2011 Annual Geotechnical Inspection
Perimeter Dams
Tailings Containment Area
Lupin Mine, Nunavut

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November 22, 2011 Ref. No. 11-293

TBT ENGINEERING
CONSULTING GROUP

November 22, 2011
TBTE Ref. No. 11-293

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Re: 2011 Annual Geotechnical Inspection (Revision 1)
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 September 20 to 21, 2011. This report provides a summary of these inspections and documents the findings. Recommendations for maintenance and future investigations/assessment 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 is year round and is by air only. Mine locations and layout have been illustrated on Enclosures 1-2.

The mine is owned by Lupin Mines Incorporated which is a wholly-owned subsidiary of Elgin Mining Inc. (Elgin). Elgin purchase Lupin Mines Incorporated in July 2011 from MMG Resources Inc. (MMG) which is a wholly-owned subsidiary of Minerals and Metals Group Ltd. of Melbourne, Australia. MMG acquired the mine via a series of corporate mergers and transactions involving OZ Minerals, Zinifex Canada Inc. and Wolfden Resources Inc. Prior to that the mine was owned and operated by Kinross Gold Corporation and before that Echo Bay Mines Ltd.

The mine operates under Nunavut Water Board License 2AM LUP0914.

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 2011 inspection was undertaken under the authorization of Patrick Downey of Elgin Mining Inc. The inspection was carried out by Gordon Maki, P.Eng. and Ernie Krause, Sr. Technologist of TBT Engineering. Conditions and any points of concern were discussed with on-site representatives of Elgin Mining Inc.

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
TBT Eng. (2009)	2009 Annual Geotechnical Inspection of Perimeter Dams Recommendation to address toe seepage at Dam 4. Recommendation to flatten slope of toe berm at Dam 1A. Recommendation to investigate minor cracking near downstream toe.

Recommendation to infill small pond upstream of Dam 6.
Placement of Riprap upstream of Dam 2 to be completed.
Improve upstream ditch and storm gully at Dam 3.
Minor erosion noted.

TBT Eng. (2010) 2010 Annual Geotechnical Inspection of Perimeter Dams
Recommended compaction of loose fills at some locations.
Recommended further investigation/remediation of small seepage zone noted at Dam 2.
Recommended review and update of thermistor monitoring program (replace and add thermistors).
Minor erosion noted.

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 most of 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. It is reported that discharge to the environment from Pond 2 normally occurs every 2 or 3 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.

Climatic Conditions

Climatic conditions recorded at the Lupin weather site prior to 2006 were obtained from Environment Canada. Data for Lupin from 2006 to 2010 were obtained from Weather Underground web site (www.wunderground.com). Climate data from Environment Canada was also obtained for Kugluktuk (located approximately 250 km northwest of Lupin). The historical long term Mean Average Annual Temperature, MAAT (based on available data between 1971 – 2000) has been reported as -11.1 °C at the Lupin Station and -10.6 °C at the Kugluktuk Station.

Mean average annual temperatures for the two stations from the year 2000 are provided in the following table:

Year	Mean Annual Temperature °C	
	Kugluktuk	Lupin
2000	-9.8	-9.9
2001	-9.7	-10.0
2002	-10.4	-10.7
2003	-9.9	-10.0
2004	-12.5	-13.4
2005	-10.0	-10.4
2006	-7.1	-8*
2007	-10.3	-10*
2008	-10.6	-11*
2009	-10.1	-12*
2010	-7.5	-8*

Notes: * data obtained from Weather Underground (www.wunderground.com)

It should be noted that mean average annual temperatures for 2006 and 2010 are significantly warmer than the long term averages

Site Inspections

The perimeter dams at the Lupin Mine were inspected by TBT Engineering on September 20 and 21, 2011. The inspections were completed by Gordon Maki, P.Eng. and Ernie Krause, Sr. Technologist from TBT Engineering. Each of the embankments was visually reviewed, photographed and a standardized site inspection form was completed. Areas of concern were discussed with on-site representatives for Elgin Mining Inc..

A number of thermistor string readings located along the various perimeter structures were taken by TBT Engineering during the inspection trip. The calibrated results of these readings have provided and have been attached in Appendix B. The spread sheet data provided by the MMG in 2010 did not include data for 2007 and 2008 for thermistor strings D1A-00-01, D4-1 and D4-4. The spreadsheet did not contain data for 2007, 2008 and 2009 for thermistor strings D2-00-1N and D4-3. Not all of the perimeter structures have thermistor strings, or where there are

thermistor strings, some of the data could not be obtained due to improper connections to the cables, or damaged cables. At some locations, one or more of the thermistors within the string were not operational.

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 available indicates the dams continue to maintain frozen conditions below the active zone, located approximately 2 to 3 m below grade. It should be noted that the depth to frozen core is generally lowest during the years 2006, 2010 and this year. In 2006 and 2010 the mean average annual temperatures were about 3 to 3.5 °C warmer than the long term historical average.

Many of the thermistor strings are now damaged and/or not readable. It is recommended that the thermistor monitoring program be reviewed and updated. Damaged thermistors should be replaced and additional thermistor strings may be warranted.

Except as noted below, the inspections confirm the dams are generally in satisfactory condition. In general, erosion of the downstream slopes is similar to last year, however some of the gullies and cracks from last year have partially in-filled (likely due to wind erosion).

Downstream erosion conditions at each of the structures inspected is summarized as follows:

- Dam 1A: Widespread shallow erosion gullies
- Dam 1B: Minor runoff erosion rills, no cracking.
- Dam 1C: Minor erosion gullies and sloughing.
- Dam 2: Extensive erosion gullies similar to last year.
- Dam 3: More extensive erosion as compared to last year.
- Dam 4: Extensive and deep erosion gullies, similar to last year.
- Dam 5: A few small 150 mm deep erosion gullies, similar to last year..
- Dam 6: Extensive erosion gullies, similar to last year.

A maintenance program to address and repair downstream erosion along all of the perimeters dams should be implemented to prevent further and eventually destabilizing erosion of the downstream slopes. A design of the erosion measures should be carried out and should consider various options to improve the erodability of the downstream slopes.
Additional recommendations for the various structures other than downstream erosion maintenance are as follows:

Dam 2:

One small area of light seepage was noted along the downstream toe. This is at the same location as observed last year. The seepage rate was estimated at 4 litres/min (approximately twice as much as last year). The current freeboard has been estimated at 3.4 m (the pond level is about 0.4 m higher than last year). The increased pond level may have resulted in the observed increased seepage rate. It should also be noted that the depth to the frozen core as measured at the nearby thermistor station (Thermistor D2-002 n) is approximately 3 m. The depth to the frozen core (as measured in the fall of each year) was also noted be low in 2006 and 2010 which likely corresponds to the warmer average annual temperatures for these years. It is possible that the depth to the frozen core locally drops to below the pond level in the area of the noted seepage. At the time of this inspection, the seepage water was free of sediment and piping conditions were not evident. It is possible the seepage conditions may become worse over time and with an increase in level of Pond 2. It is possible that some of 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. A sample of the seepage was collected (by representative of Elgin Mining Inc.) to assess if the source of the seepage can be correlated to Pond 2. In reviewing the 2007 annual inspection report, it appears that natural ground downstream of the toe area was usually wet prior to 2007, but was dry in 2007.

As recommended last year, the geotechnical conditions at Dam 2 should be investigated to determine the in-situ fill conditions and to measure pore water levels in the dam. In addition, installation of an additional thermistor string may be considered at the seepage location to review the depth of frozen ground. 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 and/or thickening of the dam to attract the aggradation of permafrost conditions into the deep foundation of the dam may also be considered as a design alternative.

