REPORT

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REPORT ON

East Dike Construction As-Built Report Meadowbank Gold Project, Nunavut

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List of Acronyms and Abbreviations

%	percent
°C	degrees Celsius
2H:1V	slope of 2 horizontal units to 1 vertical unit
AEM	Agnico-Eagle Mines Limited
CB	Core Backfill
CF	Coarse Filter
CM	Construction Manager
DFO	Department of Fisheries and Oceans Canada
Elev.	Elevation
FGL	Fernand Gilbert Limité
Golder	Golder Associates Ltd.
IF	Iron formation
IFC	Issued for Construction
IV	Intermediate volcanic
m	metre
m^3	cubic metre
masl	metres above sea level
mm	millimetre
NPAG	Non-potentially acid generating
QA	Quality Assurance
QC	Quality Control
TCG	Dynamitage T.C.G. Inc.
s	seconds
SB	Soil-Bentonite

1.0 GENERAL

1.1 Objective

This report summarizes as-built construction information for the East Dike at the Meadowbank Gold Project (Meadowbank), located approximately 80 km North of Baker Lake, Nunavut.

1.2 Scope

The major construction activities related to the East Dike works were carried out between July 2008 and March 2009, with dewatering of the downstream lake starting on March 17, 2009. This report includes:

- Description and sequence of the major construction activities;
- Summarizes the as-built construction quality control (QC) and construction quality assurance (QA) information;
- As-built drawings;
- As-built instrumentation and reading summary to August, 2009;
- Summary of key design changes during construction; and
- Summary of construction deficiencies.

As-built geometry information is based on surveys performed jointly by the East Dike general contractor, Fernand Gilbert Limité (FGL), the Owner, Agnico-Eagle Mines (AEM) and bathymetry survey by Golder Associates Ltd. (Golder). Survey data were provided to Golder in AutoCAD ® format.

For additional information, reference should be made to the *Study Limitations* included at the beginning of this report.

The as-built details for the West Channel Dike are addressed under separate cover.

1.3 Description of East Dike

Figure 1 presents the East Dike site plan. The East Dike was constructed in the wet and divides the Second Portage Lake to allow for dewatering of the northwest arm of the lake. Following downstream lake dewatering, the exposed lake basin will allow for development of the North Portage Pit and for construction of the tailings storage facility.

The main components of the East Dike include a rockfill shell, a granular core with downstream filter zone, a soil-bentonite cut-off wall through the densified granular core zone to the underlying foundation, and a grout curtain from the base of the cut-off wall into the underlying bedrock.

The rockfill embankment was founded on the sediment and till materials present on the lake bottom. The cut-off wall and granular core zone were founded in the trench excavated through the rockfill shell to the inferred bedrock foundation. A soil-bentonite (SB) mixture was used to provide a suitable low-permeability cut-off wall, and grouting was carried out below the cut-off wall into bedrock.

Based on the current mine plan, the East Dike is required to isolate the Portage Pit area from the Second Portage Lake for 10 years. Following closure of the Portage and Goose Island Pits, the mined out pit areas become part of Third Portage Lake, and when re-flooded will result in a 1 m head difference across the East Dike based on a final lake elevation of 134.1 masl on west side and 133.1 masl on the east side.

Table 1 presents a summary of the main characteristics for the East Dike.

Table 1: East Dike As-Built Characteristics

Item	East Dike	Unit
Top Cut-off Wall Elevation	135.1	m.a.s.l.
Thermal Cap Elevation	137.1	m.a.s.l.
Cut-off Wall width	1.0 (typical)	m
Normal Upstream Lake Elevation during operation	133.1	m.a.s.l.
Freeboard between top of cut-off wall and Normal Lake Elevation during operation	2.0	m
Length of dike	800	m
Maximum cut-off wall height	9.9	m
Dike Seepage Control	Soil-Bentonite cut-off wall and foundation grouting	-

1.4 Definitions

Definitions of terms used in this report are summarized in Table 2. These definitions shall be applied, unless the context of their use clearly indicates otherwise.

Table 2: Definitions

Term	Definition
Owner	Agnico-Eagle Mines Limited, Meadowbank Division (AEM)
Construction Manager (CM)	Person(s) employed by the Owner in order to oversee the project works and the Owners interests. The primary point of contact for the Designer and the General Contractor.
Designer and Engineer of Record	Golder Associates Ltd. (Golder)
Meadowbank	Meadowbank Gold Project site
QA Manager	Golder Associates Ltd.
General Contractor	Fernand Gilbert Limité (FGL)
Grouting Sub-contractor	Dynamitage TCG (TCG), a division of FGL
Slurry Wall Specialist Sub-contractor	Inquip Associates Inc. (Inquip)

Term	Definition
Approval	A written engineering or geotechnical opinion, related to the progress and completion of the Work.
Work	The labour, materials and equipment required to excavate, place and compact fill, survey to layout the Work or to record the Work, perform QC activities, and all other activities required to construct the East Dike as detailed in the Specification and on the Drawings.
Site Memorandum	Documentation prepare by the QA Manager, reviewed by the Designer, presenting design changes and/or modifications in response to field conditions.
Quality Assurance (QA)	Planned and systematic activities that provide adequate confidence to the Owner and various stakeholders that quality control are being implemented effectively. Golder was responsible for QA of contractor's and Owner's Work.
Quality Control (QC)	A planned system of inspection and testing carried out according to accepted standard specifications to ensure the quality of construction. FGL, its sub-contractors and AEM were responsible for QC.

1.5 Design, Specifications and Construction Drawings

The detailed design for the East Dike was prepared by Golder, with the Technical Specifications and Construction Drawings package issued for construction on August 1, 2008. The East Dike Design is presented in Golder (2008).

Table 3 presents a list of the Issued For Construction (IFC) revision 0 Technical Specifications, and Table 4 presents a summary of the IFC, revision 0 Drawings, dated August 1, 2008.

The construction drawings were updated by Golder as required to support subsequent field changes based on field conditions during construction. Documentation of design changes and modifications during construction are presented in Section 5.0.

Following construction, using the survey data provided by AEM and FGL, Golder updated the IFC construction drawings for as-built conditions. Table 5 presents a summary of the most current as-built revision of the drawings, and a complete reduced size set of as-built drawings are included in Appendix D.

Table 3: East Dike IFC Technical Specification List

Specification Section No.	Title
S1	Administration
S2	Foundation Preparation
S3	Soil-Bentonite Cut-off Wall
S4	Drilling and Grouting
S5	Instrumentation
S6	Quality Control (QC) and Quality Assurance (QA) Requirements
S7	Care of Water
S8	Fill Placement
S9	Turbidity Barrier

Table 4: East Dike IFC Construction Drawing List

Drawing No.	Drawing Title
2100-00	East Dike Location Map and Drawing Index
2100-01	East Dike Site Plan
2100-02	East Dike Borehole Location Plan
2100-03	East Dike Rockfill Setout Plan
2100-04	East Dike Rockfill Layout Plan (1 of 3)
2100-05	East Dike Rockfill Layout Plan (2 of 3)
2100-06	East Dike Rockfill Layout Plan (3 of 3)
2100-10	East Dike Typical Sections and Details
2100-11	East Dike Cross-Sections
2100-14	East Dike Centreline Profile
2100-15	East Dike Abutment Details
2100-16	East Dike Instrumentation Plan
2100-17	East Dike Instrumentation Typical Section and Grouting Plan

