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Giant Mine Tailings Cover Trials 2010 Data Summary

Prepared for:

**Public Works and
Government Services Canada**

Prepared by:



SENE Consultants Limited

SRK Project No. 1CS019.016

December 2010



**Giant Mine
Tailings Cover Trials
2010 Data Summary**

Public Works and Government Services Canada

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1 Introduction and Scope of Report

1.1 General

At the request of Public Works and Government Services Canada (PWGSC), SRK Consulting (Canada) Inc. (SRK) designed and oversaw construction of four tailings cover test plots over the winter of 2007/2008 at the Giant Mine in Yellowknife, NT. The project was undertaken as part of the Giant Mine Remediation Plan (SRK, 2006) to gather information related to cover design and constructability at the Giant Mine. A data report was compiled in 2010 (SRK, 2010) documenting the data gathered during the 2008 and 2009 monitoring seasons.

This report documents the results of monitoring the trial covers during 2010 season.

1.2 Background of the Project

A total of approximately 16 million tonnes of tailings are stored in the four tailings ponds at Giant Mine. The four ponds, consisting of the Northwest, North, Central, and South Ponds, cover an area of approximately 95 hectares and contain moderate amounts of arsenic. The additional settling and polishing ponds, covering approximately 9 hectares and containing water treatment sludges, are also contaminated with arsenic. The ponds pose a risk due to their susceptibility to wind erosion as well as a possible source of contamination to passing wildlife looking for salt.

The Giant Mine Remediation Plan (SRK, 2006) called for all the tailings and sludge areas to be covered with a two-layer system. The first (bottom) layer is to consist of quarried rock with a top layer of fine-grained soil overlying it. The rock layer will act as an inhibitor to both the upward migration of tailings as well as to the downward penetration of plant roots. In the event of the removal of the overlying soil layer due to erosion, it will serve as a final protective layer. The overlying soil layer will provide a medium for re-vegetation to allow for future recreational or traditional use of the area. The tailings covers will be graded, and ditches and spillways will be constructed in such a way as to minimize erosion of the soil layer and prevent contamination of surface water run-off.

The tailings cover trials are intended to provide information as to the performance of different configurations of materials on two sections of the tailings with different characteristics (i.e. beach and slimes tailings). The Northwest Pond was chosen as the test location due to its accessibility and the presence of well defined beach and slimes areas in the tailings.

1.3 Scope of Work

This report summarizes observations made during the 2010 summer season, including both survey data and data collected by the automated instrumentation. The data presented in this report provides an indication of the performance of the trial covers, contributing to better understanding of site

specific conditions. The regular surveys, performed on nine occasions throughout the summer, allowed continued monitoring of settlement resulting from consolidation.

The scope of this report is to document the settlement, temperature, and moisture content data collected as well as field observations made during physical cover inspections. This report does not attempt to make any data interpretations or predictions of future cover performance..

1.4 Methods

The tailings cover trial plots were built on the Northwest Pond at the Giant Mine, located between Vee Lake Road and the Ingraham Trail (Figure 1). The plots were built according to the Giant Mine Tailings Cover Trials design memo from SRK to Indian and Northern Affairs Canada (INAC), detailed in the As-built report (SRK, 2009). Monitoring of the plots was planned for a minimum of three years with the objective of determining the final tailings cover design criteria for the whole site, including the four tailings ponds.

Construction of the first two plots occurred during November and December of 2007 with the remainder of the work taking place in February and March of 2008. SRK provided quality assurance (QA) for the work and the general contractor for implementation of the work was Deton'Cho/Nuna Joint Venture (DCNJV).

Following construction, the automated instrumentation was installed in July 2008. It consisted of thermistor cables and moisture content probes attached to dataloggers, as well as two individual temperature probes. Data from the dataloggers was downloaded periodically by SRK personnel throughout the monitoring seasons of 2008, 2009, and 2010. Due to concerns over the flooding of the test plots, the instrumentation was decommissioned in the fall following every monitoring season and recommissioned every subsequent spring. In 2010, the instrumentation was recommissioned on August 20, and decommissioned on October 18, resulting in a monitoring season spanning over 59 days.

Immediately after construction, survey pins were placed on the surface of the covers in a grid pattern. The elevation of the pins was surveyed four times in 2008, thirteen times in 2009 (SRK 2010), and on nine occasions between June 10 and October 18, 2010.

2 Construction of Trial Covers

As detailed in the As-built report (SRK, 2009), the trial covers were constructed over frozen tailings on the beach of the Northwest pond (Figure 1). Two of the covers, Beach A and B plots, were constructed in November and December of 2007, while the last two covers were completed in February and March of 2008.

The trial cover design called for two plots to be constructed on the intermediate zone over very soft and saturated tailings (the Slimes plots), and two other plots to be constructed over well drained and stiff tailings (the Beach plots).

Snow was removed from the construction area prior to the commencement of construction, and the trial covers were constructed by placing rockfill material (Run-of-Mine and Processed Rock) according to the design. Primary survey beacons were placed on the tailings surface and the rockfill was then pushed by the dozer around them with the least disturbance possible. The rockfill material was subsequently capped with a layer of growth medium, and the secondary survey beacons were placed on the finished surface in a regular grid pattern.

3 Instrumentation

Instrumentation was installed between June 10 and June 14, 2008. Two types of instruments were installed in each of the trial covers, one measuring volumetric moisture content and the other ground temperature. Detailed descriptions of the instrumentation can be found in the As-built report (SRK, 2009). One Sentek EnviroScan probe was installed on each individual pad to measure volumetric moisture content while two EBA thermistor strings were installed in each pad to measure the temperature at various depths below the surface (except on the Slimes A plot where only one string was installed). Two additional sensors were installed to monitor temperature close to surface on Beach Plot A. These were Onset HOBO Pro V2 dataloggers with attached sensor extensions. Instrumentation locations are provided in Figure 2.

Data from all the instruments was collected by automated dataloggers. The ground temperature sensors (the EBA thermistor strings and the HOBO temperature sensors) were connected to individual dataloggers dedicated to one sensor exclusively, while the moisture content probes were all connected to a central CR800 datalogger. For description and functionality refer to the As-built report (SRK, 2009).

3.1 Moisture Content Sensors

The purpose of installing moisture content sensors through the full profile of each cover was to monitor, by non-destructive methods, the effectiveness of the upper soil layer to act as a store-and-release layer to control infiltration and support vegetation.

Each EnviroScan probe consisted of a series of sensors (8 on Beach A and B plots and 7 on Slimes A and B plots) mounted on a plastic rail at various depth intervals (Figures 9 and 10). The probes were also connected to an intelligent control unit located on top of the rail. The probes were lowered into a hollow plastic tube pre-installed on each of the trial covers in 2008, and were then connected to a central CR800 datalogger through a data transfer cable. The datalogger was programmed to record the moisture content profile every 6 hours, in sequence from each probe.

Data from the CR800 datalogger was routinely downloaded by SRK personnel using proprietary software and a dedicated field laptop computer. Further details regarding installation and functioning can be found in the As-built report (SRK 2009). Figure 2 shows the location of each sensor cluster.

3.2 Temperature Sensors

3.2.1 EBA Ground Temperature Probes

Ground temperature probes are generally used to determine subsurface temperature profiles in the soil. In this case, monitoring temperature profiles through the test covers and the tailings underneath will help to better understand the localized temperature regimes, and the influence of the cover on

the freeze-thaw cycle, which in turn affects the potential for differential settlement of any proposed cover.

The ground temperature probes consists of a series of thermistor beads mounted on a cable with pairs of wires equal to the number of thermistor beads installed. The probes were individually connected to a dedicated Lakewood UL 16 datalogger, which was programmed to record the temperature every 6 hours. Data from the Lakewood UL16 datalogger was downloaded by SRK personnel using proprietary software and a dedicated field laptop computer. Details regarding installation and functioning can be found in the As-built report (SRK, 2009). Figure 2 shows the location of each thermistor string, while Figures 12 and 13 illustrate the relative location of each bead.

3.2.2 HOBO Pro V2 Temperature Sensors

The HOBO temperature sensors function on the same principle as the EBA ground temperature probes, with the major difference being that the HOBO sensor is only capable of measuring temperature at one discrete point, with an additional reference temperature measured inside the HOBO data logger's body. The temperature sensor is connected to the data logger through a 1.8 meter long extension cable. The data logger has an internal battery and is capable of functioning autonomously for extended periods of time, measuring and storing temperature every 6 hours. Data from the HOBO datalogger was downloaded by SRK personnel using proprietary software and an Onset optical data shuttle unit which can be connected to the field laptop for downloads and final storage. Details regarding installation and functioning can be found in the As-built report (SRK 2009). Figure 2 shows the location of each sensor.

4 Trial Covers Surveys and Monitoring

4.1 Settlement Surveys and Visual Inspections

To establish a baseline against which to compare the amount of settlement of each cover, as-built surveys were planned for each test plot. The as-built survey for Beach Plot A and Beach Plot B was performed on January 21, 2008, while the as-built survey of the completed Slimes A and Slimes B plots was performed on July 4, 2008.

4.1.1 Settlement surveys

The scope of the settlement survey program was to monitor the overall settlement of the trial covers. The main mechanism leading to settlement is considered to be consolidation of the tailings beneath the covers, and to a much less extent consolidation of the cover material. Thaw settlement could also be a factor.

SRK's request was that the surveys be performed using a dumpy level, to a ± 3 mm accuracy. The surveyors used a GPS survey device instead. The surveys were performed in a closed loop, starting and ending at the benchmark.

The assessment of consolidation settlement is monitored by regularly surveying two sets of targets located on the surface of each cover: primary beacons (steel pillars) and secondary beacons (a set of rocks doubled by survey pins). The locations of the primary and secondary beacons are shown in Figures 3 and 4. For further details please refer to the As-built report (SRK, 2009).

- Primary beacons are steel pipes welded onto a sheet metal base placed directly onto the tailings before construction. The primary beacons monitor the settlement of the tailings surface underlying the trial covers. Four primary beacons were installed on each trial cover.
- Secondary beacons are a set of targets placed in a fixed grid pattern on each trial cover. The targets are boulders placed on the trial cover surface after construction and are painted yellow. Each boulder was doubled up with a survey pin, placed in the immediate vicinity as a backup, in case the boulder became unstable. The top of each boulder, as well as each survey pin, is surveyed during each event. In the survey summary table the boulders are marked with "R". A total of 25 secondary beacons (25 boulders + 25 survey pins) were placed on each trial cover in a 5x5 grid.

During the 2010 monitoring a total of 9 surveys were performed on Beach Plots A and B, while the Slimes Plots were surveyed 4 times, as they became accessible late in the summer.

The survey results were reduced by the surveyors to true elevations and only the elevations were transmitted to SRK. Attached as Appendix A are the compiled survey results. Processing of the survey data was performed by SRK to determine the differential settlement between consecutive surveys, as well as total settlement from the as-built surveys to date. Quality checks of the data were also performed during the processing.

As shown in Figures 5 through 7, the settlement between the last survey of 2009 and the first survey of 2010 is negative, i.e. surface elevation increased. Although the phenomenon is consistent with the previously observed survey gap during the winter of 2008/2009 (SRK 2010), the amount of the elevation increase is slightly different for each plot. Notwithstanding these observation, the survey of Slime Plot B East shows a significant settlement compared to 2009. The causes of this may be multiple, from survey errors to frost heave during the winter months. A more detailed analysis of the data would be required to narrow down the possible causes.

In one instance the elevation of the primary survey pin #123 (Beach B plot) reported by the surveyors was erroneous. The erroneous value was replaced with an arbitrary number, calculated as the average of the elevations reported by the previous and subsequent survey (July 13 and August 10, respectively).

Surveys of Slimes A and B plots were not possible in the first part of the season, due to high water levels in the Northwest Pond. The plots were completely submerged in the spring and then surrounded by water until late summer, which made access impossible. As water levels dropped, four surveys were performed on these plots late in the summer.

4.1.2 Visual Inspections

Detailed post-construction visual inspections of the trial covers were carried out on October 18, 2010. Inspection memo is attached as Appendix B.

The ground was covered with snow at time of inspection. Some areas were clear of snow while others areas had larger accumulations due to the wind action. No changes were observed in the state of the cover surface compared to the 2009 inspections. Frost jacking of the EnviroScan tubes installed on Slimes A and B plots was noted, with the collar of the tubes sitting as much as 85 cm above the original elevation. The 4x4 lumber posts installed on same plots were lying on the ground where they were initially installed. No frost jacking action was noted on Beach A and B plots, and all the 4x4 posts and EnviroScan access tubes were found undisturbed.

No anthropogenic disturbance of the covers was noted other than what was noted in 2009. An extensive network of shrinkage cracks caused by desiccation of the clayey growth medium was noted on the Beach A and B plots, while the Slimes A and B plots were showing evidence of having been totally submerged and the growth medium was washed away on some areas. For more details please refer to the Inspection Memo in Appendix B.

5 Instrumentation Data

Although instrumentation installed on the trial covers was designed to operate all year round, most instruments were decommissioned and removed from the trial covers at the end of the 2009 monitoring season. The change in the monitoring plan was due to changes in the water management plan of the Giant Mine underground workings, which called for additional volume of water to be stored temporarily in the Northwest pond. Therefore, to protect the instrumentation from flooding it was necessary to remove and place them in dry storage over the winter. The increased water level in the pond ultimately caused the complete flooding of Slimes Plots A and B.

The instrumentation was recommissioned on August 20, 2010 and decommissioned on October 18, 2010, resulting in data collection for a total of 59 days. The cause of the delay in the recommissioning of the instrumentation was non-technical.

5.1 Moisture Content Data

Data was collected every 6 hours from the Sentek EnviroScan probes throughout the monitoring season. The collected data was stored as a percentage, representing relative moisture content scaled to the wet (100% water) and dry (air dry) extremes. For absolute moisture content the sensors required calibration using the soil to be installed in, which was not considered necessary for these trial covers.

During the 2010 monitoring season, moisture content data was collected for a total of 59 days from August 20 to October 18, for a total of 237 recorded measurements. In 2009, during the recommissioning of the instrumentation, it was decided to change the spatial distribution of the sensors on the probe rail, such that no sensor is located below the original tailings surface. The same spatial distribution of the sensors was maintained in 2010. The legend of Figures 14 and 15 show the actual depth of each sensor measured from the cover surface, with values changed on Beach A and B plots as required. Due to high water levels in the Northwest Pond, Slimes A and Slime B plots were not accessible at the time of recommissioning, resulting in the moisture content probes not being installed on those plots.

As shown in Figures 14 and 15, the instruments performed as intended. As expected, the sensors located close to surface showed highly variable moisture content according to the wetting up and drying cycles following precipitation events. The sensor closest to the cover surface on all trial covers consistently measured moisture content values of zero or near zero. This is an artefact of the consolidation settlement of the growth medium layer, which resulted in the sensors (which have a fixed elevation) gradually becoming airborne, thus the measured values not being representative of the cover soil.

The sensor located 1.1 m below the surface of Beach B Plot, shows a much higher moisture content than the other sensors. Most likely this sensor is sitting within the tailings zone, which naturally has a higher moisture content than the crushed rock or the growth medium used to construct the cover.

The protection of the data transfer wiring between the probes and the dataloggers was upgraded at the time of recommissioning by fitting a piece of PVC pipe over the exposed portion of the wire at the probe end.

5.2 Ground Temperature Data

5.2.1 EBA Ground Temperature Probes

Similarly to the EnviroScan probes, the thermistor strings were recommissioned on August 20, 2010 and decommissioned on October 18, 2010. A total of 236 data points were collected from each thermistor string over the 56 days. Although the thermistor strings were left in place over the winter, the Lakewood dataloggers were removed. Data was not collected from October 30, 2009 to August 20, 2010.

This resulted in a gap in the data collected, with the 2010 data set starting on August 20, 2010. Due to the fact that Slimes Plots A and B were not accessible at time of recommissioning, no datalogger was installed and no ground temperature data was collected from these plots, although the thermistor strings were still in place.

As shown in Figures 16 through 20, the ground temperature sensors performed as intended. The dataloggers also performed well, except for the datalogger on Beach B East plot. The first download subsequent to the recommissioning of the instruments, revealed that the datalogger was not collecting any data. To correct this issue the datalogger was switched with an idle datalogger from the Slimes plots. The 2010 dataset recorded on this plot started on August 25, 2010.

As expected, the thermistor beads located close to the cover surface showed high variability, reflecting diurnal and seasonal air temperature variation. The deeper sensors showed attenuation of the normal diurnal and seasonal variations, while the sensors located below the original tailings surface showed only slight variations. Temperatures measured by beads located 2 meters or deeper (measured from the top of the trial covers) showed that the tailings were not frozen at time of recommissioning, with a trend of slow increase in temperature throughout the monitored period.

At the time of recommissioning, protection of the exposed portion of the thermistor strings was installed. Sections of ABS pipes were fitted and attached to the datalogger's post and the thermistor cables were threaded through the pipes. No part of the thermistor is now exposed to potential damage from wildlife or other mechanical damage.

5.2.2 HOBO Pro V2 Sensors

The HOBO sensors were only installed on Beach A plot. Because this plot was not in danger of being flooded, the dataloggers were not decommissioned until the fall of 2009. A total of 1,411 data points were collected at 6 hour intervals, between October 30, 2009 and October 18, 2010. As shown in Figure 23, there is a data gap of 15 days, between September 6 and September 21, due to the HOBO#2 dataloggers not being launched properly following download.

As shown in Figures 22 and 23, the instruments performed as intended, with internal temperature (measured inside the body of the datalogger) following the diurnal and seasonal temperature variations, while the external sensor showed a much attenuated diurnal variation. The values recorded by the two individual dataloggers were consistent against each other.

6 Recommendations for Continued Monitoring

The scope of the cover trials is to monitor the short-term performance of the proposed cover configurations and the amount of consolidation settlement to be expected, which will allow for the optimization of the final cover design.

The first three seasons of monitoring (2008, 2009, and 2010) yielded valuable consolidation settlement data as well as ground temperature and moisture content data. To further improve the database of information regarding total consolidation settlement and the effect of freeze-thaw cycles on the covers, SRK recommends the bi-weekly surveys continue for at least one more season, while the ground temperature and moisture content data continue to be collected for at least 3 more years.

The following is an itemised list of actions recommended by SRK for the following monitoring season:

- Resume bi-weekly surveys of settlement and continue monitoring for at least one more season, between May and October, 2011.
- Leave Lakewood dataloggers installed over the winter to continue monitoring ground temperature for at least 3 more winter seasons.
- Continue monitoring moisture content for at least 2 more seasons during the summer months.
- Check the integrity of sealing of the EnviroScan housing tubes and bail out standing water (if any) before re-commissioning the probes in the spring.
- Check battery voltage of the HOBO dataloggers and replace batteries, as required.
- Check the battery voltage of the Lakewood dataloggers and replace the batteries as required.
- Erase the memory of the Lakewood dataloggers before re-commissioning, to shorten the time required for downloading the data.
- Send the faulty datalogger (Serial No 7060028) to the manufacturer for diagnostic and repairs.
- Perform maintenance on the solar panel and battery of the CR800 datalogger; ensure the solar panel is tilted 85° from horizontal and recharge the battery by connecting to an AC charger, if required.

This report, “**Giant Mine: Tailings Cover Trials 2010 Data Summary**”, has been 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.