It is understood that investigation, design and approvals will be undertaken in 2012 with the work scheduled for 2013. In the interim, the water ponded downstream of the dam should be sampled to ensure environmental compliance and may require containment and pump back over the dam. The water level in Pond 2, should be lowered as much as possible to reduce seepage gradients until such time as the seepage conditions are understood and/or corrective measures

can be implemented. The seepage conditions at Dam 2 should be monitored and the mine should be prepared to implement immediate temporary repair to the dam should conditions deteriorate.

Dam 3:

Upgrades were carried out in 2010 to improve routing of surface water from the cell over the dam. As documented in the 2010 annual inspection, the new spillway has significantly more capacity than the original, but the new spillway was not constructed in strict accordance with the geometry recommended and may have slightly reduced flow capacity. It also appears the upstream ditch extension included the placement of riprap along the invert without the use of geotextile. The newly constructed ditch alignment and the new spillway should continue to be monitored / inspected for signs of erosion and/or insufficient capacity. Currently, some erosion has occurred which has lead to some blockage and standing water in the new ditching works. The new and existing upstream ditch (located south of the newly constructed portion) should be cleaned out. In addition, compaction should be considered to improve erodabilty of the crest surface.

At the time of this inspection, areas of ponded water were noted on the closed cell. Regrading measures may be considered to reduce ponding.

Dam 6:

Along the downstream toe of the dam, the lower 0.5 m was observed to be saturated during this year's inspection. While no flowing seepage conditions were noted, the saturated zone at the toe and observed standing water near the toe are likely indicative of seepage. It is recommended that the ponded water near the toe be sampled to identify if it is indeed seepage from the covered cell. Additional investigation including review of the design should be considered to assess the potential for seepage losses and/or the potential for instability of the dam. In addition, thermistors and piezometers should be installed along this dam to assess the current depth of frozen core and groundwater levels across the dam. Potential remediation options (if deemed necessary) may involve construction of suitable granular filter zones and/or construction of a suitable impermeable barrier to significantly reduce seepage. Widening and/or thickening the dam to attract the aggradation of permafrost conditions into the deep foundation of the dam may also be considered as a design alternative.

Frequency of Inspections

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 2 and possibly at Dam 6. These should monitored regularly until such time as the issues are addressed.

A revised inspection schedule should be considered once seepage at Dam 2 and Dam 6 have been addressed, 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
Principal

PERMIT TO PRACTICE
TBT ENGINEERING LIMITED
Signature
Date Nov 22/11
PERMIT NUMBER: P561
NWT/NU Association of Professional Engineers and Geoscientists

REFERENCES

TBT Engineering Limited, 2010 Annual Geotechnical Inspection, Perimeter Dams Tailing Containment Area, Lupin Mine, Nunavut, Prepared for MMG Resources' Inc., Reference No. 10-069, November 3, 2010.

TBT Engineering Limited, 2009 Annual Geotechnical Inspection, Perimeter Dams Tailing Containment Area, Lupin Mine, Nunavut, Prepared for MMG Resources Inc., Reference No. 09-161, December 1, 2009.

BGC Engineering Inc.,2008 Geotechnical Inspection of 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 of 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

Golder Associates 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.

Golder Associates Ltd. 1992. 1992 Perimeter Dam Construction Drawings. Issued for tender to Echo Bay Mines Ltd., February 1992, 4 sheets.

Geocon Inc. 1982. As-Built Talings Containment Area, Lupin Project. Report submitted to Echo Bay Mines Ltd., Project No. A1207/01186-3, December 15, 1982, 26 pages plus figures and appendicies.

APPENDIX “A”

2011 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.
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.:	Approximately 482.2 m
FREEBOARD :	Approximately 3.9 m
CREST WIDTH AND CONDITION:	7 to 8 m; surfaced with esker material. No significant cracking evident; condition remains good.
RIPRAP:	Run of Mine rockfill; broadly graded; good condition.
BACKSLOPE:	Approx. 1.5H; 1V; variably armored with cobbles and boulders. Similar condition to last year. Two ,1 m long cracks noted last year near the downstream crest are in filled (possibly due to wind effects). Widespread shallow erosion gullies exist along downstream slope (similar to last year but are now not as deep, likely due to wind erosion). Erosion is most predominant south of the remaining 2 siphon pipes.
ACCESS ROAD TOE BERM	Last year the downstream slope of the access road toe berm was regraded and provided with riprap over a 48 m long section. The access road / toe berm is in good condition.
SEEPAGE:	No evidence of seepage.
INSTRUMENTATION:	Thermistor D1A-00-2 is located on the crest near the north side of the dam. However, this thermistor could not be read as the adapter is missing. Thermistor D1A-00-1 was read; however, the 3rd deepest thermal couple is not operational.

MAINTENANCE RECOMMENDATIONS: Maintenance is recommended to repair erosion along areas of the downstream slope.

CONCLUSIONS: The dam appears to be in a stable condition. Maintenance of downstream erosion is recommended.

Dam 1A Overview- 2010

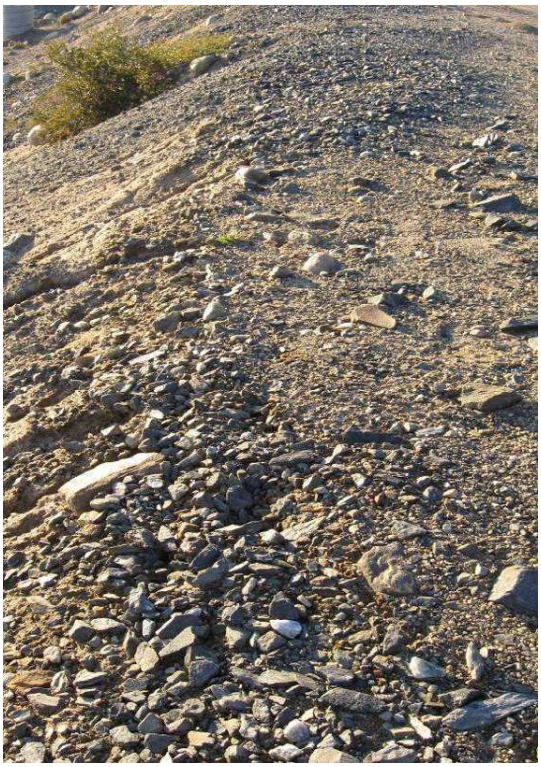
Dam 1A Overview- 2011

Dam 1A: Downstream – Looking South (north side of siphons) – 2010

Dam 1A: Downstream – Looking South (north side of siphons) – 2011

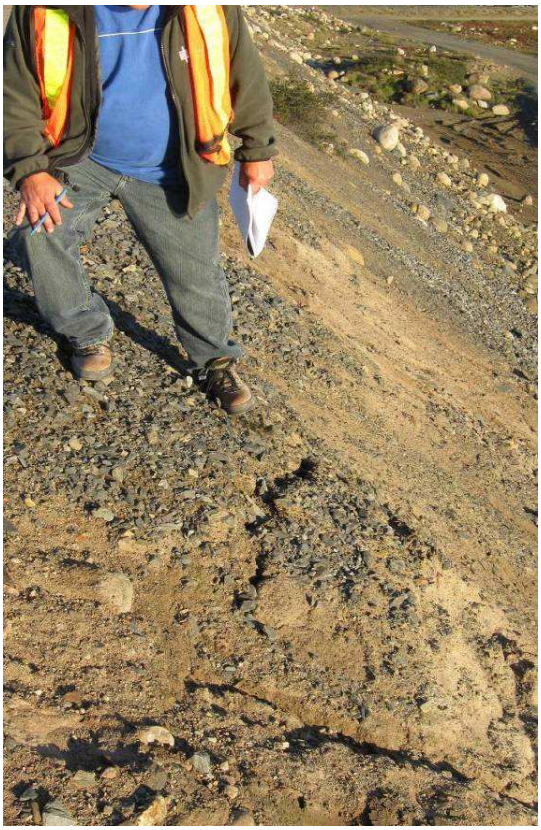
Dam 1A – Downstream Slope (south side of Siphons) Erosion Gullies – 2010