Table 5: East Dike As-Built Drawing List

Drawing No.	Drawing Title	Revision No. and Description
2100-00	East Dike Location Map and Drawing Index	Rev. 1, East Dike As-Built
2100-01	East Dike Site Plan	Rev. 1, East Dike As-Built
2100-02	East Dike Borehole Location Plan	Rev. 1, East Dike As-Built
2100-03	East Dike Rockfill Setout Plan	Rev. 2, East Dike As-Built
2100-04	East Dike Rockfill Layout Plan (1 of 3)	Rev. 1, East Dike As-Built
2100-05	East Dike Rockfill Layout Plan (2 of 3)	Rev. 1, East Dike As-Built
2100-06	East Dike Rockfill Layout Plan (3 of 3)	Rev. 1, East Dike As-Built
2100-10	East Dike Typical Sections and Details	Rev. 1, East Dike As-Built
2100-11	East Dike Cross Sections	Rev. 1, East Dike As-Built
2100-12*	East Dike Centreline Realignment	Rev. 0, East Dike As-Built
2100-14	East Dike Centreline Profile	Rev. 1, East Dike As-Built
2100-15	East Dike Abutment Detail	Rev. 1, East Dike As-Built
2100-16	East Dike Instrumentation Plan	Rev. 1, East Dike As-Built
2100-17	East Dike Instrumentation Typical Section and Grouting Plan	Rev. 1, East Dike As-Built
2100-24*	East Dike Grouting Details	Rev. 0, East Dike As-Built
2100-25*	East Dike Densification Plan Phase 1 and Phase 2	Rev. 0, East Dike As-Built
2100-26*	East Dike Densification Plan Phase 3	Rev. 0, East Dike As-Built
2100-27*	East Dike Densification Plan Phase 4	Rev. 0, East Dike As-Built
2100-28*	East Dike South Channel Instrumentation Details	Rev. 0, East Dike As-Built
2100-29*	East Dike North Channel Instrumentation Details	Rev. 0, East Dike As-Built
2100-30*	East Dike North Shallow Instrumentation Details	Rev. 0, East Dike As-Built

*denotes new Drawing sheet added to the As-Built Drawing package

Design drawings related to the seepage collection system have not been prepared and are pending topographic survey of the downstream slope area to be carried out following lake dewatering.

1.6 Construction Documentation

AEM was responsible for collection, distribution and storage of East Dike related construction documentation which includes the following:

- Golder East Dike IFC Drawings and Technical Specifications;
- FGL Daily Construction Report (excavation and fill placement);
- Geopac Tech Inc. Compaction Daily Report;
- East Dike Construction QC/QA Documentation–Foundation Preparation;
- East Dike Construction QC/QA Documentation– Fill Placement (CF and CB);
- Inquip Associates Inc. Daily Construction Report (QC) - Soil-Bentonite Wall;
- Request for Information (RFI);
- Site Memorandums, and Technical Memorandums; and
- Monthly Construction meeting minutes.

2.0 CONSTRUCTION ACTIVITIES

Construction activities for the East Dike were carried out by both AEM and FGL. FGL and its sub-contractors mobilized equipment to the site starting in July 2008. Following ice-free conditions on the lake as observed by the CM on July 11, 2008, AEM and its sub-contractor prepared and deployed the turbidity barrier. On July 30, 2008, AEM received a fisheries authorization from Fisheries and Oceans Canada (DFO) and proceeded with the in lake construction works.

The general construction work sequence for the East Dike consisted of:

- Bathymetric survey of East Dike footprint;
- Turbidity barrier installation;
- Initial rockfill shell placement;
- Trench excavation;
- Post trench excavation survey;
- Coarse filter placement;
- Post coarse filter placement survey;
- Core backfill and crushed rockfill wing placement;
- Granular cap and core backfill placement to Elev. 135.1 masl;
- Densification of core backfill zone;
- Bentonite slurry supported trench excavation;
- Soil-bentonite backfill;
- Till cap placement to typical Elev. 135.6 masl;
- Granular cap placement to Elev. 136.1 masl;
- Drilling and grouting;
- Instrumentation installation;
- Downstream rockfill shell widening, and
- Thermal cap placement over soil-bentonite cut-off wall.

FGL was the general contractor for the works under contract with AEM and reporting to the CM. FGL sub contracted Geopac Tech Inc. (Geopac) for the densification of the core backfill, Inquip Associates Inc. (Inquip) to support the slurry wall excavation, and TCG for drilling and grouting activities.

A summary of the East Dike construction activities is presented in Table 6. A photographic record summary of key activities during construction as documented by Golder during QA activities are presented in Appendix A. Details of each activity of the East Dike construction are provided in subsequent sections.

Table 6: Summary of Construction Activities for East Dike

Activity	By	Start Date	Finish Date	Notes
Turbidity Barrier Installation	AEM	July 18, 2008	July 25, 2008	
Initial Rockfill Shell Placement	AEM	July 30, 2008	August 18, 2008	■ Golder arrived on site August 9, 2008. Rockfill complete to 60+500.
Trench Excavation	FGL	August 6, 2008	August 23, 2008	■ Between August 6th and 9th, trench excavation completed from 60+087 to 60+293 under supervision of CM. ■ Golder arrived on site August 9, 2008.
Bathymetry of Excavated Trench	Golder	August 13, 2008	August 24, 2008	
Coarse Filter Placement	FGL	August 15, 2008	August 26, 2008	
Bathymetry of Excavation Trench after Coarse Filter Placement	Golder	August 16, 2008	August 30, 2008	
Core Backfill and Crushed Rockfill Wings Placement	AEM and FGL	August 17, 2008	September 3, 2008	■ AEM equipment backfilling from north to south. ■ FGL equipment backfilling from south to north.
Granular cap and core backfill placement to Elev. 135.1 masl	AEM	August 24, 2008	September 4, 2008	
Densification of core backfill zone	Geopac	August 28, 2008	September 7, 2008	
Bentonite slurry trench Excavation	FGL	September 7, 2008	September 22, 2008	
Soil-Bentonite Backfill	FGL	September 7, 2008	September 22, 2008	
Till cap to minimum 135.1 masl and granular cap to 136.1 masl	AEM	September 18, 2008	October 2008	

Activity	By	Start Date	Finish Date	Notes
Thermal Cap Placement	AEM	September 18, 2008	Not yet completed	■ Initially placed to minimum 136.1 masl along for drilling and grouting. ■ May 2009, started placing to minimum 137.1 masl from south abutment to about 60+600.
Drilling and Grouting	TCG	September 20, 2008	March 18, 2009	■ Casing installation start date to end of grouting.
Instrumentation Installation	AEM and FGL	March 20, 2009	Task not yet complete	■ Piezometers, thermistors and Slope inclinometers installed March 2009. ■ Permanent crest survey prisms, survey control monuments installed May 2009 ■ Dike crest seismographs have not yet been installed.

Rockfill materials for the East Dike construction were geochemically classified as non-potentially acid generating by AEM and supplied from on site quarries. Both AEM and FGL haul trucks were used to transported rockfill materials. Crushed rockfill materials included the Coarse Filter, a 150 mm minus crushed rockfill, and the Core Backfill, a 20 mm minus crushed rockfill, and were supplied by the Nuna Logistics Inc. crusher on the Meadowbank site. A fine quarried rockfill consisting of a 200 mm minus material was supplied from the airport quarry and used as the granular backfill.

Key construction activates lead by FGL included:

- Excavation of the rockfill shell and lakebed materials along the cut-off wall alignment;
- Haulage of rockfill materials;
- Coarse Filter material placement;
- Core Backfill and crushed rockfill placement;
- Compaction of the Core Backfill zone (Geopac);
- Bentonite slurry supported trench excavation, with Inquip;
- Soil-Bentonite backfill, with Inquip;
- Drilling and grouting; and
- Instrumentation installation.

2.1 Construction Materials and Quantities

The materials used in the construction are described in the specification and on the drawings. Table 7 summarizes the earthwork quantities for East Dike.

Table 7: Summary of As-Built Earthworks Construction Quantities

Item	As-Built Quantity	Unit	Notes:
Initial Rockfill shell	121,670	m^3	Total volume before trench excavation
Trench Excavation of rockfill	26,780	m^3	
Trench Excavation of lakebed soils	10,550	m^3	
Coarse Filter	3,205	m^3	
Core Backfill	18,350	m^3	
Crushed Rockfill Wings	15,780	m^3	
Granular Cap	11,250 m^3 (estimated)	m^3	
Core Backfill replacement during densification:			
Phase 1 and 2	950	m^3	
Phase 3	500	m^3	
Phase 4	170*	m^3	
Cut-off Trench Excavation	5,370	m^3	Excavator bucket width 1.1 m.
Soil-Bentonite Backfill	5,370	m^3	
Granular Cap placement	26,411 (estimated)	m^3	
Thermal Cap placement	n/a	m^3	placement is not yet complete to design elevation

* denotes quantity without densification craters between Sta. 60+420 and Sta. 60+460 from survey data available

A summary of grouting quantities is presented in Appendix E, Table E2-1.