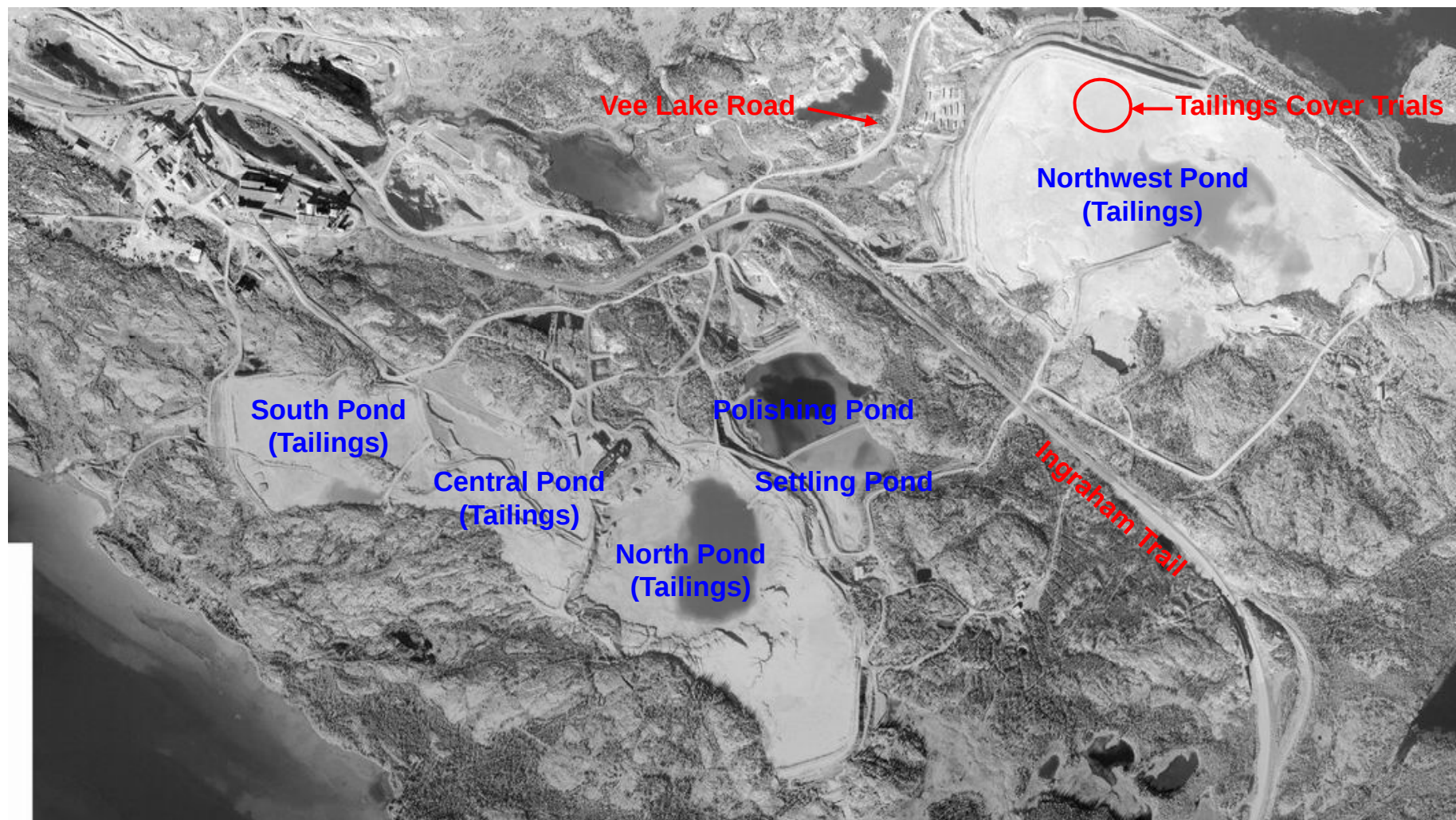
7 References

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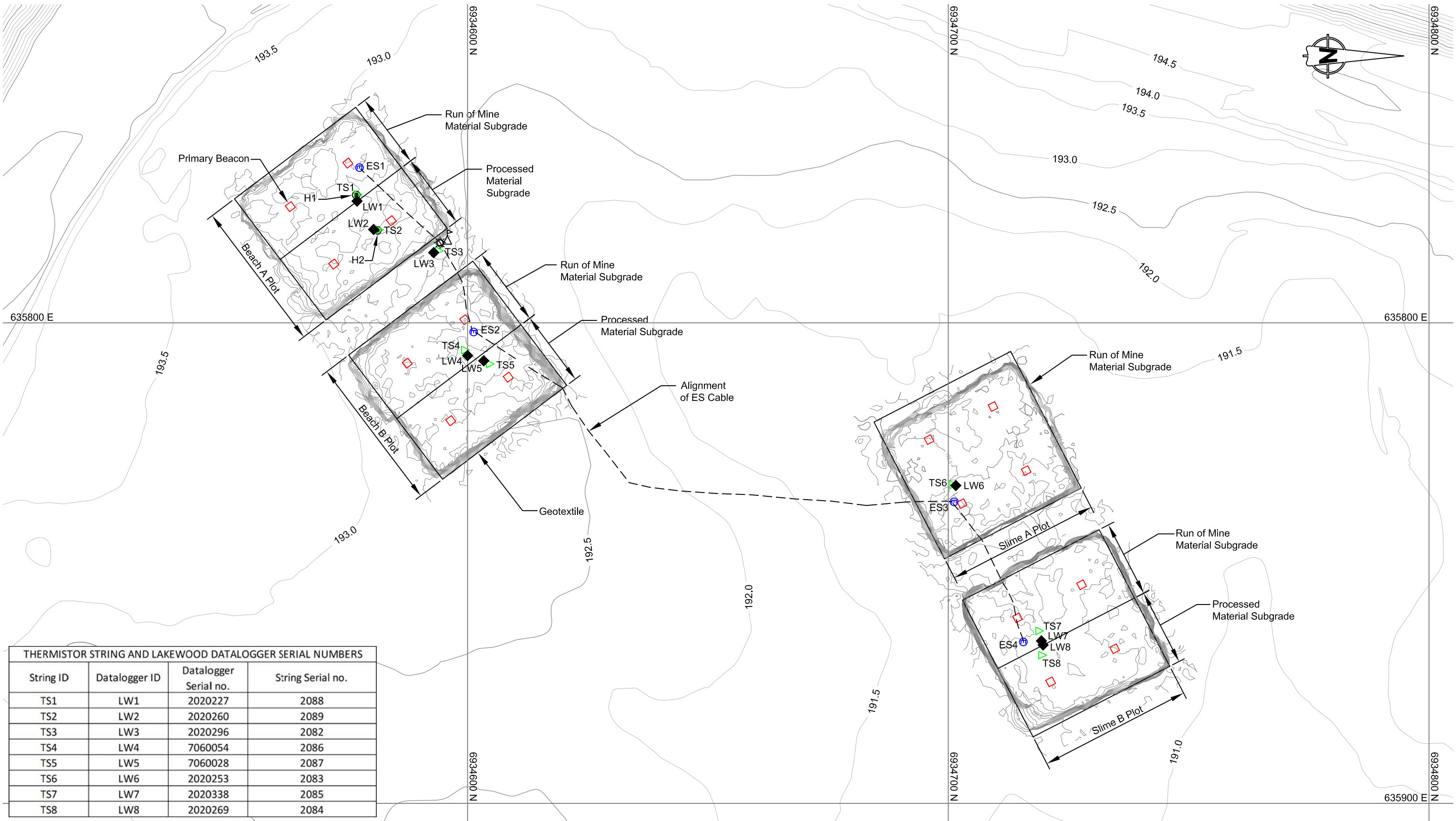
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Figures



 SRK Consulting <i>Engineers and Scientists</i> VANCOUVER	 Public Works and Government Services Canada Travaux publics et Services gouvernementaux Canada	Tailings Cover Trials 2010 Data Summary			
		Approximate Location of the Tailings Cover Trials			
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THERMISTOR STRING AND LAKEWOOD DATALOGGER SERIAL NUMBERS			
String ID	Datalogger ID	Datalogger Serial no.	String Serial no.
TS1	LW1	2020227	2088
TS2	LW2	2020260	2089
TS3	LW3	2020296	2082
TS4	LW4	7060054	2086
TS5	LW5	7060028	2087
TS6	LW6	2020253	2083
TS7	LW7	2020338	2085
TS8	LW8	2020269	2084

- LEGEND**
-  Solar Panel

 Hobo Datalogger

 Thermistor String

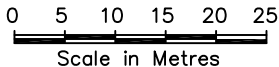
 Enviroscan Sensor

 Survey Beacon

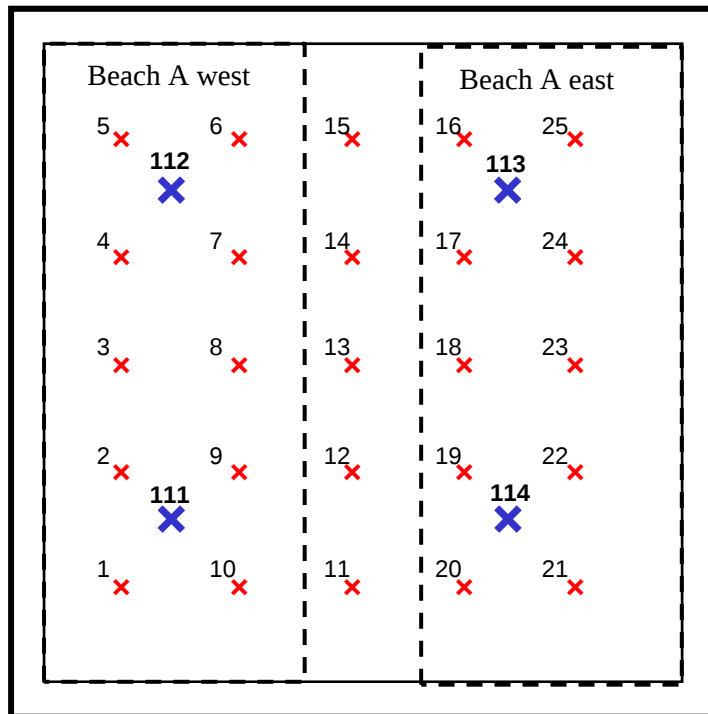
 Enviroscan Cable

 Lakewood Datalogger

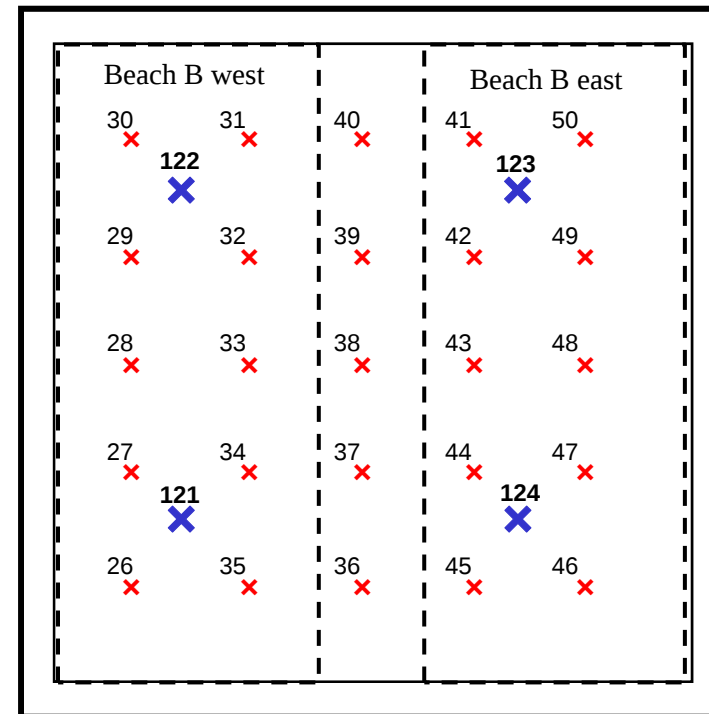
 CR 800 Datalogger



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			General Arrangement and Instrumentation		
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Beach "A"

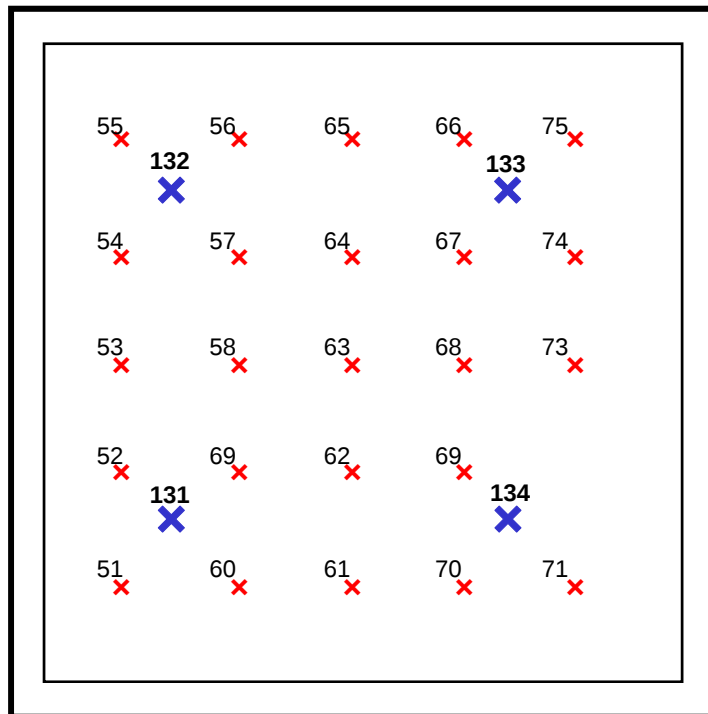


Beach "B"

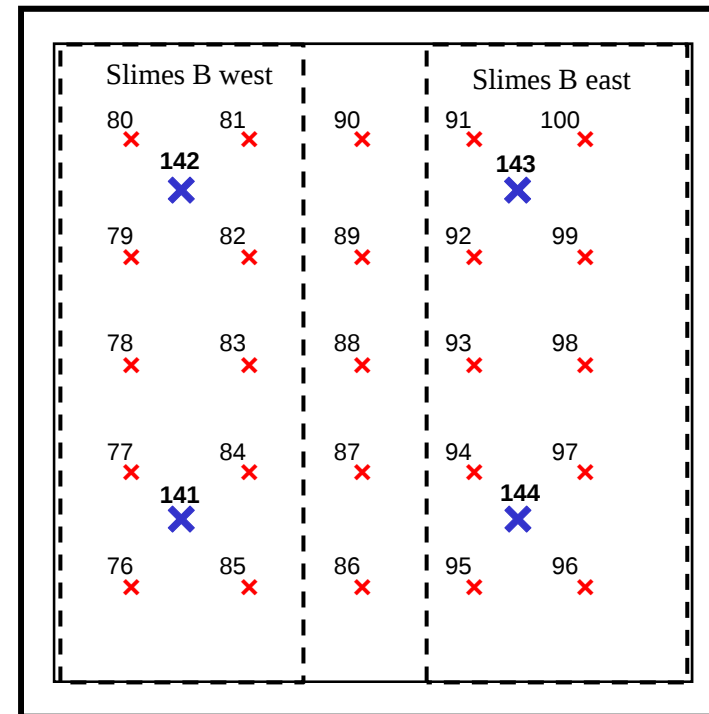
LEGEND:

-  111 Primary Beacon
 1 Secondary Beacon

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Slimes "A"

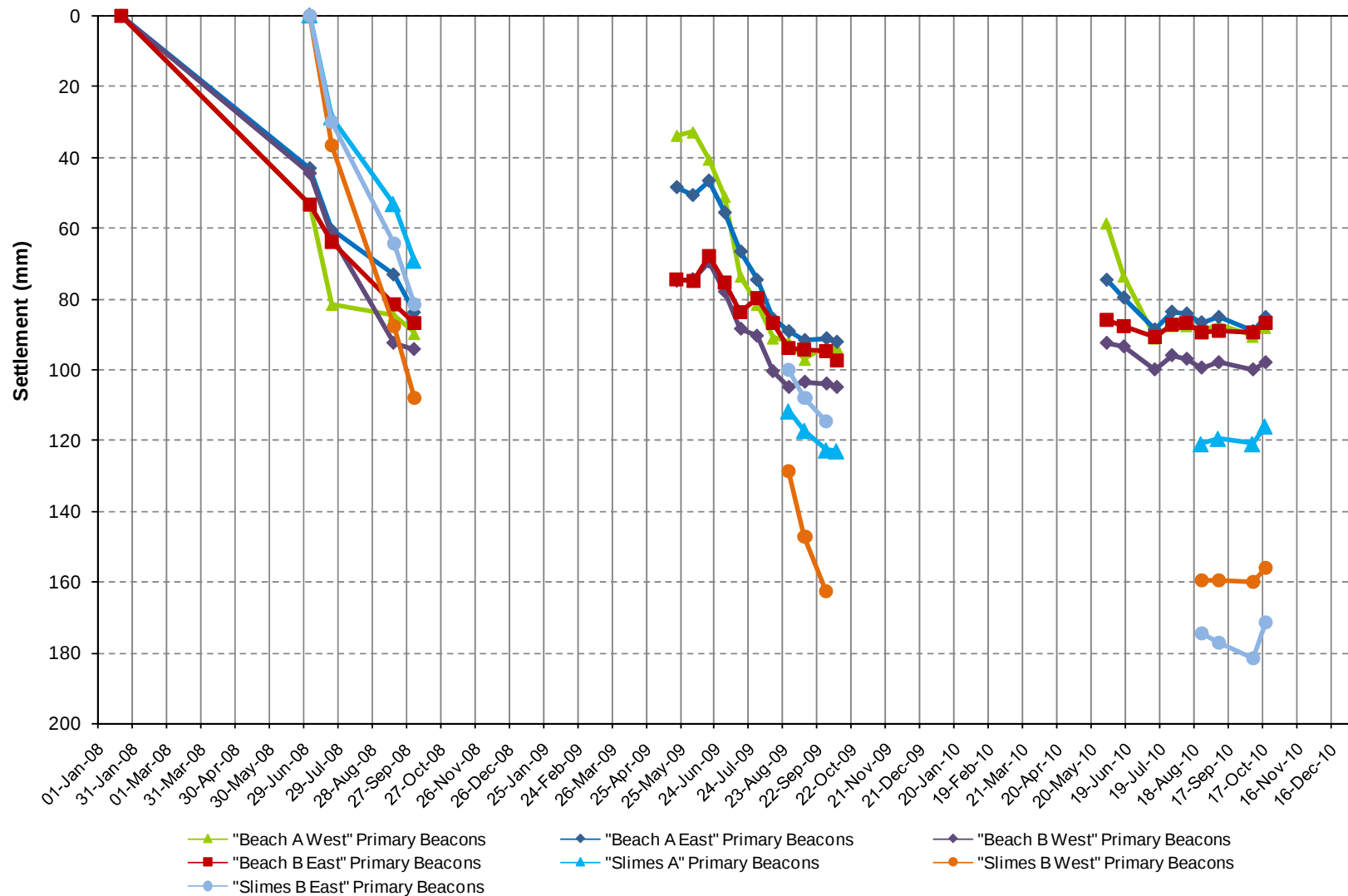


Slimes "B"

LEGEND:

- 111
X Primary Beacon
- 1
X Secondary Beacon

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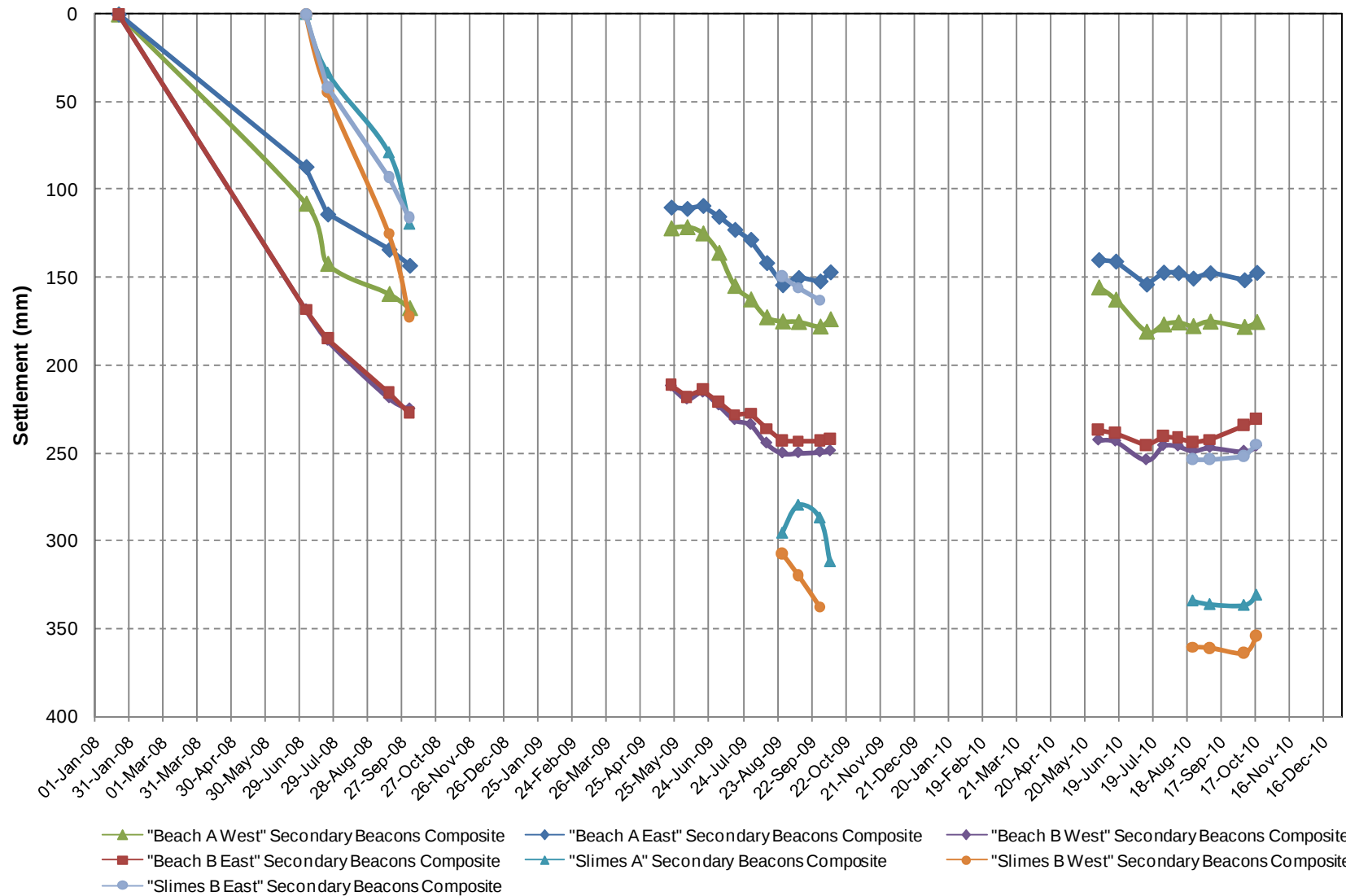
Tailings Cover Trials
2010 Data Summary

**Normalized Average Settlement Data
for Primary Beacons**

Date:
December 2010

Approved:
IM

Figure: **5**



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Job No: 1CS019.016

Filename: Figures 1.3-7-Beach_Slimes_Beacon_20101130.pptx



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Tailings Cover Trials
2010 Data Summary

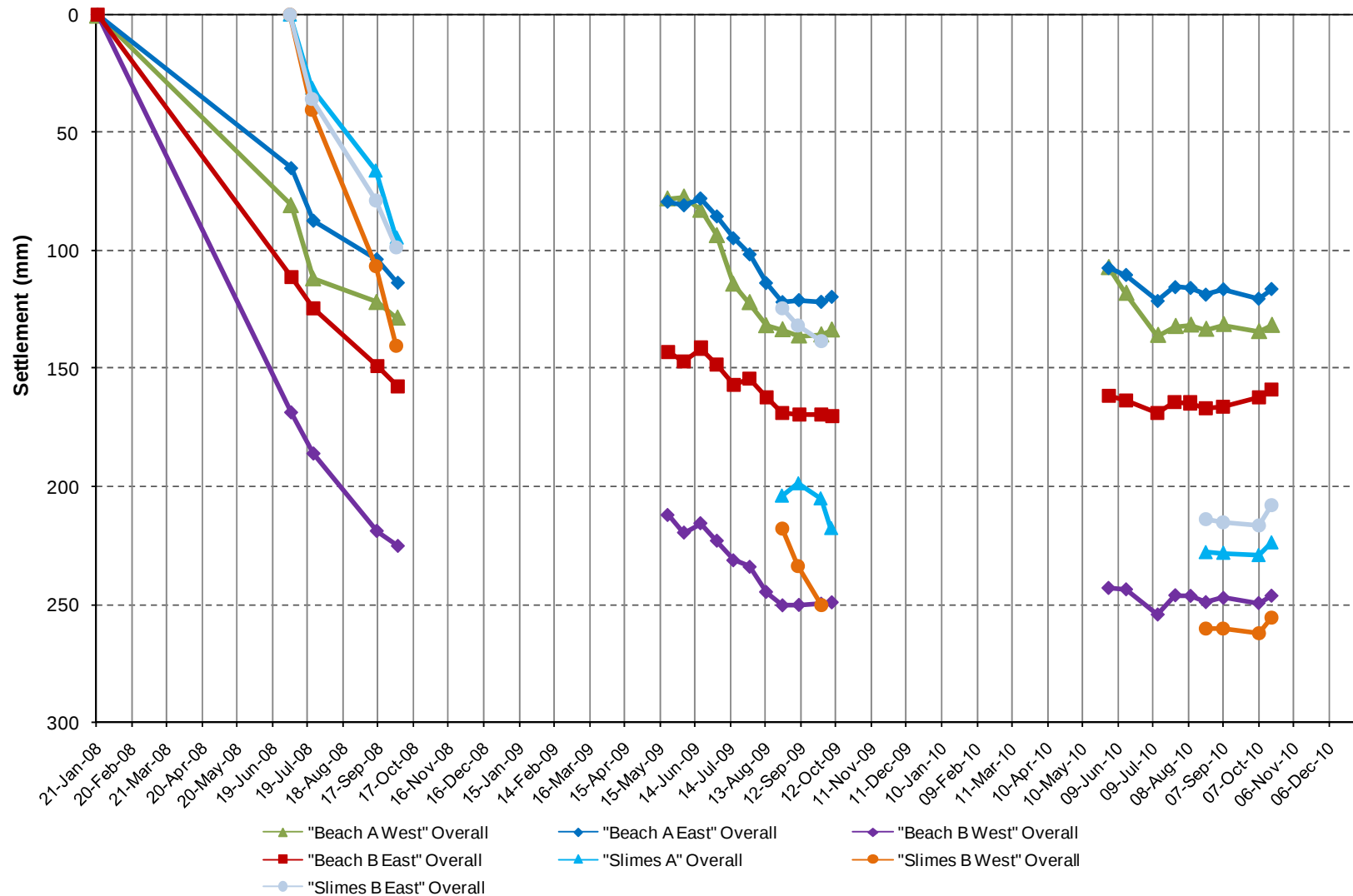
**Normalized Average Settlement Data
for Secondary Beacons**

Date:
December 2010

Approved:
IM

Figure:

6



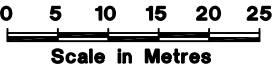
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 SRK Consulting Engineers and Scientists VANCOUVER	 Public Works and Government Services Canada Travaux publics et Services gouvernementaux Canada	Tailings Cover Trials 2010 Data Summary		
		Normalized Overall Average Settlement Data		
Job No: 1CS019.016	Giant Mine	Date:	Approved:	Figure:
Filename: Figures 1.3-7-Beach_Slimes_Beacon_20101130.pptx		December 2010	IM	7



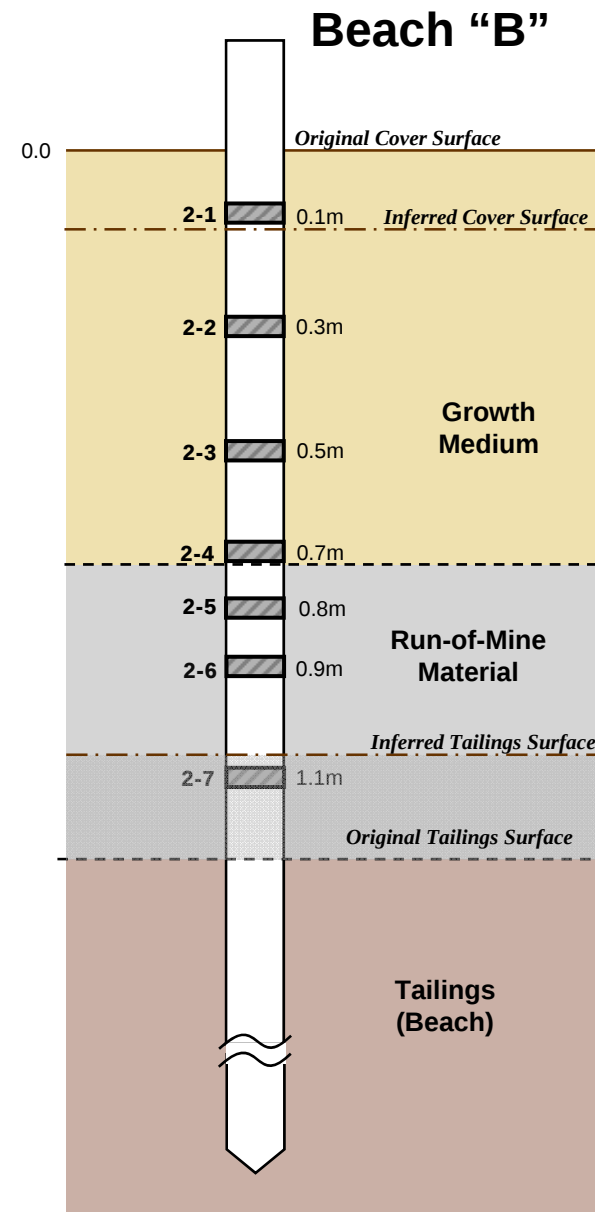
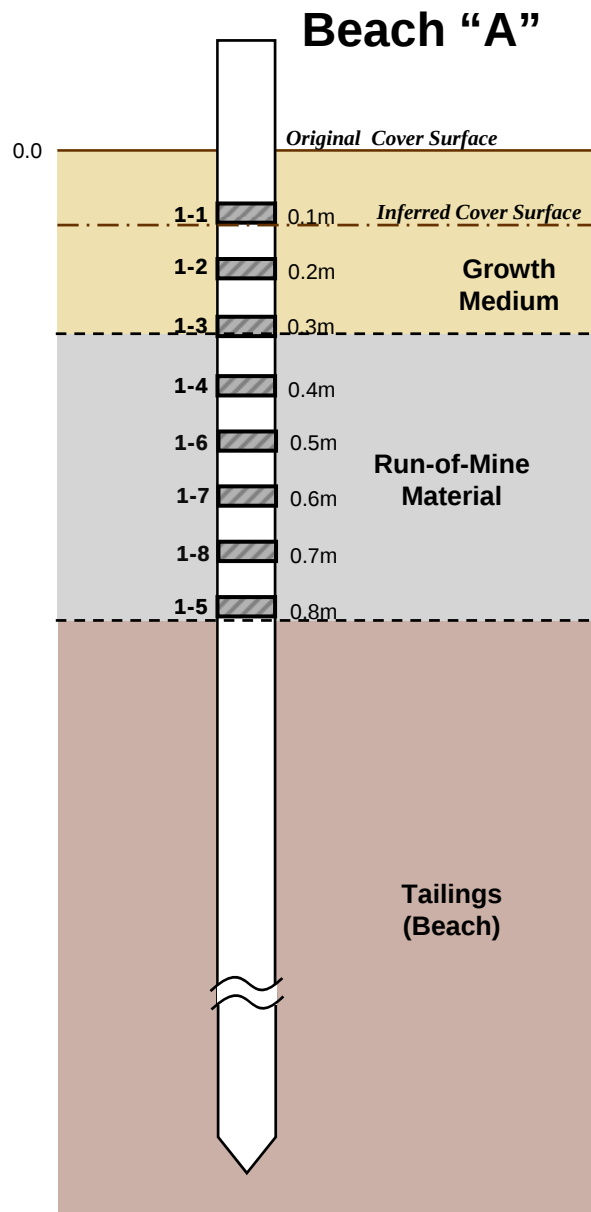
LEGEND

- Solar Panel
- Hobo
- Thermistor String
- Enviroscan Sensor
- Survey Beacon
- Enviroscan Cable

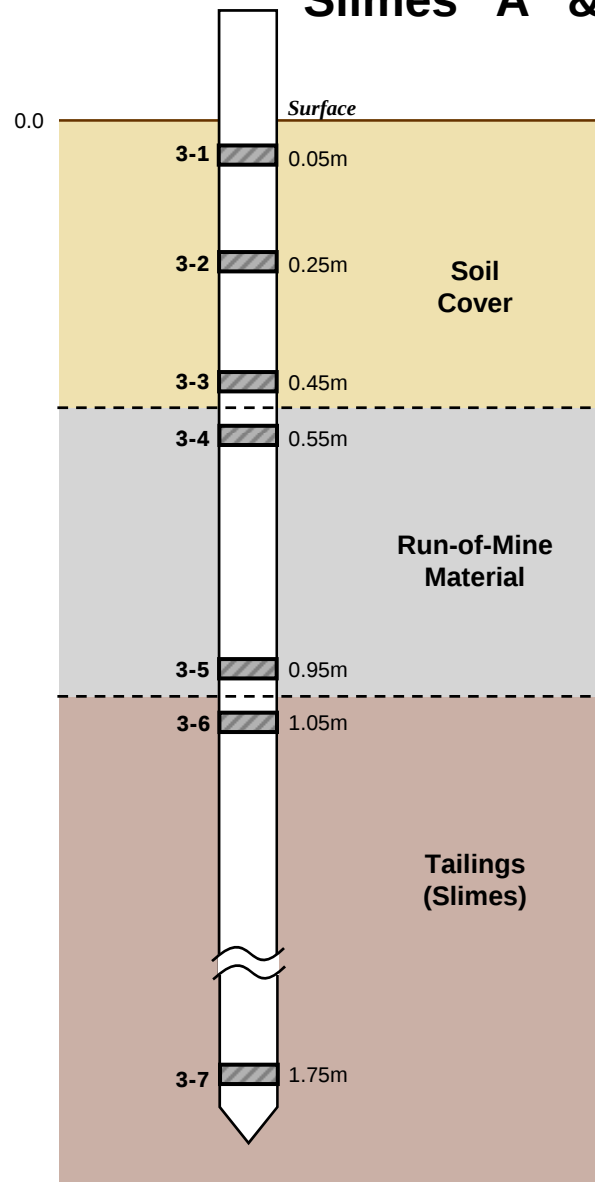


 SRK Consulting Engineers and Scientists Vancouver B.C.	 Public Works and Government Services Canada Travaux publics et Services gouvernementaux Canada		Tailings Cover Trials 2010 Data Summary		
	Giant Mine		Maximum Water Level in Northwest Pond		
	SRK JOB NO.: 1CP001.037.B02.06 FILE NAME: 1CP001_037-B02-3.dwg		DATE: Dec. 2010	APPROVED: IM	FIGURE: 8

Z:\Shared\01_Acad\Imperial\Tailings\2010 Test Covers\1CP001_037-B02-3.dwg



Slimes "A" & Slimes "B"



Job No: 1CS019.016

Filename: Figures 9-10_12-13_EnviroScan_thermistor_20101130.pptx



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Tailings Cover Trials
2010 Data Summary

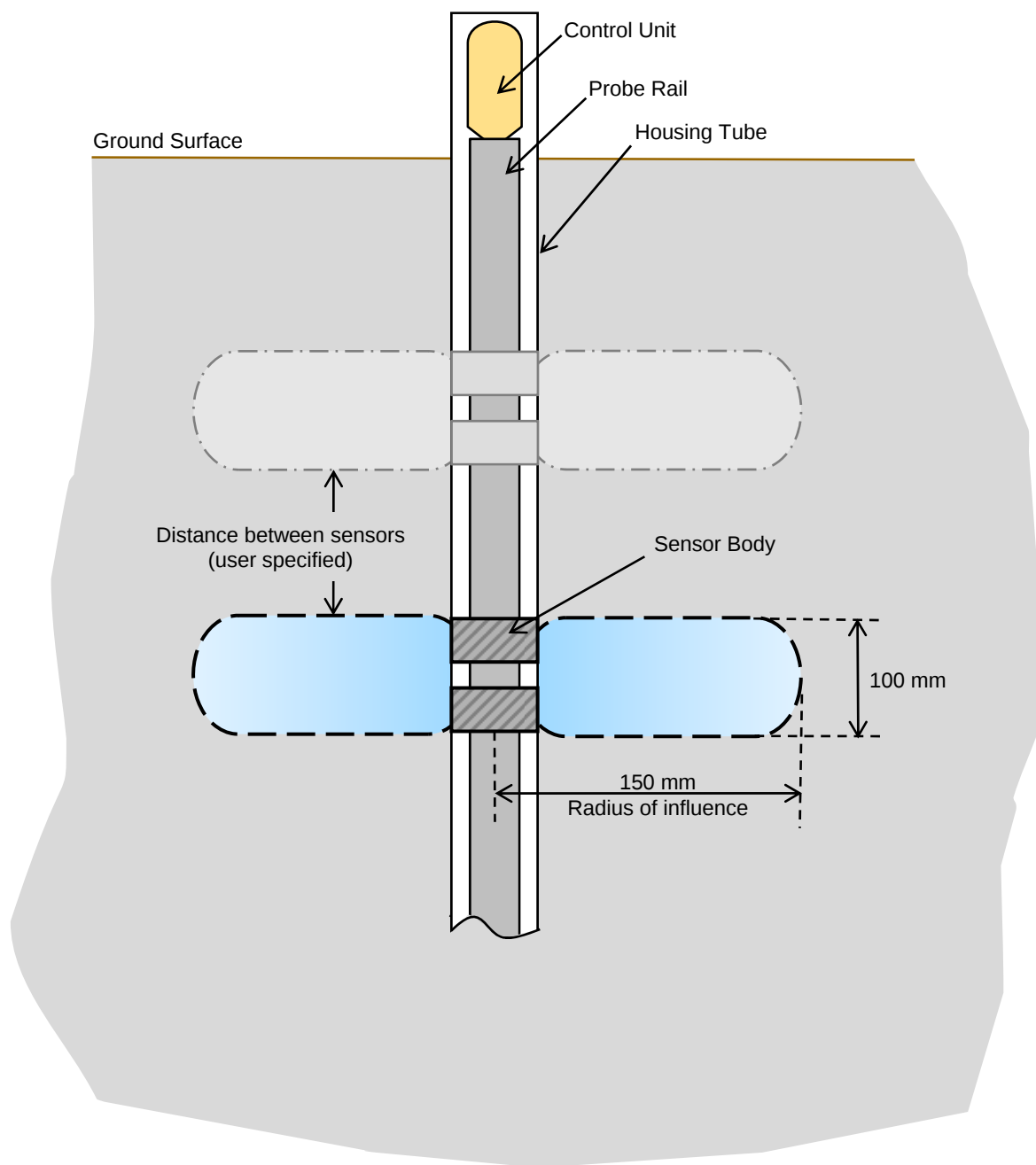
**Spatial Distribution of
EnviroScan Sensors
Slimes "A" & Slimes "B" Trial Covers**