Dam 1A – Downstream Slope (south side of Siphons) Erosion Gullies – 2011



Downstream Crest: 1 m long narrow crack- 2010

Downstream Crest: 1 m long narrow crack now filled in – 2011



Downstream Crest: 1 m long narrow crack – 2010

Downstream Crest: 1 m long narrow crack now in filled – 2011

Dam 1A: Downstream Access Road Toe Berm Looking South – 2010

Dam 1A: Downstream Access Road Toe Berm Looking South – 2011

Dam 1A: Downstream Access Road Toe Berm Looking North – 2010

Dam 1A: Downstream Access Road Toe Berm Looking North – 2011

Dam 1A: Upstream Looking North – 2010

Dam 1A: Upstream Looking North – 2011

Dam 1A: Upstream Looking South – 2010

Dam 1A: Upstream Looking South – 2011

DAM 1B

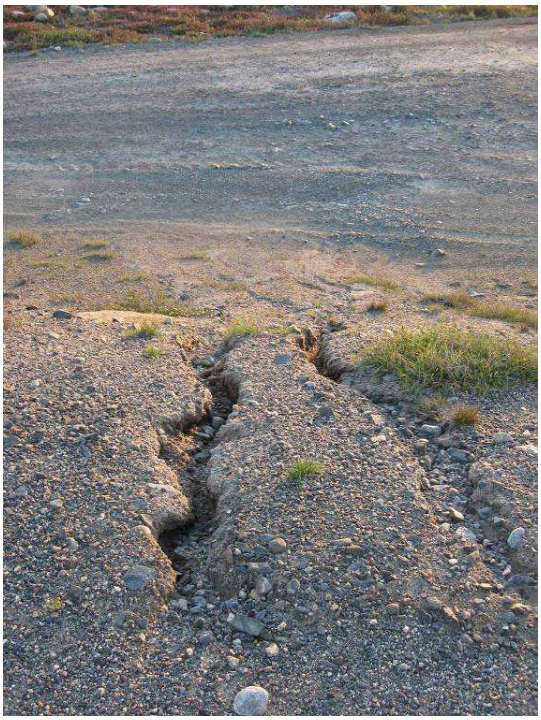
LOCATION:	West side of Pond 2.
FUNCTION:	Major perimeter closure for water retention; pond level is below dam base elevation thus currently functioning only as a road embankment.
LENGTH:	250 +/- m
MAX HEIGHT:	2.5 +/- m above d/s tundra.
AS-BUILT CREST ELEVATION:	485.83 m
CURRENT CREST ELEVATION:	485.4 – 485.6 m
POND ELEV.:	Approximately 482.2 m
FREEBOARD :	Approximately 3.2 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 gullies (partially in-filled as compared to last year likely due to wind erosion) and a toe-of-slope roadway berm (no cracking observed). Some visual evidence of animal burrow along backslope.
SEEPAGE:	No seepage observed
INSTRUMENTATION:	None.
MAINTENANCE RECOMMENDATIONS:	Maintenance of downstream surface erosion should be considered.
CONCLUSIONS:	The dam appears to be in a stable condition. Maintenance of downstream erosion is recommended.

Dam 1B: Upstream – 2010

Dam 1B: Upstream – 2011

Dam 1B: Downstream – 2010

Dam 1B: Downstream – 2011



Downstream Slope: Erosion Gullies – 2010

Downstream Slope: Erosion Gullies – 2011

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.:	Approximately 482.2 m
FREEBOARD :	Approximately 3.1 m
CREST WIDTH AND CONDITION:	9 m +/- wide; surfaced with esker material, this dam also functions as a roadway, Crest condition is good. Animal burrows evident.
RIPRAP:	Run of Mine rockfill at a grade of about 3H:1V. Minor erosion gullies noted along upstream side near the crest/shoulder (above rip rap).
BACKSLOPE:	Approx. 3H; 1V, smooth slope. Access road berm appears in good condition. Two cracks (one 7 m long and one 12 m long) were observed last year along the downstream slope are now partially in-filled due to weathering. Minor surface sloughing along the downstream slope is visible.
SEEPAGE:	No seepage observed.
INSTRUMENTATION:	None
MAINTENANCE RECOMMENDATIONS:	Maintenance of cracking/sloughing conditions along downstream slope is recommended.
CONCLUSIONS:	The dam appears to be in a stable condition. Maintenance of downstream erosion and sloughing is recommended.

Dam 1C: Upstream (Minor Erosion Gullies on Shoulder of Granular Surfacing) – 2010

Dam 1C: Upstream (Minor Erosion Gullies on Shoulder of Granular Surfacing) – 2011

Dam 1C: Upstream (Minor Erosion Gullies on Shoulder of Granular Surfacing) Southern 2/3 of Upstream Slope Has Been Regraded/Extended with a Mixture of Rip Rap and Esker Material – 2010

Dam 1C: Upstream (Minor Erosion Gullies on Shoulder of Granular Surfacing). – 2011

Dam 1C: Downstream Slope (Some Minor Erosion Gullies) – 2010

Dam 1C: Downstream Slope (Some Minor Erosion Gullies) – 2011

Dam 1C: Downstream Slope (Some Minor Erosion Gullies) – 2010

Dam 1C: Downstream Slope (Some Minor Erosion Gullies) – 2011

Downstream Slope (7 m long crack, 75 mm deep, north end of dam) – 2010

Downstream Slope (crack now in-filled) – 2011

Downstream Slope (12 m long crack, middle of dam, 150 mm deep) – 2010

Downstream Slope (crack now partially in-filled) – 2011

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.:	Approximately 482.2 m
FREEBOARD :	Approximately 3.4 m
CREST WIDTH AND CONDITION:	Approx. 6 m; surfaced with esker material and used as the primary traffic route for TCA. Crest relatively uniform and level.
RIPRAP:	Upstream slope was regraded (flattened) last year and remains at approximately 4.5H:1V above el. 483 m and 1.5H:1V below el. 483 m to the pond level. Regraded with a mixture of riprap and esker material. It appears that wave action and eroded some of the fines out of the cover material along the lower portion of the slope below el. 483 m.
BACKSLOPE:	Variable materials but comprised mostly of esker granular material. Erosion gullies and rills appear to be the same as last year. Approximate grade of 1.5H:1V.
SEEPAGE:	Seepage was observed at one location along the downstream toe (located approximately 20 m south of thermistor D2-00-02). Seepage was estimated at a rate of 2 litres/min last year and has increased to an estimated 4 litres/min this year. Seepage appeared to be free of any sediment. It appears that a historic seepage containment berm may have been constructed at the seepage location as evident by what appears to be a small berm constructed from between the toe of the dam and an existing road. The small berm is now breached. The presence of a historic seepage containment berm has not been confirmed. Mine records should be reviewed to assess if seepage has been an issue at this location historically.

INSTRUMENTATION: Thermistor D2-00-02 is located at the north end of the crest. Several of the thermal couples are not operational. Thermistor D2-00-03 has a broken cable.