2.2 Turbidity Barrier

AEM placed turbidity barriers upstream and downstream of the East Dike as specified during discussion with the DFO. The curtain was approximately 25 m from toe of the initial rockfill shell. The turbidity barrier consisted of the following:

- Panels;
- Connectors;
- Flotation devices; and
- Anchors.

The initial installation depth of the panels was 1.0 m above lakebed surface. Following a period of high turbidity encountered during construction, the panels were lowered to be about 0.2 m above the lakebed surface.

The turbidity barriers were installed in July before commencement of the in-water construction activities and were removed following completion of the major earthworks activities in September 2008.

2.3 Initial Rockfill Shell Placement

AEM placed the initial single rockfill shell platform using quarried NPAG rockfill working about 0.5 m above the waterline, following the alignment in the construction drawings. The rockfill shell consisted of a 50 m wide road width with minimum 1.9 m height safety berms on each the upstream and downstream sides, for a total shell width of about 55 m. The rate of rockfill placement was in the order of 5,000 to 15,000 m^3/day. Compaction of the rockfill material was achieved with trafficking of loaded 55 and 90 tonne haul trucks. After design surface elevation was reach, a 200 mm crushed road surfacing material was placed on the rockfill.

In May 2009, AEM widened the downstream side of the rockfill shell to allow for two way haul truck traffic from the North Portage Pit. The final rock fill shell survey has not been provided to Golder, and is not included in the current as-built drawings.

2.4 Trench Excavation

Trench excavation was carried out by FGL. Portions of the rockfill excavated from the trench were reused to advance the rockfill shell when both activities were carried out concurrently. Excavated rockfill was not placed on the upstream side of shell to create a bench as presented in the construction drawings. The lakebed soils were excavated, hauled and disposed in specific area, designated by the Construction Manager. The lakebed material recovered consist of a thin layer of sediment followed by till (with boulders up to 2.0 m in diameter). The till was dense, unoxidized and grey. Frozen material was encountered near the shore lines.

The excavation was performed by a CAT 385 excavator, working along the cut-off wall alignment, and excavating from south to north. A second CAT 385 excavator was used perpendicular to the trench, reshaping the downstream slope to meet design slope. From the bathymetry surveys of the excavation, the average side slope for the upstream side was about 1.5H:1V and for the downstream side was about 2H:1V. Based on the results of the bathymetry surveys, some difficulties in obtaining a clean excavation base were encountered, and this required the excavator to return to some sections and re-excavate.

2.5 Coarse Filter Placement

Coarse Filter placement was carried out by FGL, following final cleaning of the trench and sloping of the downstream trench rock fill slope. 150 mm crushed rock was used as filter material. The filter material was end dumped on the crest of the excavation and placed, underwater, with a CAT 385 excavator in 1.0 m lifts. Filter placement progressed from the toe of slope to the crest. Compaction of the coarse filter was achieved with the excavator bucket.

2.6 Trench Backfill

The trench backfill was carried following coarse filter placement, working from a platform at about elevation 133.6 m. Both FGL and AEM hauled and placed Core Backfill and crushed rockfill materials to backfill the trench following the construction specifications and to the geometry presented on the construction drawings. Both the core backfill and crushed rockfill materials were end dumped on the crest of the excavation and placed first with a loader and then with a CAT 385 excavator or Terex RH40-E.

Core backfill was advanced by placing a bucket of material on the advancing crest and pushing the vertically down on the material underwater. This placement technique was adopted to limit segregation of the core backfill material. The core backfill was placed a minimum of 1.0 m ahead of the crushed rockfill material.

To support the core backfill, crushed rockfill material (nominal 150 mm minus) material were placed as wings. The material was placed on the slope of the trench and pushed vertically down. This placement technique was adopted to limit segregation of the coarse filter and to ensure the toe of the core backfill was well ahead of the coarse backfill.

2.7 Raising Core Backfill Zone and Densification

A minimum 4 m crest width of the Core Backfill zone supported by 3 m width on each side of fine quarry run rockfill was placed to Elev. 135.1 m prior to densification. Survey of the trench backfill and granular cap limits were not provided at the time of this report. Typical cross-section layouts have been prepared based on assumed geometry.

Densification of the core backfill zone was carried out by Geopac, using a dynamic compaction method. Dynamic compaction consisted of 4 stages using a 15 ton weight falling from 18 m height. The number of drops per stage varied with the depth of the core backfill zone. Craters created during compaction were backfilled with the core backfill material by AEM prior to the next stage of compaction.

2.8 Slurry Supported Cut-off Wall Excavation

Following densification of the core backfill zone, a bentonite slurry supported excavation was carried out by FGL with the support of Inquip. The excavation was performed by a CAT 385 excavator to a minimum width of 1.1 m along the alignment as outlined in the construction drawings. Trench stability was maintained with a 5% bentonite slurry.

The cut-off wall excavation was made through the densified core backfill zone to refusal on assumed bedrock foundation. The excavated dry core backfill was used to construct an 0.5 m high berm on each the upstream and downstream sides of the excavation area. The remaining wet core backfill excavated from under water and slurry level was loaded into trucks and disposed of by AEM.

Soundings through the bentonite slurry were used to measure the cut-off wall excavation depth each 3 m along the crest. The recorded depths were compared to the bathymetry measured depth of the initial trench excavation. The cut-off wall excavation was generally greater than that of the initial excavation. Observations of the cut-off wall excavation material, particularly in zones where depths were below that of the initial excavation included till materials which were removed, fine grained sediments to a maximum thickness of approximately 1.0 m which were excavated from around Sta. 60+350, 60+430 and 60+680. Boulders were encountered and removed from the excavation at around Sta. 60+350, 60+420, 60+440, 60+450, 60+600 and 60+610.

2.9 Soil-Bentonite Backfill

AEM farmed local till sources using a CAT 385 excavator to visually sort and remove oversize (typically >300 mm) particles and prepared a stockpile. AEM prepared a mixing pad where farmed till and 1.5% dry bentonite powder by mass, were mixed. The farmed till with bentonite was then transported to the slurry trench excavation.

On the dike crest, adjacent to the slurry trench excavation, FGL and Inquip used a CAT D6 dozer for mixing of the farmed till with bentonite and the bentonite slurry from the trench to prepare the soil-bentonite backfill. Mixing was carried out until the soil-bentonite backfill had a uniform consistency, an average slump of 150 mm, and an estimated 2% bentonite content.

During mixing a minor portion of the core backfill berm that had been constructed to contain the slurry was mixed into the soil-bentonite backfill.

Once mixed the Soil-bentonite backfill was dragged into the trench with the D6 dozer, generally by the dozer lowering its blade and reversing towards the trench, forcing the soil-bentonite material to flow into the slurry trench. Density of both the Soil-bentonite backfill and the bentonite slurry were monitored to ensure that the soil-bentonite density remained greater than the slurry, which results in the Soil-bentonite continuously displacing the slurry as it is placed. During Soil-bentonite backfill placement, the slope and location of the backfill front was monitored to ensure that it remained the specified 6 m behind the current slurry trench excavation location. The slurry trench excavation was not allowed to advancing more than 45 m from the toe of the Soil-bentonite backfill.

During placement of the Soil-bentonite backfill down the south slope of the north channel, around Sta. 60+393, a steel beam was installed in the trench to act as a gate and hold the Soil-bentonite backfill from advancing too close to the excavation front.

2.10 Till and Thermal Cap Placement

Following completion of the soil-bentonite backfill, a till cap was placed to raise the minimum elevation of the cut-off wall to Elev. 135.6 masl. This was followed by the placement of fine quarry run rockfill to minimum Elev. 136.1 masl. The rockfill surface was prepared as the drill rig platform for the drilling and grouting stage of construction.