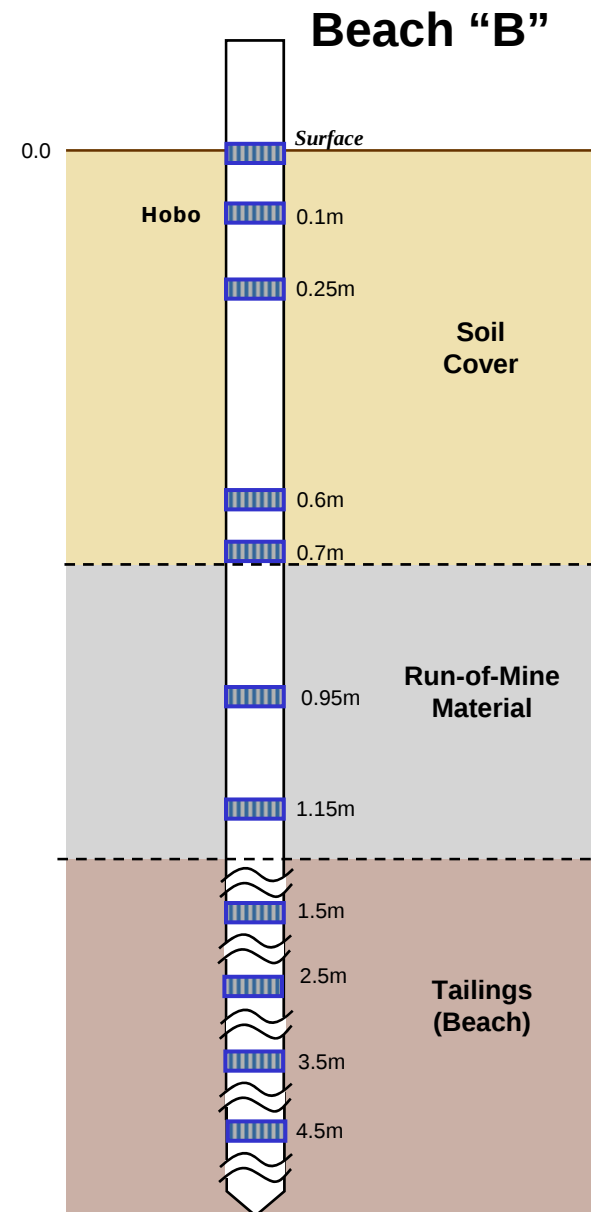
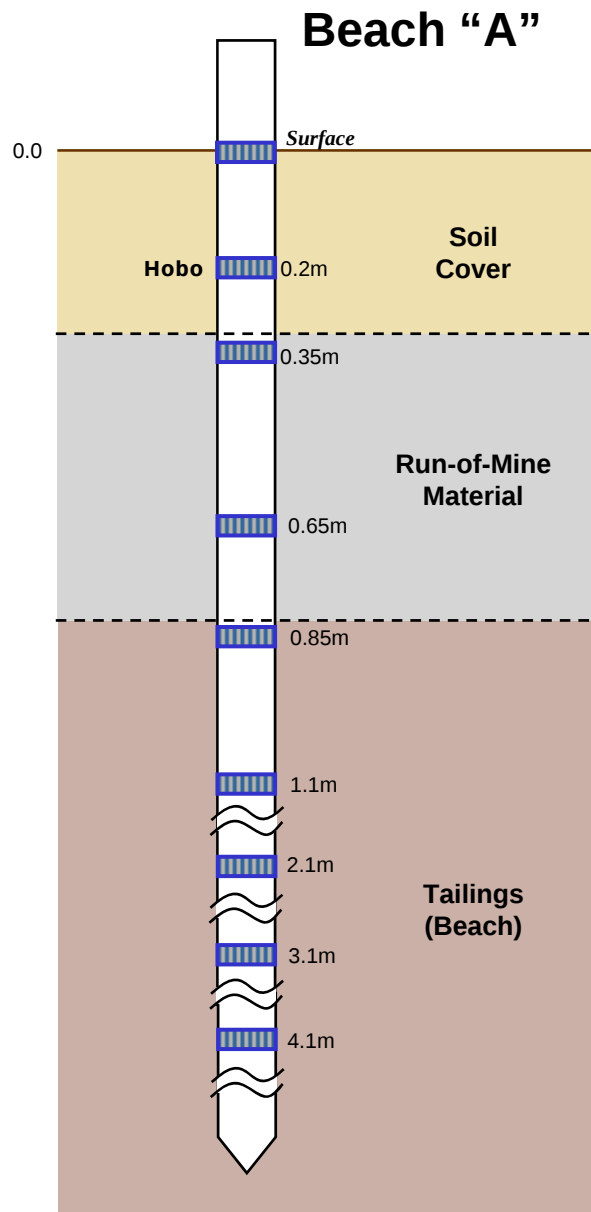
Giant Mine

Date:
December 2010

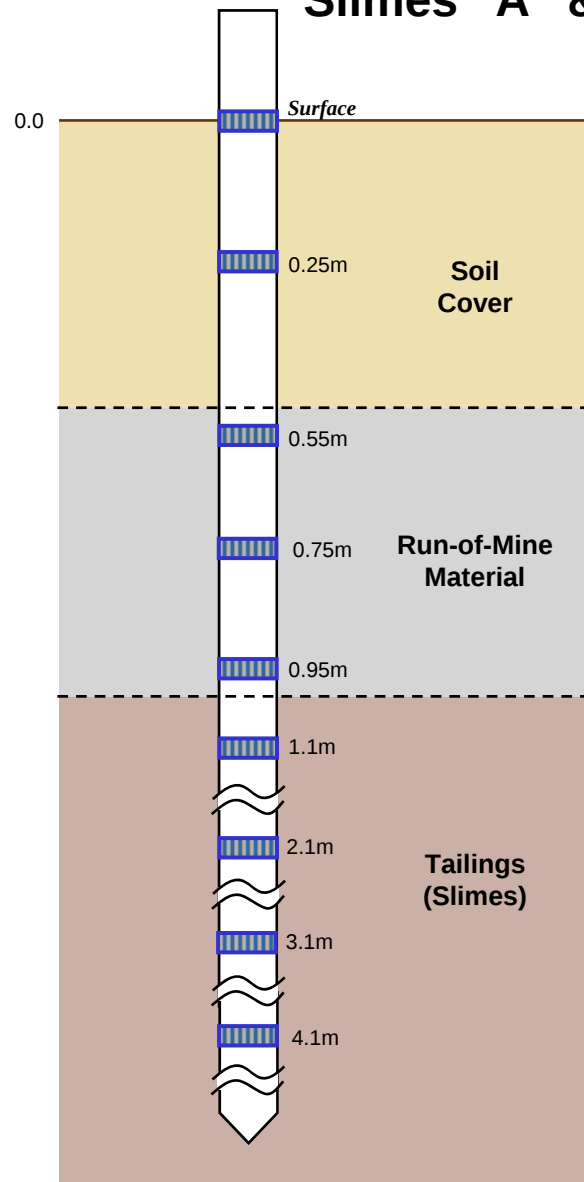
Approved:
IM

Figure:
10





Slimes "A" & Slimes "B"



Job No: 1CS019.016

Filename: Figures 9-10_12-13_EnviroScan_thermistor_20101130.pptx



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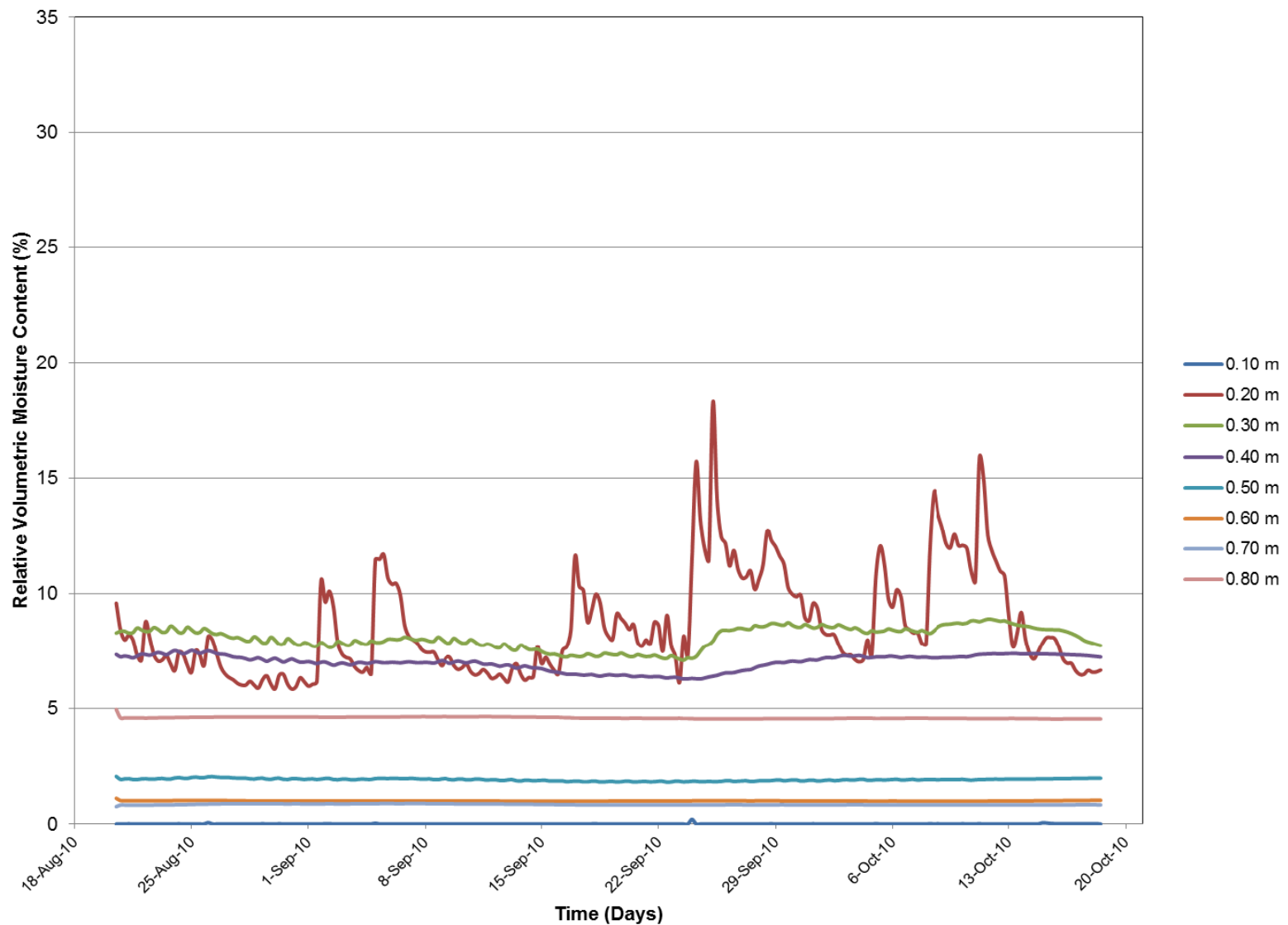
Tailings Cover Trials
2010 Data Summary

**Typical Spatial Distribution of
Thermistor Strings
Slimes "A" & Slimes "B" Trial Covers**

Date:
December 2010

Approved:
IM

Figure:
13



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Job No: 1CS019.016
Filename: Figures 14-21_20101130.pptx



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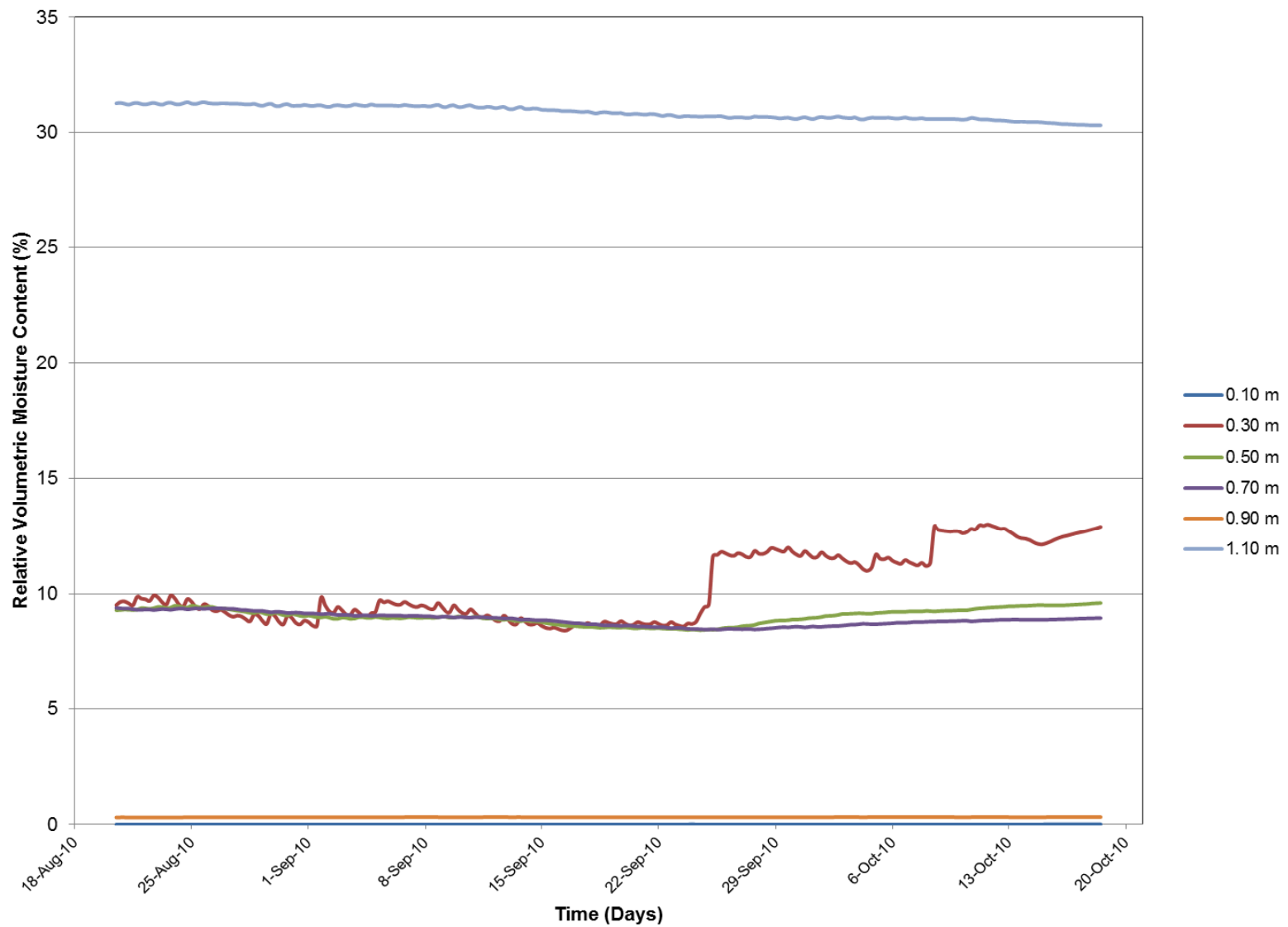
Tailings Cover Trials
2010 Data Summary

**Volumetric Moisture Content
Measured Using the EnviroScan
Probe on Beach A Plot**

Date:
December 2010

Approved:
IM

Figure: **14**



\\van-svr0\Projects\01_SITES\GIANT\1CS019.016_TailingsCovers_350047-009\Task5_DataQC\Dataloggers\TailingsCovers_EnviroScan_Compiled&Graphs_1CS019.016_im_Rev02.xlsx]



Job No: 1CS019.016
Filename: Figures 14-21_20101130.pptx



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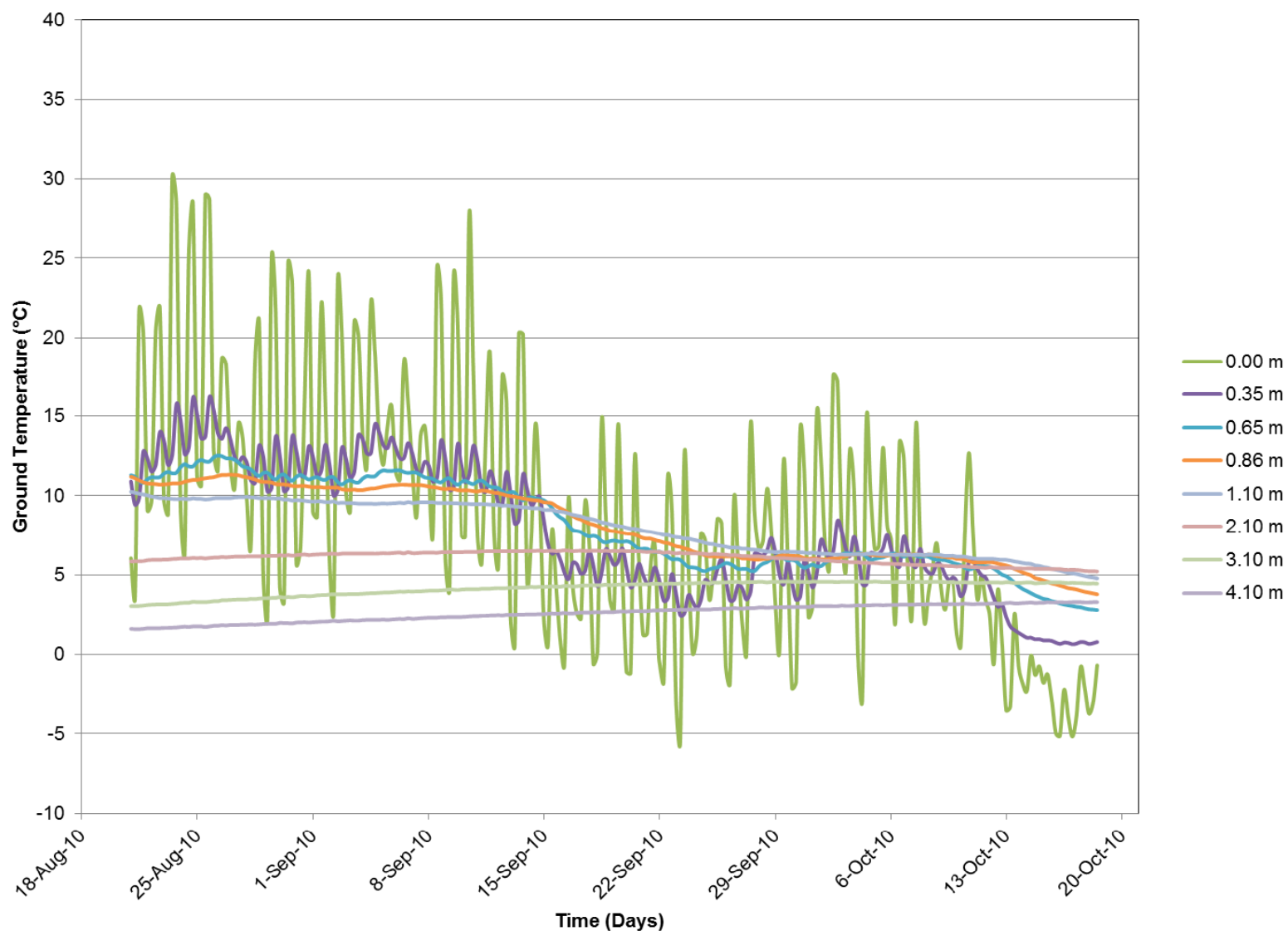
Tailings Cover Trials
2010 Data Summary

