2012 Annual Geotechnical Inspection
Doris North Project
Hope Bay, Nunavut

Prepared for

Hope Bay Mining Ltd.

Prepared by

SRK Consulting (Canada) Inc.
1CH008.066
March 2013

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Executive Summary

The Doris North Project (Project) is a mining and milling undertaking of Hope Bay Mining Limited (HBML), a wholly owned subsidiary of Newmont Mining Company (NMC). The site is located in the Kitikmeot Region of Nunavut, about 170 km southwest of Cambridge Bay. The Project is licenced to conduct mining, milling and associated activities. Construction of the Project started in 2007, and was expected to continue through to 2013. Mine development started in the summer of 2010; however, ore processing was not scheduled until 2013 at the earliest. In addition to supporting ongoing construction activities, the site was used to carry out regional exploration. In February 2012, HBML announced the Project had been placed into Care and Maintenance.

Site operations were conducted under a Type “A” Nunavut Water Board (NWB) Licence 2AM-DOH0713 (the Licence), dated September 19, 2007, which entitles HBML (the Licencee) to use water and dispose of waste associated with their operations. HBML contracted SRK Consulting (Canada) Inc. to conduct the annual geotechnical site inspection of the Doris North Project in accordance with stipulated Licence conditions. This annual investigation was carried out from September 7 to 10, 2012.

Table A below provides a summary of the inspection components and the primary recommendations stemming from the inspection. There were no issues that require urgent and immediate action. The recommendations made reflect the fact that the site is currently under Care and Maintenance, as opposed to being under active construction. This includes recognition that the site will only be occupied seasonally during the summer months.

Table A: Summary of the Inspection Items and Associated Inspection Recommendations

Inspection Item	2011 Recommendations	2012 Recommendations
Thermistors	• Re-evaluate thermistor requirements taking into considering the surface infrastructure elements currently on site • Continue to collect quarterly thermistor data at a minimum (August, November, February and May) • Consider installing data loggers for select remote thermistors to ease the burden of frequent manual data downloads	• Re-evaluate thermistor requirements taking into considering the surface infrastructure elements currently on site • Continue formal monitoring once a year in July or August • North Dam thermistors must be monitored in accordance with recommendations provided in the As-built Report (SRK 2012b)
Old Beach Laydown Area	• Relocate the last two explosives magazines from the tundra vegetation onto the beach • Remove any remaining debris	• Relocate the last two explosives magazines and the 11 sea cans from the tundra vegetation onto the beach • Remove any remaining debris
Roberts Bay Jetty	• Continue to collect quarterly thermistor data at a minimum (August, November, February and May) • Conduct annual survey of the jetty to allow for actual measurement of ongoing settlement • Remind operational staff annually about the operational limitations of the jetty	• Continue formal monitoring once a year in July or August • Remind operational staff annually about the operational limitations of the jetty

Inspection Item	2011 Recommendations	2012 Recommendations
Shoreline Laydown Area	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion
5 ML Roberts Bay Tank Farm	• Monitor overburden ponding immediately above the high wall and construct a new drainage channel in 2012 • Install permanent sumps within the secondary containment area to facilitate complete surface water drainage • Install settlement beacons along the fuel transfer station and sections of the secondary containment facility not constructed on bedrock. Monitor the beacons quarterly	• Backfill test pits excavated to confirm liner elevation • Should the facility be re-commissioned, consider installation of settlement beacons along the fuel transfer station and on sections of the secondary containment facility not constructed on bedrock
20 ML Roberts Bay Tank Farm	• No action required	• Areas within the bunded area along the berm’s incline that have experienced disturbance should be evaluated for integrity of the liner system and repairs made, if required, by a qualified person • Reconstruct pedestals prior to re-commissioning tank farm
Roberts Bay Laydown Area	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion • Monitor flow from drainage channels beneath pad. If flow stops, the blockage must be traced to prevent onset of thermal erosion • Monitor areas where rock was relocated from the tundra for signs of thermal erosion	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion • Monitor flow from drainage channels beneath pad. If flow stops, the blockage must be traced to prevent onset of thermal erosion • Monitor areas where rock was relocated from the tundra for signs of thermal erosion
Quarry #1 Overburden Dump	• Monitor surface runoff and consider requirement for alternate sedimentation control measures • If the surface is used as a laydown area implement appropriate management protocols to account for sinkhole and differential settlement risk	• Monitor surface runoff and consider requirement for alternate sedimentation control measures • If the surface is used as a laydown area implement appropriate management protocols to account for sinkhole and differential settlement risk
Airstrip	• Monitor areas where rock was relocated from the tundra for signs of thermal erosion • Maintain practice of inspecting the runway toe line during freshet and after significant or prolonged rainfall events. Pump ponded water to prevent onset of thermal erosion • Conduct daily inspections of the airstrip shoulder to monitor the tension cracks	• Monitor areas where rock was relocated from the tundra for signs of thermal erosion • Maintain practice of inspecting the runway toe line during freshet and after significant or prolonged rainfall events. Pump ponded water to prevent onset of thermal erosion • Conduct daily inspections of the airstrip shoulder to monitor the tension cracks

Inspection Item	2011 Recommendations	2012 Recommendations
All Weather Roads (Doris Site)	• Inspect road toe lines during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion • Monitor areas where rock was relocated from the tundra for signs of thermal erosion • Implement a monitoring protocol and erect warning signs at the site of the slope failure until the buttress have been installed	• Inspect road toe lines during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion • Monitor areas where rock was relocated from the tundra for signs of thermal erosion • Implement a monitoring protocol and erect warning signs at the site of the slope failure until the buttress have been installed
Doris Creek Bridge	• Monitor thermistor strings in accordance with the recommendations set out in Section 3.2	• Monitor thermistor strings in accordance with the recommendations set out in Section 3.2 • Monitor and ultimately replace the rock gabions
Wash Bay/Explosives Mixing Plant	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion
Upper and Lower Reagent Pads	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Ponded water should be pumped to prevent onset of thermal erosion	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Ponded water should be pumped to prevent onset of thermal erosion
Quarry #2 and Crusher Area	• Continue to follow the Quarry Management Plan	• No action required
Batch Plant Pad (previously Crusher Pad)	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion	• No action required
Upper Reagent Pad AN Storage	• Not constructed in 2011	• Confirm design criteria before re-commissioning
Landfarm	• HBML to continue to follow the designated Landfarm Management Plan • Conduct regular visual inspections to monitor for signs of settlement	• HBML to continue to follow the designated Landfarm Management Plan • Conduct regular visual inspections to monitor for signs of settlement
Sewage Treatment Plant Outfall	• Develop and implement a long-term solution for discharge of grey water to prevent vegetation dieback and subsequent thermal and physical erosion. An improved system is currently under construction	• Continue to monitor old sewage outfall location for signs of permafrost degradation
Quarry # 2 Overburden Dump	• No action required	• No action required

Inspection Item	2011 Recommendations	2012 Recommendations
Doris North Camp	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion • Construct a catch berm at the toe of the high wall and install appropriate signage and barricades to warn people and equipment of the danger • High wall stabilization measures designed for the tank farm and mill pad should be installed as planned. • Develop and implement a differential settlement monitoring protocol for heated buildings constructed directly onto the thermal rock fill pads	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion • Construct a catch berm at the toe of the high wall and install appropriate signage and barricades to warn people and equipment of the danger • High wall stabilization measures designed for the mill pad should be installed as planned • Develop and implement a differential settlement monitoring protocol for heated buildings constructed directly onto the thermal rock fill pads
7.5 ML Doris North Camp Tank Farm	• No action required	• Remove crushed rock pedestal supports for the piping and replace with fabricated supports that do not reduce containment capacity (if the facility is to be re-commissioned) • High wall stabilization measures designed for the mill pad should be installed as planned
Power Generation Station (Pad B)	• Not constructed in 2011	• Install a monitoring system for tracking, and advance notice of any deformations of Pad B
Other Site Wide Fuel Storage	• Revisit the secondary containment requirements for fuel tanks on site	• No action required
Sedimentation and Pollution Control Ponds	• Implement remedial measures as designed	• Pump out ponded water to prevent onset of thermal erosion • Carefully track thermistors and sump water quality and flow data
Sumps #1 and #2	• Not constructed in 2011	• Pump out standing water to prevent thermal erosion • Inspect sump perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion
Doris North Portal	• No action required	• No action required
Waste Rock Pile	• HBML to continue to follow the designated Waste Rock Management Plan	• HBML to continue to follow the designated Waste Rock Management Plan
Temporary Pond	• Conduct daily visual inspections to check for obvious signs of distress	• Conduct daily visual inspections to check for obvious signs of distress (at times when it contains water)
Doris Fresh Water Intake	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion

Inspection Item	2011 Recommendations	2012 Recommendations
Doris Primary Vent Raise Pad	• Not constructed in 2011	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion
Frozen Core Plant Pad	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion
North Dam	• Complete construction of dam and installation of required instrumentation in accordance with the stipulated design • Implement monitoring program for dam instrumentation in accordance with recommendations by the Engineer-of-Record • Conduct thorough review of the dam performance monitoring data during the 2012 geotechnical inspection	• Continue with monitoring program for dam instrumentation in accordance with recommendations by the Engineer-of-Record • Conduct thorough review of the dam performance monitoring data during the 2013 geotechnical inspection
Shoreline Erosion	• Not a concern in 2011	• Implement measures to maintain the water level in Tail Lake at 28.3 masl to prevent onset of permafrost degradation
Doris-Windy All Weather Road	• Inspect road toe lines during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion • Monitor areas where rock was relocated from the tundra for signs of thermal erosion • Implement inspection protocol to monitor shoulder cracks and potholes	• Inspect road toe lines during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion • Monitor areas where rock was relocated from the tundra for signs of thermal erosion • Implement inspection protocol to monitor shoulder cracks and potholes
Doris-Windy All Weather Road Stream Crossings	• Install the required thermistor strings and commence monitoring in accordance with recommendations in Section 3.2	• Monitor thermistor strings in accordance with recommendations in Section 3.2
Quarry A	• Continue to follow the Quarry Management Plan	• Continue to follow the Quarry Management Plan
Quarry B	• Continue to follow the Quarry Management Plan	• Continue to follow the Quarry Management Plan
Quarry D	• Continue to follow the Quarry Management Plan	• Continue to follow the Quarry Management Plan

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1 Introduction

1.1 Inspection Requirements

The Doris North Project (Project) is a mining and milling undertaking of Hope Bay Mining Limited (HBML), a wholly owned subsidiary of Newmont Mining Company (NMC). The site is located in the Kitikmeot Region of Nunavut, about 170 km southwest of Cambridge Bay (with general coordinates of latitude 68°09'N and longitude 106°40'W, as shown in Figure 1).

The Project is licenced to conduct mining, milling and associated activities. HBML temporarily delayed mine development pending re-evaluation of project economics and therefore much of the licenced infrastructure components have not been constructed, as illustrated in Figures 2 and 3. Construction of the Project started in 2007, and was expected to continue through to 2013. Mine development started in the summer of 2010; however, ore processing was not scheduled until 2013 at the earliest. In addition to supporting construction activities (Figure 4), the site was used to carry out regional exploration. In February 2012, HBML announced the Project was placed under Care and Maintenance.

Site operations were conducted under the Type "A" Nunavut Water Board (NWB) Licence 2AM-DOH0713 (the Licence), dated September 19, 2007, which entitles HBML (the Licencee) to use water and dispose of waste associated with their operations. Part J, Items 18 and 19 of the Licence states the following:

> *"18. The Licencee shall ensure that a geotechnical inspection is carried out annually between July and September by a Geotechnical Engineer. The inspection shall be conducted in accordance with the Canadian Dam Safety Guidelines where applicable and take into account all major earthworks, including the following:*
>
> *(a) North and South Dams;*
>
> *(b) Geotechnical instrumentation and associated monitoring data;*
>
> *(c) Tailings Impoundment Area shoreline and erosion strip monitoring results;*
>
> *(d) Emergency Dump Catch Basins;*
>
> *(e) All weather access roads;*
>
> *(f) Roberts Bay Jetty;*
>
> *(g) Landfill;*
>
> *(h) Landfarm;*
>
> *(i) Fuel Storage and Containment Facilities at the Plant site and Roberts Bay site;*
>
> *(j) Sedimentation Pond;*

(k) Pollution control Pond;

(l) Sumps;

(m) Underground mine openings;

(n) Groundwater conditions underground; and

(o) Rock temperature measurements and groundwater inflow in the underground mine workings.

19. The Licencee shall submit to the Board within sixty (60) days of completion of the geotechnical inspection, the Geotechnical Engineer's inspection report. The report shall include a cover letter from the Licencee outlining an implementation plan addressing each of the Geotechnical Engineer's recommendations."

In fulfillment of these regulatory requirements, Mr. Chris Hanks, Director for Environment and Social Responsibility (ESR) for HBML, requested that SRK conduct the 2012 geotechnical site inspection. This report provides a summary of the conditions observed and the resulting mitigation recommendations. This is the fourth formal annual geotechnical inspection carried out for this site in fulfillment of the stipulated Water Licence Condition. Inspections completed in 2009, 2010, and 2011 were also completed by SRK (SRK 2009e, SRK 2011a, and SRK 2012a).

A 10 km all-weather road linking the Doris Camp and the Windy Camp has been completed except for placing the surfacing material over the Run of Quarry base, on the last 1.1 km. This road does not fall under the Doris North Water Licence; however, the water management plans for the three rock quarries along the road is administered through the NWB. HBML therefore requested that the geotechnical inspection include the all-weather road.

It should be noted that up until February 2012, most of the site was still under construction, and as a result, many of the elements listed for inspection under the Water Licence had not yet been constructed and are therefore not reported on. This is illustrated in Figures 2 and 3. In February 2012, HBML announced the Doris North Project would be placed under Care and Maintenance and, as such, all site activity was stopped and HBML embarked on a major demobilization campaign of all salvageable equipment and supplies.

1.2 Report Structure

Section 2 of this report provides a brief summary of the site history and physical conditions to provide context for the report content. Inspection conditions are described in Section 3 and an overall summary of recommendations is provided in Section 4. All elements of the site discussed in this report are presented in the enclosed figures, which includes detailed site photographs. Details pertaining to the site thermistors and the North Dam monitoring are presented in the Appendices. The annual Jetty inspection report, submitted under separate cover to the Nunavut Impact Review Board (NIRB), is not repeated here.

1.3 Disclaimer

This report, and the opinions and conclusions contained herein ("Report"), contains the expression of the professional opinion of SRK Consulting (Canada) Inc. ("SRK") as to the matters set out herein, subject to the terms and conditions of the agreement dated September 2008, HBML Professional Services Agreement (HBML.BOC.CM.PSA.003) (the "Agreement") between SRK and Hope Bay Mining Ltd. ("Hope Bay Mining"), the methodology, procedures and sampling techniques used, SRK's assumptions, and the circumstances and constraints under which Services under the Agreement were performed by SRK. This Report is written solely for the purpose stated in the Agreement, and for the sole and exclusive benefit of Hope Bay Mining Limited, whose remedies are limited to those set out in the Agreement. This Report is meant to be read as a whole, and sections or parts thereof should thus not be read or relied upon out of context. In addition, this Report is based in part on information not within the control of SRK. Accordingly, use of such Report shall be at the user's sole risk. Such use by users other than Hope Bay Mining Limited and its corporate affiliates shall constitute a release and agreement to defend and indemnify SRK from and against any liability (including but not limited to liability for special, indirect or consequential damages) in connection with such use. Such release from and indemnification against liability shall apply in contract, tort (including negligence of SRK whether active, passive, joint or concurrent), strict liability, or other theory of legal liability; provided, however, such release, limitation and indemnity provisions shall be effective to, and only to, the maximum extent, scope or amount allowable by law.

2 Site Conditions

2.1 Site History

A brief summary of the site history is listed in Table 1.

Table 1: Summary of Pertinent Site Ownership History

Period	Comment
1964	Sporadic exploration in the Hope Bay area begins, resulting in several gold and silver showings including Ida Point, Ida Bay and Roberts Lake.
1970	Roberts Bay Mining explores the area for about a decade up to 1980.
1977	Noranda begins exploring for volcanogenic massive sulphide deposits. They leave the belt in 1990. Prior to 1980, Roberts Bay Mining also explored the area.
1987	Abermin Corporation stake claims in the vicinity of Aimaokatalok and Doris Lakes. After completing some exploration, they allow their claims to expire.
1988	BHP Minerals Canada Inc. (BHP) explores the southern portion of Hope Bay Volcanic Belt.
1991	BHP acquires a contiguous block of claims covering about 1,106 km^2.
1992	BHP commences exploration drilling at the Boston property.
1996 and 1997	BHP complete 2,300 m of underground development, underground exploration (drilling and sampling) and bulk sampling of the Boston deposit.
1999	BHP sells all its interests in the Hope Bay Belt to Hope Bay Joint Venture (HBJV), a 50:50 joint venture between Hope Bay Gold Corporation Inc. (formerly Cambiex Exploration Inc.), and Miramar Hope Bay Limited (MHBL), a wholly owned subsidiary of Miramar Mining Corporation (MMC).
2002	Hope Bay Gold Corporation Inc. formerly merges with MMC, and the Hope Bay site is operated under MHBL.
2003	MHBL completes a feasibility study to develop the Doris North Project as a small high grade underground mine.
2005	MHBL completes an Environmental Assessment (EA) for the Doris North Project.
2006	MHBL receives an approved and signed Project Certificate for the Doris North Project.
2007	The Doris North Project Water Licence is issued, and construction of the Doris North Project commences.
2008	Hope Bay Mining Limited (HBML), a wholly owned subsidiary of Newmont Mining Corporation (NMC) buys out all interests in the Hope Bay Belt from MMC. HBML announces a delay in the construction of the Doris North Project. Construction of select surface infrastructure continues, but mine development is not started.
2009 to 2011	Construction of select surface infrastructure elements of the Doris North Project continues. Mine development is started in the summer of 2010.
2012	In February 2012 the Doris North Project is placed under Care and Maintenance. Salvageable equipment and supplies were demobilized in the summer of 2012. By mid-October the camp was temporarily shut down, and will be seasonally operated during summer seasons

2.2 Site Infrastructure

The Doris North Project site is located on a narrow north-south trending stretch of land spanning approximately 8 km long and 3 km wide from Roberts Bay in the north to the southern end of Tail Lake in the south, as illustrated on Figures 2, 3 and 4. Outside of this area, immediately to the northwest along the Roberts Bay shoreline, there is a beach which has historically been used as a barge landing site and laydown area. This beach is not permanently connected to the Project. Its only link to the greater site is a seasonal ice-road constructed over the Roberts Bay sea ice.

At the north end of the Project there is a Jetty and shoreline laydown area. An all-weather road connects these facilities to the Roberts Bay laydown area and the two tanks farms (the 5 Million Liter (ML) tank constructed in the disused Quarry #1 and the 20 ML fuel tanks which have been constructed in another bedrock outcrop zone). The all-weather road continues south from this laydown area towards the camp, about 4 km further along. Part of this road has been widened for use as an all-weather airstrip (with another expanded airstrip under construction). Between the camp and the airstrip, there is a spur road heading east towards a pad housing the wash bay and explosives mixing plant. Further along the road heading towards the camp, there is a large laydown area (*aka* the Upper and Lower Reagent pads) which was used as the operational base for the exploration drilling contractor, as well as general equipment and supply storage.

Beyond the Upper and Lower Reagent pads, there is a spur road servicing a rock quarry used for a source of construction material (Quarry #2). This spur road also serves as an access to the construction crusher complex and stockpile area, as well as the Quarry #2 overburden pile.

The camp area, also known as Quarry #4, consists of multiple tiered foundation pads, cut partially into bedrock. The westernmost pad contains the two camps, sewage treatment plant, fire water tank and other miscellaneous camp services. The lower tier houses the temporary site power plant and warehousing and exploration support facilities.

The 7.5 ML camp tank farm is located immediately north of the camp, on bedrock outcrop and the pad immediately south of it houses the permanent power station. Immediately to the east, the mill pad has been blasted into a bedrock zone and this pad is currently hosting the lined Temporary Pond. Moving further east the ore stockpile pad is located between the mill pad and the portal. Immediately downslope of these facilities are additional mine area laydown pads as well as the waste rock pile.

The all-weather road running along the south of the site (*aka* Float Plane Access Road) acts as the downstream walls of the Sedimentation and Pollution Control Ponds, facilitating proper site water management. This road links the camp area to Doris Lake, where the fresh water intake is located for the camp potable water supply.

The all-weather Secondary Road (*aka* Tail Lake Access Road) junctions off the Float Plane Access Road along the western shore of Doris Lake before crossing Doris Creek and on to the Frozen Core Plant pad and the North Dam. The primary vent raise pad is located along this road.

A helicopter support base is located due south of the camp, at the junction from where the 10 km long Doris-Windy all-weather road starts. This road meanders due south along high ground, passing by three construction quarries as illustrated in Figure 3 and provides an all-weather link between Doris Camp and the old Windy Camp.

2.3 Climate

The project area has a low arctic eco-climate with a mean annual temperature of -12°C with winter (October to May) and summer (June to September) mean daily temperature ranges of -50°C to +11°C and -14°C to +30°C, respectively. The mean annual precipitation is about 207 mm, with just over one third of that falling as snow. Significant and persistent site winds results in substantial snow redistribution throughout the season, which often leads to protected slopes having almost year round snow cover. The annual lake evaporation (typically occurring between June and September) is estimated at about 220 mm.

2.4 Regional Geology

During the Quaternary period, the region was subjected to multiple glaciations. The northwestern sector of the vast Laurentide Ice Sheet covered the area during each glaciation, and the present day landscape provides clear evidence of the most recent (Late Wisconsin) glaciation. Striations, orientation of eskers, grooves and drumlins indicate that the predominant glacial ice movement was north-northwest (EBA 1996).

The ice disappeared about 8,800 years ago leaving a blanket of basal till. The sea level was about 200 m higher than present immediately following de-glaciation. At that time, the project area was submerged and the edge of the ice sheet abutted the open sea. Melt water streams from the ice carried fine grained sediments towards the sea, resulting in the accumulation of marine sediments on top of the till, with the greatest accumulation in deeper water zones, which now form the valley bottoms (EBA 1996).

Isostatic rebound after de-glaciation resulted in emergent landforms, and during this process all parts of the land were washed by waves. The easily erodible marine sediments, till and glacio-fluvial sands and gravels were subsequently reworked by waves, currents and sea ice. This has resulted in the present day outcrops where thin soil veneers were washed off the uplands and deposited in the valley bottoms. Since emergence, the natural effects of slope processes, frost action and permafrost have transformed the landscape to its present day shape (EBA 1996).

2.5 Permafrost and Geotechnical Conditions

There have been numerous subsurface geotechnical investigations in the area and SRK (2009a) and SRK (2011b) provides a comprehensive summary of this information. The area is characterized by extensive areas of bedrock outcrop zones transitioning to deep overburden soils at the contact zones. Geotechnical laboratory testing (moisture contents, Atterberg Limits, grain size distribution, pore water salinity, strength, permeability, mineralogy, thermal conductivity, bulk density, Proctor density and consolidation) on disturbed and intact samples collected during the various field campaigns confirms that overburden soils are comprised mainly of ice-rich, saline marine silt and clay ranging in thickness from 5 to 35 m. Isolated historic beach deposits containing small amounts of sand are present. Bedrock generally consists of competent basalt, and the interface zone between overburden and bedrock are typically associated with a relatively small rubble zone.

The area is completely within the cold continuous permafrost region of Canada, and site specific thermistor data, dating back to 2003 confirm the average surface ground temperature is about -9°C. The active layer is somewhat variable, but is typically about 1 m thick, and the depth of zero annual amplitude is about 10 m. Based on data from a deep thermistor installed in 2003, total permafrost depth is estimated to be about 570 m.

3 Inspection Conditions

3.1 General

Messers Lowell Wade, MSc, PEng, PGeo, a Senior Consultant, and Maritz Rykaart, PhD, PEng, a Principal Consultant with SRK, conducted the geotechnical inspection from September 7 to 10, 2012. The detailed site inspection was carried out using a pickup truck with frequent stops for actual physical inspections, followed by a reconnaissance fly-over of the site via helicopter. Ms. Catherine Paul and Ms. Jill Turk, the HBML Environmental site representatives were available for questioning but did not accompany SRK during the inspection.

Weather conditions during the inspection were cool but sunny with cloudy periods and light winds, but no precipitation. A photo log of the inspection is presented in the figures accompanying this report.

3.2 Thermistors

Figures 3 and 5 presents location maps of all 74 Project area thermistors installed between 2002 and 2012. Forty-five of these strings are still active (Appendix A, E and F), 25 are inactive (Appendix B), ones that have not been recorded since 2010 are listed as status unknown (Appendix C and D). Appendix G provides a complete summary listing reconciling these strings to the Water Licence conditions and to the requirements under Care and Maintenance. In addition to the listed thermistor strings, there are also a number of historic thermistor installations dating back to the 1990s (SRK 2009a); however, data from these cables are not reported in this document.

In the Project area, the bulk of the thermistors are less than 20 m deep, with the exception of five thermistors at an approximate depth of 50 m (SRK-38, SRK-39, SRK-40, SRK-42 and SRK-43), and three deeper thermistors (SRK-50 at 200 m, 08TDD632 at 350 m and TDD-242 at 70 m).

Based on approximately five years of data from the thermistor in SRK-50, the geothermal gradient below a depth of 90 m is about 10.9°C/km, which in turn implies a depth of permafrost of about 570 m in the area of the drill-hole. Using one year of data from the thermistor in drill hole 08TDD632, the geothermal gradient below a depth of approximately 90 m is about 17.9°C/km, which in turn implies a depth of permafrost of about 435 m in the area of that drill-hole. Another deep string (about 70 m long) was installed in drill hole TDD-242 in 2000. Golder (2001) presents data from this string, but reports that this data is likely unreliable due to an unidentified malfunction, and has thus not been used in any assessments of the deep thermal gradient.

The numerous shallow thermistors (5 to 20 m deep), some with data spanning more than nine years, consistently show an active layer of about 1 m thick and a depth of zero annual amplitude of about 10 m. The surface permafrost temperature is consistently about -9°C.

Two thermistors were installed through the jetty into submarine permafrost in 2009 (SRK 2009b). One of the thermistor strings was damaged and had to be replaced in 2012. Data from these strings supports an observation that the submarine permafrost has similar trends to onshore conditions.

Since the North Dam construction has only recently been completed, the structure is still in the process of reaching thermal equilibrium and therefore, a detailed evaluation of its thermal performance is not warranted. A review of the data does however suggest that the temperatures are trending towards the design temperatures.

Except for the data loggers installed at the North Dam, there are no data loggers connected to any of the project thermistors. HBML ESR and survey staff collects manual readings at roughly monthly intervals. This data is forwarded to SRK, who maintains a database with the relevant information.

Recommendations

1. Re-evaluate thermistor requirements taking into consideration the surface infrastructure elements currently on site. Where appropriate inactive thermistors should be inspected, and where practical they should be repaired and re-commissioned for the collection of baseline data.
2. The thermistor monitoring frequency should be formalized under Care and Maintenance. At a minimum a single set of annual readings should be taken, with the readings scheduled around the maximum thermal activity expected in the area, i.e., in July or August (maximum thaw depth).
3. North dam thermistor data must be collected in accordance with the monitoring recommendations provided in the As-built Report (SRK 2012b).

3.3 Old Beach Laydown Area

Prior to construction of the Doris North Project jetty, barges resupplying the site were beached at a location along the western shore of Roberts Bay (see Figures 2 and 4). This area has sufficiently deep water to allow barges to be pushed up onto the shore for safe offloading. Once offloaded, supplies and equipment were stored on the beach until such time that there was sufficient sea-ice and snow to construct an ice road to allow transport of the supplies and equipment to their final destination on the belt.

HBML used this facility during early construction stages of the Project. This facility is useful for the offloading of heavier loads which exceed the design capacity of the Roberts Bay jetty for any future plans for the Project

During the 2007 to 2012 construction seasons, this site was primarily used for storage of construction explosives, in five (two added in 2009) self-contained Type-4 magazines. At the time of the inspection, these magazines were still located at this site, although they were scheduled for demobilization (see Figure 4). During winter time, explosives were transported to their intended areas of use via an explosives truck on an ice road, and during the summer period, explosives were transported via helicopter.

The beach landing site is a large un-vegetated sandy area, and there have been no surface improvements to the site since it was first used in the 1990s.

At the time of the inspection two explosives magazines were located on the perimeter of the beach area, partially on tundra vegetation, while the remaining three were on the un-vegetated beach area. Given the short growth season in the area, SRK recommends that these two magazines be relocated to avoid permanent vegetation damage, which may lead to permafrost degradation (if these magazines are not demobilized as scheduled). There are also 21 sea cans at this location which were not present during the 2011 inspection. Eleven of the sea cans are located along the edge of the tundra by the explosives magazines and should be relocated to be fully contained on the beach if they are not demobilized as was the plan during the site inspection

There is a small pile of debris on the site consisting of pallets and empty super-sacks which was present during the 2011 inspection. The beach is covered in wheel tracks; however, given the sandy nature of the beach, and the fact that there have been no signs of physical and/or thermal erosion, there are no concerns associated with these ruts.

Recommendations

1. Relocate two explosives magazines and the eleven sea cans to an area where it is on the sandy beach as opposed to partially on the tundra vegetation (unless they are being demobilized completely in 2012).
2. Remove any remaining debris.

3.4 Roberts Bay Jetty

The jetty (Figure 6) was constructed in the summer of 2007, and was put in use for the first time in August 2007. It is used as a berthing facility from which to offload barges during the annual resupply sealift. This jetty is designed to replace the use of the old beach laydown area for normal resupply operations of the Project.

Foundation conditions beneath the jetty are very weak, and as a result the jetty is subject to extensive consolidation settlement (SRK 2004, 2005a, b, and 2006). This settlement was expected, and to facilitate more controlled settlement, the rock fill structure was underlain by a double layer of geogrid placed directly onto the seabed. The jetty was originally designed to extend a total length of 103 m from the shoreline, such that the barges could berth in 5 m deep water; however, during construction, and due to very weak foundation conditions in the deep water, the front section of the jetty slumped. The design was subsequently modified to allow berthing in shallower water (about 2 m deep), which resulted in a slightly shorter overall jetty length (SRK 2009c and d).

Extensive settlement monitoring of the berthing face of the jetty was undertaken in 2007, and by the summer of 2008, the jetty was observed to have settled about 0.5 m, in accordance with original design expectations (SRK 2005a). Subsequently the jetty was raised in the summer of 2008 to ready the facility for the 2008 sealift. No further settlement monitoring was undertaken after this, and no further raising of the jetty was required prior to the 2009 sealift. Further levelling and raising of the jetty was done prior to the 2010 sealift; however, no surveys were available to confirm how much settlement had occurred. In 2012 the Jetty had been raised again, and an earthen ramp constructed to facilitate demobilization activities that were underway during the time of inspection. No surveys or quantities of fill used were available. Observational information suggests that over the last couple of years settlement had slowed down considerably, and possibly reached steady state.

A significant portion of the jetty has been constructed on submarine permafrost, and HBML installed two thermistors to confirm the presence of this condition. These thermistors were installed by HBML in March 2009 under supervision of SRK (SRK 2009b). During snow clearing operations, in late 2011, the thermistor SRKJT2-09 was severed. A replacement thermistor string was installed early in 2012 (SRK 2013).

The 2012 geotechnical inspection of this structure revealed no cause for concern (Figure 6). There were no obvious signs of distress anywhere on the structure, and based on these observations, supported by verbal descriptions from site staff, settlement appears to have reached steady state. The SRK inspectors have inspected the jetty annually since construction, and no visual differences could be observed since the 2011 inspection, other than the fact that the facility was raised, and an earthen ramp constructed. SRK imposed strict design and operational limitations on the use of the jetty due to the weak foundation conditions (SRK 2005a, 2009c, d), and based on observations, supported by staff interviews, HBML are following these recommendations carefully.

A more comprehensive stand-alone summary of the jetty inspection was submitted under separate cover to the NIRB (SRK 2013).

Recommendations

1. Remind operational staff annually about the operational limitations of the jetty.
2. Continue monitoring the jetty thermistors in accordance with the protocols stipulated in Section 3.2.

3.5 Shoreline Laydown Area

A small laydown area has been constructed adjacent to the jetty as illustrated in Figure 6. This area was initially used for the construction office facilities, but is currently used to stage equipment, supplies and garbage which will be backhauled via the annual sealift return barges. The area consists of one large triangle shaped pad, connected via a short all-weather road to the construction phase helipad (now used as laydown area), and a short spur road further west (intended to join up with a mooring bollard, but that was not constructed). All these elements are thermal rock fill pads between 1 and 2 m thick placed directly on the tundra. The main laydown pad was constructed in the winter of 2006/2007 to final design grade; however, the road spurs were only constructed as tote roads at that time. The roads were completed to design grade, and the helipad constructed during the summer of 2007. The access road between the jetty and the Roberts Bay laydown area was widened during the 2010 construction season to facilitate barge off-loading activities.

Although this seasonal construction technique is not desirable, visual inspections show no sign of permafrost degradation, or undue settlement of any of the shoreline laydown area pads. Some natural surface overland flow is blocked by the shoreline laydown area pad, and no culverts or rock drains have been installed. There are, however, no signs of ponding upstream of the pads, suggesting that the run-of-quarry fill used in pad construction is sufficiently coarse enough to not impede drainage.

Recommendations

1. Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion.

3.6 5 ML Roberts Bay Tank Farm

Primary project fuel storage is in three on-site locations and the purpose built single 5 ML steel tank located in the disused Quarry #1 at Roberts Bay (Figure 7) is one of these facilities. The steel tank is placed in an engineered secondary containment facility designed and constructed by SNC Lavalin Engineers and Contractors (SLEC) in 2008. Secondary containment is provided with a double-lined system consisting of an HDPE liner overlying a geosynthetic clay liner. This liner system is protected with a gravel topping. Appropriate quality control and quality assurance were carried out during construction of the secondary containment facility (SRK 2009c and d).

The tank sits on a competent bedrock foundation, but the eastern section of the secondary containment and the fuel transfer station sit on engineered fill (compacted quarry rock) overlying a permafrost overburden foundation. Rock high walls are present along about 30% of the perimeter of the secondary containment. These high walls have been scaled and there are no concerns about their general condition.

Immediately north of the secondary containment area, a large deep pocket of frozen overburden soil was encountered overlying the quarry rock. During quarry development much of this overburden was relocated to a stockpile northeast of the tank farm (Quarry #1 Overburden Dump, see Figure 8); however, this has resulted in areas of ponding above the north high wall of the secondary containment area. To alleviate any risk of overtopping and spilling of water into the secondary containment area, a drainage channel was constructed to convey this water away from the high wall towards the tundra east of the quarry. Thaw settlement of this drainage channel has occurred, and as a result the amount of ponding increased. HBML subsequently in-filled this area with rock to construct a road access to the radio tower at the apex of Quarry #1 which completely remediated this area of concern.

At the time of the inspection there was no ponded water inside the containment area, and SRK understands that the low spots observed in previous years had been remediated through installation of secondary sumps and re-grading.

HBML reviewed as-built data for the secondary containment in 2011 and concluded that the required capacity to allow the fuel tank to be filled to capacity was not met. Subsequently, the fuel level in the tank was lowered to ensure compliance with appropriate regulations. At the time of the inspection, the 5 ML fuel tank had been emptied and the piping as well as the Fuel Transfer Station had been removed.

As part of the investigation to confirm the secondary containment volume, the liner was exposed in areas through careful hand excavation. These areas were not backfilled.

Since the fuel transfer station and part of the secondary containment are only partially constructed on bedrock, the area should be carefully monitored for any signs of settlement if the facility is re-commissioned to contain fuel.

Recommendations

1. Backfill the test pits excavated to confirm liner elevation.
2. Should the facility be re-commissioned, consider the installation of settlement beacons along the fuel transfer station and on sections of the secondary containment facility not constructed on bedrock.

3.7 20 ML Roberts Bay Tank Farm

A 20 ML tank farm was completed late is 2011 (Figure 8). The facility is constructed on a rock foundation which was created through drilling and blasting of a rock outcrop due south of the Roberts Bay laydown area. The high wall created is up to 17 m in height and has one catch bench. The high wall had been scaled and was generally in good condition. In areas, permanent slope stabilization had been installed in accordance with design recommendations.

The presence of high water marks along the interior slopes of the secondary containment area suggests that appropriate snow and management practices were not in place for the facility leading to prolonged periods of ponding. Although this does not impact the facility design capacity (due to the facts that all the tanks have not yet been constructed) it is not considered best practice and HBML should implement proper water management protocols.

Wheel and grader damage was observed on the slopes of the bunded areas suggesting that when snow clearing was done due care was not taken. Externally there does not appear to be any permanent damage to the liner; however, these areas should be excavated and the integrity of the liner confirmed prior to re-commissioning this tank farm.

The high standing water level has resulted in erosion of the crushed rock tank pedestals, exacerbated by inattentive snow clearing. Since the tanks were almost empty at the time of the inspection, and is expected to remain so for the duration of Care and Maintenance activities, no action is required. Should the tanks be re-commissioned, the pedestals would have to be reconstructed.

Recommendations

1. In the areas were there has been potential for the liner to be compromised, it should be exposed and evaluated by a qualified person to confirm the integrity of the bunded area before the facility is re-commissioned.

2. Prior to re-commissioning the tank farm the pedestals need to be reconstructed. Under Care and Maintenance no action is required (unless further erosion continues).

3.8 Roberts Bay Laydown Area

The laydown area at Roberts Bay (Figure 9) is a thermal rock fill pad approximately 1 to 2 m thick, placed directly on the tundra. The pad essentially follows the natural topography in the area; however, there are some levelling tiers included. This laydown pad is intended to serve as the staging area for receipt of supplies and equipment from the annual sealift. Prior to being placed under Care and Maintenance this site is also used to house the workshop and warehousing facilities (including power generation) of the site services contractor, the site and contractor construction fleet and spares, the primary camp incinerator, and other general warehousing in the form of converted sea cans.

The incinerator has been installed within a fully lined facility (HDPE liner), and all other fuel storage on the pad is in double-lined tanks, placed within secondary lined fuel containment berms.

The laydown pad shows no obvious signs of distress in the form of thaw settlement, and there was no evidence of ponding water on the pad. The southeastern section of the pad was constructed over a couple of drainage channels which used to direct overland surface runoff towards Roberts Bay. There was no special care taken to place rock drains over these areas; however, a reconnaissance investigation along the perimeter toe of the pad showed no signs of standing or ponding water, suggesting that the pad is coarse enough to allow subsurface drainage. This observation is supported by the fact that where the drainage channels emerge from the pad, water was visibly flowing unimpeded from the pad. Within this general area, a large quantity of quarry rock was temporarily stored on the tundra, but this has subsequently been relocated. The contractor took great care to not damage the tundra whilst removing the rock; however, the net effect is that there is a thin veneer of gravel covering the tundra vegetation. This will affect the thermal response and most likely result in a localized increase in the active layer thickness. Significant long-term thermal erosion is not expected; however, these areas should be monitored.

Recommendations

1. Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion.

2. Monitor flow from drainage channels beneath pad. If flow stops, the blockage must be traced to prevent onset of thermal erosion.

3. Monitor areas where rock was relocated from the tundra for signs of thermal erosion.

3.9 Quarry #1 Overburden Dump

A temporary Overburden Dump was constructed north of Quarry #1 during its initial development (Figure 10); however, there was no sedimentation control in place at the time. A sedimentation control berm was subsequently constructed in 2011 and overburden, organics, snow and ice and oversize material from the quarry development of the 20 ML tank farm was deposited in this Overburden Dump as shown in Figure 8. Poor dumping practices resulted in zero separation between the sedimentation control berm and the toe of the Overburden Dump and therefore surface runoff can flow unimpeded directly onto the tundra.

Following completion of dumping the surface of the pile was levelled and covered with a layer of surfacing material to allow the pile to be used as general laydown area. The surface has several large sinkholes, located at the entrance, which are simply a function of the fact that the pile contains large voids and the fine grained surfacing material is falling though as the pile undergoes settlement and snow and ice lenses melt. Only four fuel sleighs, a waste bin, the remains of the Emergency Response Fire Truck that was destroyed by the camp fire, and a small pile of lumber are stored in this area. Should this area be used as laydown area, careful monitoring of these potholes will be required along with regular maintenance. It is also possible that equipment or supplies stored on this pile could be damaged if potholes develop under it.

Recommendations

1. Monitor surface runoff and consider requirement for alternate sedimentation control measures.
2. If the surface is used as a laydown area appropriate management protocols must be put in place taking into consideration the propensity for sinkhole development and overall differential settlement.

3.10 Airstrip

The all-weather airstrip (runway) is 900 m long and 23 m wide and is a 2 m thick thermal rock fill pad constructed directly on the tundra (Figure 11). At each end of the runway there is an apron which measures about 80 m x 50 m. The base course of the airstrip consists of run-of-quarry material, followed by a layer of 2-inch crush. The surfacing material is a ¾-inch gravel topping layer. The north end of the airstrip, up to the first drainage crossing was constructed in 2007, and the remainder was completed in 2008. An airstrip expansion was partially completed in 2011 which would increase the airstrip length to 1,900 m and its width to 45 m. The north airstrip apron extension was also completed in 2011.

This airstrip doubles as the main access road between Roberts Bay and the Doris North Camp, and traffic control is managed via access control booms at each end of the runway. A permanent aircraft control tower is located on the north apron, complete with a portable wash station and power supply. Fuel for the generator is stored in a double walled fuel tank housed in a portable secondary containment berm. Drummed jet fuel is also housed in a portable secondary containment berm. Both of these facilities are located right on the shoulder of the apron.

The airstrip is equipped with permanent runway lights (power supplied by the generator at the control tower), Global Positioning System (GPS) approach instrumentation, and a standard windsock. During installation of the runway lighting and windsock, temporary rock fill roads were pushed out onto the tundra. During the removal of these roads, care was taken not to damage the tundra; however, that meant that a thin veneer of gravel was left behind. This will likely affect the thermal response of the active layer and these areas should be monitored for signs of thermal erosion.

There are two ephemeral drainage channels passing under the airstrip, and at each of these locations rock drains were installed to allow unimpeded flow of water. At the location of the two rock drains, flow appears to be unimpeded, suggesting that they are functioning as intended.

The airstrip has required a significant amount of maintenance since its completion in 2008, which according to the staff was mostly a result of frequent construction traffic passing over the runway. Some of the maintenance can also be ascribed to ongoing settlement. The settlement is to be expected, since the airstrip was not completely constructed to design grade during the winter, and as such, there was not complete frost in the foundation which would result in consolidation settlement of the active layer. There were tension cracks along the edge of the runway present at the time of the inspection, which supports the observation that minor settlement is still occurring; however, the manifestation of these cracks are also partially as a result of the over-steepened shoulders. Based on site feedback, the level of maintenance was decreased in 2011 and minimal maintenance was carried out in 2012, suggesting a steady state condition is being approached.

Although no water was present during the inspection, there was clear evidence of significant ponding of water against the airstrip, which would result in thermal erosion, in turn leading to increased runway settlement. It is understood that there is a management protocol in place whereby ponding is pumped out, and therefore this is likely not a significant contributing factor to runway settlement.

Recommendations

1. Monitor areas where rock was relocated from the tundra for signs of thermal erosion.
2. Maintain practice of inspecting the runway toe line during freshet and after significant or prolonged rainfall events. Pump ponded water to prevent onset of thermal erosion.
3. Conduct daily inspections of the airstrip shoulder (if in use) to monitor the tension cracks.

3.11 All-Weather Roads (Doris Site)

The following all-weather roads have been constructed on site, as illustrated in Figures 2 and 4:

- 120 m long, 8.3 m wide single lane link between Quarry #1 Overburden Dump and shoreline in support of the fuel offloading barges;
- 250 m long, 10 m wide single lane link between the jetty and Roberts Bay laydown area;
- 600 m long, 8.3 m wide single lane link between Roberts Bay laydown area and the north airstrip apron;
- 2.6 km long, 8.3 m wide single lane link between the south airstrip apron and Doris Camp (*aka* Primary Road);
- 75 m long, 8.3 m wide single lane spur from the Primary Road to the wash bay;

- 300 m long, 8.3 m wide single lane spur from the Primary Road to Quarry #2;
- 870 m long, 8.3 m wide single lane link between Doris Camp and Doris Lake (*aka* Float Plane Access Road);
- 1,570 m long, 8.3 m wide single lane link between Doris Camp and North Dam and Frozen Core Plant pad called the Tail Lake Road (*aka* Secondary Road); and
- 260 m long 8.3 m wide single lane link between the Frozen Core Plant pad and the Tail Lake fish-out pad (*aka* Tail Lake Access Road).

The roads are above grade thermal rock fill pads constructed directly on the tundra. Road fill thickness is variable between 1 m up to 3 m. The roads have been constructed with run-of-quarry material with a surfacing layer of 2-inch crush. All roads are single lane roads with turnouts. There are no culverts or rock drains under the roads to allow drainage of overland surface runoff flow. Visual inspection revealed that there are only a few isolated areas where ponding exists along the toe of the roads, suggesting that the fill material is generally sufficiently coarse to not impede flow. Where ponding does occur, it appears to be associated with areas of the tundra where construction damage occurred. There were no signs of thermal erosion, but these ponded areas should be monitored and pumped out during freshet and after significant or prolonged rainfall events.

As per the Mines Act, road turnouts were constructed every four truck-lengths to facilitate road construction. Many of these have been picked up, and since care was taken not to damage the tundra, a thin veneer of gravel remains present at these locations. This gravel will change the thermal response of the underlying soils and these areas should be monitored for signs of thermal erosion.

A surficial slope failure occurred in August 2010 during construction of the Secondary Road at approximately chainage 0+550 (Figure 17). At the time construction in this area was stopped and a temporary bypass was constructed. The ground was allowed to freeze during the subsequent winter season and road construction commenced completing this section of road in April 2011. SRK recommended that a buttress be constructed at the same time to ensure that the failure would not get remobilized. This buttress was not constructed; however, no further movement in the road shoulder was observed during the 2012 inspection.

Recommendations

1. Inspect road toe lines during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion.
2. Monitor areas where rock was relocated from the tundra for signs of thermal erosion.
3. The buttress recommended for the Secondary Road should be constructed, and until such time as the buttress is constructed a visual monitoring system should be put in place and warning signs posted along the section in question.

3.12 Doris Creek Bridge

The Secondary Road crosses Doris Creek (Figure 21) via a single span prefabricated bridge constructed on two thermal pad abutments. The bridge was installed in 2010. Two thermistor cables were installed in 2011 (one at each abutment) to monitor the integrity of permafrost conditions. Visual inspection revealed no issues of concern other than the poorly constructed rock gabions. These gabions are continuing to deform, and it is likely ultimately they will not fulfill their function of retaining the abutment. Their degradation should be monitored, and the gabions replaced when appropriate.

Recommendations

1. Monitor thermistor strings in accordance with the recommendations set out in Section 3.2.
2. Monitor and ultimately replace the rock gabions.

3.13 Wash Bay/Explosives Mixing Plant

The wash bay pad houses a large modular building with a smaller adjoining modular building, a Weatherhaven, with a double walled fuel tank (Figure 11). The large modular building was used for the ANFO emulsion plant. Only the bunded area on the ground and electrical panels remain. The pad is a thermal rock fill pad about 1 m thick. Visual inspection showed no signs of ponding at the toe of the pad.

Recommendations

1. Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion.

3.14 Upper and Lower Reagent Pads

Between the airstrip and Doris North Camp two large laydown areas have been constructed (Figure 12). These areas, which are at two different elevations, are called the Upper and Lower Reagent pads. Prior to the site being placed under Care and Maintenance the Lower Pad was used as the primary sea can storage and warehousing area. The Upper Reagent pad was used for sea can storage as well as a general laydown yard for equipment and construction supplies. These pads became the general staging area for demobilization during the 2012 sealift. These pads were constructed to cover and mitigate an area of permafrost degradation which was inadvertently caused as part of the 2008 construction activities. The pads range between 1 to 3 m thick, and there are no concerns associated with them based on the visual inspection.

Recommendations

1. Inspect pad perimeter during freshet, and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion.

3.15 Quarry #2 and Crusher Area

At the time of the inspection Quarry #2 was inactive, but was continuously used as the primary source of construction materials for the project. The quarry was developed using two benches, each about 6 m high, as illustrated in Figure 13. There were no signs of standing water on either of the quarry benches, and no evidence of overland surface runoff flowing uncontrolled onto the tundra. There are no significant natural water bodies near the quarry site and therefore no risk of an uncontrolled sediment release into a water body.

Prior to development of the quarry, a significant amount of overburden (frozen silt and clay) was stripped and stockpiled on the tundra in an area immediately west of the quarry. This overburden was relocated to an area north of the quarry as shown in Figure 13. At the time of the inspection this overburden material had been spread out and levelled, covered with crushed rock and is used as a core storage area, the burn pit for approved combustible construction materials, and the landfarm site.

The construction crusher was relocated to a disused part of the quarry in late 2010 but had been dismantled and removed from site by the time of the 2012 inspection. Multiple stockpiles of various crusher products are stockpiled in the quarry.

Recommendations

1. Continue to follow the Quarry Management Plan.

3.16 Batch Plant Pad (Previously Crusher Pad)

At the junction between the Primary Road to the camp and the quarry spur road (Figure 2) a 1 m thick run-of-quarry pad measuring about 125 m x 125 m has been constructed (Figure 13), linking up with the Lower Reagent pad. This thermal pad previously housed the construction crusher plant, crusher power and fuel supply, as well as stockpiles of crushed rock; however, it now houses a prefabricated building which contained the concrete batch mixing plant. Fuel supply for the plant is a double-walled steel tank placed in a lined and bermed secondary containment facility immediately outside the building. A stockpile of 6-in crush product remains on part of the pad along with some sea cans.

Visual inspection of the pad perimeter showed no signs of standing water, and given the fact that this pad has been constructed on the natural watershed divide, surface overland flow is limited.

Recommendations

1. Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion.

3.17 Upper Reagent Pad AN Storage

At the south end of the Upper Reagent Pad (Figure 12) a lined bulk ammonium nitrate (AN) storage area was constructed by HBML. No formal design for this facility was prepared and construction was carried out with no designated quality control or quality assurance. No as-built drawings exist. Visually the facility shows no concern; however, without knowing the appropriate design data, it is not apparent whether there is appropriate containment capacity and whether there is sufficient liner protection material.

Recommendations

1. Should the facility be re-commissioned, the design criteria must be confirmed and appropriate remedial measures must be implement. Under Care and Maintenance no action is required.

3.18 Landfarm

A landfarm has been constructed immediately north of Quarry #2 as shown in Figure 13. The facility consists of three lined cells: one for contaminated snow, one for contaminated soils, and the last for hydrocarbon contaminated water. The facility is a fully-lined facility designed to temporarily hold these contaminated materials rather than being a facility that can be used to remediate the materials. A Landfarm Management Plan has been prepared by HBML outlining its use.

The landfarm has been constructed on a levelled pad consisting of a random mix of overburden, organics, snow and ice, and oversize material from early Quarry #2 development. To minimize the risk of differential settlement the landfarm foundation was designed to include a layer of woven geotextile; however, this facility should be monitored for signs of distress. The visual inspection did not show any cause for concern.

Recommendations

1. HBML to continue to follow the designated Landfarm Management Plan.
2. Conduct regular visual inspections to monitor for signs of settlement.

3.19 Sewage Treatment Plant Outfall

The grey water (sewage treatment effluent) pipeline used to discharge directly onto the tundra immediately south of the crusher pad (Figure 13).Visual inspection during 2010 and 2011 confirmed that there was significant ponding of water; and tundra vegetation dieback had started with associated erosion damage. As a result, discharging directly to the tundra was discontinued, and an alternate diffuser system was constructed and put into operation in 2012. The new discharge location is further to the west with the diffuser located on a bedrock outcrop.

Recommendations

1. Monitor for permafrost degradation at old outfall location.
2. No action required at new outfall location.

3.20 Quarry #2 Overburden Dump

A permanent overburden dump has been constructed north of Quarry #2 as shown in Figure 13 and 11. Overburden stripped from Quarry # 2 and #4, and oversize quarry rock that was not suitable for construction is hauled to this location. Material was end dumped and then spread with a dozer. The overall dump construction consists of a series of cells, primarily to facilitate constructability. The material is therefore a random mix of organics, marine silts and clays, and quarry rock. A sedimentation berm has been constructed downstream of the overburden dump to ensure that no sediment is released from the dump area. At the time of inspection the area was dry.

Recommendations

1. No action required.

3.21 Doris North Camp Pads

The Doris North Camp area is also the designated Quarry #4 area as illustrated in Figures 14 through 17. The permanent camp has been constructed on a bedrock foundation which was achieved through a benched cut with a high wall at the north side of the camp (Pad X). This pad is increased in size via a fill zone extended to the south placed directly on tundra. This pad is variable in thickness but generally at least 1 m thick. A lower fill pad (about 2 m lower than the upper pad) provides additional space for camp facilities (Pad Y).

The upper camp pad (Pad X) houses the camp, temporary power generation station, equipment storage shed, the sewage treatment plant, fire water tank and pump house, and a muster station. The lower camp pad (Pad Y), which extends all the way to the location of the Sedimentation and Pollution Control ponds houses the temporary (construction) power station and fuel supply, joint geology/warehousing building, additional warehousing in the form of modified sea cans, as well as general miscellaneous equipment and supplies, and core storage.

Immediately south of the lower camp pad is the helicopter base pad, which houses four helipads, a helicopter base station as well as other related support facilities. Towards the east, immediately below the portal, are two pads that were to serve as primary support for the mining activities (Pads F and G). At the time of the inspection, the underground drilling contractor’s shop and warehousing facilities, as well as general mining supplies, had been removed and only a few sea cans and underground construction supplies remained on Pad G. The empty contractor’s shop, warehousing facilities, and the dismantled mine power house, were located on Pad F.

Immediately northeast of the camp, a rock excavation was completed which now houses the primary 7.5 ML camp fuel tank farm (Pad R). Immediately south of this facility, the permanent power house for the site has been constructed on a levelled rock fill pad (Pad B). Between these facilities and the portal, is another rock excavation which will form the foundation of the mill building (Pad D). At the time of the inspection, this area was occupied by a temporary lined facility which is used as part of the interim site water management plan.

Between the mill pad and the portal is an elevated ore storage pad (Pad Q/H/J), and immediately below the mill pad is the waste rock pile (Pad I). Downslope of the facilities, at the natural collection point for the site, are the Sedimentation and Pollution Control ponds.

All the pads in question range in thickness between at least 1 m and up to 6 m thick. All the pads have been designed as thermal pads to preserve the underlying permafrost. By design, no permanent heated buildings are to be constructed directly onto these pads; however, at the time of the inspection the geotechnical core cutting building and mine services workshops did not comply. As Doris Camp is now under Care and Maintenance, these buildings will be closed and are not of concern. Should the Project and Doris Camp be re-commissioned, these heat sources may lead to permafrost degradation, which in turn would lead to foundation settlement. There would be no short-term concerns; however, HBML would have to closely monitor for signs of settlement and take appropriate remedial measures.

Visual inspection of the pad perimeters showed no signs of ponding water, and there was no ponding water visible anywhere on the pad surfaces. The high wall behind the camp has been scaled clean, and a catch berm has been constructed behind wooden cabins, immediately beneath the wall and along the base of the entire length of the high wall in case rocks loosen and fall from the highly fractured face. Appropriate barricades and signage have not been re-erected to keep people and equipment at a safe distance from the wall.

The high walls behind the tank farm and the mill pad were scaled clean, and were generally in good condition. Recommendations for permanent stabilization of these walls were provided in 2011 but have not been implemented.

Recommendations

1. Inspect pad perimeter during freshet, and immediately after significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion.
2. Construct a catch berm at the toe of the high wall and install appropriate signage and barricades to warn people and equipment of the danger.
3. High wall stabilization measures designed for the mill pad should be installed as planned.
4. Develop and implement a differential settlement monitoring protocol for heated buildings constructed directly onto the thermal rock fill pads.

3.22 7.5 ML Doris North Camp Tank Farm

The primary camp fuel supply is contained within the 7.5 ML tank farm constructed on a blasted rock foundation immediately north of the camp (Pad R, Figure 14). This facility was completed in 2010. At the time of the inspection there was no visible ponding, but there are clear signs of ponding which drains towards the engineered sump. This water is pumped from the facility in accordance with the site Water Management Plan. Crushed rock pedestals have been constructed to support the piping between the fuel tanks. These should be replaced with a fabricated support structure that does not create a point load on the liner, because the crushed rock pedestals reduce the storage capacity of the bunded area should there be a failure and fuel is released from the storage tanks.

The high wall behind the tank farm is in good condition; however, long term stabilization measures which have been designed should be implemented if the Project and Doris Camp are re-commissioned.

Recommendations

1. Remove crushed rock pedestal supports for the piping and replace with fabricated supports that do not reduce containment capacity.
2. High wall stabilization measures designed for the mill pad should be installed as planned.

3.23 Power Generation Station (Pad B)

The main camp power plant has been constructed on Pad B immediately south of the 7.5 ML tank farm (Figure 14). This thick pad (up to 6 m in places) is founded on ice rich permafrost marine silt and clay, and is therefore subject to differential settlement. The power plant is a heated, large and heavy structure constructed on concrete footings located close to steep angle of repose rock fill slopes. This structure generates heat and vibrations and a failure could result in loss of life. A monitoring system needs to be put in place to provide advance warming of any deformation.

Recommendations

1. Install a monitoring system on Pad B to allow for tracking and advance notice of any deformations of Pad B.

3.24 Other Site Wide Fuel Storage

A number of other double-lined fuel tanks were scattered throughout the site during construction activities. All of these tanks had been placed in lined secondary containment. These double lined fuel tanks have been emptied and demobilized from site.

Recommendations

1. No action required.

3.25 Sedimentation and Pollution Control Ponds

All non-contact and contact water from the Doris North camp pads flows to the Sedimentation and Pollution Control ponds respectively (Figures 16 and 17). Both ponds have been designed with downstream liners keyed and frozen into the permafrost, but without bottom liners. The ponds were constructed and commissioned in 2011. Both ponds leaked, and the primary mode of leakage was water bypassing the liner keyed into the permafrost. The most likely cause of this was due to the late season construction of the ponds (May 2011) which meant that there was no time for the liner to freeze-back into the permafrost. A decision was subsequently made to reconstruct both ponds; the Sedimentation Control pond was to be completely lined and the Pollution Control pond would have its key trench deepened and reseated. In addition two downstream sumps (Section 3.26) were constructed to allow collection of any water that does manage to bypass any of the reconstructed ponds.

At the time of inspection there was water in the southeast corner of the Sedimentation Pond. The liner in the upper northeast corner of the pond appears to have been cut at regular intervals, possibly due to handling, and the overlap between two liners has not been sealed.

A significant amount of standing water was observed in the southeast corner of the Pollution Control Pond. A steady flow of water was also observed from the toe of Pad I (the Waste Rock Pile). The interior benches of the Pollution Control Ponds had experienced differential settlement as observed by the tension cracks. During the time of the site inspection, the pump within the Pollution Control Pond was not operated.

Three thermistors have been installed to monitor freeze back of the permafrost within the Pollution Control Pond key trench. At the time of the inspection the deeper string monitoring freeze back of the base of the key trench did not show sufficiently cold temperatures. This may lead to continued leaking of the pond and should be closely monitored.

Recommendations

1. During seasonal camp operations, under Care and Maintenance, the Sedimentation and Pollution Control Ponds should be kept free of standing water, as this will lead to permafrost degradation.
2. Keep a close watch on the Pollution Control Pond thermistor data as well as the sump water quality and flow.

3.26 Sumps #1 and #2

Two sumps (Figure 17) were constructed within the tundra to capture the water that manages to bypass the reconstructed Sedimentation and Pollution Control Ponds. Both sumps were full of water during the time of the inspection. Perimeter permafrost degradation was observed around Sump #1. This was to be expected, and the depression around the steel sump should be backfilled with saved and stockpiled overburden material and covered with coconut matting. Sump #2 appeared to be in good condition.

Recommendation

1. During seasonal camp operations, under Care and Maintenance, both sumps should be kept free of standing water as this will lead to permafrost degradation.
2. Inspect sump perimeter during freshet, and after following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion.

3.27 Doris North Portal

Mine development started in 2010 and at the time of the inspection the portal had been backfilled with waste rock and covered with wire mesh bolted to the ceiling. A steel and wire gate with warning signs had been placed close to the portal entrance. The high wall above the collar had been scaled and meshed in accordance with recommendations of a specialist. The collar had been properly supported in accordance with recommendations of a specialist.

Recommendations

1. No action required.

3.28 Waste Rock Pile

Waste rock from mine development are brought up via the portal and dumped on the waste rock dump. A Waste Rock Management Plan (SRK 2010) outlines how waste was characterized, tested, and how segregated placement was carried out. From discussions with site staff the appropriate protocols are being followed. The majority of Pad I had been covered with waste rock and subsequent lifts of waste rock had started being placed.

Recommendations

1. HBML to continue to follow the designated Waste Rock Management Plan.

3.29 Temporary Pond

A 6,000 m^3 total capacity lined Temporary Pond was constructed on the Mill Pad in early 2011 as part of the 2011 Interim Water Management Plan. The pond was constructed using compacted waste rock berms and a HDPE liner. The pond is founded on bedrock and the liner is bedded in ¾-in gravel. At the time of the inspection the pond was at its full supply level (FSL), which is 300 mm below crest elevation. The pond has no spillway, so care must be taken to not operate the facility beyond its FSL.

The facility showed no signs of distress during the inspection. Given that this facility was constructed as a temporary emergency measure it was not subject to the same rigorous design and construction protocols as permanent facilities, and it should be carefully monitored.

Recommendations

1. Conduct daily visual inspections to check for obvious signs of distress (while being used to store water).

3.30 Doris Fresh Water Intake

A small thermal pad has been constructed on the shoreline of Doris Lake to support the fresh water intake facilities which consist of a pump house, generator and fuel supply. The fuel tank is a double-walled steel tank within a portable secondary containment facility. A removable boat dock extends from the pad during the open water season.

Visual inspection of the pad toe showed no signs of ponding or thermal erosion. There appears to have been a rupture in the intake pipe as there are erosion gullies leading from the pump house down to the tundra.

At the time of inspection the removable dock was sitting on the tundra next to the rock fill pad. The dock should be relocated and placed on the pad to prevent die-back of vegetation and permafrost degradation.

Recommendations

1. Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion.

3.31 Doris Primary Vent Raise Pad

The primary Doris North vent raise is located along the Secondary Road (Figure 21). A rock fill pad had been constructed using a cut/fill method such that the vent raise could be collared on competent bedrock. The tiered pad houses the vent raise collar building on the upper platform, and a lined fuel containment area on the lower platform. A 2 to 3 m high wall exists around the collar, and is generally in good shape having been scaled during construction. Visual inspection shows no signs of ponding or permafrost damage.

Recommendations

1. Inspect pad perimeter during freshet, and immediately aftersignificant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion.

3.32 Frozen Core Plant Pad

A 1 to 2 m thick thermal pad was constructed due north of the North Dam alignment along the Secondary Road to support construction of the North Dam (Figure 22). A prefabricated building was located on this pad that housed the asphalt plant used for mixing the saturated core material used in dam construction. The asphalt plant and prefabricated building has been removed, but a small stockpile of frozen core material occupies the remaining space on the pad. Visual inspection of the pad toe showed no signs of ponding or thermal erosion.

Recommendations

1. Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion.

3.33 North Dam

Tail Lake is the designated Tailings Containment Area (TCA) for the project. Tailings deposition would have been sub-aqueous, and therefore two water retaining dams have been designed as the primary containment method. Due to the complex foundation conditions, both these dams have been designed as frozen core structures with a secondary upstream liner.

The dams have been designed to maintain “critical sections” of the core and the underlying saline permafrost foundation sufficiently cold and over a wide enough section to be an impermeable barrier to seepage. The critical section of the core is defined as the part of the core that is colder than -2°C during impoundment under normal operating conditions, or colder than -1°C during impoundment under upset conditions. The critical section of the saline permafrost foundation is defined as the portion of the saline permafrost layer that is colder than -8°C under normal or upset conditions. The dams have been designed with a 25-year design life in mind, taking into account global warming and upset conditions.

Construction of the North Dam started in February 2011 and was scheduled to be completed in May 2011; however, unforeseen circumstances led to construction stopping partway through. As a result, the partially constructed structure was covered with a 3 m thick temporary thermal cover of run-of-quarry rock until construction was completed in 2012. Photos of the completed dam are shown in Figures 22, 23 and 24.

The North Dam is instrumented with 11 vertical ground temperature cables (*aka* thermistors) and 13 horizontal ground temperature cables; 18 Surficial Survey Monitoring Points located throughout the downstream face; 14 Survey Monitoring Points located along the upstream and downstream crests of the dam; 3 Deep Settlement Points and 6 Inclinometers located within the downstream face. The data collected at the time of the inspection is not representative of the dam performance and is therefore not discussed at this time, but is presented in the Appendices.

Visual inspection of the completed structure showed no signs of concern.

Recommendations

1. Implement a monitoring program for the dam instrumentation in accordance with recommendations by the Engineer-of-Record.
2. Conduct a thorough review of the dam performance monitoring data during the 2013 geotechnical inspection.

3.34 Shoreline Erosion

The normal water level in Tail Lake is 28.2 masl. As a result of the North Dam construction the water level in Tail Lake was at elevation 29.1 masl during the time of the inspection. A large section of shoreline is flooded becauseof this increased water level, and will in time result in irreversible vegetation die-back and ultimately permafrost damage. Such permafrost damage will result in thaw and erosion of the overburden soils, which will result in increased Total Suspended Solids (TDS) in Tail Lake. This was an expected consequence; however, with the project being under Care and Maintenance it would be prudent to manage the water level in Tail Lake to prevent the onset of permafrost degradation and subsequent risk of increase TDS.

Recommendations

1. Implement measures to maintain the water level in Tail Lake at 28.2 masl to prevent onset of permafrost degradation.

3.35 Doris-Windy All-Weather Road

The Doris-Windy road is a 10 km all-weather road that stretches from the Doris Camp, due south to the Windy Camp (Figure 18). The road is an 8.3 m wide single lane road with turnouts designed based on lines of sight. Construction of this road started during the winter of 2009/2010 and was completed in 2011. No 2-inch crush was placed as a surfacing layer from 8+600 to the end of the alignment at 9+733. As a result the road is very rough but passable along this section.

