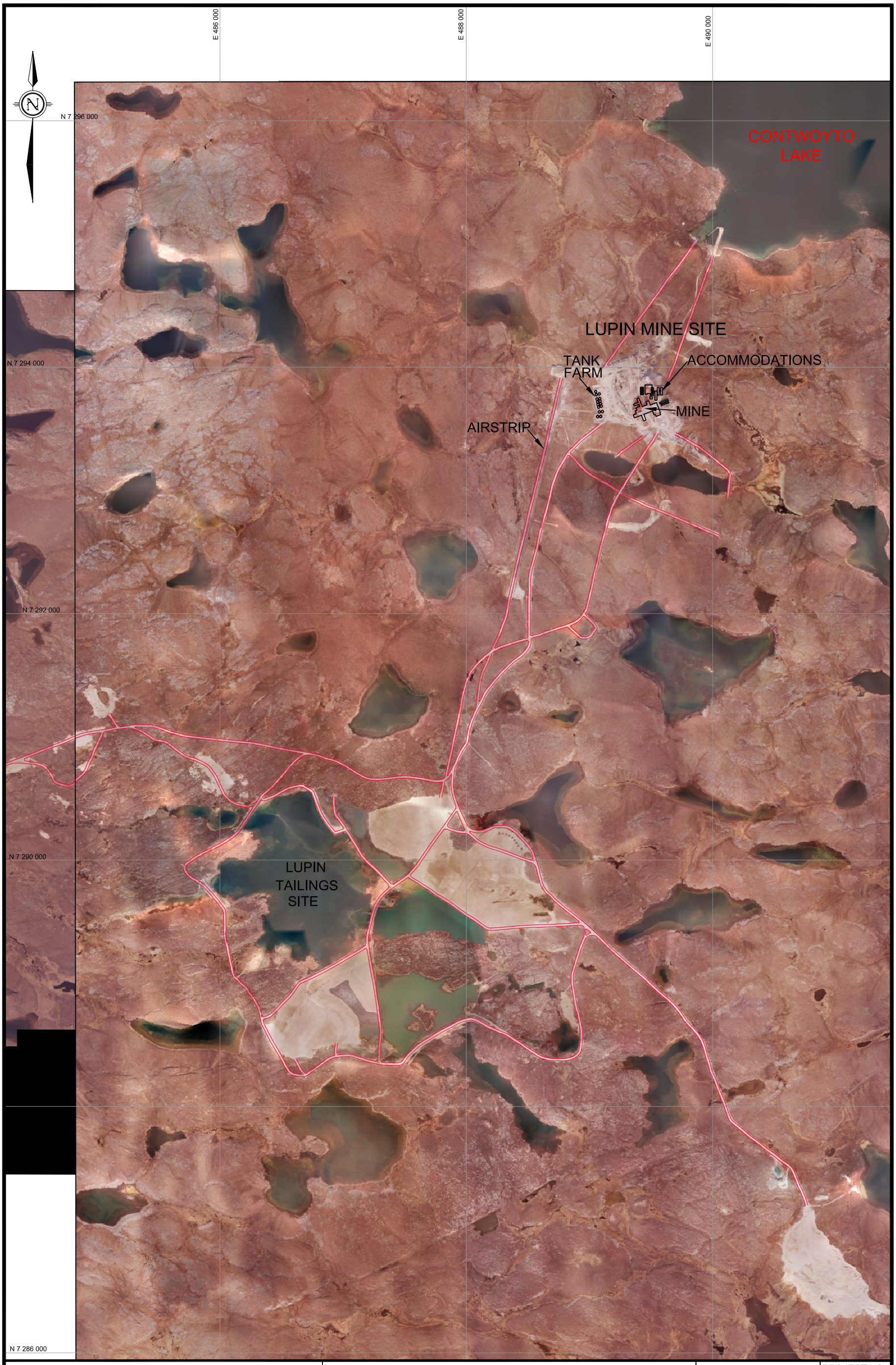

Thermistor D3D-1 - Installed June 13, 2004
(Vertical Thermistor installed on the Upstream side of Dam 3D, Beside Cell 2)
Vertical Depth (mbgs)
2.00
-2.00
-6.00
-10.00
-14.00
-18.00
-22.00
-30.0
-25.0
-20.0
-15.0
-10.0
-5.0
0.0
5.0
10.0
15.0
20.0
Temperature (ºC)
01-Aug-04
09-Sep-04
21-Sep-04
10-Oct-04
13-Nov-04
17-Dec-04
04-Feb-05
06-Mar-05
02-Apr-05
25-Apr-05
23-May-05
23-Jun-05
14-Jul-05
11-Aug-05
17-Sep-08


Thermistor TC1-7 - Installed June 13, 2005
(Vertical Thermistor Installed in Tails Cell 1, East of Dam 3D)
Vertical Depth (mbgs)
0
-5
-10
-15
-20
-30.0
-25.0
-20.0
-15.0
-10.0
-5.0
0.0
5.0
10.0
15.0
20.0
Temperature (ºC)
01-Aug-04
09-Sep-04
21-Sep-04
10-Oct-04
13-Nov-04
17-Dec-04
04-Feb-05
06-Mar-05
02-Apr-05
25-Apr-05
23-May-05
23-Jun-05
14-Jul-05
11-Aug-05
17-Sep-08


Thermistor TC1-7 - Installed June 13, 2005
(Vertical Thermistor Installed in Tails Cell 1, East of Dam 3D)
Vertical Depth (mbgs)
0
-5
-10
-15
-20
-30.0
-25.0
-20.0
-15.0
-10.0
-5.0
0.0
5.0
10.0
15.0
20.0
Temperature (°C)
01-Aug-04
09-Sep-04
21-Sep-04
10-Oct-04
13-Nov-04
17-Dec-04
04-Feb-05
06-Mar-05
02-Apr-05
25-Apr-05
23-May-05
23-Jun-05
14-Jul-05
11-Aug-05
17-Sep-08

ENCLOSURES

CLIENT: MIN METALS GROUP LTD	DWG. TITLE: LUPIN FACILITY - OVERVIEW MAP	SCALE: 1:7,500	PROJECT NO. 09-161
TBT ENGINEERING CONSULTING GROUP	PROJECT: LUPIN MINE ANNUAL INSPECTION LUPIN FACILITY, NUNAVUT		DATE: NOV.2009 ENCLOSURE 1



CLIENT:

MIN METALS GROUP

MMG

TBT ENGINEERING
CONSULTING GROUP

DWG. TITLE:

LUPIN FACILITY AREA PLAN

SCALE:

1 : 30,000

PROJECT NO.

09-161

PROJECT:

LUPIN ANNUAL INSPECTION

LUPIN FACILITY, NUNAVUT

DATE:

NOV 2009

ENCLOSURE

2