**Volumetric Moisture Content
Measured Using the EnviroScan
Probe on Beach B Plot**

Date:
December 2010

Approved:
IM

Figure:
15



Z:\1CS019.016_TailingsCovers_350047-009\Task5_DataQC\DataLoggers\[TailingsCovers_ThermistorData_Compiled&Graphs_1CS019.016_im_Rev02.xlsx]



Job No: 1CS019.016
Filename: Figures 14-21_20101130.pptx



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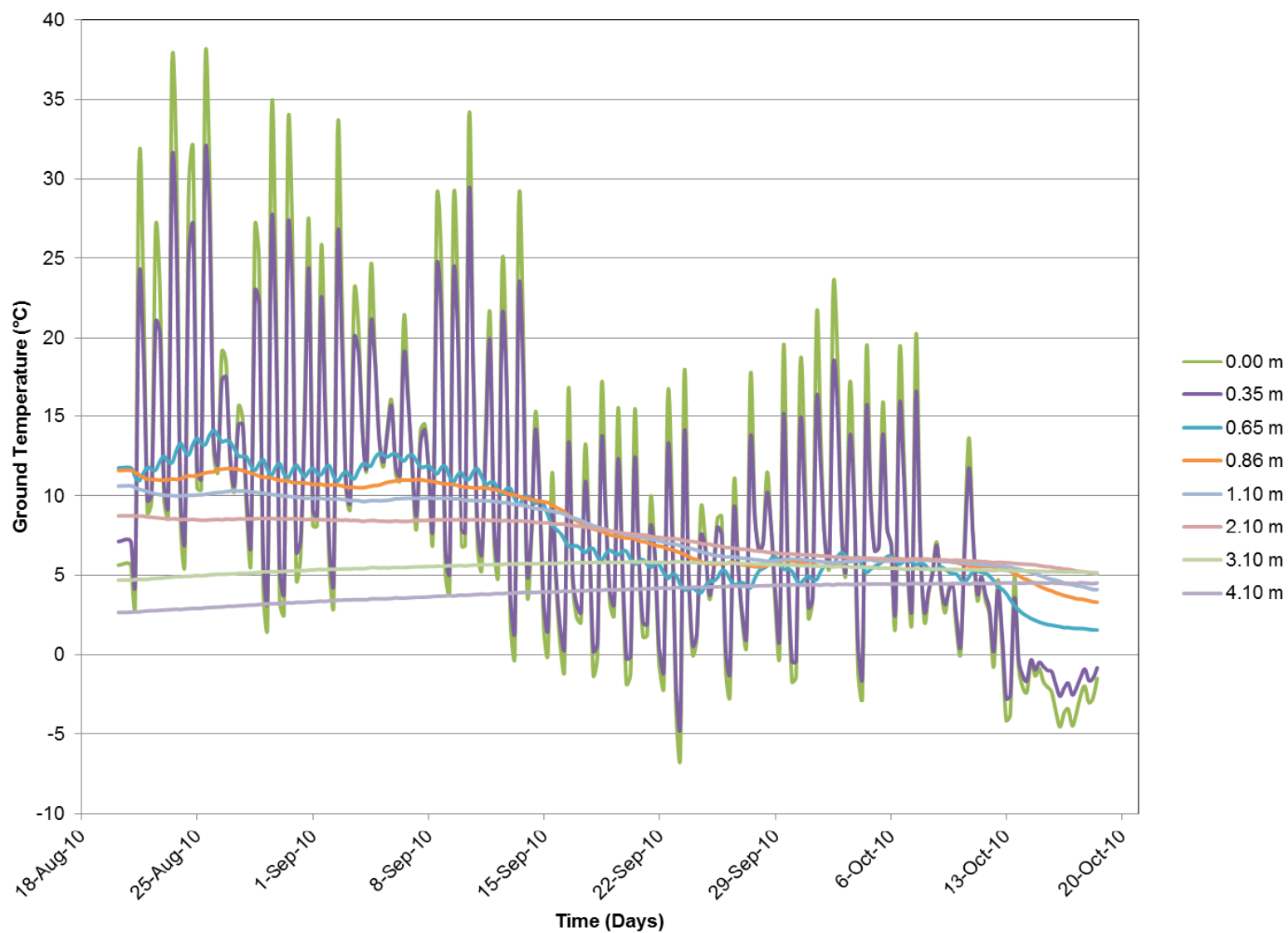
Tailings Cover Trials
2010 Data Summary

**Ground Temperature Measured
Using an EBA Ground Temperature
Probe on Beach Plot A West**

Date:
December 2010

Approved:
IM

Figure: **16**



\\van-svr0\Projects\01_SITES\GIANT\1CS019.016_TailingsCovers_350047-009\Task5_DataQC\Dataloggers\TailingsCovers_ThermistorData_Compiled&Graphs_1CS019.016_im_Rev01.xlsx



Job No: 1CS019.016

Filename: Figures 14-21_20101130.pptx



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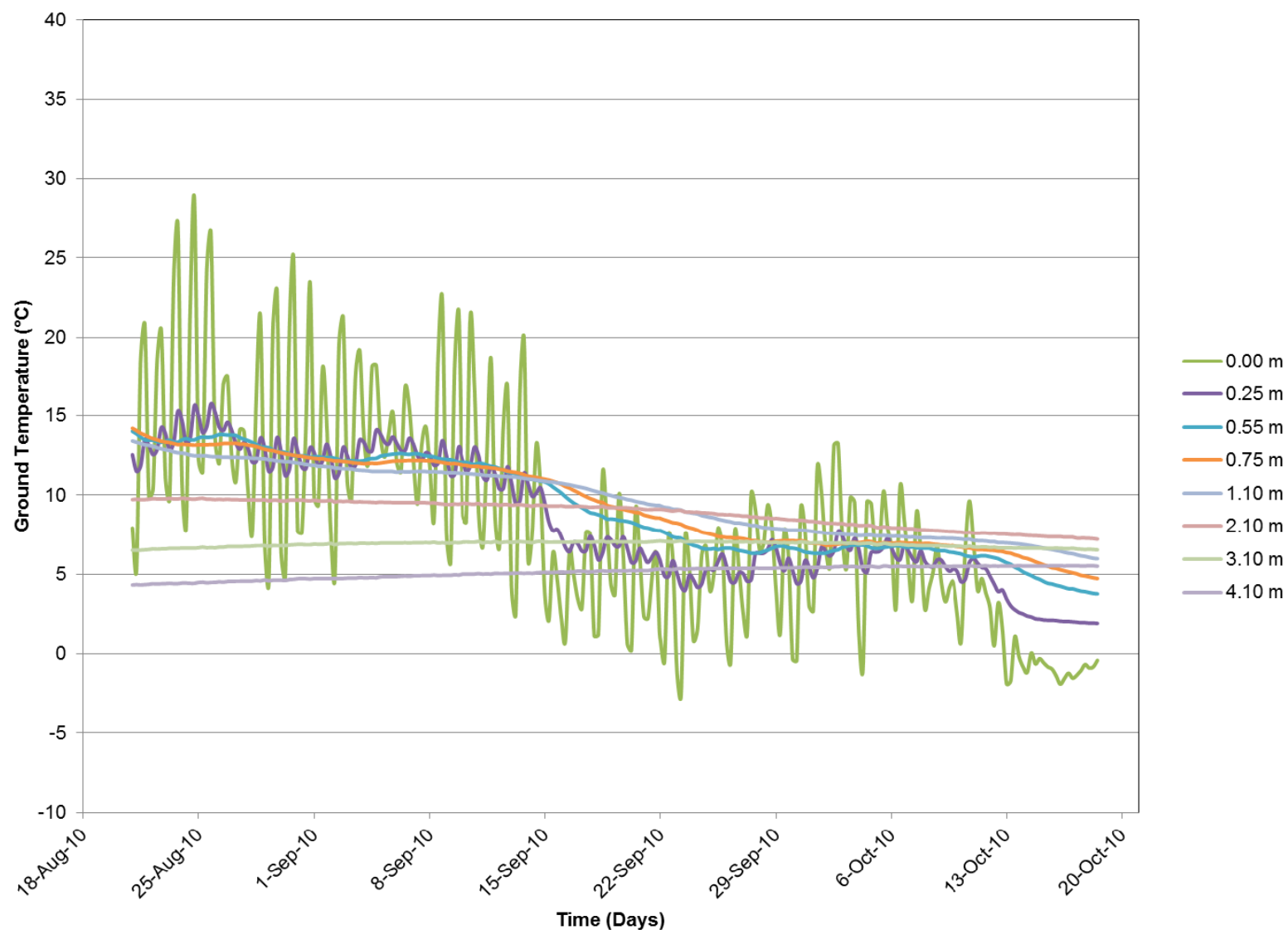
Tailings Cover Trials
2010 Data Summary

**Ground Temperature Measured
Using an EBA Ground Temperature
Probe on Beach Plot A East**

Date:
December 2010

Approved:
IM

Figure: **17**



\\van-svr0\Projects\01_SITES\GIANT\1CS019.016_TailingsCovers_350047-009\Task5_DataQC\DataLoggers\TailingsCovers_ThermistorData_Compiled&Graphs_1CS019.016_im_Rev01.xlsx]



Job No: 1CS019.016

Filename: Figures 14-21_20101130.pptx



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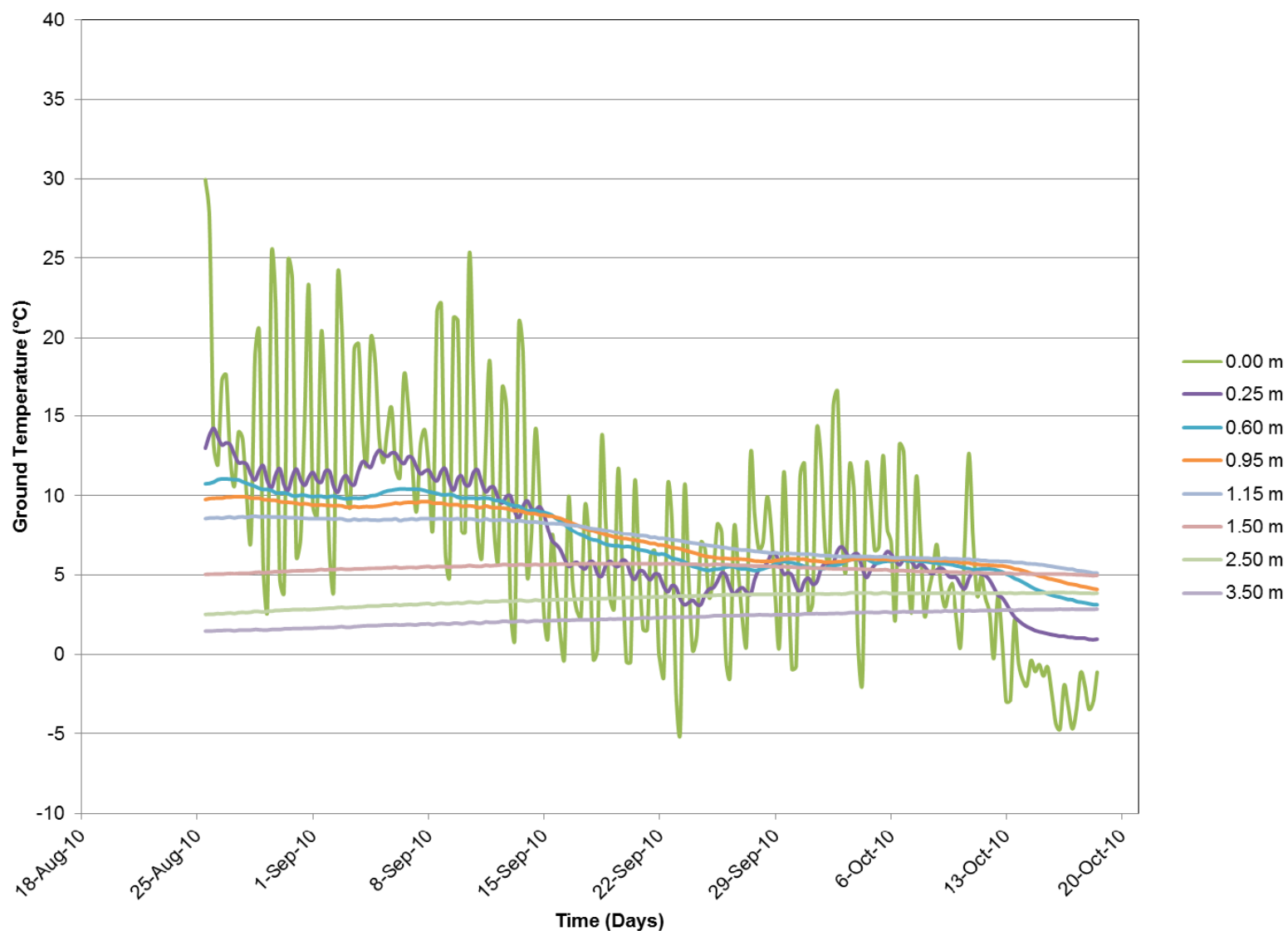
Tailings Cover Trials
2010 Data Summary

**Ground Temperature Measured
Using an EBA Ground Temperature
Probe on Beach Plot B West**

Date:
December 2010

Approved:
IM

Figure: **18**



\\nsn-ws06\Projects\01 STFS\Giant\16S019.016 Tailings\Users 350047-008\Task Data\01\Detainers\Tailings\Users Therm\Date Consolidated\16S019.016 in Rev01.xlsx



Job No: 1CS019.016
Filename: Figures 14-21_20101130.pptx



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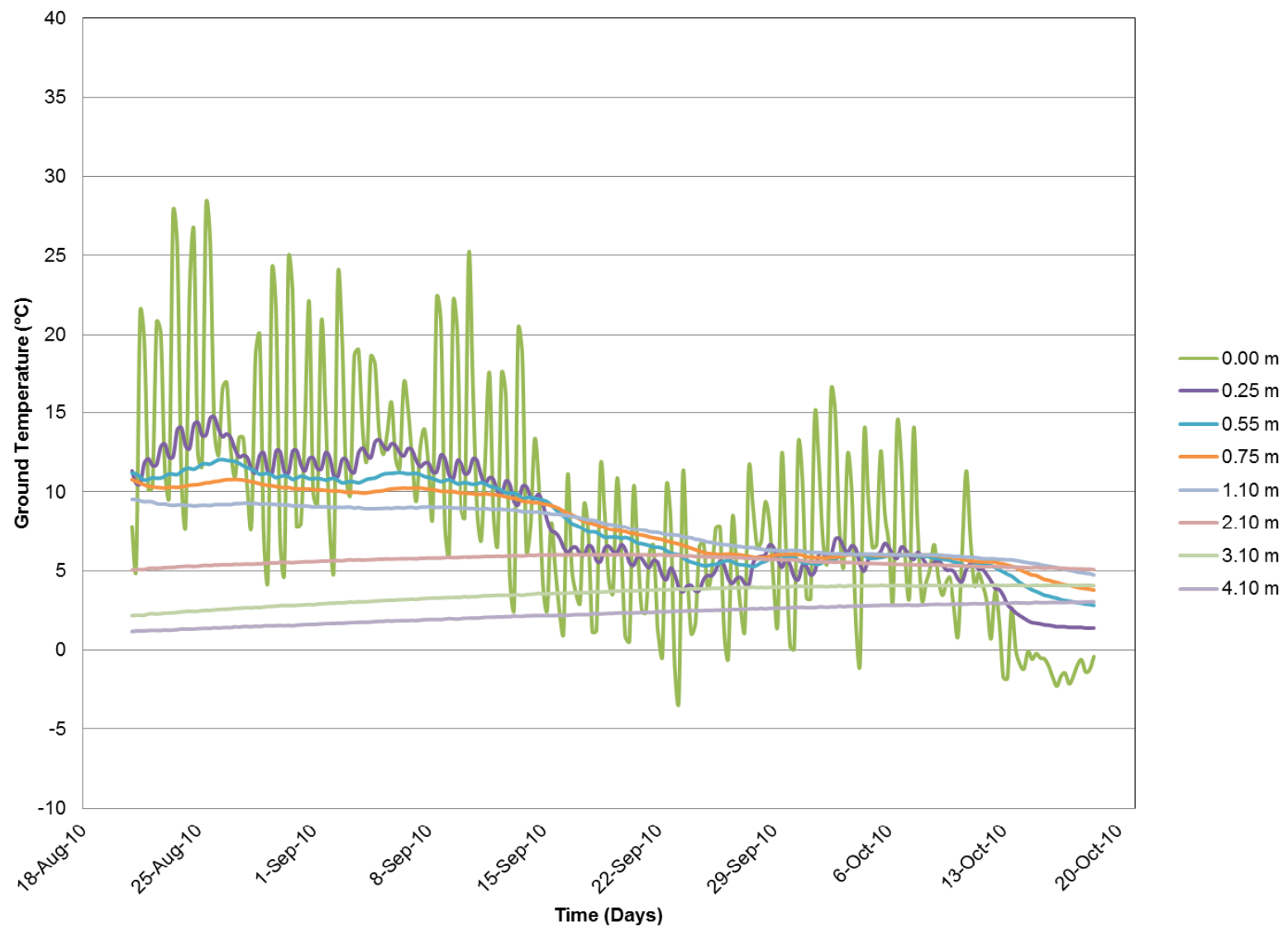
Tailings Cover Trials
2010 Data Summary

**Ground Temperature Measured
Using an EBA Ground Temperature
Probe on Beach Plot B East**

Date:
December 2010

Approved:
IM

Figure:
19



\\van-svr0\Projects\01_SITES\GIANT\1CS019.016_TailingsCovers_350047-009\Task5_DataQC\Dataloggers\TailingsCovers_ThermistorData_Compiled&Graphs_1CS019.016_im_Rev01.xlsx