The roads are above grade thermal rock fill pads constructed directly on the tundra. Road fill thickness is variable between 1 m to over 2 m. The roads have been constructed with run-of-quarry material with a surfacing layer of 2-inch crush (except for the section as noted above). There are no culverts or rock drains under the road to allow drainage of overland surface runoff flow. Visual inspection revealed that there are only a few isolated areas where ponding exist along the toe of the road, suggesting that the fill material is generally sufficiently coarse to not impede flow. Where ponding does occur, it appears to be associated with areas of the tundra where construction damage occurred. There were no signs of thermal erosion.

Some cracking along the shoulder of the road can be observed along sections which is most likely a result of settlement of the shoulders. A few potholes were also observed at the abutments of the stream crossings, and these are likely due to the fact that the surfacing layer is infilling the larger voids of the underlying run-of-quarry material.

As per the Mines Act, road turnouts were constructed every four truck-lengths to facilitate road construction. Many of these have been picked up, and since care was taken not to damage the tundra, a thin veneer of gravel remains present at these locations. This gravel will change the thermal response of the underlying soils and these areas should be monitored for signs of thermal erosion.

Two caribou crossings were constructed in 2011 along the route alignment based on recommended locations by the landowner.

Recommendations

1. Inspect road toe lines during freshet, and immediately after significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion.
2. Monitor areas where rock was relocated from the tundra for signs of thermal erosion.
3. Implement inspection protocol to monitor shoulder cracks and potholes.

3.36 Doris-Windy All-Weather Road Stream Crossings

There are four designated stream crossings along the Doris-Windy all-weather road (Figure 19). The first crossing was installed in 2010 and consists of an arch culvert. The culvert is founded on add-freeze piles. The inspection revealed no concerns.

The remaining crossings are bridges with thermal pad abutments. The abutment integrity is monitored using thermistor strings. The data collected up to the time of the inspection is not representative of the abutments performance and is therefore not discussed at this time, but is included in Appendix A.

Recommendations

1. Monitor thermistor strings in accordance with recommendations in Section 3.2.

3.37 Doris-Windy All-Weather Road Quarries (A, B and D)

Three rock quarries were designated and used to construct the Doris-Windy road as illustrated in Figure 20. At the time of the inspection, none of these quarries were in use; however, all three quarries may be used at some time in future. Currently Quarry A was used as a temporary explosives storage area and it housed an access road and two Type 4 magazines.

Quarry B was used during the demobilization stage to detonate all excess explosives on site and therefore contains a very large quality of fine rock dust laden with explosives residue. Although there are no signs of ponded water and the likelihood on drainage water leaving the quarry is low, it should be closely monitored as any discharge is likely to exceed water quality criteria.

Quarry D was designed to ultimately become the new Windy Camp but it was never fully developed. An overburden dump was constructed across the access road and is being used to store core boxes from Windy Camp. Some core storage is also being done within the excavated quarry.

There were no signs of standing water on either of the quarry benches, and no evidence of overland surface runoff flowing uncontrolled onto the tundra. There are no natural water bodies near any of the quarry sites, and therefore, no risk of an uncontrolled sediment release into a water body.

Recommendations

1. Continue to follow the Quarry Management Plan.

4 Summary of Recommendations

This report provides a performance assessment of the numerous foundation pads and infrastructure at the Doris North Project site. The findings are based on a site visit and walkover survey between September 7 to 10, 2012 and subsequent consultation with site staff. This is the fourth formal annual geotechnical inspection undertaken at this site. The site is currently under Care and Maintenance, and therefore many of the remedial recommendations identified during this geotechnical investigation are likely to be addressed as part of Care and Maintenance operations.

Table 2 below provides a summary of the inspection components and the primary recommendations stemming from the inspection. There were no issues that require urgent and immediate action.

Table 2: Summary of Inspection Items and Associated Recommendations

Inspection Item	2011 Recommendations	2012 Recommendations
Thermistors	• Re-evaluate thermistor requirements taking into considering the surface infrastructure elements currently on site • Continue to collect quarterly thermistor data at a minimum (August, November, February and May) • Consider installing data loggers for select remote thermistors to ease the burden of frequent manual data downloads	• Re-evaluate thermistor requirements taking into considering the surface infrastructure elements currently on site • Continue formal monitoring once a year in July or August • North dam thermistors must be monitored in accordance with recommendations provided in the As-built Report (SRK 2012b)
Old Beach Laydown Area	• Relocate the last two explosives magazines from the tundra vegetation onto the beach • Remove any remaining debris	• Relocate the last two explosives magazines and the 11 sea cans from the tundra vegetation onto the beach • Remove any remaining debris
Roberts Bay Jetty	• Continue to collect quarterly thermistor data at a minimum (August, November, February and May) • Conduct annual survey of the jetty to allow for actual measurement of ongoing settlement • Remind operational staff annually about the operational limitations of the jetty	• Continue formal monitoring once a year in July or August • Remind operational staff annually about the operational limitations of the jetty
Shoreline Laydown Area	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion

Inspection Item	2011 Recommendations	2012 Recommendations
5 ML Roberts Bay Tank Farm	• Monitor overburden ponding immediately above the high wall and construct a new drainage channel in 2012 • Install permanent sumps within the secondary containment area to facilitate complete surface water drainage • Install settlement beacons along the fuel transfer station and sections of the secondary containment facility not constructed on bedrock. Monitor the beacons quarterly	• Backfill test pits excavated to confirm liner elevation • Should the facility be re-commissioned, consider installation of settlement beacons along the fuel transfer station and on sections of the secondary containment facility not constructed on bedrock
20 ML Roberts Bay Tank Farm	• No action required	• Areas within the bunded area along the berm's incline that have experienced disturbance should be evaluated for integrity of the liner system and repairs made if required by a qualified person • Prior to re-commissioning tank farm reconstruct pedestals
Roberts Bay Laydown Area	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion • Monitor flow from drainage channels beneath pad. If flow stops, the blockage must be traced to prevent onset of thermal erosion • Monitor areas where rock was relocated from the tundra for signs of thermal erosion	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion • Monitor flow from drainage channels beneath pad. If flow stops, the blockage must be traced to prevent onset of thermal erosion • Monitor areas where rock was relocated from the tundra for signs of thermal erosion
Quarry #1 Overburden Dump	• Monitor surface runoff and consider requirement for alternate sedimentation control measures • If the surface is used as a laydown area implement appropriate management protocols to account for sinkhole and differential settlement risk	• Monitor surface runoff and consider requirement for alternate sedimentation control measures • If the surface is used as a laydown area implement appropriate management protocols to account for sinkhole and differential settlement risk
Airstrip	• Monitor areas where rock was relocated from the tundra for signs of thermal erosion • Maintain practice of inspecting the runway toe line during freshet and after significant or prolonged rainfall events. Pump ponded water to prevent onset of thermal erosion • Conduct daily inspections of the airstrip shoulder to monitor the tension cracks	• Monitor areas where rock was relocated from the tundra for signs of thermal erosion • Maintain practice of inspecting the runway toe line during freshet and after significant or prolonged rainfall events. Pump ponded water to prevent onset of thermal erosion • Conduct daily inspections of the airstrip shoulder to monitor the tension cracks

Inspection Item	2011 Recommendations	2012 Recommendations
All Weather Roads (Doris Site)	• Inspect road toe lines during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion • Monitor areas where rock was relocated from the tundra for signs of thermal erosion • Implement a monitoring protocol and erect warning signs at the site of the slope failure until the buttress have been installed	• Inspect road toe lines during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion • Monitor areas where rock was relocated from the tundra for signs of thermal erosion • Implement a monitoring protocol and erect warning signs at the site of the slope failure until the buttress have been installed
Doris Creek Bridge	• Monitor thermistor strings in accordance with the recommendations set out in Section 3.2	• Monitor thermistor strings in accordance with the recommendations set out in Section 3.2 • Monitor and ultimately replace the rock gabions
Wash Bay/Explosives Mixing Plant	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion
Upper and Lower Reagent Pads	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Ponded water should be pumped to prevent onset of thermal erosion	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Ponded water should be pumped to prevent onset of thermal erosion
Quarry #2 and Crusher Area	• Continue to follow the Quarry Management Plan	• No action required
Batch Plant Pad (previously Crusher Pad)	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion	• No action required
Upper Reagent Pad AN Storage	• Not constructed in 2011	• Confirm design criteria before re-commissioning
Landfarm	• HBML to continue to follow the designated Landfarm Management Plan • Conduct regular visual inspections to monitor for signs of settlement	• HBML to continue to follow the designated Landfarm Management Plan • Conduct regular visual inspections to monitor for signs of settlement
Sewage Treatment Plant Outfall	• Develop and implement a long-term solution for discharge of grey water to prevent vegetation dieback and subsequent thermal and physical erosion. An improved system is currently under construction	• Continue to monitor old sewage outfall location for signs of permafrost degradation
Quarry # 2 Overburden Dump	• No action required	• No action required

Inspection Item	2011 Recommendations	2012 Recommendations
Doris North Camp	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion • Construct a catch berm at the toe of the high wall and install appropriate signage and barricades to warn people and equipment of the danger • High wall stabilization measures designed for the tank farm and mill pad should be installed as planned. • Develop and implement a differential settlement monitoring protocol for heated buildings constructed directly onto the thermal rock fill pads	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion • Construct a catch berm at the toe of the high wall and install appropriate signage and barricades to warn people and equipment of danger • High wall stabilization measures designed for the mill pad should be installed as planned • Develop and implement a differential settlement monitoring protocol for heated buildings constructed directly onto the thermal rock fill pads
7.5 ML Doris North Camp Tank Farm	• No action required	• Removed crushed rock pedestal supports for the piping and replace with fabricated supports that do not reduce containment capacity • High wall stabilization measures designed for the mill pad should be installed as planned
Power Generation Station (Pad B)	• Not constructed in 2011	• Install a monitoring system for tracking and advance notice of any deformations of Pad B
Other Site Wide Fuel Storage	• Revisit the secondary containment requirements for fuel tanks on site	• No action required
Sedimentation and Pollution Control Ponds	• Implement remedial measures as designed	• Pump out ponded water to prevent onset of thermal erosion • Carefully track thermistors and sump water quality and flow data
Sumps #1 and #2	• Not constructed in 2011	• Pump out standing water to prevent thermal erosion • Inspect sump perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion
Doris North Portal	• No action required	• No action required
Waste Rock Pile	• HBML to continue to follow the designated Waste Rock Management Plan	• HBML to continue to follow the designated Waste Rock Management Plan
Temporary Pond	• Conduct daily visual inspections to check for obvious signs of distress	• Conduct daily visual inspections to check for obvious signs of distress
Doris Fresh Water Intake	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion

Inspection Item	2011 Recommendations	2012 Recommendations
Doris Primary Vent Raise Pad	• Not constructed in 2011	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion
Frozen Core Plant Pad	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion	• Inspect pad perimeter during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion
North Dam	• Complete construction of dam and installation of required instrumentation in accordance with the stipulated design • Implement monitoring program for dam instrumentation in accordance with recommendations by the Engineer-of-Record • Conduct thorough review of the dam performance monitoring data during the 2012 geotechnical inspection	• Continue with monitoring program for dam instrumentation in accordance with recommendations by the Engineer-of-Record • Conduct thorough review of the dam performance monitoring data during the 2013 geotechnical inspection
Shoreline Erosion	• Not a concern in 2011	• Implement measures to maintain the water level in Tail Lake at 28.2 masl to prevent onset of permafrost degradation
Doris-Windy All Weather Road	• Inspect road toe lines during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion • Monitor areas where rock was relocated from the tundra for signs of thermal erosion • Implement inspection protocol to monitor shoulder cracks and potholes	• Inspect road toe lines during freshet and immediately following significant or prolonged rainfall events. Pump out ponded water to prevent onset of thermal erosion • Monitor areas where rock was relocated from the tundra for signs of thermal erosion • Implement inspection protocol to monitor shoulder cracks and potholes
Doris-Windy All Weather Road Stream Crossings	• Install the required thermistor strings and commence monitoring in accordance with recommendations in Section 3.2	• Monitor thermistor strings in accordance with recommendations in Section 3.2
Quarry A	• Continue to follow the Quarry Management Plan	• Continue to follow the Quarry Management Plan
Quarry B	• Continue to follow the Quarry Management Plan	• Continue to follow the Quarry Management Plan
Quarry D	• Continue to follow the Quarry Management Plan	• Continue to follow the Quarry Management Plan

This report, ***"2012 Doris North Annual Geotechnical Inspection Report"***, was prepared by

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All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

5 References

EBA Engineering Consultants Ltd. 1996. Boston Gold Project, Surficial Geology and Permafrost Features. Report prepared for Rescan Environmental Services Ltd., Report No. 0101-96-12259. December.

Golder Associates Ltd. 2001. Report on Thermistor Data Review – Hope Bay Project. Letter report prepared for Miramar Mining Corporation, Project No. 012-1507, November 27.

SRK Consulting (Canada) Inc. 2004. Phase I Foundation Investigation, Proposed Roberts Bay Jetty Location, Doris North Project, Hope Bay, Nunavut, Canada. Report prepared for Miramar Hope Bay Limited, Report No. 1CM014.002, April.

SRK Consulting (Canada) Inc. 2005a. Preliminary Jetty Design: Doris North Project, Hope Bay, Nunavut, Canada. Report prepared for Miramar Hope Bay Limited, Report No. 1CM014.006, October.

SRK Consulting (Canada) Inc. 2005b. Phase II Foundation Investigation, Proposed Roberts Bay Jetty Location, Doris North Project, Hope Bay, Nunavut, Canada. Report prepared for Miramar Hope Bay Limited, Report No. 1CM014.04-0110, May.

SRK Consulting (Canada) Inc. 2006. Phase III Foundation Investigation, Proposed Roberts Bay Jetty Location, Doris North Project, Hope Bay, Nunavut, Canada. Report prepared for Miramar Hope Bay Limited, Report No. 1CM014.008-260, August.

SRK Consulting (Canada) Inc. 2009a. Hope Bay Gold Project: Stage 2 Overburden Characterization Report, Hope Bay, Nunavut, Canada. Report prepared for Hope Bay Mining Limited, Report No. 1CH008.002, September.

SRK Consulting (Canada) Inc. 2009b. Hope Bay Project: Roberts Bay Jetty Thermistor Installation. Memo prepared for Hope Bay Mining Limited, Project No. 1CH008.015.400, March 30.

SRK Consulting (Canada) Inc. 2009c. Doris North Project: 2008 SRK Construction Support. Letter Report prepared for Hope Bay Mining Limited, Report No. 1CH008.004, February 12.

SRK Consulting (Canada) Inc. 2009d. Doris North Project: 2007 SRK Construction Support. Letter Report prepared for Hope Bay Mining Limited, Report No. 1CH008.025, September 29.

SRK Consulting (Canada) Inc. 2009e. 2009 Annual Geotechnical Inspection, Doris North Project, Hope Bay, Nunavut. Report prepared for Hope Bay Mining Limited, Report No. 1CH008.021, November.

SRK Consulting, 2010. Hope Bay Project Doris North Waste Rock and Ore Management Plan. Prepared for Hope Bay Mining Limited, Report no. 1CH008.029, December.

SRK Consulting (Canada) Inc. 2011a. 2010 Annual Geotechnical Inspection, Doris North Project, Hope Bay, Nunavut. Report prepared for Hope Bay Mining Limited, Report No. 1CH008.032, March.

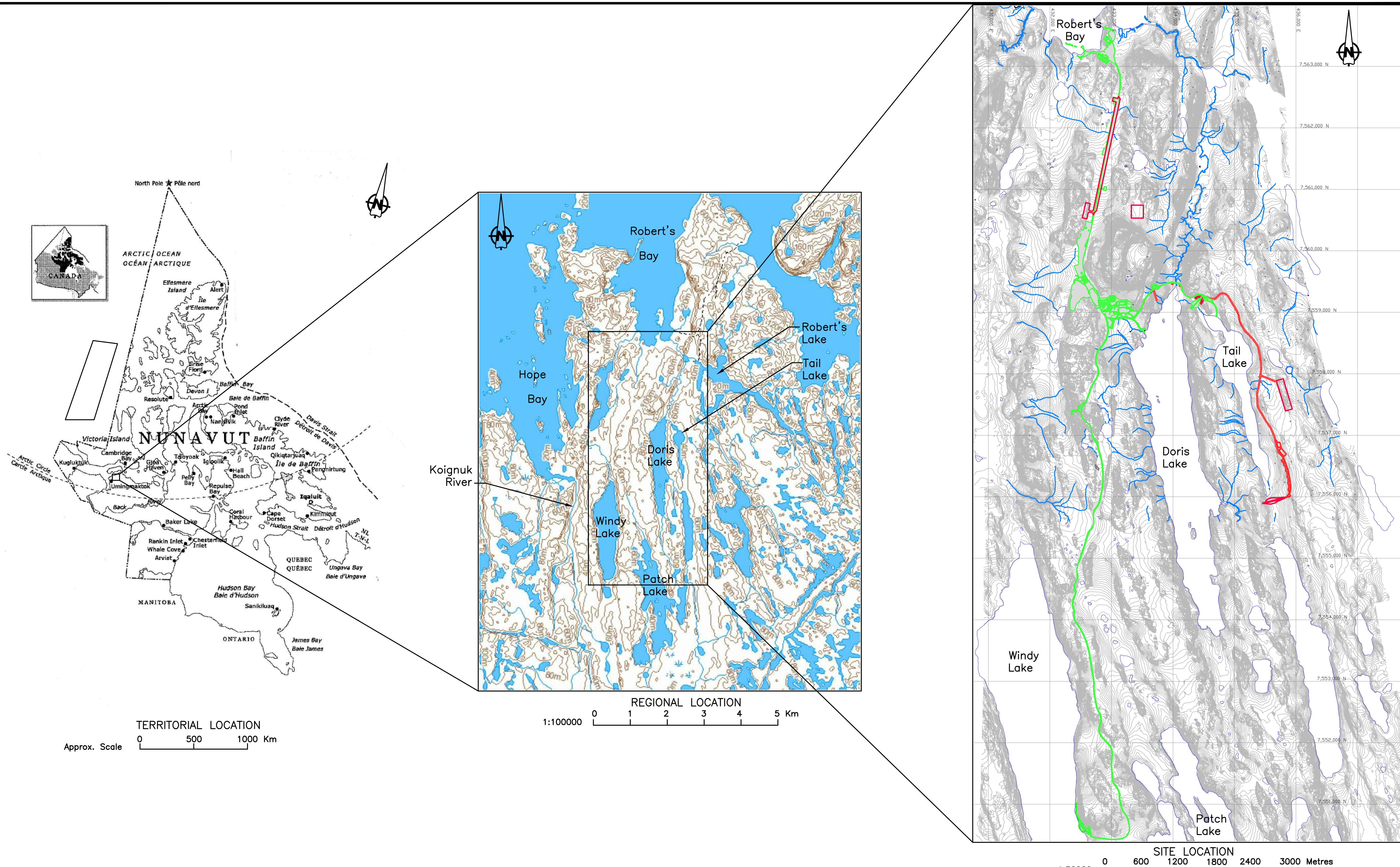
SRK Consulting (Canada) Inc. 2011b. Hope Bay Project – Geotechnical Design Parameters. Report prepared for Hope Bay Mining Limited, Report No. 1CH008.033.216, October.

SRK Consulting (Canada) Inc. 2012a. 2011 Annual Geotechnical Inspection, Doris North Project, Hope Bay, Nunavut. Report prepared for Hope Bay Mining Limited, Report No. 1CH008.046, March.

SRK Consulting (Canada) Inc. 2012b. Hope Bay Project – North Dam As-Built Report. Report prepared for Hope Bay Mining Limited. Report No. 1CH008.058, October.

SRK Consulting (Canada) Inc. 2013. Doris North Project: 2012 Annual Roberts Bay Jetty Inspection. Memo prepared for Hope Bay Mining Limited, Project No. 1CH008.066, January.

Figures



LEGEND

- Asbuilt
- Licenced but not yet constructed

srk consulting

SRK JOB NO.: 1CH008.066

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NEWMONT NORTH AMERICA

HOPE BAY MINING LTD.

2012 Geotechnical Inspection

Location Map

DATE:	APPROVED:	FIGURE:
January 2013	EMR	1

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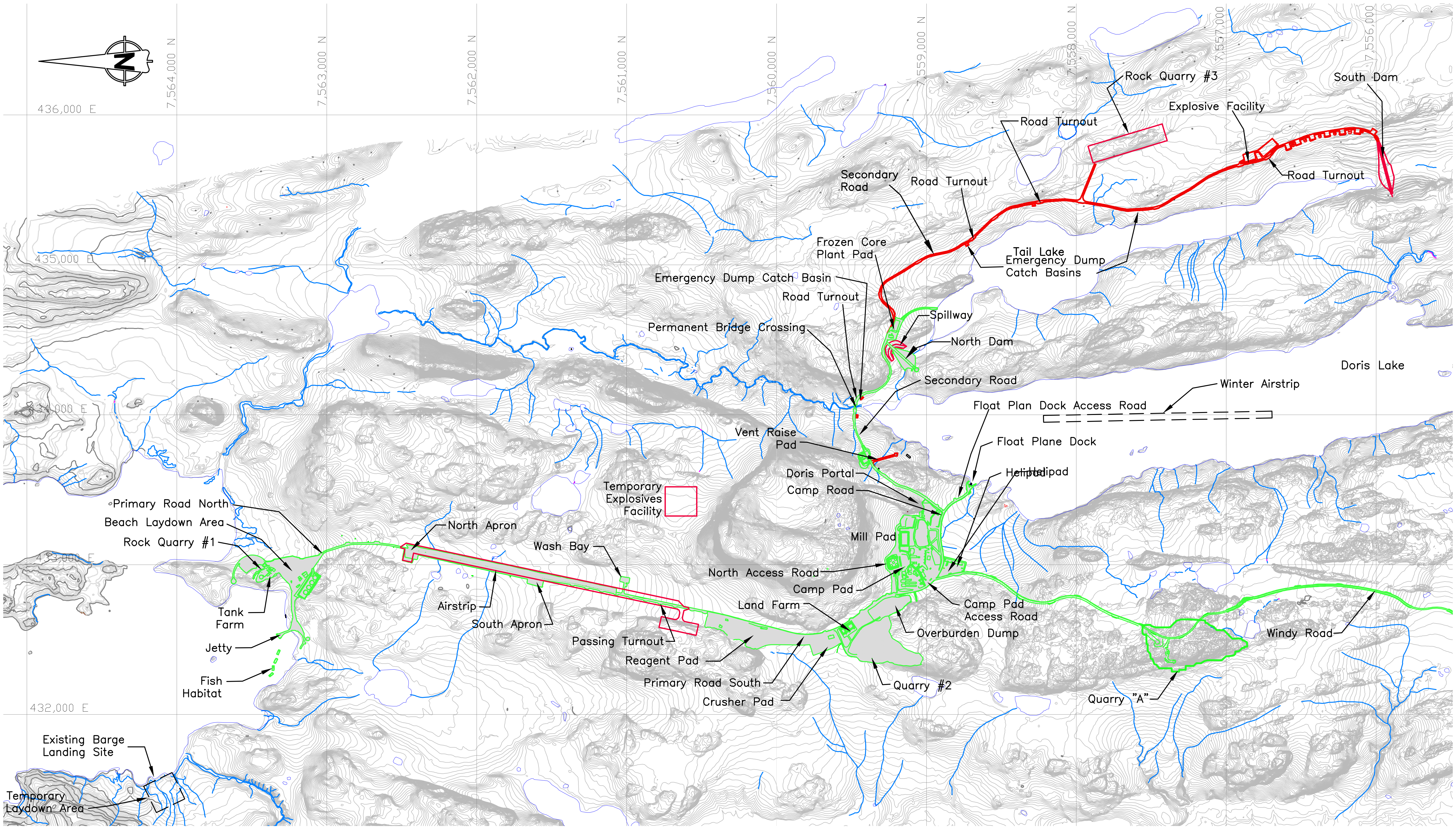


LEGEND

Asbuilt

Licenced but not yet constructed

0 200 400 600 800 1000 Metres

srk consulting

NEWMONT. NORTH AMERICA

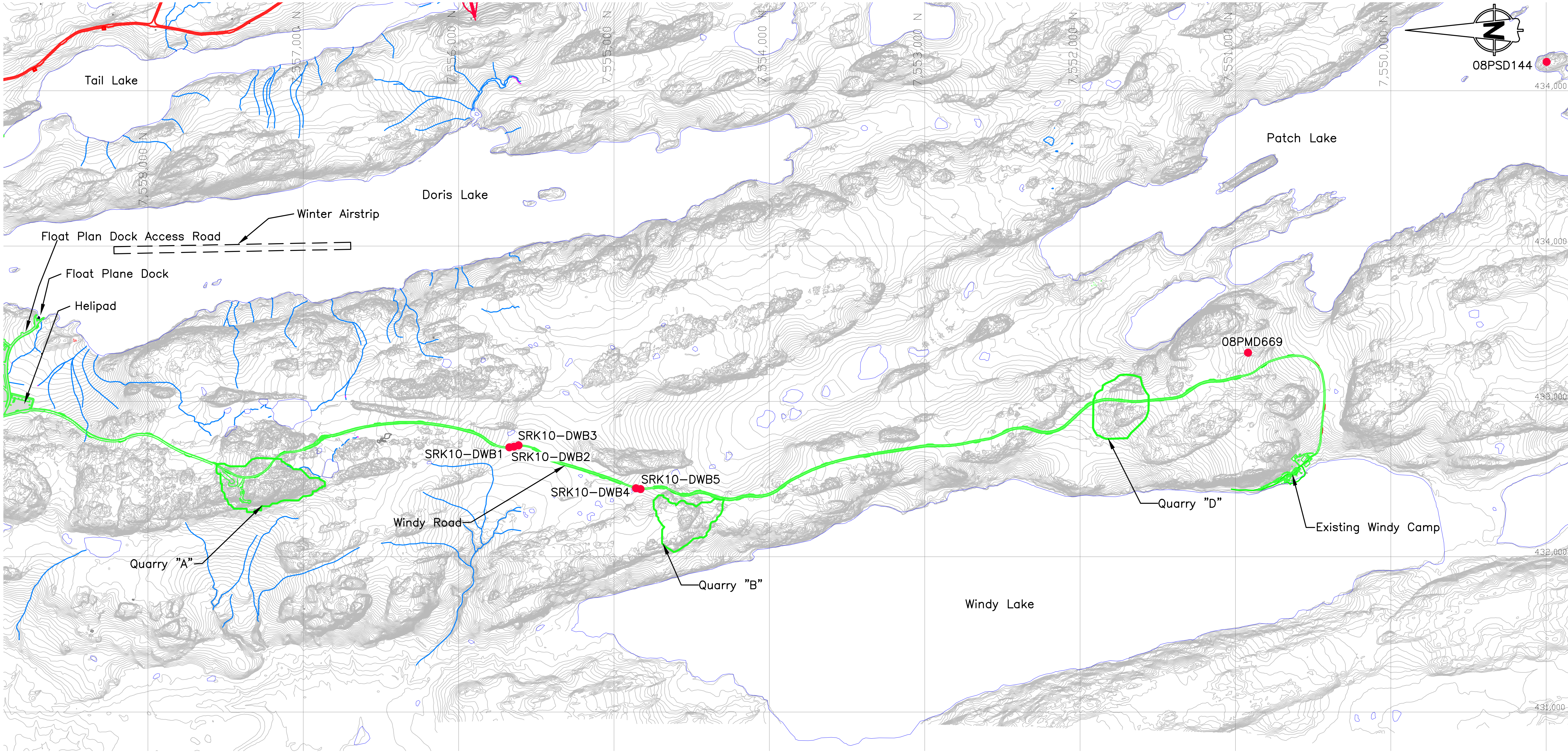
HOPE BAY MINING LTD.

2012 Geotechnical Inspection

Overall Site Layout (Sheet 1)

SRK JOB NO.: 1CH008.066	DATE: January 2013	APPROVED: EMR	FIGURE: 2
FILE NAME: 1CH008_032-GT10-1-20130205.dwg			

J:\01_SITES\Hope.Bay\1CH008.046_2011 Annual Geotech Inspection\040_AutoCAD\1CH008_032-GT10-1-20130205.dwg



LEGEND

- Active Thermistor Installation
- Inactive Thermistor Installation
- Status Unknown
- Westbay Wells
- Proposed Thermistor Location
- Asbuilt
- Licensed but not yet Constructed

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NEWMONT NORTH AMERICA

HOPE BAY MINING LTD.

2012 Geotechnical Inspection

Overall Site Layout (Sheet 2)

SRK JOB NO.: 1CH008.066	DATE: January 2013	APPROVED: EMR	FIGURE: 3
FILE NAME: 1CH008_032-GT10-1-20130205.dwg			

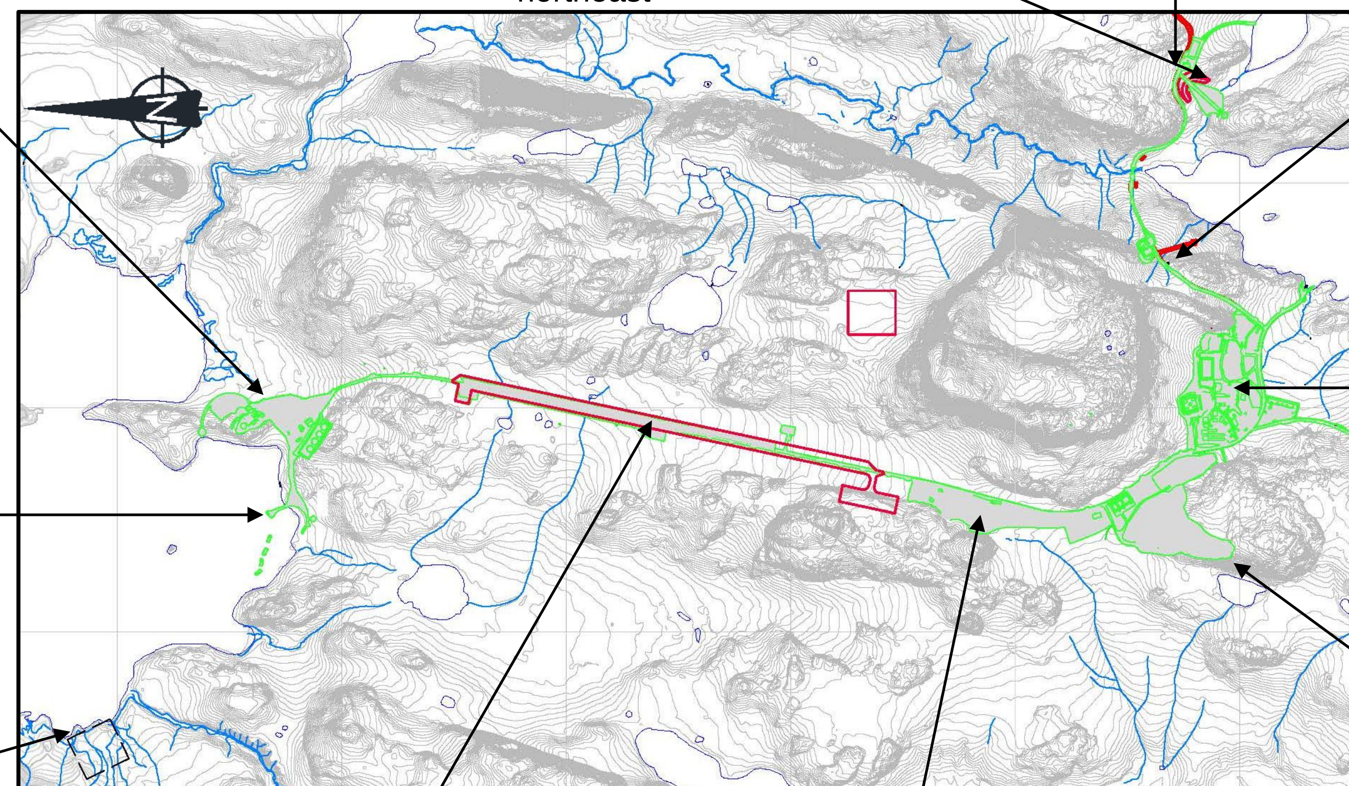
J:\01_SITES\Hope.Bay\1CH008.046_2011 Annual Geotech Inspection\040_AutoCAD\1CH008_032-GT10-1-20130205.dwg

View of Roberts Bay Fuel Tank Farm, Jetty and Laydown area

Aerial view of the North Dam looking northeast

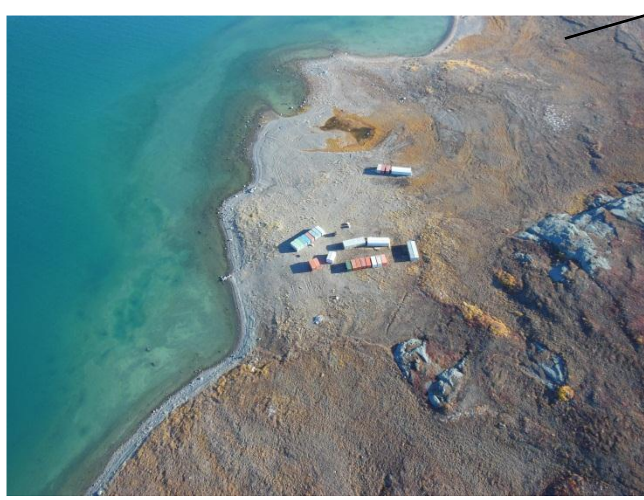
Secondary Road heading west towards camp

View of Roberts Bay Fuel Tank Farm, Jetty and Laydown area



Aerial view of camp

Landfarm and Quarry 2

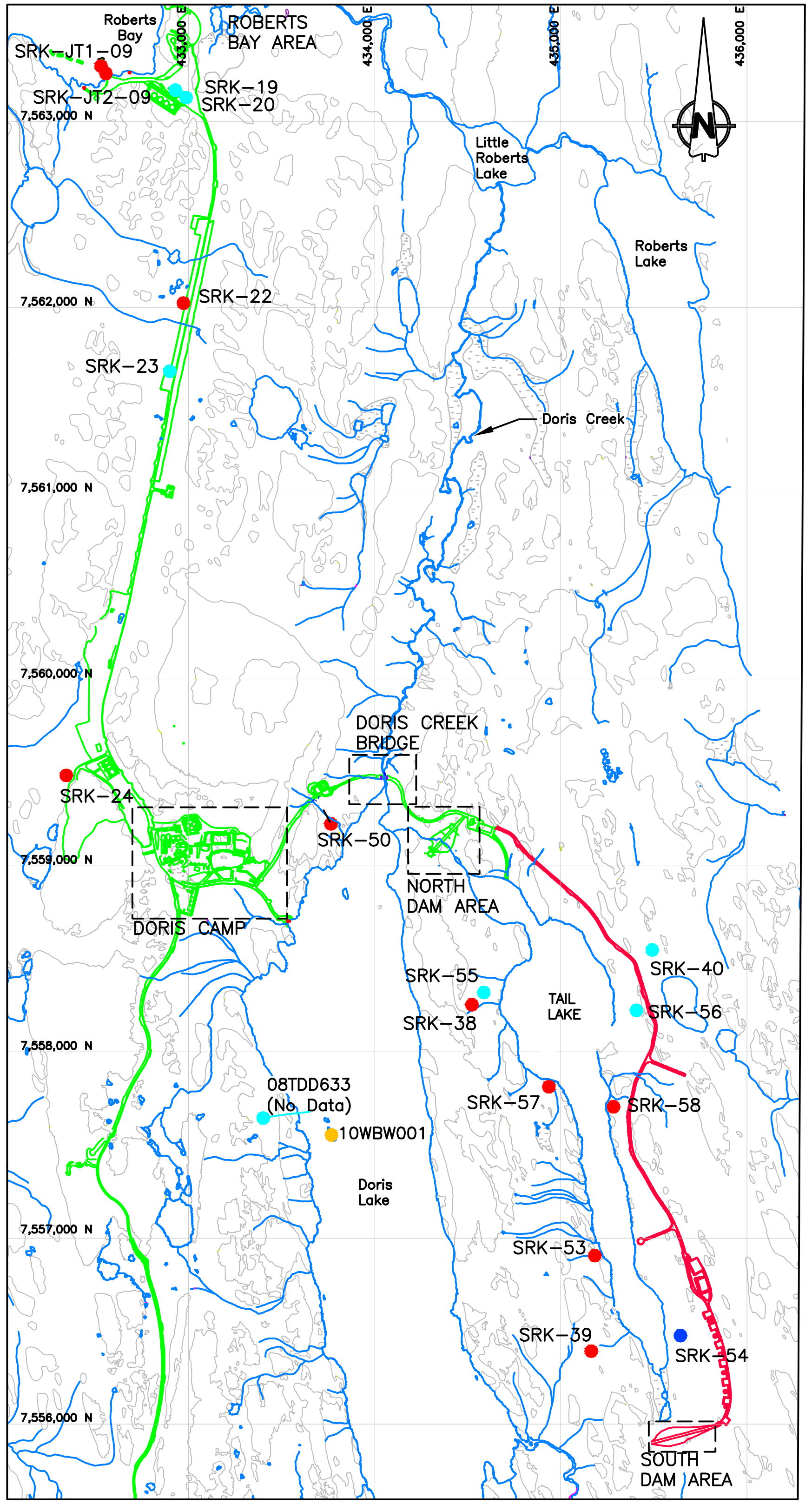


Aerial view of old beach laydown area

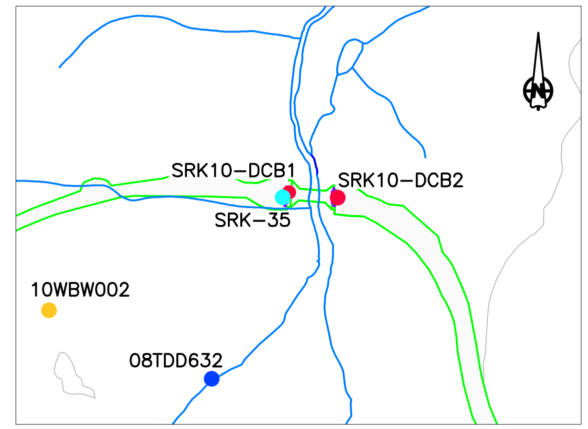
Airstrip

Upper and Lower Reagent Pads

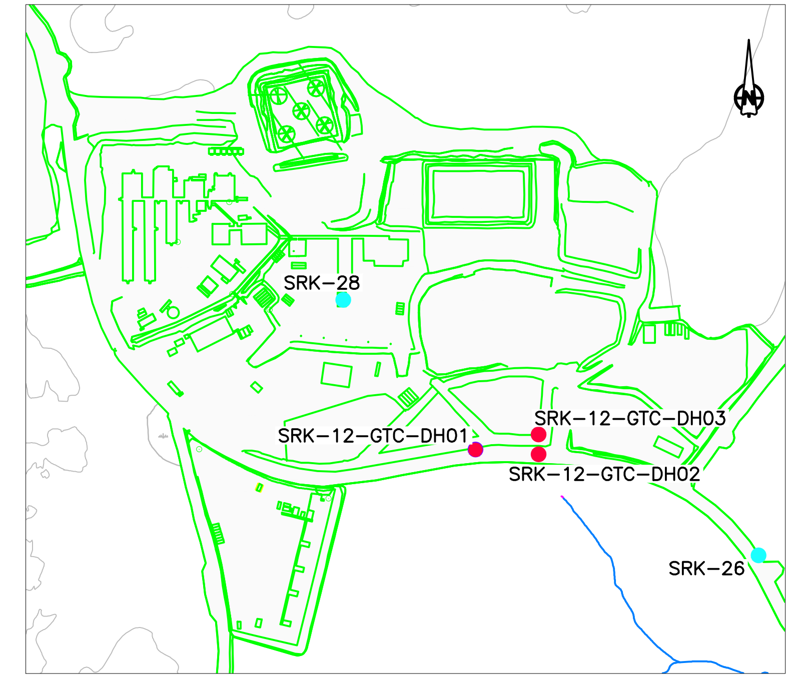
srk consulting	NEWMONT NORTH AMERICA	2012 Geotechnical Inspection		
		Current Site Layout		
Job No: 1CH008.066 Filename: 2012GeotechInsp_rev1_sw	**HOPE BAY MINING LTD.**	Date: January 2013	Approved: LW	Figure: 4



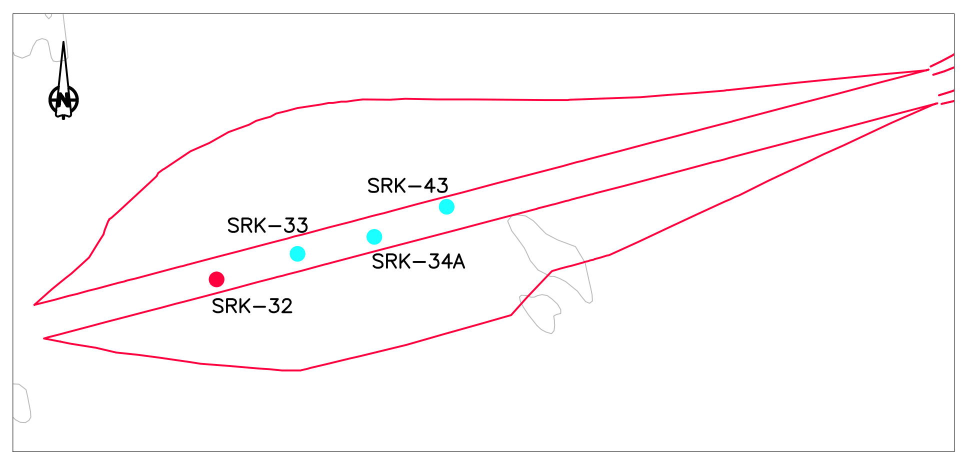
DORIS NORTH OVERVIEW



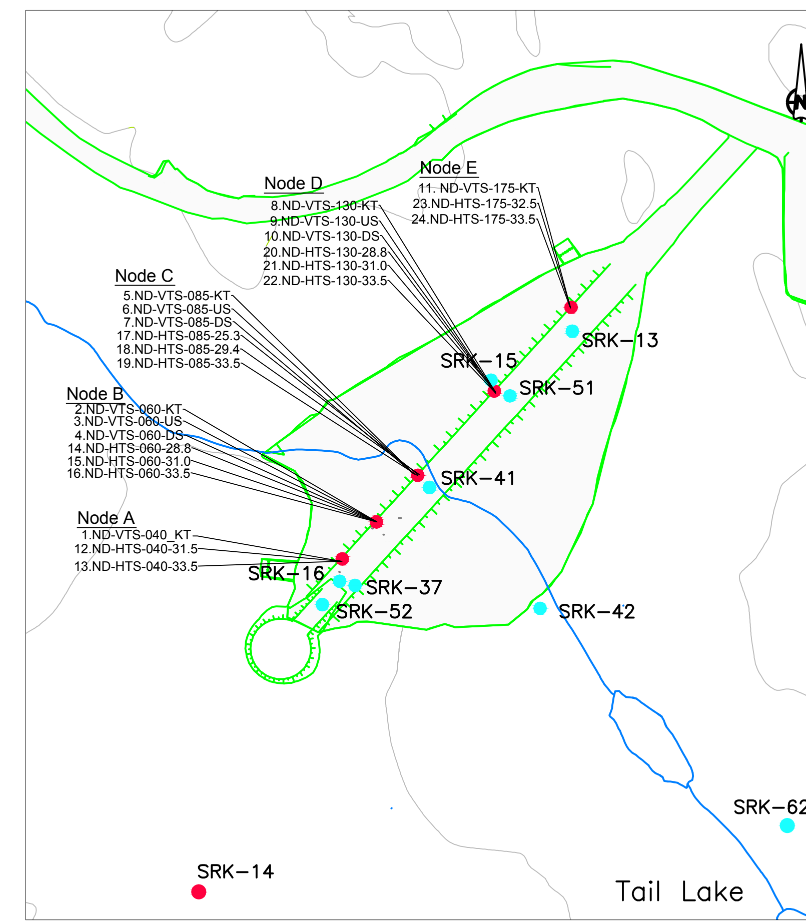
DORIS CREEK BRIDGE



DORIS CAMP



SOUTH DAM AREA



NORTH DAM AREA

LEGEND

- Active Thermistor Installation
- Inactive Thermistor Installation
- Status Unknown
- Westbay Wells
- Proposed Thermistor Location
- Asbuilt
- Licensed but not yet Constructed

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NEWMONT NORTH AMERICA

SRK JOB NO.:	1CH008.066
FILE NAME:	1CH008_032-GT09-3-20130205.dwg

HOPE BAY MINING LTD.

2012 Geotechnical Inspection

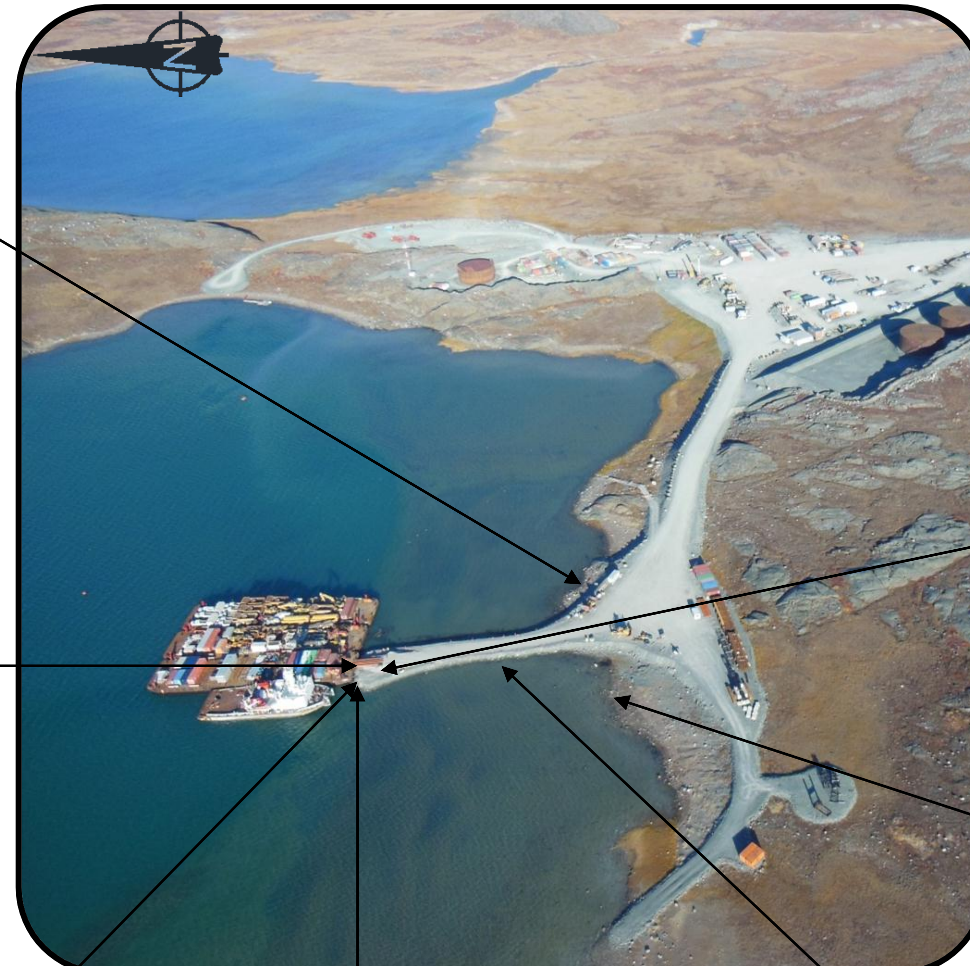
Thermistor Locations

DATE:	APPROVED:	FIGURE:
Jan. 2013	EMR	5

J:\01_SITES\Hope.Bay\1CH008.046_2011 Annual Geotech Inspection\040_AutoCAD\1CH008_032-GT09-3-20130205.dwg

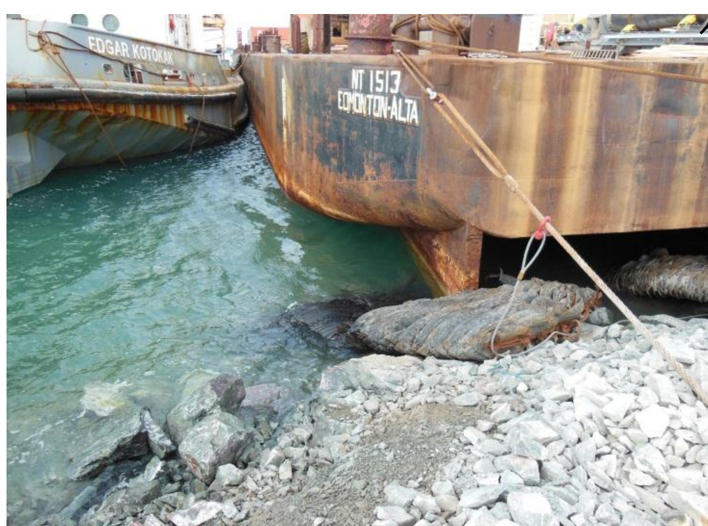
Eastern shoreline of Jetty – looking south

Jetty surface looking south



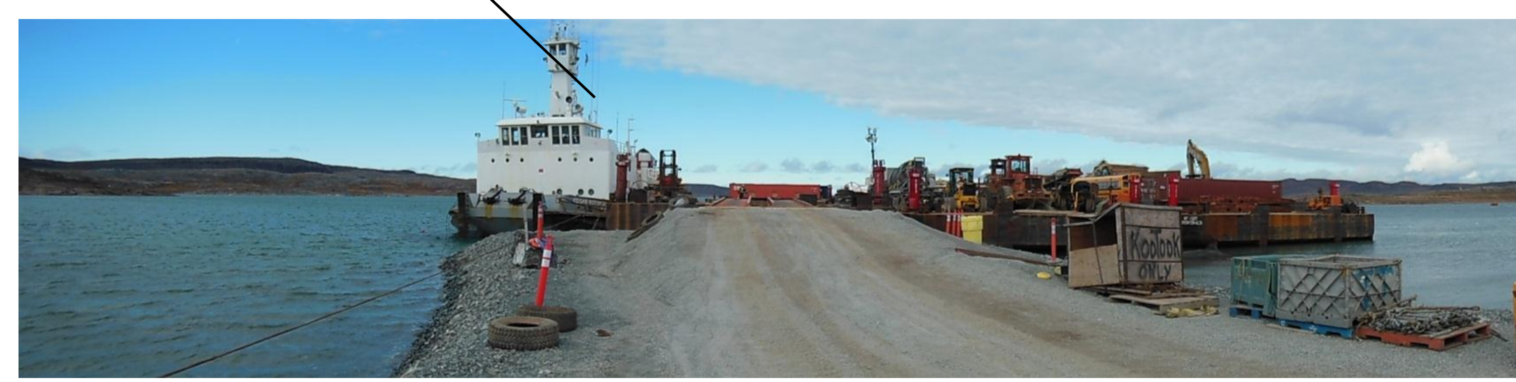
Western Jetty Shoreline showing ground temperature cable SRK-JT1-09

Western shoreline of Jetty Shoreline showing the ground temperature cables – looking south



Toe of Jetty. Exposed geotextile placed on marine sediments

Condition of ground temperature cable SRK-JT1-09



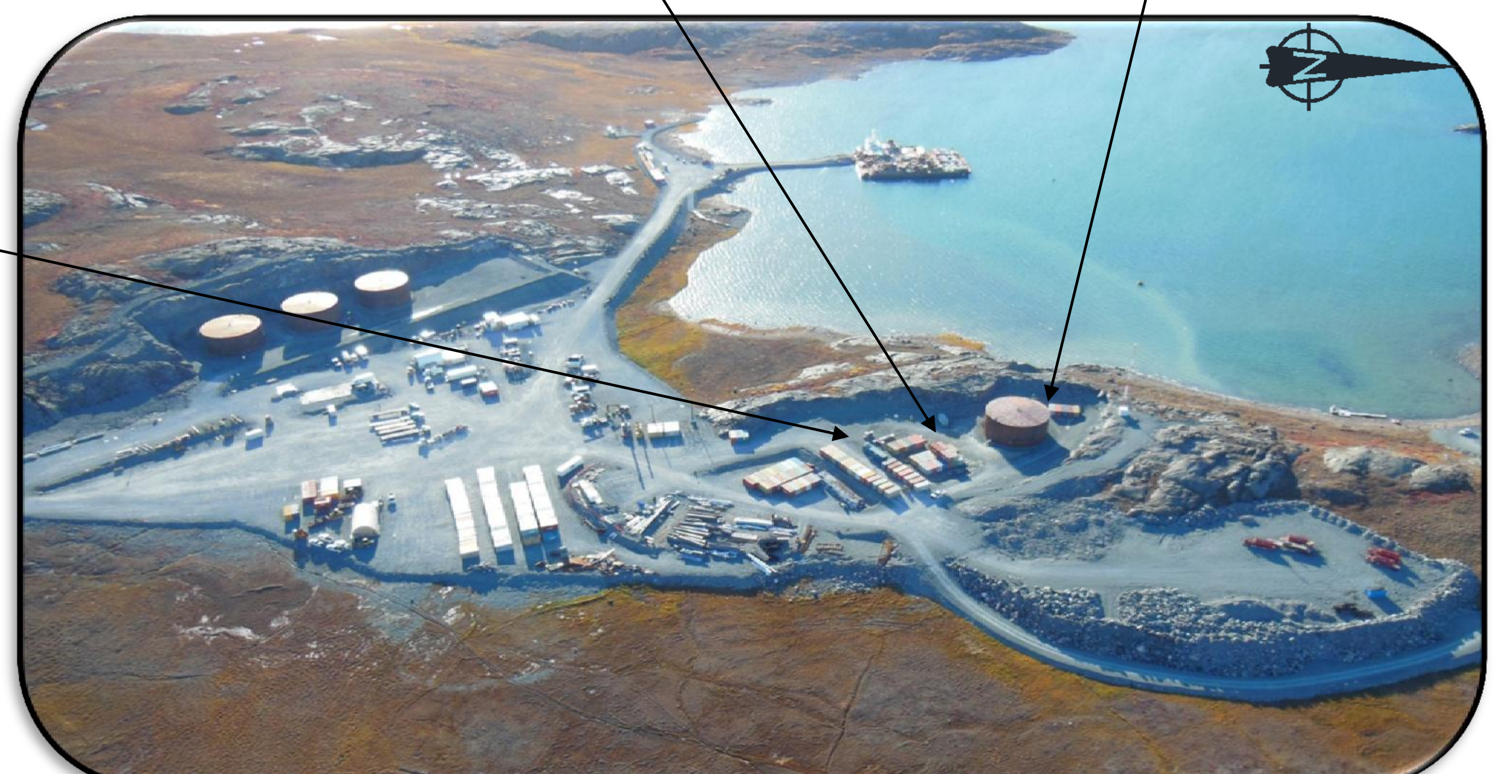
North end of Jetty showing earth fill ramp to resist loading barges – looking north

srk consulting	NEWMONT NORTH AMERICA	2012 Geotechnical Inspection
		Jetty and Shoreline Laydown Area
Job No: 1CH008.066 Filename: 2012GeotechInsp_rev1_sw.pptx	**HOPE BAY MINING LTD.**	Date: January 2013 | Approved: LW | Figure: 6

5ML Fuel Tank Farm looking south from the Radio Tower

5ML Fuel Tank Farm looking north from Western high wall

Fuel transfer station ramp and access



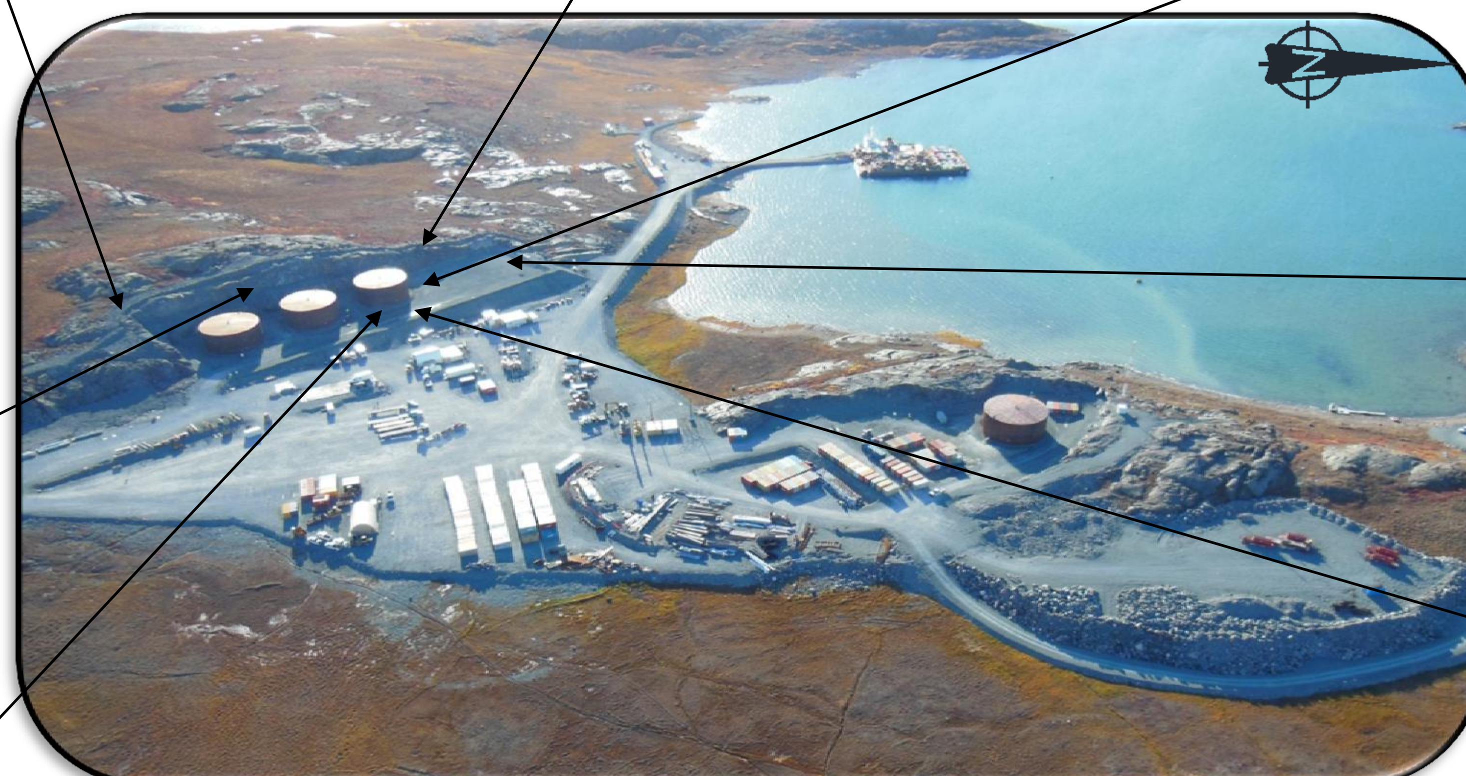
srk consulting	NEWMONT NORTH AMERICA	2012 Geotechnical Inspection **Quarry #1 Tank Farm**
Job No: 1CH008.066 Filename: 2012GeotechInsp_rev1_sw.pptx	**HOPE BAY MINING LTD.**	Date: January 2013 / Approved: LW / Figure: 7


Condition of the South Highwall


High wall reinforcement along the top of the west high wall


Fuel tank and western high wall


Interior Berm along western high wall showing the liner has been exposed




Interior Berm that show evidence of being in contact with the blade of a


Interior Berm that shows evidence of wheeled traffic. Looking north from Tank #3


Pedestal of Tank #3 that has been undercut

srk consulting	NEWMONT NORTH AMERICA	2012 Geotechnical Inspection
		Roberts Bay 20M L Tank Farm
Job No: 1CH008.066 Filename: 2012GeotechInsp_rev1_sw.pptx	**HOPE BAY MINING LTD.**	Date: January 2013 / Approved: LW / Figure: 8

Looking north towards the 5ML Fuel Tank Farm from the south end of the 20 ML Fuel tank Farm

Roberts Bay laydown area looking northeast from the western high wall of the 20 ML Fuel Tank Farm

Roberts Bay laydown area looking southwest across the 5ML Fuel Tank Farm

srk consulting	NEWMONT. NORTH AMERICA	2012 Geotechnical Inspection
		Roberts Bay Laydown Area
Job No: 1CH008.066 Filename: 2012GeotechInsp_rev1_sw.pptx	**HOPE BAY MINING LTD.**	Date: January 2013 / Approved: LW / Figure: 9

Toe of Roberts Bay access road looking east with the overburden stockpile to the right

Roberts Bay access road looking west

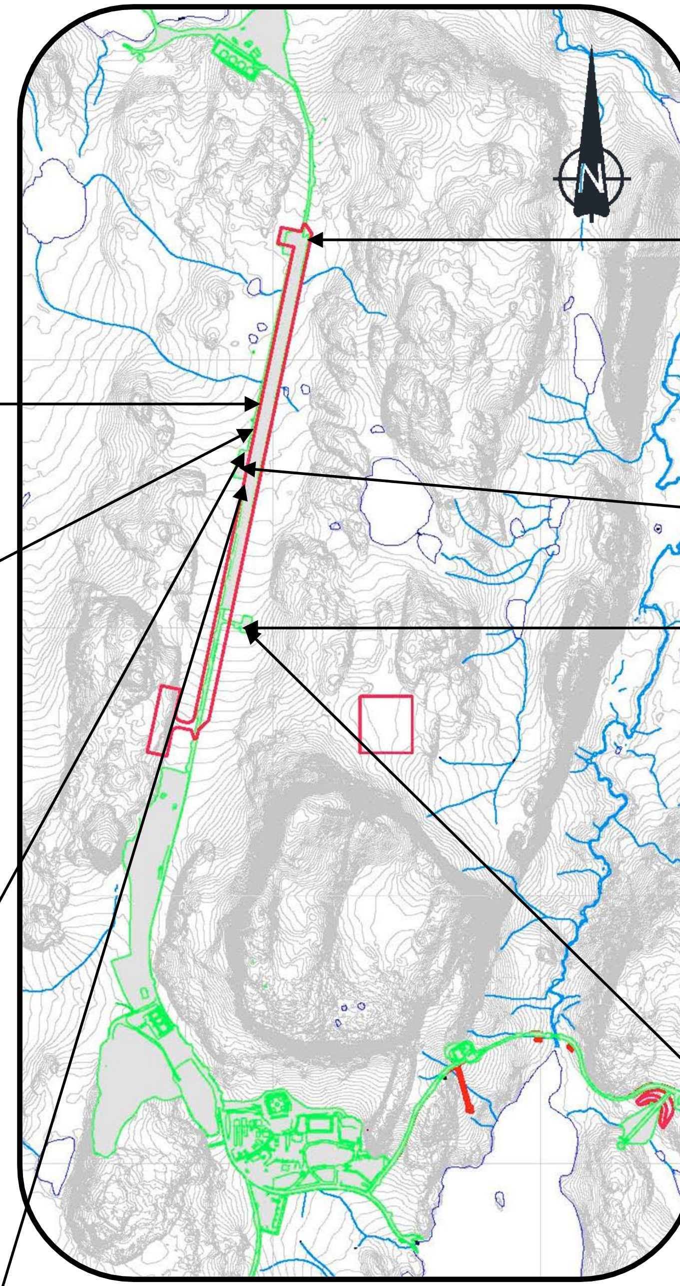
Looking south towards the Roberts Bay laydown from the end of the Roberts Bay access road

srk consulting	NEWMONT NORTH AMERICA	2012 Geotechnical Inspection
		Roberts Bay Overburden Dump Area
Job No: 1CH008.066 Filename: 2012GeotechInsp_rev1_sw.pptx	**HOPE BAY MINING LTD.**	Date: January 2013 | Approved: LW | Figure: 10

Tension cracks along west side of run-way

Tension cracks along west side of run-way

Sinkholes and erosion gully on the south edge of the South Apron



Aerial view of the South Apron

Aerial view of the North Apron

Explosives AN/FO Mixing Facility

Sinkholes and erosion gully on South Apron

Explosives Mixing Plant and Airstrip Expansion

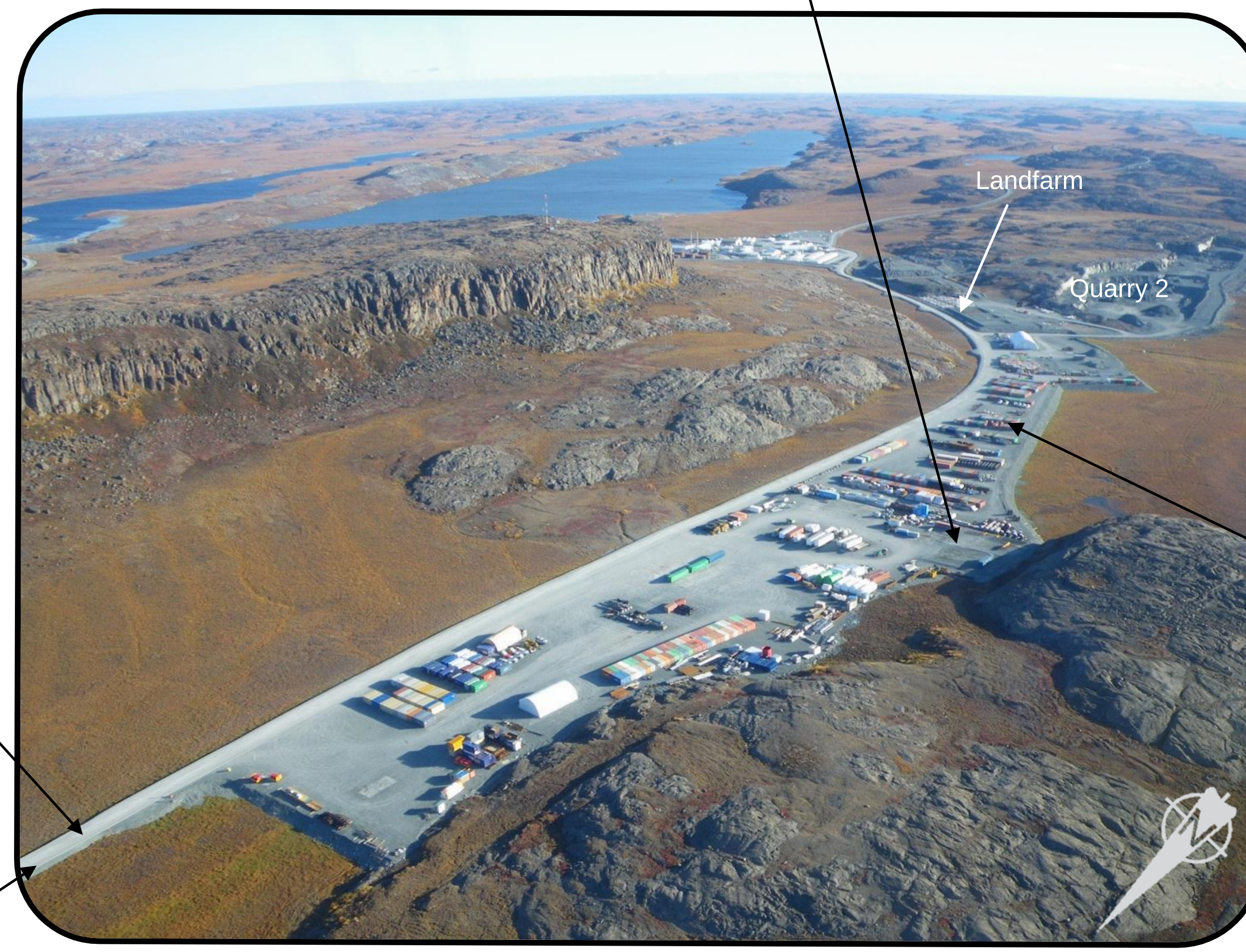
Ponding of surface water along the west side of the airstrip

srk consulting	NEWMONT NORTH AMERICA	2012 Geotechnical Inspection
		Airstrip
Job No: 1CH008.066 Filename: 2012GeotechInsp_rev1_sw.pptx	**HOPE BAY MINING LTD.**	Date: January 2013 / Approved: LW / Figure: 11