Following grouting operations, AEM placed rockfill to raise the general dike crest, including the downstream haul road and the thermal cap to approximate Elev. 136.6 masl. The design calls for a final thermal cap with minimum 6.0 m width, placed to Elev. 137.1 masl. Placement of the final thermal cap to the design elevation is still outstanding. Following completion of this placement and final survey, data should be provided to update the as-built drawings.

2.11 Drilling and Grouting

2.11.1 General

Drilling and grouting operations were carried out by TCG. Two 4.8 m wide, 12.2 m long and 2.6 m high grouting shelters (labelled units C-216 and C-217) were constructed by the contractor to provide warm, dry areas in which to complete the work (Photograph 63). Each shelter was composed of a set of two metal sea containers. The first container housed a grout plant, single pallet of cement (cycled as required) bentonite, and grouting additives along with a heated water supply tank. The second adjacent container (with connecting doorway) housed the heating unit, real-time monitoring equipment, and provided access to grout holes via a removable floor.

The use of two separate grout shelters allowed for the contractor to work on two different work areas of the dike at once. Shelters were mobilized along the dike by pulling with either a 450A John Deere Timberjack (Photograph 65) or 950H Caterpillar Loader (Photograph 66).

2.11.2 Grouting Work Areas

For the grouting works, the East Dike was divided into six separate working areas. The approximate stationing of each area is summarized in Table 8.

Table 8: Grouting Work Areas

Work Area	From (Chainage)	To (Chainage)
South Abutment	60+60.5	60+110
South Channel	60+110	60+254
Island	60+254	60+335
North Channel	60+335	60+599
North Shallows	60+599	60+800
North Abutment	60+800	60+881

2.11.3 Method of Work

2.11.3.1 General

2.11.3.2 Drilling Equipment

Throughout the grouting program, TCG used the following drilling equipment:

- Rockmaster 990 (Photograph 67) or a Rockmaster 945 (Photograph 68) downhole hammer (DTH) drill rigs for Casing installation. Both drill rigs were capable of installing nominal 125 mm (5 inch) ID steel casing through the soil-bentonite wall and a minimum of 0.5 m into bedrock.
- Tamrock 996 top hammer water flush drill rig (Photograph 73) for bedrock drilling, capable of drilling grout holes in bedrock through the grout casing to a depth of 15 m below the casing.

2.11.3.3 Grout Plant, Injection and Monitoring Equipment

Throughout the grouting program, the contractor maintained up to two grout plants operating at any one time.

Each grout plant was comprised of a 420 L capacity Chemgrout CG-680/3L8/EH high shear colloidal mixer and agitator and a progressive cavity, helical-screw Moyno grout pump (Photograph 82) with an 18 bar maximum injection pressure.

The rotation speed of each progressive cavity pump was controlled by a throttle located on the control panel of the grout plant. The pump output and consequently injection pressure was regulated by a series of valves on a grout header (Photograph 83) which allowed grout to travel directly via a single line to the grout hole collar, or return line back to the agitator.

The real-time monitoring of the injection process was carried out using RST Instrument's Permeation Grout Monitoring System which included standard 4 mA to 20 mA, 0 to 6.9 MPa pressure transducers and 3 to 295 L/min magnetic flowmeters, linked to Campbell Scientific's programmable Loggernet software on a laptop computer to produce real time displays of data.

The pressure transducer and magnetic flowmeter were protected within a steel frame shell (Photograph 84), located centrally within the sea-container providing floor access to the collar of the grout hole. The laptop computer and valve control were positioned inside the same sea-container.

The entire set-up provided electronic monitoring of the grouting and the real-time control of grouting parameters (flow rate, pressure, penetrability, and injected volume) and an efficient way for the grouting engineer to direct the grouting flow rate and pressure response at all times, make timely decisions, and readily detect if hydraulic jacking (or fracturing) of the ground had occurred.

To isolate grout stages in rock, the contractor used Geopro (Bimbar), heavy duty, 72.SP.500 single gland (nominal 72 mm deflated, maximum 150 mm inflated diameter, 500 mm gland length) grout packers inflated with a water / antifreeze solution (Photograph 87).

2.11.4 Sequence of Work

Drilling, water pressure testing and grouting was typically carried out concurrently along the East Dike. Essential information pertaining to control and quality assurance was collected for each work activity.

Following trials to confirm the grouting methods and procedures, Golder issued Technical Memo TMO No. 800 “Proposed Revised Grouting Procedure for the East Dike – Meadowbank Gold Project”, (Golder 2008a) which identified a total of four separate grouting stages for each grout hole. These four stages are summarized in Table 9.

Primary, secondary and tertiary bedrock grouting including stages 1, 2 and 3 was completed ahead of the Primary, secondary and tertiary contact grouting carried out in Stage 4.

Table 9: Grouting Stages

Stage	Description
1	Lower 5 - 7 m of bedrock
2	Upper 2.5 - 4.5 m of bedrock
3	End of Casing (shallow bedrock)
4	Contact Grouting via perforations

2.11.4.1 Bedrock Grouting

In bedrock, upstage grouting techniques were employed. Generally, this comprised drilling 5 or 10 m into bedrock beneath the end of casing, followed by upstage grouting of the drilled advance (Stages 1, 2 and 3). All bedrock grouting was completed using Type 30 (HE) cement.

In general, drilling and grouting activities were carried out by grouting every primary and secondary grout hole in sequence. Results of the grouting was reviewed and used to produce the requirement for grouting of the tertiary grout holes and in some areas quaternary grout holes were required.

2.11.4.2 Contact Grouting

At the contact of the soil-bentonite wall and bedrock, a single stage grouting technique was employed (Stage 4). The steel casings were perforated at the bottom using a Holte Perforator Tool pushed using an Atlas Copco DM45 drill rig provided by AEM (Photograph 74). The perforator tool was capable of perforating rows of approximately 6 mm x 30 mm slots spaced at 35 mm apart. The perforator was used to punch two rows of slots in each casing, oriented parallel to the dike cut-off wall axis, over a length of between about 0.6 and 1.0 m.

Primary and secondary grout holes were completed using Type 30 (HE) cement, while tertiary grout holes, where required, were completed along the contact using Microfine cement.

2.11.5 Grout Mix Design

A range of mixes were tested in the field by the Golder QA staff prior to the commencement of grouting and as required throughout the grouting program. For bedrock stages 1, 2 and 3, as well as contact grouting stage 4 in primary and secondary holes, a thickening sequence of grout mixes, Mixes A through D, was developed on site prior to commencement of grouting activities.

The criterion used for designing the grout mixes was to use a cement-rich mix, including a superplasticizer for penetrability, to provide high strength and long term durability against leaching. All accepted mixes were stable, with 5% or less bleed measured over a two hour period. Standard grout mix designs were developed using a combination of water, St.Lawrence Type 30 (HE) Hydraulic Cement, BASF Glenium 3030 NS superplasticizer and Baroid Quik-Gel high yield bentonite.

A microfine cement based mix, using a combination of water and Nittetsu Super Fine Cement, was used to initiate Stage 4 tertiary hole contact grouting.

During grouting activities on the Abutments and the Island work areas, an accelerator / cold weather admixture, BASF Pozzutec 20+, was added to designs for both Mix A with Type 30 cement as well as the microfine mix to ensure proper setting of the mixes in the permafrost zones.

The final mix designs used are presented on Table 10. A more detailed mix testing sequence is provided on Table E1-1 in Appendix E1.