Job No: 1CS019.016

Filename: Figures 14-21_20101130.pptx



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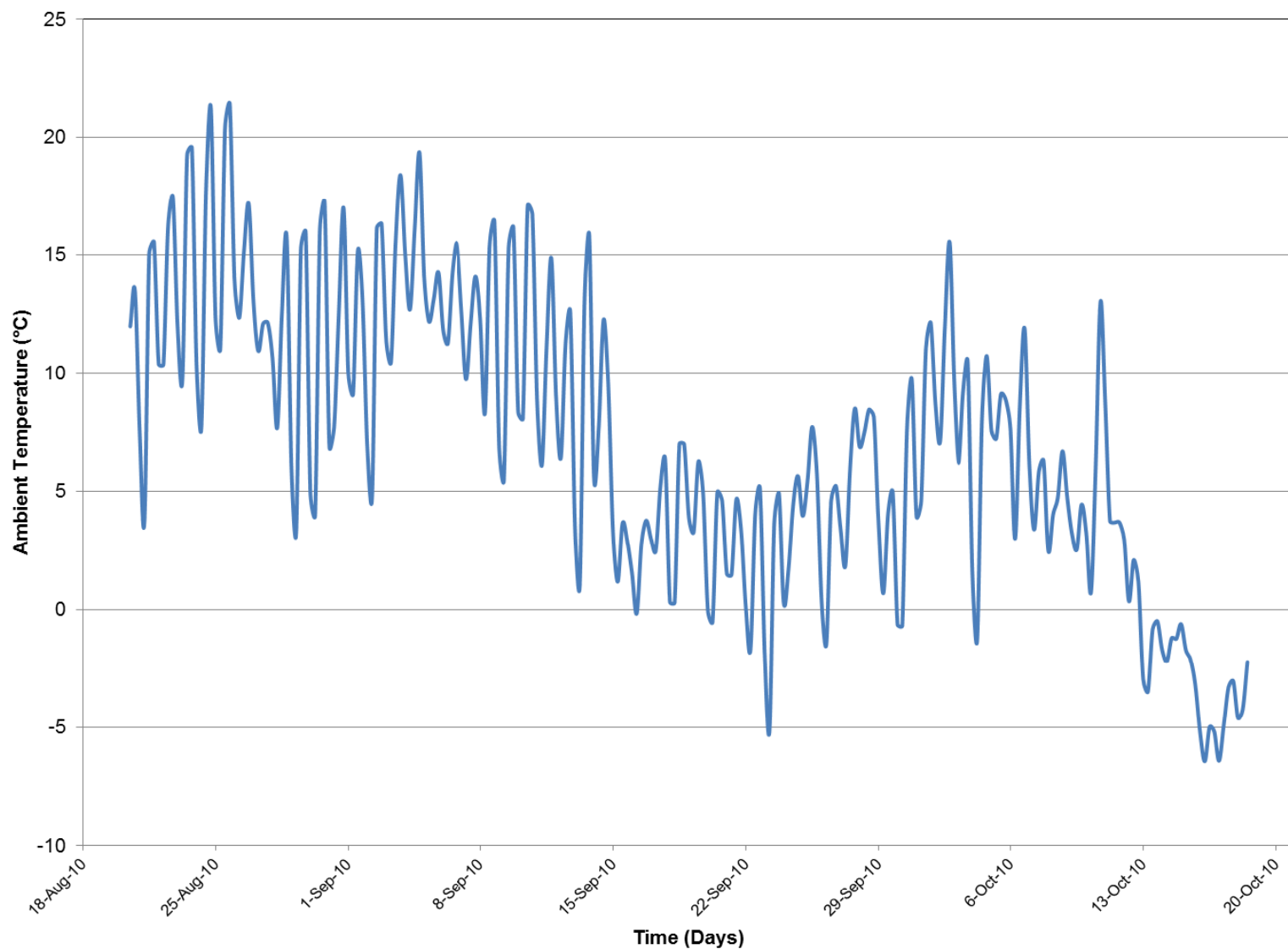
Tailings Cover Trials
2010 Data Summary

**Reference Ground Temperature
Measured Using an EBA Ground
Temperature Probe Installed between
Beach A and Beach B Plots**

Date:
December 2010

Approved:
IM

Figure:
20



\\van-svr0\Projects\01_SITES\GIANT\1CS019.016_TailingsCovers_350047-009\Task5_DataQC\Dataloggers\[TailingsCovers_EnviroScan_Compiled&Graphs_1CS019.016_im_Rev02.xlsx]



Job No: 1CS019.016

Filename: Figures 14-21_20101130.pptx



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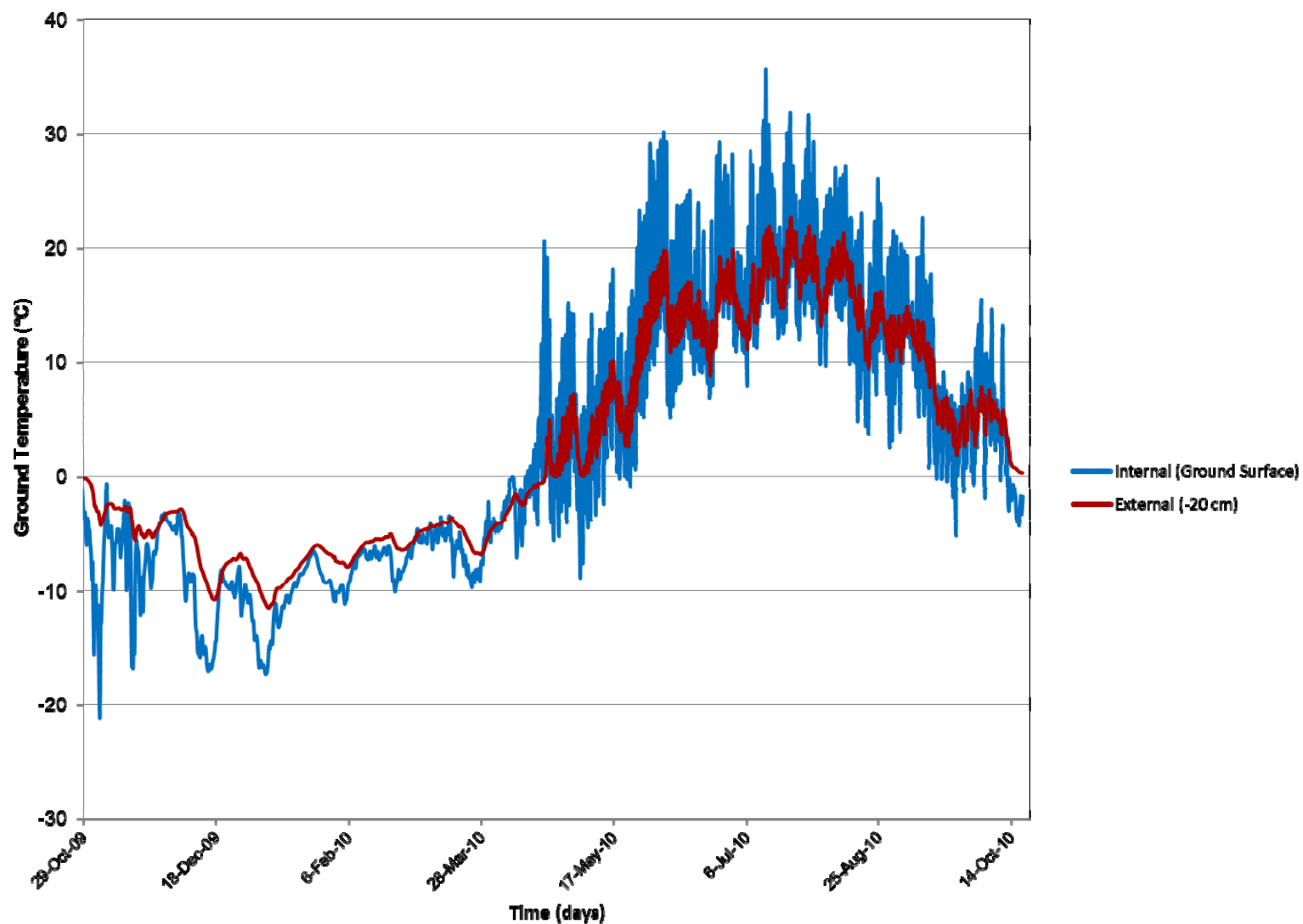
Tailings Cover Trials
2010 Data Summary

**Ambient Air Temperature
Measured Using the Campbell
Scientific CR800 Datalogger**

Date:
December 2010

Approved:
IM

Figure: **21**



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Job No: 1CS019.016

Filename: Figures 22-23_20101130.pptx



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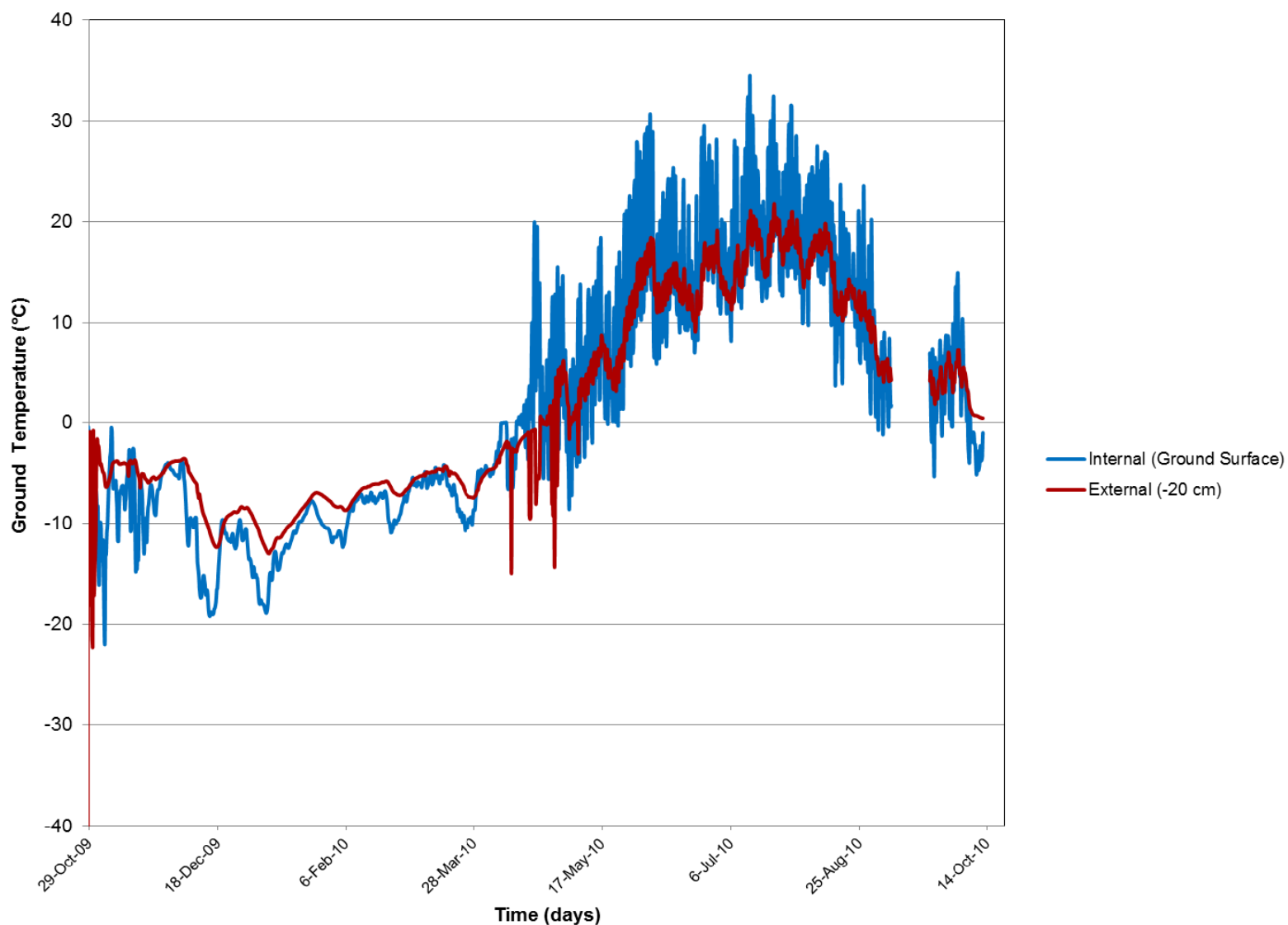
Tailings Cover Trials
2010 Data Summary

**Ground Temperature Measured
Using HOB0#1 Temperature
Probe on Beach A West Plot**

Date:
December 2010

Approved:
IM

Figure:
22



Job No: 1CS019.016
Filename: Figures 22-23_20101130.pptx



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Tailings Cover Trials
2010 Data Summary

**Ground Temperature Measured
Using HOB0#2 Temperature
Probe on Beach A East Plot**

Date:
December 2010

Approved:
IM

Figure:
23

Appendix A

Survey Results

Appendix A1
Settlement Monitoring – Compiled Survey data

Settlement Monitoring (Raw Survey Data): Trial Covers at Northwest Tailings Pond											Secondary Survey Beacon (Stake in Ground)	Secondary Survey Beacon (Nail in Rock)	Primary Survey Beacon (Pillar)															
Date of reading	21-Jan-08	4-Jul-08	23-Jul-08	15-Sep-08	3-Oct-08	6-May-09	21-May-09	4-Jun-09	18-Jun-09	2-Jul-09	16-Jul-09	30-Jul-09	13-Aug-09	27-Aug-09	10-Sep-09	29-Sep-09	8-Oct-09	22-Oct-09	1-Jun-10	16-Jun-10	13-Jul-10	28-Jul-10	10-Aug-10	23-Aug-10	7-Sep-10	7-Oct-10	18-Oct-10	
Elevation of MP (m)		Corrected with 25.977 m	Corrected with 25.977 m	Corrected with 25.977 m	Corrected with 25.977 m	Corrected with 25.977 m	Corrected with 25.977 m																					
Point #																												
1	193.811	193.735	193.716	193.709	193.703	193.745	193.743	193.744	193.736	193.729	193.716	193.705	193.696	193.695	193.695	193.695	193.699	193.703	193.67	193.717	193.693	193.698	193.697	193.696	193.698	193.694	193.699	
2	193.848	193.777	193.752	193.731	193.725	193.780	193.780	193.780	193.781	193.769	193.750	193.738	193.725	193.72	193.72	193.721	193.721	193.719	193.753	193.743	193.717	193.69	193.722	193.719	193.723	193.719	193.722	
3	193.800	193.725	193.698	193.676	193.666	193.721	193.719	193.722	193.713	193.706	193.683	193.673	193.659	193.656	193.656	193.654	193.659	193.665	193.682	193.671	193.656	193.66	193.659	193.657	193.66	193.656	193.657	
4	193.863	193.775	193.695	193.726	193.713	193.792	193.779	193.777	193.763	193.747	193.723	193.717	193.702	193.698	193.697	193.697	193.706	193.719	193.731	193.716	193.699	193.706	193.704	193.701	193.708	193.705	193.706	
5	193.728	193.649	193.619	193.602	193.600	193.659	193.659	193.661	193.648	193.635	193.613	193.606	193.596	193.593	193.592	193.593	193.593	193.601	193.625	193.606	193.59	193.597	193.596	193.594	193.596	193.592	193.595	
6	193.754	193.653	193.644	193.627	193.613	193.654	193.647	193.646	193.643	193.634	193.628	193.622	193.611	193.612	193.604	193.602	193.611	193.62	193.636	193.629	193.608	193.613	193.612	193.609	193.614	193.613	193.615	
7	193.692	193.620	193.605	193.580	193.578	193.612	193.610	193.609	193.611	193.608	193.590	193.583	193.573	193.572	193.572	193.521	193.527	193.531	193.527	193.524	193.511	193.52	193.519	193.516	193.517	193.514	193.516	
8	193.787	193.723	193.707	193.682	193.674	193.719	193.709	193.710	193.710	193.702	193.689	193.679	193.669	193.667	193.667	193.666	193.671	193.678	193.683	193.687	193.664	193.671	193.672	193.67	193.671	193.668	193.671	
9	193.699	193.632	193.613	193.601	193.596	193.639	193.636	193.640	193.639	193.622	193.598	193.596	193.591	193.59	193.59	193.586	193.587	193.591	193.613	193.598	193.583	193.588	193.589	193.588	193.589	193.586	193.589	
10	193.753	193.680	193.647	193.636	193.626	193.679	193.677	193.678	193.677	193.659	193.635	193.628	193.622	193.622	193.622	193.621	193.627	193.634	193.656	193.638	193.62	193.624	193.626	193.62	193.625	193.622	193.624	
11	193.781	193.712	193.688	193.667	193.662	193.706	193.701	193.701	193.703	193.699	193.683	193.668	193.658	193.653	193.656	193.652	193.653	193.662	193.66	193.693	193.649	193.654	193.655	193.652	193.654	193.652	193.655	
12	193.809	193.749	193.729	193.706	193.686	193.727	193.718	193.718	193.723	193.716	193.711	193.703	193.691	193.684	193.681	193.679	193.7	193.693	193.697	193.698	193.682	193.688	193.687	193.685	193.687	193.684	193.687	
13	193.768	193.711	193.691	193.666	193.659	193.690	193.684	193.683	193.683	193.680	193.677	193.668	193.657	193.651	193.647	193.644	193.646	193.652	193.654	193.658	193.644	193.652	193.651	193.649	193.65	193.648	193.649	
14	193.745	193.669	193.657	193.630	193.617	193.655	193.652	193.650	193.650	193.644	193.642	193.637	193.624	193.618	193.615	193.614	193.616	193.621	193.629	193.626	193.62	193.623	193.624	193.615	193.617	193.614	193.616	
15	193.617	193.537	193.520	193.411	193.401	193.449	193.438	193.437	193.433	193.431	193.422	193.413	193.399	193.394	193.392	193.392	193.396	193.41	193.411	193.414	193.4			193.405	193.403	193.407	193.401	193.404
16	193.638	193.574	193.566	193.530	193.528	193.592	193.549	193.547	193.549	193.547	193.541	193.537	193.523	193.518	193.515	193.514	193.517	193.522	193.517	193.629	193.513	193.52	193.52	193.517	193.519	193.517	193.518	
17	193.658	193.600	193.586	193.567	193.561	193.597	193.588	193.586	193.584	193.578	193.572	193.568	193.556	193.55	193.549	193.548	193.552	193.568	193.557	193.554	193.55	193.557	193.557	193.542	193.544	193.542	193.546	
18	193.715	193.663	193.653	193.637	193.625	193.657	193.653	193.651	193.652	193.639	193.637	193.637	193.624	193.618	193.615	193.613	193.619	193.634	193.625	193.62	193.615	193.621	193.621	193.618	193.62	193.617	193.622	
19	193.682	193.628	193.612	193.600	193.587	193.619	193.615	193.616	193.611	193.608	193.598	193.592	193.583	193.582	193.582	193.581	193.591	193.596	193.587	193.592	193.582	193.589	193.589	193.587	193.589	193.585	193.591	
20	193.819	193.775	193.747	193.714	193.706	193.754	193.750	193.748	193.753	193.752	193.738	193.721	193.707	193.702	193.699	193.699	193.702	193.717	193.727	193.728	193.7	193.705	193.706	193.702	193.705	193.703	193.705	
21	193.775	193.725	193.697	193.678	193.660	193.720	193.712	193.710	193.712	193.699	193.693	193.686	193.672	193.663	193.66	193.655	193.656	193.668	193.685	193.675	193.65	193.655	193.656	193.652	193.654	193.651	193.657	
22	193.620	193.537	193.512	193.502	193.498	193.545	193.544	193.547	193.548	193.534	193.523	193.517	193.504	193.5	193.498	193.498	193.497	193.509	193.519	193.513	193.503	193.509	193.51	193.507	193.51	193.506	193.507	
23	193.668	193.606	193.596	193.577	193.569	193.603	193.602	193.603	193.604	193.600	193.593	193.587	193.574	193.567	193.563	193.56	193.564	193.572	193.568	193.57	193.561	193.567	193.567	193.565	193.566	193.562	193.566	
24	193.698	193.652	193.646	193.631	193.620	193.663	193.658	193.657	193.661	193.656	193.652	193.652	193.638	193.63	193.624	193.62	193.626	193.637	193.631	193.633	193.62	193.627	193.627	193.626	193.627	193.624	193.627	
25	193.637	193.585	193.568	193.540	193.534	193.573	193.570	193.569	193.574	193.572	193.564	193.559	193.544	193.537	193.532	193.529	193.54	193.549	193.547		193.53	193.537	193.535	193.533	193.535	193.532	193.535	
26	193.895	193.783	193.770	193.726	193.718	193.769	193.755	193.747	193.751	193.737	193.729	193.722	193.708	193.699	193.696	193.696	193.696	193.709	193.712	193.715	193.697	193.705	193.705	193.703	193.705	193.702	193.704	
27	193.788	193.618	193.605	193.567	193.564		193.582	193.578	193.584	193.577	193.564	193.559	193.549	193.546	193.546	193.546	193.545	193.555	193.553	193.553	193.547	193.554	193.554	193.551	193.553	193.55	193.554	
28	193.830	193.713	193.703	193.685	193.673	193.692	193.682	193.677	193.681	193.676	193.668	193.67	193.66	193.656	193.657	193.656	193.658	193.663	193.659	193.663	193.653	193.666	193.665	193.661	193.663	193.661	193.663	
29	193.833	193.717	193.694	193.664	193.656	193.689	193.669	193.654	193.660	193.656	193.644	193.635	193.629	193.625	193.627	193.626	193.628	193.634	193.64	193.636	193.625	193.631	193.632	193.629	193.63	193.627	193.63	
30	193.715	193.609	193.589	193.573	193.562	193.574	193.560	193.556	193.555	193.551	193.542	193.546	193.535	193.53	193.532	193.533	193.532	193.539	193.537	193.536	193.526	193.536	193.534	193.532	193.534	193.53	193.534	
31	193.696	193.591	193.587	193.571	193.562	193.583	193.574	193.559	193.564	193.551	193.546	193.549	193.538	193.534	193.535	193.535	193.534	193.542	193.544	193.545	193.53	193.538	193.537	193.534	193.535	193.533	193.536	
32	193.779	193.663	193.659	193.636	193.630	193.654	193.637	193.632	193.632	193.623	193.619	193.617	193.586	193.555	193.554	193.557	193.556	193.563	193.569	193.566	193.56	193.568	193.568	193.565	193.567	193.564	193.566	
33	193.796	193.660	193.643	193.612	193.605	193.641	193.620	193.616	193.619	193.606	193.598	193.601	193.597	193.593	193.594	193.593	193.596	193.602	193.607	193.601	193.594	193.601	193.598	193.601	193.599	193.599	193.602	
34	193.863	193.746	193.732	193.707	193.683	193.716	193.705	193.699	193.704	193.697	193.691	193.685	193.677	193.67	193.67	193.67	193.672	193.679	193.681	193.68	193.67	193.678	193.677	193.675	193.676	193.674	193.676	
35	193.849	193.727	193.706	193.654	193.643	193.687	193.675	193.6																				