MAINTENANCE RECOMMENDATIONS: Maintenance of erosion is recommended. At the area of seepage observed along the downstream toe, it appears that the seepage rate has increased from last year. This may be a result of a higher pond level. Currently, the seepage rate does not appear to be causing internal erosion. The seepage may be a result of thawing conditions near the northeast abutment. A sample of the seepage was collected by the client to possibly determine if seepage is from Pond 2. The results of this testing were not provided at the time of this report. This area should be monitored to identify if seepage stops during colder months, or for signs of erosion. As seepage has been observed over the last two years and it appears to be increasing, additional investigation, analyses and/or remedial measures should be considered. .

CONCLUSIONS: The dam currently appears to be in a stable condition. However, continuing and increased seepage conditions could lead to instability of the structure. The seepage quantities should also be considered for potential environmental impacts. Further inspection and investigation/assessment with possible remediation should be carried out. In addition, the downstream erosion should be repaired.

Overview of Dam 2 – 2011

Possible Historic Seepage Collection Berm or Berms? – 2011

Dam 2: Upstream Slope Looking Northeast – 2010

Dam 2: Upstream Slope Looking Northeast – 2011

Dam 2: Upstream Looking Southwest – 2010

Dam 2: Upstream Looking Southwest – 2011

Dam 2: Downstream Slope – 2010

Dam 2: Downstream Slope – 2011

Dam 2: Downstream Slope Erosion Gullies and Rills – 2010

Dam 2: Downstream Slope Erosion Gullies and Rills – 2011

Dam 2: Downstream Toe (approx. 20 m South of D2-00-02) Clear Seepage at a Rate of Approx. 2 litres/min. – 2010

Dam 2: Downstream Toe (approx. 20 m South of D2-00-02) Clear Seepage at a Rate of Approx. 4 litres/min. – Th2011

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. In 2010, a new upstream ditch outlet spillway was constructed across the dam to replace the existing spillway which did not appear to have sufficient capacity. While the new spillway has a significant increase in capacity over the original spillway, the new spillway was constructed smaller than specified and as such may have less capacity than designed for. In addition, a portion of the upstream ditch has been reconstructed between the old and new spillway locations has been lined with riprap (without geotextile) over a length of approximately 100 m. The existing ditch upstream of the reconstructed section has experienced some erosion and deposition of sediment (standing water was noted at some locations within the run-off ditch). Between the old and new spillway locations, the crest of the dam has been recovered with esker material in a loose condition. This dam remains in a similar condition as last year.
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. More extensive erosion gullies were noted.
SEEPAGE:	None observed. Some standing surface water was noted on top of the cell.
MAINTENANCE RECOMMENDATIONS:	The loosely placed esker material along the crest should be compacted to improve resistance to erosion. Downstream erosion should be repaired. The existing ditch southeast of the regraded section should be cleaned out and regraded to remove accumulated material to permit flow. The newly regarded portion of the upstream ditch should be inspected for future signs of erosion.

The new spillway performance should be monitored for signs of erosion and/or inadequate capacity.

CONCLUSIONS: The dam appears to be in a stable condition. Maintenance and inspection as recommended above should be carried out.

Dam 3: Overview – 2010

Dam 3: Overview – 2011

Dam 3: Upstream slope looking northwest at area of last year's ditch regrading leading to reconstructed spillway. Ditch invert lined with riprap (no geotextile observed). – 2010

Dam 3: Upstream slope looking northwest at area of last year's ditch regrading leading. Some scour and standing water. – 2011

DAM 3: Upstream crest looking southeast. Loose fill on crest. End of ditch regrading. Ditching upstream of ditch regrading treatment contains some sediment. – 2010

DAM 3: Upstream crest looking southeast. Loose fill on crest. End of ditch regrading. Standing water. Ditching upstream of ditch regrading treatment contains some sediment. – 2011

Dam 3: Spillway crossing dam at end of upstream ditch. Re-constructed last year with a grade of about 20H:1V (was specified at 30H:1V through the dam and 7H:1V along downstream slope). Through the dam crest, the new spillway has a channel base width of 2 m, not the specified 4 m. The spillway is lined with riprap and geotextile. – 2010

Dam 3: Spillway crossing dam at end of upstream ditch. Similar conditions to last year. – 2011

Dam 3: Downstream side of spillway (splash pad) constructed last year. Spillway side slope constructed at about 2.5H:1V (steeper than 3H:1V specified). Slopes on the outside of the spillway channel are also steeper than specified. – 2010

Dam 3: Downstream side of spillway (splash pad) – 2011

Areas of Ponded Water onto of Cell – 2011

Erosion Gullies on Downstream Slope – 2011

DAM 4

LOCATION:	South end of Cell 4 for K Dam sub-pond.
FUNCTION:	Perimeter closure for water retention at present; natural pond downstream of the dam at its west end.
LENGTH:	900 +/- m
MAX HEIGHT:	6 +/- m above u/s native ground elevation.
AS-BUILT CREST ELEVATION:	489.59 m
CURRENT CREST ELEVATION:	489.2 – 489.5 m
POND ELEV.:	Approximately 484.9 m
FREEBOARD :	Approximately 4.3 m
CREST WIDTH AND CONDITION:	Approximately 12 m wide crest width in generally good condition.
RIPRAP:	Run of Mine rockfill in generally good condition on upstream slope. Occasional small void in riprap and minor sloughing at some locations. Similar to last year.
BACKSLOPE:	Esker sand. At the west end of the dam, the area between the dam and the old cofferdam was in-filled last year (treating oversteeped slope and seepage zone). The esker fill in this area still appears to be placed in loose condition. Shallow erosion gullies are present. The downstream slope east of the old coffer dam has extensive and deep erosion gullies (although not as deep as last year as some have been partially in-filled likely due to wind erosion).
SEEPAGE:	No seepage observed.
INSTRUMENTATION:	Three of the original four thermistors remain along Dam 4. Thermistor TD4-2 was reported destroyed.
MAINTENANCE RECOMMENDATIONS:	Corrective measures were implemented last year (2010) to address seepage in the area of coffer dam observed in 2009. This appear to be effective as no seepage was observed this year. However, the infilling remains in a loose condition which may be subject to erosion. Surface compaction is recommended to improve resistance to surface erosion. Extensive erosion with gullies (up to

1 m deep) have not been properly maintained along the eastern 2/3 of the dam. These were noted last year and should be repaired.

CONCLUSIONS: Dam appears to be in a stable condition. Maintenance of extensive downstream erosion should be carried out to prevent further deterioration of the dam.

Dam 4: Overview – 2010

Dam 4: Overview – 2011

Dam 4: Downstream side, west end of dam. Area between Dam and downstream coffer dam infilled (last year) with esker material to mitigate seepage conditions. – 2010

Dam 4: Downstream side, west end of dam. Some erosion gullies evident. Surface material in loose condition. No seepage observed. – 2011

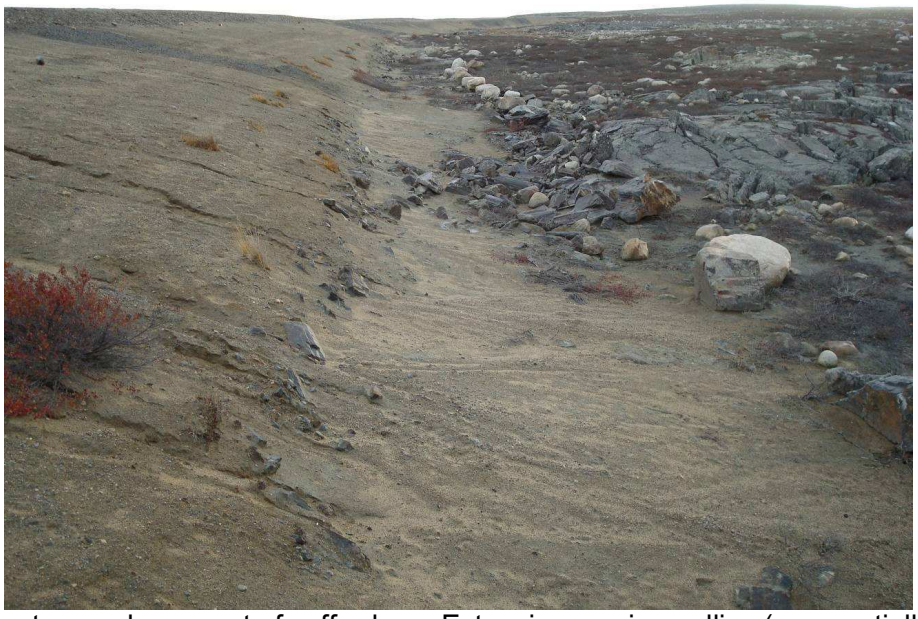
Dam 4: Downstream slope. Loose surface and erosion gullies on new infill. – 2010