Table 10: Summary of Grout Mixes Used

Mix	W:C Ratio	Glenium (%)	Pozzutec 20+ (%)	Bentonite (%)	Marsh (sec)	Specific Gravity (g/cc)
A	0.7 : 1	0.4	-	-	32	1.65
A*	0.7 : 1	0.4	0.75	-	31	1.64
B	0.7 : 1	-	-	-	35	1.64
C	0.7 : 1	-	-	0.3	44	1.68
D	0.7 : 1	-	-	0.45	58	1.67
MF	1.2 : 1	-	-	-	31	1.43

Note:

1. All admixture dosages were calculated with respect to weight of cement.

Mix testing was conducted several times throughout the program, due to required need for both a standard Type 30 mix, as well as microfine mix. Additional testing was also required to produce alternative mixes which included an accelerating admixture due to variable ground temperatures along the dike. Based on previous experience, the starting mix of the thickening sequence, Mix A, typically has a water/cement ratio ranging between 0.7:1 to 0.8:1 by weight, with a superplasticizer dosage rate of between 0.3% and 2.0% by weight of cement, depending on viscosity/compatibility test results. Because of the variability in cement temperature upon arrival to the grouting shelter, grout mixes were modified by Golder QA staff during mix testing until the nominal Marsh viscosity of 32 seconds was achieved.

2.11.6 Grouting Procedures

2.11.6.1 Bedrock

The grouting injection process within bedrock followed procedures outlined in Golder (2008a). Using a borehole packer, stages 1, 2 and 3 were grouted in each hole, concentrating on primary and secondary holes first, followed by tertiary and select quaternary holes.

After grout holes were drilled and flushed to the specified depth, the packer was set at the top of the lowest stage and grouting progressed upstage. Grout was injected at a flow rate of no greater than 15 L/min until the target pressure was reached, at which time the flow rate was reduced to maintain the target pressure with continued grout injection until refusal.

Grouting was initiated starting with Mix A and sequentially thickened, if necessary, when the relevant decision volume was reached. After the first 400 L of Mix A, if the injection pressure was less than 20% of the target pressure for the stage, the grout was thickened to Mix B. Thereafter, every subsequent 400 L (*i.e.*, at 800 L, 1200 L, 1600 L, *etc*), if the injection pressure was less than 30% of the target pressure <u>or</u> if penetrability was not slowly and steadily decreasing in a linear fashion, the grout was thickened to the next thickest mix.

Once the thickest mix possible was being injected, and the injection pressure was rising slowly while penetrability continued to decrease, refusal of an injected stage was then either limited by volume or achieved by obtaining a penetrability of less than 0.1 L/min/m/bar held for a period of 10 minutes, at the target injection pressure and an injection rate of less than 0.5 L/min/m stage length. Refusal by penetrability was achieved by decreasing flowrate while maintaining the target injection pressure and was monitored by field staff on the real-time plot of injection pressure vs. flow rate.

2.11.6.2 Contact

The grouting injection process at the contact followed procedures outlined in (Golder 2008a), using a single borehole packer for a single stage (Stage 4), concentrating on primary and secondary holes first, followed by tertiary holes.

After grout holes were re-drilled and flushed to the specified depth (if necessary due to freezing, hole collapse and / or grout build-up), a perforator tool was used to punch two rows of holes in the casings over an approximately 0.6 m length. The intent was for these holes to be located across or above the contact of the soil-bentonite wall and bedrock contact. The two rows of holes were oriented at 180° to each other along, and both along the longitudinal axis of the dike. A single packer was set above the perforations and grouting injection proceeded. Grout was injected at a flow rate of no greater than 10 L/min until the target pressure was reached, at which time the flow rate was reduced to maintain the target pressure with continued grout injection until refusal as outlined above. If the target pressure was not achieved, grouting was carried out to a maximum volume of 600 L.

2.11.7 Progress and Quantities

The progress of grouting activities was monitored on a daily basis. Stages 1 to 3 were required in all primary, secondary and selected tertiary grout holes, with some additional quaternary grout holes required based on the grout takes and refusal pressures achieved in the tertiary level of injection. Stage 4 grouting was completed in all primary, secondary and tertiary grout holes.

A summary Table of all grouting activities is included in Appendix E2.

Figures E3-1 through E3-9 in Appendix E3, present a summary grout takes with final injection pressures for each stage of grouting along the centerline of the cut-off wall.

2.12 Instrumentation

A series of geotechnical instrumentation was specified to be installed in the East Dike to allow for the monitoring of dike performance following construction, during dewatering, operation and into closure.

Details of instrument monitoring frequency are included in the East Dike Operation, Maintenance and Surveillance (OMS) manual.

Instrumentation currently installed along the East Dike consists of:

- Vibrating Wire Piezometers (VWP);
- Thermistors;
- Inclinometers; and
- Crest survey prisms and survey monitor control points.

Table 11 presents a summary of the as-built instrumentation which has been installed by TCG and the CM under observation of Golder personnel.

Instrumentation which has not been installed on the dike crest at this time includes:

- Seismographs at 3 locations along the dike crest.

AEM has installed a seismograph station on the upstream side at the north abutment of the East Dike and have been monitoring the impact of blasting from the development of the North Portage Pit from this location.

The instrumentation calibration data sheets are presented in Appendix F. Piezometer and Thermistor data collected between March and early August 2009 are presented in Appendix F.

The as-built survey of the location and elevation of each seismograph installation should be added to the as-built drawings once completed.

Table 11: Summary of East Dike Instrumentation

Instrumentation Type	Station Location	Label / Identification	Offset from Centerline (+ is d/s – is u/s)	Elevation (masl)	Details
Vibrating Wire Piezometer – Group	60+190	190-P1-A, 190-P1-B, 190-P1-C, 190-P2-A, 190-P2-B, 190-P2-C, 190-P3-A, 190-P3-B	10.0 10.0 10.0 2.0 2.0 2.0 -2.0 -2.0	116.7 121.7 126.7 116.34 121.34 126.34 116.63 121.63	190-P1 Top of steel casing: El. 136.39 190-P2 Top of steel casing: El. 136.54 190-P3 Top of steel casing: El. 136.54
Vibrating Wire Piezometer – Group	60+490	490-P1-A, 490-P1-B, 490-P1-C, 490-P2-A, 490-P2-B, 490-P2-C, 490-P3-A, 490-P3-B	11.0 11.0 11.0 3.1 3.1 3.1 -0.9 -0.9	114.12 119.12 125.81 115.07 120.07 126.76 114.62 119.62	490-P1 Top of steel casing: El. 136.20 490-P2 Top of steel casing: El. 136.15 490-P3 Top of steel casing: El. 136.02
Vibrating Wire Piezometer – Group	60+700	700-P1-A, 700-P1-B, 700-P1-C, 700-P2-A, 700-P2-B, 700-P2-C, 700-P3-A, 700-P3-B	9.9 9.9 9.9 2.0 2.0 2.0 -1.9 -1.9	118.81 123.81 130.5 118.08 123.08 129.77 117.93 122.92	700-P1 Top of steel casing: El. 136.27 700-P2 Top of steel casing: El. 136.48 700-P3 Top of steel casing: El. 136.40
Vibrating Wire Piezometer - Individual	60+150	150-C	2.1	127.35	Top of steel casing: El. 136.33
	60+200	200-C	2.0	127.71	Awaiting data from AEM
	60+240	240-C	2.0	128.71	Top of steel casing: El. 136.26
	60+400	400-C	2.2	126.76	Top of steel casing: El. 136.27
	60+420	420-C	2.0	125.32	Top of steel casing: El. 137.10
	60+440	440-C	2.0	124.66	Top of steel casing: El. 137.14
	60+450	450-C	1.9	127.00	Top of steel casing: El. 136.22
	60+460	460-C	2.0	125.15	Top of steel casing: El. 137.60
	60+470	470-C	2.0	124.76	Top of steel casing: El. 137.43
	60+480	480-C	2.0	125.44	Top of steel casing: El. 137.65
	60+500	500-C	2.0	125.78	Top of steel casing: El. 137.34
	60+510	510-C	2.0	126.06	Top of steel casing: El. 137.10
	60+550	500-C	2.0	129.85	Top of steel casing: El. 136.24
	60+600	600-C	1.9	128.60	Top of steel casing: El. 136.53
	60+650	650-C	2.0	128.48	Top of steel casing: El. 136.59
	60+750	750-C	1.5	128.16	Top of steel casing: El. 136.93
Thermistor String	60+092	TH92	0	136.0 (1st Bead)	Top of steel casing: El.
	60+185	TH185	0	136.0 (1st Bead)	Top of steel casing: El.