Date of reading	21-Jan-08	4-Jul-08	23-Jul-08	15-Sep-08	3-Oct-08	6-May-09	21-May-09	4-Jun-09	18-Jun-09	2-Jul-09	16-Jul-09	30-Jul-09	13-Aug-09	27-Aug-09	10-Sep-09	29-Sep-09	8-Oct-09	22-Oct-09	1-Jun-10	16-Jun-10	13-Jul-10	28-Jul-10	10-Aug-10	23-Aug-10	7-Sep-10	7-Oct-10	18-Oct-10
Elevation of MP (m)		Corrected with 25.977 m	Corrected with 25.977 m	Corrected with 25.977 m	Corrected with 25.977 m	Corrected with 25.977 m	Corrected with 25.977 m																				
16R	193.789	193.623	193.614	193.590	193.577	193.597	193.596	193.597	193.596	193.596	193.589	193.584	193.57	193.566	193.563	193.562	193.567	193.576	193.559	193.564	193.556	193.563	193.562	193.559	193.562	193.559	193.564
17R	193.811	193.698	193.596	193.574	193.570	193.563	193.591	193.589	193.588	193.584	193.578	193.572	193.56	193.555	193.553	193.553	193.559	193.575	193.56	193.557	193.55	193.558	193.56	193.556	193.558	193.554	193.561
18R	193.918	193.774	193.751	193.734	193.721	193.746	193.746	193.744	193.746	193.734	193.732	193.732	193.718	193.713	193.71	193.708	193.715	193.731	193.715	193.712	193.706	193.713	193.712	193.71	193.712	193.709	193.714
19R	193.866	193.747	193.738	193.726	193.717	193.743	193.740	193.740	193.734	193.733	193.723	193.718	193.709	193.707	193.707	193.707	193.712	193.722	193.707	193.712	193.706	193.711	193.711	193.708	193.71	193.707	193.713
20R	193.920	193.807	193.787	193.759	193.751	193.796	193.792	193.790	193.794	193.793	193.779	193.764	193.749	193.744	193.742	193.741	193.746	193.763	193.761	193.762	193.735	193.742	193.742	193.739	193.741	193.738	193.743
21R	193.928	193.823	193.791	193.770	193.754	193.805	193.802	193.800	193.803	193.789	193.782	193.775	193.76	193.612	193.746	193.744	193.748	193.781	193.769	193.76	193.734	193.742	193.741	193.739	193.76	193.738	193.743
22R	193.750	193.606	193.536	193.522	193.514	193.557	193.553	193.555	193.556	193.543	193.532	193.524	193.513	193.509	193.507	193.506	193.515	193.525	193.524	193.517	193.504	193.514	193.514	193.511	193.514	193.51	193.515
23R	193.848	193.757	193.698	193.682	193.672	193.705	193.704	193.704	193.707	193.701	193.695	193.689	193.675	193.669	193.664	193.661	193.667	193.674	193.665	193.668	193.657	193.664	193.663	193.662	193.663	193.661	193.664
24R	193.884	193.797	193.776	193.757	193.749	193.784	193.781	193.779	193.784	193.781	193.776	193.774	193.76	193.752	193.748	193.744	193.748	193.757	193.747	193.749	193.738	193.745	193.743	193.742	193.745	193.742	193.745
25R	193.712	193.619	193.585	193.562	193.554	193.593	193.589	193.588	193.594	193.589	193.582	193.577	193.561	193.554	193.551	193.547	193.552	193.565	193.562	193.561	193.545	193.552	193.55	193.548	193.55	193.547	193.553
26R	194.029	193.857	193.841	193.795	193.789	193.830	193.823	193.814	193.818	193.815	193.807	193.799	193.785	193.777	193.774	193.773	193.775	193.788	193.781	193.785	193.767	193.775	193.775	193.773	193.775	193.773	193.776
27R	194.056	193.791	193.777	193.742	193.737	193.765	193.747	193.742	193.748	193.742	193.732	193.725	193.714	193.707	193.707	193.708	193.707	193.717	193.708	193.707	193.7	193.708	193.709	193.707	193.708	193.706	193.708
28R	193.988	193.807	193.792	193.772	193.759	193.771	193.759	193.754	193.759	193.754	193.747	193.747	193.739	193.737	193.741	193.739	193.74	193.74	193.747	193.732	193.737	193.728	193.738	193.738	193.736	193.738	193.739
29R	193.976	193.781	193.741	193.715	193.707	193.733	193.720	193.705	193.711	193.708	193.697	193.688	193.682	193.679	193.68	193.681	193.682	193.69	193.69	193.686	193.674	193.682	193.681	193.678	193.68	193.678	193.682
30R	193.928	193.733	193.715	193.703	193.689	193.690	193.680	193.674	193.679	193.677	193.668	193.67	193.661	193.657	193.658	193.66	193.66	193.666	193.66	193.658	193.65	193.658	193.656	193.654	193.655	193.653	193.656
31R	193.839	193.631	193.610	193.587	193.579	193.600	193.588	193.573	193.580	193.566	193.561	193.564	193.552	193.549	193.551	193.552	193.553	193.563	193.559	193.559	193.543	193.552	193.551	193.548	193.55	193.548	193.553
32R	193.953	193.682	193.713	193.692	193.684	193.704	193.688	193.682	193.683	193.673	193.669	193.667	193.66	193.658	193.659	193.66	193.661	193.666	193.662	193.659	193.653	193.66	193.661	193.657	193.66	193.658	193.661
33R	194.064	193.823	193.794	193.692	193.757	193.777	193.758	193.750	193.755	193.740	193.733	193.736	193.734	193.726	193.727	193.729	193.73	193.737	193.735	193.729	193.721	193.729	193.729	193.728	193.729	193.728	193.732
34R	194.115	193.915	193.890	193.864	193.843	193.867	193.855	193.849	193.854	193.848	193.841	193.836	193.828	193.822	193.821	193.823	193.823	193.827	193.824	193.827	193.817	193.822	193.822	193.819	193.822	193.82	193.824
35R	194.059	193.834	193.772	193.720	193.709	193.748	193.735	193.730	193.732	193.727	193.714	193.705	193.692	193.687	193.688	193.689	193.692	193.7	193.698	193.697	193.683	193.693	193.692	193.689	193.691	193.69	193.695
36R	194.041	193.841	193.846	193.822	193.805	193.827	193.817	193.814	193.816	193.798	193.791	193.795	193.787	193.782	193.784	193.785	193.787	193.795	193.788	193.778	193.772	193.781	193.78	193.778	193.78	193.778	193.782
37R	193.921	193.712	193.687	193.675	193.650	193.684	193.665	193.660	193.664	193.647	193.640	193.644	193.635	193.63	193.631	193.632	193.634	193.643	193.643	193.632	193.626	193.635	193.632	193.632	193.634	193.631	193.635
38R	194.050	193.863	193.832	193.811	193.798	193.826	193.814	193.806	193.809	193.799	193.794	193.795	193.787	193.78	193.781	193.782	193.783	193.794	193.784	193.781	193.776	193.783	193.782	193.781	193.782	193.779	193.784
39R	194.068	193.888	193.866	193.838	193.819	193.844	193.833	193.826	193.829	193.823	193.814	193.815	193.806	193.798	193.797	193.798	193.799	193.815	193.803	193.804	193.796	193.797	193.796	193.793	193.795	193.792	193.796
40R	193.949	193.748	193.681	193.659	193.649	193.677	193.670	193.661	193.665	193.651	193.647	193.647	193.638	193.63	193.631	193.633	193.636	193.642	193.638	193.634	193.628	193.632	193.632	193.629	193.63	193.628	193.633
41R	193.977	193.742	193.706	193.691	193.675	193.703	193.692	193.682	193.687	193.686	193.680	193.68	193.677	193.665	193.661	193.663	193.664	193.674	193.664	193.663	193.667	193.666	193.663	193.663	193.664	193.662	193.666
42R	194.043	193.856	193.838	193.812	193.789	193.828	193.812	193.798	193.803	193.799	193.793	193.794	193.788	193.779	193.777	193.777	193.78	193.789	193.779	193.782	193.77	193.778	193.776	193.774	193.775	193.774	193.777
43R	193.989	193.795	193.773	193.744	193.736	193.762	193.754	193.747	193.750	193.748	193.738	193.739	193.729	193.721	193.722	193.723	193.725	193.734	193.724	193.726	193.716	193.722	193.723	193.71	193.722	193.721	193.724
44R	193.982	193.792	193.760	193.736	193.704	193.722	193.710	193.707	193.711	193.707	193.700	193.7	193.691	193.686	193.685	193.686	193.691	193.701	193.684	193.687	193.678	193.69	193.69	193.687	193.679	193.687	193.694
45R	193.977	193.750	193.740	193.724	193.720	193.744	193.732	193.731	193.733	193.727	193.718	193.718	193.709	193.705	193.707	193.708	193.713	193.72	193.706	193.706	193.697	193.708	193.708	193.706	193.705	193.704	193.709
46R	194.081	193.922	193.905	193.866	193.855	193.886	193.875	193.867	193.872	193.867	193.858	193.859	193.845	193.838	193.838	193.839	193.842	193.852	193.861	193.853	193.835	193.841	193.841	193.838	193.839	193.839	193.844
47R	193.968	193.805	193.809	193.787	193.774	193.802	193.793	193.787	193.793	193.782	193.775	193.779	193.769	193.764	193.763	193.763	193.766	193.774	193.77	193.765	193.758	193.767	193.767	193.765	193.766	193.763	193.777
48R	193.958	193.810	193.791	193.751	193.755	193.779	193.770	193.761	193.767	193.756	193.749	193.752	193.746	193.739	193.739	193.739	193.741	193.749	193.741	193.736	193.729	193.738	193.737	193.734	193.735	193.734	193.737
49R	193.998	193.798	193.790	193.745	193.727	193.753	193.744	193.733	193.738	193.730	193.722	193.726	193.717	193.711	193.709	193.708	193.709	193.72	193.717	193.719	193.758	193.709	193.709	193.708	193.708	193.707	193.712
50R	193.835	193.634	193.630	193.614	193.596	193.611	193.601	193.598	193.605	193.603	193.593	193.597	193.588	193.579	193.581	193.581	193.584	193.595	193.582	193.579	193.572	193.582	193.581	193.578	193.58	193.579	193.584
51R		192.462	192.418	192.351	192.294									192.046	1												

Appendix A2
Survey Reports – Data Spreadsheets

File Name: 10057NC-JUNE 1 2010 NW POND MONITORING.xlsx					
			21ROCK	193.769	
1	193.670		26	193.712	
1ROCK	193.734		26ROCK	193.781	
2	193.753		27	193.553	
2ROCK	193.829		27ROCK	193.708	
3	193.682		28	193.659	
3ROCK	193.835		28ROCK	193.732	
4	193.731		29	193.640	
4ROCK	193.806		29ROCK	193.690	
5	193.625		30	193.537	
5ROCK	193.714		30ROCK	193.660	
6	193.636		31	193.544	
6ROCK	193.673		31ROCK	193.559	
7	193.527		32	193.569	
7ROCK	193.581		32ROCK	193.662	
8	193.683		33	193.607	
8ROCK	193.758		33ROCK	193.735	
9	193.613		34	193.681	
9ROCK	193.760		34ROCK	193.824	
10	193.656		35	193.643	
10ROCK	193.679		35ROCK	193.698	
11	193.680		36	193.712	
11ROCK	193.776		36ROCK	193.788	
12	193.697		37	193.602	
12ROCK	193.845		37ROCK	193.643	
13	193.654		38	193.662	
13ROCK	193.737		38ROCK	193.784	
14	193.629		39	193.647	
14ROCK	193.725		39ROCK	193.803	
15	193.411		40	193.788	
15ROCK	193.522		40ROCK	193.638	
16	193.517		41	193.616	
16ROCK	193.559		41ROCK	193.664	
17	193.557		42	193.693	
17ROCK	193.560		42ROCK	193.779	
18	193.625		43	193.637	
18ROCK	193.715		43ROCK	193.724	
19	193.587		44	193.572	
19ROCK	193.707		44ROCK	193.684	
20	193.727		45	193.649	
20ROCK	193.761		45ROCK	193.706	
21	193.685		46	193.750	
21ROCK	193.769		46ROCK	193.861	
22	193.519		47	193.724	
22ROCK	193.524		47ROCK	193.770	
23	193.568		48	193.684	
23ROCK	193.665		48ROCK	193.741	
24	193.631		49	193.601	
24ROCK	193.747		49ROCK	193.717	
25	193.549		50	193.502	
25ROCK	193.562		50ROCK	193.582	
111	194.421		213	194.421	
112	194.352		214	194.642	
113	194.179		211	194.632	
114	194.322		212	194.461	

	File Name:	10057NC-June 16 2010 Monitorintg.xlsx			
1	193.717		26	193.715	
1R	193.736		26R	193.785	
2	193.743		27	193.553	
2R	193.823		27R	193.707	
3	193.671		28	193.663	
3R	193.822		28R	193.737	
4	193.716		29	193.636	
4R	193.790		29R	193.686	
5	193.606		30	193.536	
5R	193.697		30R	193.658	
6	193.629		31	193.545	
6R	193.668		31R	193.559	
7	193.524		32	193.566	
7R	193.578		32R	193.659	
8	193.687		33	193.601	
8R	193.759		33R	193.729	
9	193.598		34	193.680	
9R	193.745		34R	193.827	
10	193.638		35	193.643	
10R	193.659		35R	193.697	
11	193.683		36	193.702	
11R	193.777		36R	193.778	
12	193.698		37	193.591	
12R	193.846		37R	193.632	
13	193.658		38	193.659	
13R	193.741		38R	193.781	
14	193.626		39	193.648	
14R	193.722		39R	193.804	
15	193.414		40	193.584	
15R	193.526		40R	193.634	
16	193.523		41	193.616	
16R	193.564		41R	193.663	
17	193.554		42	193.695	
17R	193.557		42R	193.782	
18	193.620		43	193.638	
18R	193.712		43R	193.726	
19	193.592		44	193.577	
19R	193.712		44R	193.687	
20	193.728		45	193.648	
20R	193.762		45R	193.706	
21	193.675		46	193.752	
21R	193.760		46R	193.853	
22	193.513		47	193.718	
22R	193.517		47R	193.765	
23	193.570		48	193.681	
23R	193.668		48R	193.736	
24	193.633		49	193.602	
24R	193.749		49R	193.719	
25	193.547		50	193.486	
25R	193.561		50R	193.579	
111	194.401		213	194.423	
112	194.342		214	194.636	
113	194.169		211	194.632	
114	194.322		212	194.459	
			21R	193.759	
			142	195.156	

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	File name:	10057NC-July 28 2010 NW Pond Monitoring.xlsx			
1	193.698		26	193.705	
1R	193.717		26R	193.775	
2	193.69		27	193.554	
2R	193.803		27R	193.708	
3	193.66		28	193.666	
3R	193.813		28R	193.738	
4	193.706		29	193.631	
4R	193.782		29R	193.682	
5	193.597		30	193.536	
5R	193.686		30R	193.658	
6	193.613		31	193.538	
6R	193.653		31R	193.552	
7	193.52		32	193.568	
7R	193.574		32R	193.66	
8	193.671		33	193.601	
8R	193.745		33R	193.729	
9	193.588		34	193.678	
9R	193.736		34R	193.822	
10	193.624		35	193.638	
10R	193.647		35R	193.693	
11	193.654		36	193.714	
11R	193.748		36R	193.781	
12	193.688		37	193.594	
12R	193.838		37R	193.635	
13	193.652		38	193.662	
13R	193.735		38R	193.783	
14	193.623		39	193.628	
14R	193.72		39R	193.797	
15	193.407		40	193.583	
15R	193.518		40R	193.632	
16	193.52		41	193.618	
16R	193.563		41R	193.666	
17	193.557		42	193.685	
17R	193.558		42R	193.778	
18	193.621		43	193.637	
18R	193.713		43R	193.722	
19	193.589		44	193.579	
19R	193.711		44R	193.69	
20	193.705		45	193.65	
20R	193.742		45R	193.708	
21	193.655		46	193.74	
21R	193.742		46R	193.841	
22	193.509		47	193.72	
22R	193.514		47R	193.767	
23	193.567		48	193.681	
23R	193.664		48R	193.738	
24	193.627		49	193.592	
24R	193.745		49R	193.709	
25	193.537		50	193.488	
25R	193.552		50R	193.582	
111	194.388		211	194.629	
112	194.327		212	194.457	
113	194.167		213	194.37	
114	194.316		214	194.641	