Upper Reagent Pad AN storage

Upper Reagent Pad AN storage

Primary Road from Airstrip to Robert's Bay
Laydown Area



Primary Road from Airstrip to Upper Reagent Pad

Lower Reagent Pad

srk consulting	NEWMONT NORTH AMERICA	2012 Geotechnical Inspection **Primary Road, Reagent Pads, and AN Storage**
Job No: 1CH008.066 Filename: 2012GeotechInsp_rev1_sw.pptx	**HOPE BAY MINING LTD.**	Date: January 2013 | Approved: LW | Figure: 12

Aerial view of the Overburden Stockpiles

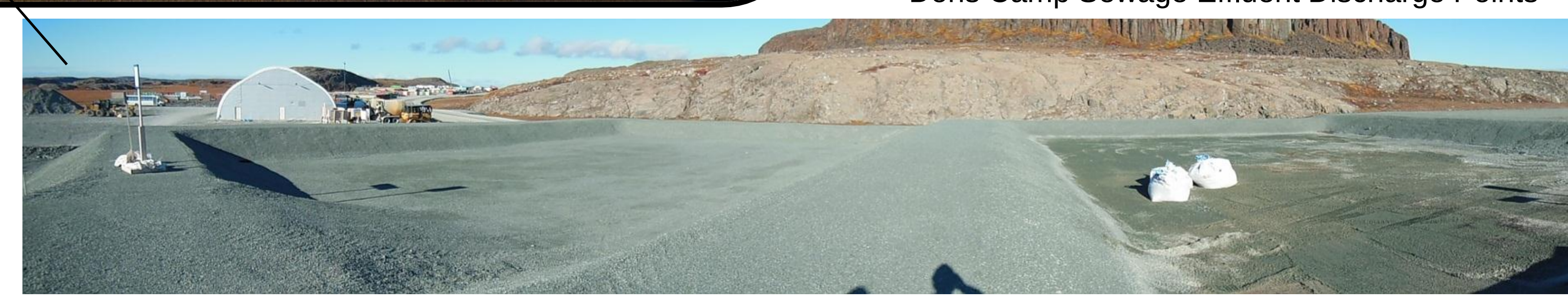
Doris North Landfarm – Contaminated Soil Pond

Aerial view of the Overburden Stockpiles with Doris North Camp in the background

Doris North Landfarm and concrete batch plant

Doris Camp Sewage Effluent Discharge Points

Doris North Landfarm Contaminated Snow Pond



Doris North Landfarm with the Water Pond on the left and the Contaminated Snow Pond on the right

srk consulting	NEWMONT NORTH AMERICA	2012 Geotechnical Inspection
		Quarry #2, Crusher and Landfarm
Job No: 1CH008.066 Filename: 2012GeotechInsp_rev1_sw.pptx	**HOPE BAY MINING LTD.**	Date: January 2013 · Approved: LW · Figure: 13

5ML Fuel Tank Farm north high way

Internal Pipe Supports in the Pad R 5ML Fuel Tank Farm

Power Plant Exhaust on Pad B

Exposed Grounding Cable in the 5ML Fuel Tank Farm in Pad R

Conduit from the toe of Pad B under the access road coming out by the arctic corridor loading towards the admin and mine day buildings

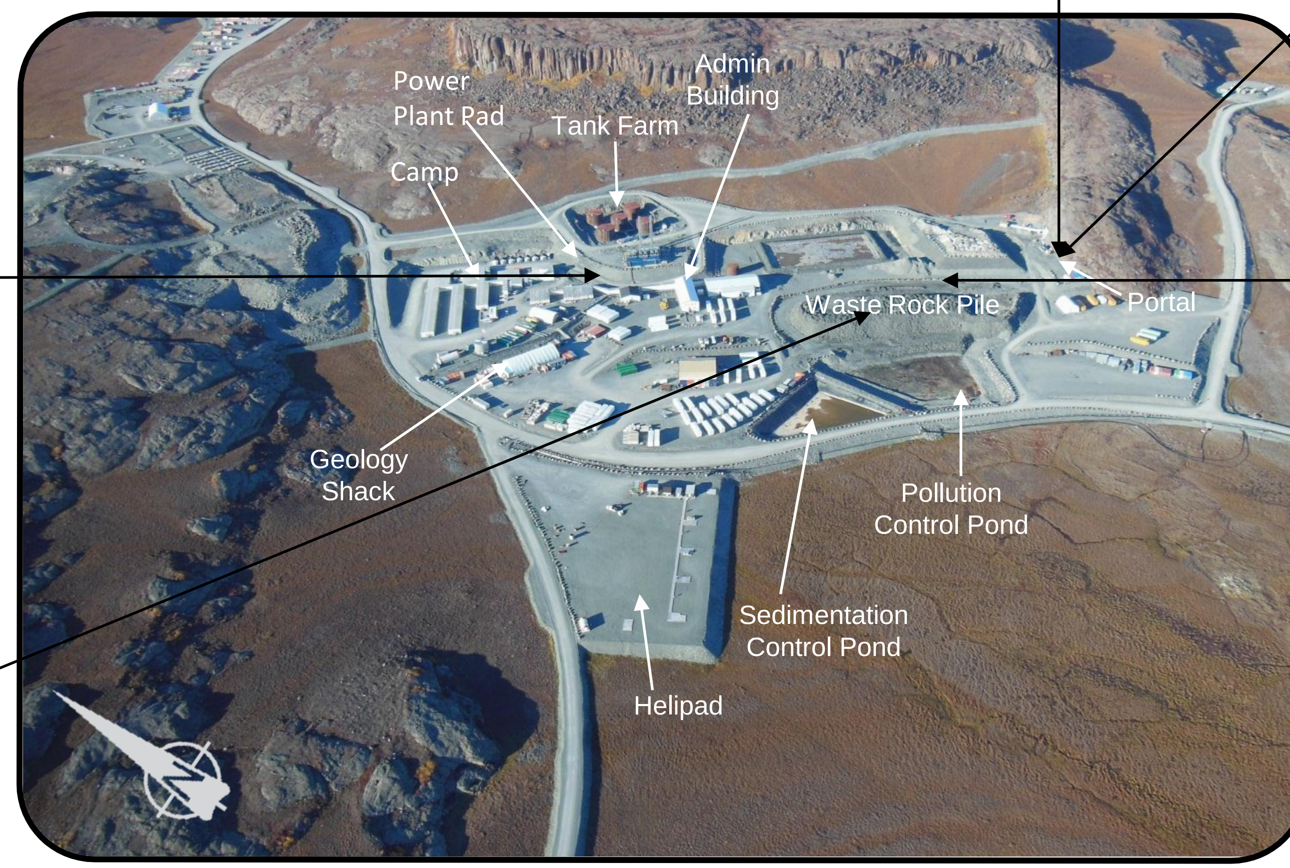
Crest of Pad B

srk consulting	NEWMONT NORTH AMERICA	2012 Geotechnical Inspection
Job No: 1CH008.066	HOPE BAY MINING LTD.	**Tank Farm and Pad B**
Filename: 2012GeotechInsp_rev1_sw.pptx		Date: January 2013 / Approved: LW / Figure: 14

Portal entrance looking north from the ramp leading up to Pad H/J

Portal entrance looking east from Pad B

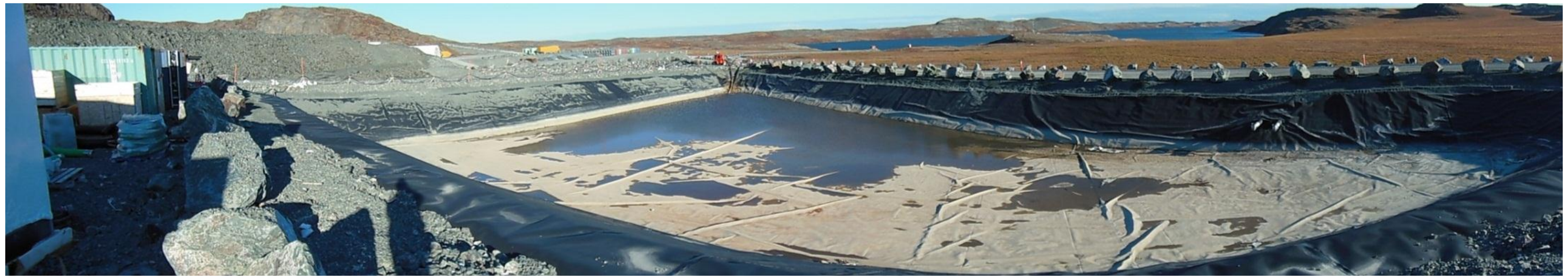
Pad X Highwall looking west from Pad B



Pad Q expansion over Pads H/J with Waste Rock looking north from the top of the waste rock floor of Pad I

Standing on top of the Waste Rock Pile on Pad I looking East to Pads L and F

srk consulting	NEWMONT NORTH AMERICA	2012 Geotechnical Inspection
		Portal, Helipad and Other pads
Job No: 1CH008.066 Filename: 2012GeotechInsp_rev1_sw.pptx	**HOPE BAY MINING LTD.**	Date: January 2013 / Approved: LW / Figure: **15**



Panoramic view of the Temporary Pond taken from The Power Plant

Start of the Diversion Berm north of the Portal

Temporary Pond on Pad D looking east from the north east corner of Pad B

Exposed liner along the crest of the Berm

The exposed liner in the Temporary Pond on Pad D. Looking south from the Doris North Access Road

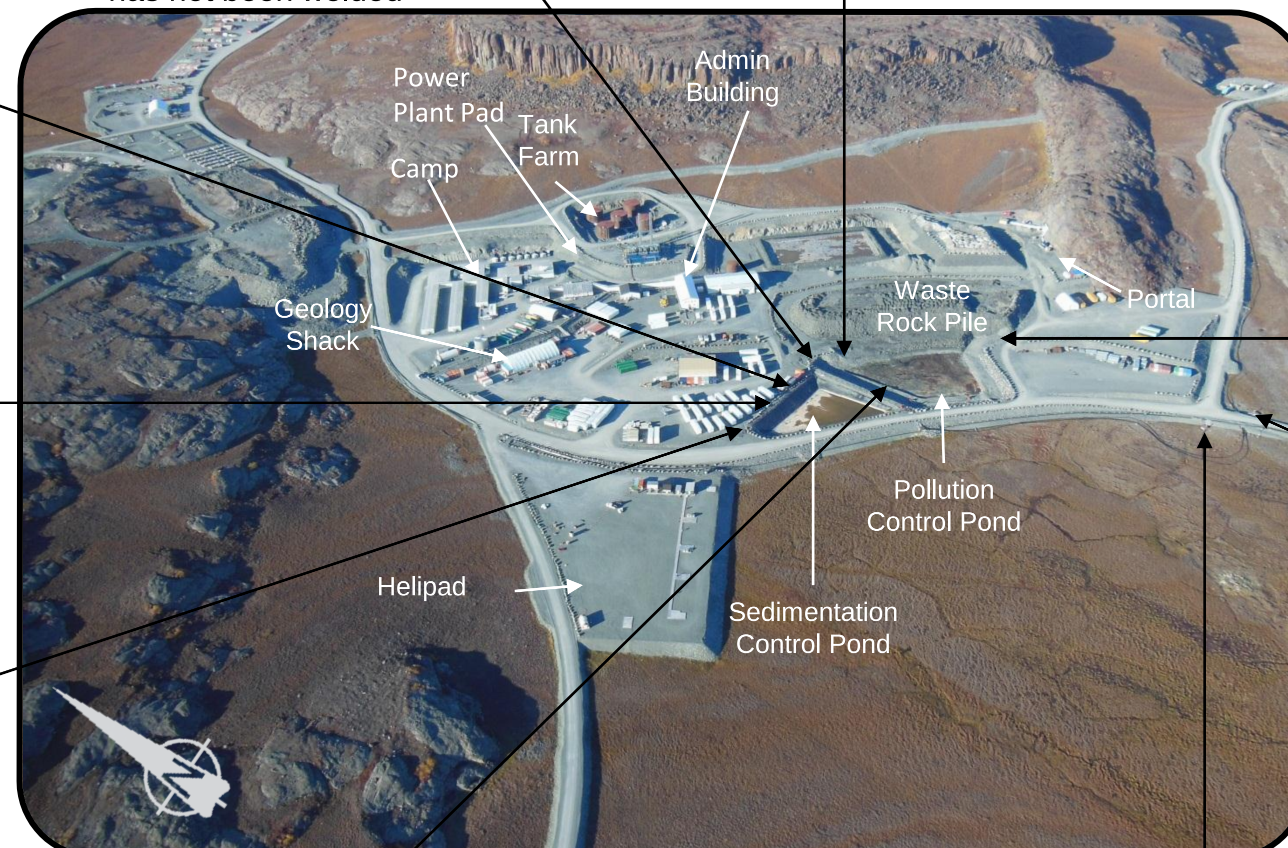
Panoramic view of the Pad D high wall looking north while standing on the top of the southwest corner of the Temporary Pond Berm

srk consulting	NEWMONT. NORTH AMERICA	2012 Geotechnical Inspection
		Temporary Pond and Diversion Berm
Job No: 1CH008.066 Filename: 2012GeotechInsp_rev1_sw.pptx	**HOPE BAY MINING LTD.**	Date: January 2013 / Approved: LW / Figure: 16

A puncture in the liner at the top northeast corner of the Sedimentation Pond

A gap in the overlap of two liner panels that has not been welded

Cuts in the liner at the top northeast corner of the Sedimentation Pond



Tension cracks on the interior bench of the Pollution Control Pond

Sump #2 looking north into camp

Sediment Control Pond looking east from Pad E/P

Pollution Control Pond looking southeast from the north end of the diversion berm

Sump #1 looking west out onto the tundra

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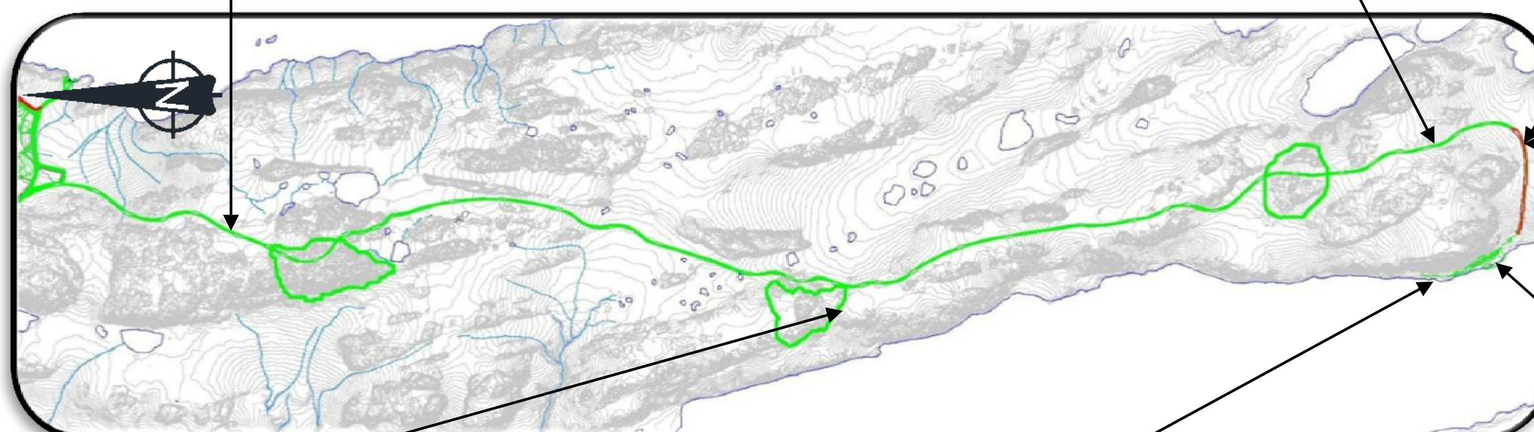
Job No: 1CH008.066 Filename: 2012GeotechInsp_rev1_sw.pptx	**HOPE BAY MINING LTD.**	Date: March 2013 / Approved: LW / Figure: 17

Looking south along Doris-Windy Road Towards Quarry A

Looking north above the Doris-Windy Road towards Quarry D (area the new Windy Camp)

Aerial view of the Core Storage Area and Doris-Windy Road leading to Windy Camp (right), looking south



Doris-Windy Road leading to Windy Camp where no surfacing material has been placed

A turn-out in the foreground with a carbon crossing in the center of the photo

Aerial view of Windy Camp looking south

Aerial view of Windy Camp looking north

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NORTH AMERICA

2012 Geotechnical Inspection

Doris-Windy All Weather Road

Job No: 1CH008.066

Filename: 2012GeotechInsp_rev1_sw.pptx

HOPE BAY MINING LTD.

Date:	Approved:	Figure:
January 2013	LW	18

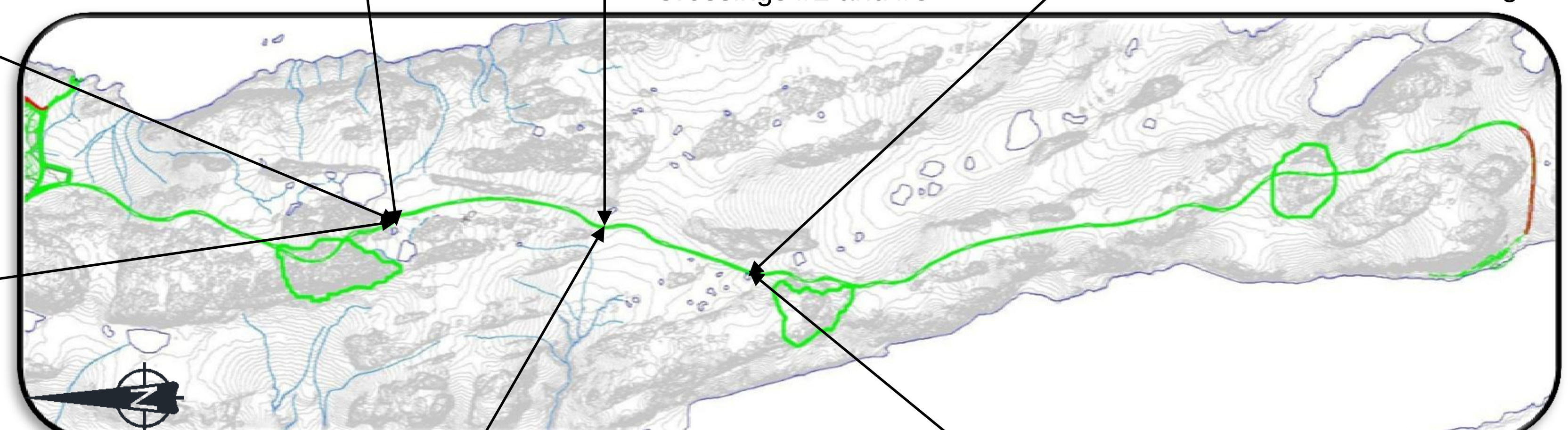
Arched Culvert #1

Condition of the battered and straight piles along the north side of Arched Culvert #1

Small sinkholes were observed where the abutment joined the bridges for Stream Crossings #2 and #3

Sink holes were observed where the abutment joins the bridges for Stream Crossing #4

Water running against the north piles around Culvert #1



Stream Crossing #4

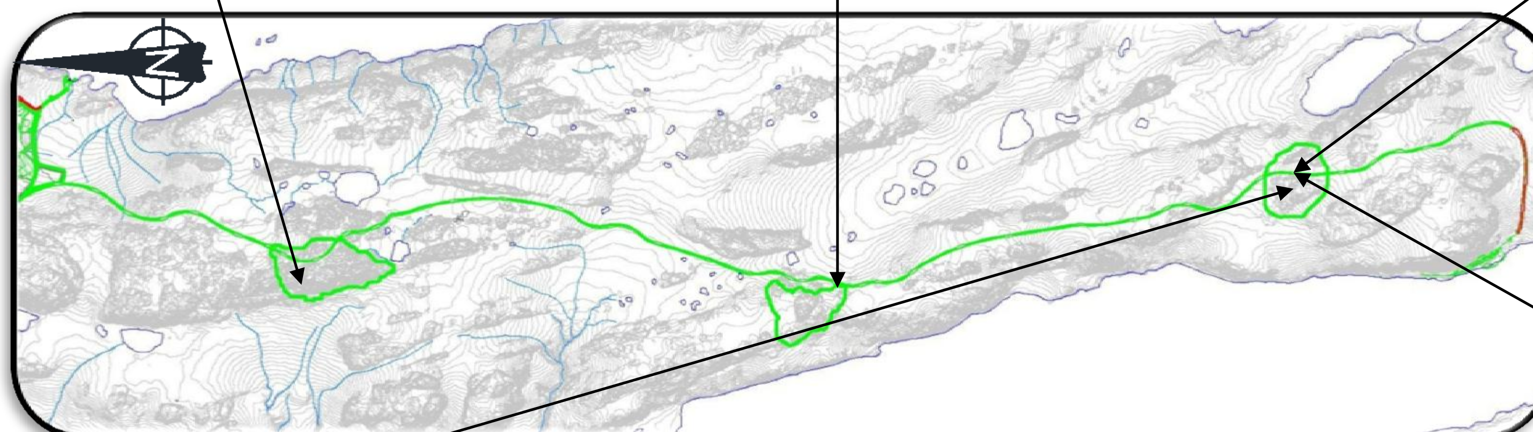
Stream Crossing #2 and #3

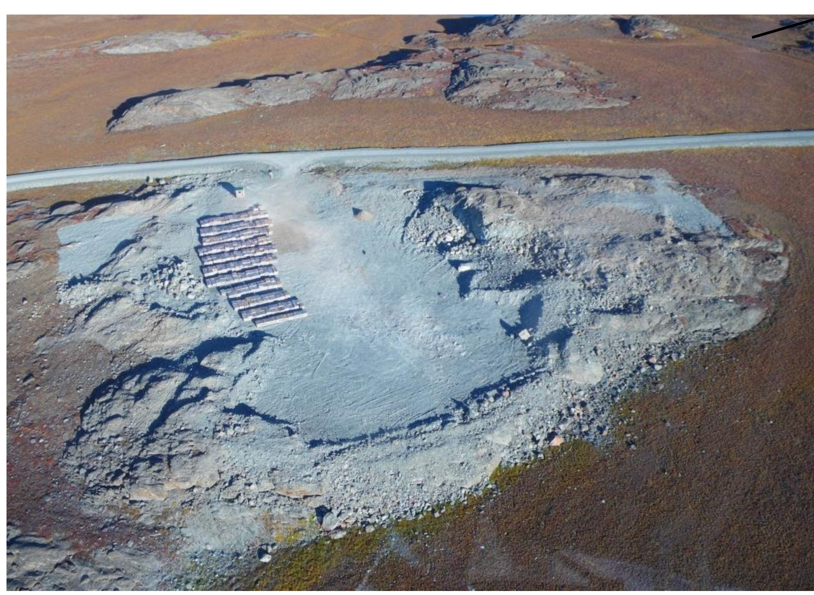
srk consulting	NEWMONT NORTH AMERICA	2012 Geotechnical Inspection **Doris-Windy All Weather Road Stream Crossings**		
Job No: 1CH008.066 Filename: 2012GeotechInsp_rev1_sw.pptx	**HOPE BAY MINING LTD.**	Date: January 2013	Approved: LW	Figure: 19

The two type of explosives magazines located in Quarry A

Quarry B with seismic monitoring stations

Quarry D - overburden stockpile with relocated core boxes from Windy Camp





Quarry D – the location of the new Windy Camp

Quarry D – overburden stockpile

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2012 Geotechnical Inspection

Doris-Windy All Weather Road Quarries

Job No: 1CH008.066

Filename: 2012GeotechInsp_rev1_sw.pptx

HOPE BAY MINING LTD.

Date: January 2013

Approved: LW

Figure: 20

Primary Vent Raise Plenum

Secondary Road slope failure

Toe of the Primary Vent Raise Pad

Doris Creek Bridge

Primary Vent Raise Surface Infrastructure

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		Secondary Road and Doris Crossing Bridge
Job No: 1CH008.066 Filename: 2012GeotechInsp_rev1_sw.pptx	**HOPE BAY MINING LTD.**	Date: March 2013 / Approved: LW / Figure: 21

Closer view of Tail Lake shoreline – looking southeast

The shoreline of the lake has been flooded due to the increased elevation of Tail Lake

Pump station and water intake line located at the west upstream toe of the dam. The inundated Tail Lake shoreline in the background

Tail Lake Access Road

Closer view of Tail Lake shoreline – looking west

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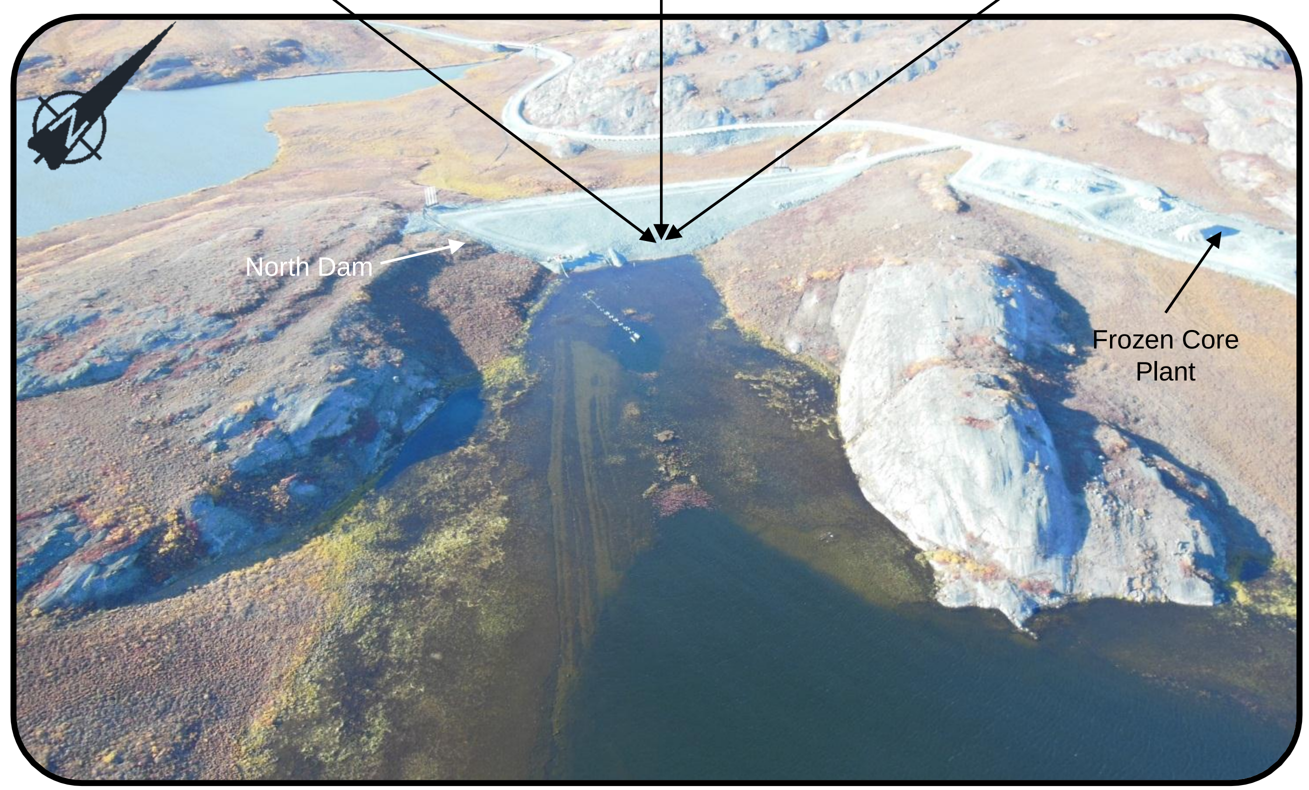
		Tail Lake Access Road and Shoreline Erosion
Job No: 1CH008.066 Filename: 2012GeotechInsp_rev1_sw.pptx	**HOPE BAY MINING LTD.**	Date: January 2013 · Approved: LW · Figure: 22

Upstream face looking east

View of the upstream face of the North Dam looking northeast

Upstream face looking west

A sinkhole in the upstream face of the North Dam



srk consulting	NEWMONT. NORTH AMERICA	2012 Geotechnical Inspection
		North Dam Upstream
Job No: 1CH008.066 Filename: 2012GeotechInsp_rev1_sw.pptx	**HOPE BAY MINING LTD.**	Date: January 2013 / Approved: LW / Figure: 23

The downstream face of the North Dam looking East from the Base of the East Radiator Foundation

Instrumentation installed in the downstream face of the North Dam


Sink Hole in the downstream face of the North Dam


Stream gauge installed in Tail Lake Creek


Tail Lake Creek Downstream of the North Dam

Tail Lake Creek

Down Stream Face of the North Dam. Tail Lake Creek in the foreground

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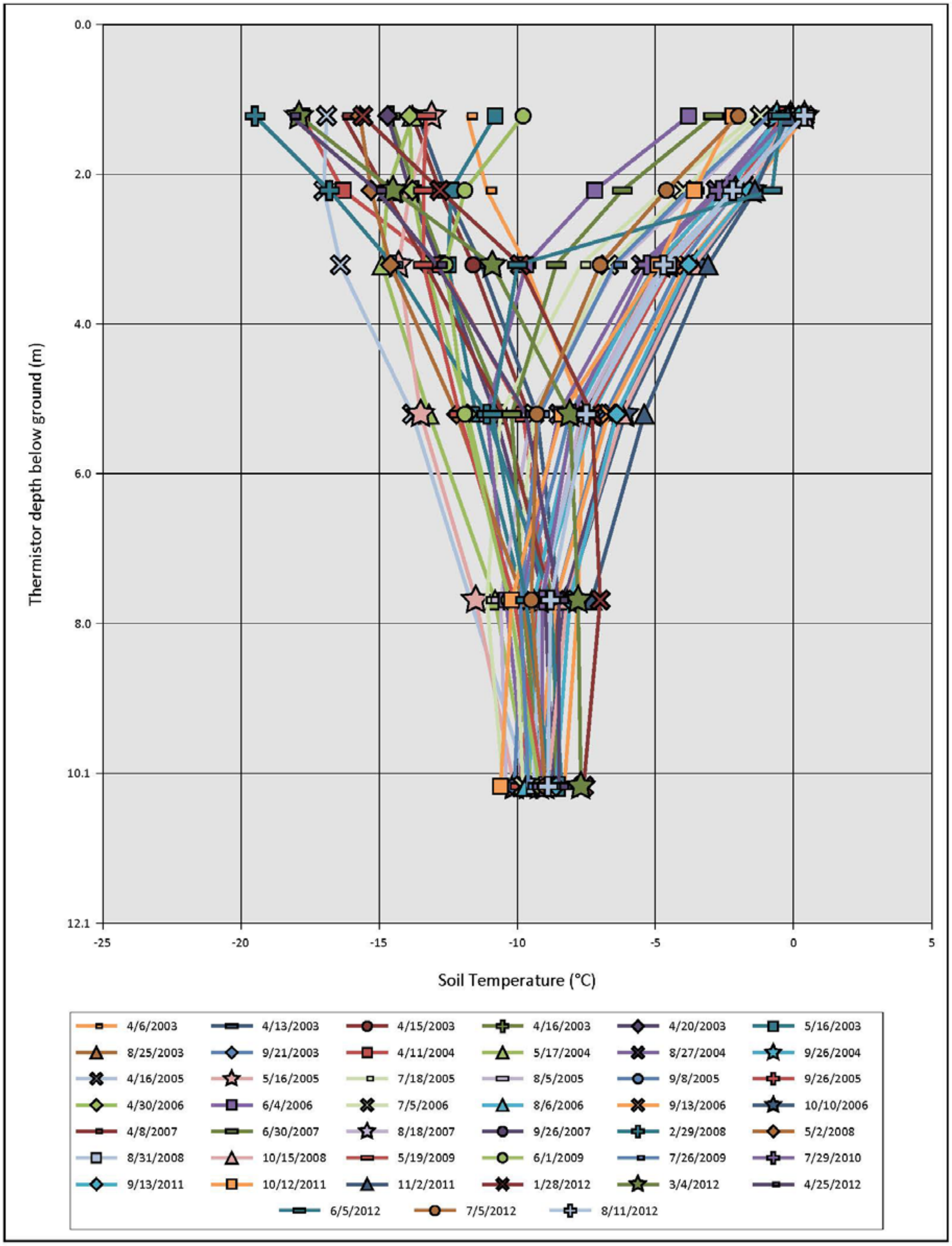
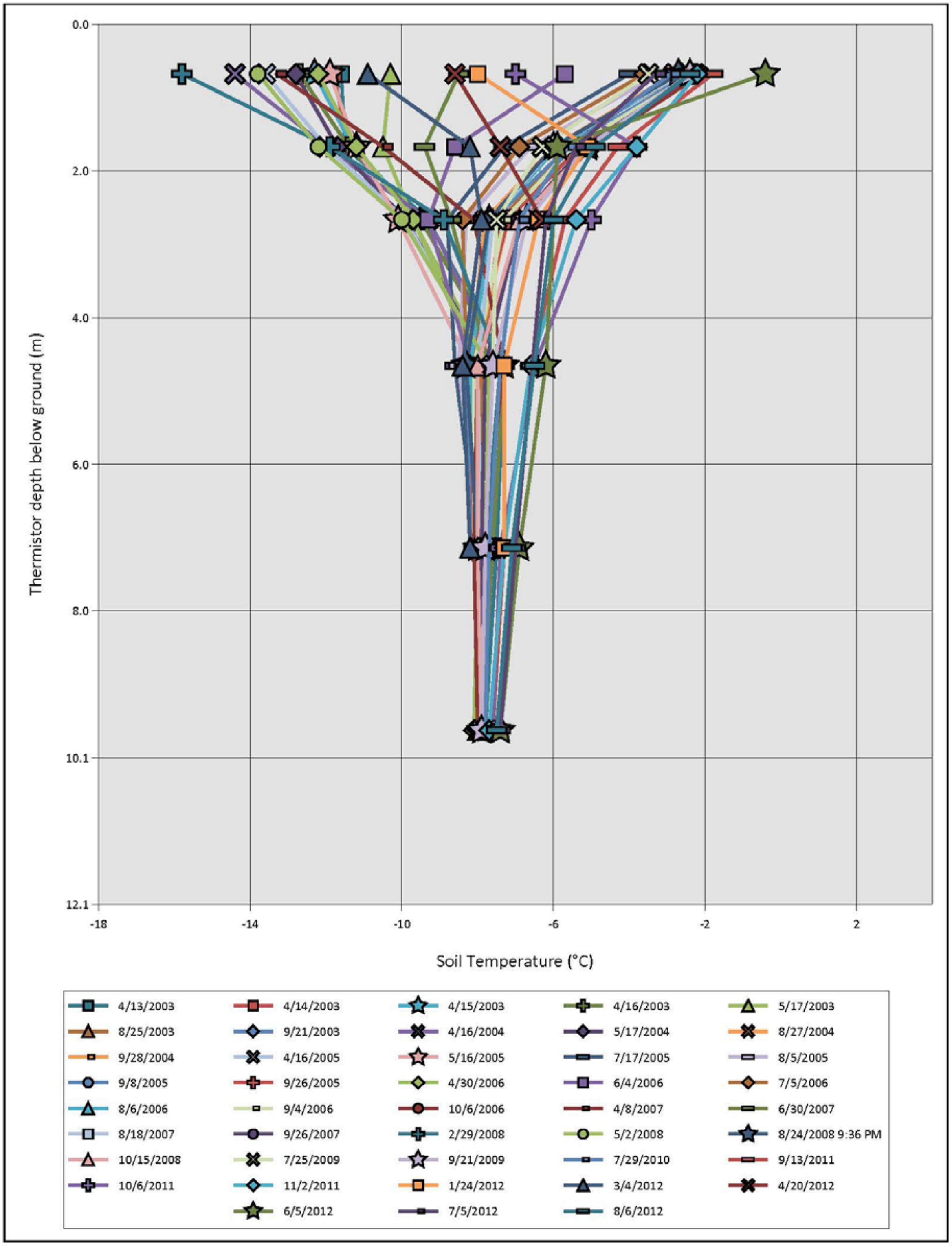
		North Dam Downstream
Job No: 1CH008.066 Filename: 2012GeotechInsp_rev1_sw.pptx	**HOPE BAY MINING LTD.**	Date: January 2013 | Approved: LW | Figure: 24

Appendix A: Active Thermistor Profiles

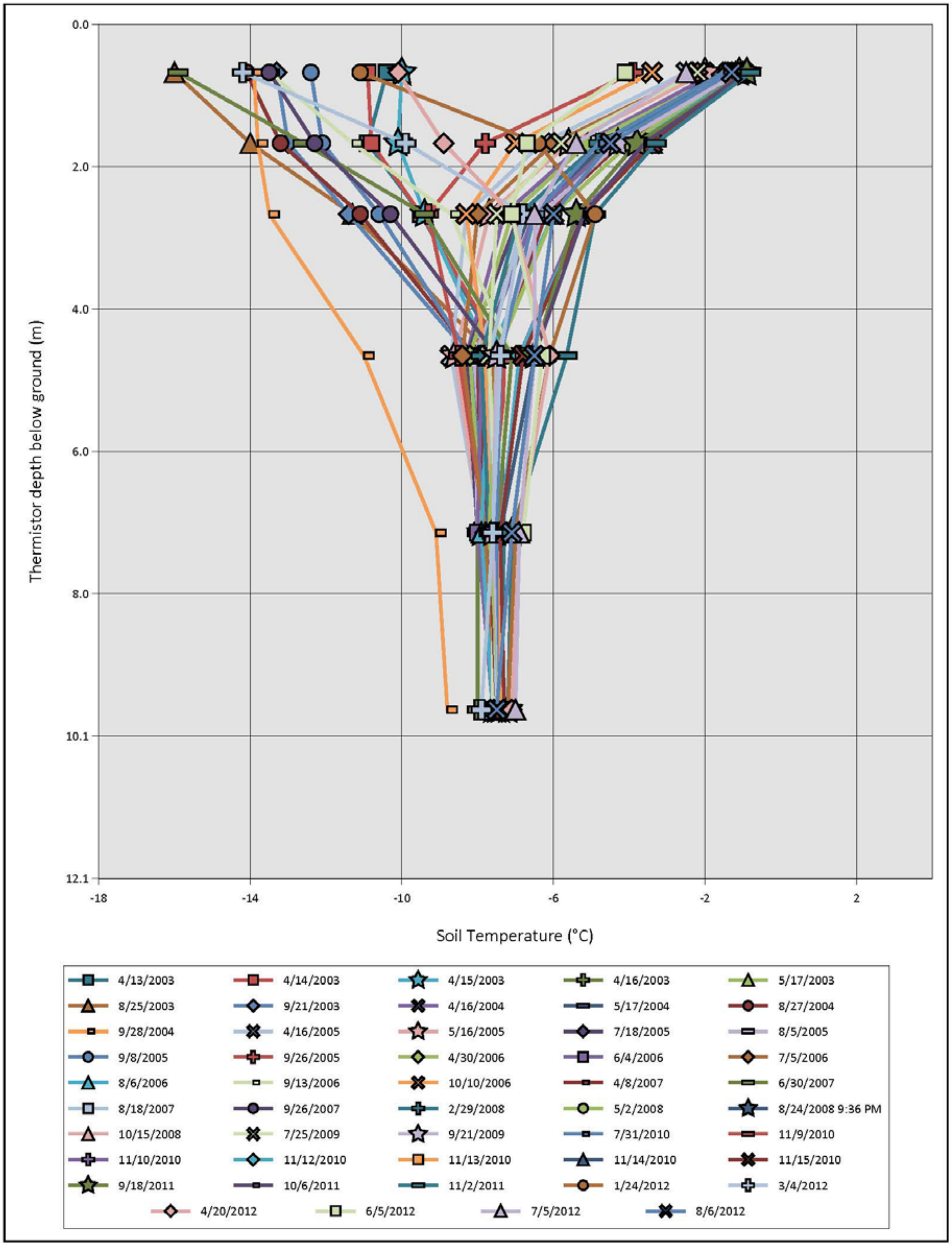
Thermistor Data (SRK-14)



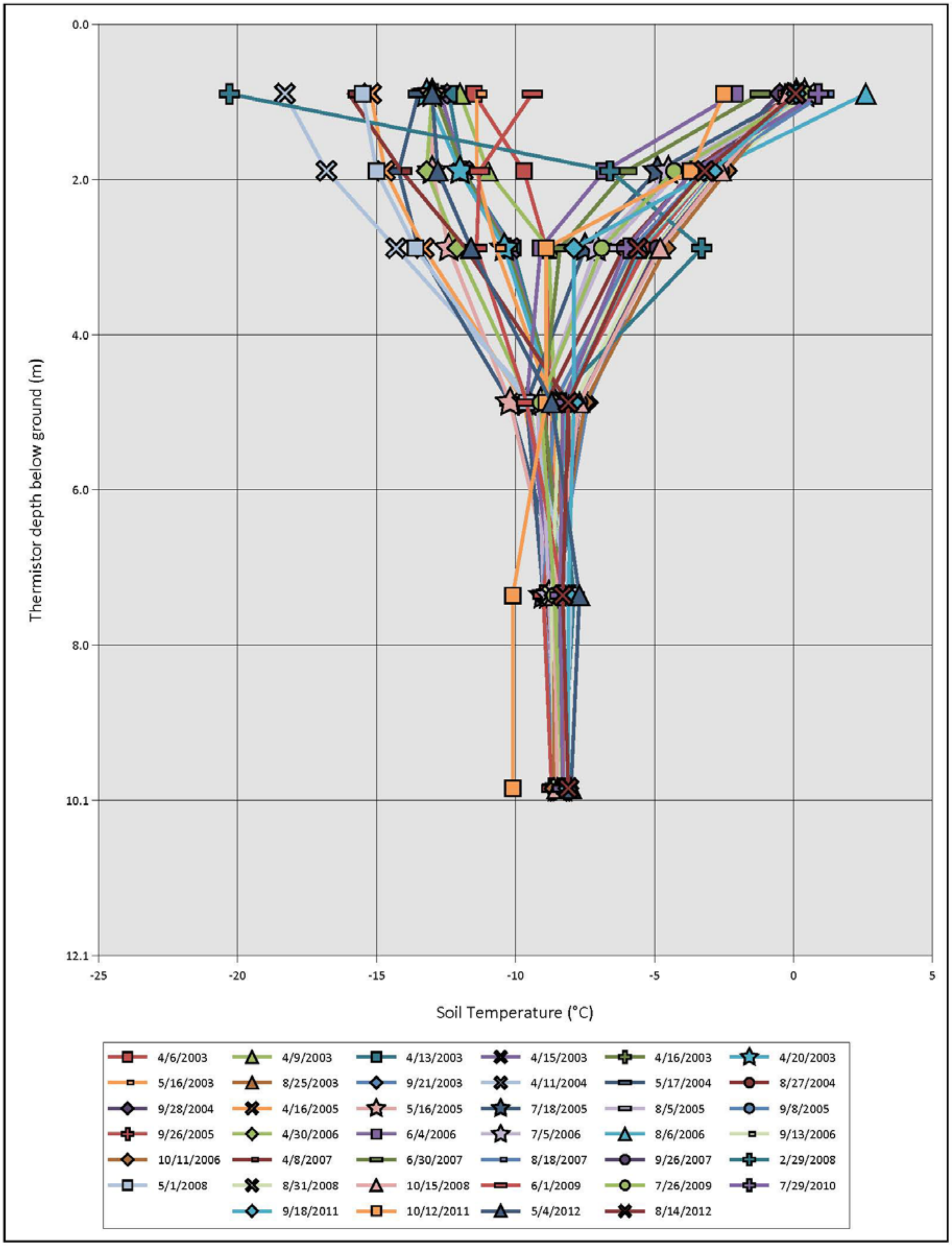
Thermistor Data (SRK-22)



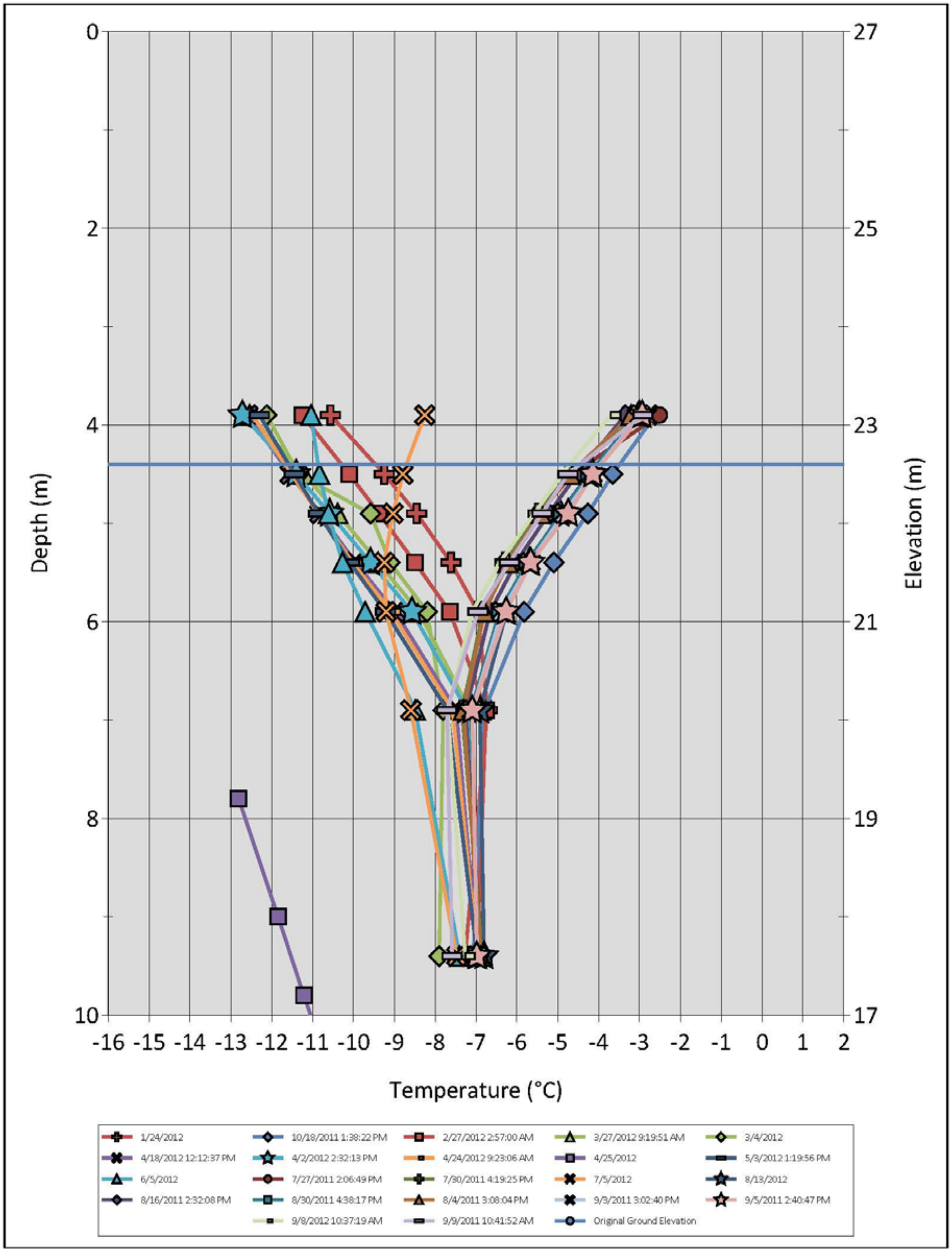
Thermistor Data (SRK-24)



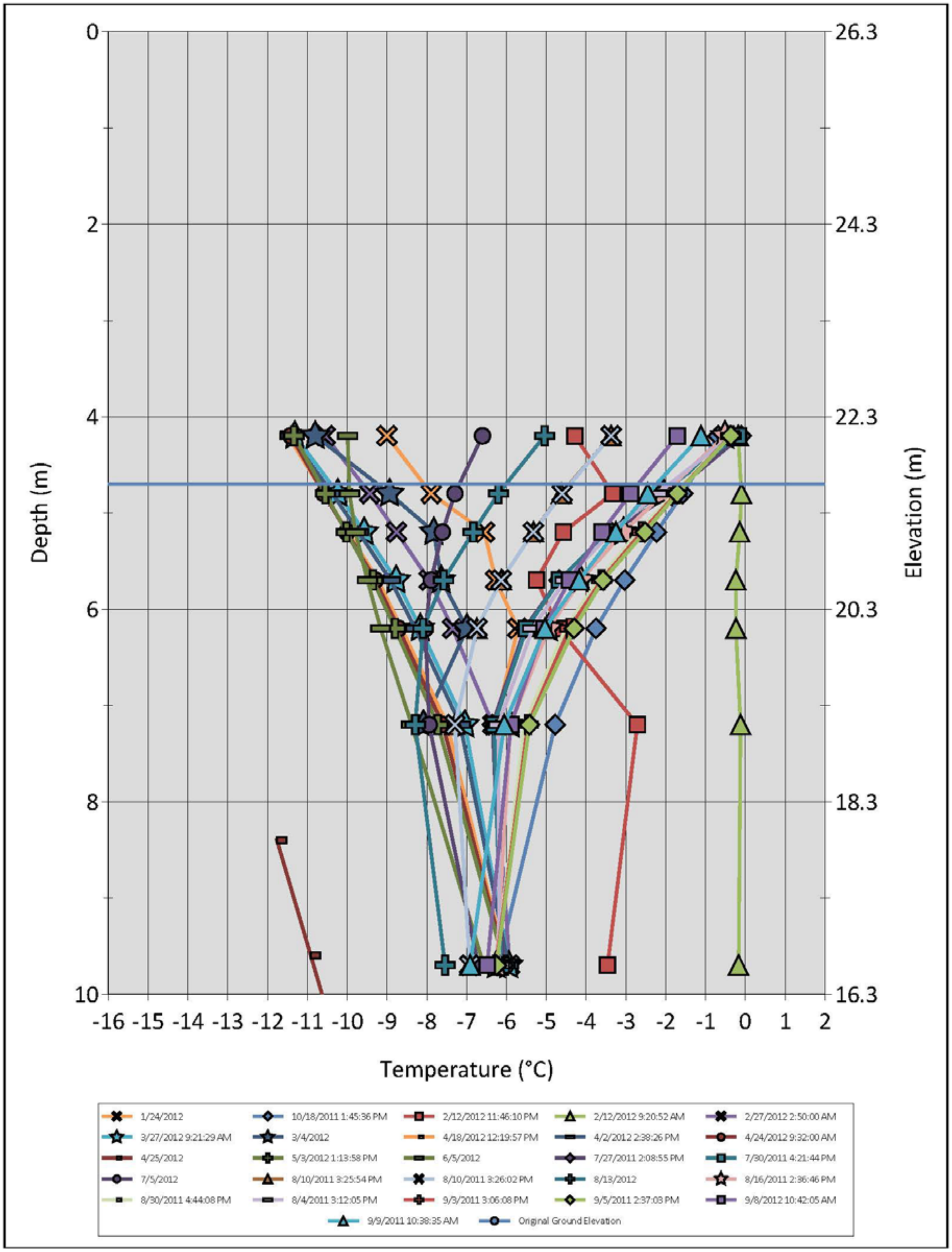
Thermistor Data (SRK-32)



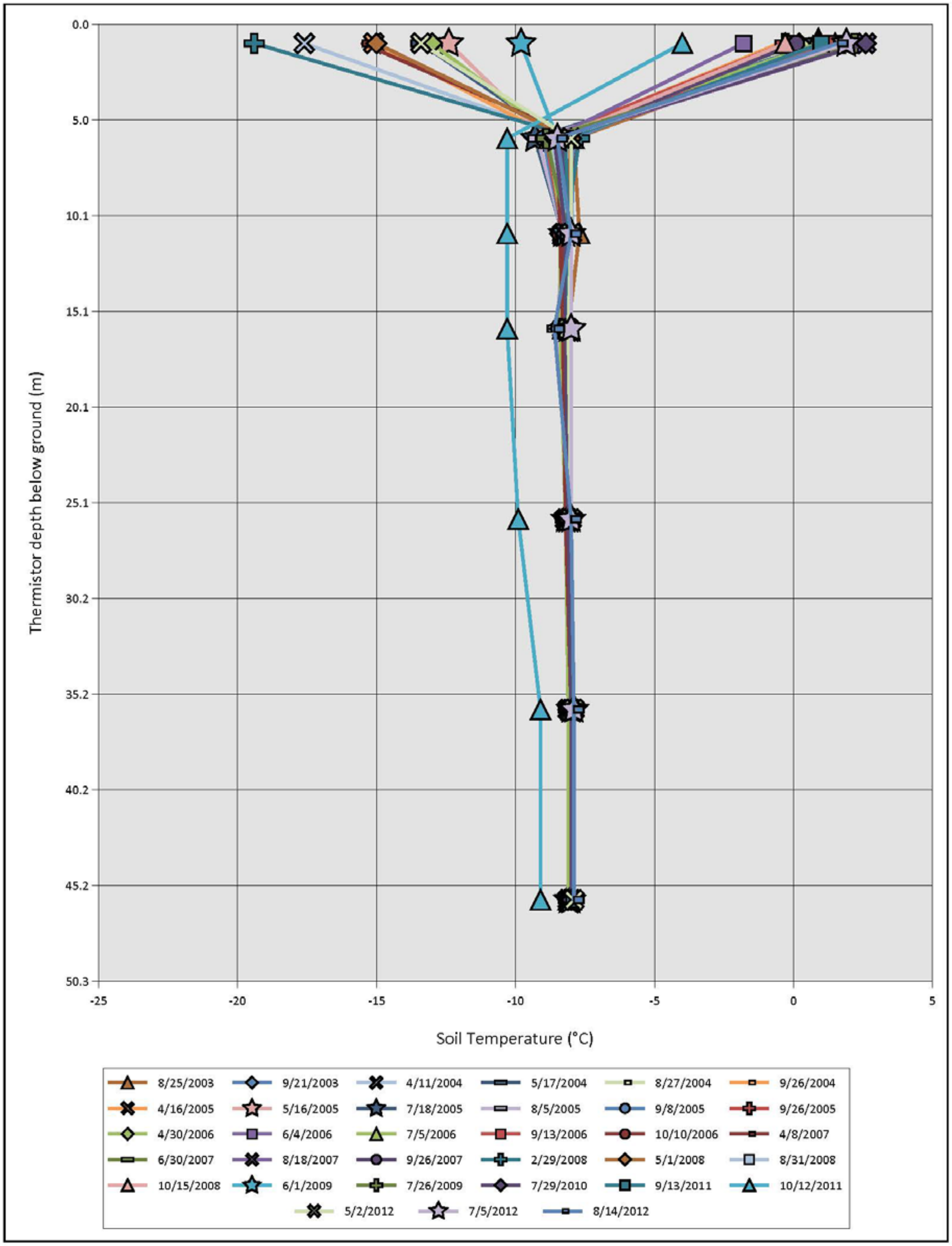
Thermistor Data (SRK 10-DCB2 / Doris Creek Bridge East)



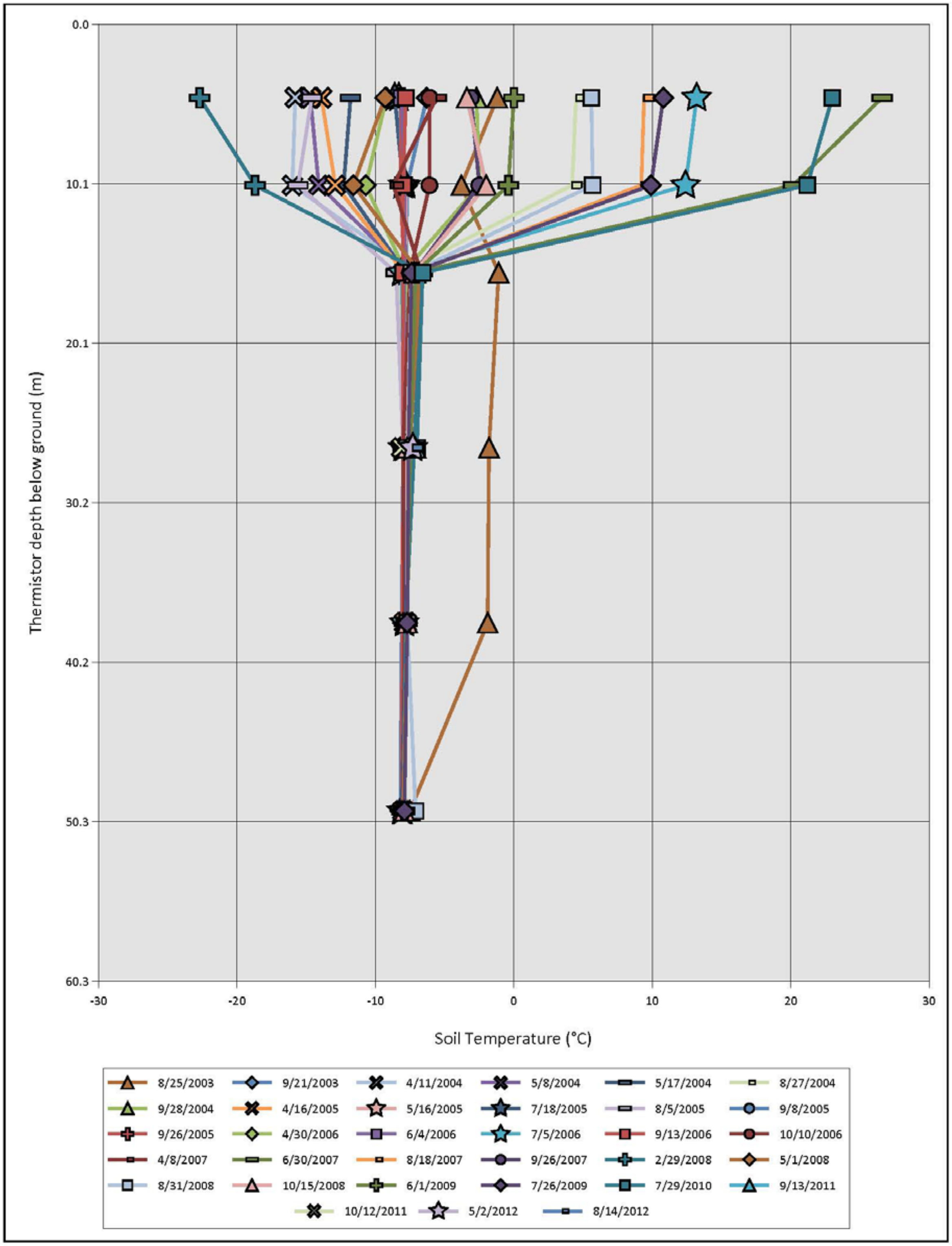
Thermistor Data (SRK 10-DCB1 / Doris Creek Bridge West)



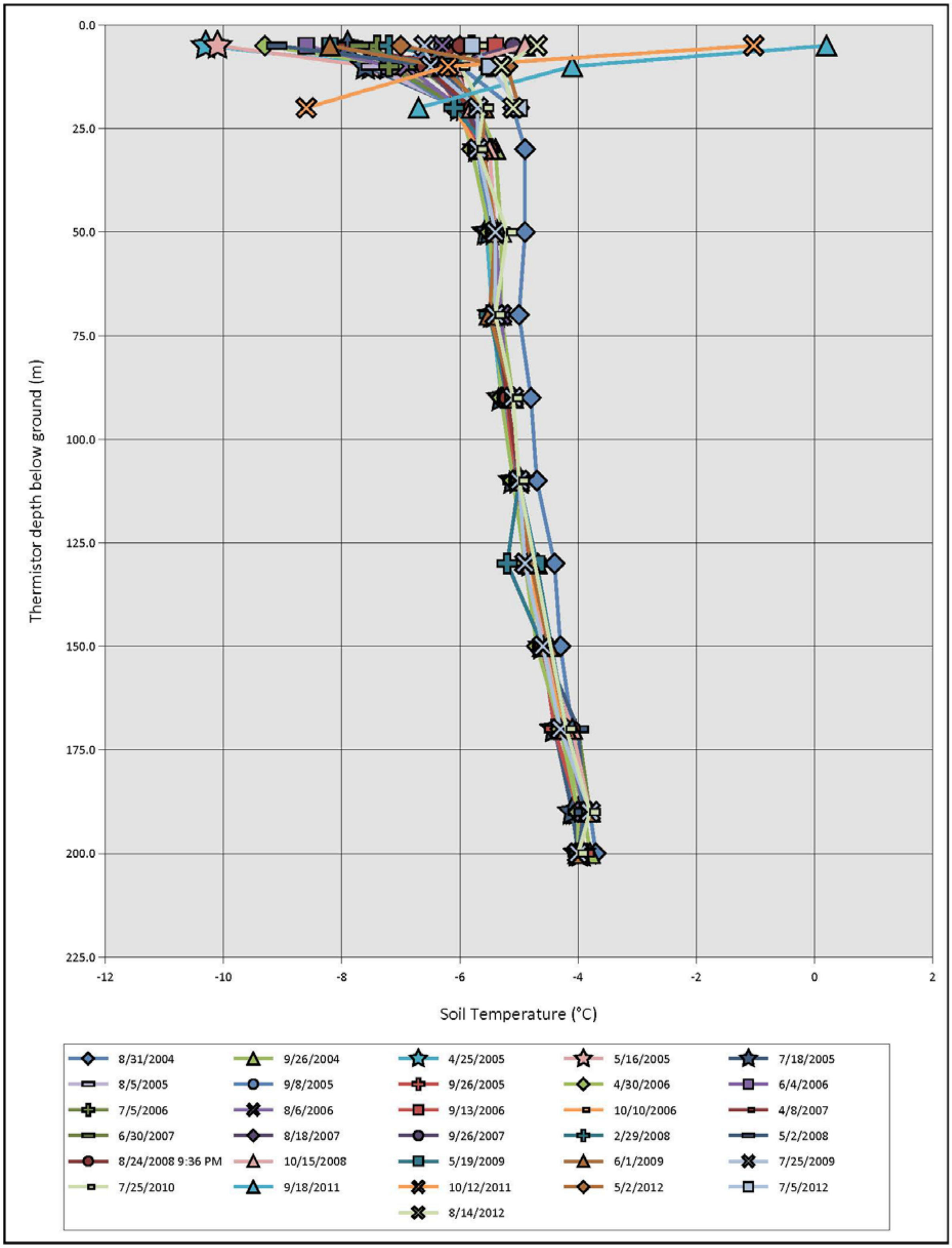
Thermistor Data (SRK-38)



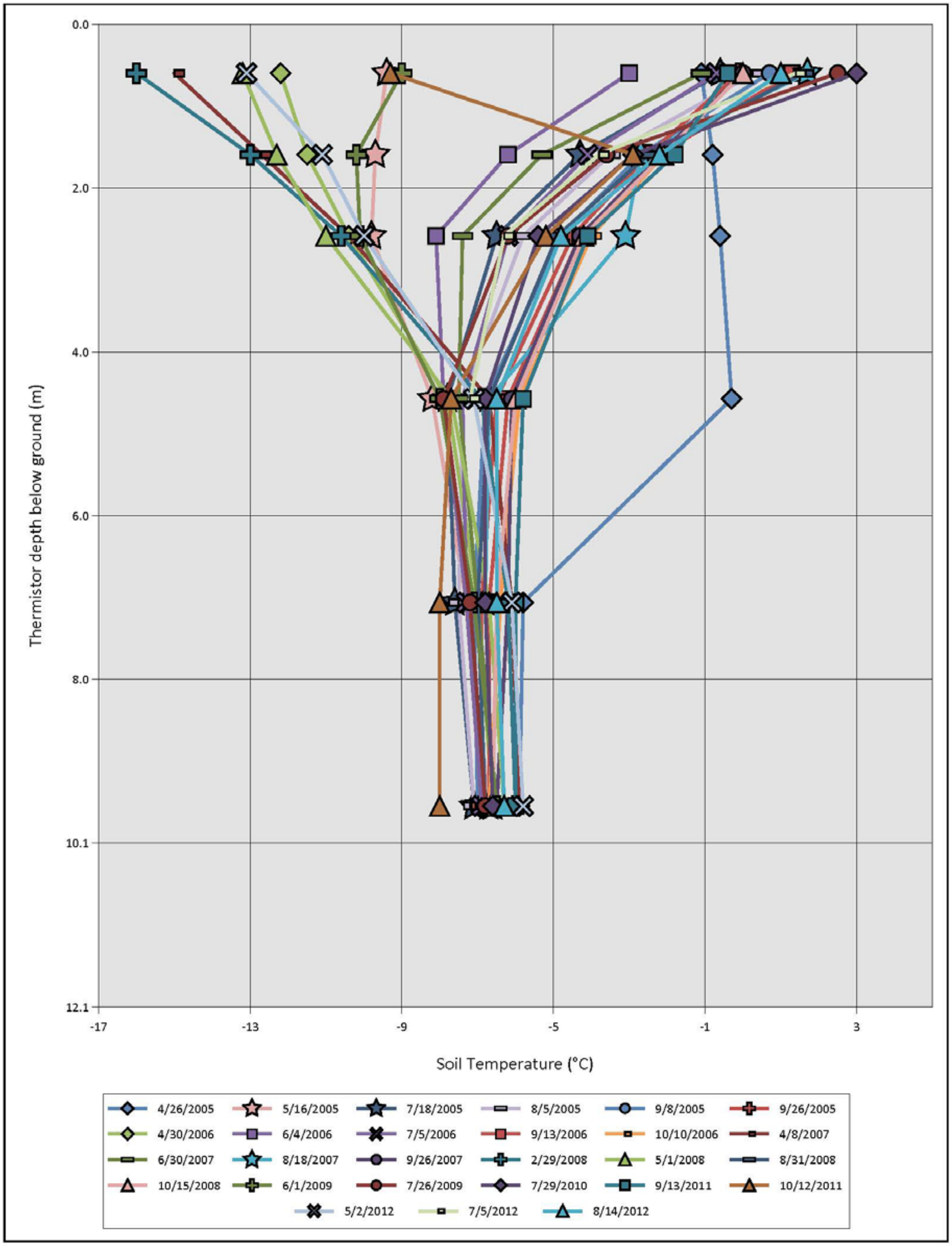
Thermistor Data (SRK-39)