Dam 4: Downstream slope. Loose surface and erosion gullies (partially in-filled) on new infill. – 2011

Dam 4: Downstream slope in area of old coffer dam (cobble stone). – 2010

Dam 4: Downstream slope in area of old coffer dam (cobble stone). Note slightly higher downstream lake level. – 2011

Dam 4: Downstream slope, east of cofferdam. Extensive erosion gullies (exposed geogrid). – 2010



Dam 4: Downstream slope, east of cofferdam. Extensive erosion gullies (now partially in-filled). – 2011

Dam 4: Downstream slope, east of cofferdam. Extensive erosion gullies – 2010

Dam 4: Downstream slope, east of cofferdam. Extensive erosion gullies (now partially in-filled) – 2011

Dam 4: Downstream slope, east of cofferdam. Extensive erosion gullies - 2010

Dam 4: Downstream slope, east of cofferdam. Extensive erosion gullies - 2011

Dam 4: Downstream slope, east of cofferdam. Extensive erosion gullies – 2010

Dam 4: Downstream slope, east of cofferdam. Extensive erosion gullies – 2011

Dam 4: Downstream slope, east of cofferdam (looking west). Extensive erosion gullies – 2010

Dam 4: Downstream slope, east of cofferdam (looking west). Extensive erosion gullies – 2011

Dam 4: Upstream slope – 2010

Dam 4: Upstream slope – 2011

Dam 4: Upstream slope – 2010

Dam 4: Upstream slope – 2011

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. Covered with esker sand at some locations (likely from run-off from crest).
BACKSLOPE:	About 1.5 to 2H:1V with till and esker sand. 2 small cracks noted along downstream shoulder along east half of dam noted last year now in-filled. A few small 150 mm deep erosion gullies have formed along downstream slope and are now partially in-filled.
SEEPAGE:	No seepage observed. No water head being retained by the majority of structure.
MAINTENANCE RECOMMENDATIONS:	None recommended at this time.
CONCLUSIONS:	The dam appears to be in a stable condition.

Dam 5: Upstream – 2010

Dam 5: Upstream – 2011

Dam 5: Downstream – 2010

Dam 5: Downstream – 2011

Dam 5: Downstream. Erosion gullies. – 2010

Dam 5: Downstream. Erosion gullies (partially in-filled). – 2011

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. Riprap along upstream slope in area of small upstream pond at east end of dam.
BACKSLOPE:	About 2H:1V with till and esker sand; extensive erosion gullies along downstream slope (similar to last year). Lower 0.5 m of slope is saturated (not observed last year).
SEEPAGE:	No flowing seepage observed. However, lower 0.5 m of toe of slope is saturated and standing water observed at toe of slope.
MAINTENANCE RECOMMENDATIONS:	Backfilling of ponded area may be considered (as previously recommended). Maintenance of downstream erosion is recommended. Installation of piezometer at crest may be considered to assess potential for seepage. Flatting backslope with a graded filter and/or geoxtile may be considered should seepage be confirmed.
CONCLUSIONS:	The dam appears to be in a stable condition. Maintenance of downstream erosion is recommended. Additional investigation (including review of design) should be considered to assess potential for seepage losses and/or potential for instability of downstream slope.

Dam 6: Upstream – 2010

Dam 6: Upstream – 2011

Dam 6: Upstream. Riprap in area of small pond. – 2010

Dam 6: Upstream. Riprap in area of small pond. – 2011

Dam 6: Upstream – 2010

Dam 6: Upstream – 2011

Dam 6: Downstream. Erosion gullies. – 2010

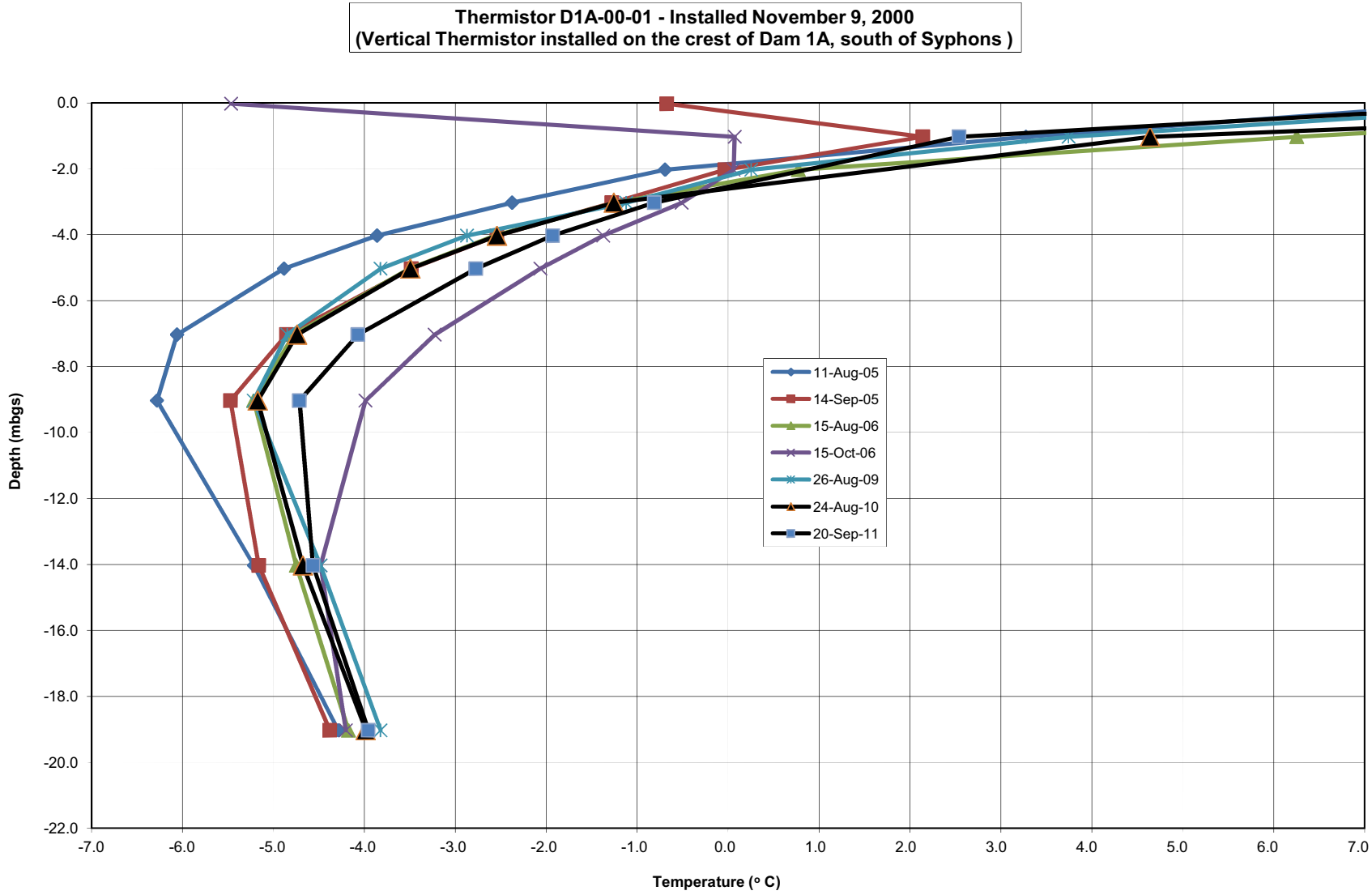
Dam 6: Downstream. Erosion gullies and Standing Water Near Toe. – 2011