Instrumentation Type	Station Location	Label / Identification	Offset from Centerline (+ is d/s – is u/s)	Elevation (masl)	Details
	60+485	TH485	0	136.0 (1st Bead)	Top of steel casing: El.
	60+695	TH695	0	136.0 (1st Bead)	Top of steel casing: El.
	60+842	TH842	0	136.0 (1st Bead)	Top of steel casing: El.
Inclinometer	60+195	ED-IN-195 (A and B Axis)	0.05	137.6 (Collar Elevation)	Azimuth 51.2 degree
	60+495	ED-IN-495 (A and B Axis)	0.05	137.6 (Collar Elevation)	Azimuth 347.9
	60+705	ED-IN-705 (A and B Axis)	0.09	137.6 (Collar Elevation)	Azimuth 20.4 degree
Crest Survey Prisms		100	0	136.9	Prisms have been installed, however no data has been provided presenting crest displacement monitoring
		101		136.8	
		102		136.7	
		103		136.6	
		104		136.9	
		105		136.8	
		106		136.9	
		107		136.7	
		108		136.6	
		109		136.5	
		110		136.6	
		111		136.3	
		112		136.5	
		113		136.7	
		114		136.8	
		115		136.7	
		116		136.8	
		117		136.7	
		118		136.7	
Seismographs					Not yet installed

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3.0 CONSTRUCTION QC / QA ACTIVITIES

As required by the Technical Specifications, the contractor and CM were responsible for carrying out construction QC testing, inspection and measurements. Golder was represented on site by a QA Manager who carried out the QA testing, inspection and measurements. Due to limited resources of the contractor, the CM requested that Golder QA team on site undertake some of QC testing. Daily construction reports from FGL were provided to Golder in accordance with the Specifications.

A summary of the East Dike construction QC and QA testing and monitoring is presented in Table 12.

Table 12: Summary of Construction QC and QA Testing and Monitoring

Construction Item	Test Description	Minimum QC Testing Requirement and Frequency (Specification S6 Table 11)	QC Tests Performed (by)	Minimum QA Testing Requirement and Frequency (Specification S6 Table 12)	QA Tests Performed (by)
Turbidity Barrier	Deployment	Visual (continuous)	Continuous (CM)	Visual (Continuous)	n/a (Golder) not on site (during deployment)
	Water Quality	Daily	Daily (AEM)	n/a	n/a
Care of Water	Visual Observation	Visual (continuous)	Continuous (CM)	Visual (continuous)	(Golder)
Survey-Location and Extents	On-land survey	Initial rockfill, before and after foundation preparation and excavation.	Survey: 21Aug08 (AEM) Surveys: 15Aug to 23Sep08 (FGL)	1 every 5 QC survey by GPS	n/a
	In-water survey	■ Before rockfill placement. ■ After excavation to bedrock and before CF placement. ■ After CF placement.	Bathymetry survey: Aug08 to Oct08 (Golder)	Point soundings at 5 m spacing to confirm QC survey	n/a
Rockfill	Gradation	Visual (continuous)	Continuous (CM)	Visual (continuous)	Continuous after 9Aug2008 (Golder)

Construction Item	Test Description	Minimum QC Testing Requirement and Frequency (Specification S6 Table 11)	QC Tests Performed (by)	Minimum QA Testing Requirement and Frequency (Specification S6 Table 12)	QA Tests Performed (by)
Coarse Filter Placement	Gradation (stockpile and as place)	6 (1 every 500 m^3)	4 (Golder)	2 (1 every 5 QC tests)	Same as QC (Golder)
	Visual Inspection	Visual (continuous)	Continuous (CM)	Visual (continuous)	Continuous (Golder)
Core Backfill Placement	Gradation (stockpile and as place)	36 (1 every 500 m^3)	16 (Golder)	8 (1 every 5 QC tests)	Same as QC (Golder)
	Visual Inspection	Visual (continuous)	Continuous (CM)	Visual (continuous)	Continuous (Golder)
Cut-off Wall Construction	Refer to Table 13				
Drilling and Grouting	Refer to Table 14				
Instrumentation Installation	Visual Observation	During Installation	Continuous (TCG)	Visual Observation	Continuous (Golder)

Notes:* denotes QA review undertaken during QC testing.

Table 13: Summary of Slurry Trench Excavation and Soil-Bentonite Backfill QC/QA Testing Frequency and Monitoring

Construction Item	Test Description	Minimum Testing Requirement and Frequency (Specification S6 Table 13)	QC Tests Performed (by)	Minimum Testing Requirement and Frequency (Specification S6 Table 12)	QA Tests Performed (by)
Water for Slurry Mixing	pH	1 (1 per source)	1 (Inquip)	Observe 1 every 5 QC tests	2 (Golder), 1 (AEM)
	Hardness	1 (1 per source)	Unknown (Inquip)	Observe 1 every 5 QC tests	n/a
	Total Dissolved Solids	1 (1 per source)	Unknown (Inquip)	Observe 1 every 5 QC tests	n/a
New Bentonite Slurry	Viscosity	34 (2 per shift)	25 (Inquip)	Observe 1 every 5 QC tests	17
	Density	34 (2 per shift)	25 (Inquip)	Observe 1 every 5 QC tests	17
	Bentonite	17	Demonstrated	Observe 1 every 5	Observed

Construction Item	Test Description	Minimum Testing Requirement and Frequency (Specification S6 Table 13)	QC Tests Performed (by)	Minimum Testing Requirement and Frequency (Specification S6 Table 12)	QA Tests Performed (by)
	Content	(1 per shift)	(Inquip)	QC tests	(Golder)
In-trench Bentonite Slurry	Density	34 (2 per shift)	38 (Inquip)	Observe 1 every 5 QC tests	17
	Viscosity	34 (2 per shift)	38 (Inquip)	Observe 1 every 5 QC tests	17
Soil Bentonite Backfill Material	Slump Cone	17 (1 per shift)	42 (Inquip)	Observe 1 every 5 QC tests	17
	Gradation per design mix	21 (1 per 250 m^3)	36 (Golder)	31 (Observe 1 every 5 QC tests)	Same as QC
	Density	17 (1 per shift)	42 (Inquip)	Observe 1 every 5 QC tests	17
	Hydraulic Conductivity	31 (Greater of 1 per 25 m linear trench or per 350 m^3)	34 (Golder)	Observe 1 every 5 QC tests	Same as QC

Table 14: Summary of Grouting QC/QA Testing Frequency and Monitoring

Construction Item	Test Description	Minimum Testing Requirement and Frequency (Specification S6 Table 11)	QC Tests Performed (by)	Minimum Testing Requirement and Frequency (Specification S6 Table 12)	QA Tests Performed (by) [average per hole]
Location and Extents	Grout Hole Collar Survey	Each Hole (570 total)	533 – By AEM. Quaternary holes not surveyed.	1 every 10 QC tests	n/a
Equipment Calibration	Calibration Checks (pressure transducer and gauges)	1 per week against a reference pressure gauge	Only as required if gauge readings off. No records.	1 every 5 QC tests	n/a
	Calibration Checks (flow meters)	1 per week against a known volume container	Only as required if meter readings off. No records.	1 every 5 QC tests	n/a

Construction Item	Test Description	Minimum Testing Requirement and Frequency (Specification S6 Table 11)	QC Tests Performed (by)	Minimum Testing Requirement and Frequency (Specification S6 Table 12)	QA Tests Performed (by) [average per hole]
Grout Mix	Marsh Funnel	1 at the initiation of injection of every stage, and thereafter, at every change of mix	none reported (TCG)	1 every shift, per grout plant carrying out injection grouting (day shift and night shift)	1058 total – Mixes A, A*, B, C, D, MF (Golder) [1.9]
	Lombardi Cohesion – replaced by Pilcon Vane as per email to G.Blanchette from B.Wickland (Aug 26, 2008)	No revised QC frequency during grouting works for Pilcon Vane specified	none reported (TCG)	No revised QC frequency during grouting works for Pilcon Vane specified	Only utilized during Mix Testing
	Mud Balance	1 at the initiation of injection of every stage, and thereafter, at every change of mix	none reported (TCG)	1 every shift, per grout plant carrying out injection grouting (day shift and night shift)	960 total – Mixes A, A*, B, C, D MF (Golder) [1.7]
	Bleed	1 at the initiation of injection of every stage, and thereafter, at every change of mix	none reported (TCG)	1 every shift, per grout plant carrying out injection grouting (day shift and night shift)	702 total – Mixes A, A*, B, C, D, MF (Golder). [1.2]
	Mix Water and Grout Mix Temperature	1 at the initiation of injection of every stage, and thereafter, at every change of mix	none reported (TCG)	1 every shift, per grout plant carrying out injection grouting (day shift and night shift)	810 total Mix Water Temperature (Golder) [1.4]) 934 total Grout Mix Temperature (Golder) [1.6]
	Strength Testing	1 at the initiation of injection of every stage, and thereafter, at every change of mix	none reported (TCG)	1 every 5 QC tests	n/a

Details of the QC and QA activities by task are summarized below.