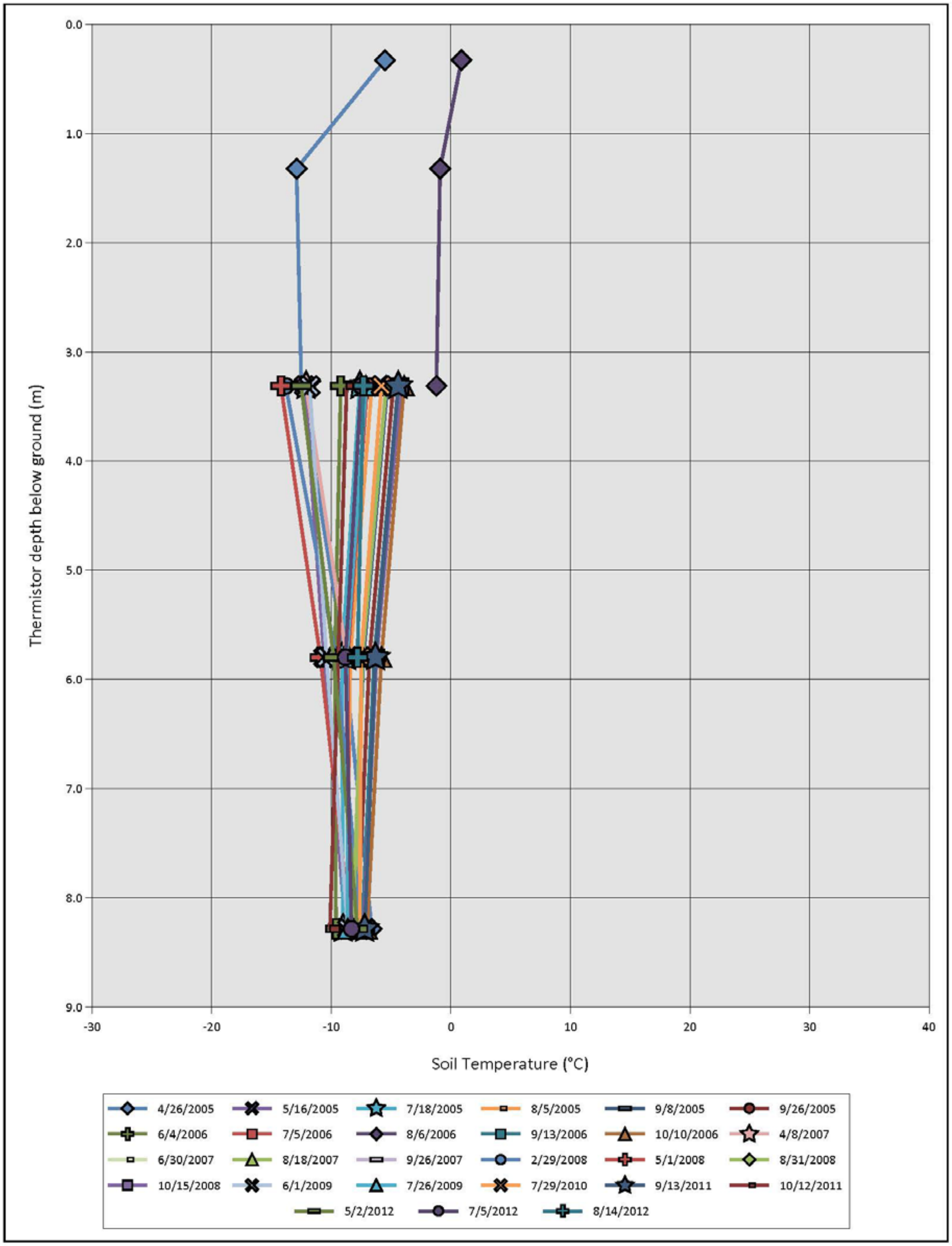
Thermistor Data (SRK-50)



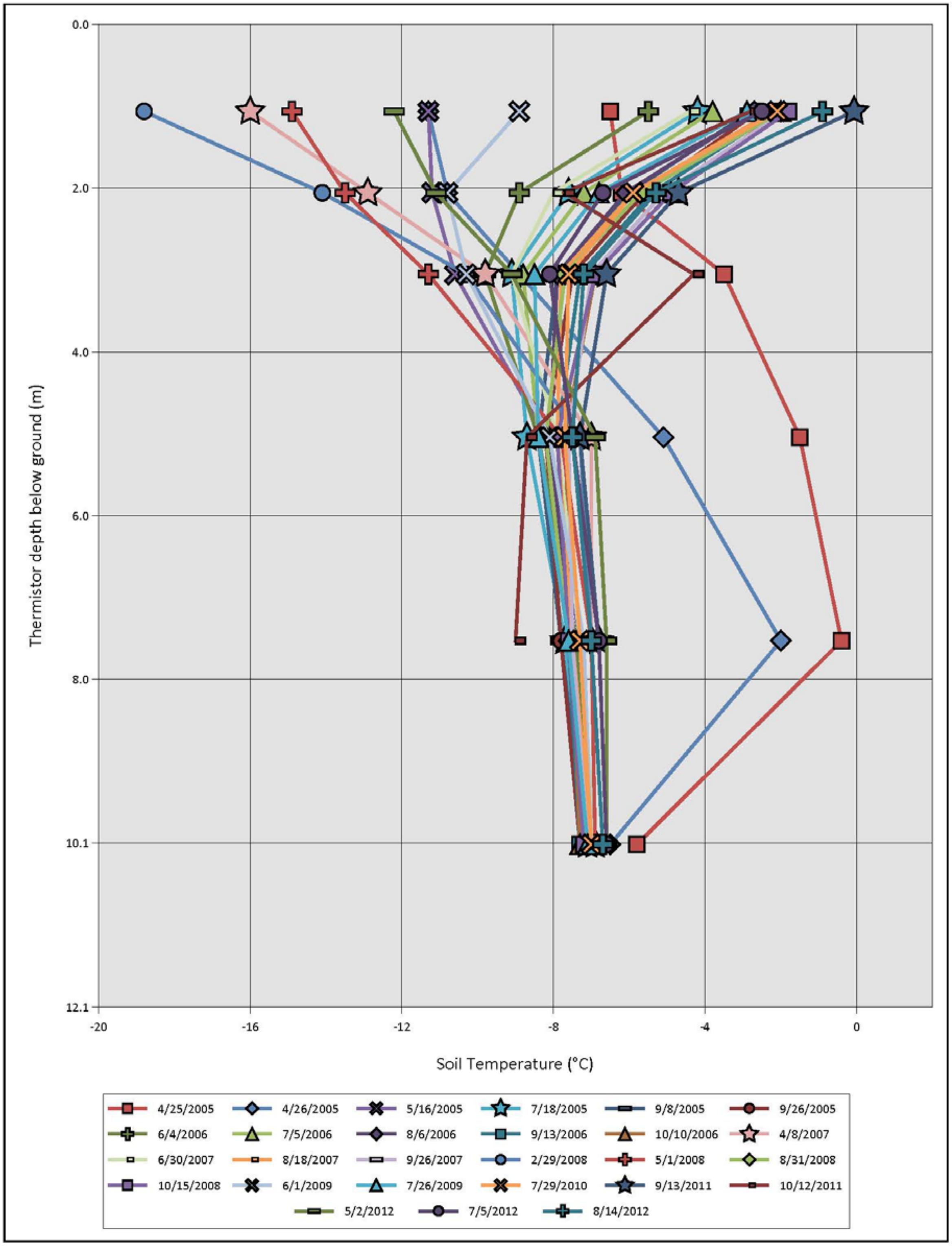
Thermistor Data (SRK-53)



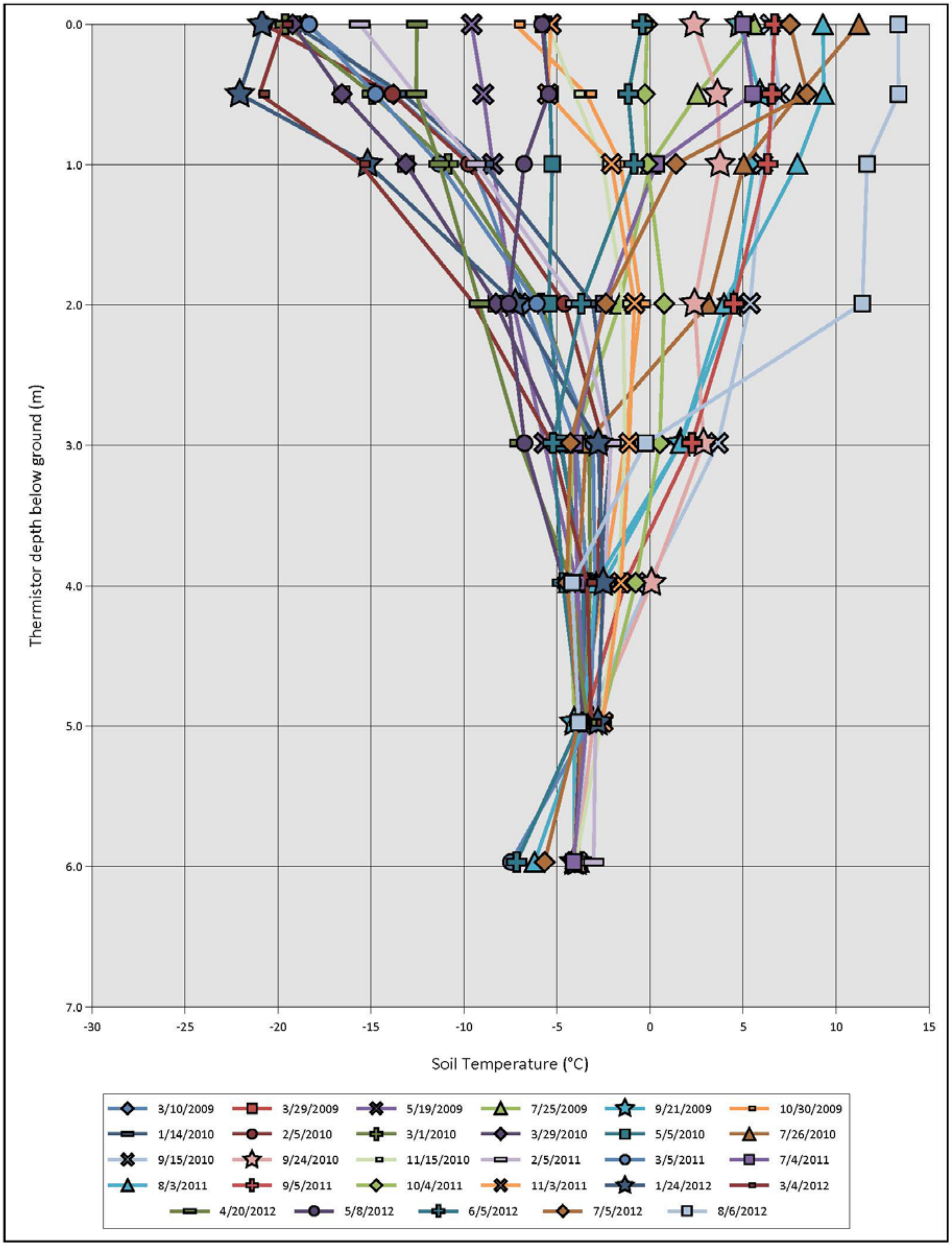
Thermistor Data (SRK-57)



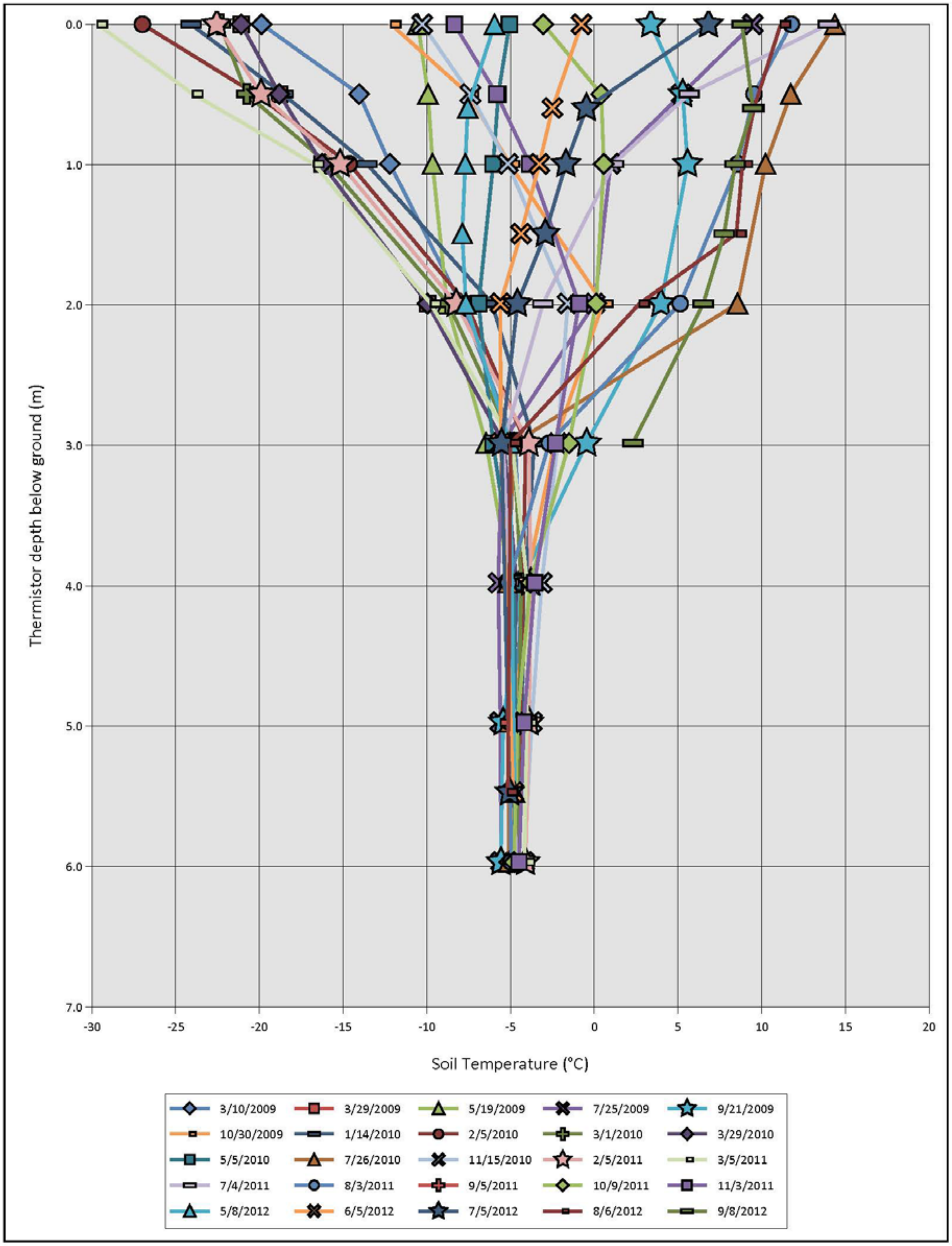
Thermistor Data (SRK-58)



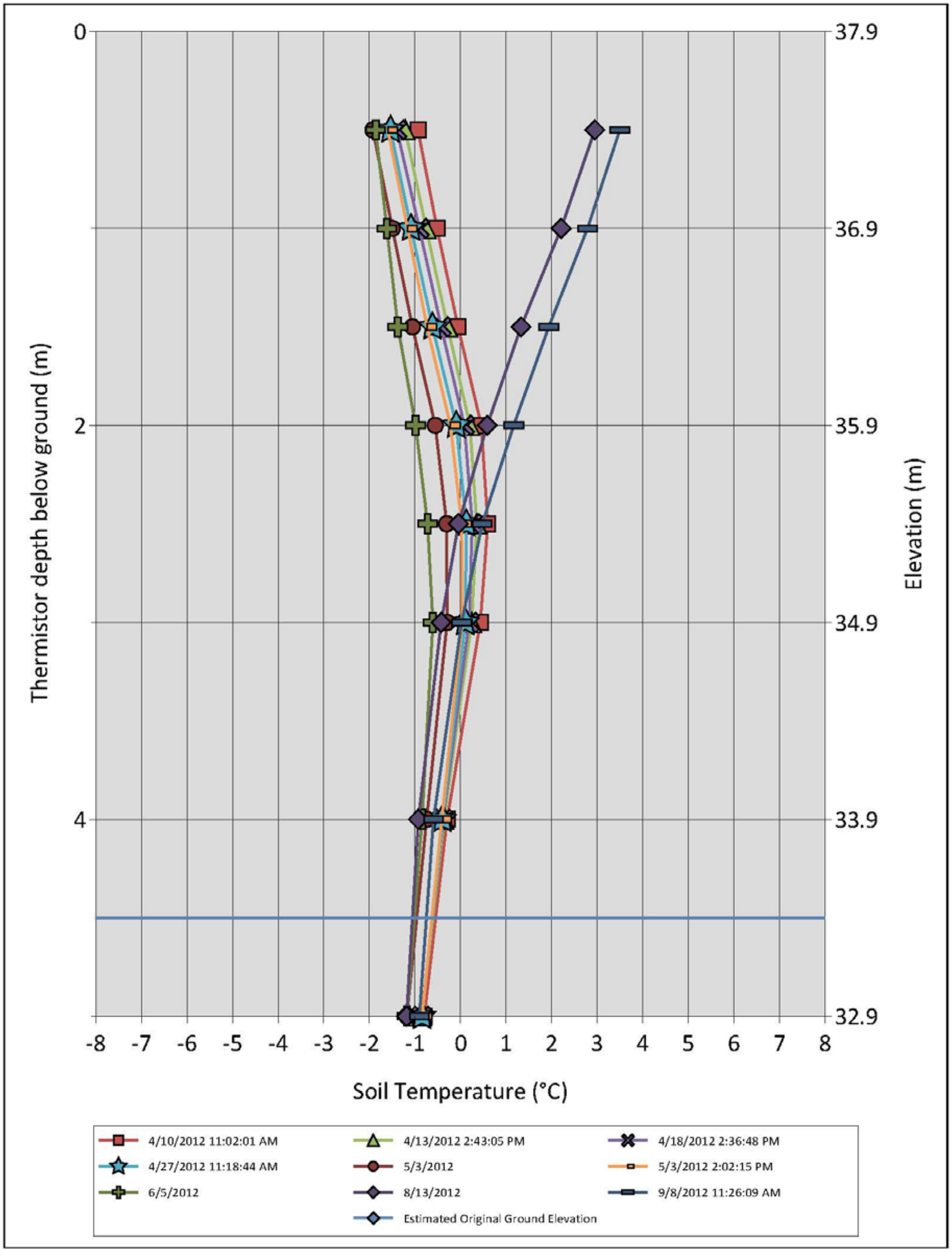
Thermistor Data (SRK-JT1-09)



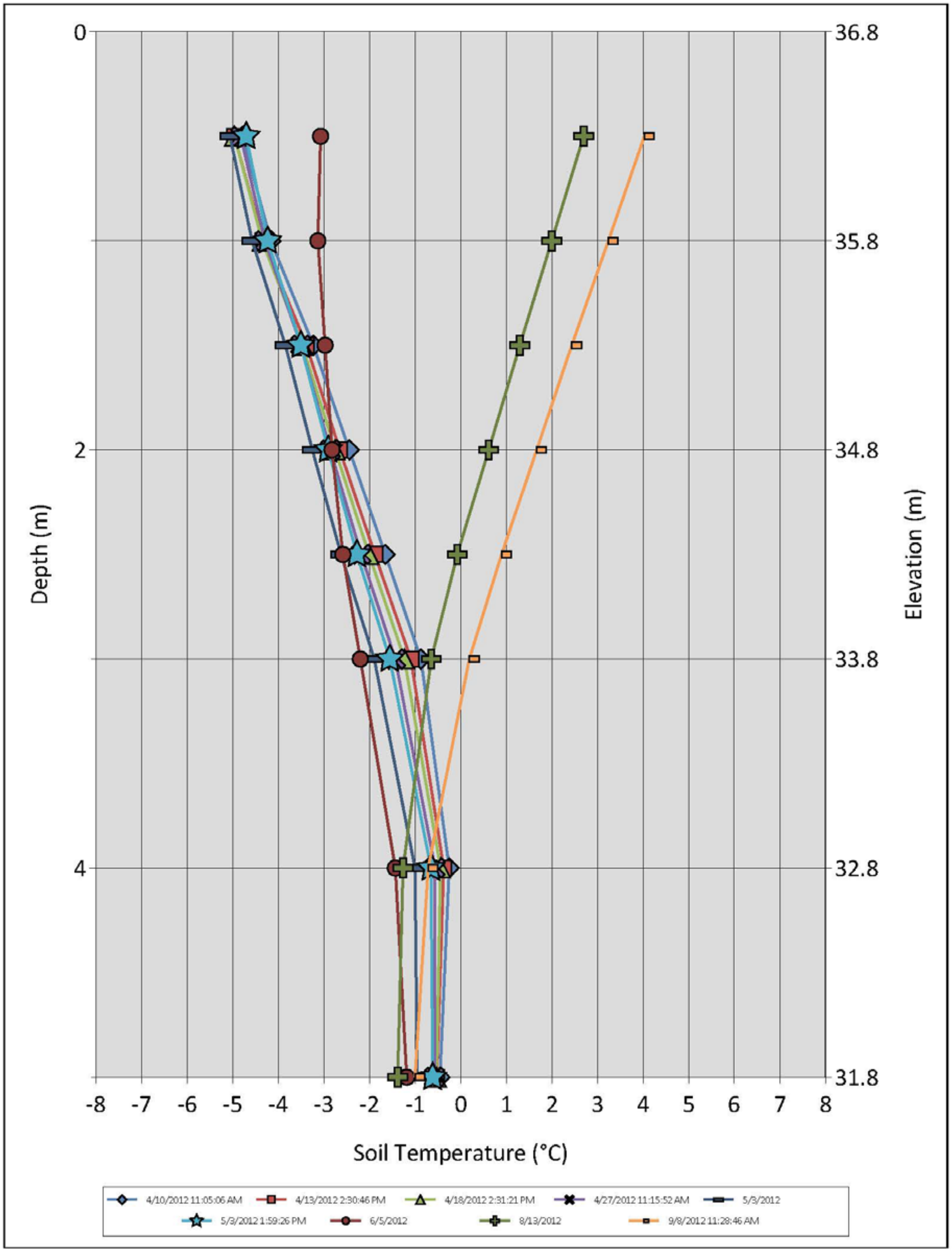
Thermistor Data (SRK-JT2-09/ SRK-JT2-12)



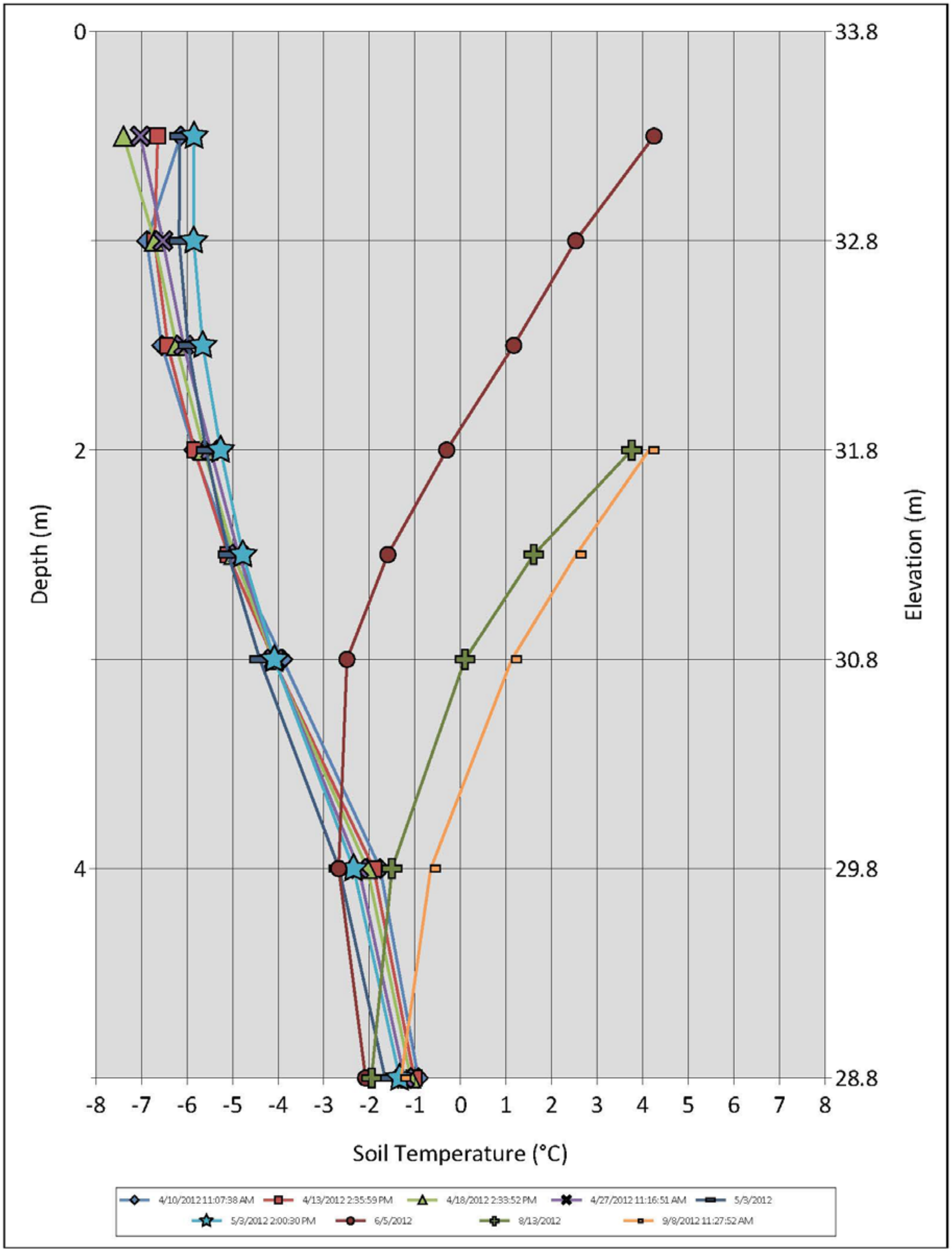
Thermistor Data (SRK-12-GTC-DH01)



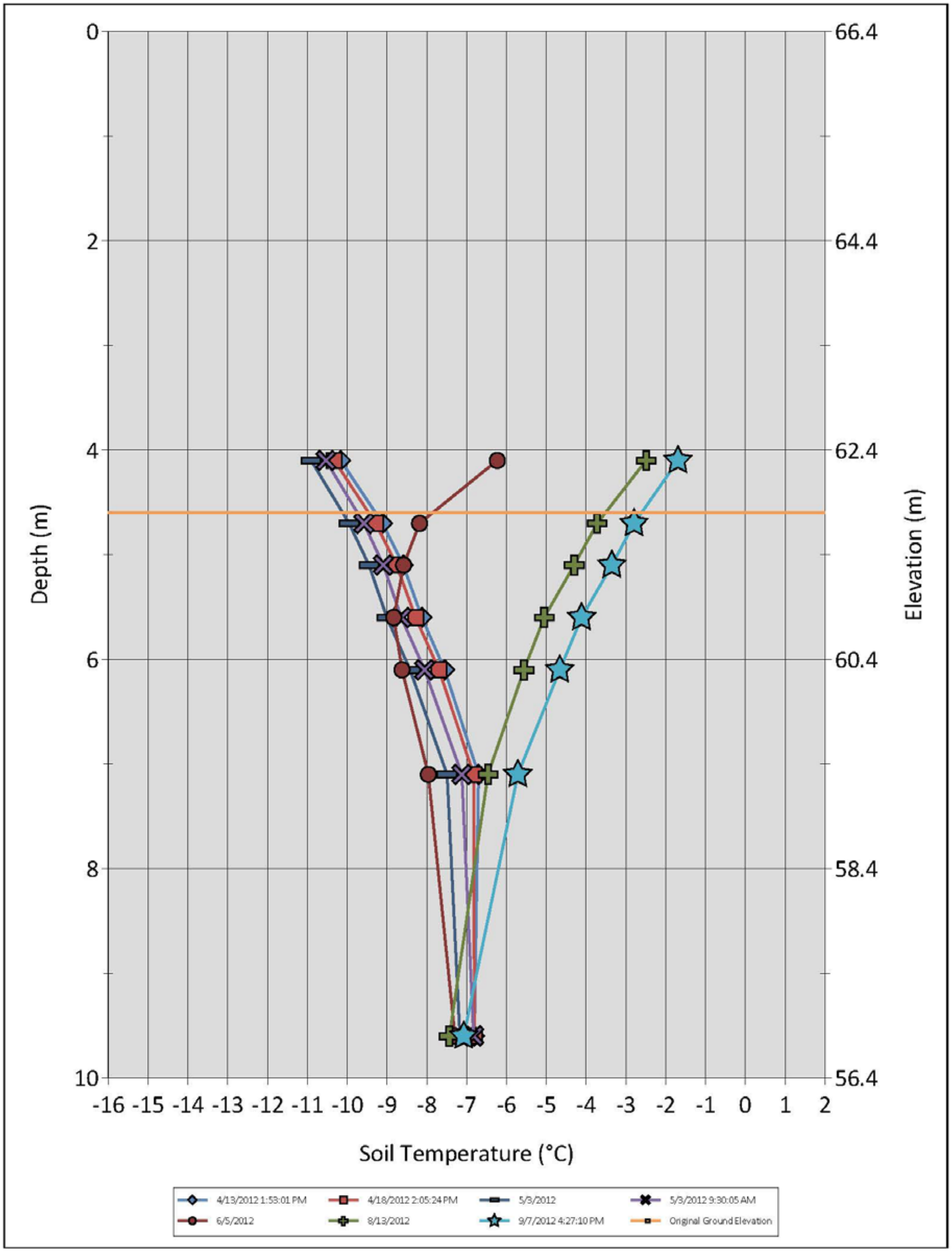
Thermistor Data (SRK-12-GTC-DH02)



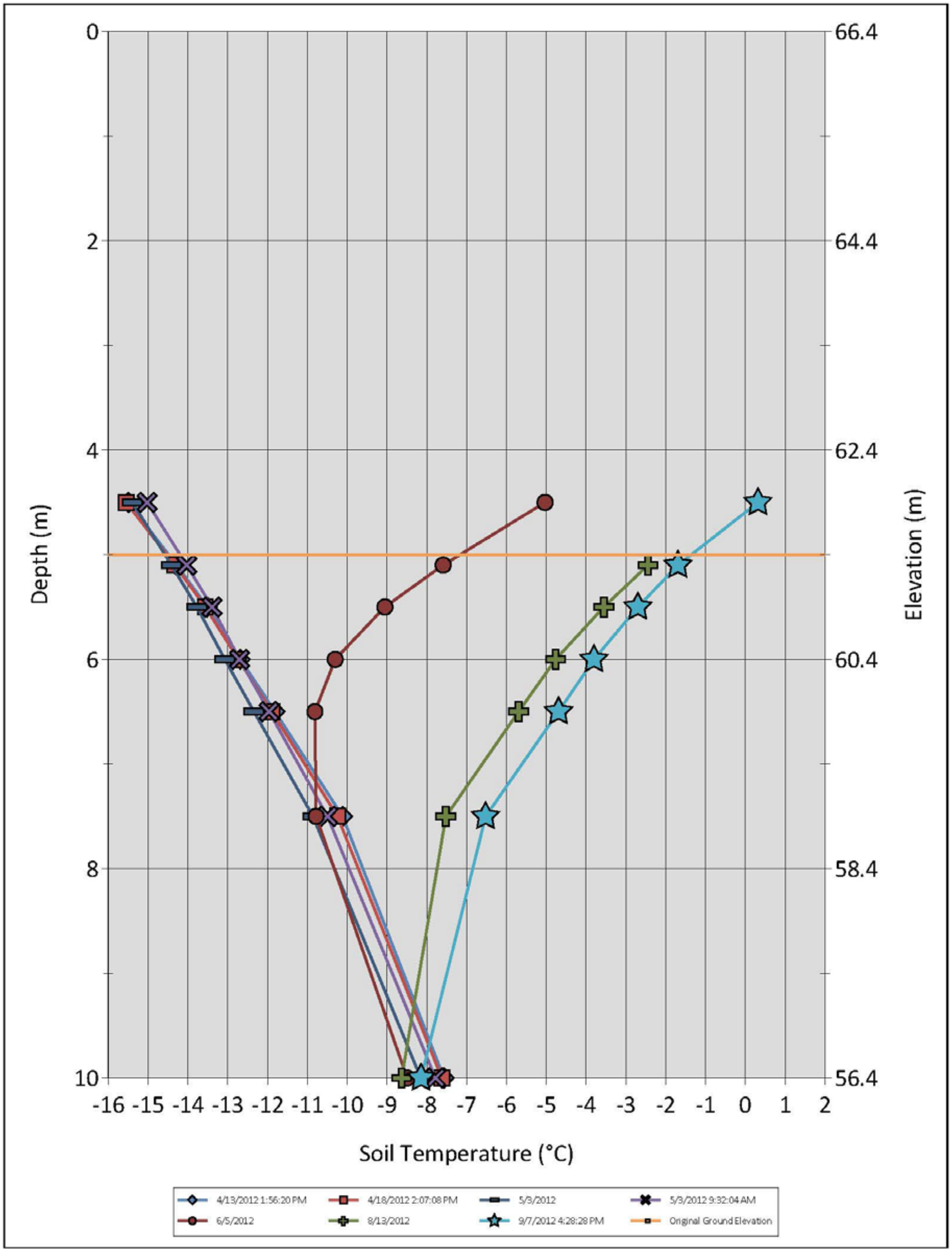
Thermistor Data (SRK-12-GTC-DH03)



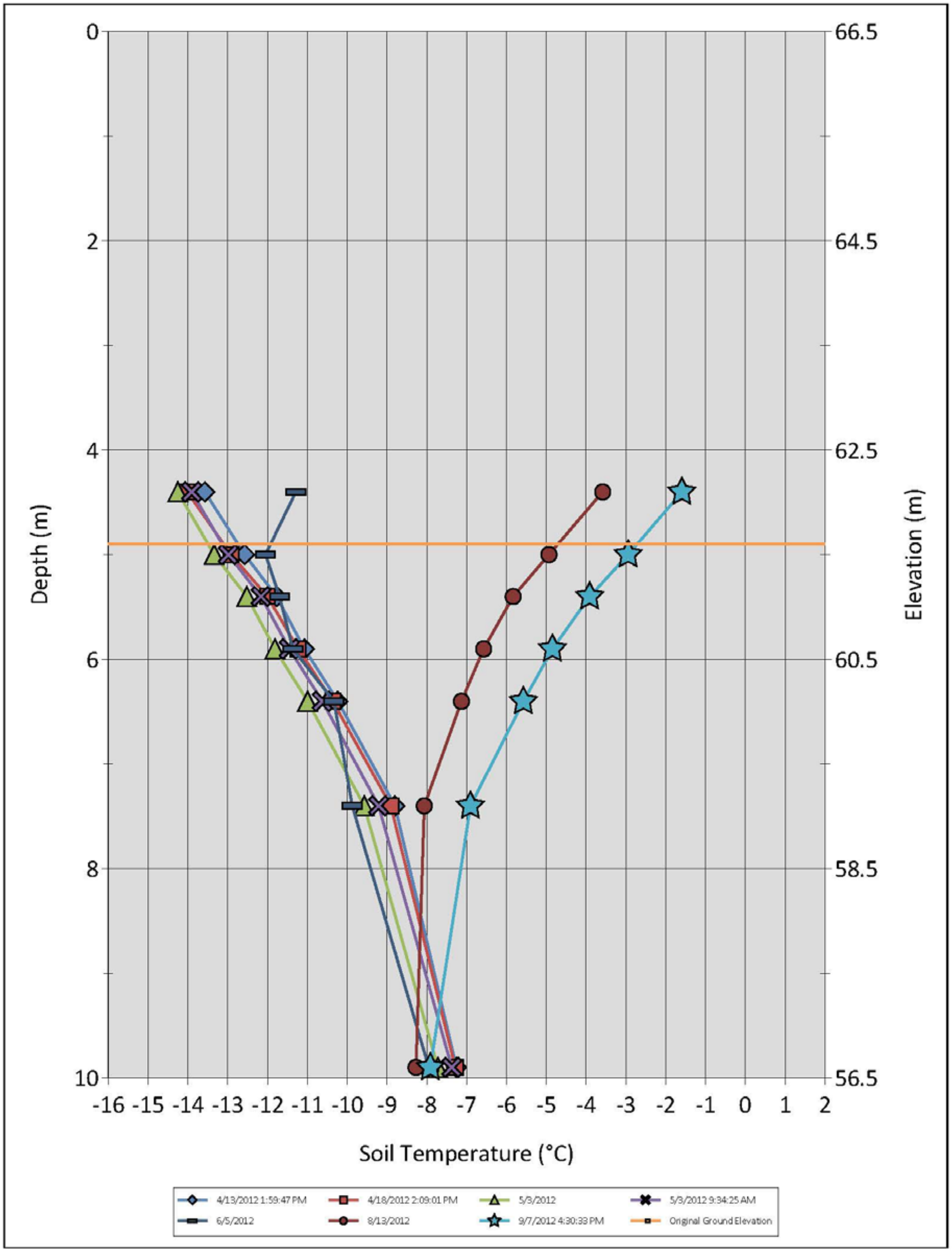
Thermistor Data (SRK10-DWB1)



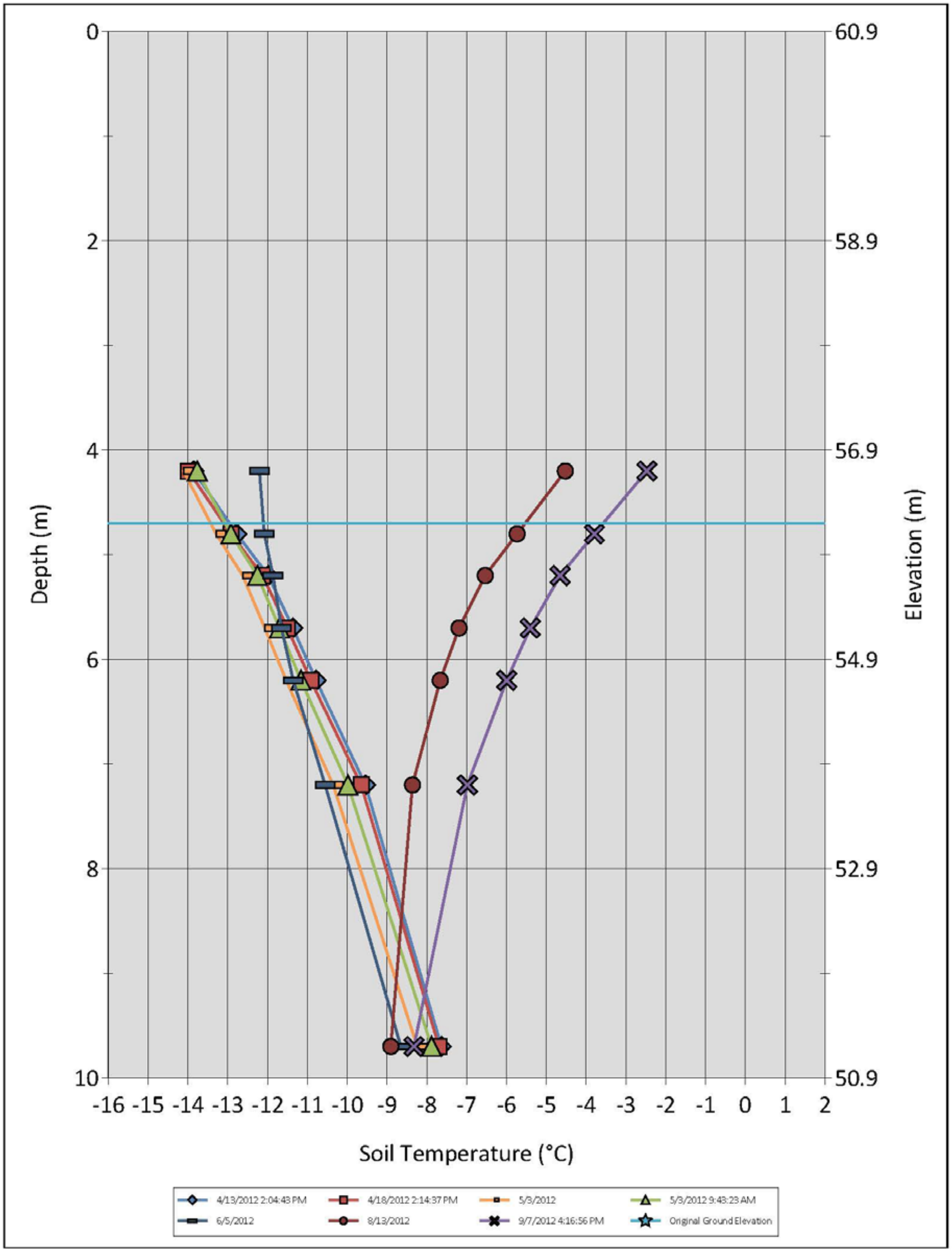
Thermistor Data (SRK10-DWB2)



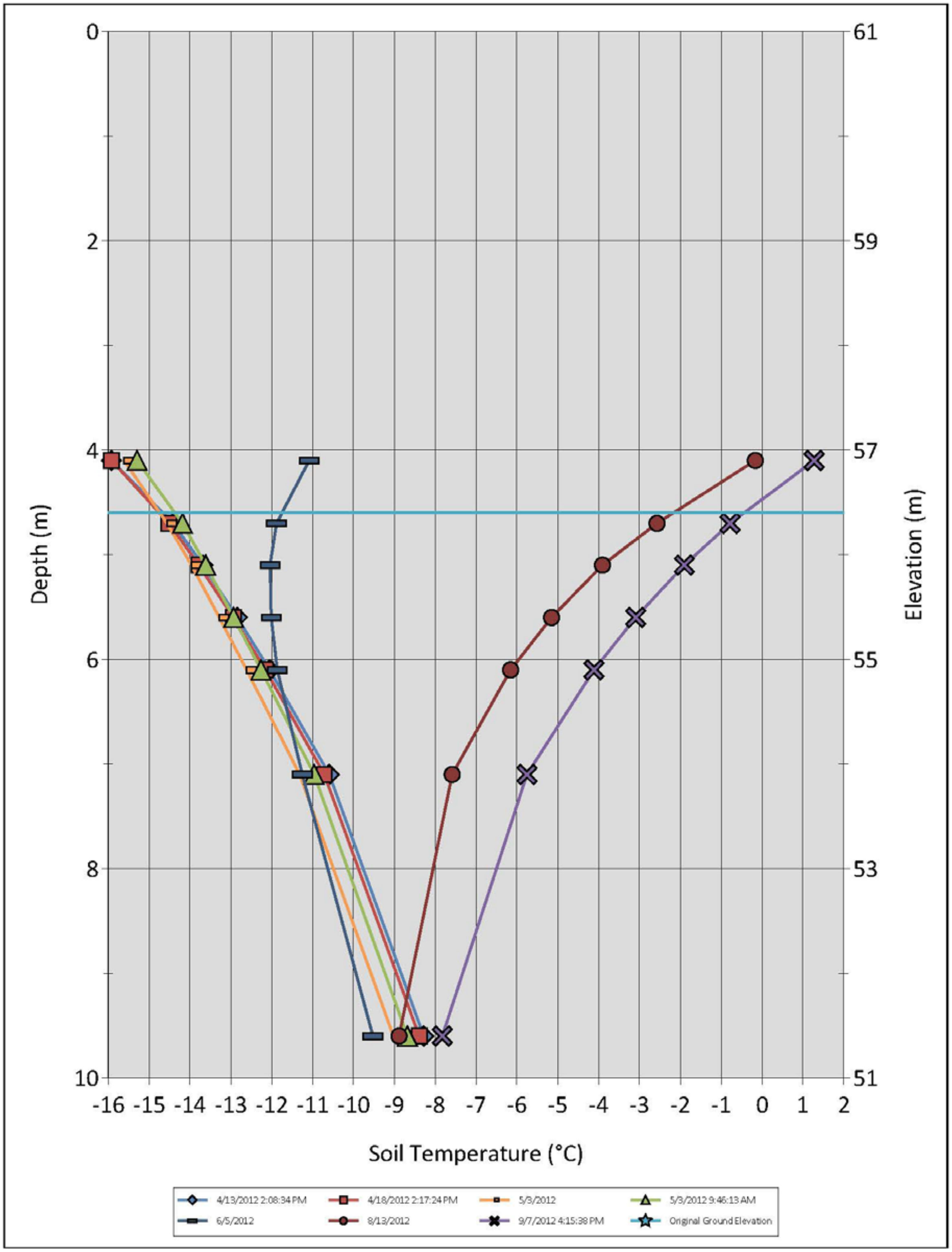
Thermistor Data (SRK10-DWB3)



Thermistor Data (SRK10-DWB4)

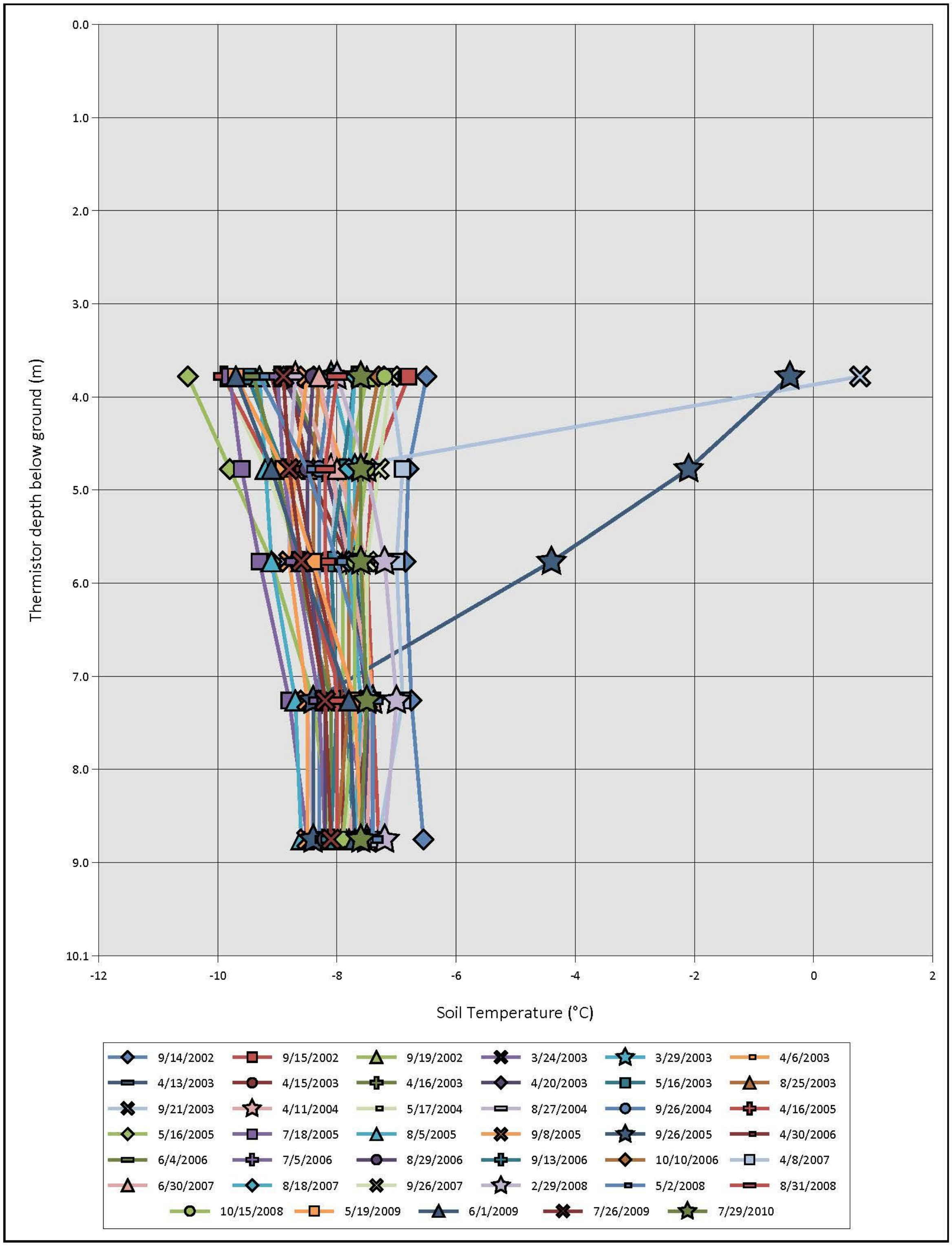


Thermistor Data (SRK10-DWB5)

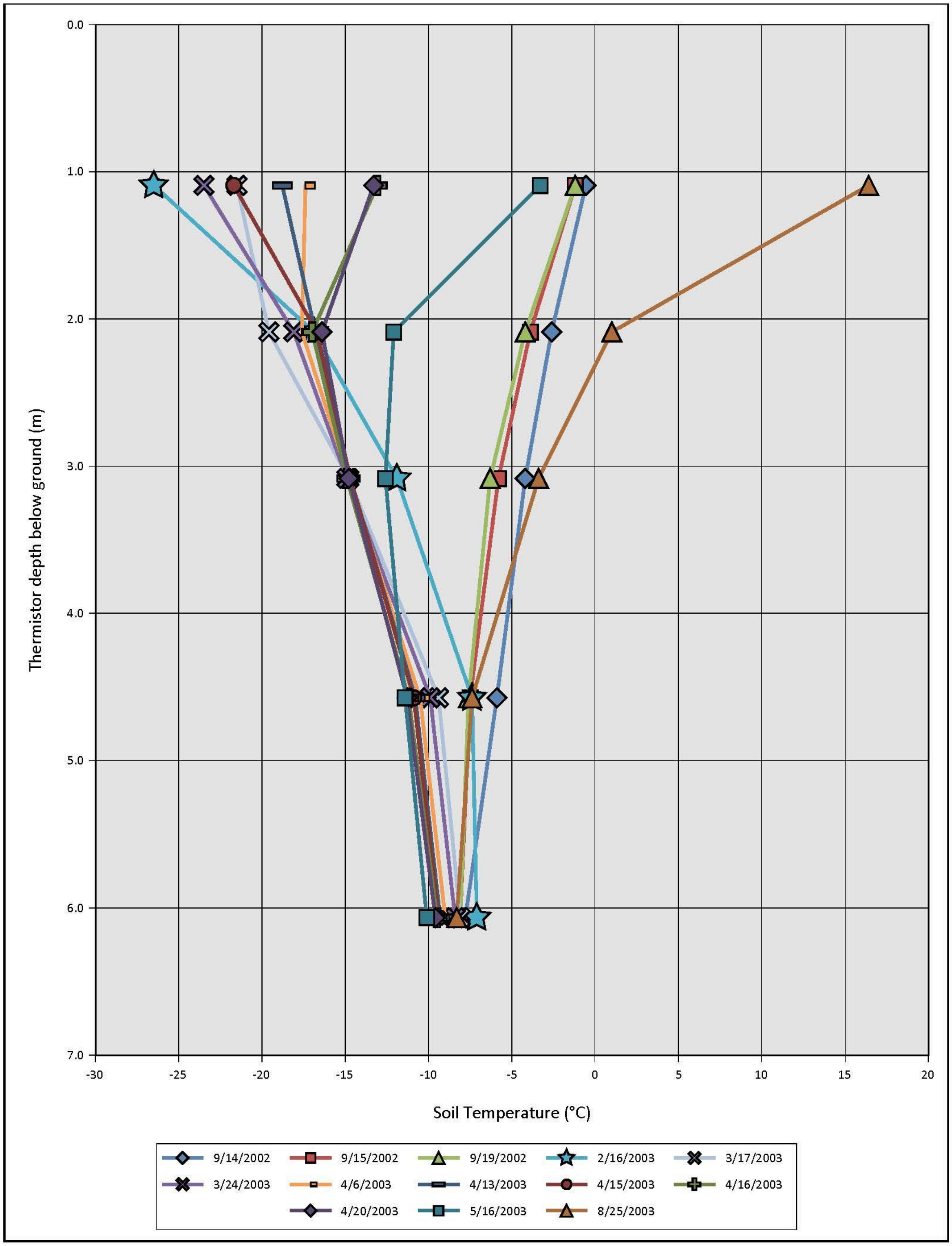


Appendix B: Inactive Thermistor Profiles

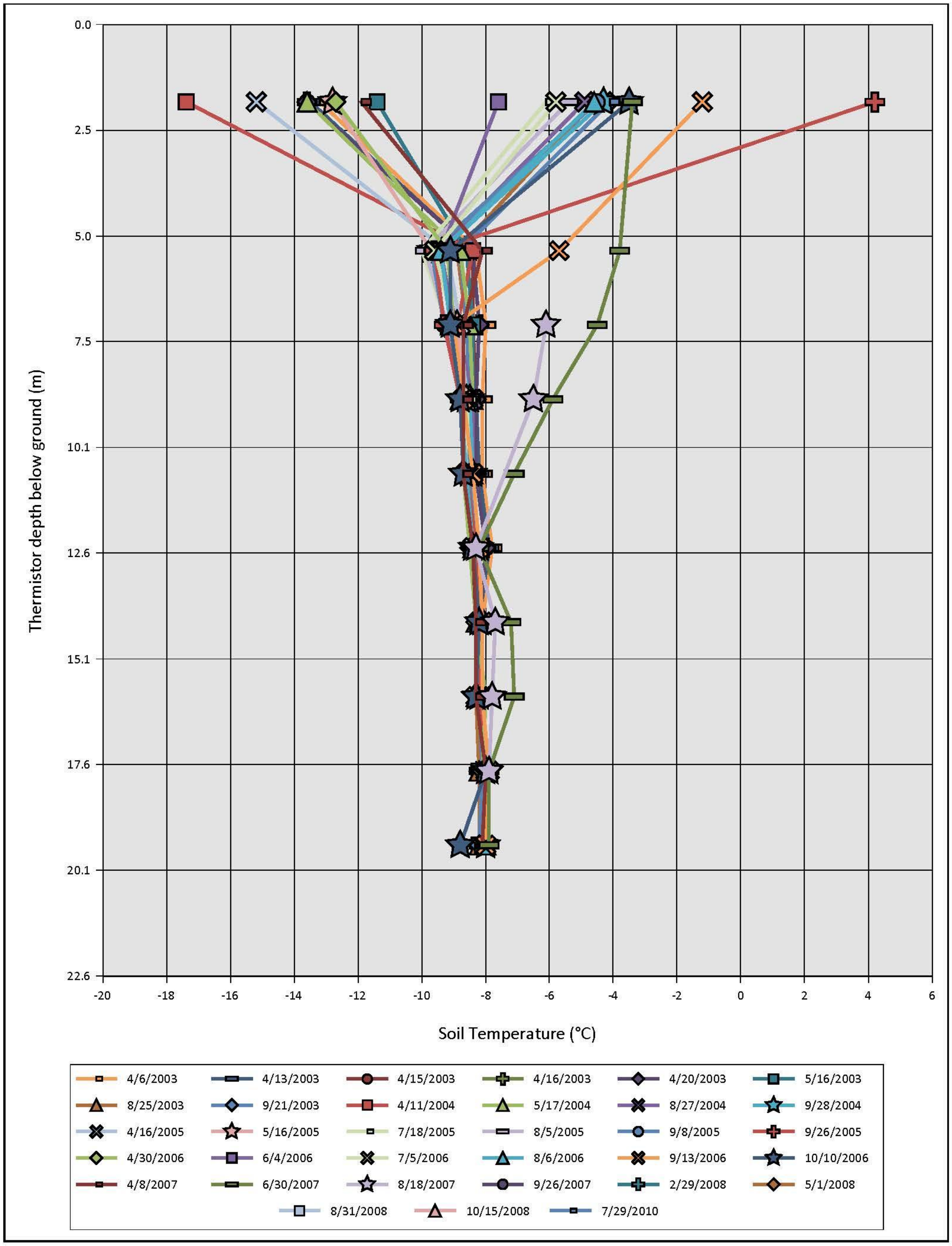
Thermistor Data (SRK-11)



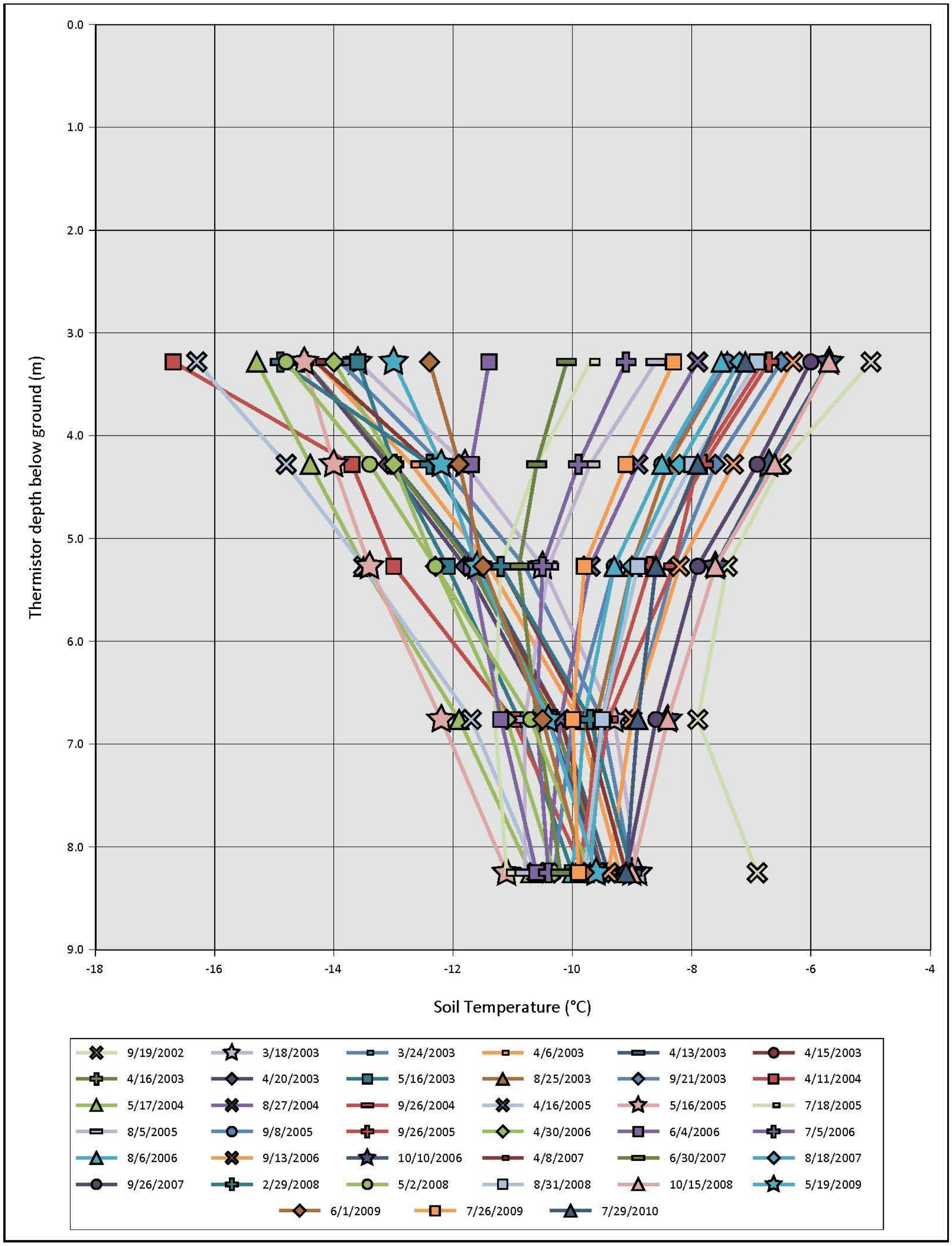
Thermistor Data (SRK-13)



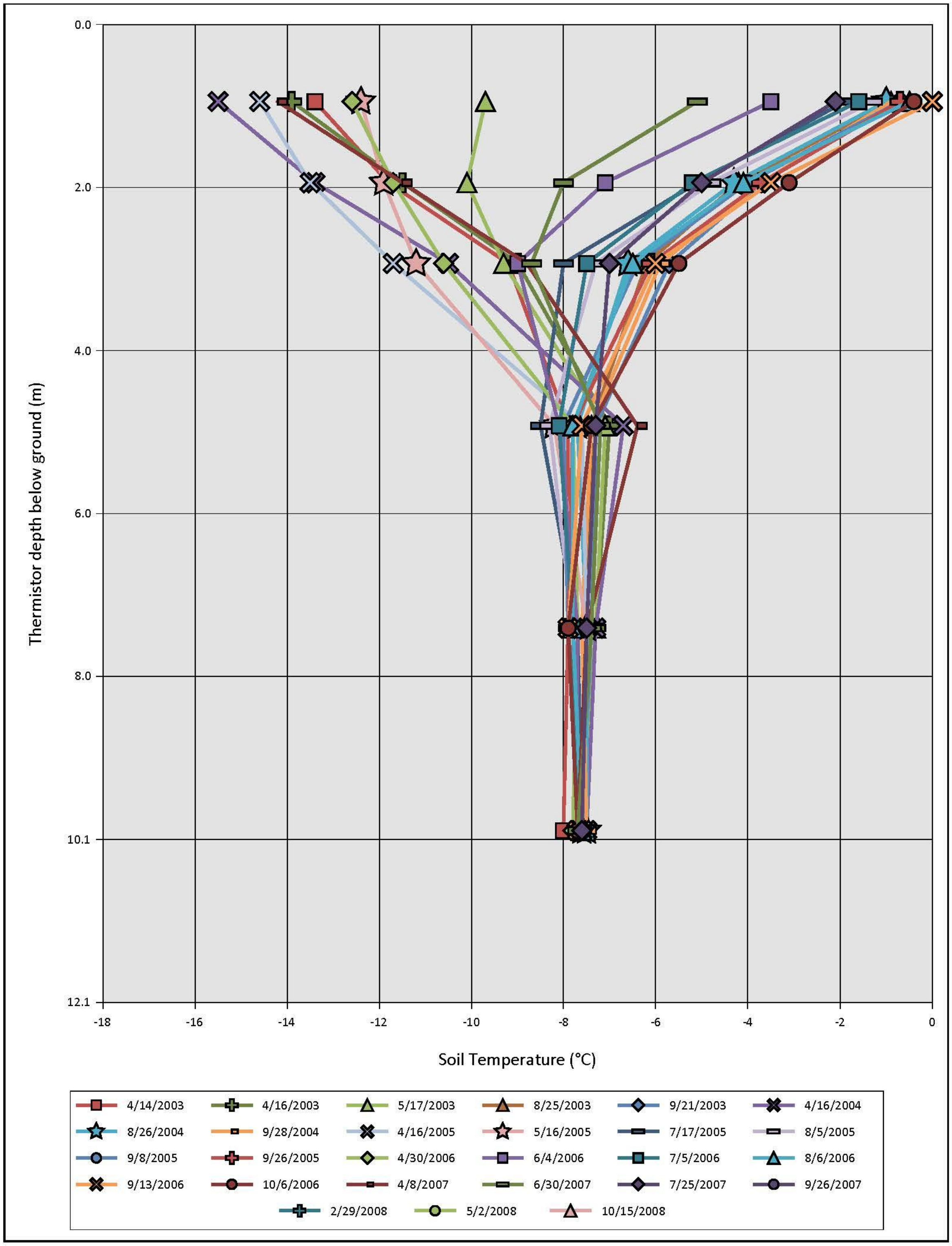
Thermistor Data (SRK-15)