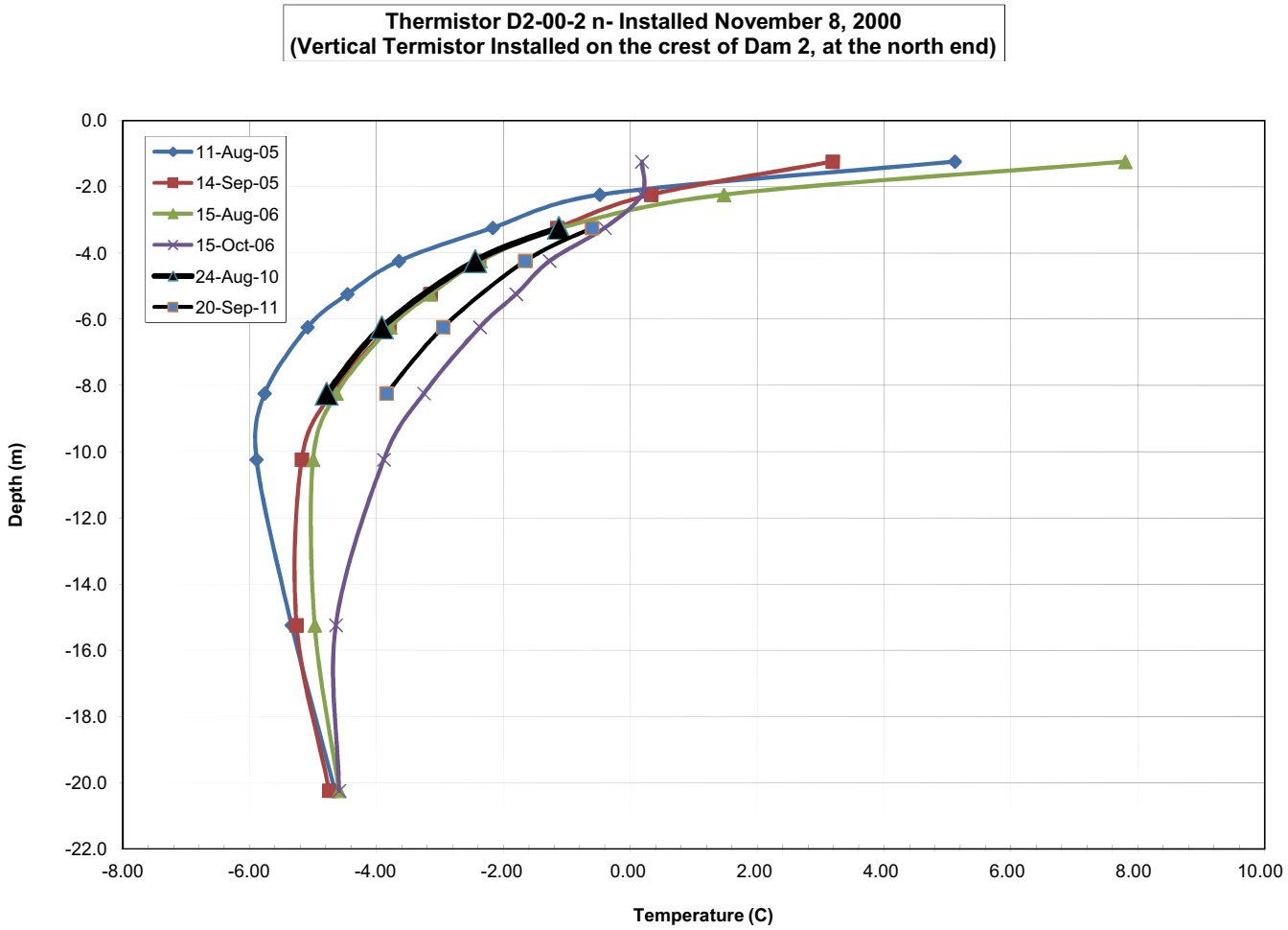
Dam 6: Down stream erosion gullies – 2010

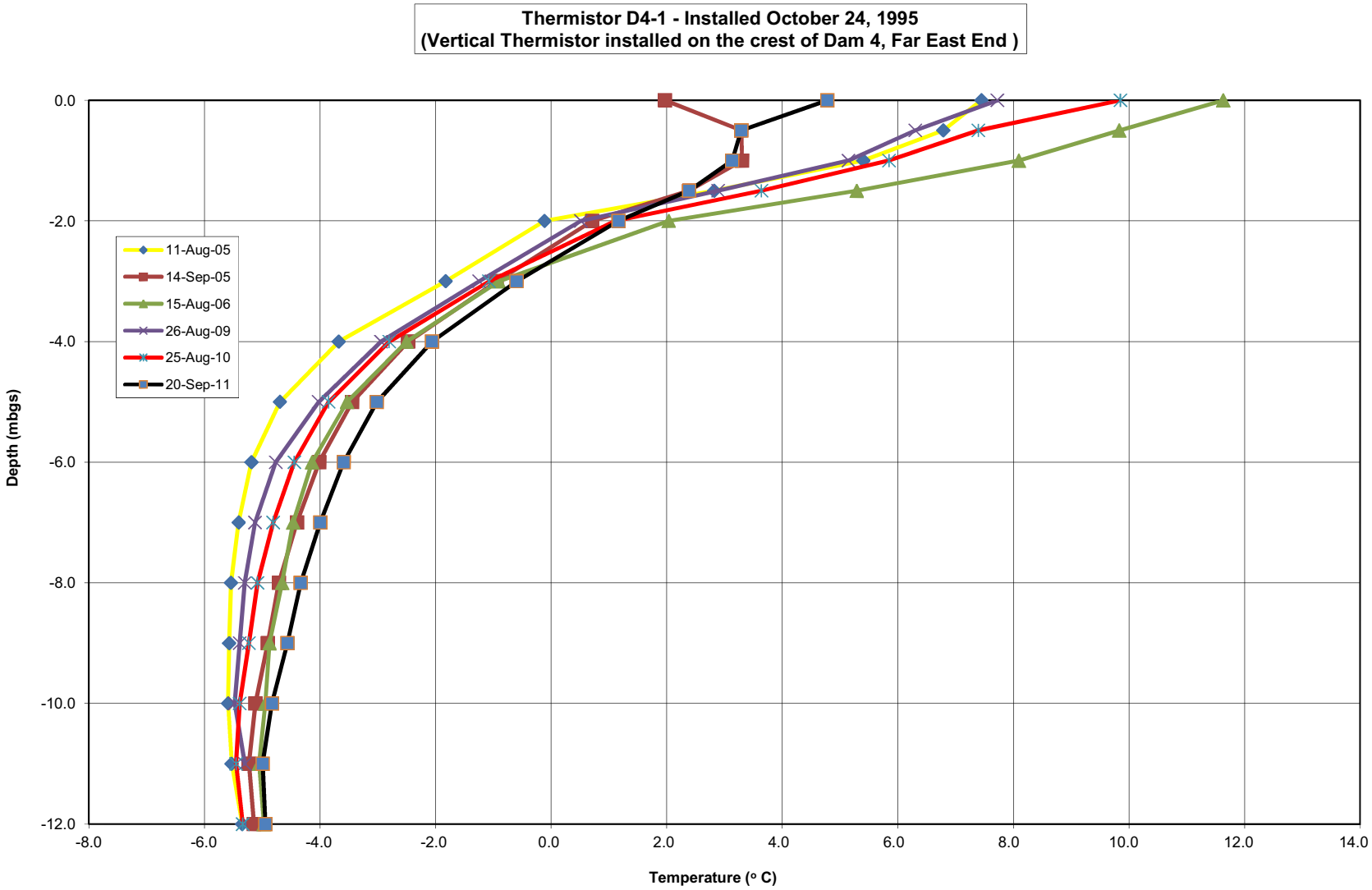
Dam 6: Down stream erosion gullies – 2011