File Name: 10-057-NC August 10 2010 NW Pon							
1	193.697		26	193.705		111	194.388
1R	193.715		26R	193.775		112	194.327
2	193.722		27	193.554		113	194.166
2R	193.802		27R	193.709		114	194.316
3	193.659		28	193.665		211	194.627
3R	193.811		28R	193.738		212	194.457
4	193.704		29	193.632		213	194.421
4R	193.78		29R	193.681		214	194.64
5	193.596		30	193.534			
5R	193.686		30R	193.656			
6	193.612		31	193.537			
6R	193.652		31R	193.551			
7	193.519		32	193.568			
7R	193.574		32R	193.661			
8	193.672		33	193.601			
8R	193.746		33R	193.73			
9	193.589		34	193.677			
9R	193.736		34R	193.822			
10	193.626		35	193.639			
10R	193.648		35R	193.692			
11	193.655		36	193.704			
11R	193.749		36R	193.78			
12	193.687		37	193.592			
12R	193.84		37R	193.632			
13	193.651		38	193.656			
13R	193.735		38R	193.782			
14	193.624		39	193.636			
14R	193.72		39R	193.796			
15	193.405		40	193.581			
15R	193.516		40R	193.632			
16	193.52		41	193.614			
16R	193.562		41R	193.663			
17	193.557		42	193.684			
17R	193.56		42R	193.776			
18	193.621		43	193.635			
18R	193.712		43R	193.723			
19	193.589		44	193.577			
19R	193.711		44R	193.69			
20	193.706		45	193.649			
20R	193.742		45R	193.708			
21	193.656		46	193.74			
21R	193.741		46R	193.841			
22	193.51		47	193.721			
22R	193.514		47R	193.767			
23	193.567		48	193.68			
23R	193.663		48R	193.737			
24	193.627		49	193.59			
24R	193.743		49R	193.709			
25	193.535		50	193.487			
25R	193.55		50R	193.581			

06_10-057-NC-AU23_QC.xlsx

	File Name: 10-057-NC Sept 7 2010 Elevations.xlsx									
Station	September 7, 2010									
1	193.698		26	193.705		51	192.036		76	191.854
1ROCK	193.716		26ROCK	193.775		51ROCK	192.026		76ROCK	191.897
2	193.723		27	193.553		52	192.121		77	191.919
2ROCK	193.804		27ROCK	193.708		52ROCK	192.186		77ROCK	191.949
3	193.660		28	193.663		53	192.260		78	191.995
3ROCK	193.813		28ROCK	193.738		53ROCK	192.329		78ROCK	191.992
4	193.708		29	193.630		54	192.151		79	191.906
4ROCK	193.780		29ROCK	193.680		54ROCK	192.184		79ROCK	191.934
5	193.596		30	193.534		55	192.192		80	191.899
5ROCK	193.685		30ROCK	193.655		55ROCK	192.183		80ROCK	191.923
6	193.614		31	193.535		56	192.123		81	191.902
6ROCK	193.652		31ROCK	193.550		56ROCK	192.186		81ROCK	191.930
7	193.517		32	193.567		57	192.179		82	191.916
7ROCK	193.574		32ROCK	193.660		57ROCK	192.236		82ROCK	191.917
8	193.671		33	193.601		58	192.166		83	191.978
8ROCK	193.745		33ROCK	193.729		58ROCK	192.230		83ROCK	192.038
9	193.589		34	193.676		59	192.096		84	191.891
9ROCK	193.737		34ROCK	193.822		59ROCK	192.096		84ROCK	191.905
10	193.625		35	193.638		60	192.102		85	191.828
10ROCK	193.648		35ROCK	193.691		60ROCK	192.088		85ROCK	191.879
11	193.654		36	193.704		61	192.116		86	191.875
11ROCK	193.749		36ROCK	193.780		61ROCK	192.135		86ROCK	192.041
12	193.687		37	193.591		62	192.096		87	191.918
12ROCK	193.839		37ROCK	193.634		62ROCK	192.108		87ROCK	192.006
13	193.650		38	193.658		63	192.176		88	191.943
13ROCK	193.734		38ROCK	193.782		63ROCK	192.212		88ROCK	191.985
14	193.617		39	193.634		64	192.168		89	191.918
14ROCK	193.719		39ROCK	193.795		64ROCK	192.183		89ROCK	191.921
15	193.407		40	193.579		65	192.053		90	191.863
15ROCK	193.515		40ROCK	193.630		65ROCK	192.071		90ROCK	191.907
16	193.519		41	193.615		66	191.975		91	191.916
16ROCK	193.562		41ROCK	193.664		66ROCK	192.029		91ROCK	191.966
17	193.544		42	193.683		67	192.010		92	192.040
17ROCK	193.558		42ROCK	193.775		67ROCK	192.006		92ROCK	192.095
18	193.620		43	193.634		68	192.099		93	192.074
18ROCK	193.712		43ROCK	193.722		68ROCK	192.138		93ROCK	192.110
19	193.589		44	193.576		69	192.055		94	191.934
19ROCK	193.710		44ROCK	193.679		69ROCK	192.108		94ROCK	192.068
20	193.705		45	193.647		70	192.026		95	191.912
20ROCK	193.741		45ROCK	193.706		70ROCK	192.065		95ROCK	191.948
21	193.654		46	193.739		71	191.998		96	191.908
21ROCK	193.760		46ROCK	193.839		71ROCK	192.043		96ROCK	191.963
22	193.510		47	193.719		72	191.960		97	192.031
22ROCK	193.514		47ROCK	193.766		72ROCK	192.001		97ROCK	192.046
23	193.566		48	193.677		73	191.979		98	191.952
23ROCK	193.663		48ROCK	193.735		73ROCK	191.980		98ROCK	
24	193.627		49	193.588		74	191.935		99	192.003
24ROCK	193.745		49ROCK	193.708		74ROCK	191.956		99ROCK	
25	193.535		50	193.487		75			100	
25ROCK	193.550		50ROCK	193.580		75ROCK	191.874		100ROCK	
111	194.389		211	194.628		P131	192.775		P141	192.658
112	194.326		212	194.454		P132	192.911		P142	192.668
113	194.165		213	194.418		P133	192.775		P143	192.846
114	194.315		214	194.639		P134	192.845		P144	192.580

File Name: 10-057-NC Oct 7 2010 Elevations.xlsx									
Station	07-Oct-10								
1	193.694		26	193.702		51	192.035		191.852
1ROCK	193.714		26ROCK	193.773		51ROCK	192.025		191.895
2	193.719		27	193.550		52	192.120		191.917
2ROCK	193.801		27ROCK	193.706		52ROCK	192.185		191.948
3	193.656		28	193.661		53	192.260		191.994
3ROCK	193.809		28ROCK	193.736		53ROCK	192.329		191.992
4	193.705		29	193.627		54	192.150		191.906
4ROCK	193.778		29ROCK	193.678		54ROCK	192.184		191.933
5	193.592		30	193.530		55	192.191		191.898
5ROCK	193.683		30ROCK	193.653		55ROCK	192.188		191.923
6	193.613		31	193.533		56	192.122		191.900
6ROCK	193.649		31ROCK	193.548		56ROCK	192.186		191.900
7	193.514		32	193.564		57	192.178		191.914
7ROCK	193.571		32ROCK	193.658		57ROCK	192.246		191.916
8	193.668		33	193.599		58	192.166		191.975
8ROCK	193.742		33ROCK	193.728		58ROCK	192.229		192.035
9	193.586		34	193.674		59	192.094		191.889
9ROCK	193.734		34ROCK	193.820		59ROCK	192.095		191.903
10	193.622		35	193.636		60	192.101		191.826
10ROCK	193.645		35ROCK	193.690		60ROCK	192.088		191.877
11	193.652		36	193.703		61	192.115		191.872
11ROCK	193.746		36ROCK	193.778		61ROCK	192.134		192.040
12	193.684		37	193.590		62	192.096		191.917
12ROCK	193.836		37ROCK	193.631		62ROCK	192.107		192.003
13	193.648		38	193.657		63	192.176		191.942
13ROCK	193.732		38ROCK	193.779		63ROCK	192.202		191.984
14	193.614		39	193.633		64	192.167		191.918
14ROCK	193.718		39ROCK	193.792		64ROCK	192.181		191.921
15	193.401		40	193.578		65	192.064		191.863
15ROCK	193.513		40ROCK	193.628		65ROCK	192.073		191.907
16	193.517		41	193.613		66	191.974		191.914
16ROCK	193.559		41ROCK	193.662		66ROCK	192.028		191.966
17	193.542		42	193.681		67	192.009		192.040
17ROCK	193.554		42ROCK	193.774		67ROCK	192.005		192.094
18	193.617		43	193.633		68	192.099		192.074
18ROCK	193.709		43ROCK	193.721		68ROCK	192.136		192.110
19	193.585		44	193.574		69	192.055		191.983
19ROCK	193.707		44ROCK	193.687		69ROCK	192.107		192.067
20	193.703		45	193.645		70	192.027		191.910
20ROCK	193.738		45ROCK	193.704		70ROCK	192.063		191.945
21	193.651		46	193.738		71	191.995		191.905
21ROCK	193.738		46ROCK	193.839		71ROCK	192.041		191.961
22	193.506		47	193.718		72	191.959		192.030
22ROCK	193.510		47ROCK	193.763		72ROCK	192.000		192.044
23	193.562		48	193.676		73	191.977		191.952
23ROCK	193.661		48ROCK	193.734		73ROCK	191.978		
24	193.624		49	193.587		74	191.934		192.002
24ROCK	193.742		49ROCK	193.707		74ROCK	191.954		
25	193.532		50	193.485		75			
25ROCK	193.547		50ROCK	193.579		75ROCK	191.874		
111	194.385		211	194.625		P131	192.774		192.657
112	194.324		212	194.453		P132	192.911		192.668
113	194.159		213	194.418		P133	192.772		192.837
114	194.313		214	194.638		P134	192.843		192.580

	File Name:	10-057-NC Oct 18 2010 NW Pond Elevations.xlsx								
Station	October 18, 2010									
1	193.699		26	193.704		51	192.039		76	191.856
1ROCK	193.716		26ROCK	193.776		51ROCK	192.03		76ROCK	191.903
2	193.722		27	193.554		52	192.124		77	191.921
2ROCK	193.803		27ROCK	193.708		52ROCK	192.19		77ROCK	191.958
3	193.657		28	193.663		53	192.263		78	192.002
3ROCK	193.814		28ROCK	193.739		53ROCK	192.342		78ROCK	192.005
4	193.706		29	193.63		54	192.152		79	191.912
4ROCK	193.781		29ROCK	193.682		54ROCK	192.192		79ROCK	191.942
5	193.595		30	193.534		55	192.198		80	191.903
5ROCK	193.685		30ROCK	193.656		55ROCK	192.195		80ROCK	191.931
6	193.615		31	193.536		56	192.127		81	191.905
6ROCK	193.653		31ROCK	193.553		56ROCK	192.193		81ROCK	191.939
7	193.516		32	193.566		57	192.182		82	191.922
7ROCK	193.574		32ROCK	193.661		57ROCK	192.248		82ROCK	191.924
8	193.671		33	193.602		58	192.17		83	191.984
8ROCK	193.745		33ROCK	193.732		58ROCK	192.24		83ROCK	192.05
9	193.589		34	193.676		59	192.099		84	191.894
9ROCK	193.737		34ROCK	193.824		59ROCK	192.1		84ROCK	191.917
10	193.624		35	193.637		60	192.106		85	191.831
10ROCK	193.649		35ROCK	193.695		60ROCK	192.092		85ROCK	191.889
11	193.655		36	193.705		61	192.12		86	191.878
11ROCK	193.75		36ROCK	193.782		61ROCK	192.139		86ROCK	192.048
12	193.687		37	193.594		62	192.1		87	191.921
12ROCK	193.838		37ROCK	193.635		62ROCK	192.112		87ROCK	192.016
13	193.649		38	193.657		63	192.18		88	191.947
13ROCK	193.734		38ROCK	193.784		63ROCK	192.21		88ROCK	191.991
14	193.616		39	193.637		64	192.171		89	191.922
14ROCK	193.721		39ROCK	193.796		64ROCK	192.192		89ROCK	191.93
15	193.404		40	193.581		65	192.068		90	191.869
15ROCK	193.515		40ROCK	193.633		65ROCK	192.082		90ROCK	191.913
16	193.518		41	193.617		66	191.979		91	191.92
16ROCK	193.564		41ROCK	193.666		66ROCK	192.037		91ROCK	191.972
17	193.546		42	193.684		67	192.013		92	192.044
17ROCK	193.561		42ROCK	193.777		67ROCK	192.01		92ROCK	192.102
18	193.622		43	193.636		68	192.1		93	192.08
18ROCK	193.714		43ROCK	193.724		68ROCK	192.141		93ROCK	192.12
19	193.591		44	193.576		69	192.053		94	191.988
19ROCK	193.713		44ROCK	193.694		69ROCK	192.111		94ROCK	192.073
20	193.705		45	193.649		70	192.031		95	191.917
20ROCK	193.743		45ROCK	193.709		70ROCK	192.07		95ROCK	191.953
21	193.657		46	193.743		71	192		96	191.911
21ROCK	193.743		46ROCK	193.844		71ROCK	192.054		96ROCK	191.971
22	193.507		47	193.722		72	191.96		97	192.034
22ROCK	193.515		47ROCK	193.77		72ROCK	192.013		97ROCK	192.053
23	193.566		48	193.678		73	191.982		98	191.957
23ROCK	193.664		48ROCK	193.737		73ROCK	191.989		98ROCK	
24	193.627		49	193.589		74	191.94		99	192.007
24ROCK	193.745		49ROCK	193.712		74ROCK	191.961		99ROCK	
25	193.535		50	193.487		75			100	
25ROCK	193.553		50ROCK	193.584		75ROCK	191.887		100ROCK	
111	194.388		211	194.626		P131	192.779		P141	192.661
112	194.326		212	194.456		P132	192.915		P142	192.672
113	194.165		213	194.419		P133	192.778		P143	192.852
114	194.315		214	194.642		P134	192.848		P144	192.585

Appendix B
Visual Inspection Report

Memo

To:	Maritz Rykaart	Date:	December 8, 2010
cc:	Dan Hewitt	From:	Iozsef Miskolczi
Subject:	Report on Fall Geotechnical Inspection of Tailings Covers Plots at Giant Mine	Project #:	1CS019.016

The Fall Geotechnical Inspection of the Tailings Cover Trials on the North-West Pond at the Giant Mine was performed by Iozsef Miskolczi on October 18, 2010 in conjunction with the instrumentation decommissioning program.

This memo summarises the notes made during the inspection. Photos are attached as Attachment A. At the time of the inspection the ground was covered with snow. Wind action cleared the snow from the exposed flat areas and piled it up in depressions and on wind protected slopes.

1 Beach Plot A

- Surface covered by snow in small patches mainly in localised depressions. Very sparse vegetation retains minimal amount of snow cover.
- Surface appears as generally flat, with localized small depressions randomly distributed on the entire surface of the cover.
- Some sort of a shallow trench is apparent on the East side of the cover, but the location and extent does not seem to have changed since 2009.
- Localized depressions around the primary beacons (same as noted during previous inspections)
- Evidence of very sparse vegetation (grass bunches and legumes), less abundant than the vegetation observed in 2009.
- Minor erosion gullies close to the edge of the cover.
- Surface cracks evident in places devoid of snow. Depth and extent of cracks could not be accurately assessed due to snow on the ground.
- Evidence of erosion of fines in the form of pebbles free-standing on the surface with no fines surrounding them.

2 Beach Plot B

- Surface appears as generally flat, with localized small depressions randomly distributed on the entire surface of the cover.
- Minor erosion gullies close to the edges of the cover.
- No anthropogenic disturbance was noted other than the mini-excavator tracks documented in previous inspection reports.
- Evidence of medium dense vegetation cover (grass bunches and legumes). The vegetation on this cover plot has the highest density of all plots. The vegetation extends onto the side slopes as well.
- Localized depressions around the Primary Beacons, same as noted in the 2009 inspections.
- Surface cracks evident in places devoid of vegetation. Depth and extent of cracks could not be accurately assessed due to snow on the ground.

3 Slimes Plot A

- Surface appears generally flat, with small localized depressions randomly distributed on the entire surface of the cover.
- Surrounded by water on 3 sides at time of inspection.
- Evidence of medium dense vegetation, mainly bunches of grass.
- Snow cover retained by the vegetation varies in thickness between 10 and 20 cm.
- High water marks around the edges on the crest, with growth medium being washed away on a strip of about 4-5 m width around the east and south edges.
- Evidence of erosion of fines in the form of pebbles free-standing on the surface with no fines surrounding them. Observed only on the surfaces barren of snow; could not determine if the erosion is generalised as vegetation remnants retained the snow cover.
- The housing tube of the EnviroScan probe has a stickup of about 91 cm, which is 60 cm more than when it was installed.
- The 4x4 lumber post of the Lakewood datalogger was lying on the ground.
- The 12 mm PVC pipe housing the thermistor string and the datalogger's grounding rod do not show any evidence of vertical movement or lateral displacement.
- The thermistor string on this plot is missing, being used in 2009 as a replacement for the damaged thermistor on Beach plot B.

4 Slimes Plot B

- The perimeter of the plot is barren, while the central area (where remnants of summer vegetation are evident) is covered with 5-15 cm of snow.
- Surface appears generally flat, with small localized depressions randomly distributed on the entire surface of the cover.
- Surrounded by water on 3 sides at time of inspection.
- Evidence of sparse vegetation, mainly bunches of grass.
- High water marks around the edges on the crest, with growth medium being washed away on a strip of about 4-5 m width around the perimeter.
- Evidence of erosion of fines in the form of pebbles free-standing on the surface with no fines surrounding them. Observed only on the surfaces barren of snow; could not determine if the erosion is generalised as vegetation remnants retained the snow cover.
- The housing tube of the EnviroScan probe has a stickup of about 83 cm, which is 50 cm more than when it was installed.
- The 4x4 lumber post of the Lakewood datalogger was lying on the ground.
- The 12 mm PVC pipes housing the thermistor string and the Lakewood datalogger's grounding rod do not show any evidence of vertical movement or lateral displacement.

Attachment A
Photos



Photo 1: Beach A Plot – panoramic stitched photograph from South-East corner. The optical distortion of the photo stitching technique causes the East and South edges to be almost parallel.



Photo 2: Beach B Plot – panoramic stitched photograph from North-East corner. The optical distortion of the photo stitching technique causes the East and North edges to be almost parallel.



Photo 3: Slimes A Plot – panoramic stitched photograph from South-East corner. The optical distortion of the photo stitching technique causes the East and South edges to be almost parallel.



Photo 4: Slimes B Plot – panoramic stitched photograph from South-East corner. The optical distortion of the photo stitching technique causes the East and South edges to be almost parallel



Photo 5: Beach A Plot – evidence of shrinkage cracking and wind erosion.



Photo 6: Beach B Plot – looking North from South-East corner. Note the density and type of the vegetation and the increased amount of snow retained by the vegetation.



Photo 7: Beach A Plot – looking south west. Note the improved protection of the thermistor cable. On the left side of the photo the shallow trench observed in 2009 is noticeable.



Photo 8: Slimes A Plot – stickup of the EnviroScan probe housing tube is 91 cm.



Photo 9: Slimes B Plot – stickup of the EnviroScan probe housing tube is 83 cm.