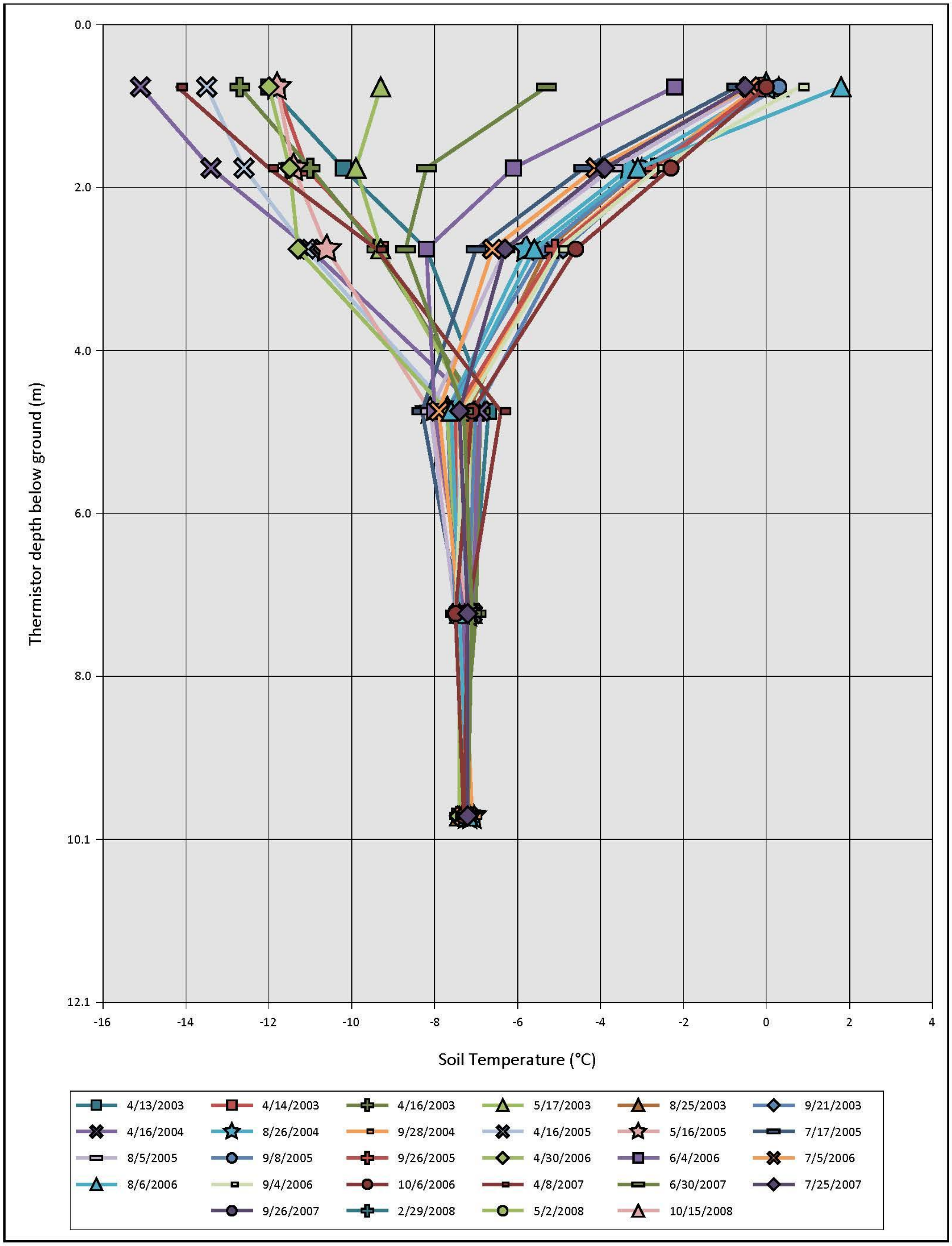
Thermistor Data (SRK-16)



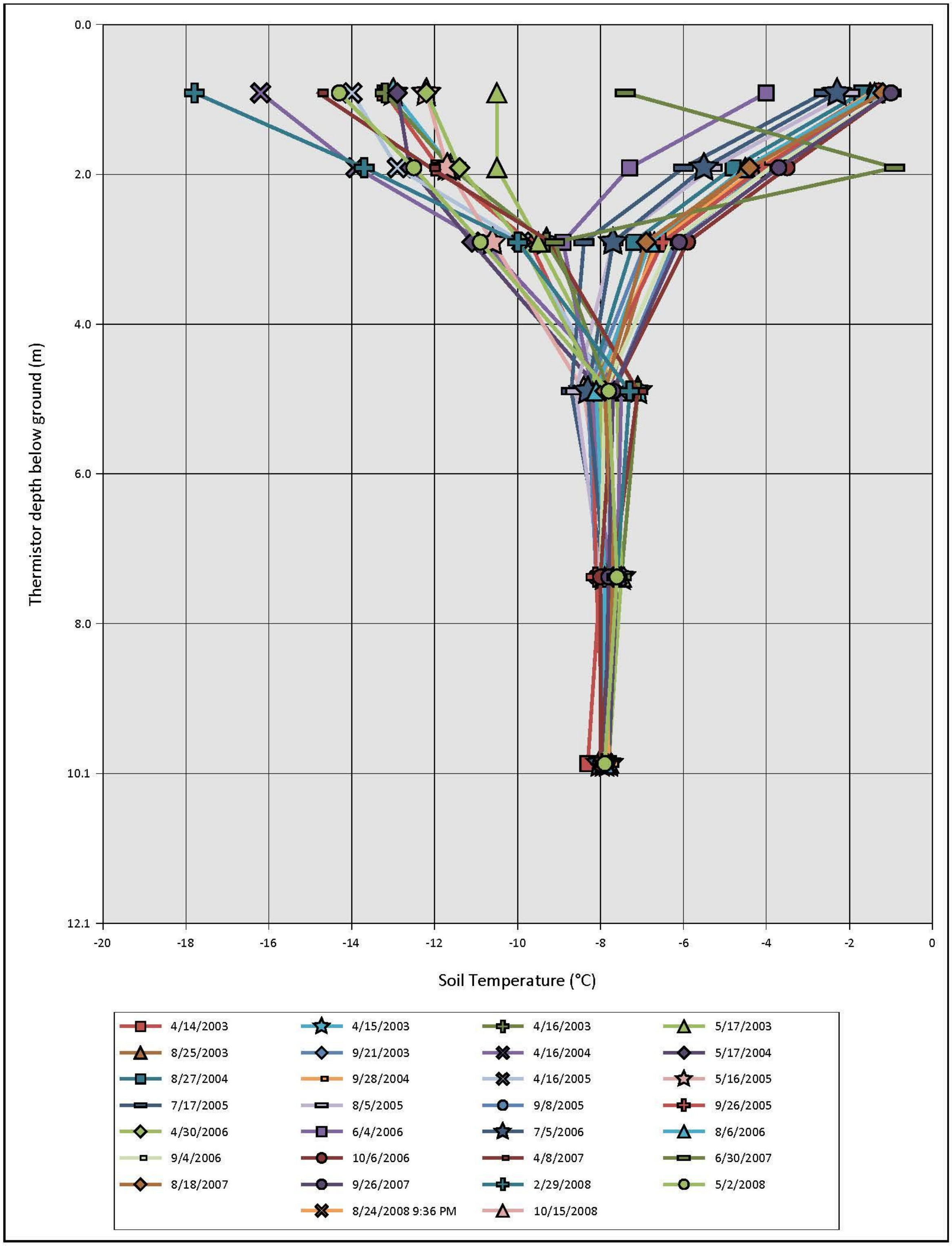
Thermistor Data (SRK-19)



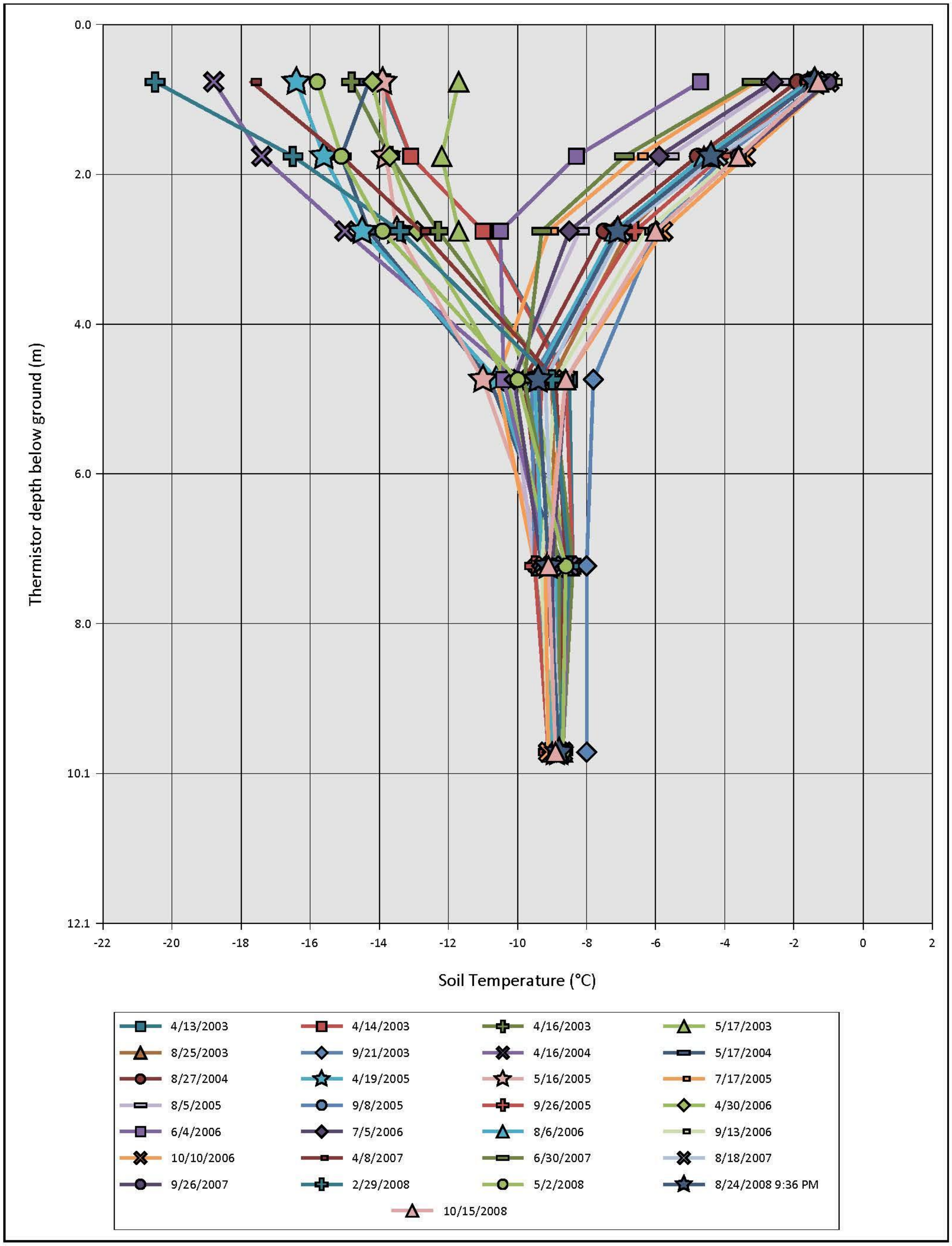
Thermistor Data (SRK-20)



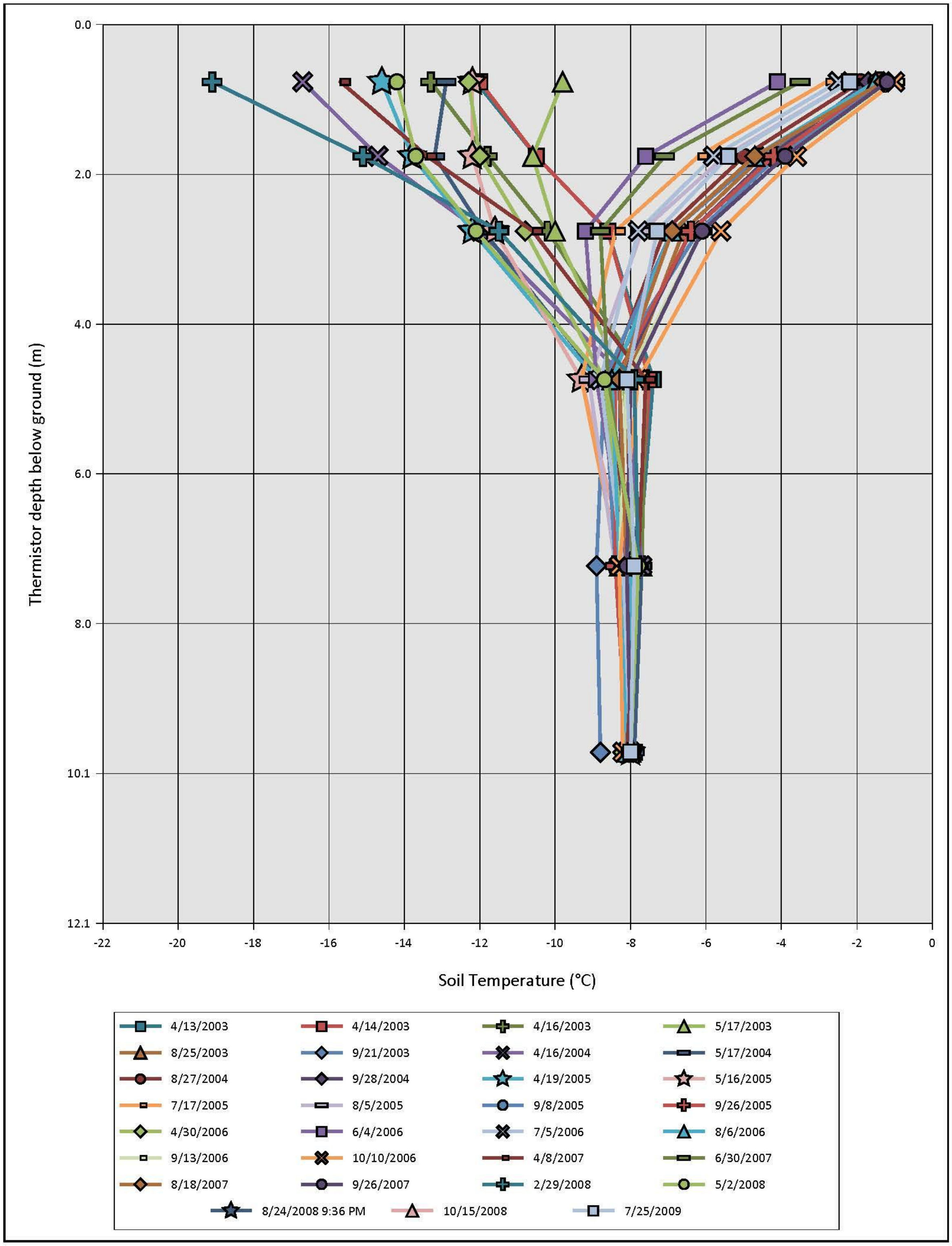
Thermistor Data (SRK-23)



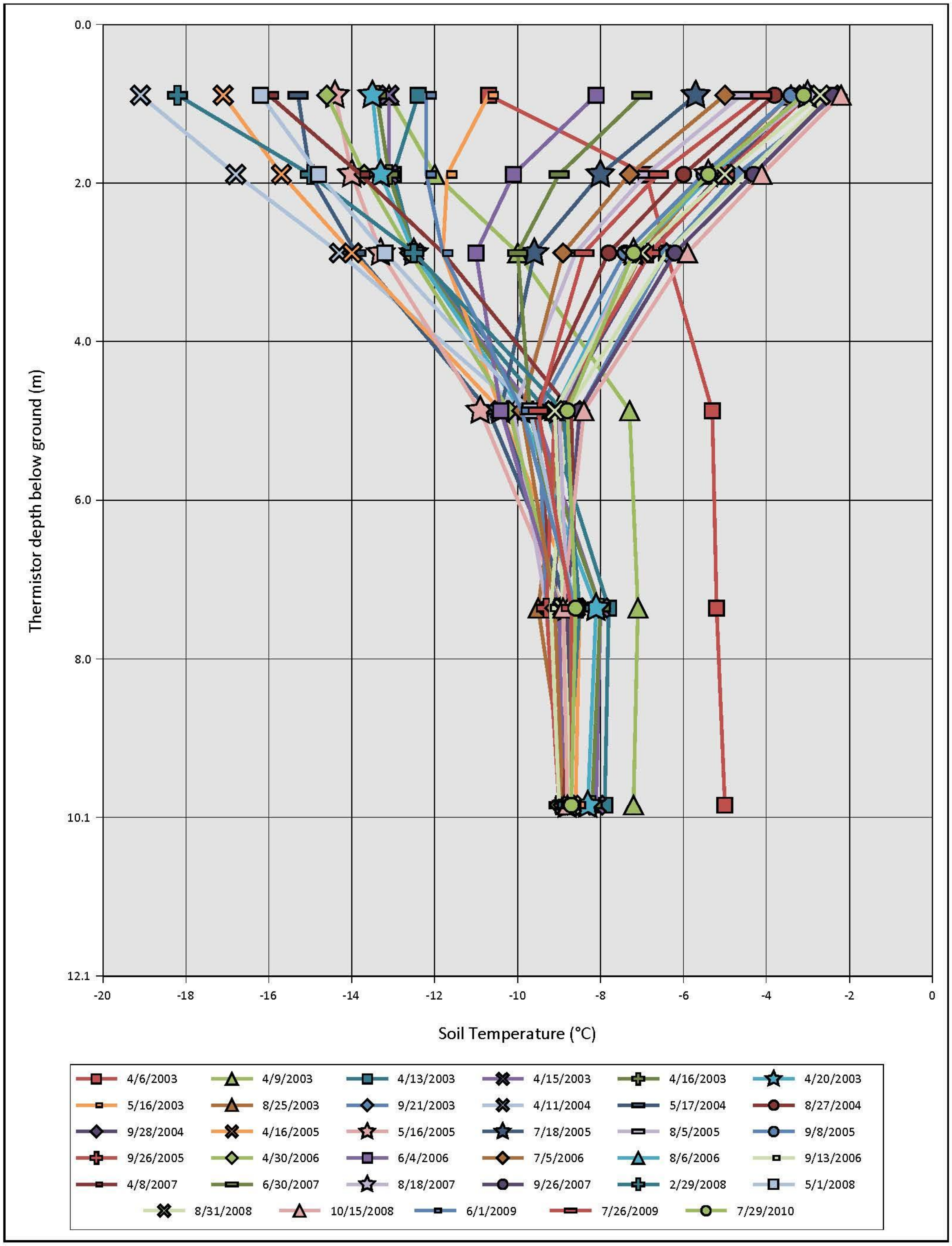
Thermistor Data (SRK-26)



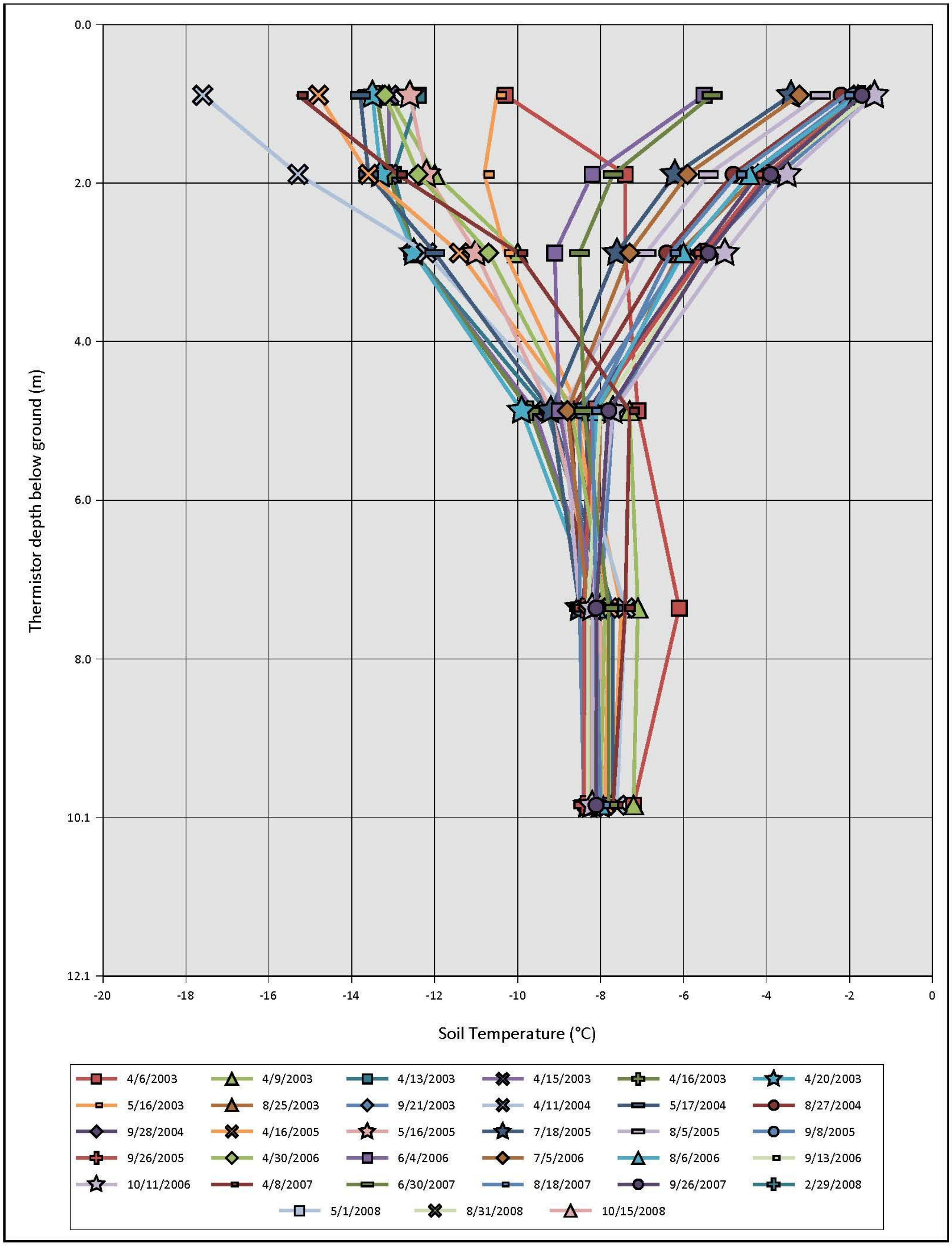
Thermistor Data (SRK-28)



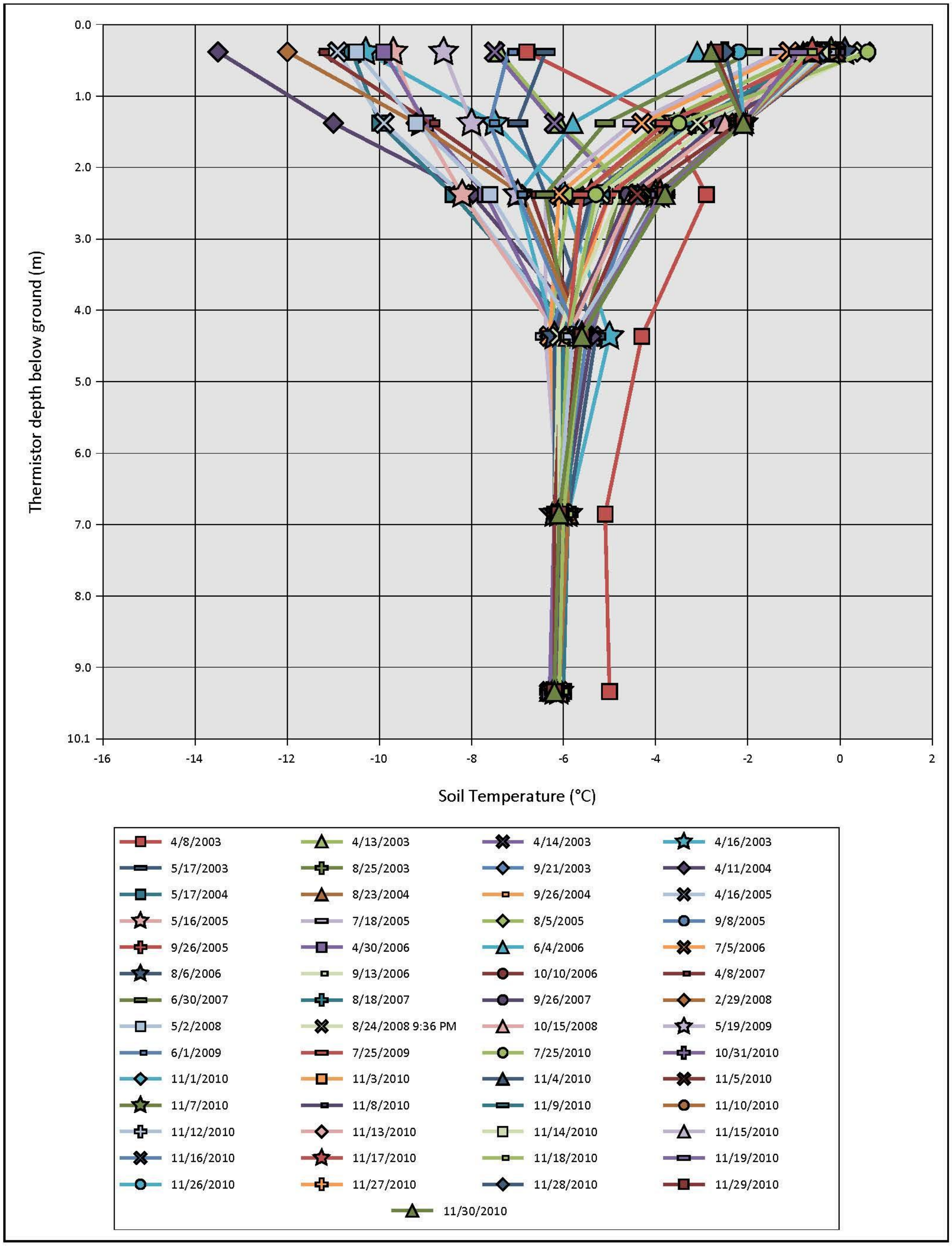
Thermistor Data (SRK-33)



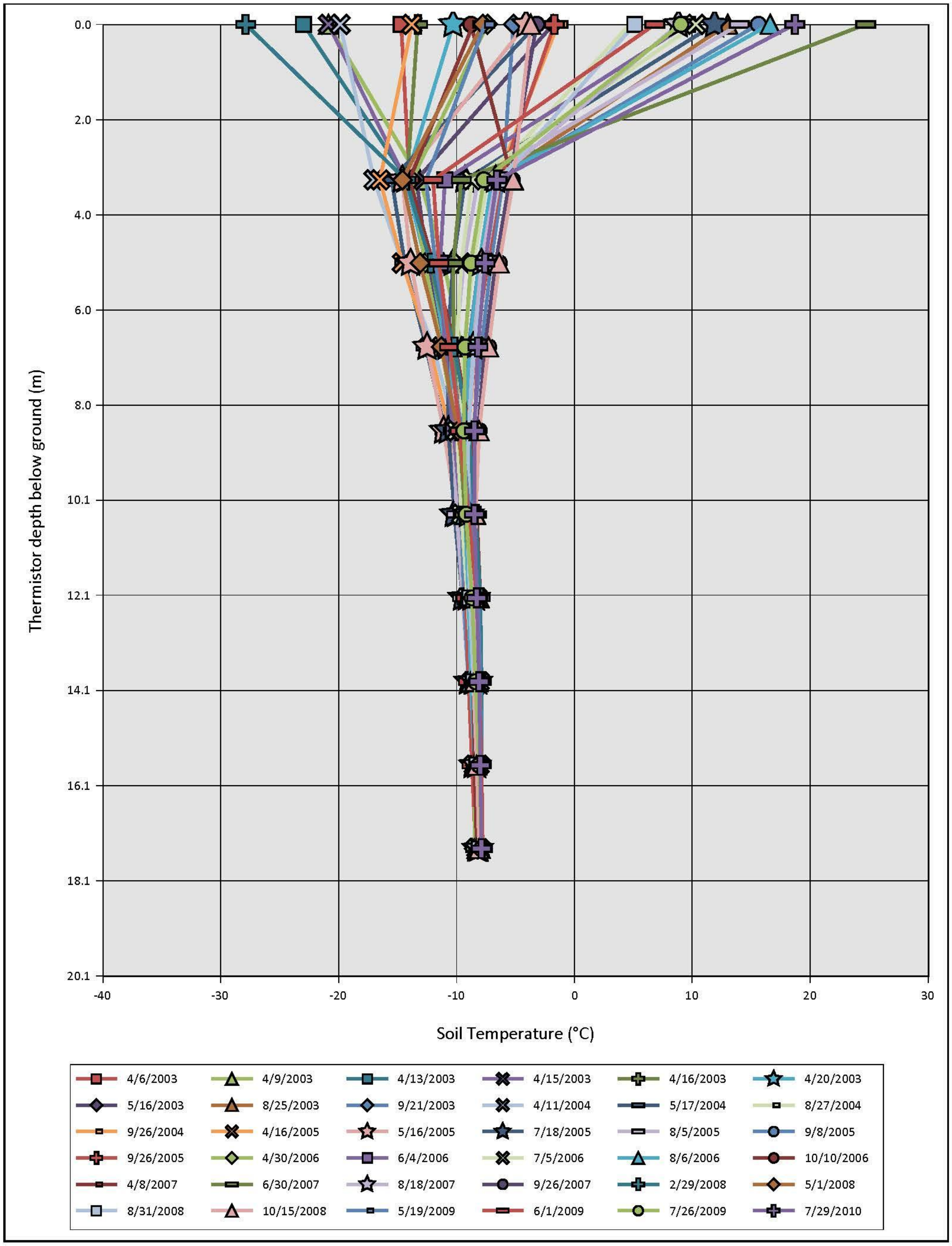
Thermistor Data (SRK-34A)



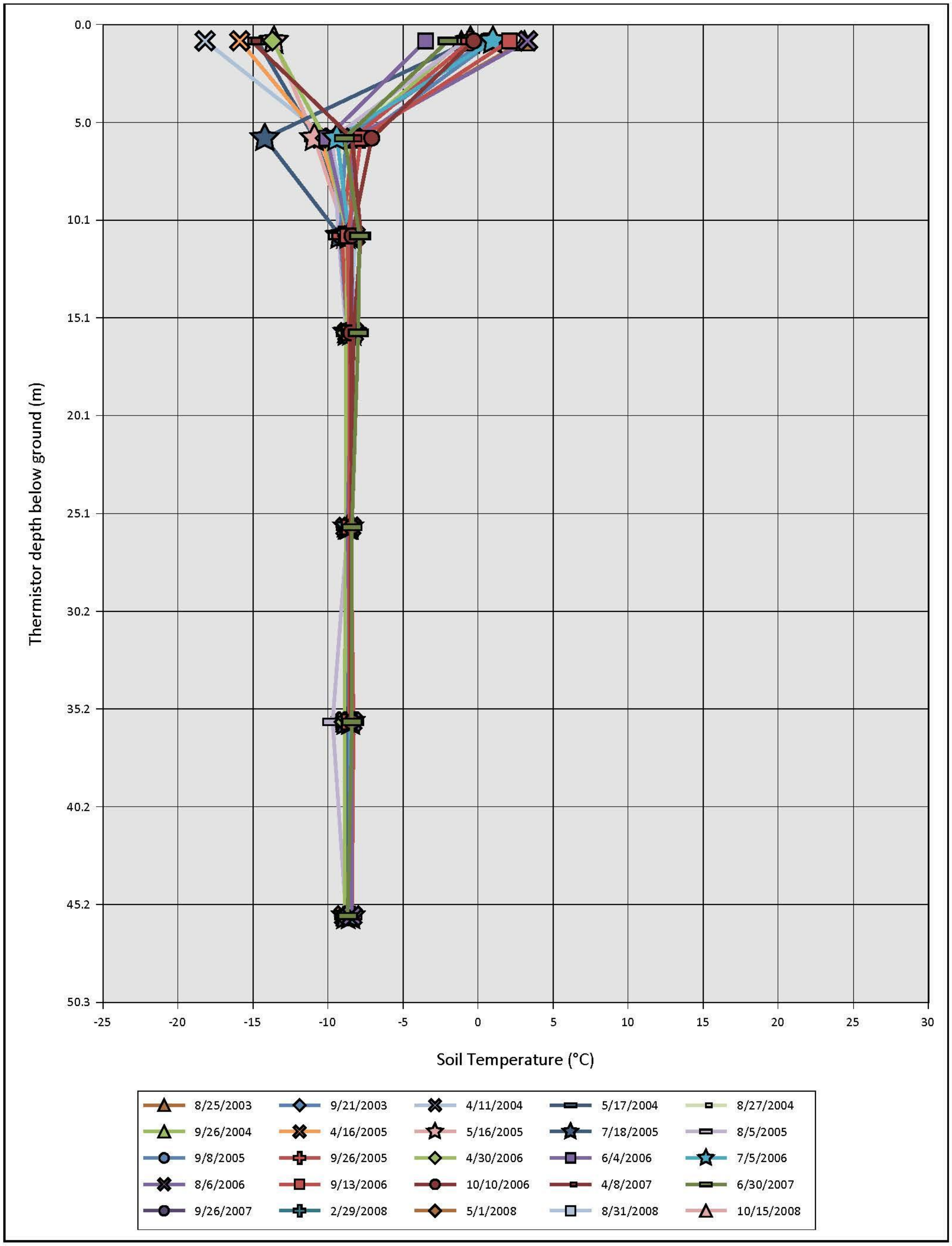
Thermistor Data (SRK-35)



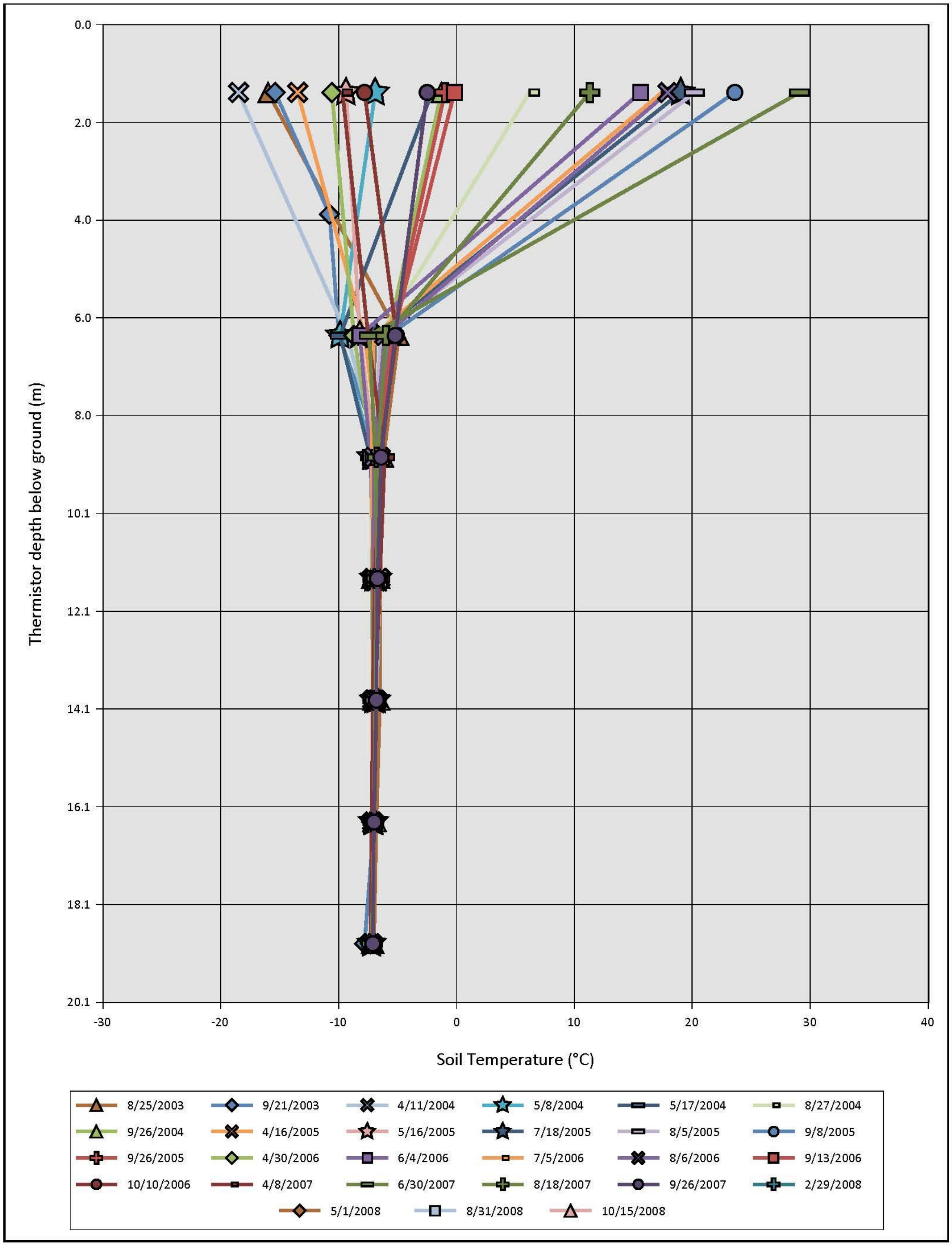
Thermistor Data (SRK-37)



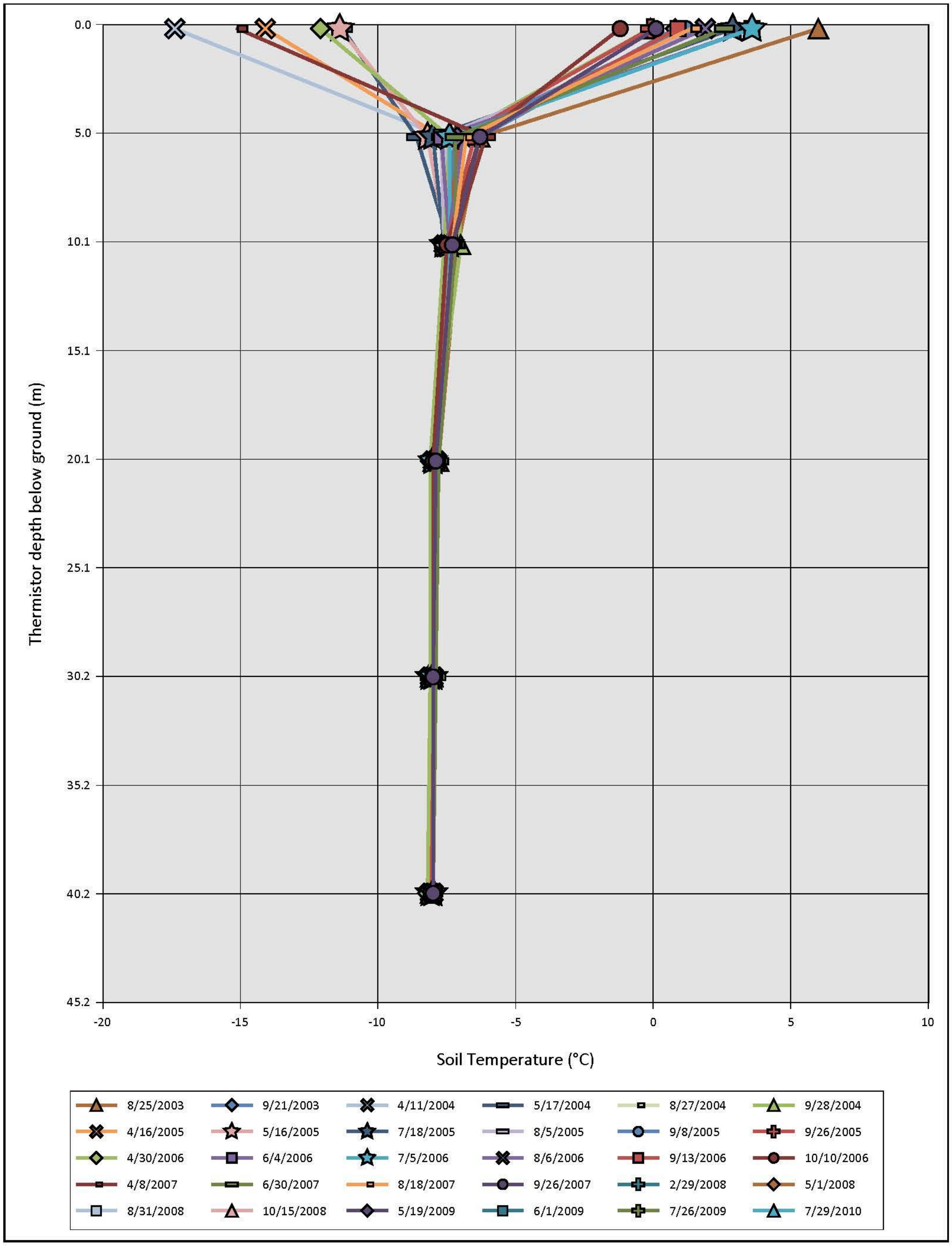
Thermistor Data (SRK-40)



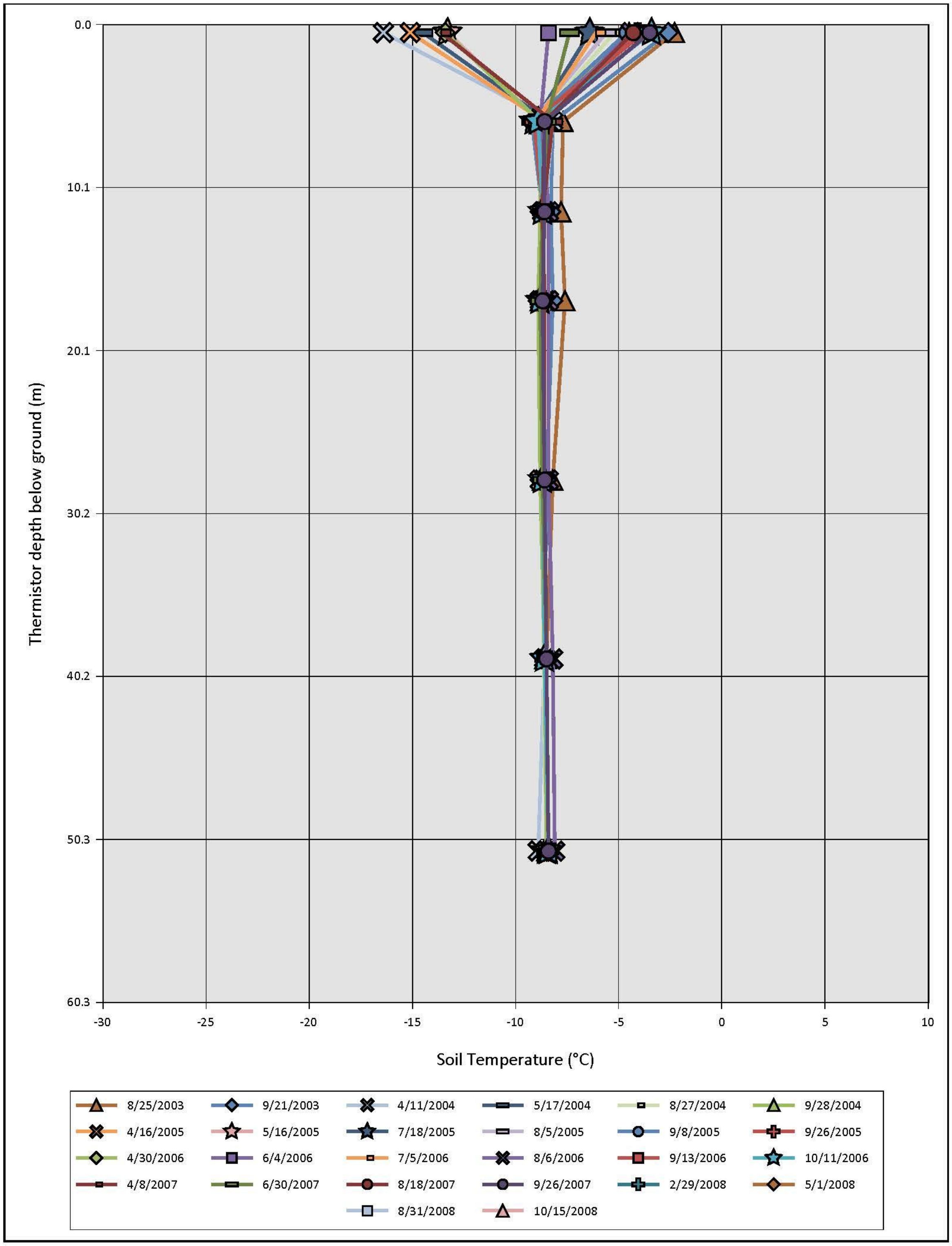
Thermistor Data (SRK-41)



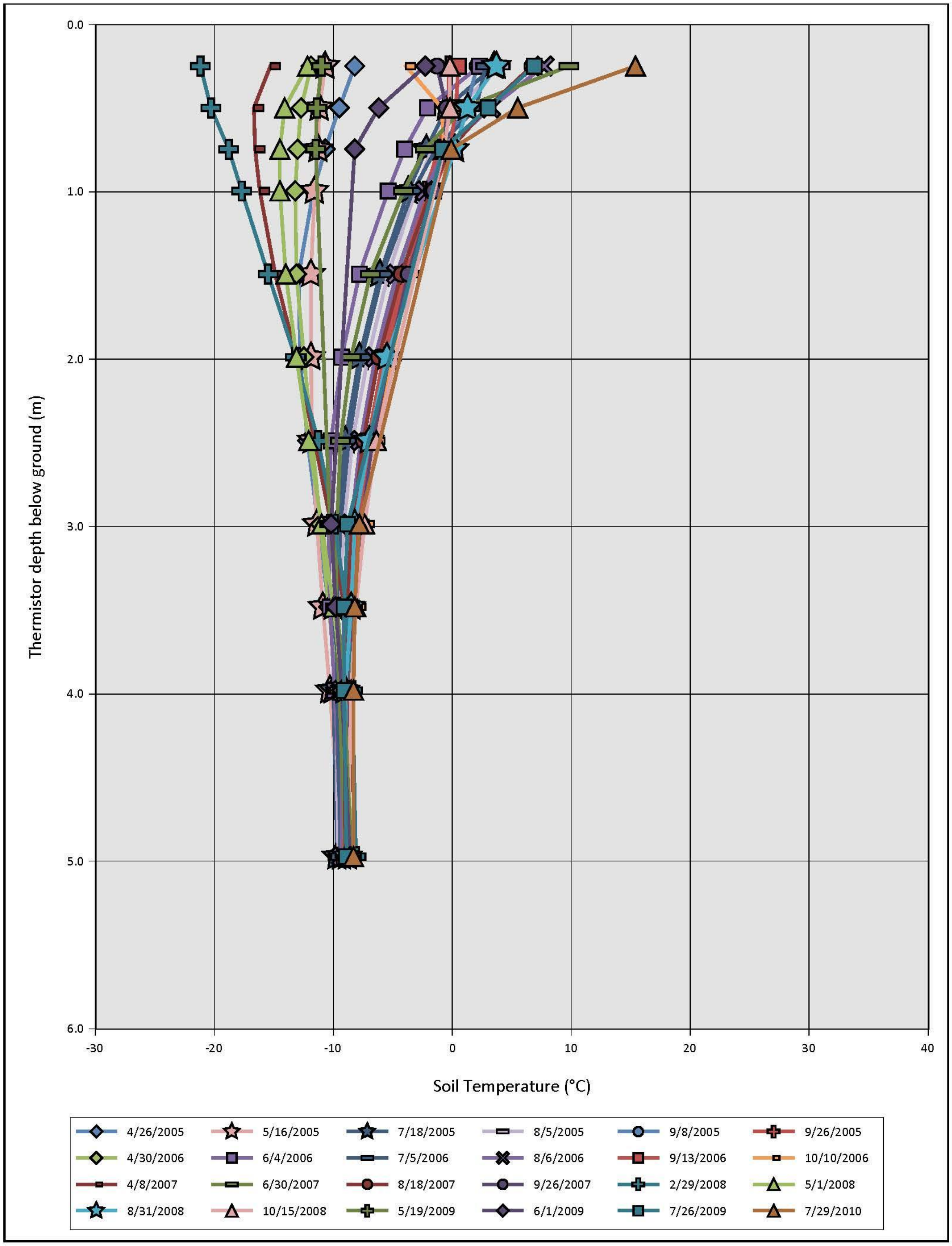
Thermistor Data (SRK-42)



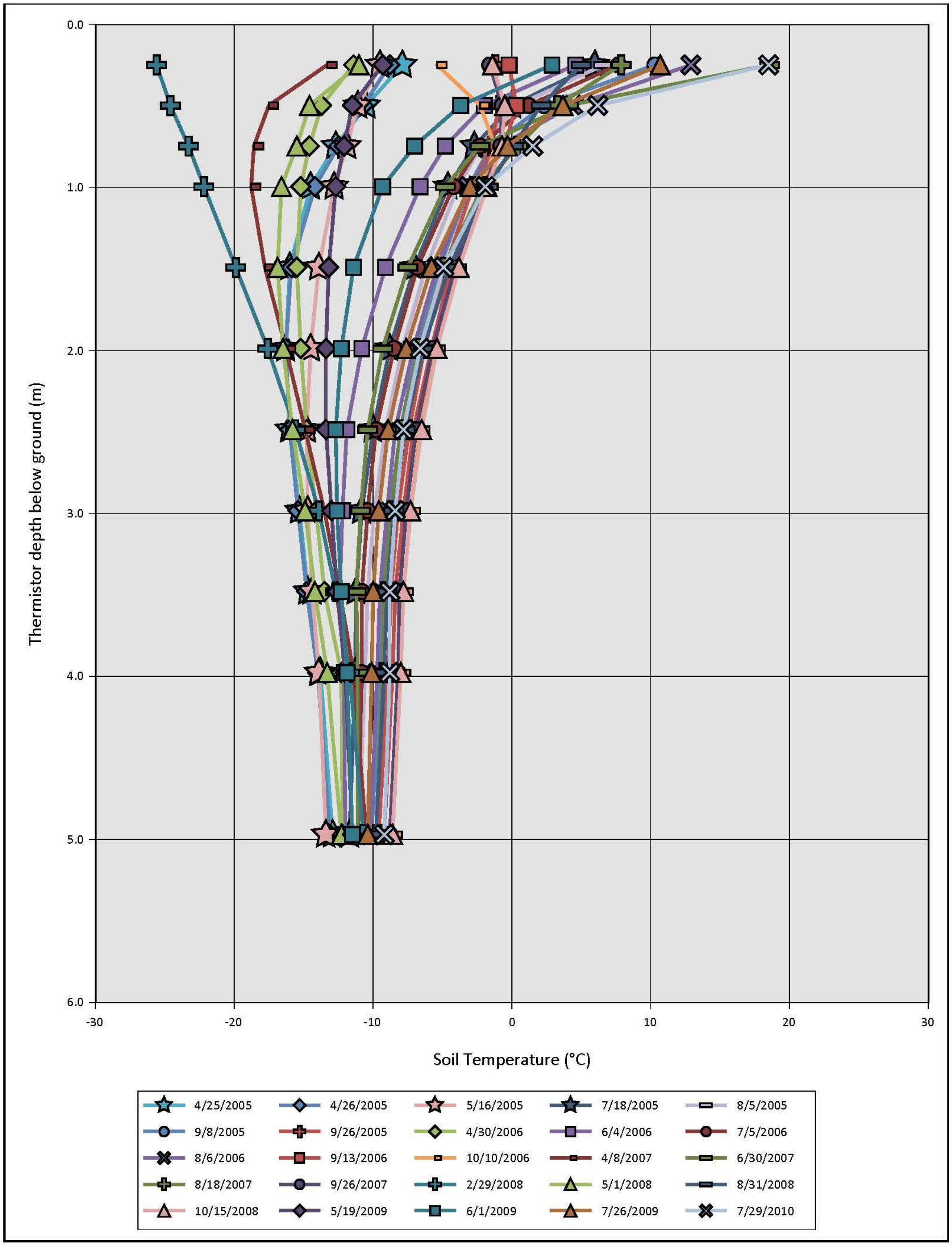
Thermistor Data (SRK-43)



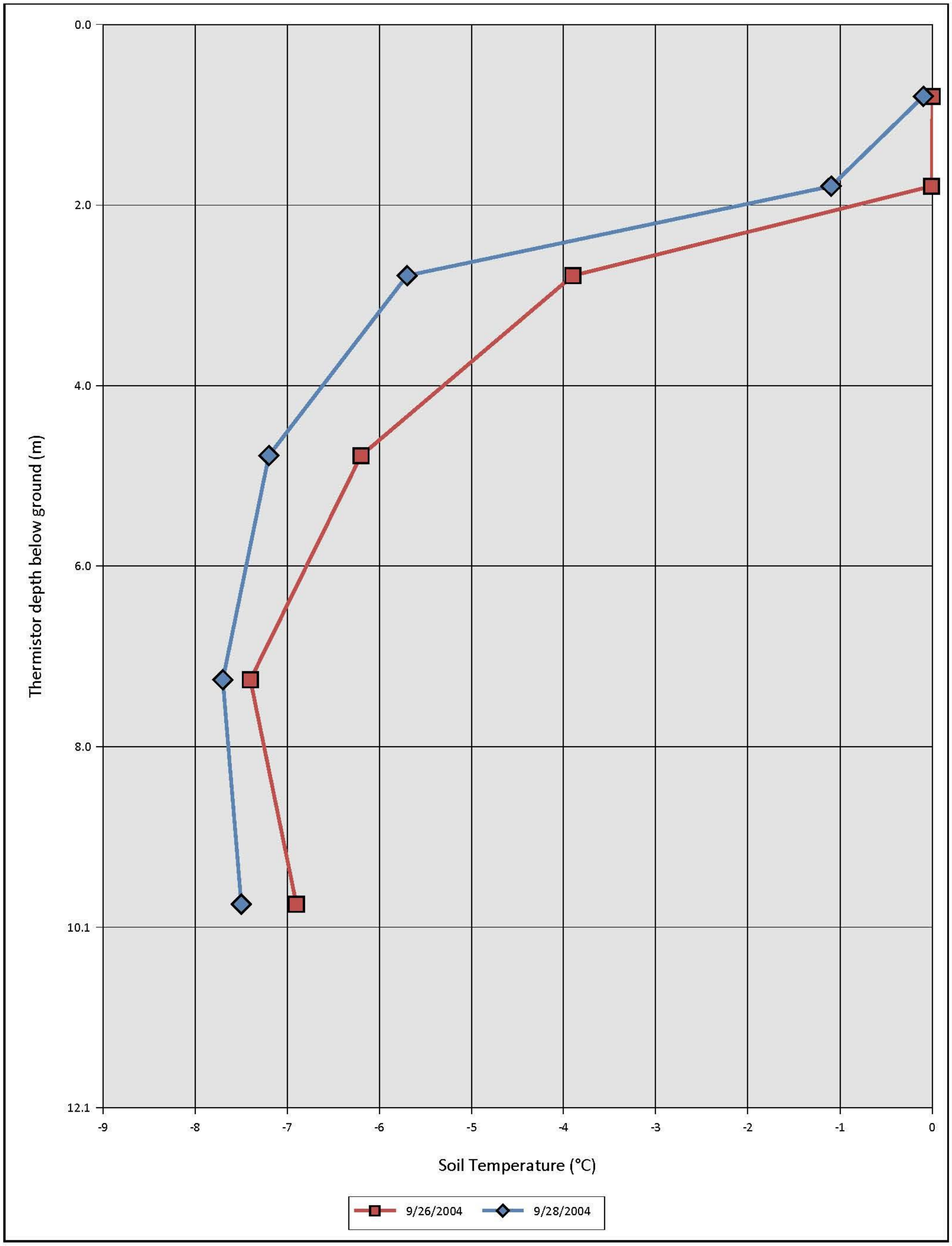
Thermistor Data (SRK-51)



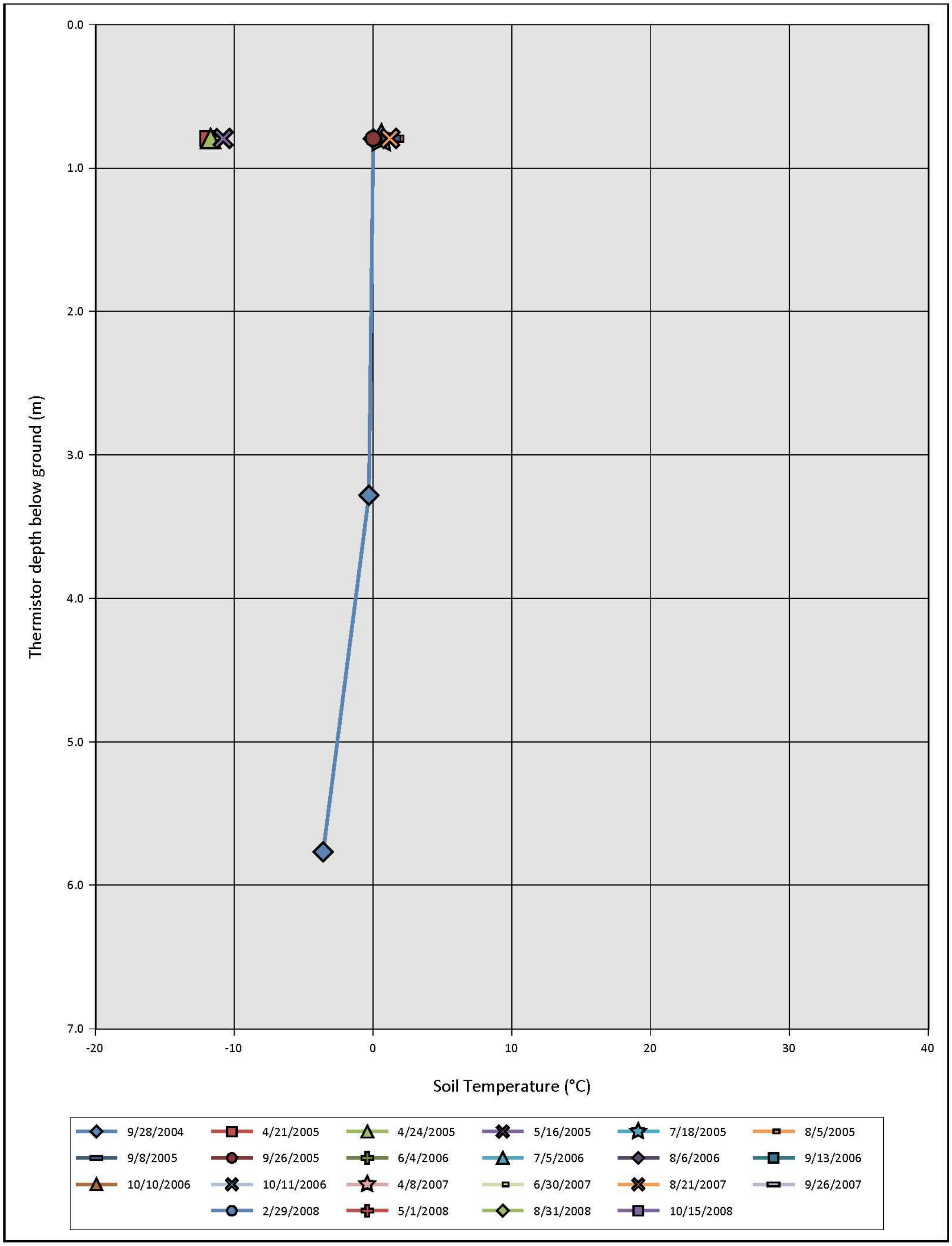
Thermistor Data (SRK-52)



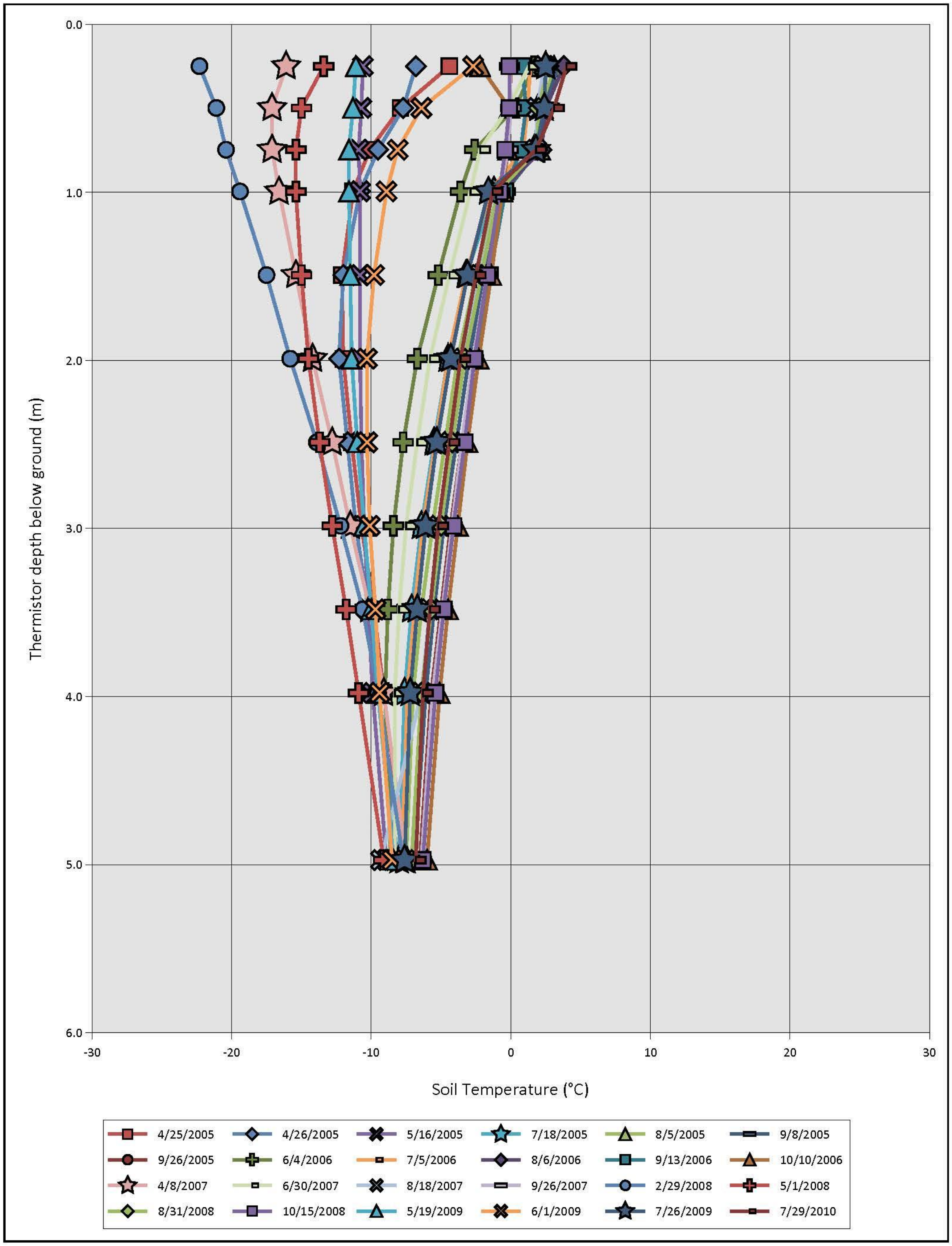
Thermistor Data (SRK-55)



Thermistor Data (SRK-56)

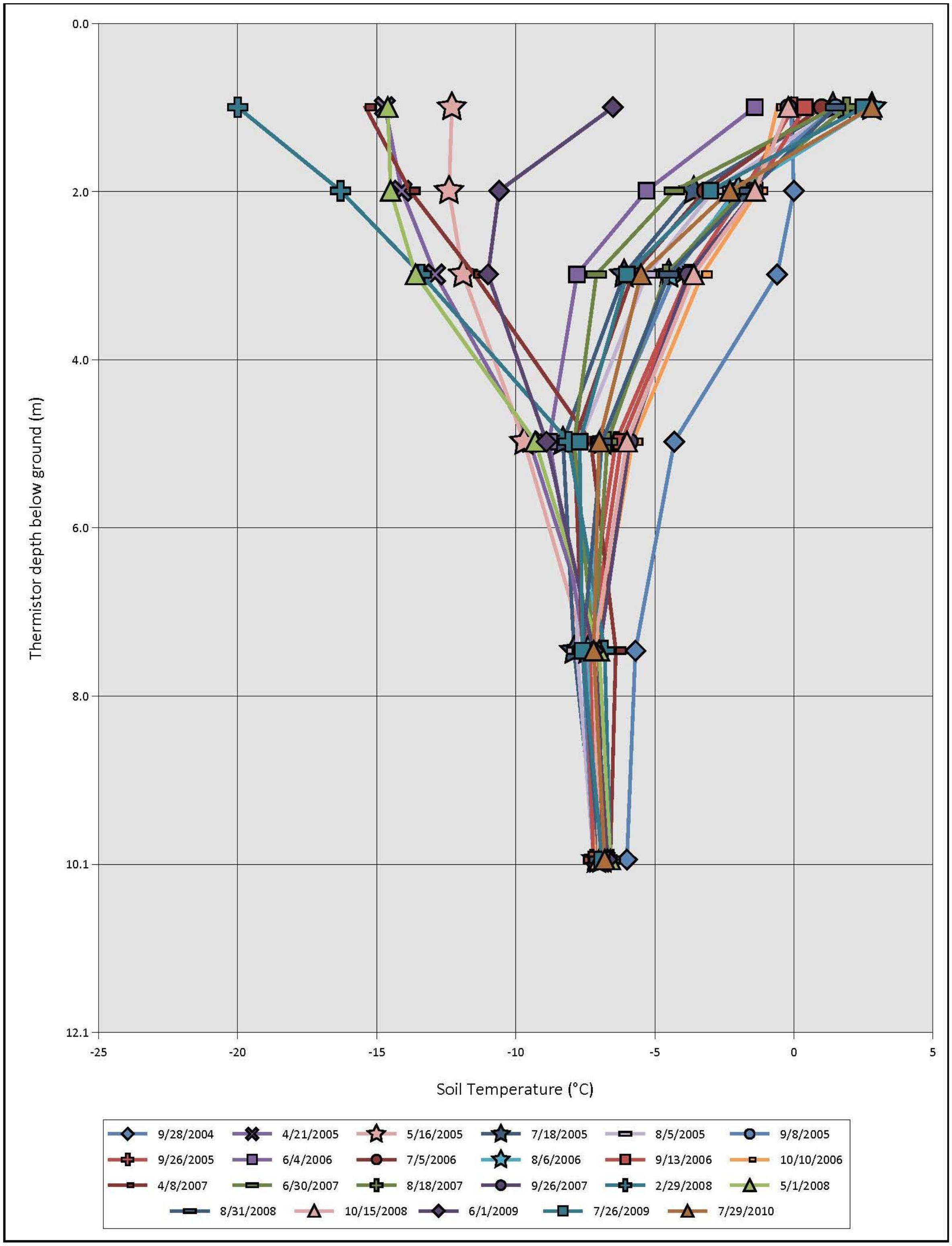


Thermistor Data (SRK-62)