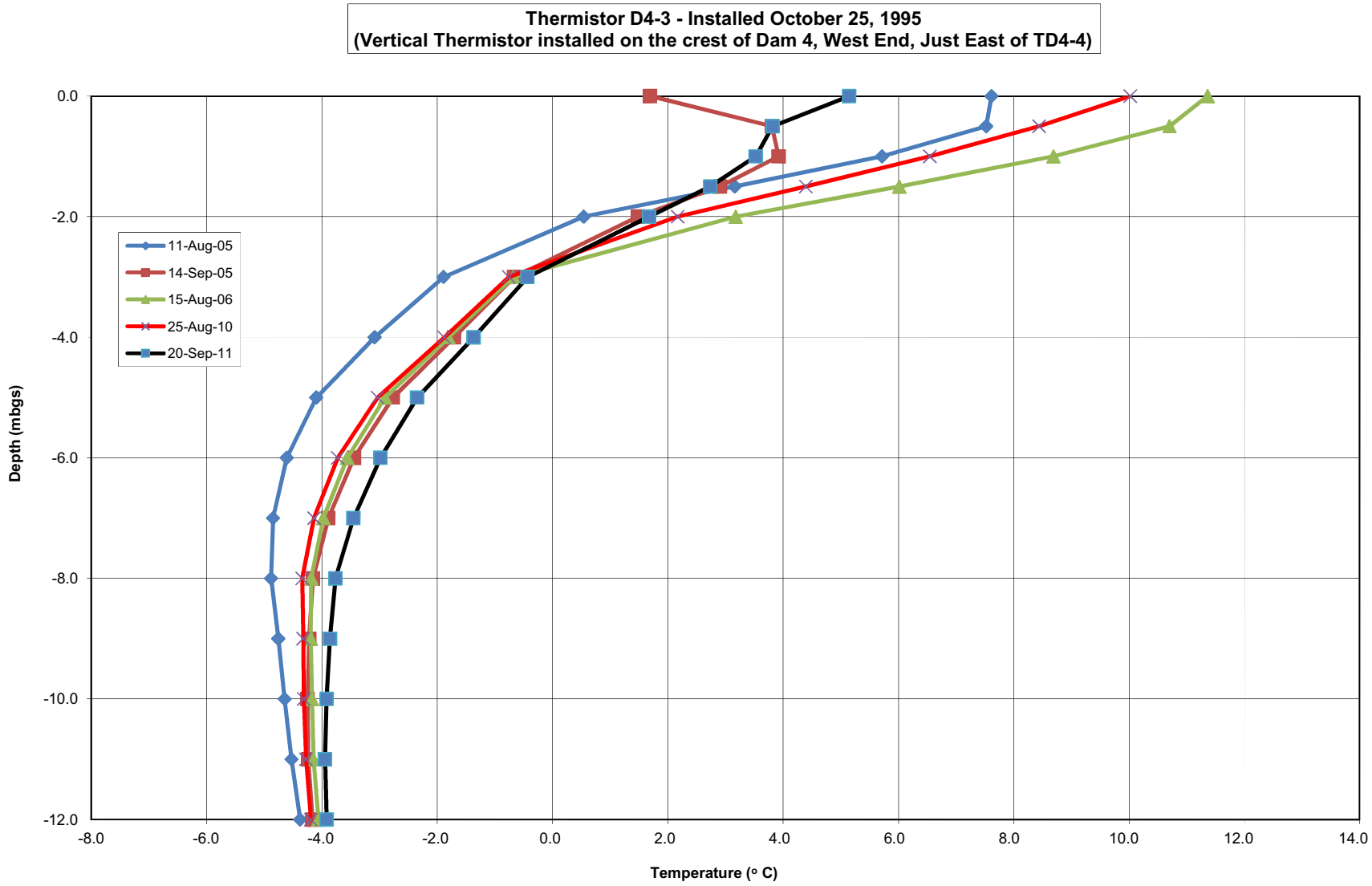
APPENDIX “B”