3.1 Turbidity Barrier

The QC activities during turbidity barrier installation consisted of visual inspection during deployment to ensure sediments migration is reduced during construction activities. Turbidity barriers were installed by AEM on the downstream and upstream side of the East Dike under QC supervision of the CM. Golder was not present on site during deployment of the turbidity barriers and could not provide QA observations or comment on the turbidity barrier installation.

Removal of turbidity barrier was undertaken after earthworks construction was completed at the end of September 2008.

3.2 Initial Rockfill Shell Placement

QC activities during initial rockfill placement consisted of visual observation of the material gradation, material placement technique, confirmation that material type was NPAG rockfill and ensuring placement and extent is as shown on the Drawings. QA activities consisted of visual observation of the gradation and material placement. The initial rockfill was placed by AEM under the QC supervision of the CM. The rockfill consisted of 1.0 m minus rockfill from the on-site quarry. The QA team arrived on site on August 9, 2008, and was not on site during initial rock fill placement from July 31 to August 8, 2008.

Following the initial rockfill shell placement, re-sloping of the exterior shell and safety berm construction was carried out by AEM.

3.3 Trench Excavation

The QC and QA activities during excavation of the cut-off trench consisted of:

- Visual observation during trench excavation;
- Bathymetry surveys to measured dimension of excavation trench;
- Analysis of bathymetry noting areas requiring additional side wall and base cleaning and areas of potential sidewall failures or failures;
- Visual inspection during post cleaning;
- Additional survey as required post cleaning; and
- Detailed bathymetry in deep excavation areas in 1.0 m cross lines.

QC observation was continuous by during trench excavation by the CM, excavation to bedrock was inferred by sound and refusal of excavator bucket. Golder QA personnel were not on site during initial trench excavation from about Sta. 60+070 to Sta. 60+320. Trench excavation in this area was surveyed prior to coarse filter placement as noted in the foundation preparation QC/QA inspection forms in Appendix C.

QA review included noting localized areas which required additional cleaning after bathymetry survey review. The minimum excavation base width of 5.0 m was generally respected. Between Sta. 60+ 460 and Sta. 60+540, which were some of the deepest excavation, some difficulty was encountered in cleaning the base of excavation due to equipment reach limitations. Following review of the as-built excavation extents, an alignment modification was required to ensure the wall was located away from the filter and at the base of the trench.

3.4 Coarse Filter Placement

QC and QA activities for the coarse filter placement included:

- Foundation approval of the downstream trench sidewall;
- Granular coarse filter material for placement based on visual observation of the gradation;
- In-situ QC samples taken to assess particle size distribution; and
- As-built survey of coarse filter placement.

QA review of the excavation bathymetry survey was carried out for foundation approval to proceed with coarse filter placement. Due to instability of the downstream slope of the trench between about Sta. 60+070 to Sta. 60+320, FGL placed Coarse Filter material before Golder had time to evaluate the excavation bathymetry data.

QC testing by Golder for the East Dike coarse filter grain size analysis including envelope limits as specified in the technical specifications by Golder is summarized and presented in Figure 2. Laboratory results for grain size distribution for each sample are presented in Appendix B. The results indicate that gradation of the samples of coarse filter material placed was on the finer side of the specification.

The technique used to place the coarse filter included a final clean up of the slope prior to placement of the coarse filter and this did not allow for true thickness of the coarse filter placed to be measured. Based on the bathymetry survey data collected of the post-filter installation and visual observations by the QA manager, the following areas were noted to potentially have less than the specified thickness of 1.0 m CF material:

- Stn. 60+150 to Stn. 60+200;
- Stn. 60+390 to Stn 60+410;
- Stn. 60+500 to Stn. 60+540; and
- Stn. 60+600 to Stn. 60+700.

The QC and or QA fill placement sign off for the coarse filter placed between Stn. 60+640 to Stn. 60+ 840 was not completed due to time constraints. The approval for this section was limited to a field review.

3.5 Trench Backfill

The trench backfill consisted of core backfill and granular crushed rockfill wing material placement. The QC and QA activities for the trench backfill included:

- Foundation approval of the trench base and sidewalls after coarse filter installation;
- Visual observation of the material for gradation and placement technique;
- In-situ QC samples taken to assess particle size distribution; and
- As-built survey of backfill.

Core backfill material was prepared and stockpiled prior to construction. AEM carried out QC gradation testing of this material in July 2008, the results of which should be provided to Golder to complete this report.

AEM and FGL placed core backfill prior to QA approval of the area between Stn. 60+470 and Stn. 60+610.

Foundation approval by the QA managers was given after review of the trench bathymetry data and generally immediately backfilled by FGL. To increase trench backfill rate, AEM commenced with a second backfill operation which was advanced from the north end of the dike starting on August 27, 2008. Foundation preparation of the material was approved by the QC and QA manager and is recorded in the inspection forms in Appendix C.

QC testing on site of in-situ core backfill samples for grain size analysis by Golder is summarized in Figure 3 including envelope limits as specified in the technical specifications. Two samples of core backfill were transported to the Golder Burnaby, B.C. laboratory for particle size distribution testing. Laboratory results for grain size distribution for samples tested on and off site are presented in Appendix B. Base on QC/QA review the particle size analysis results, the material meet the specification for core backfill.

3.6 Granular Cap and Core Backfill Raising

QC and QA activities for raising the granular cap and core backfill zone to minimum Elev. 135.1 m included:

- Ensuring the limits and extents of material placement is to the lines and grades as shown on the drawings and material type conforms to the technical specifications;
- Visual observation of maximum particle size;
- Material placement technique and lift thickness suitable; and
- As-built survey of granular cap.

Visual observation by the QA manager indicates a combination of 150 mm minus crush rockfill and 200 mm minus fine quarry run material flanked the 4.0 m nominal width core backfill.

As-built survey has not been provided at the time of this report and is understood that survey was not completed. Interpolated granular cap extent and elevations have been used based on existing data from the contractor and AEM.

QA manager observed compaction of the granular cap and core backfill using a smooth drum vibratory roller prior to densification.

3.7 Densification

For densification of the core backfill zone, QC activities were completed be Geopac and QA activities by AEM, and included:

- Ensuring the densification work is executed as shown in the contractor QC work plan;
- As-built survey of craters prior to backfill; and
- Visual gradation of crater backfill material.

Geopac undertook a total of 4 phases of dynamic compaction. Review of the survey data indicates that Phase 1 and Phase 2 pattern were approximately 4 m offset from center line and included center line compaction pattern of 154 craters. Phase 3 outer edge of compaction was offset approx 5.5 m with no center line densification for 165 craters. The Phase 4 pattern was closer at 3 m offset from centerline and 160 craters were completed. Between each phase of densification, AEM backfilled the craters with 20 mm minus rockfill core backfill material. A summary of backfill quantities and crater depth is presented in Table 15. For the four phases of compaction, a total of an additional 1,620 m^3 of core backfilled was added to the dike. This is estimated to have increased the density of the core backfill zone by approximately 7%, however, no density measurements of the core backfill zone were made either before or after dynamic compaction to confirm this.