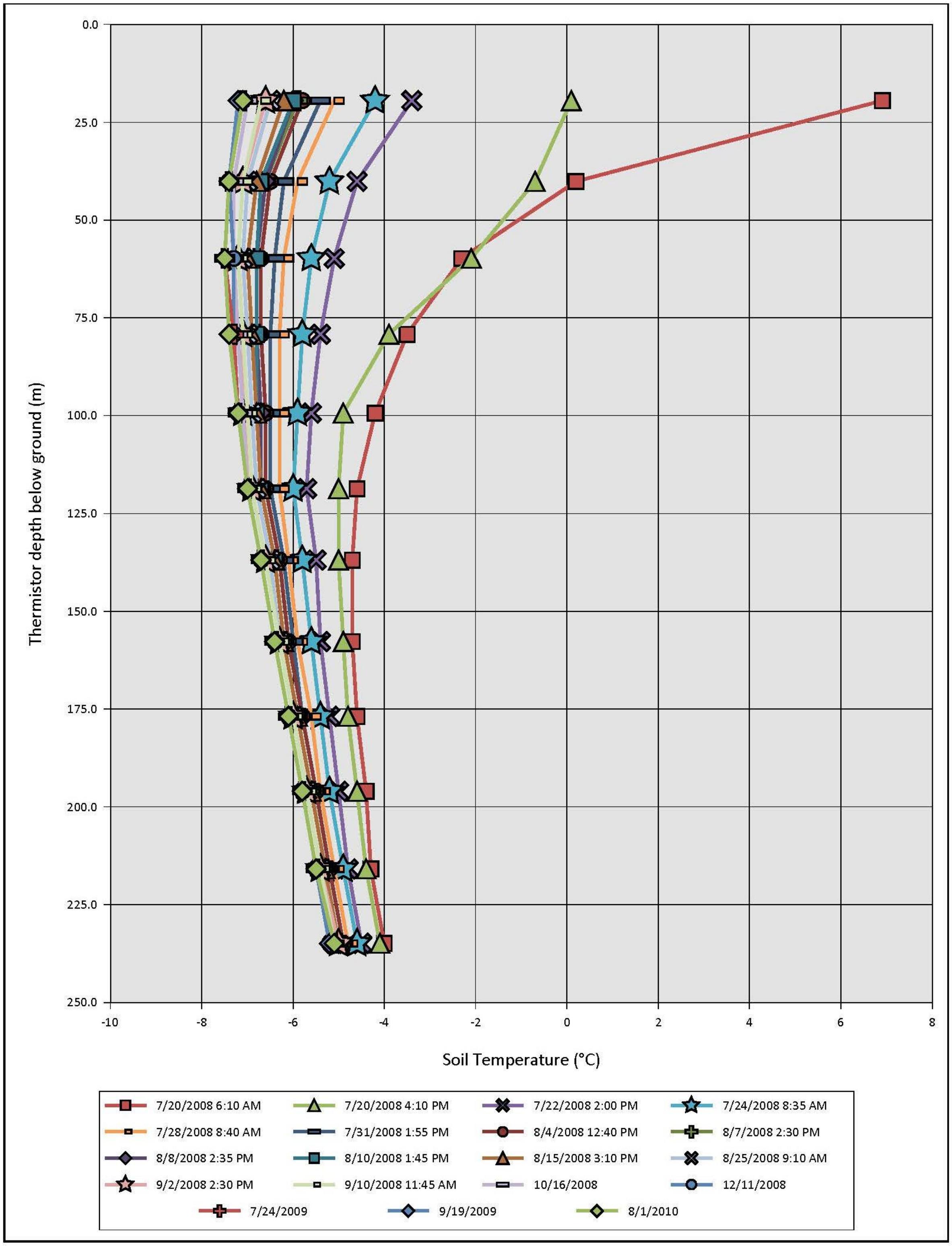


Appendix C: Status Unknown Thermistor Profiles

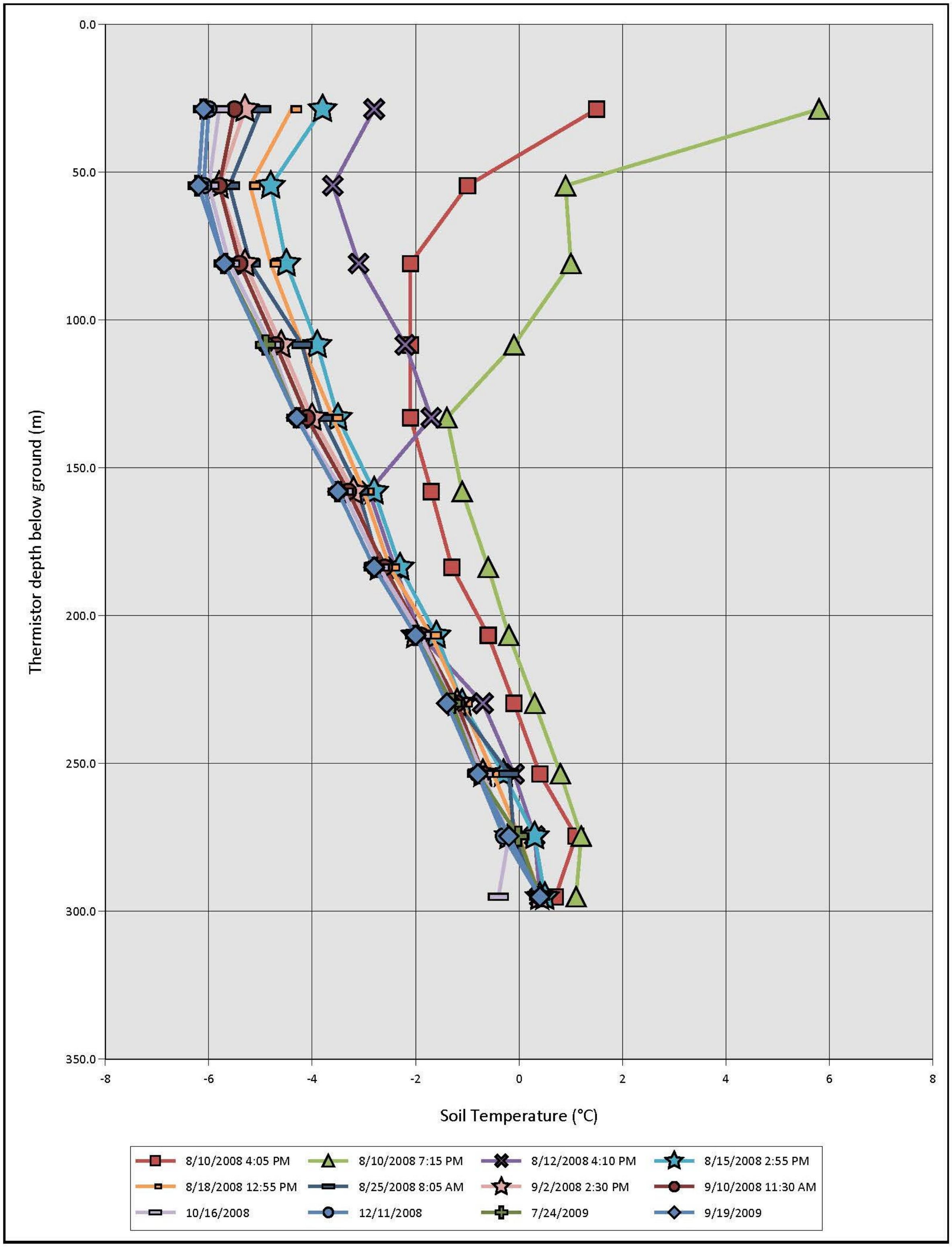
Thermistor Data (SRK-54)



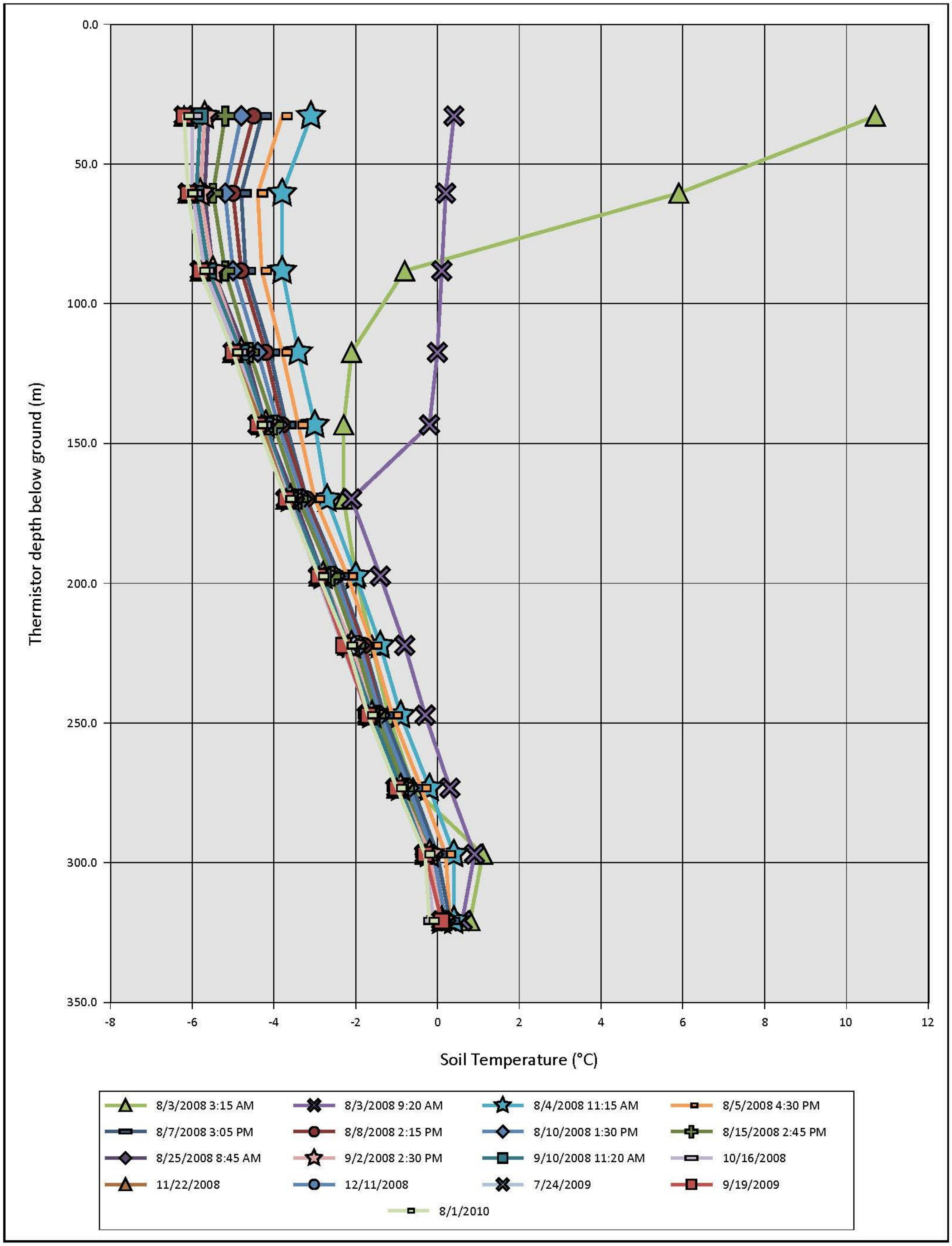
Thermistor Data (08SBD380)



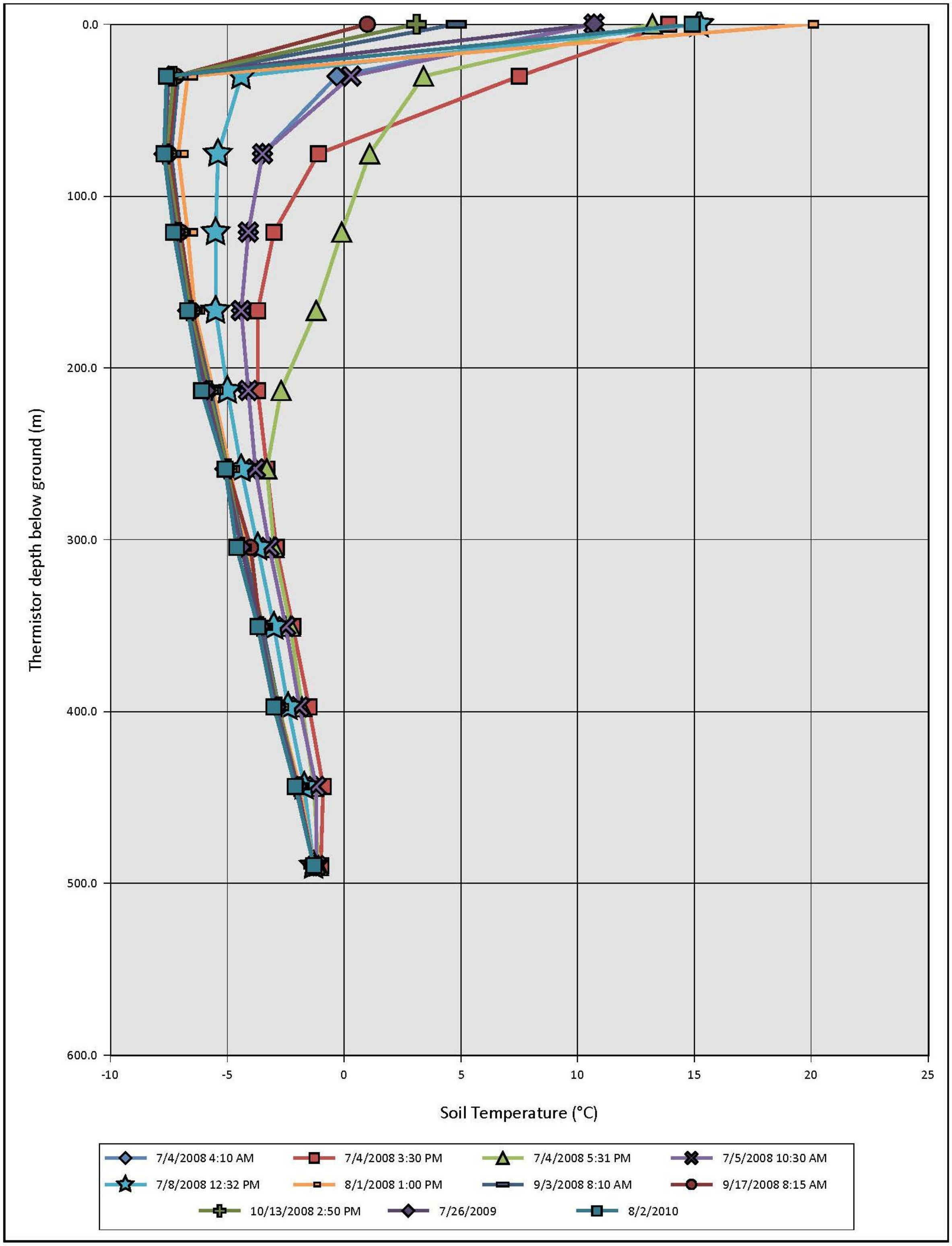
Thermistor Data (08SBD381A)



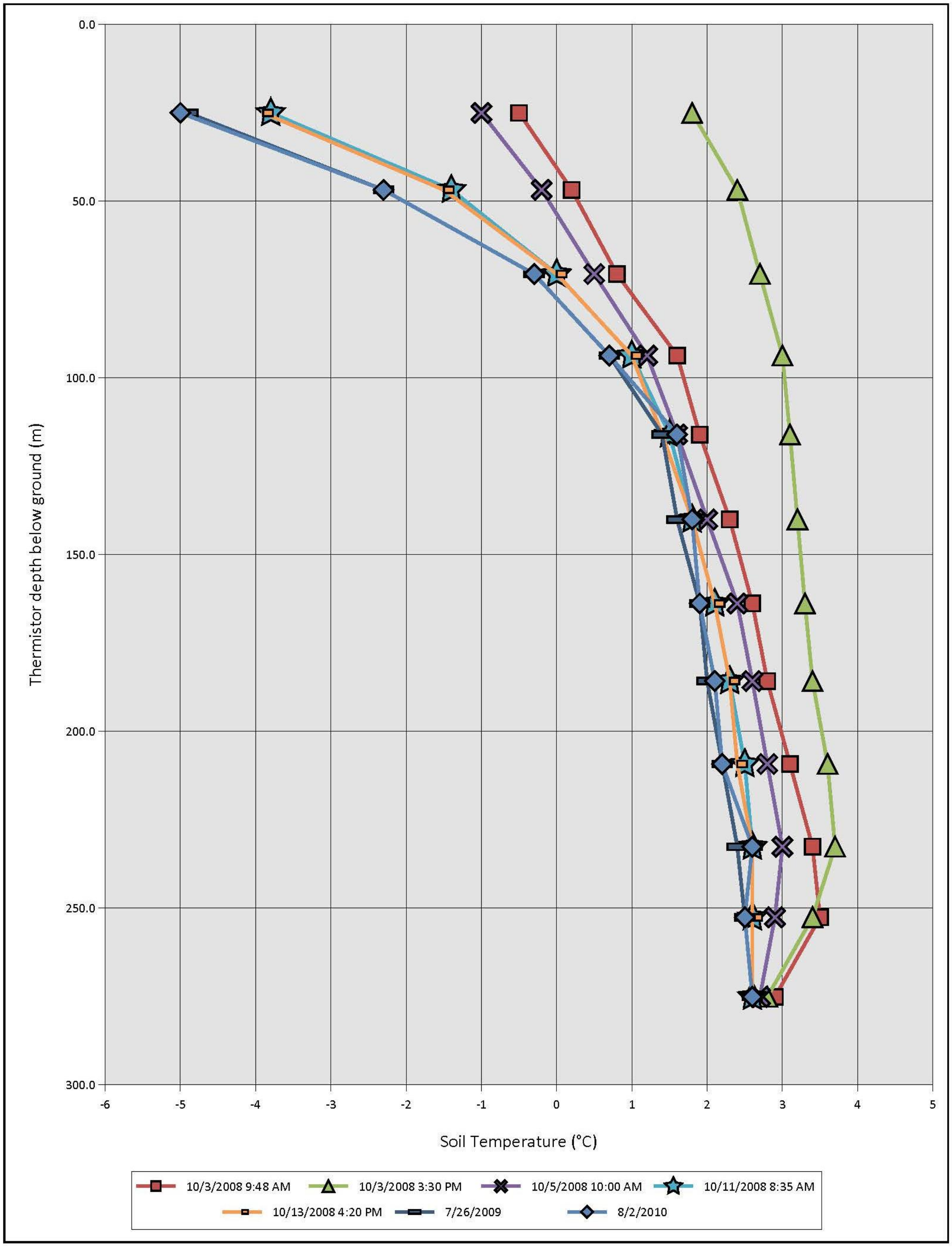
Thermistor Data (08SBD832)



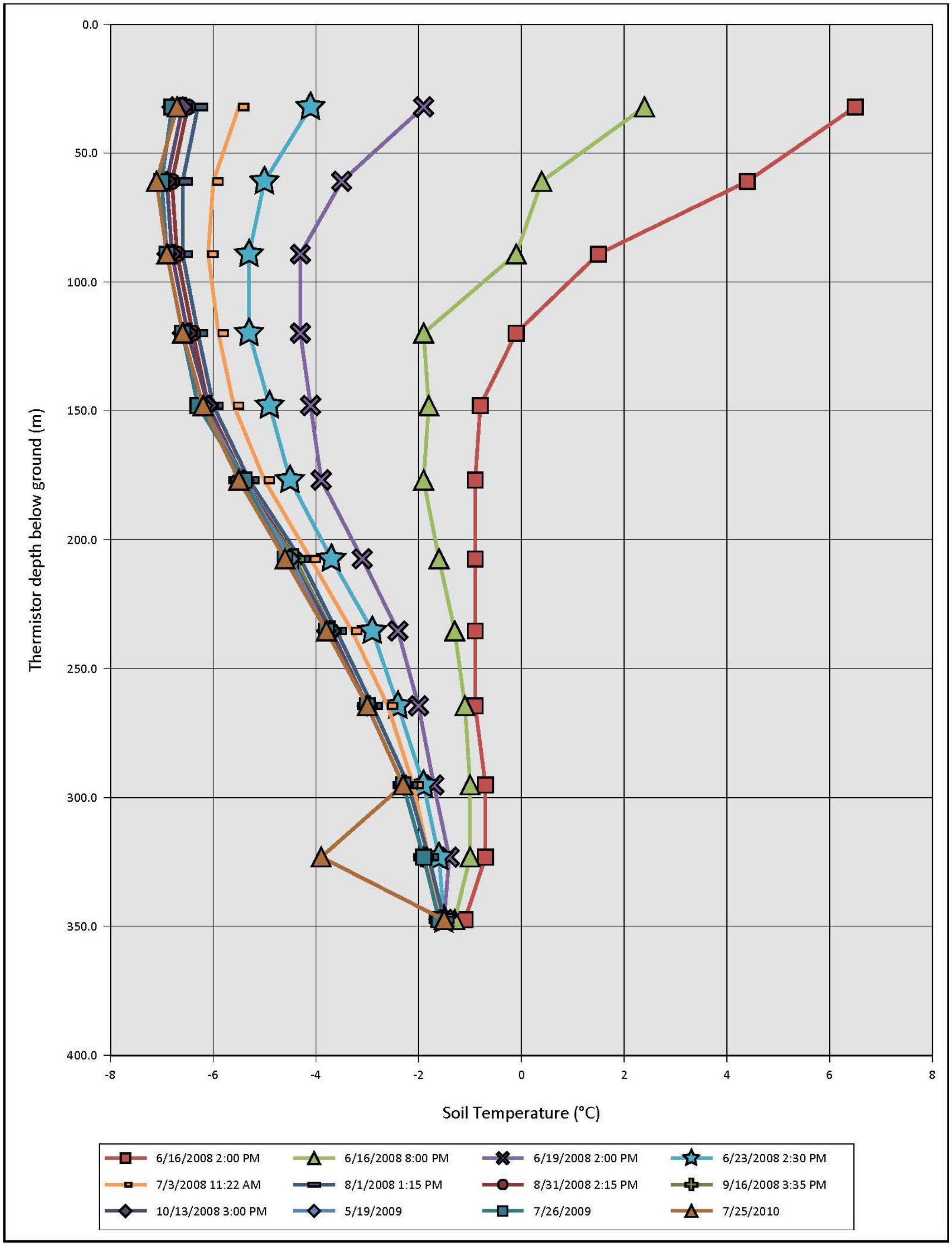
Thermistor Data (08PMD669)



Thermistor Data (08PSD144)

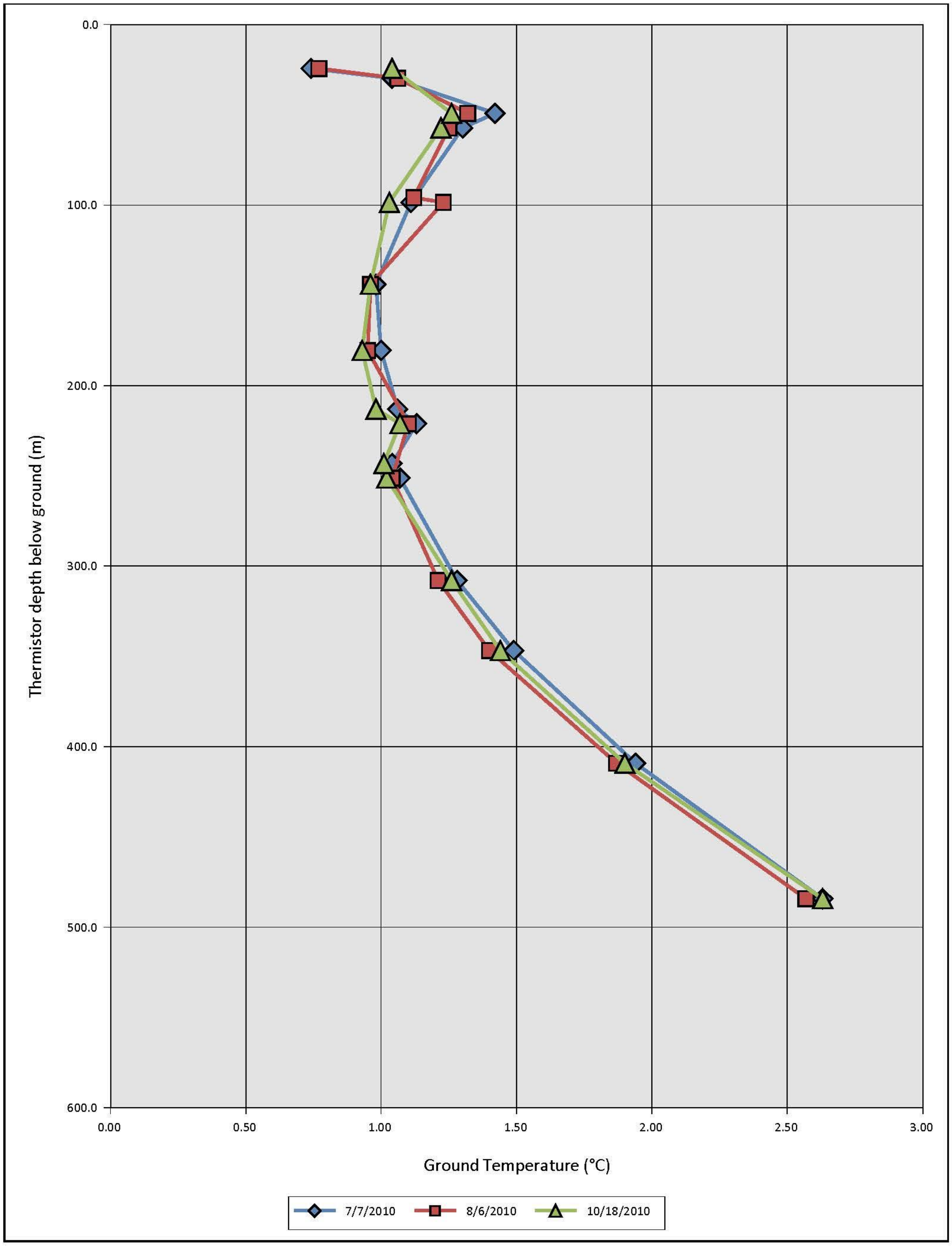


Thermistor Data (08TDD632)

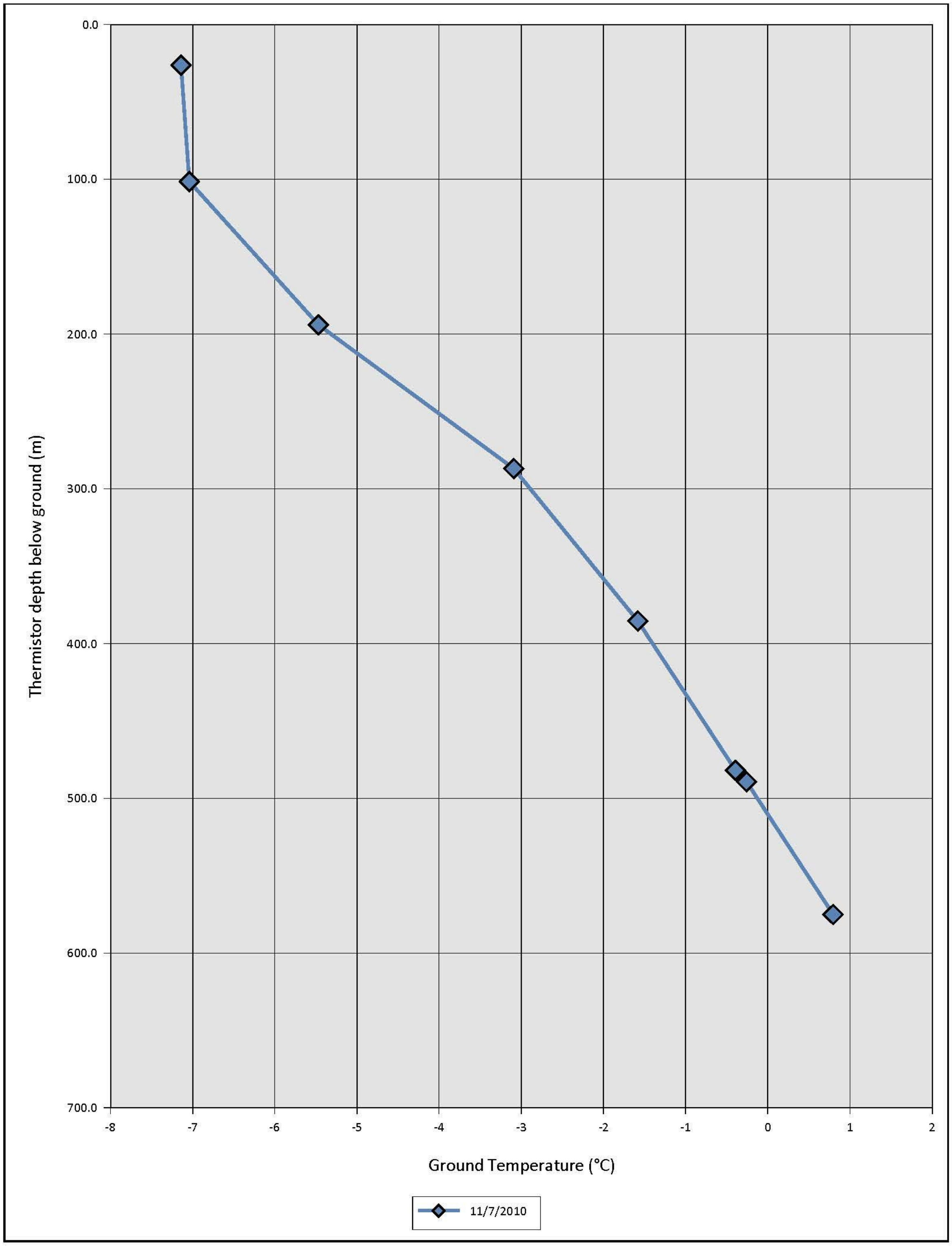


Appendix D: Westbay Well Thermistor Profiles

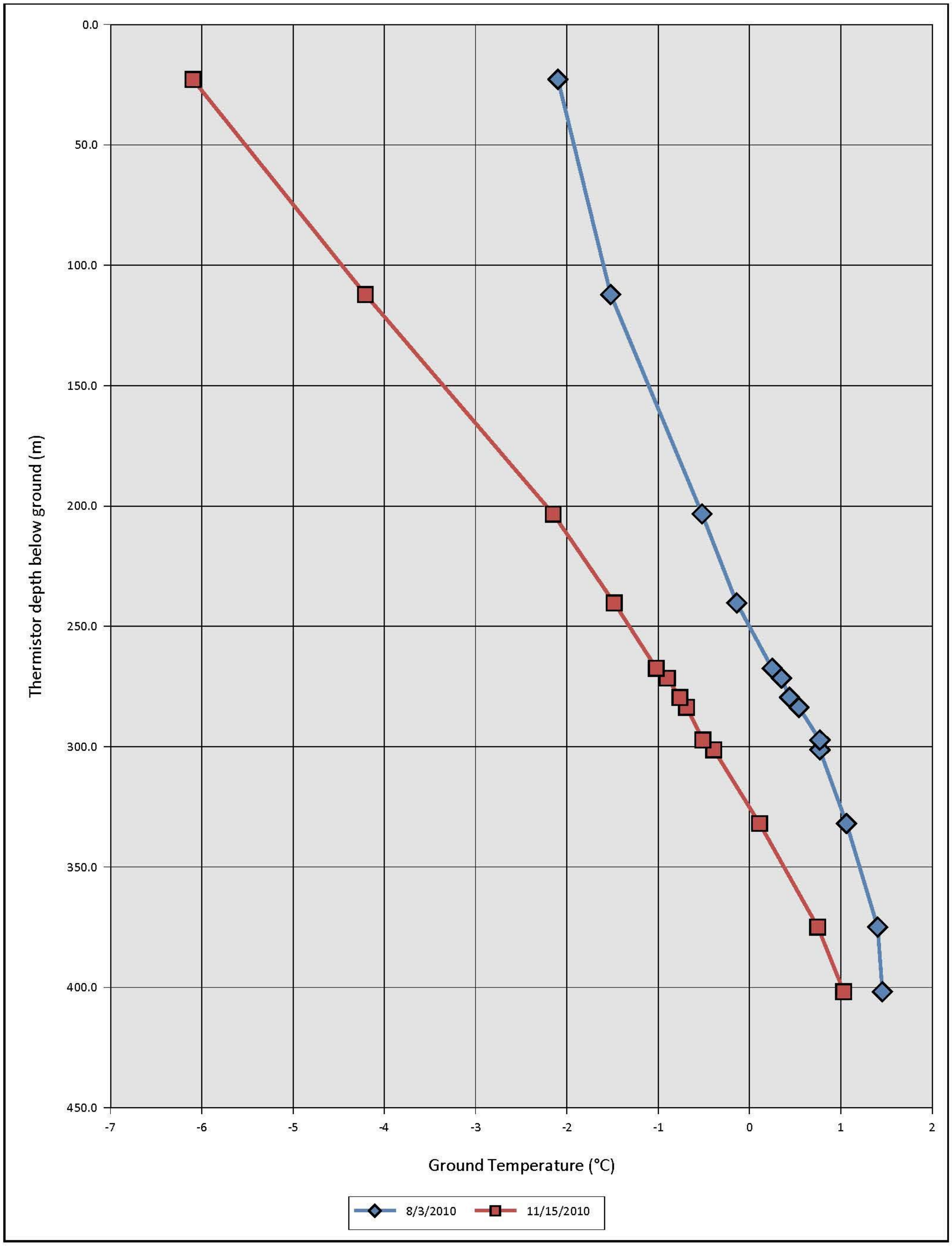
Thermistor Data (10WBW001)



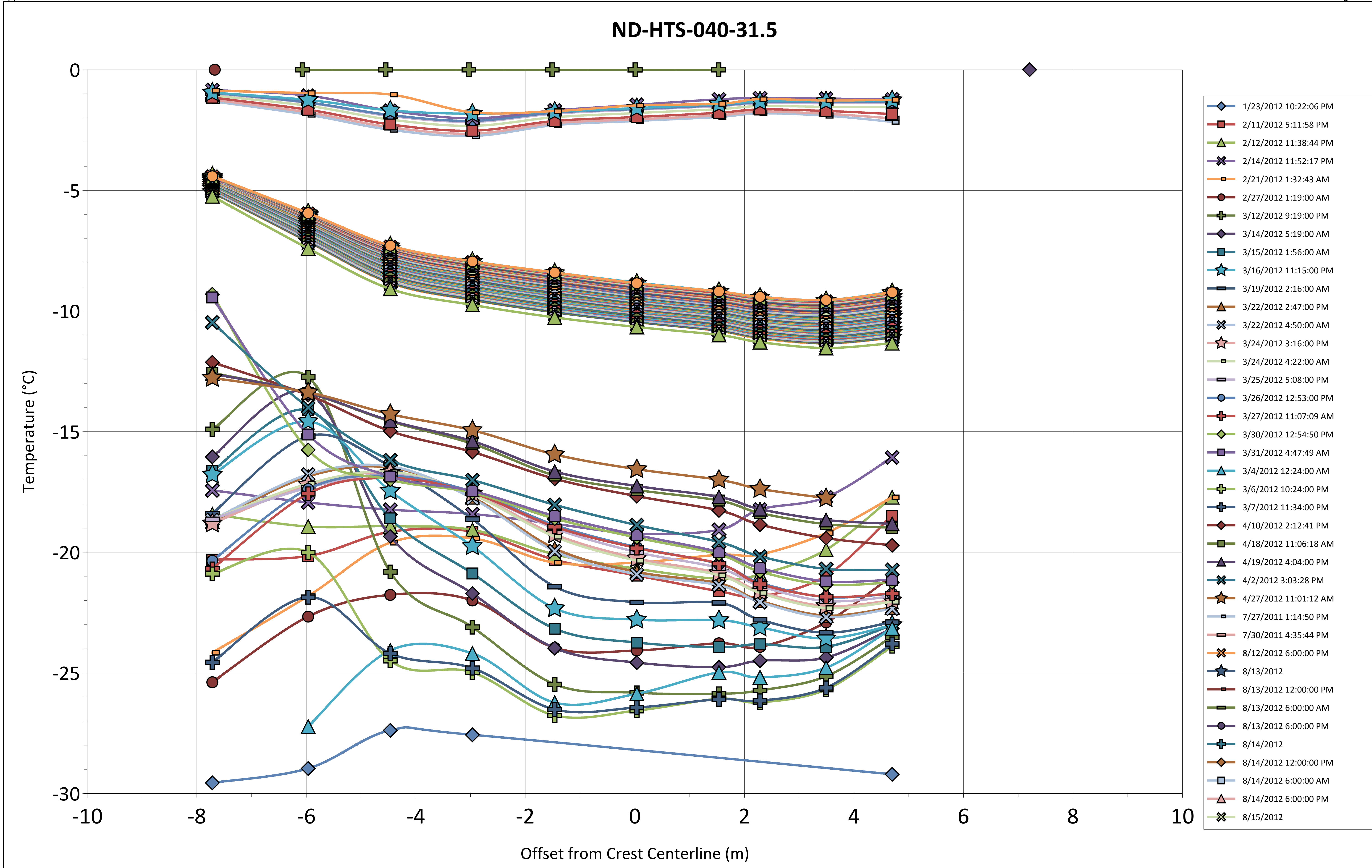
Thermistor Data (10WBW002)



Thermistor Data (10WBW004)