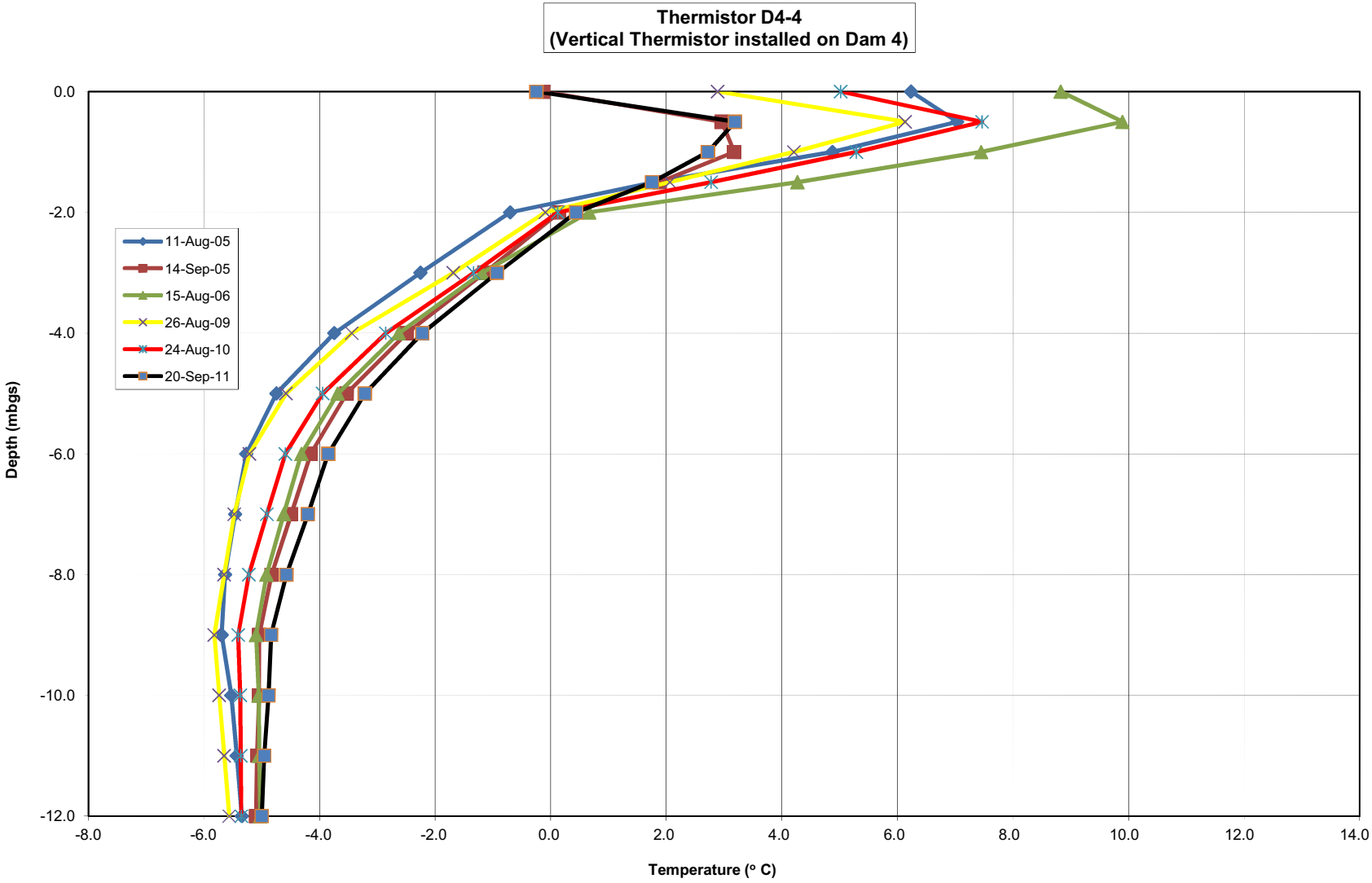
THERMISTOR DATA


Thermistor D1A-00-01 - Installed November 9, 2000
(Vertical Thermistor installed on the crest of Dam 1A, south of Syphons)
Depth (mbgs)
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-14.0
-16.0
-18.0
-20.0
-22.0
-7.0
-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
7.0
Temperature (° C)
11-Aug-05
14-Sep-05
15-Aug-06
15-Oct-06
26-Aug-09
24-Aug-10
20-Sep-11


Thermistor D2-00-2 n- Installed November 8, 2000
(Vertical Termistor Installed on the crest of Dam 2, at the north end)
11-Aug-05
14-Sep-05
15-Aug-06
15-Oct-06
24-Aug-10
20-Sep-11
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
-8.00
-6.00
-4.00
-2.00
0.00
2.00
4.00
6.00
8.00
10.00
Temperature (C)

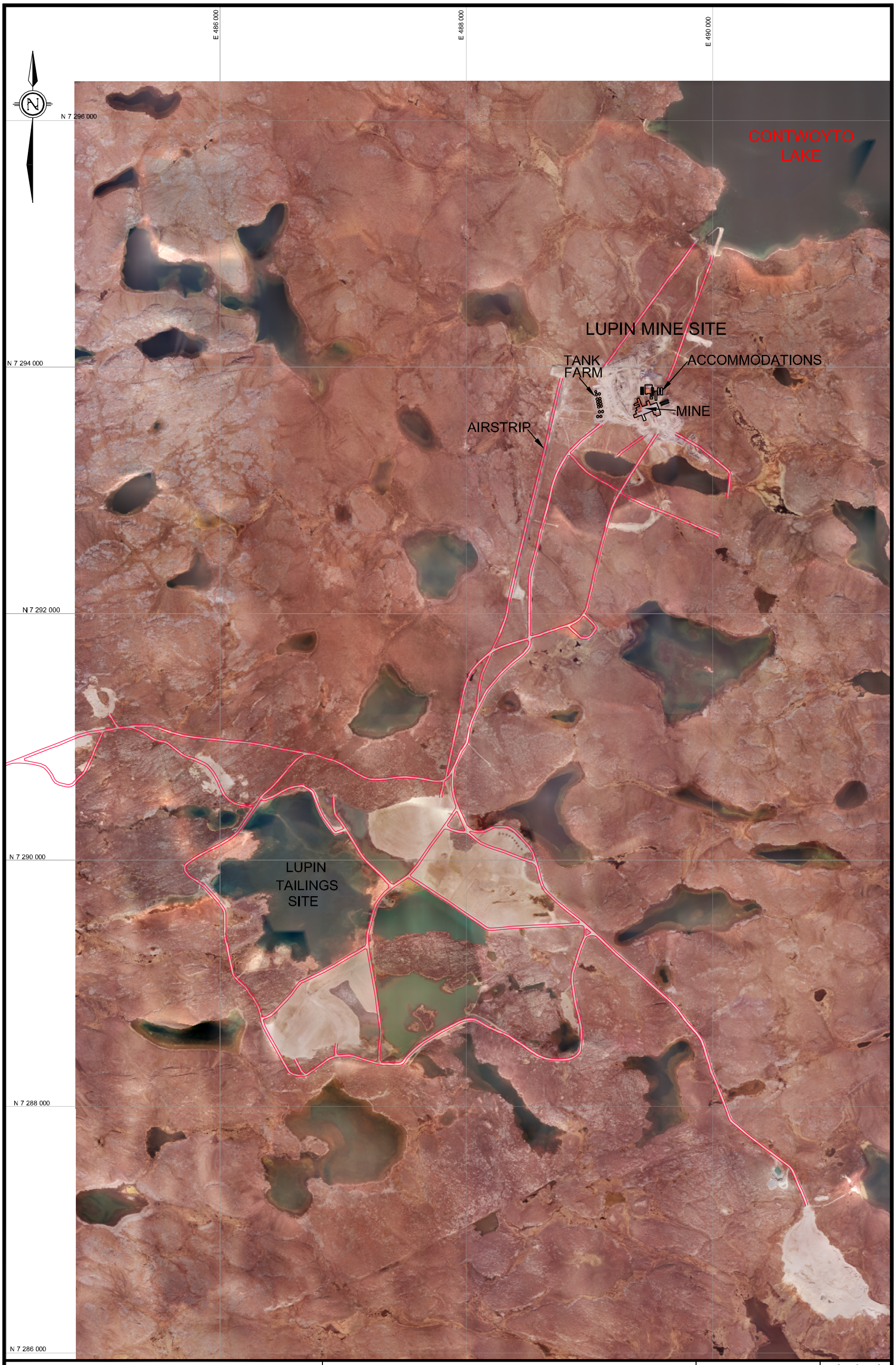

Thermistor D4-1 - Installed October 24, 1995
(Vertical Thermistor installed on the crest of Dam 4, Far East End)
Depth (mbgs)
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-8.0
-6.0
-4.0
-2.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Temperature (° C)
11-Aug-05
14-Sep-05
15-Aug-06
26-Aug-09
25-Aug-10
20-Sep-11


Thermistor D4-3 - Installed October 25, 1995
(Vertical Thermistor installed on the crest of Dam 4, West End, Just East of TD4-4)
Depth (mbgs)
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-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)
11-Aug-05
14-Sep-05
15-Aug-06
25-Aug-10
20-Sep-11


Thermistor D4-4
(Vertical Thermistor installed on Dam 4)
Depth (mbgs)
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-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)
11-Aug-05
14-Sep-05
15-Aug-06
26-Aug-09
24-Aug-10
20-Sep-11

ENCLOSURES

CLIENT: **Elgin Mining Inc.** 83 Yonge Street, Suite 200 Toronto, ON M5C 1S8	DWG. TITLE: LUPIN FACILITY - OVERVIEW MAP	SCALE: 1:7,500	PROJECT NO. 11-293
TBT ENGINEERING CONSULTING GROUP	PROJECT: LUPIN MINE ANNUAL INSPECTION LUPIN FACILITY, NUNAVUT		DATE: NOV.2011 ENCLOSURE 1



CLIENT:

Elgin Mining Inc.
83 Yonge Street, Suite 200
Toronto, ON
M5C 1S8

TBT ENGINEERING CONSULTING GROUP

DWG. TITLE: LUPIN FACILITY AREA PLAN

SCALE: 1 : 30,000

PROJECT NO. 11-293

PROJECT:

LUPIN ANNUAL INSPECTION

LUPIN FACILITY, NUNAVUT

DATE: **NOV.2011**

ENCLOSURE 2