Appendix E: North Dam Horizontal Thermistor Profiles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-20
-25
-30
-10
-8
-6
-4
-2
0
2
4
6
8
10
Offset from Crest Centerline (m)
1/23/2012 10:22:06 PM
2/11/2012 5:11:58 PM
2/12/2012 11:38:44 PM
2/14/2012 11:52:17 PM
2/21/2012 1:32:43 AM
2/27/2012 1:19:00 AM
3/12/2012 9:19:00 PM
3/14/2012 5:19:00 AM
3/15/2012 1:56:00 AM
3/16/2012 11:15:00 PM
3/19/2012 2:16:00 AM
3/22/2012 2:47:00 PM
3/22/2012 4:50:00 AM
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3/24/2012 4:22:00 AM
3/25/2012 5:08:00 PM
3/26/2012 12:53:00 PM
3/27/2012 11:07:09 AM
3/30/2012 12:54:50 PM
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3/4/2012 12:24:00 AM
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7/27/2011 1:14:50 PM
7/30/2011 4:35:44 PM
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8/13/2012
8/13/2012 12:00:00 PM
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8/13/2012 6:00:00 PM
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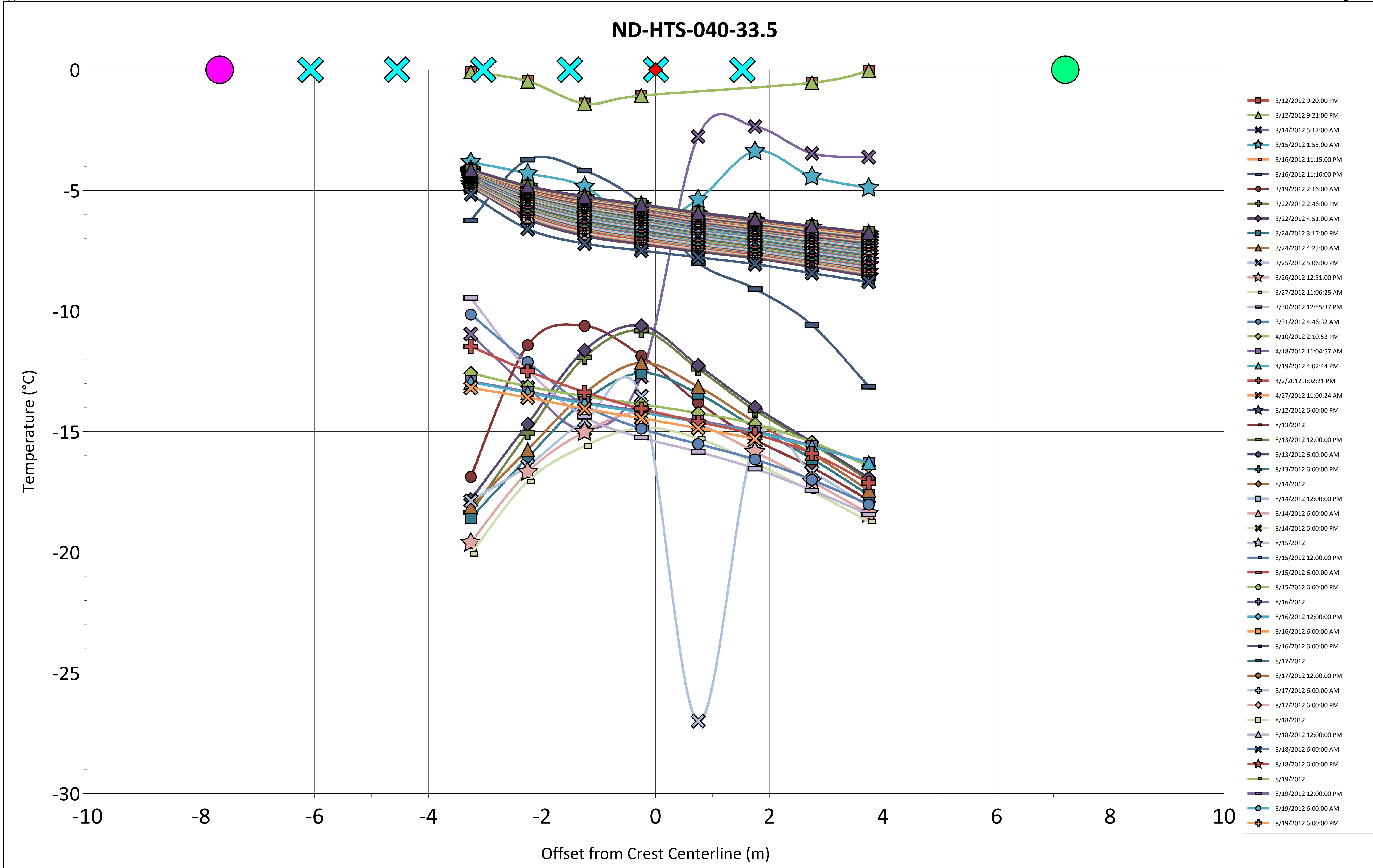
8/15/2012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-30
Offset from Crest Centerline (m)
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-6
-4
-2
0
2
4
6
8
10
3/12/2012 9:20:00 PM
3/12/2012 9:21:00 PM
3/14/2012 5:17:00 AM
3/15/2012 1:55:00 AM
3/16/2012 11:15:00 PM
3/16/2012 11:16:00 PM
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4/19/2012 4:02:44 PM
4/2/2012 3:02:21 PM
4/27/2012 11:00:24 AM
8/12/2012 6:00:00 PM
8/13/2012
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8/14/2012
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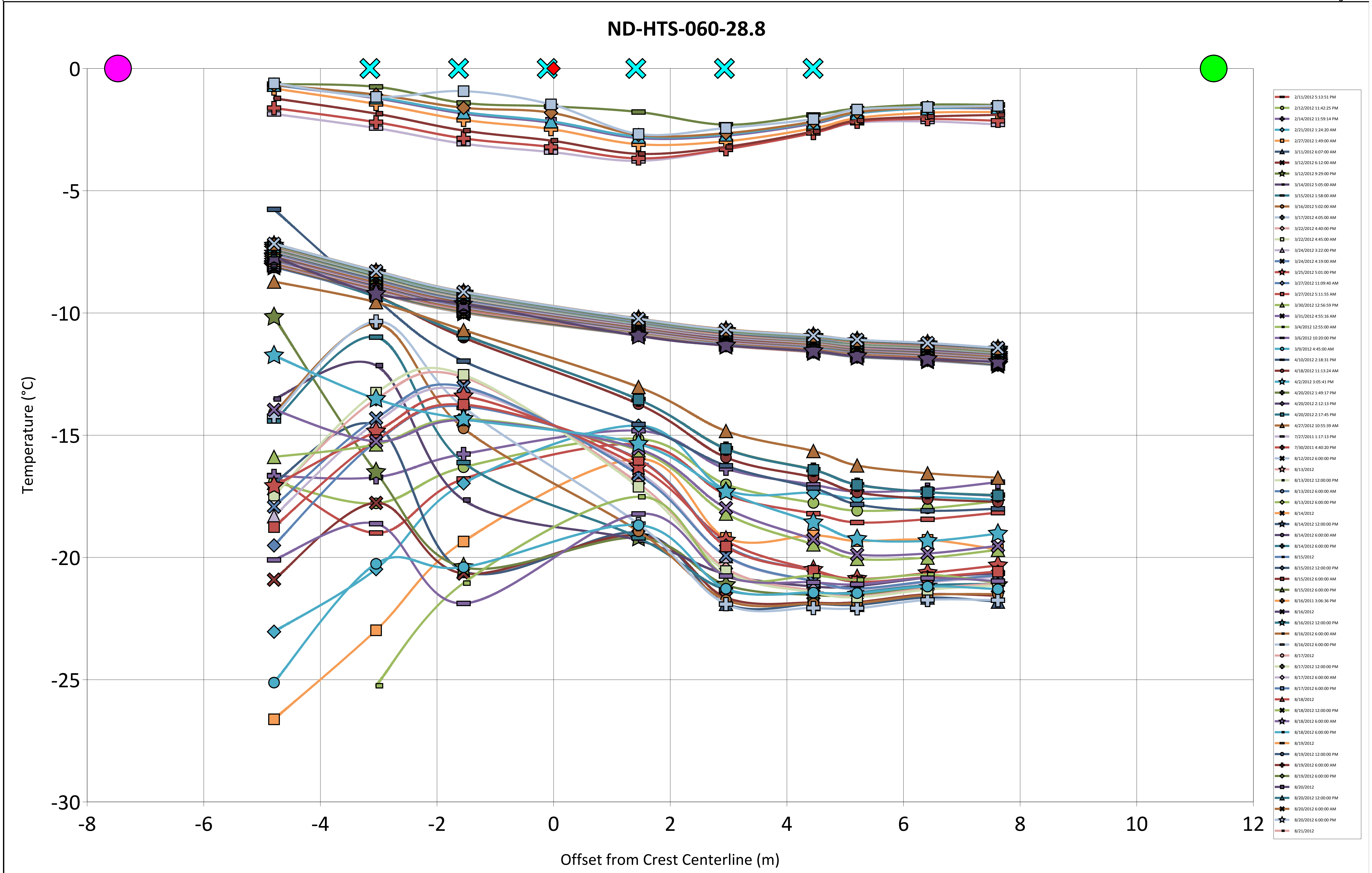
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6
8
10
12
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3/11/2012 6:07:00 AM
3/12/2012 6:12:00 AM
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8/19/2012 6:00:00 PM
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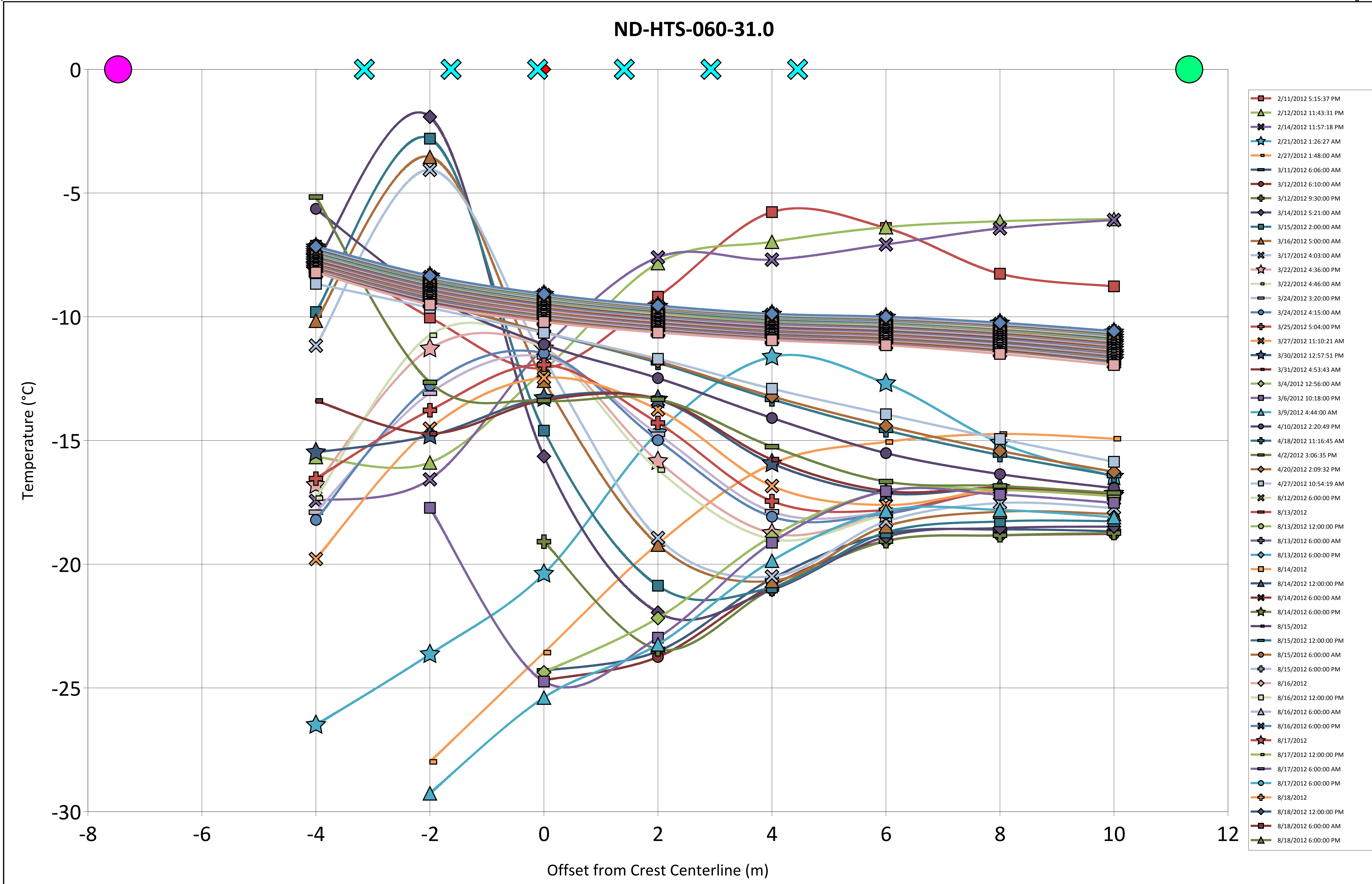
8/20/2012 6:00:00 AM
8/20/2012 6:00:00 PM
8/21/2012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-20
-25
-30
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-4
-2
0
2
4
6
8
10
12
Offset from Crest Centerline (m)
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2/12/2012 11:43:31 PM
2/14/2012 11:57:18 PM
2/21/2012 1:26:27 AM
2/27/2012 1:48:00 AM
3/11/2012 6:06:00 AM
3/12/2012 6:10:00 AM
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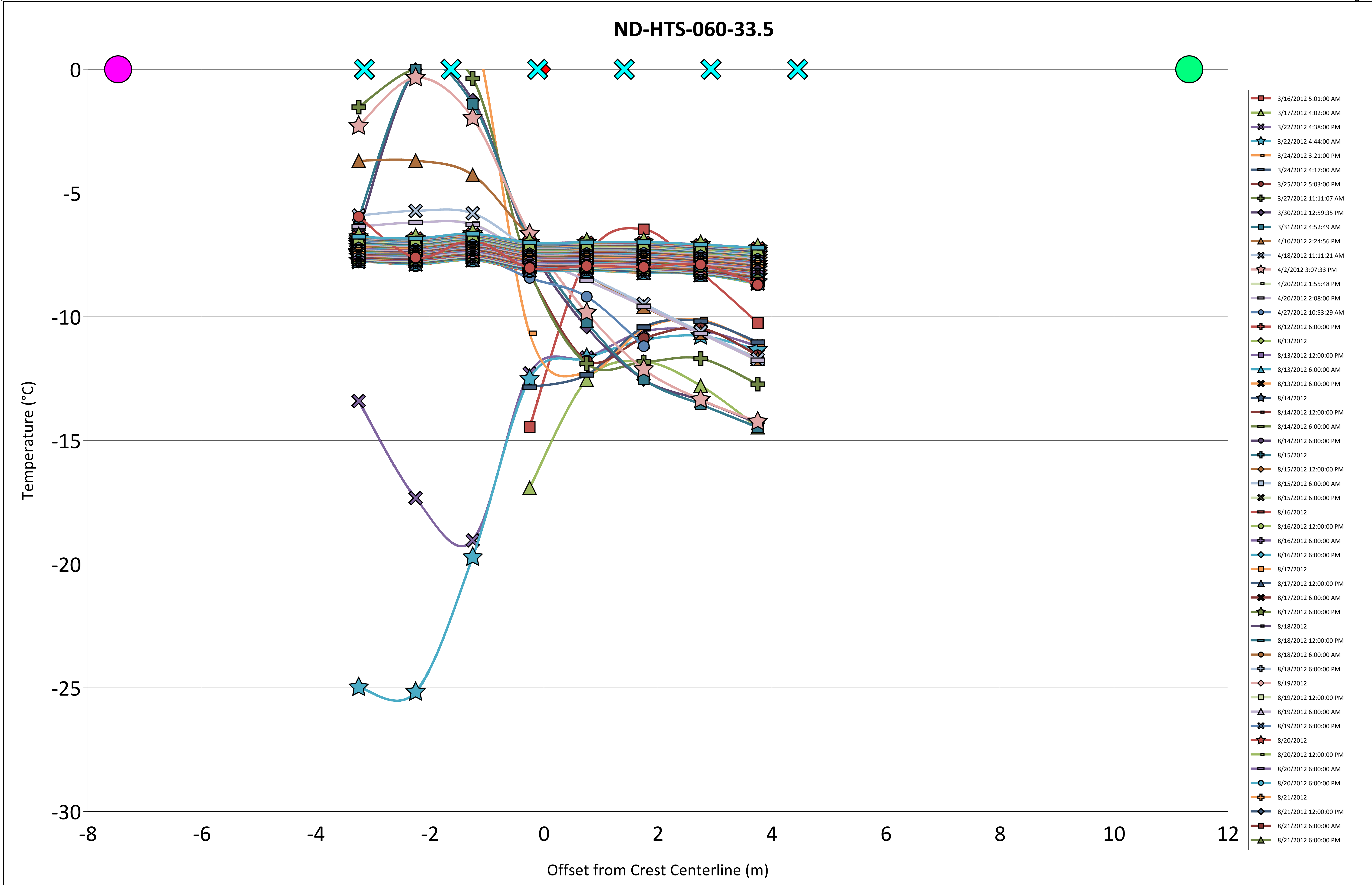
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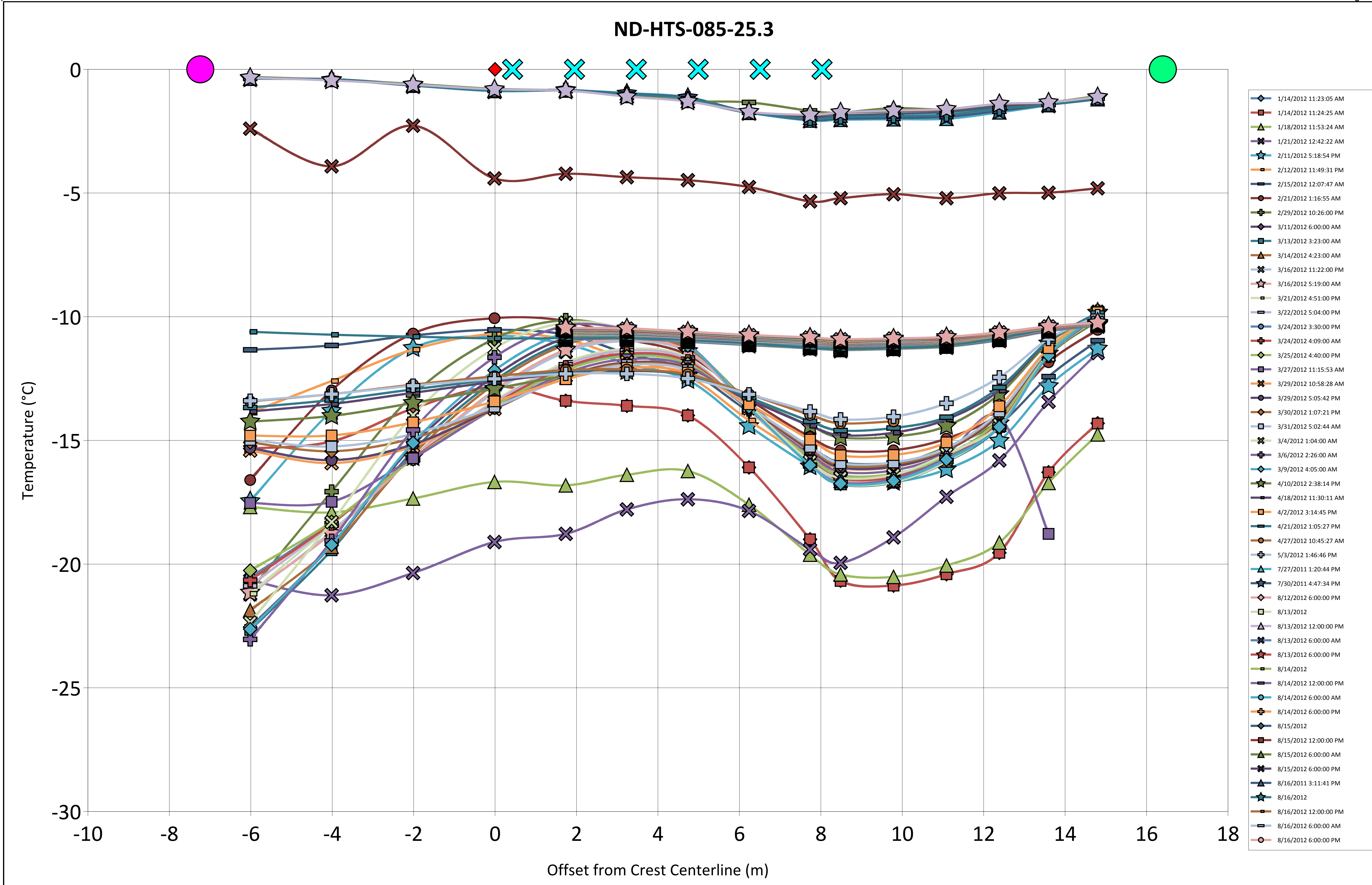
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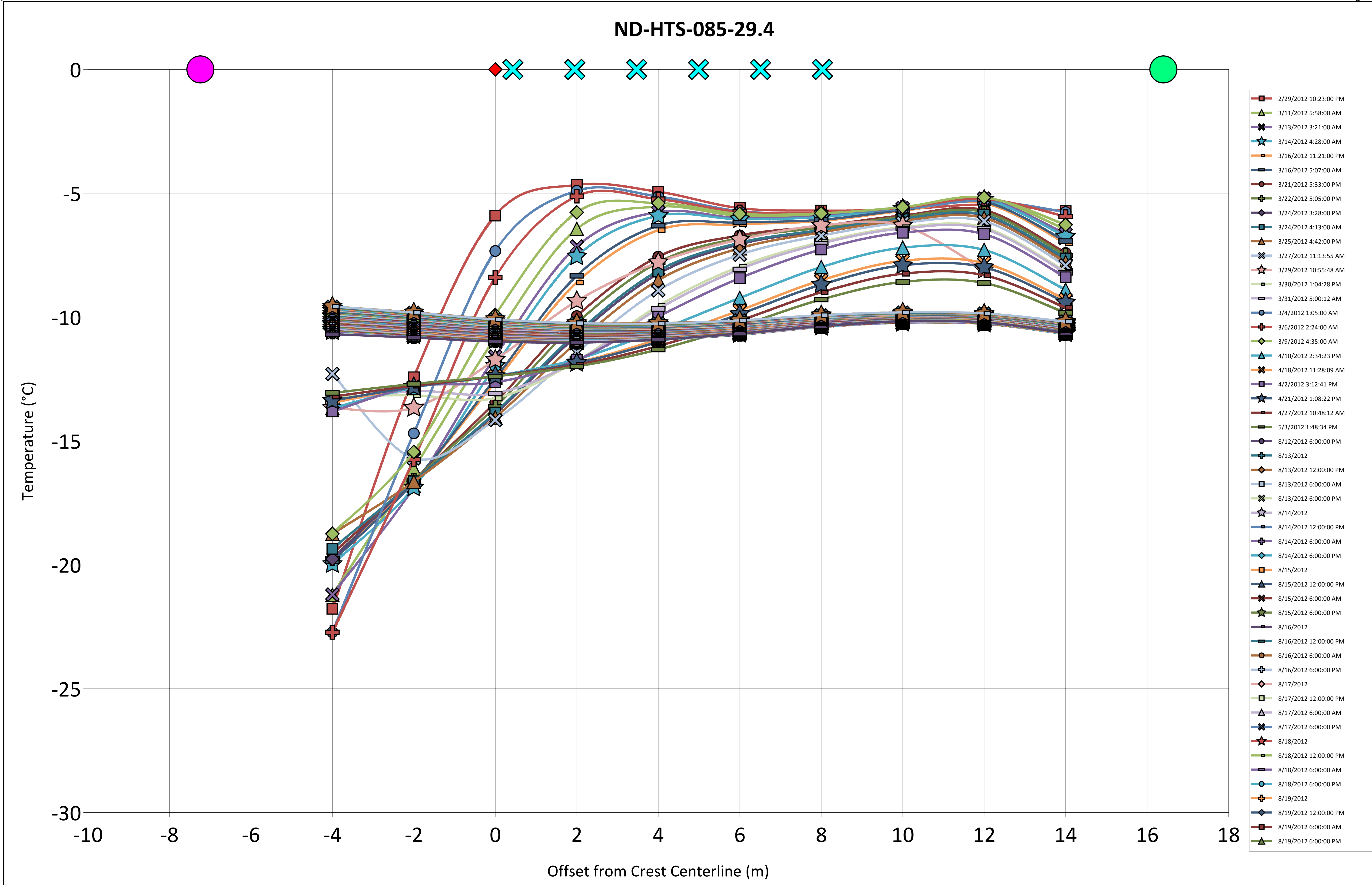
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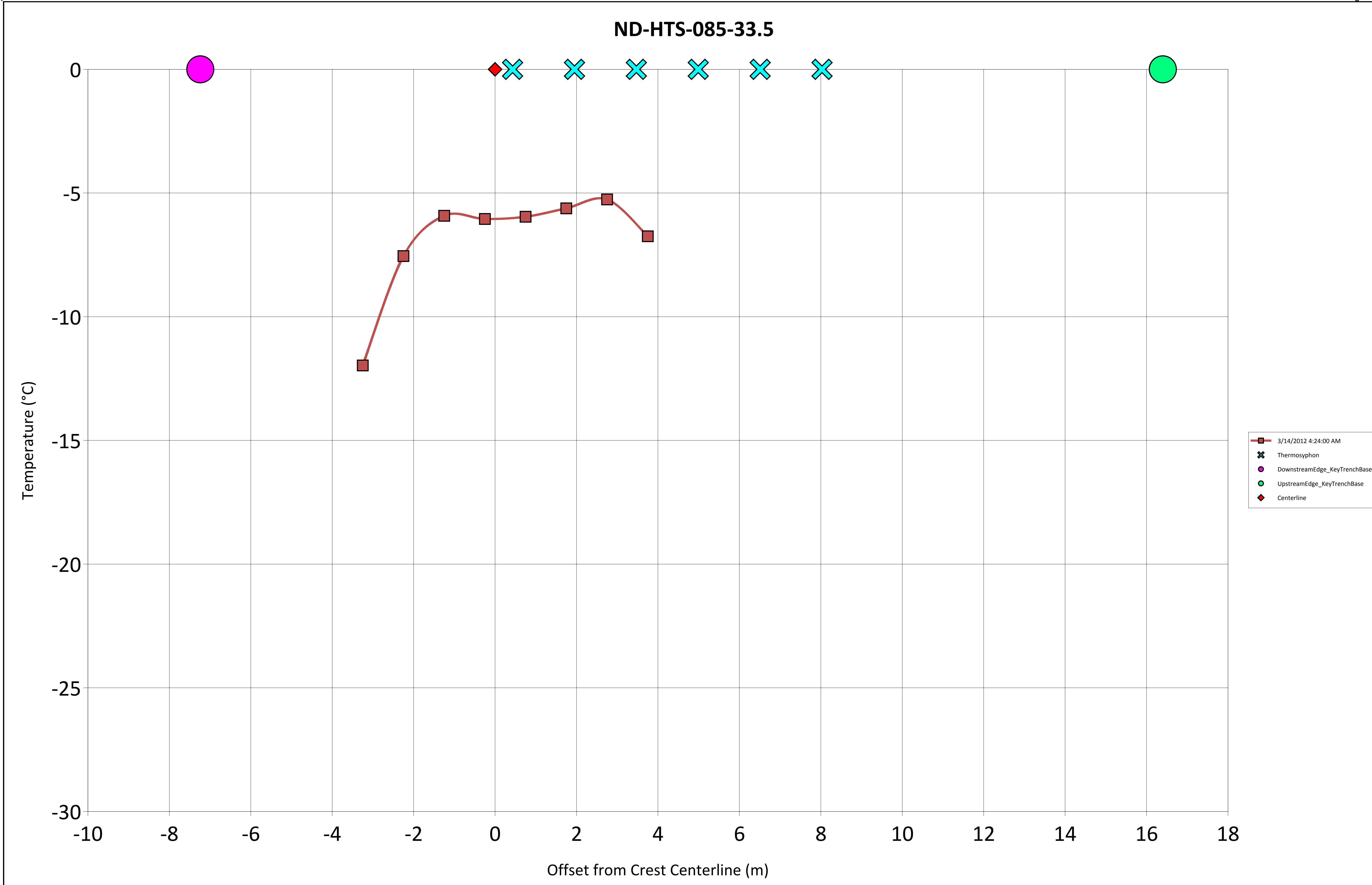
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4
6
8
10
12
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16
18
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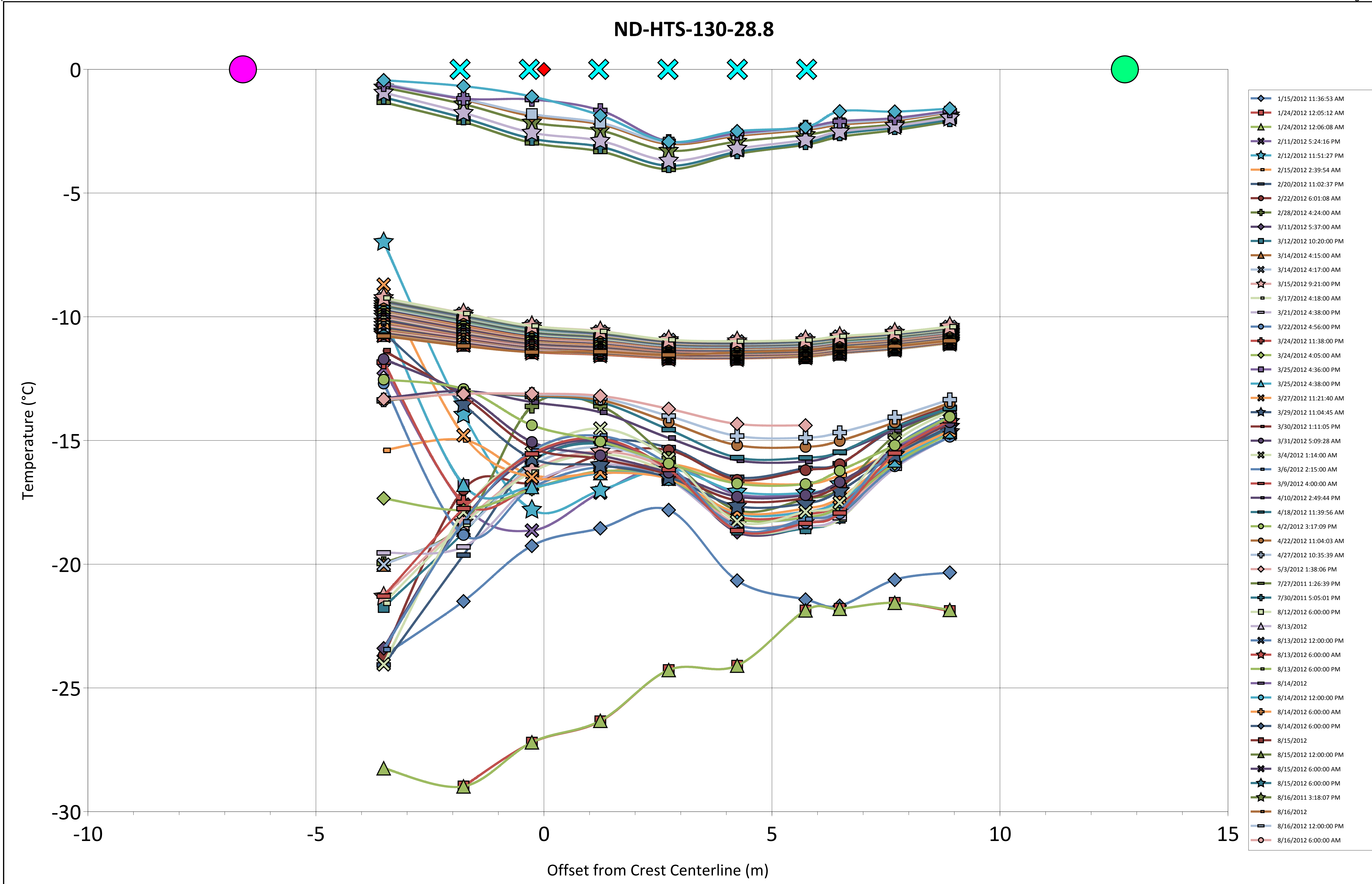
DownstreamEdge_KeyTrenchBase
UpstreamEdge_KeyTrenchBase
Centerline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10
15
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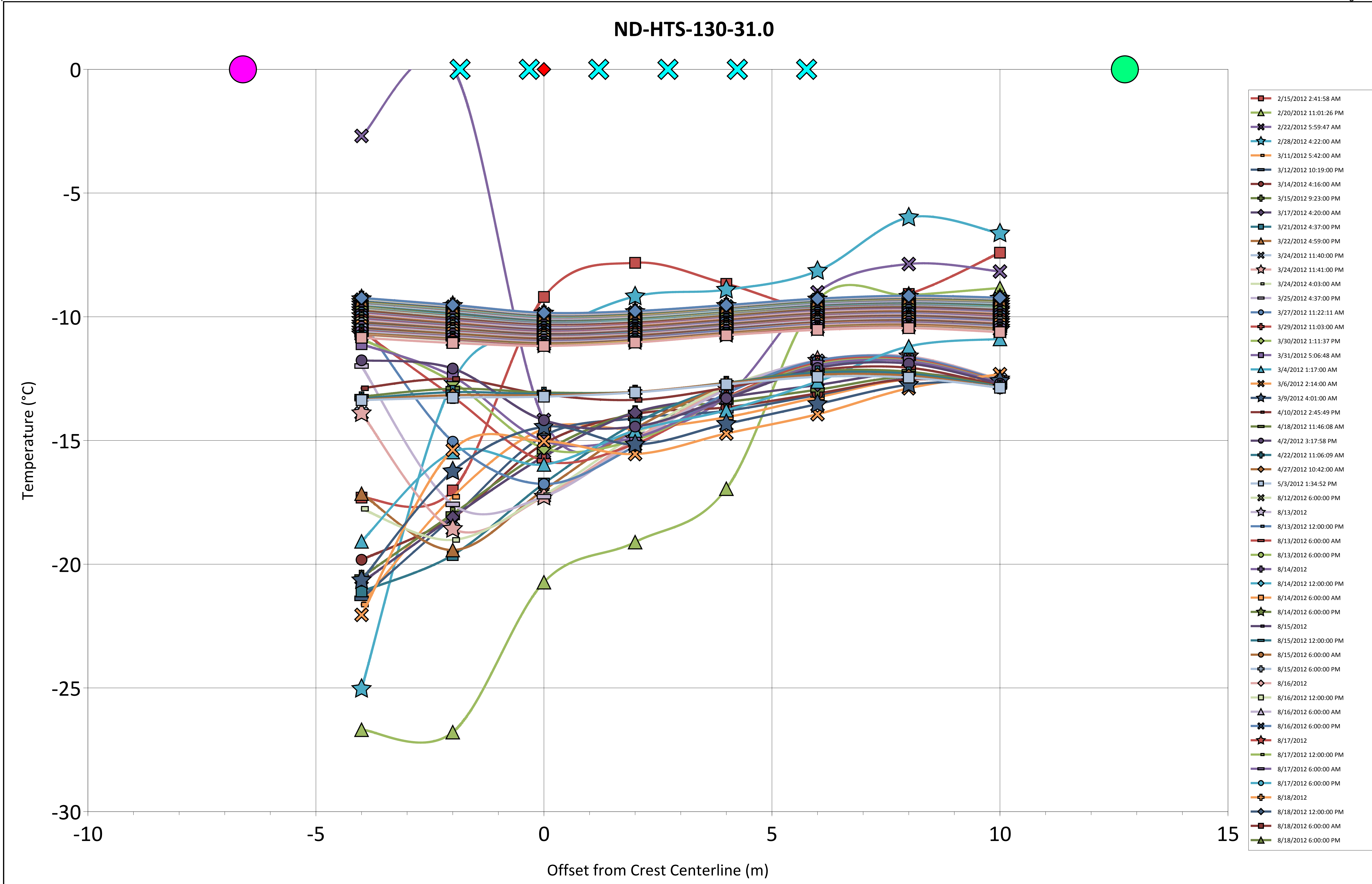
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10
15
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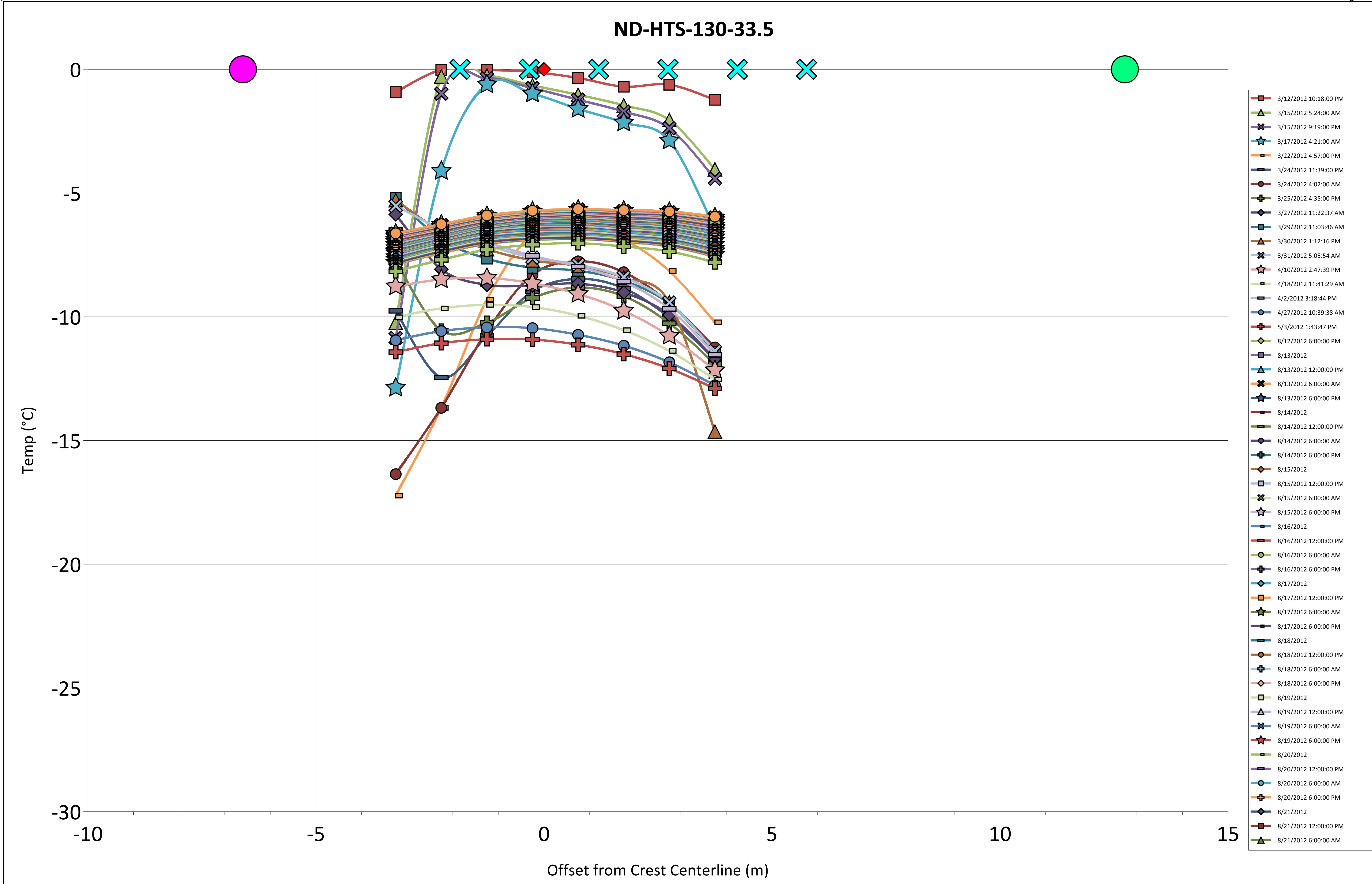
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-25
-30
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5
10
15
Offset from Crest Centerline (m)
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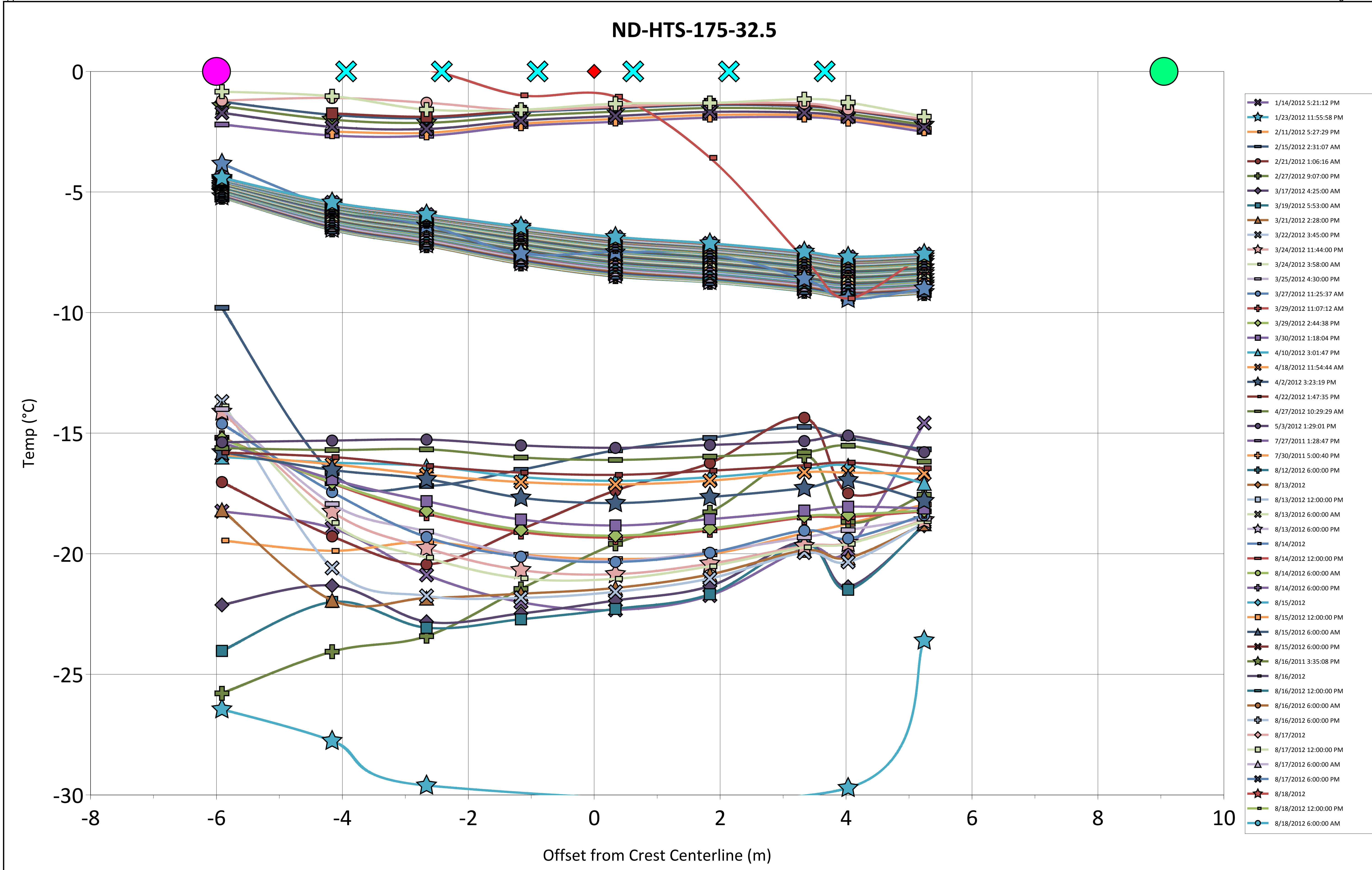
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0
2
4
6
8
10
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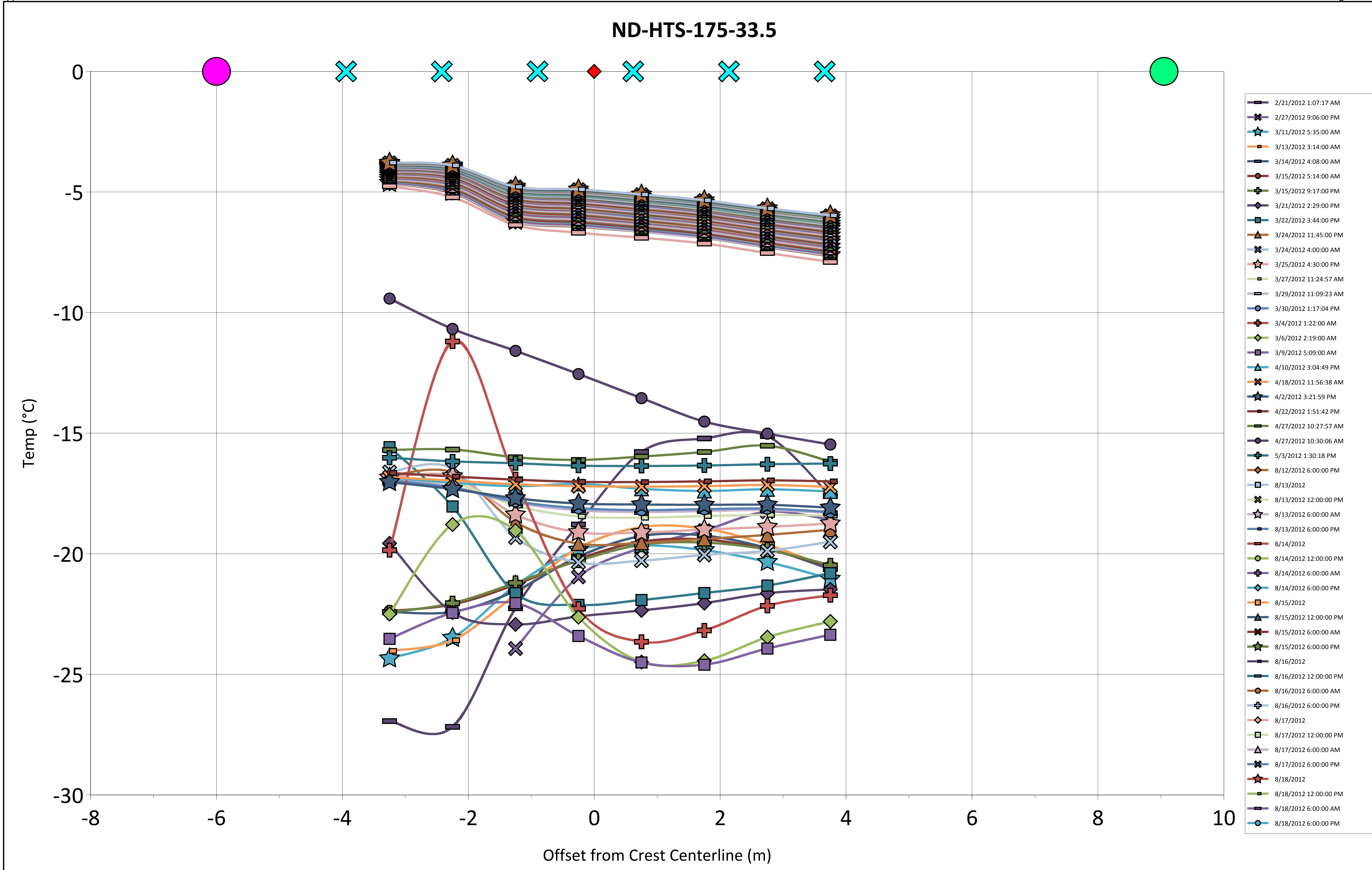
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2
4
6
8
10
Offset from Crest Centerline (m)
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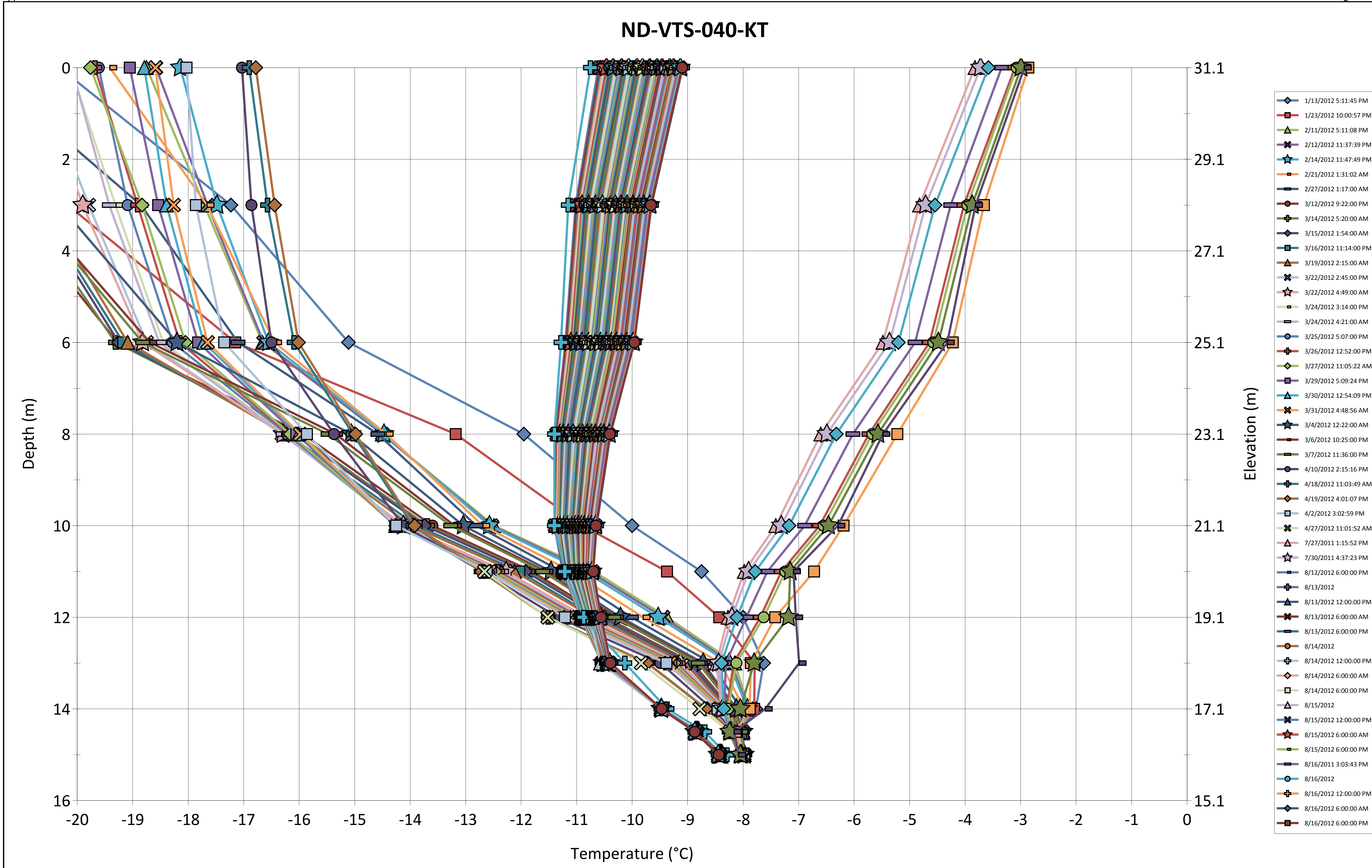
Appendix F: North Dam Vertical Thermistor Profiles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-6
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-2
-1
0
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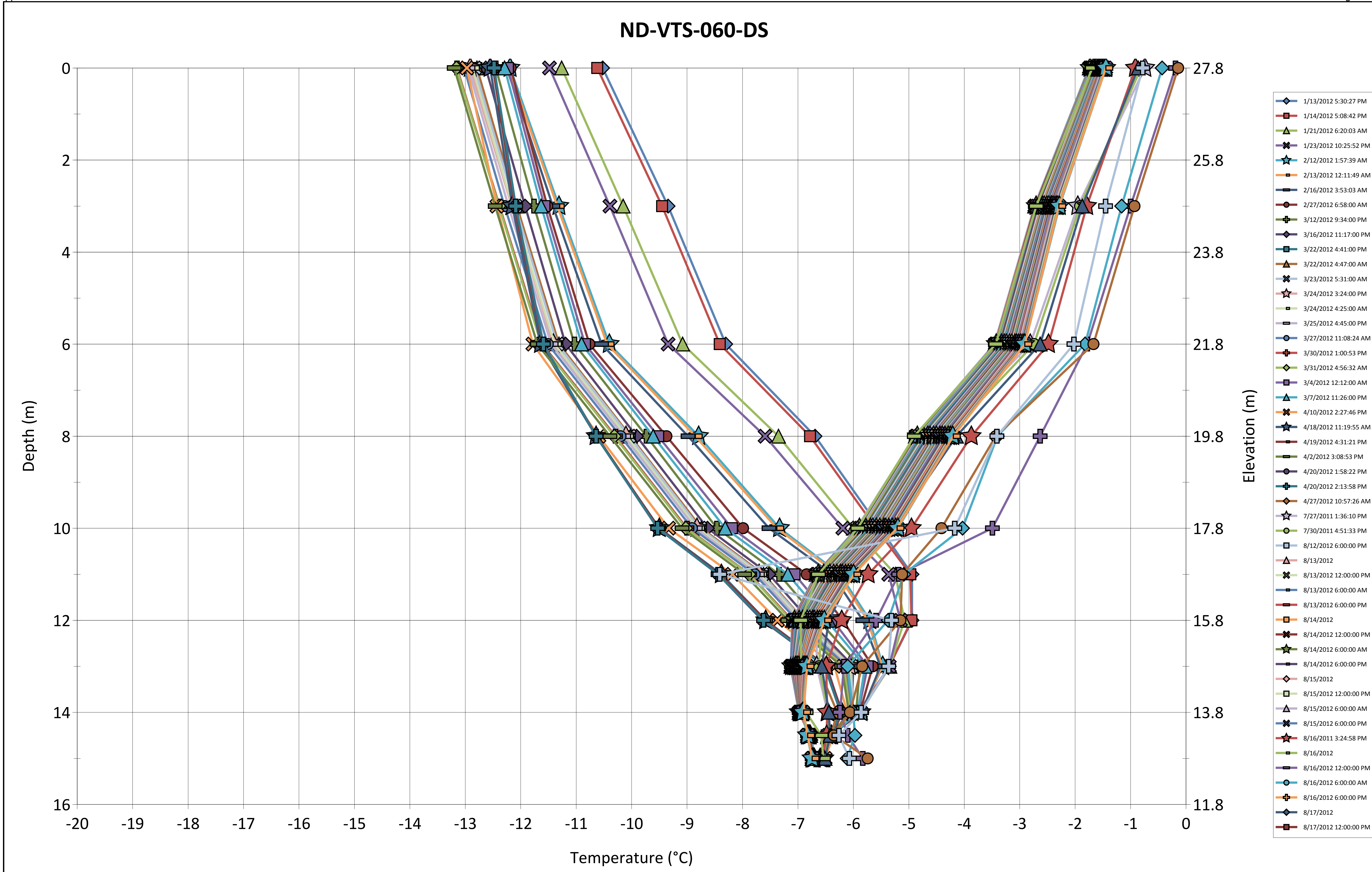
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8
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21.8
19.8
17.8
15.8
13.8
11.8
-20
-19
-18
-17
-16
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-13
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-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
Temperature (°C)
1/13/2012 5:30:27 PM
1/14/2012 5:08:42 PM
1/21/2012 6:20:03 AM
1/23/2012 10:25:52 PM
2/12/2012 1:57:39 AM
2/13/2012 12:11:49 AM
2/16/2012 3:53:03 AM
2/27/2012 6:58:00 AM
3/12/2012 9:34:00 PM
3/16/2012 11:17:00 PM
3/22/2012 4:41:00 PM
3/22/2012 4:47:00 AM
3/23/2012 5:31:00 AM
3/24/2012 3:24:00 PM
3/24/2012 4:25:00 AM
3/25/2012 4:45:00 PM
3/27/2012 11:08:24 AM
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3/7/2012 11:26:00 PM
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4/18/2012 11:19:55 AM
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4/20/2012 1:58:22 PM
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7/27/2011 1:36:10 PM
7/30/2011 4:51:33 PM
8/12/2012 6:00:00 PM
8/13/2012
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8/13/2012 6:00:00 AM
8/13/2012 6:00:00 PM
8/14/2012
8/14/2012 12:00:00 PM
8/14/2012 6:00:00 AM
8/14/2012 6:00:00 PM
8/15/2012
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8/15/2012 6:00:00 AM
8/15/2012 6:00:00 PM
8/16/2011 3:24:58 PM
8/16/2012
8/16/2012 12:00:00 PM
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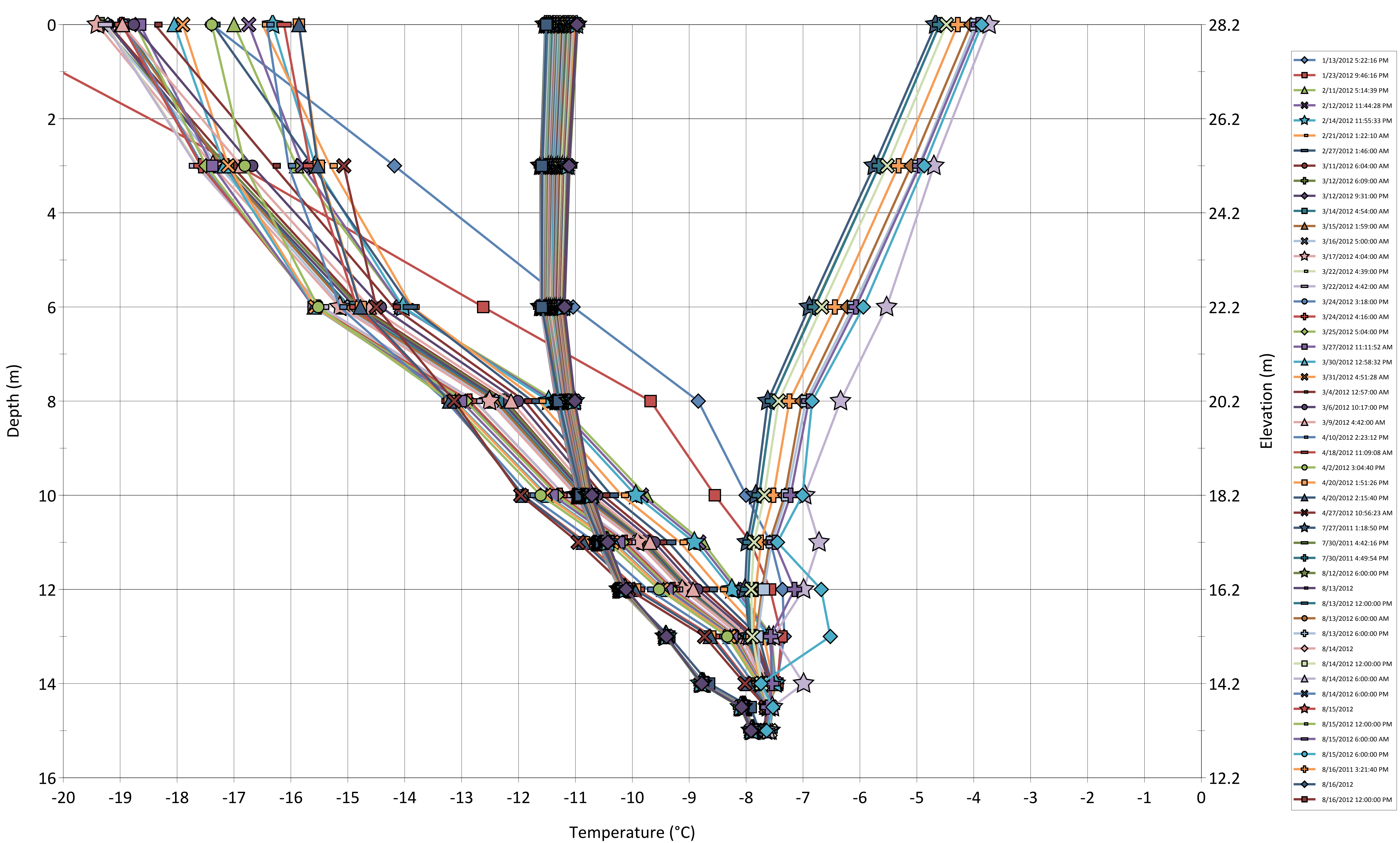
8/16/2012 6:00:00 PM
8/17/2012
8/17/2012 12:00:00 PM

ND-VTS-060-KT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0
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4
6
8
10
12
14
16
Elevation (m)
28.2
26.2
24.2
22.2
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18.2
16.2
14.2
12.2
-20 -19 -18 -17 -16 -15 -14 -13 -12 -11 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0
Temperature (°C)
1/13/2012 5:22:16 PM
1/23/2012 9:46:16 PM
2/11/2012 5:14:39 PM
2/12/2012 11:44:28 PM
2/14/2012 11:55:33 PM
2/21/2012 1:22:10 AM
2/27/2012 1:46:00 AM
3/11/2012 6:04:00 AM
3/12/2012 6:09:00 AM
3/12/2012 9:31:00 PM
3/14/2012 4:54:00 AM
3/15/2012 1:59:00 AM
3/16/2012 5:00:00 AM
3/17/2012 4:04:00 AM
3/22/2012 4:39:00 PM
3/22/2012 4:42:00 AM
3/24/2012 3:18:00 PM
3/24/2012 4:16:00 AM
3/25/2012 5:04:00 PM
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3/6/2012 10:17:00 PM
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4/10/2012 2:23:12 PM
4/18/2012 11:09:08 AM
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4/20/2012 2:15:40 PM
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7/27/2011 1:18:50 PM
7/30/2011 4:42:16 PM
7/30/2011 4:49:54 PM
8/12/2012 6:00:00 PM
8/13/2012
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8/13/2012 6:00:00 AM
8/13/2012 6:00:00 PM
8/14/2012
8/14/2012 12:00:00 PM
8/14/2012 6:00:00 AM
8/14/2012 6:00:00 PM
8/15/2012
8/15/2012 12:00:00 PM
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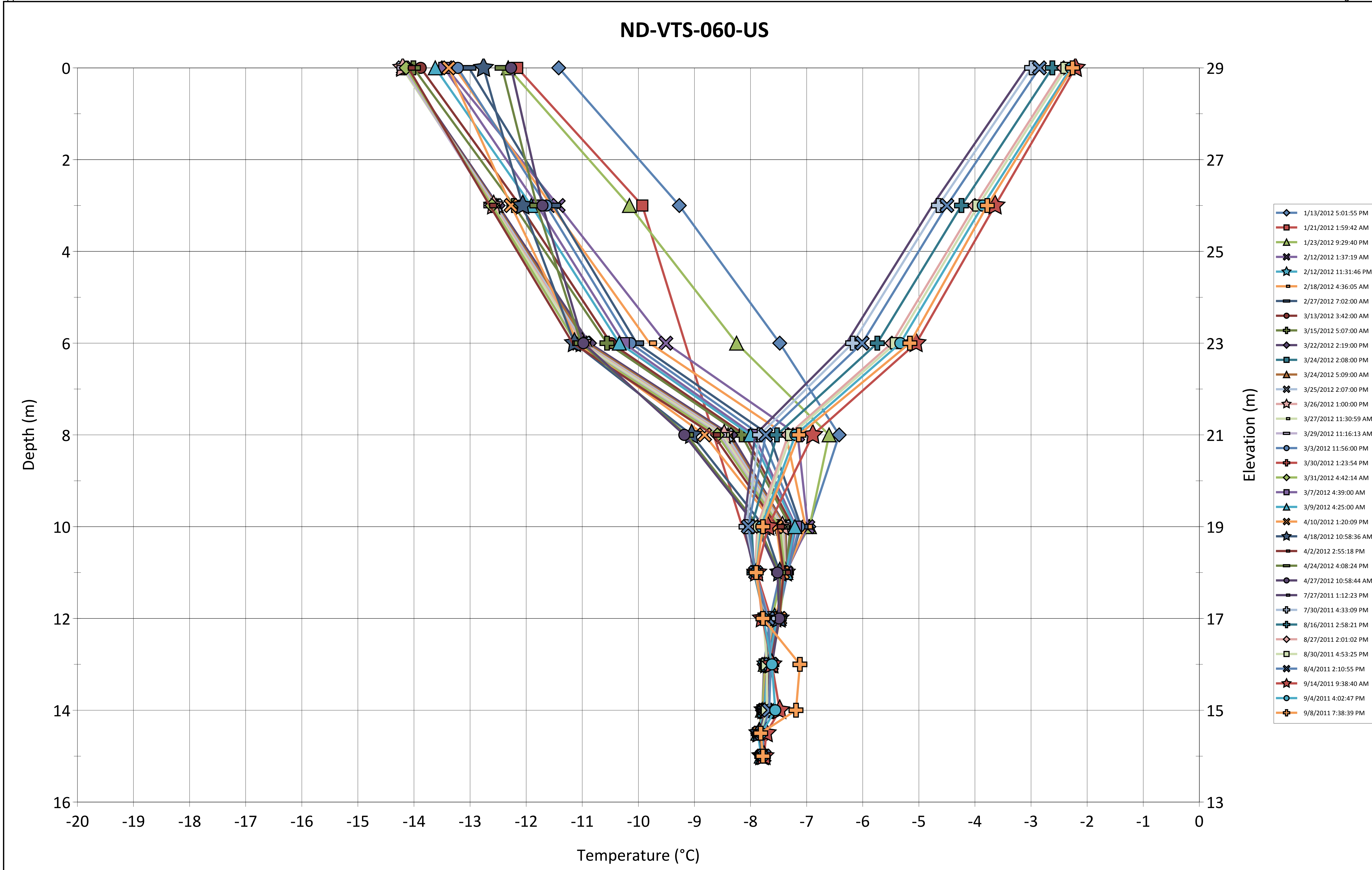
8/15/2012 6:00:00 PM
8/16/2011 3:21:40 PM
8/16/2012
8/16/2012 12:00:00 PM


ND-VTS-060-US
Depth (m)
Elevation (m)
Temperature (°C)
0
2
4
6
8
10
12
14
16
29
27
25
23
21
19
17
15
13
-20
-19
-18
-17
-16
-15
-14
-13
-12
-11
-10
-9
-8
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-6
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3/24/2012 2:08:00 PM
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3/25/2012 2:07:00 PM
3/26/2012 1:00:00 PM
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3/30/2012 1:23:54 PM
3/31/2012 4:42:14 AM
3/7/2012 4:39:00 AM
3/9/2012 4:25:00 AM
4/10/2012 1:20:09 PM
4/18/2012 10:58:36 AM
4/2/2012 2:55:18 PM
4/24/2012 4:08:24 PM
4/27/2012 10:58:44 AM
7/27/2011 1:12:23 PM
7/30/2011 4:33:09 PM
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8/27/2011 2:01:02 PM
8/30/2011 4:53:25 PM
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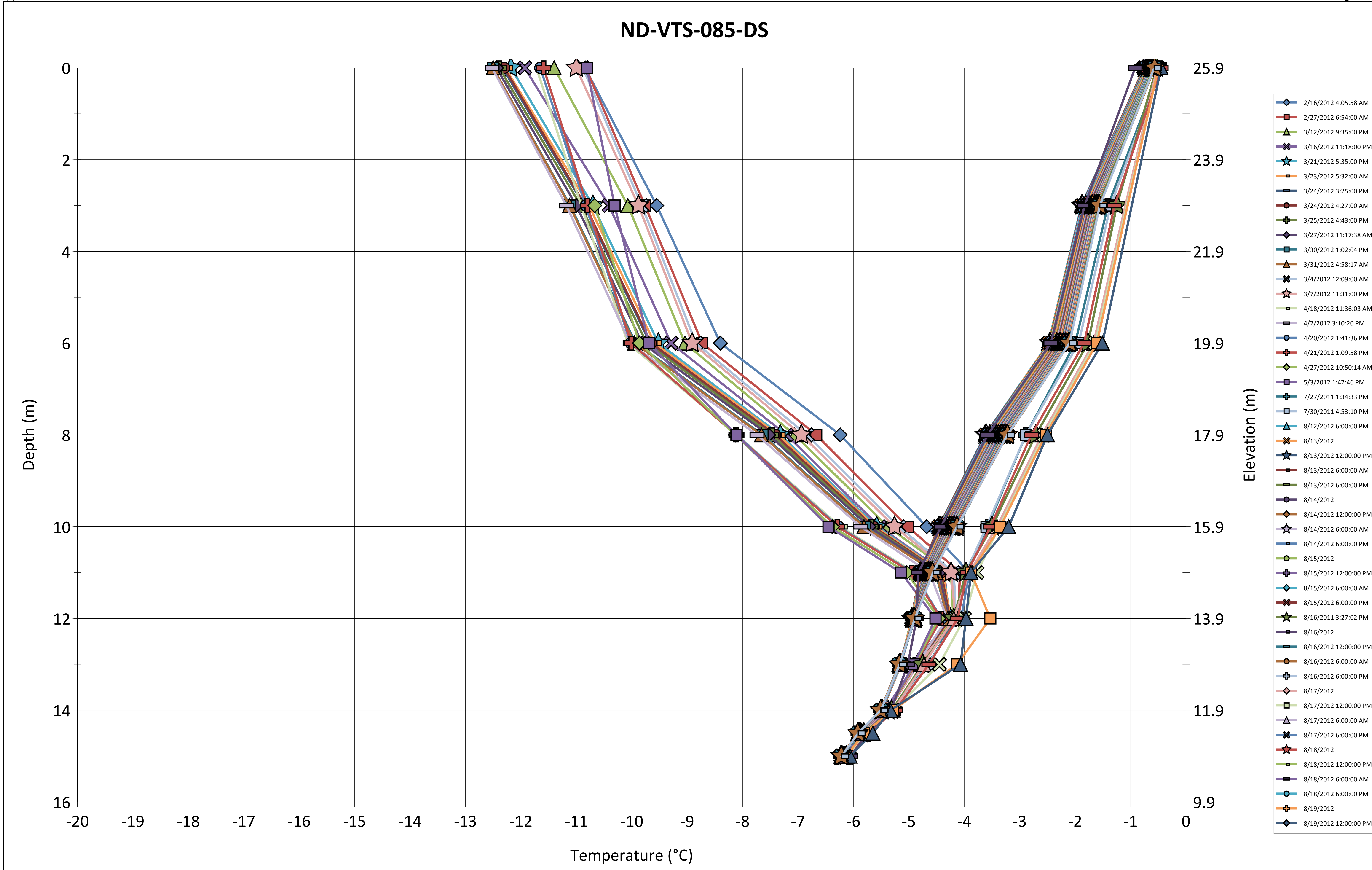
9/4/2011 4:02:47 PM
9/8/2011 7:38:39 PM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6
8
10
12
14
16
Elevation (m)
25.9
23.9
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11.9
9.9
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-19
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-16
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-10
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-8
-7
-6
-5
-4
-3
-2
-1
0
Temperature (°C)
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3/16/2012 11:18:00 PM
3/21/2012 5:35:00 PM
3/23/2012 5:32:00 AM
3/24/2012 3:25:00 PM
3/24/2012 4:27:00 AM
3/25/2012 4:43:00 PM
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3/31/2012 4:58:17 AM
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4/18/2012 11:36:03 AM
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7/27/2011 1:34:33 PM
7/30/2011 4:53:10 PM
8/12/2012 6:00:00 PM
8/13/2012
8/13/2012 12:00:00 PM
8/13/2012 6:00:00 AM
8/13/2012 6:00:00 PM
8/14/2012
8/14/2012 12:00:00 PM
8/14/2012 6:00:00 AM
8/14/2012 6:00:00 PM
8/15/2012
8/15/2012 12:00:00 PM
8/15/2012 6:00:00 AM
8/15/2012 6:00:00 PM
8/16/2011 3:27:02 PM
8/16/2012
8/16/2012 12:00:00 PM
8/16/2012 6:00:00 AM
8/16/2012 6:00:00 PM
8/17/2012
8/17/2012 12:00:00 PM
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8/18/2012
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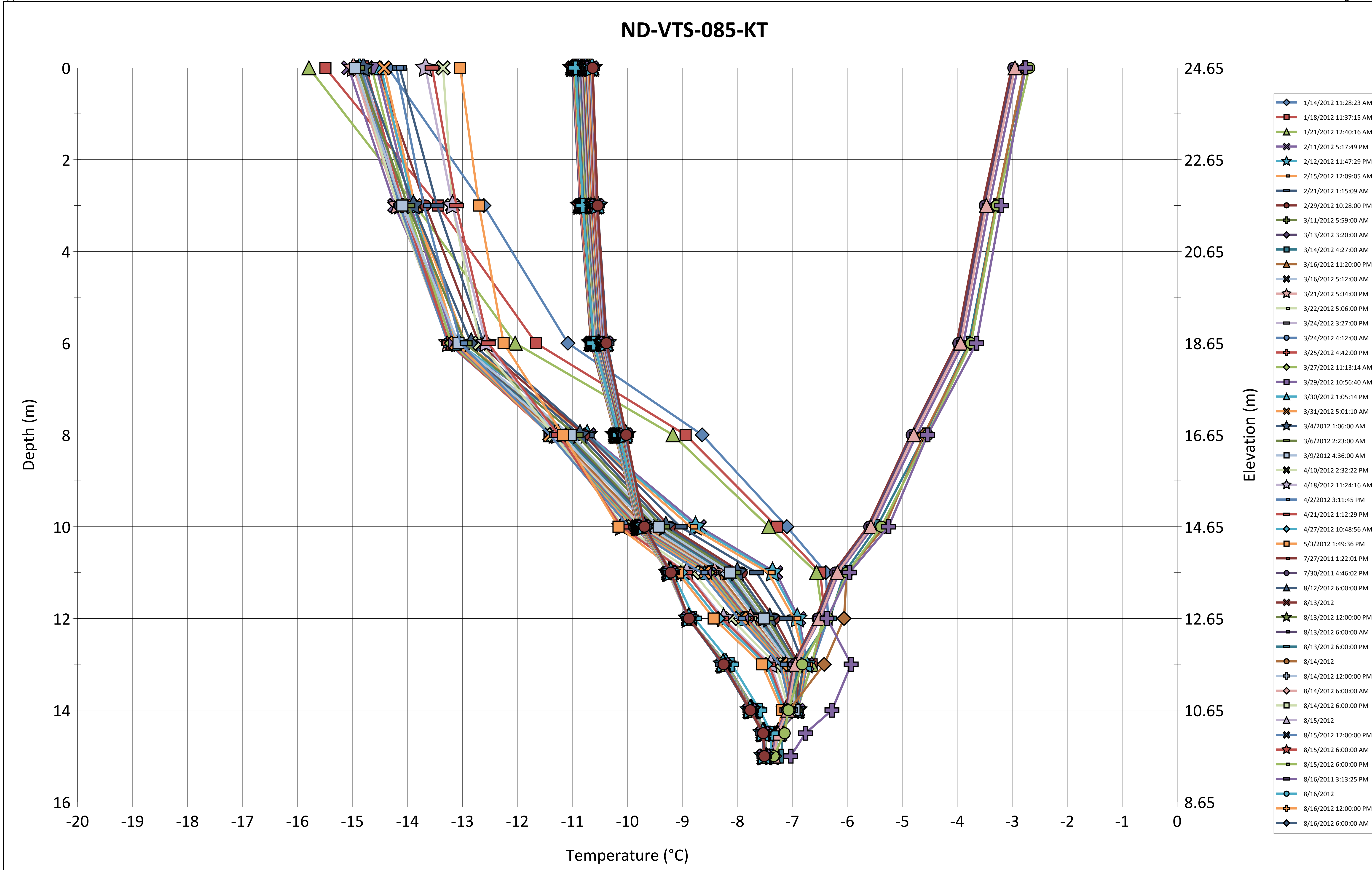
8/19/2012
8/19/2012 12:00:00 PM


ND-VTS-085-KT
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Elevation (m)
Temperature (°C)
0
2
4
6
8
10
12
14
16
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22.65
20.65
18.65
16.65
14.65
12.65
10.65
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-16
-15
-14
-13
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
1/14/2012 11:28:23 AM
1/18/2012 11:37:15 AM
1/21/2012 12:40:16 AM
2/11/2012 5:17:49 PM
2/12/2012 11:47:29 PM
2/15/2012 12:09:05 AM
2/21/2012 1:15:09 AM
2/29/2012 10:28:00 PM
3/11/2012 5:59:00 AM
3/13/2012 3:20:00 AM
3/14/2012 4:27:00 AM
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3/9/2012 4:36:00 AM
4/10/2012 2:32:22 PM
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5/3/2012 1:49:36 PM
7/27/2011 1:22:01 PM
7/30/2011 4:46:02 PM
8/12/2012 6:00:00 PM
8/13/2012
8/13/2012 12:00:00 PM
8/13/2012 6:00:00 AM
8/13/2012 6:00:00 PM
8/14/2012
8/14/2012 12:00:00 PM
8/14/2012 6:00:00 AM
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8/15/2012 12:00:00 PM
8/15/2012 6:00:00 AM
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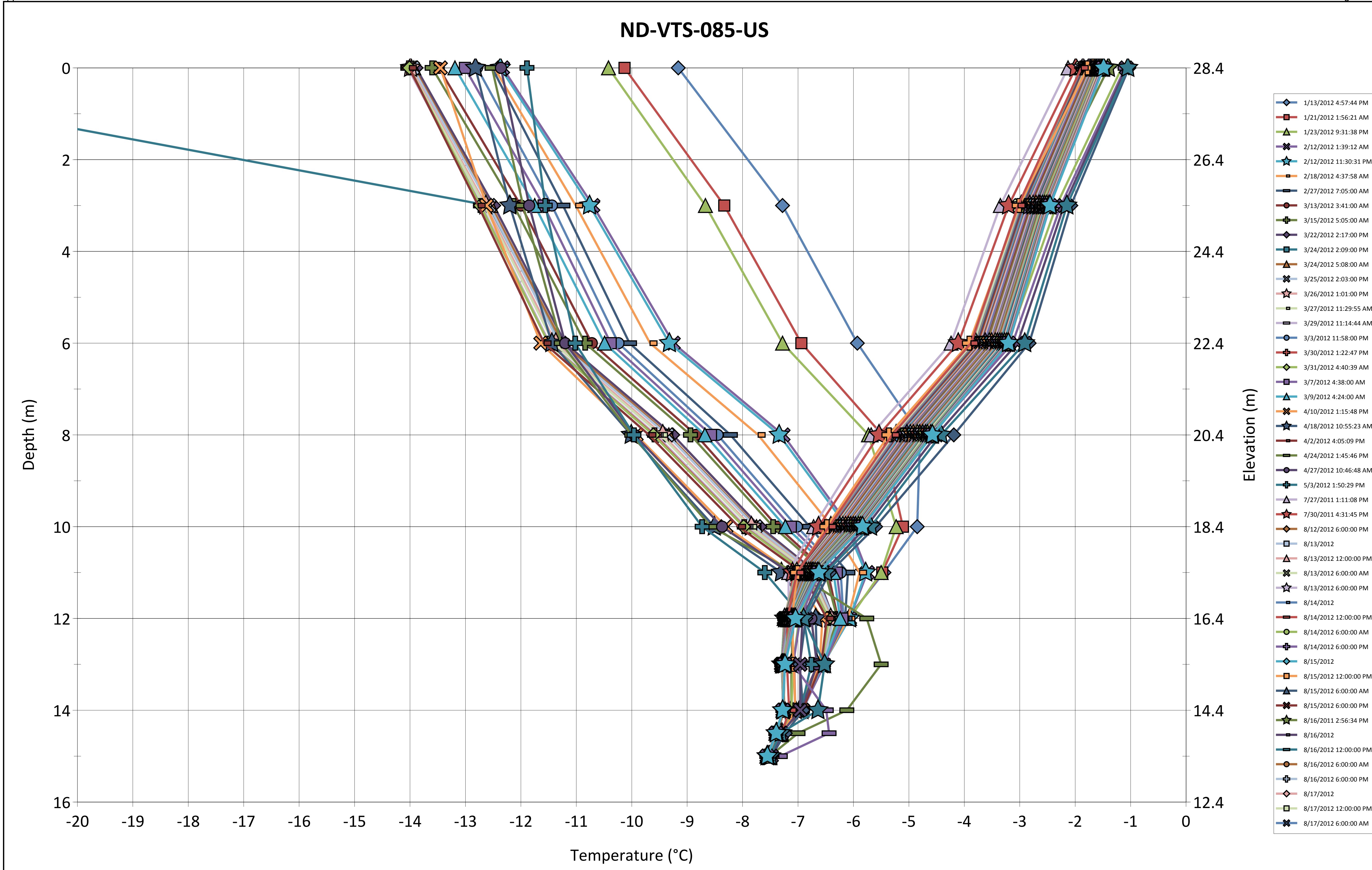
8/16/2012
8/16/2012 12:00:00 PM
8/16/2012 6:00:00 AM


ND-VTS-085-US
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2
4
6
8
10
12
14
16
Elevation (m)
28.4
26.4
24.4
22.4
20.4
18.4
16.4
14.4
12.4
-20
-19
-18
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-16
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-14
-13
-12
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-7
-6
-5
-4
-3
-2
-1
0
Temperature (°C)
1/13/2012 4:57:44 PM
1/21/2012 1:56:21 AM
1/23/2012 9:31:38 PM
2/12/2012 1:39:12 AM
2/12/2012 11:30:31 PM
2/18/2012 4:37:58 AM
2/27/2012 7:05:00 AM
3/13/2012 3:41:00 AM
3/15/2012 5:05:00 AM
3/22/2012 2:17:00 PM
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5/3/2012 1:50:29 PM
7/27/2011 1:11:08 PM
7/30/2011 4:31:45 PM
8/12/2012 6:00:00 PM
8/13/2012
8/13/2012 12:00:00 PM
8/13/2012 6:00:00 AM
8/13/2012 6:00:00 PM
8/14/2012
8/14/2012 12:00:00 PM
8/14/2012 6:00:00 AM
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8/16/2012
8/16/2012 12:00:00 PM
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8/16/2012 6:00:00 PM
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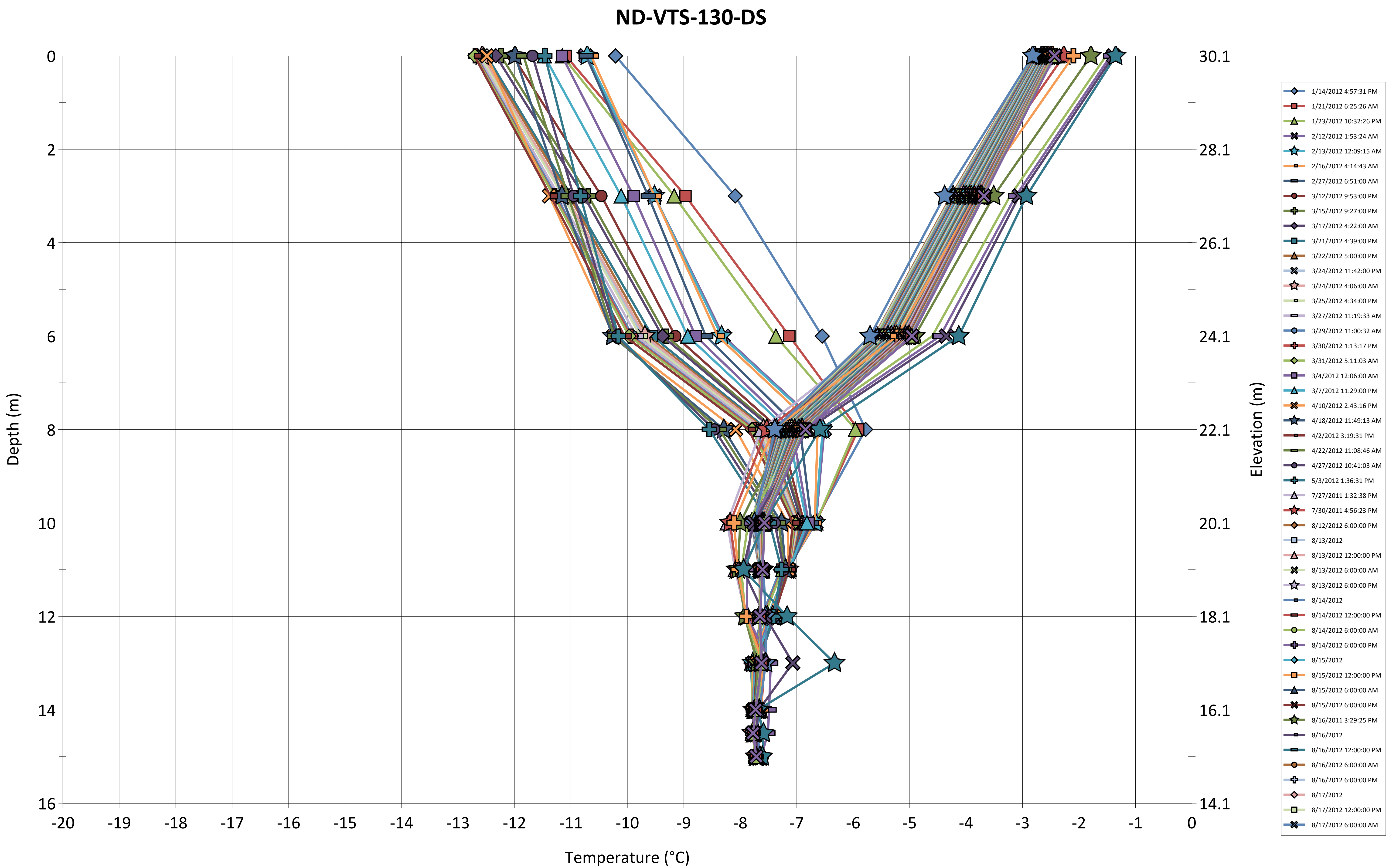
8/17/2012 12:00:00 PM
8/17/2012 6:00:00 AM


ND-VTS-130-DS
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8
10
12
14
16
Elevation (m)
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26.1
24.1
22.1
20.1
18.1
16.1
14.1
-20
-19
-18
-17
-16
-15
-14
-13
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
Temperature (°C)
1/14/2012 4:57:31 PM
1/21/2012 6:25:26 AM
1/23/2012 10:32:26 PM
2/12/2012 1:53:24 AM
2/13/2012 12:09:15 AM
2/16/2012 4:14:43 AM
2/27/2012 6:51:00 AM
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3/17/2012 4:22:00 AM
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3/22/2012 5:00:00 PM
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5/3/2012 1:36:31 PM
7/27/2011 1:32:38 PM
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8/14/2012
8/14/2012 12:00:00 PM
8/14/2012 6:00:00 AM
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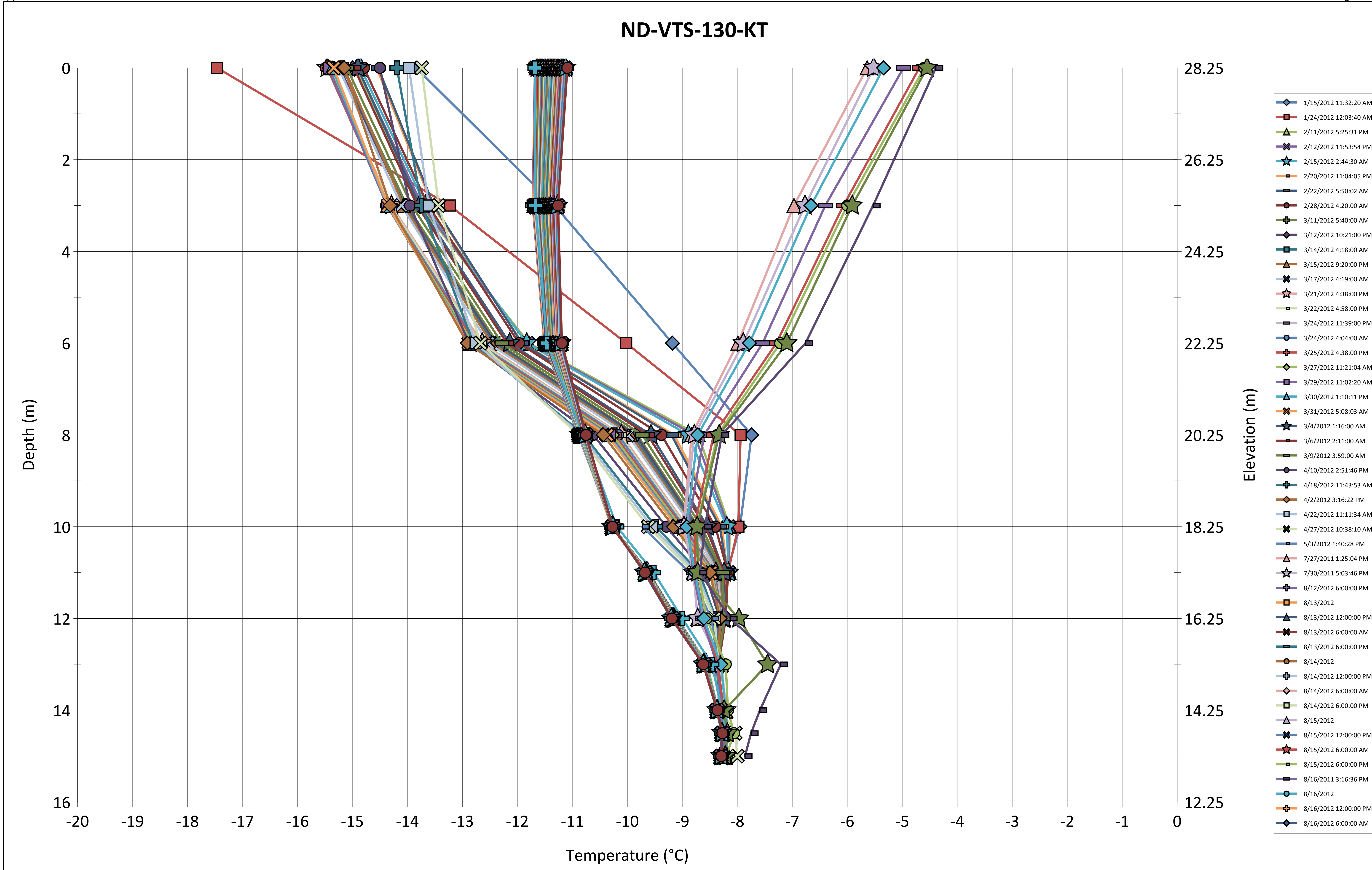
8/17/2012 6:00:00 AM


ND-VTS-130-KT
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-5
-4
-3
-2
-1
0
Temperature (°C)
Elevation (m)
28.25
26.25
24.25
22.25
20.25
18.25
16.25
14.25
12.25
1/15/2012 11:32:20 AM
1/24/2012 12:03:40 AM
2/11/2012 5:25:31 PM
2/12/2012 11:53:54 PM
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5/3/2012 1:40:28 PM
7/27/2011 1:25:04 PM
7/30/2011 5:03:46 PM
8/12/2012 6:00:00 PM
8/13/2012
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8/13/2012 6:00:00 AM
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8/15/2012 12:00:00 PM
8/15/2012 6:00:00 AM
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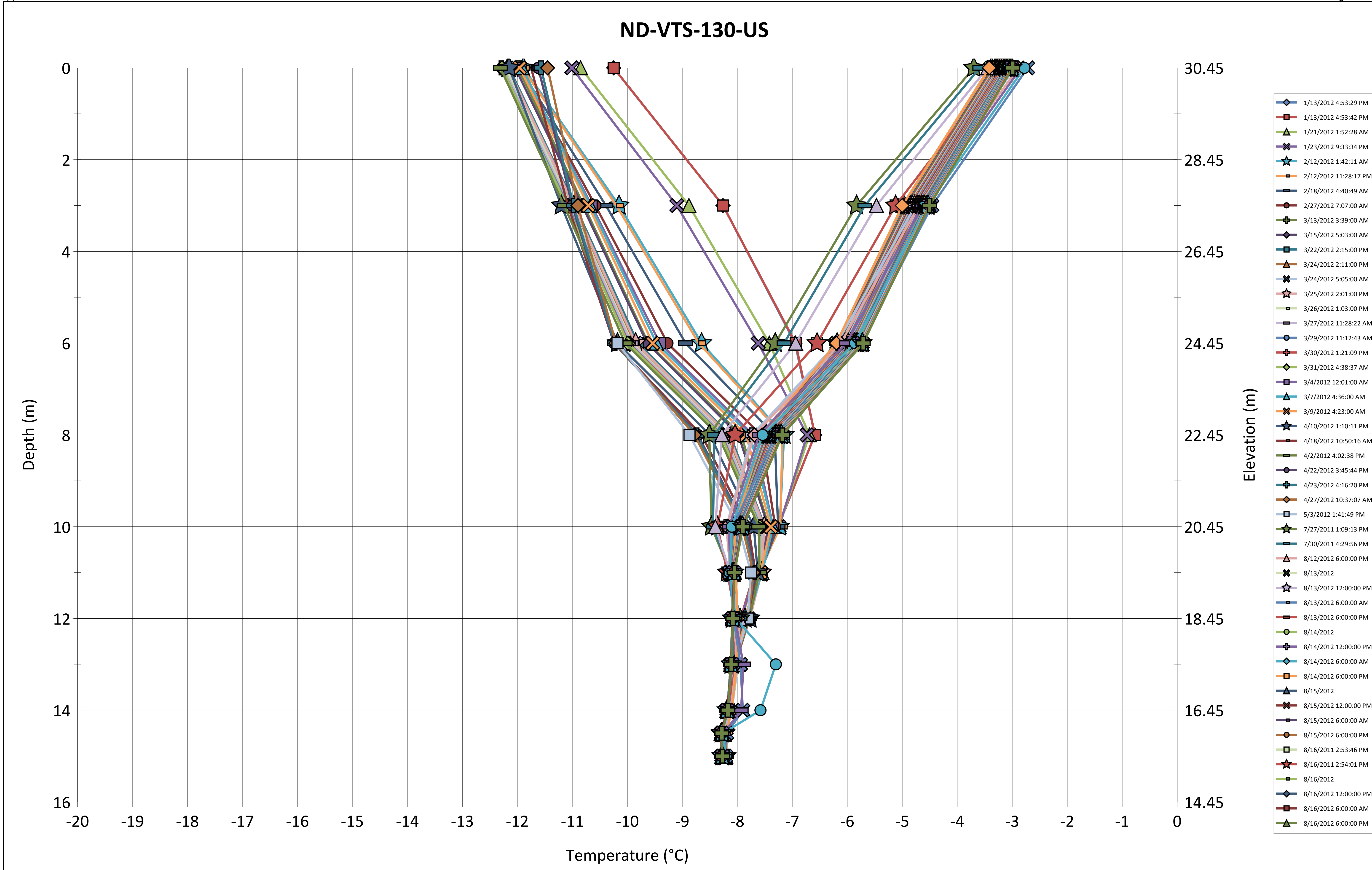
ND-VTS-130-US
Depth (m)
Elevation (m)
Temperature (°C)
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6
8
10
12
14
16
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24.45
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4/22/2012 3:45:44 PM
4/23/2012 4:16:20 PM
4/27/2012 10:37:07 AM
5/3/2012 1:41:49 PM
7/27/2011 1:09:13 PM
7/30/2011 4:29:56 PM
8/12/2012 6:00:00 PM
8/13/2012
8/13/2012 12:00:00 PM
8/13/2012 6:00:00 AM
8/13/2012 6:00:00 PM
8/14/2012
8/14/2012 12:00:00 PM
8/14/2012 6:00:00 AM
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8/15/2012
8/15/2012 12:00:00 PM
8/15/2012 6:00:00 AM
8/15/2012 6:00:00 PM
8/16/2011 2:53:46 PM
8/16/2011 2:54:01 PM
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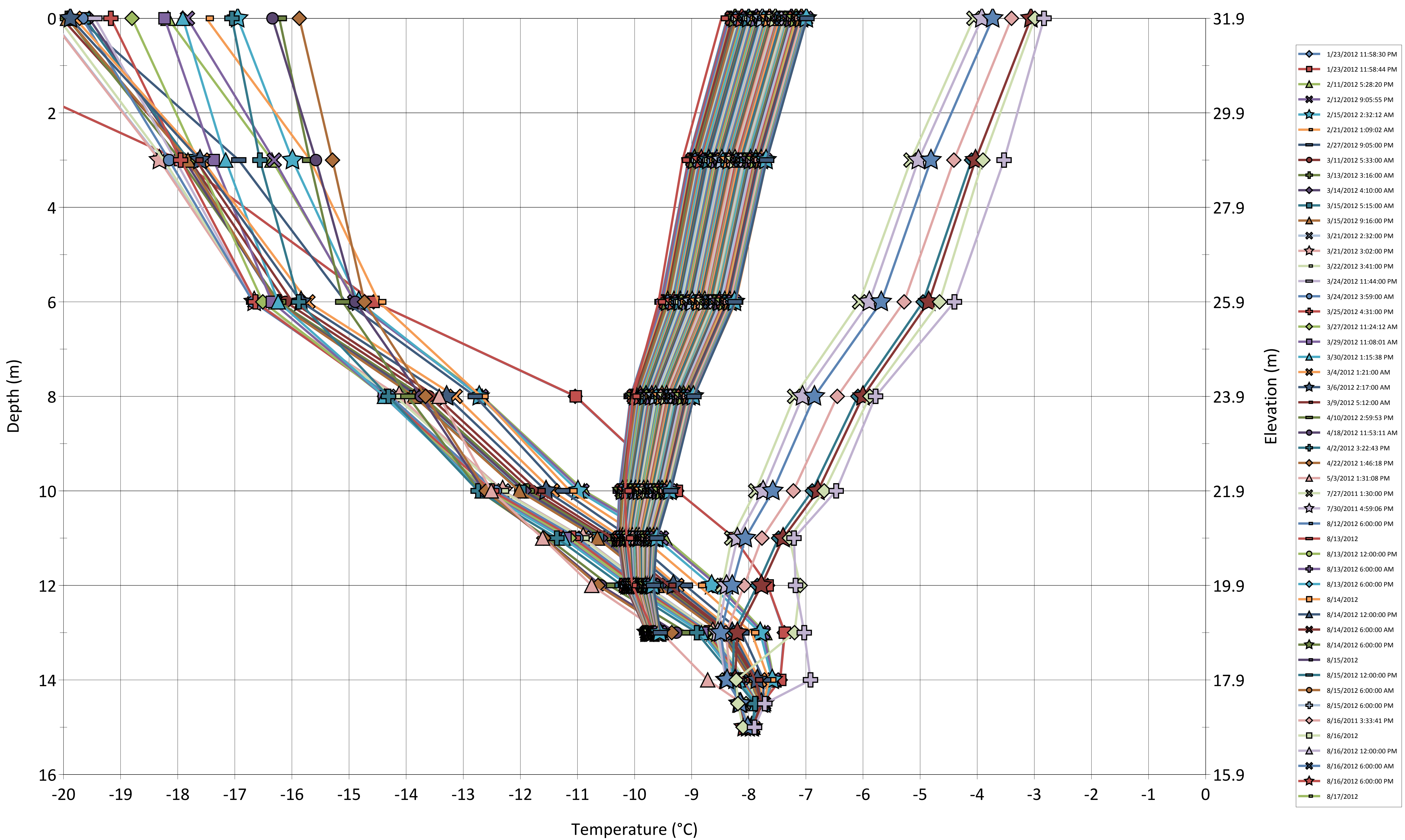
ND-VTS-175-KT


Depth (m)
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8
10
12
14
16
Elevation (m)
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29.9
27.9
25.9
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21.9
19.9
17.9
15.9
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-19
-18
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-16
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Temperature (°C)
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2/15/2012 2:32:12 AM
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2/27/2012 9:05:00 PM
3/11/2012 5:33:00 AM
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3/15/2012 5:15:00 AM
3/15/2012 9:16:00 PM
3/21/2012 2:32:00 PM
3/21/2012 3:02:00 PM
3/22/2012 3:41:00 PM
3/24/2012 11:44:00 PM
3/24/2012 3:59:00 AM
3/25/2012 4:31:00 PM
3/27/2012 11:24:12 AM
3/29/2012 11:08:01 AM
3/30/2012 1:15:38 PM
3/4/2012 1:21:00 AM
3/6/2012 2:17:00 AM
3/9/2012 5:12:00 AM
4/10/2012 2:59:53 PM
4/18/2012 11:53:11 AM
4/2/2012 3:22:43 PM
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5/3/2012 1:31:08 PM
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8/16/2012
8/16/2012 12:00:00 PM
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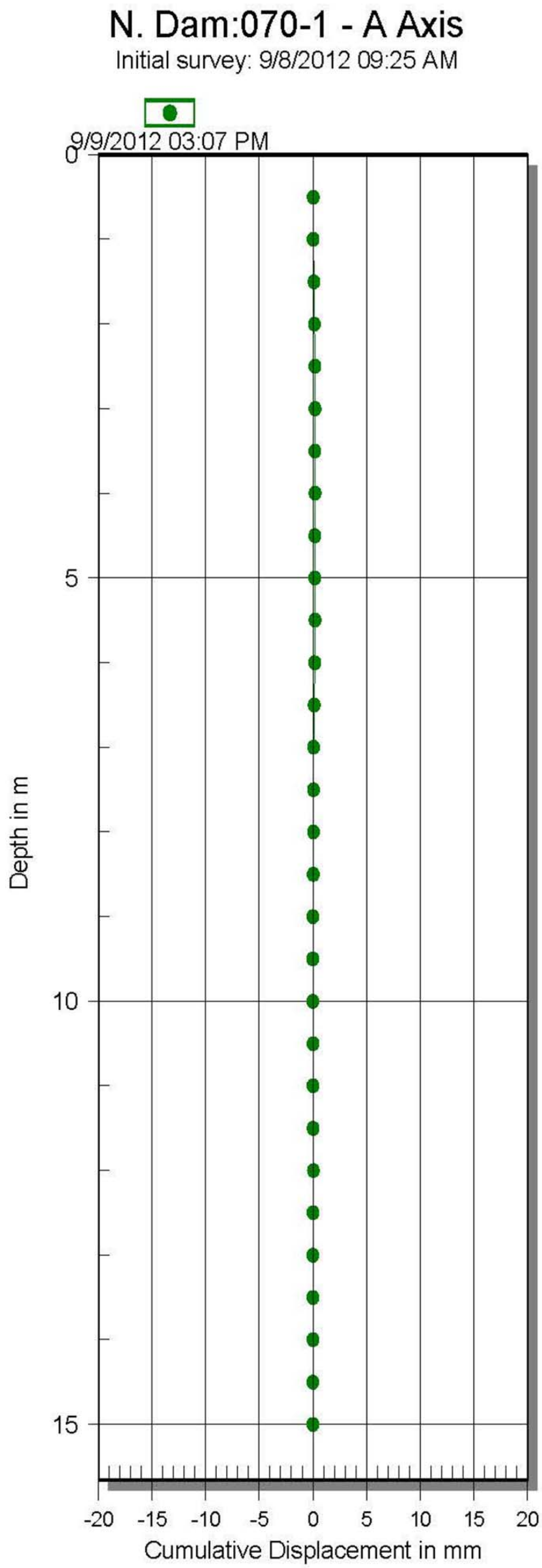
8/17/2012

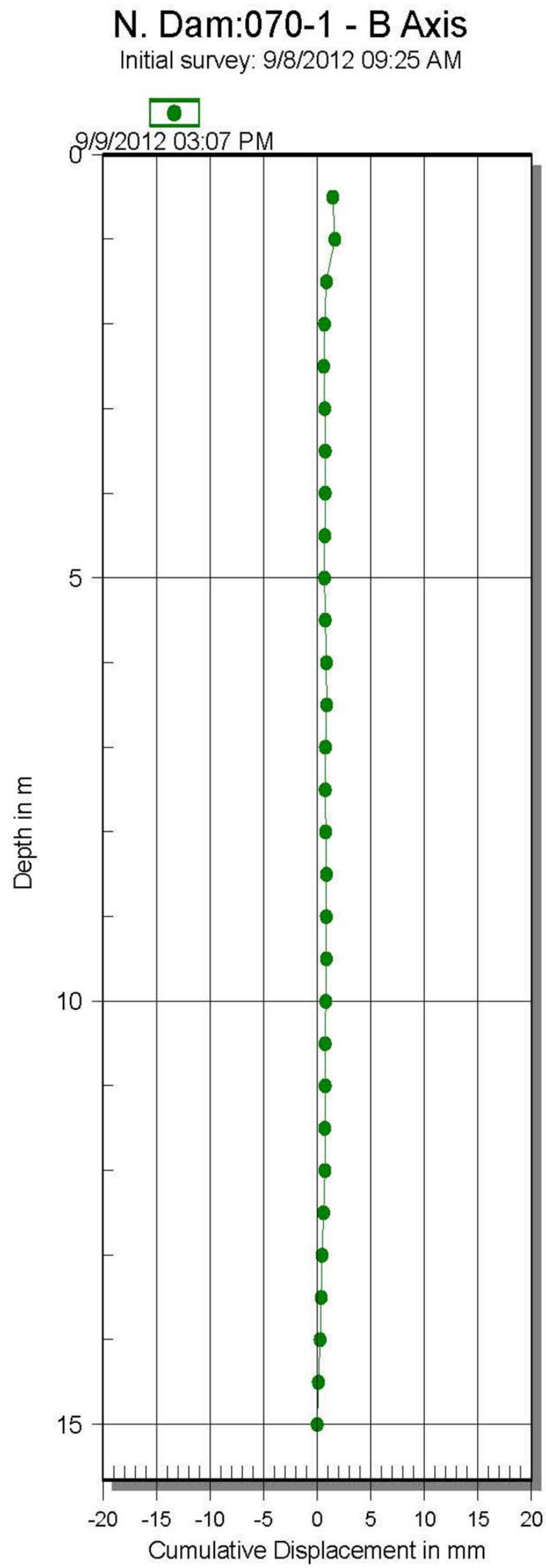
Appendix G: Reconciliation of SRK and Water Licence Thermistor Station ID's

Station ID		Northing	Easting	Status	Location	Area	Comments
Water License 2AM-DOH0713	SRK						
n/a	SRK-11	7559117.00	434347.00	Inactive	North Dam	Doris Mining Area	Replaced by NI1 to NI24 series
n/a	SRK-13	7559171.72	434383.32	Inactive	North Dam	Doris Mining Area	Replaced by NI1 to NI24 series
n/a	SRK-14	7559059.45	434291.66	Active	Near North Dam	Doris Mining Area	Baseline data
n/a	SRK-15	7559171.62	434383.00	Inactive	North Dam	Doris Mining Area	Replaced by NI1 to NI24 series
n/a	SRK-16	7559092.00	434323.20	Inactive	North Dam	Doris Mining Area	Replaced by NI1 to NI24 series
T4	SRK-19	7563211.92	432983.69	Inactive	Beach Laydown Area	Roberts Bay	Baseline data - Destroyed during construction
T5	SRK-20	7563129.78	432986.02	Inactive	Beach Laydown Area	Roberts Bay	Baseline data - Destroyed during construction
T8	SRK-22	7562026.69	432971.94	Active	East of Doris Airstrip	Roberts Bay	Baseline data
T7	SRK-23	7561665.77	432901.86	Inactive	South Apron Doris Airstrip	Roberts Bay	Baseline data - Destroyed during construction
n/a	SRK-24	7559493.64	432344.49	Active	Near crusher at Q2	Doris Mining Area	Baseline data
DOR-5	SRK-26	7558819.91	433422.37	Inactive	Junction Doris Rd and Tail Lk Road	Doris Mining Area	Baseline data - Destroyed during construction
DOR-1	SRK-28	7559046.27	433043.30	Inactive	Camp Pad	Doris Mining Area	Baseline data - Destroyed during construction
SI2	SRK-32	7555914.51	435554.73	Active	South Dam Area	Doris Mining Area	Baseline data
SI3	SRK-33	7555930.36	435613.59	Inactive	South Dam Area	Doris Mining Area	Baseline data - No longer functioning
SI4	SRK-34A	7555941.61	435640.69	Inactive	South Dam Area	Doris Mining Area	Baseline data - No longer functioning
T1	SRK10-DCB2/Doris Bridge East	7559478.35	434036.99	Active	Doris Creek Bridge Abutment East	Doris Mining Area	Doris Water License
T2	SRK10-DCB1/Doris Bridge West	7559475.15	434067.76	Active	Doris Creek Bridge Abutment West	Doris Mining Area	Doris Water License
n/a	SRK-35	7559477.53	434035.64	Inactive	Doris Creek - West	Doris Mining Area	Baseline data: Replaced by T1
n/a	SRK-37	7559090.54	434328.97	Inactive	North Dam	Doris Mining Area	Replaced by NI1 to NI24 series
n/a	SRK-38	7558254.33	434525.84	Active	Tail Lake West Side	Doris Mining Area	Baseline data
n/a	SRK-39	7556391.33	435164.13	Active	Tail Lake West Side	Doris Mining Area	Baseline data
n/a	SRK-40	7558546.86	435492.39	Inactive	Tail Lake East Side	Doris Mining Area	Baseline data - No longer functioning
n/a	SRK-41	7559129.11	434358.55	Inactive	North Dam Area	Doris Mining Area	Baseline data - No longer functioning
n/a	SRK-42	7559081.34	434402.62	Inactive	North Dam Area	Doris Mining Area	Baseline data - No longer functioning
SI5	SRK-43	7555923.82	435584.52	Inactive	South Dam Area	Doris Mining Area	Baseline data - No longer functioning
n/a	SRK-50	7559177.00	433807.00	Active	Doris Lake North End	Doris Mining Area	Baseline data
n/a	SRK-51	7559165.54	434390.70	Inactive	North Dam Area	Doris Mining Area	Baseline data - No longer functioning
n/a	SRK-52	7559082.73	434316.33	Inactive	North Dam Area	Doris Mining Area	Baseline data - No longer functioning
SRK-53	SRK-53	7556906.93	435184.24	Active	Tail Lake West Side	Doris Mining Area	Baseline data
SRK-54	SRK-54	7556467.00	435632.00	Unknown	Tail Lake East Side	Doris Mining Area	Baseline data - Surrounded by Water Sep. 2011
SRK-56	SRK-55	7557813.27	434935.95	Inactive	Tail Lake West Side	Doris Mining Area	Baseline data - No longer functioning
SRK-56	SRK-56	7558258.00	435334.00	Inactive	Tail Lake East Side	Doris Mining Area	Baseline data - No longer functioning
SRK-57	SRK-57	7557812.13	434937.72	Active	Tail Lake West Side	Doris Mining Area	Baseline data
SRK-58	SRK-58	7557704.54	435284.89	Active	Tail Lake East Side	Doris Mining Area	Baseline data
n/a	SRK-62	7558994.93	434500.74	Inactive	Tail Lake North End	Doris Mining Area	Baseline data - No longer functioning
T1	SRK-JT1-09	7563297.00	432534.00	Active	Jetty	Roberts Bay Jetty	Doris Water License
T2	SRK-JT2-09	7563264.00	432550.00	Inactive	Jetty	Roberts Bay Jetty	Replaced with SRK-JT2-12
T2	SRK-JT2-12	7563264.00	432550.00	Active	Jetty	Roberts Bay Jetty	Doris Water License

Station ID		Northing	Easting	Status	Location	Area	Comments
Water License 2AM-DOH0713	SRK						
n/a	08SBD380	7504780.24	441079.71	Unknown	South of Boston Camp	Boston Mining Area	Baseline data - Boston Water License
n/a	08SBD381A	7504813.94	441070.40	Unknown	South of Boston Camp	Boston Mining Area	Baseline data - Boston Water License
n/a	08SBD382	7505140.53	441025.86	Unknown	South of Boston Camp	Boston Mining Area	Baseline data - Boston Water License
n/a	08PMD669	7550955.12	433300.23	Unknown	Between Patch and Windy Lakes (N)	Madrid Mining Area	Baseline data - Windy Water License
n/a	08PSD144	7548989.92	435177.97	Unknown	Patch Lake Island	Madrid Mining Area	Baseline data - Windy Water License
n/a	08TDD632	7559369.75	433915.20	Unknown	West Side Doris Lake N	Doris Mining Area	Baseline data
n/a	08TDD633	7557646.05	433402.21	Inactive	West Side Doris Lake	Doris Mining Area	Baseline data - No longer functioning - Never read / no data
n/a	SRK-12-GTC-DH01	7558917.20	433169.18	Active	Pollution Control Pond	Doris Mining Area	New installation 2012, specifically for Doris Water License
n/a	SRK-12-GTC-DH02	7558912.96	433225.25	Active	Pollution Control Pond	Doris Mining Area	New installation 2012, specifically for Doris Water License
n/a	SRK-12-GTC-DH03	7558930.81	433225.25	Active	Pollution Control Pond	Doris Mining Area	New installation 2012, specifically for Doris Water License
DOR-6	SRK10-DWB1	7555673.50	432703.40	Active	Doris-Windy Road Bridge #2	Madrid Mining Area	New installation 2012, specifically for Doris Water License
DOR-7	SRK10-DWB2	7555644.40	432708.20	Active	Doris-Windy Road Bridge #2 / #3	Madrid Mining Area	New installation 2012, specifically for Doris Water License
DOR-8	SRK10-DWB3	755615.00	432712.80	Active	Doris-Windy Road Bridge #3	Madrid Mining Area	New installation 2012, specifically for Doris Water License
DOR-9	SRK10-DWB4	7554860.30	432444.00	Active	Doris-Windy Road Bridge #4	Madrid Mining Area	New installation 2012, specifically for Doris Water License
DOR-10	SRK10-DWB5	7554831.30	732437.00	Active	Doris-Windy Road Bridge #4	Madrid Mining Area	New installation 2012, specifically for Doris Water License
NI1	ND-HTS-040-31.5	7559100.71	434324.01	Active	North Dam	Doris Mining Area	Doris Water License
NI2	ND-HTS-040-33.5	7559100.71	434324.01	Active	North Dam	Doris Mining Area	New installation 2012, specifically for Water License
NI3	ND-VTS-040-KT	7559100.71	434324.01	Active	North Dam	Doris Mining Area	Doris Water License
NI4	ND-VTS-060-DS	7559115.28	434337.72	Active	North Dam	Doris Mining Area	Doris Water License
NI5	ND-HTS-060-33.5	7559115.28	434337.72	Active	North Dam	Doris Mining Area	New installation 2012, specifically for Doris Water License
NI6	ND-HTS-060-31.0	7559115.28	434337.72	Active	North Dam	Doris Mining Area	New installation 2012, specifically for Doris Water License
NI7	ND-HTS-060-28.8	7559115.28	434337.72	Active	North Dam	Doris Mining Area	Water License. One bead not working.
NI8	ND-VTS-060-KT	7559115.28	434337.72	Active	North Dam	Doris Mining Area	Doris Water License
NI9	ND-VTS-060-US	7559106.54	434346.46	Active	North Dam	Doris Mining Area	Doris Water License
NI10	ND-VTS-085-DS	7559133.96	434353.91	Active	North Dam	Doris Mining Area	Doris Water License
NI11	ND-HTS-085-25.3	7559133.96	434353.91	Active	North Dam	Doris Mining Area	Doris Water License
NI12	ND-HTS-085-29.4	7559133.96	434353.91	Active	North Dam	Doris Mining Area	New installation 2012, specifically for Doris Water License
NI13	ND-HTS-085-33.5	7559133.96	434353.91	Inactive	North Dam	Doris Mining Area	Cut during construction, end could not be found to be spliced.
NI14	ND-VTS-085-KT	7559133.96	434353.91	Active	North Dam	Doris Mining Area	Doris Water License
NI15	ND-VTS-085-US	7559125.08	434363.23	Active	North Dam	Doris Mining Area	Doris Water License
NI16	ND-VTS-130-DS	7559167.23	434384.47	Active	North Dam	Doris Mining Area	Doris Water License
NI17	ND-HTS-130-28.8	7559167.23	434384.47	Active	North Dam	Doris Mining Area	Doris Water License
NI18	ND-HTS-130-31.0	7559167.23	434384.47	Active	North Dam	Doris Mining Area	Doris Water License
NI19	ND-HTS-130-33.5	7559167.23	434384.47	Active	North Dam	Doris Mining Area	Doris Water License
NI20	ND-VTS-130-KT	7559167.23	434384.47	Active	North Dam	Doris Mining Area	Doris Water License
NI21	ND-VTS-130-US	7559158.49	434393.93	Active	North Dam	Doris Mining Area	Doris Water License
NI22	ND-HTS-175-32.5	7559200.63	434414.72	Active	North Dam	Doris Mining Area	Doris Water License
NI23	ND-HTS-175.33.5	7559200.63	434414.72	Active	North Dam	Doris Mining Area	Doris Water License
NI24	ND-VTS-175-KT	7559200.63	434414.72	Active	North Dam	Doris Mining Area	Doris Water License

Appendix H: North Dam Slope Inclinometer Readings





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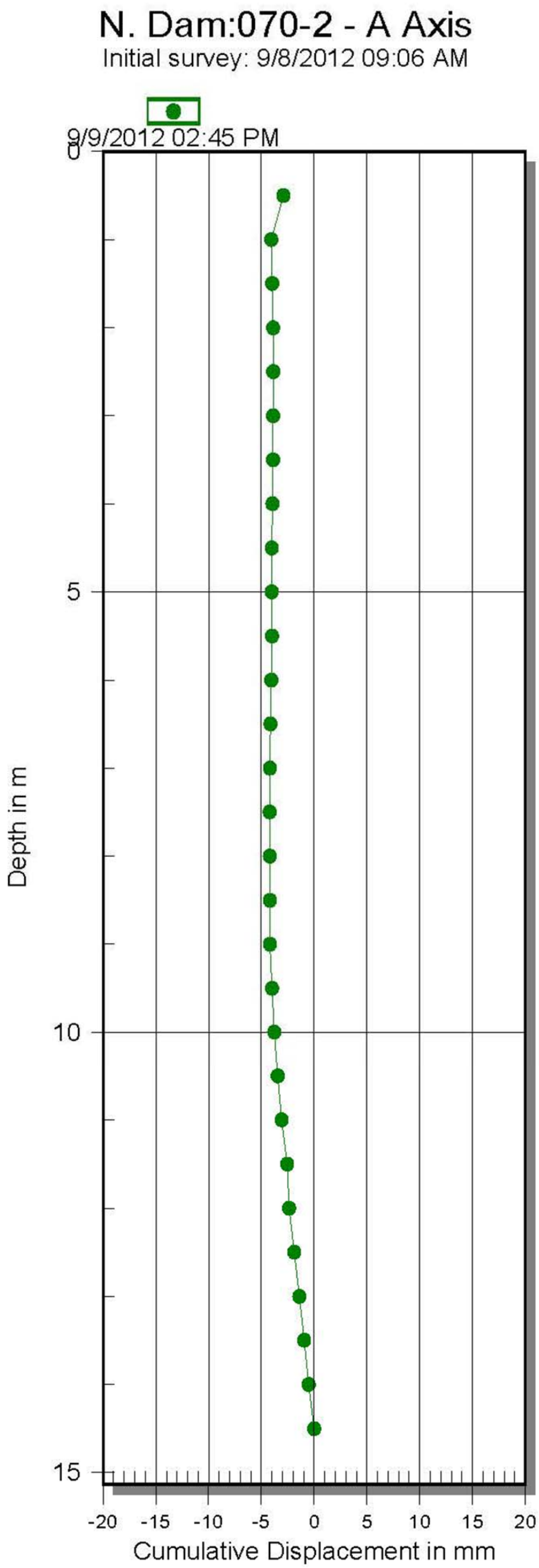
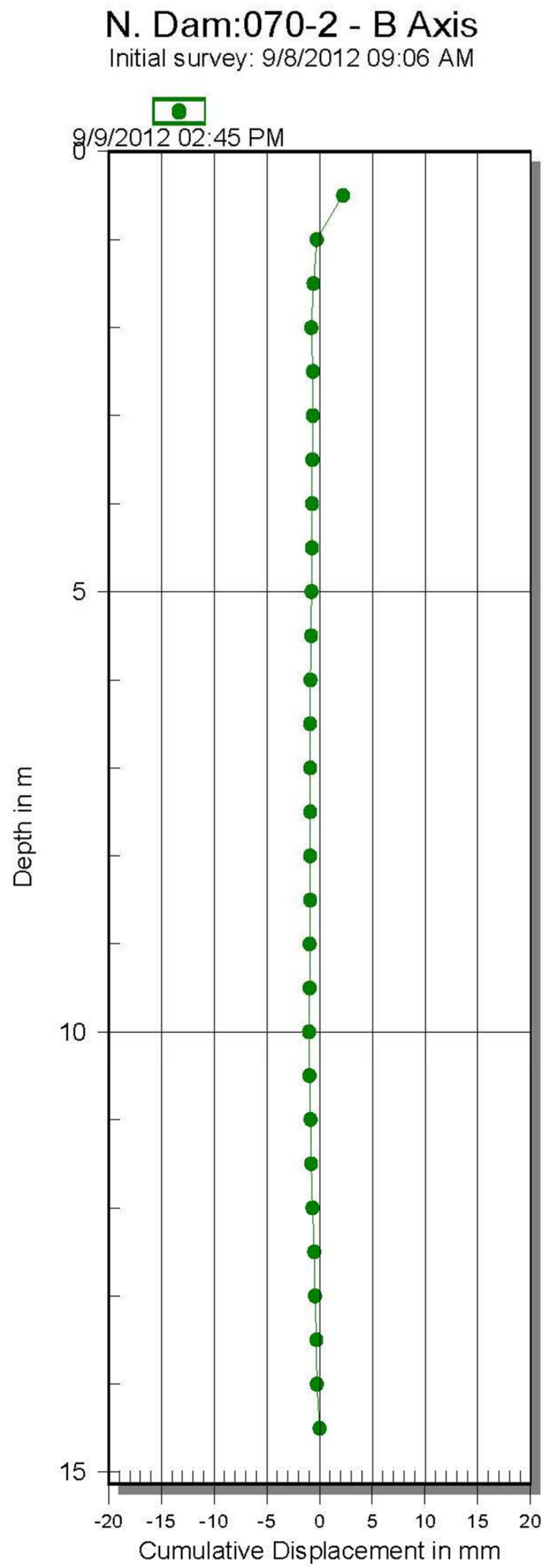
Job No: 1CH088.066 Filename: HopeBay_ND_IN_DATA_ML.pptx	HOPE BAY MINING LTD	Date: January 2013 / Approved: LW / Figure: **1**





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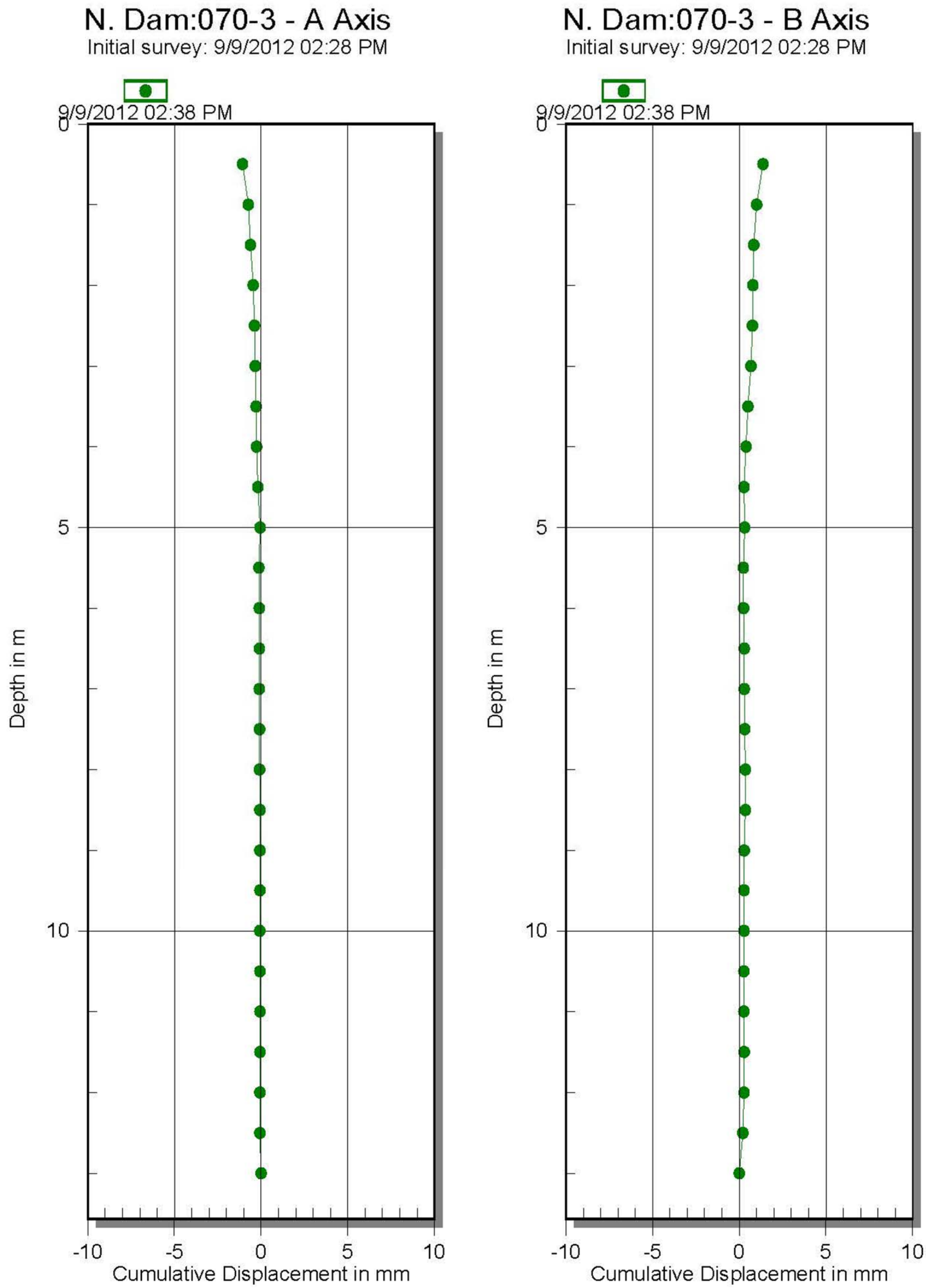


srk consulting

NEWMONT NORTH AMERICA

2012 Geotechnical Inspection

North Dam Inclinometer Station

ND-IN-070-3

Job No: 1CH088.066

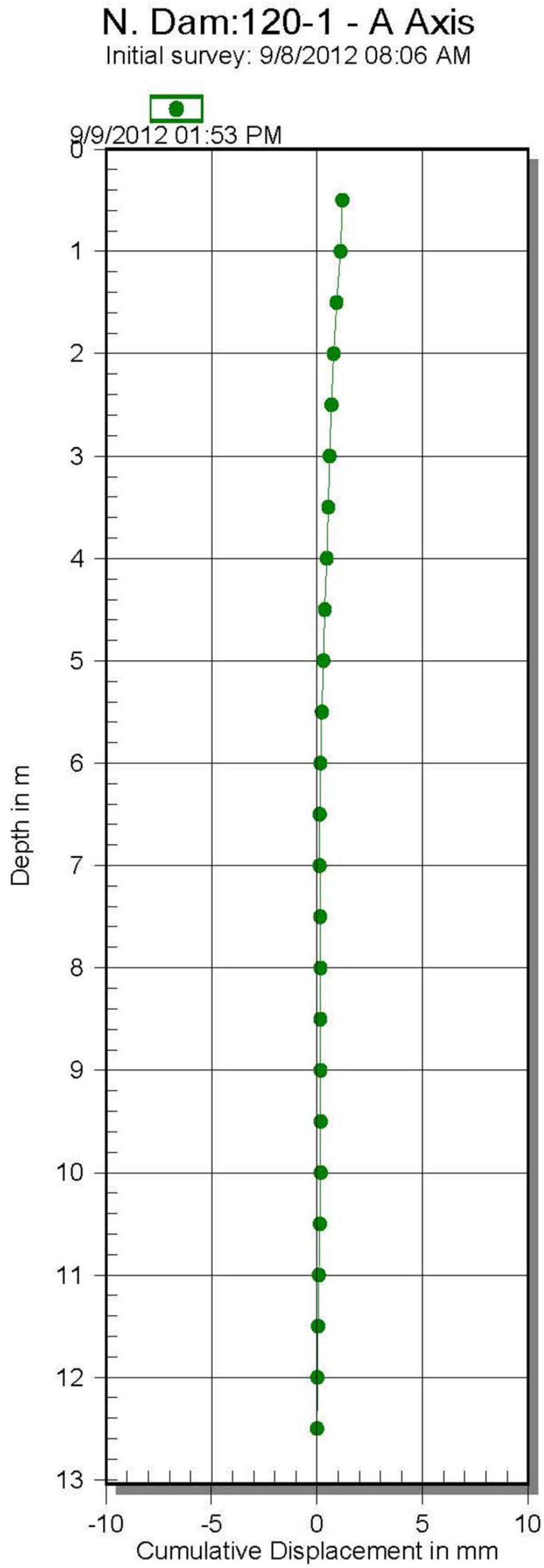
Filename: HopeBay_ND_IN_DATA_ML.pptx

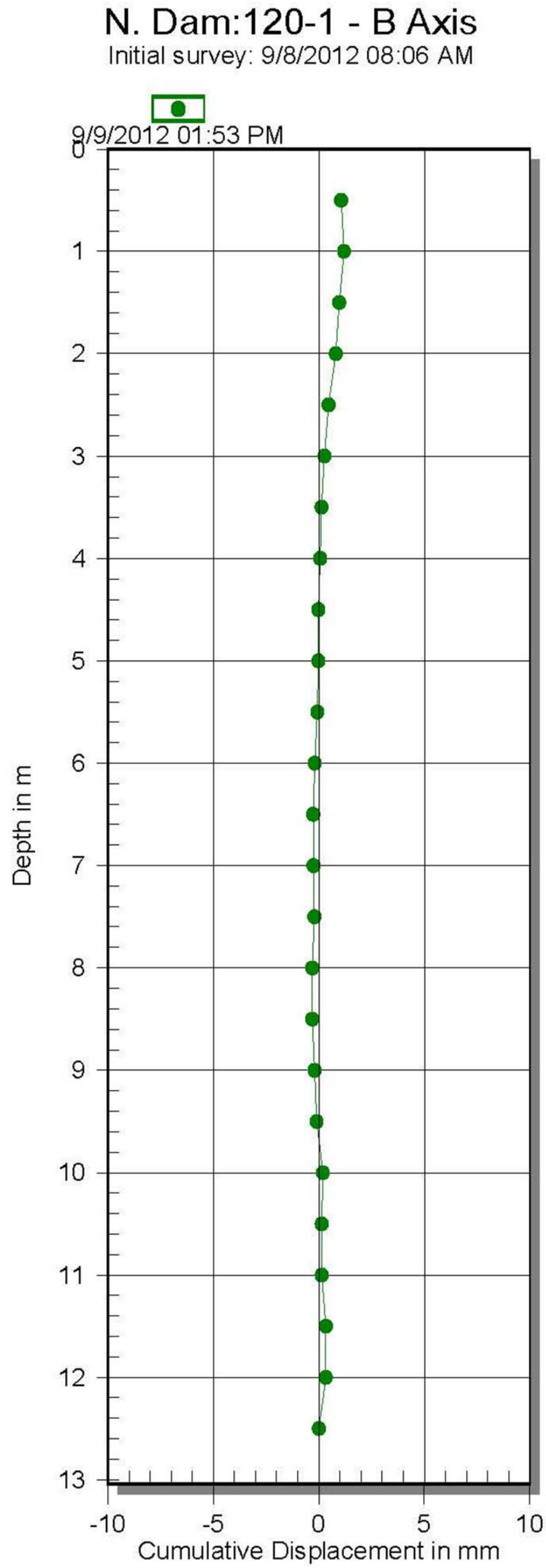
HOPE BAY MINING LTD

Date: January 2013

Approved: LW

Figure: 3





srk consulting	NEWMONT NORTH AMERICA	2012 Geotechnical Inspection **North Dam Inclinometer Station** **ND-IN-120-1**		
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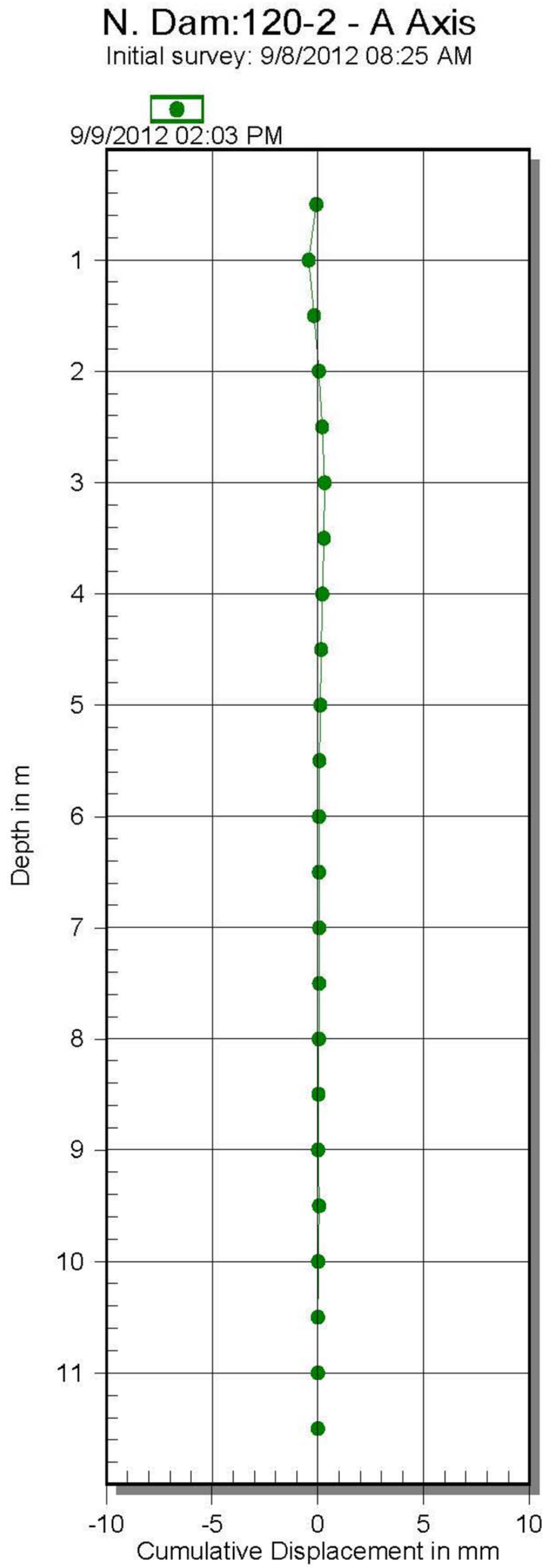
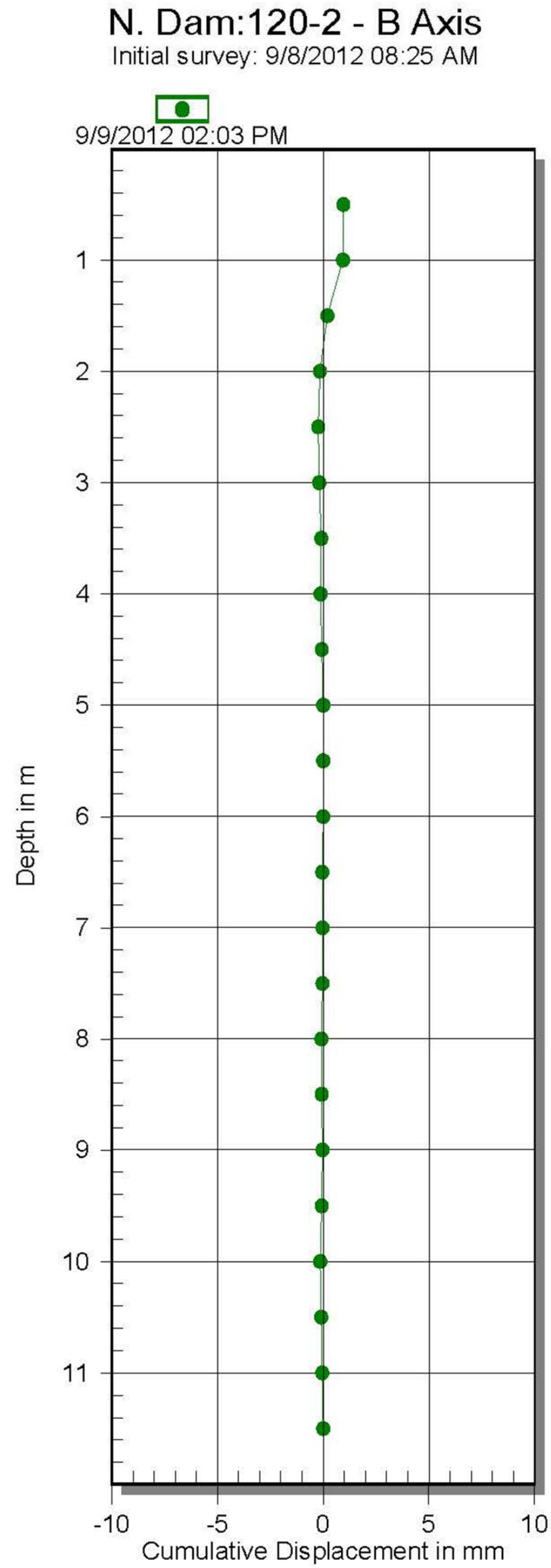
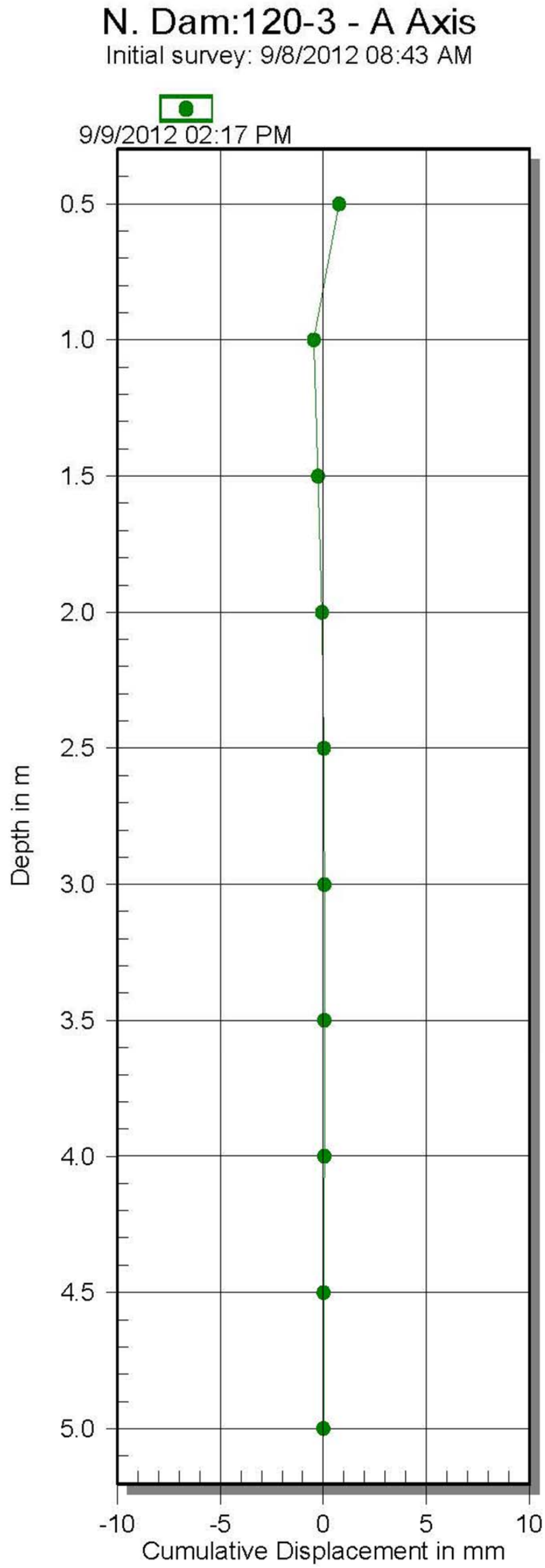
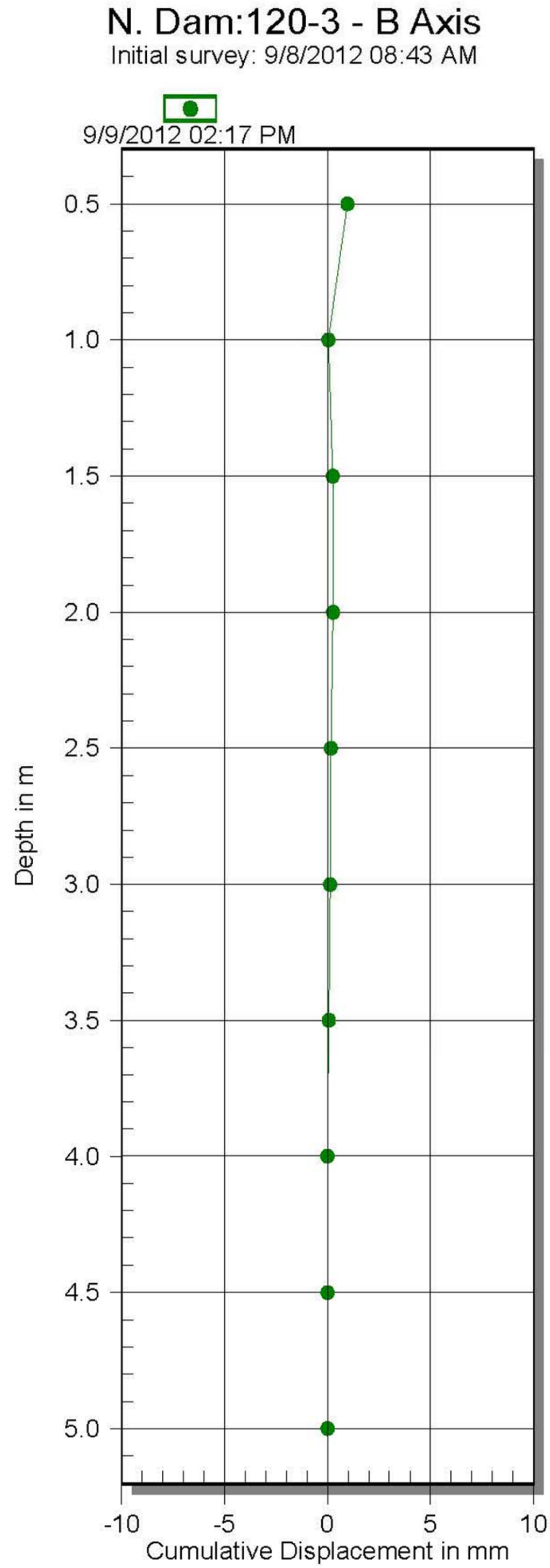




srk consulting	NEWMONT NORTH AMERICA	2012 Geotechnical Inspection **North Dam Inclinometer Station** **ND-IN-120-2**
Job No: 1CH088.066 Filename: HopeBay_ND_IN_DATA_ML.pptx	HOPE BAY MINING LTD	Date: January 2013	Approved: LW	Figure: **5**





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NEWMONT. NORTH AMERICA

2012 Geotechnical Inspection

North Dam Inclinometer Station

ND-IN-120-3

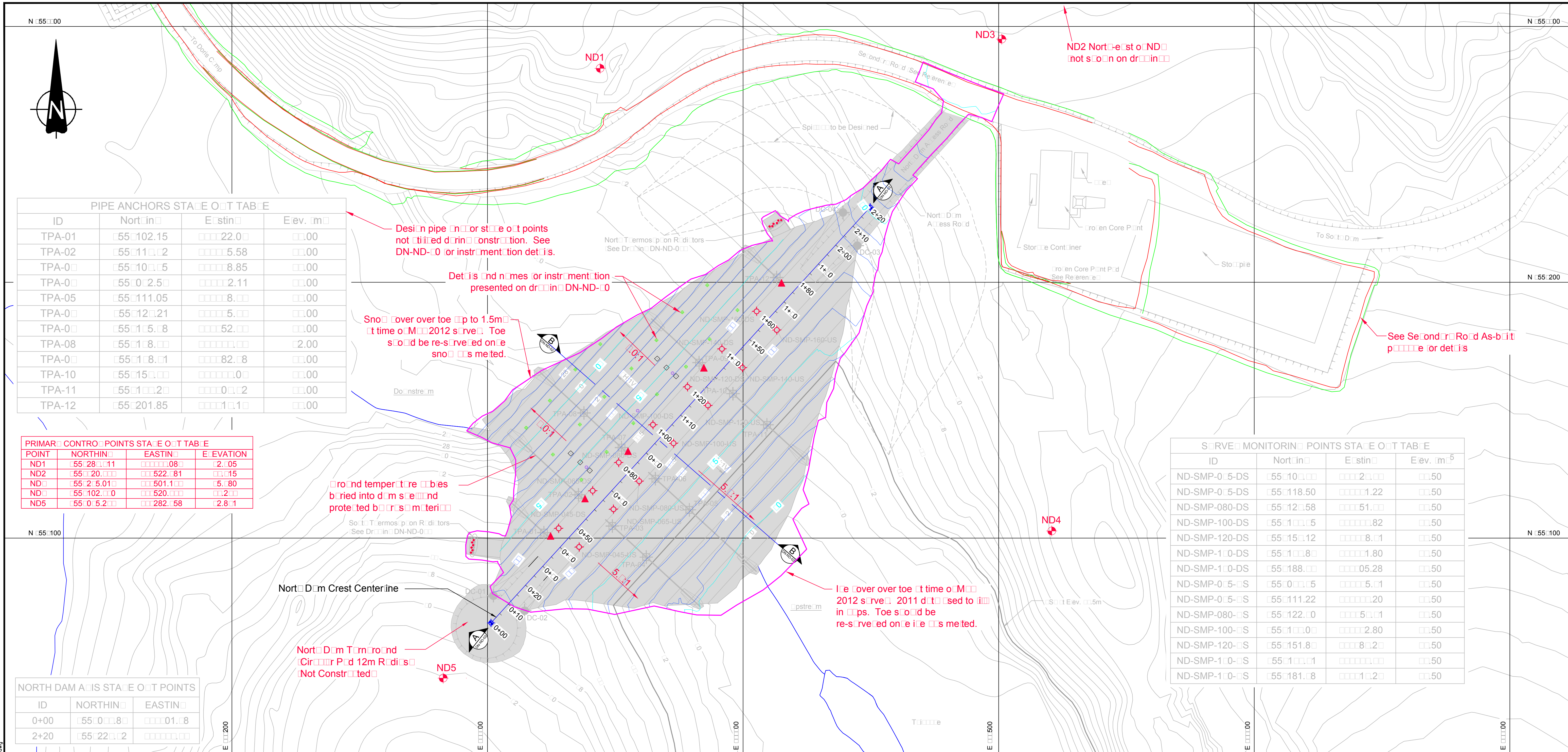
Job No: 1CH088.066

Filename: HopeBay_ND_IN_DATA_ML.pptx

HOPE BAY MINING LTD

Date:	Approved:	Figure:
January 2013	LW	**6**

Appendix I: North Dam Survey Monitoring Data



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TPA-0□	□55□10□.□5	□□□□□8.85	□□.00
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TPA-0□	□55□12□.21	□□□□□5.□□	□□.00
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TPA-11	□55□1□□□2□	□□□□0□.□2	□□.00
TPA-12	□55□201.85	□□□□1□.1□	□□.00

PRIMAR□ CONTRO□ POINTS STA□E O□T TAB□E			
POINT	NORTHIN□	EASTIN□	E□EVATION
ND1	□55□28□.□11	□□□□□□□.08□	□2.□05
ND2	□55□□20.□□□	□□□522.□81	□□.□15
ND□	□55□2□5.01□	□□□501.1□□	□5.□80
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ND5	□55□0□5.2□□	□□□282.□58	□2.8□1

S□RVE□ MONITORIN□ POINTS STA□E O□T TAB□E			
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DC-0□	□55□21□.□1	□□□□□□□.□□	□□.50
DC-0□	□55□22□.2□	□□□□□□□.0□	□□.50

0 5 10 15 20 25
S□□□e in Metres

LEGEND

- S□rve□ Monitorin□ Point
- □ro□nd Temper□t□re C□b□e Pipe An□□or
- Nort□ D□m Crest St□□e O□t Points
- Nort□ D□m A□is St□□e O□t Points
- Ro□d Crest As-b□i□t
- Ro□d Toe As-b□i□t
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- Deep Sett□ement Point As-b□i□t
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- □in□ S□r□□□e E□tents As-b□i□t
- T□ermos□p□on R□di□tor As-b□i□t

REFERENCE

□or det□i□ed desi□n o□ t□e □ro□en Core P□□t P□d □nd Se□ond□r□ Ro□d re□er to Se□ond□r□ Ro□d □rom Doris Cree□ Brid□e to So□t□ D□m 0+000 to 0+□50, Doris Nort□ Pro□e□t, N□n□□v□t, C□n□d□ - T□-RDS-0□ □HB+T-CIV-CIV-OND-0005□ - Rev. 1 - Iss□ed □or Constr□□tion, Doris Nort□ Pro□e□t, N□n□□v□t, C□n□d□, Sept 2□, 2010 □nd M□teri□□ Spe□i□i□□tions, Nort□ Pro□e□t, N□n□□v□t, C□n□d□ - T□-RDS-11 □HB+T-CIV-CIV-OND-0012□ - Rev. 1 - Iss□ed □or Constr□□tion, Doris Nort□ Pro□e□t, N□n□□v□t, C□n□d□. Sept 2□, 2010.

NOTES

1. Topo□r□p□i□ □onto□r d□t□ □or t□e terr□in mode□ □□s provided b□ t□e Contr□□tor.
2. T□e □o-ordin□te s□stem is □TM NAD 8□, □one 1□.
3. A□□ dr□□in□s □re s□□□ed □ppropri□te□□ □or D-Si□e □onstr□□tion dr□□in□s. S□□□es m□□ not be □orre□t i□ t□ese dr□□in□s □re reprod□□ed □nd presented in □n□ ot□er si□e □orm□t.
4. □or det□i□s o□ s□rve□ monitorin□ points □nd □ro□nd temper□t□re □□b□es see D□□ DN-ND-1□.
5. St□□e o□t e□ev□tion in t□b□e is t□e desi□n d□m □rest.

NO.	DESCRIPTION	CHK'D	APP'D	DATE
AB	2012 AS-BUILT	JBK	LW	20JUL12
1	UPDATED STAKE OUT TABLES	LW	EMR	31MAR11
0	ISSUED FOR CONSTRUCTION	LW	EMR	03DEC10
A	ISSUED FOR REVIEW	LW	EMR	22OCT10

DRAWING NO. | DRAWING TITLE | DRAWING NO. | DRAWING TITLE

REFERENCE DRAWINGS — REVISIONS — PROFESSIONAL ENGINEER'S STAMP

srk consulting

DESIGN: EMR — DRAWN: VY/LR/NV/DC — REVIEWED: LW
CHECKED: LW/JBK/MMM — APPROVED: EMR — DATE: July 20, 2012
FILE NAME: DN-ND-01.dwg

NEWMONT NORTH AMERICA

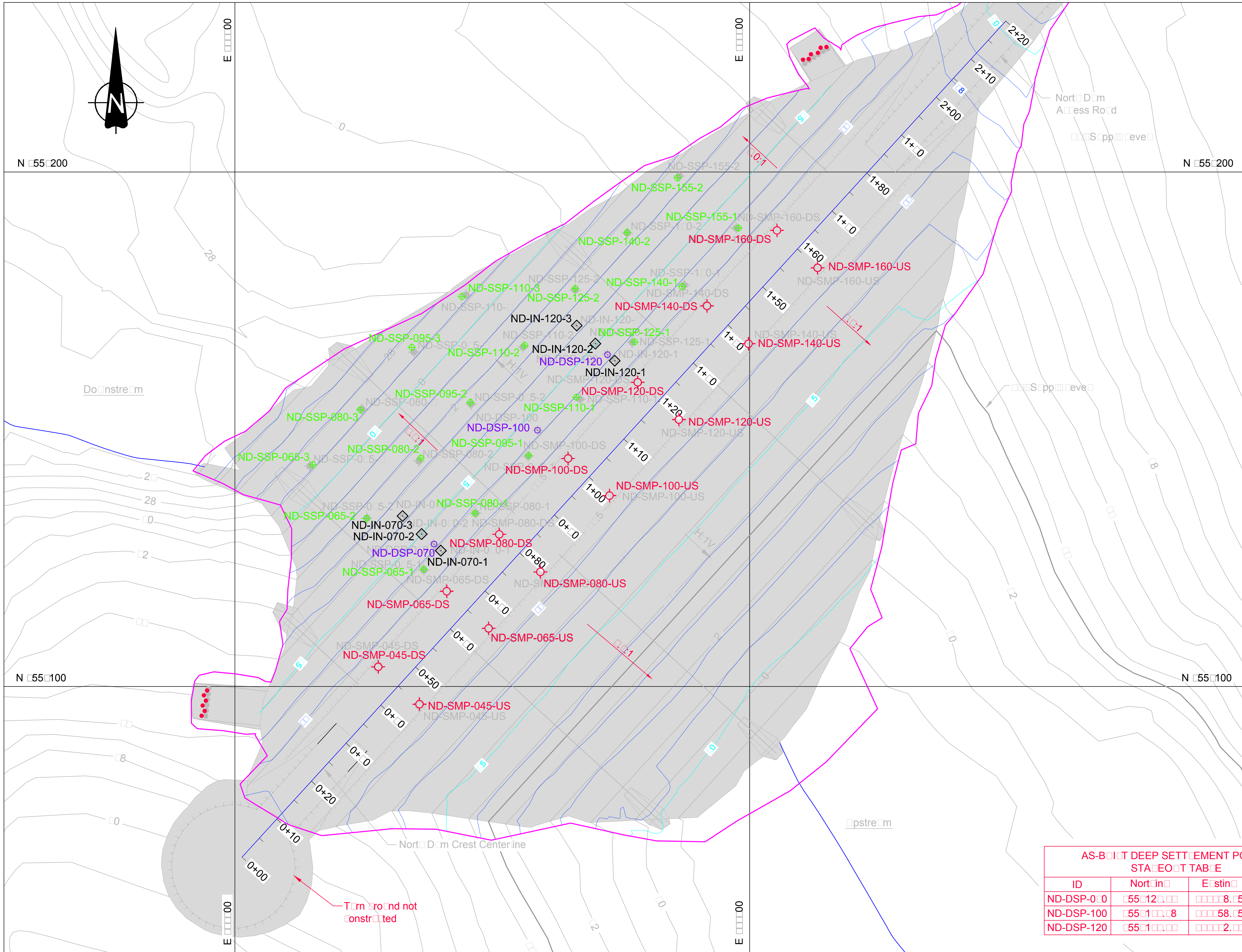
HOPE BA□ MININ□ □TD.

SRK JOB NO.: 1CH008.027/058 — SRK DWG NO.: DN-ND-01

Doris Nort□ Pro□e□t

DRAWING TITLE: Nort□ D□m □ener□□ Arr□n□ement

NEWMONT DRAWING NO.: HB+T-CIV-CIV-OND-0021 — SHEET 2 OF 29 — REVISION NO. AB



LEGEND

- In□inometer □o□□tion
- S□ri□i□□ S□rve□ Points
- Deep Sett□ement Points
- S□rve□ Monitorin□ Point
- S□rve□ Monitorin□ Point As-b□i□t
- Prim□r□ Contro□ Point As-b□i□t
- Deep Sett□ement Point As-b□i□t
- S□r□□□e S□rve□ Point As-b□i□t
- In□inometer □o□□tion As-b□i□t
- M□□or Conto□r As-b□i□t
- Minor Conto□r As-b□i□t
- □in□□ S□r□□□e E□tents As-b□i□t
- T□ermos□p□on R□di□tor As-b□i□t

NOTES

1. Topo□r□p□i□ □onto□r d□t□ □or t□e terr□in mode□ □□s provided b□ t□e Contr□□tor.
2. T□e □o-ordin□te s□stem is □TM NAD 8□, □one 1□.

AS-B□I□T INC□INOMETER □OCATION STA□EO□T TAB□E			
ID	Nort□in□	E□stin□	E□ev. □m□
ND-IN-0□0-1	□55□12□.□1	□□□□□0.00	□□.□□
ND-IN-0□0-2	□55□12□.□□	□□□□□□.2□	□□.20
ND-IN-0□0-□	□55□1□□.1□	□□□□□2.5□	□□.85
ND-IN-120-1	□55□1□□.□1	□□□□□□.□8	□□.□□
ND-IN-120-2	□55□1□□.□□	□□□□□0.0□	□□.05
ND-IN-120-□	□55□1□0.15	□□□□□□.□0	□□.□5

AS-B□I□T S□R□ICIA□ S□RVE□ POINTS STA□EO□T TAB□E			
ID	Nort□in□	E□stin□	E□ev. □m□
ND-SSP-0□5-1	□55□122.80	□□□□□□.□□	□□.□□
ND-SSP-0□5-2	□55□1□2.□□	□□□□25.55	□2.81
ND-SSP-0□5-□	□55□1□□.10	□□□□15.11	2□.□□
ND-SSP-080-1	□55□1□□.□5	□□□□□□.5□	□□.□□
ND-SSP-080-2	□55□1□□.□□	□□□□□□.10	□2.□2
ND-SSP-080-□	□55□15□.□5	□□□□2□.□□	2□.□□
ND-SSP-0□5-1	□55□1□□.□0	□□□□5□.0□	□□.58
ND-SSP-0□5-2	□55□155.21	□□□□□5.□2	□2.85
ND-SSP-0□5-□	□55□1□5.□2	□□□□□□.□5	28.□0
ND-SSP-110-1	□55□15□.20	□□□□□□.2□	□□.□2
ND-SSP-110-2	□55□1□□.□1	□□□□5□.2□	□2.88
ND-SSP-110-□	□55□1□5.□□	□□□□□□.10	28.□□
ND-SSP-125-1	□55□1□□.□□	□□□□□□.□1	□□.□□
ND-SSP-125-2	□55□1□□.□□	□□□□□□.08	□2.□1
ND-SSP-1□0-1	□55□1□□.□5	□□□□8□.85	□□.□8
ND-SSP-1□0-2	□55□188.28	□□□□□□.1□	□2.8□
ND-SSP-155-1	□55□18□.0□	□□□□□□.□□	□□.80
ND-SSP-155-2	□55□1□8.85	□□□□85.□8	□2.□1

AS-B□I□T S□RVE□ MONITORIN□ POINTS STA□EO□T TAB□E			
ID	Nort□in□	E□stin□	E□ev. □m□
ND-SMP-0□5-DS	□55□118.52	□□□□□1.1□	□8.□□
ND-SMP-0□5-□S	□55□111.□1	□□□□□□.□0	□8.□□
ND-SMP-080-DS	□55□12□.5□	□□□□51.□5	□8.□1
ND-SMP-080-□S	□55□122.2□	□□□□5□.□□	□8.□0
ND-SMP-100-DS	□55□1□□.□2	□□□□□□.□1	□8.□□
ND-SMP-100-□S	□55□1□□.12	□□□□□2.□□	□8.□□
ND-SMP-120-DS	□55□15□.12	□□□□□8.2□	□8.□1
ND-SMP-120-□S	□55□151.88	□□□□8□.2□	□8.□□
ND-SMP-1□0-DS	□55□1□□.□8	□□□□□1.□□	□8.□□
ND-SMP-1□0-□S	□55□1□□.□2	□□□□□□.□□	□8.□2
ND-SMP-1□0-DS	□55□188.□□	□□□□05.□0	□8.□0
ND-SMP-1□0-□S	□55□181.□□	□□□□1□.18	□8.□□

AS-B□I□T DEEP SETT□EMENT POINTS STA□EO□T TAB□E			
ID	Nort□in□	E□stin□	E□ev. □m□
ND-DSP-0□0	□55□12□.□□	□□□□□8.□5	□□.□5
ND-DSP-100	□55□1□□.□8	□□□□58.□5	□□.8□
ND-DSP-120	□55□1□□.□□	□□□□□2.□□	□□.□2

0 □ 8 12 1□ 20
S□□e in Metres

NO.	DESCRIPTION	CHK'D	APP'D	DATE
AB	2012 AS-BUILT	JBK	LW	20JUL12
0	ISSUED FOR CONSTRUCTION	LW	EMR	24Feb12
A	ISSUED FOR REVIEW	LW	EMR	10Feb12

REVISIONS

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

PROFESSIONAL ENGINEERS STAMP

srk consulting

DESIGN: LW | DRAWN: NV | REVIEWED: LW
CHECKED: LW/JBK/MMM | APPROVED: EMR | DATE: July 20, 2012

FILE NAME: 1CH008.058–DNND30–AB.dwg

NEWMONT NORTH AMERICA

HOPE BA□ MININ□ □TD.

SRK JOB NO.: 1CH008.027/058 | SRK DWG NO.: DN-ND-□0

Doris Nort□ Pro□e□t

DRAWING TITLE:
Nort□ D□m
Addition□□ Instr□ment□tion □□□o□t

NEWMONT DRAWING NO.: HB+T-CIV-CIV-OND-00□1
SHEET 31 of 32
REVISION NO. AB

J:\01_SITES\Hope.Bay\ACAD\2010 Drawings\NorthDam2010\10 - Asbuilt Rev AB\1CH008.058-DNND30-AB.dwg