Table 15: Densification Crater Depth and Backfill Quantity

Phase No.	Minimum Crater Depth (m)	Maximum Crater Depth (m)	Average Crater Depth (m)	Estimated Backfill Volume (m^3)
1 and 2	0.50	1.61	1.03	950
3	0.22	0.96	0.67	500
4	0.15	0.89	0.26	170

3.8 Slurry Supported Cut-off Wall Excavation

Construction QC and QA activities during the cut-off wall excavation consisted of:

- Visual inspection of excavation materials including soils, boulders and rockfill from the trench;
- Sounding of the base of the trench at a minimum spacing of 3 m;
- Review of the sounding depths vs. initial trench excavation depth information.

A bentonite slurry was used to support the cut-off wall excavation through the core backfill material. QC and QA were carried out to confirm that the cut-off wall excavation was at or below the initial trench excavation for the core backfill. Rockfill and lakebed material was occasionally observed during excavation. Sounding of the trench base was completed at 3 m spacing. The width of the trench is approximately 1.1 m based on the width of the toothed and smooth buckets used for excavating the core backfill and cleaning the bedrock surface, respectively. Survey of excavation limits were not completed during the excavation and backfilling process. An assumed excavation of 1.1 m is used for the drawings and quantities.

No major slurry losses were reported by Inquip during the slurry supported excavation. The effort to excavate the core backfill zone was generally consistent over the range of thicknesses excavated. These observations supports that a sufficient degree of densification was applied to the core backfill zone to facilitate slurry wall construction.

3.9 Soil-Bentonite Backfill

The construction QC and QA activities during soil-bentonite backfill consisted of:

- Water quality, slurry quality, SB backfill quality is in conformance with the slurry trench QC Testing Plan and frequency;
- Ensure that during placement of SB backfill that it did not reach the current slurry trench excavation;
- Ensure extent is to the lines and grades as shown on the drawings; and
- As-built survey of SB backfill.

The field QC of the cut-off wall was completed by the slurry trench specialist Inquip under QA supervision of Golder. The QC permeability test results were tested by Golder in the on-site laboratory. The tests were generally terminated in less than 24 hours and the results based on this time indicated an average hydraulic conductivity of 4.6 x 10^{-9} m/s over 34 tests conducted during construction. Two (2) permeability tests (samples 38 from Stn. 60+191 and sample 49 from Stn. 60+389) were performed in Golder Burnaby Laboratory under applied pressure of 100 kPa and 165 kPa. The results indicate values between 1 x 10^{-8} m/s and 2.8 x 10^{-8} m/s. Figure 5 shows the summary of the hydraulic conductivity test results along the cut-off wall alignment.

Samples of the in-trench SB Backfill materials tested indicates an average wet density of 2105 kg/m^3 which meets the specified criteria of greater than 240 kg/m^3 of the in-trench bentonite slurry (1290 kg/m^3 to 1460 kg/m^3 minimum required). The average dry density of the soil-bentonite samples tested was 1789 kg/m^3.

During QA observations of the SB wall construction, an ice layer of up to 1.0 cm was witnessed on the surface of the slurry in some mornings during late September. For the first days of cold weather, removing the ice was attempted with the dozer along with hand shovels, however not all of the ice was removed and ice was present as new soil-bentonite was pushed into the trench. On the four cold days and onward, the ice was then removed using rates and shovels which removed most of the ice crust over the bentonite slurry. The soil-bentonite and bentonite enriched till was witnessed to have a frozen crust of up to 0.1 m on the surface in the mornings. This frozen layer was scrapped off with the dozer and pushed to the side of mixing pad.

Water, slurry and soil-bentonite quality testing frequency is summarized in Table 13.

The results from the QC field testing by the contractor and QC laboratory testing by Golder is summarized in Table 16 and Table 17, respectively.

Table 16: Slurry Trench QC Testing Result Summary

Property	Requirement	Test Results	Comments
Water for Slurry			
a) pH b) Hardness c) Total Dissolved Solids	6 to 9 <250 ppm <500 ppm	6 to 7 Unknown Unknown	Single source: near slurry ponds at north abutment.
New Bentonite Slurry			
a) Viscosity b) Density c) Bentonite Content	45 to 55 marsh seconds >1025 kg/m^3 >4%	41 to 53 marsh seconds 1020 to 1120 kg/m^3 unknown	
In-Trench Bentonite Slurry			
a) Density b) Viscosity	1025 to 1250 kg/m^3 >40 seconds	1050 to 1220 kg/m^3 43 to 65 seconds	
SB Backfill Material			
a) Slump Cone b) Gradation c) Density d) Permeability	50 to 150 mm Per mix design 240 kg/m^3 > In trench slurry <10^{-9} m/s	76.2 to 165.1 mm Refer to Table 11 and Figure 4 2000 to 2160 kg/m^3 Refer to Table 11	

Note: Requirements based on Specification S6 QC and QA requirements Table 13: Slurry Trench QC Testing Plan.

Table 17: Summary of SB backfill QC Laboratory Results

Sample No.	Date Sampled	Sample Location	Hydraulic Conductivity Value (m/s)	Dry Density (kg/m^3)	Wet Density (kg/m^3)
30	07-Sep-08	60+095	5.08×10^{-9}	1682	2083
31	08-Sep-08	60+095	9.90×10^{-9}	1996	2009
32	08-Sep-08	60+100	5.45×10^{-10}	1825	2155
33	08-Sep-08	60+095	3.25×10^{-9}	1890	2168
35	10-Sep-08	60+119	Not tested	-	-
36	10-Sep-08	60+119	6.26×10^{-9}	1744	2097
38 [a]	11-Sep-08	60+191	2.48×10^{-8} [b]	1995	2229
	"	"	2.70×10^{-8} [c]	2016	2253
39	11-Sep-08	60+219	4.80×10^{-9}	1918	2171
40	12-Sep-08	60+242	5.50×10^{-9}	2503	2857
41	12-Sep-08	60+264	3.40×10^{-9}	1766	2103
42	13-Sep-08	60+305	1.78×10^{-9}	1853	2171
43	13-Sep-08	60+314	3.07×10^{-9}	1933	2205
46	14-Sep-08	60+347	5.63×10^{-9}	1803	2095
47	15-Sep-08	60+368	4.54×10^{-9}	1744	2088
48	15-Sep-08	60+377	1.10×10^{-9}	1754	2072
49 [a]	16-Sep-08	60+389	1.33×10^{-8} [b]	1957	2183
	"	"	1.04×10^{-8} [c]	1973	2201
50	16-Sep-08	60+401	2.91×10^{-9}	1784	2133
51	17-Sep-08	60+435	9.30×10^{-10}	1768	2088
52	17-Sep-08	60+450	1.16×10^{-9}	1787	2110
53	18-Sep-08	60+490	Not tested	-	-
54	18-Sep-08	60+512	1.48×10^{-9}	1760	2061
55	18-Sep-08	60+530	1.26×10^{-9}	1681	2049
56	19-Sep-08	60+545	1.75×10^{-9}	1686	2049
57	19-Sep-08	60+093	1.20×10^{-9}	1798	2100
59	19-Sep-08	60+567	1.89×10^{-9}	1621	2002
60	20-Sep-08	60+585	1.71×10^{-9}	1647	2030
61	20-Sep-08	60+594	7.09×10^{-10}	1695	2077
62	20-Sep-08	60+624	3.53×10^{-9}	1641	2022
63	21-Sep-08	60+651	8.39×10^{-10}	1646	2031
64	21-Sep-08	60+675	6.70×10^{-10}	1811	2160
65	21-Sep-08	60+699	7.22×10^{-10}	1551	2002
67	22-Sep-08	60+726	6.32×10^{-10}	1719	2073
68	22-Sep-08	60+765	9.30×10^{-10}	1683	2046
69	23-Sep-08	60+852	3.35×10^{-10}	1912	2178

Note: [a] denotes an aged sample which was tested in off-site laboratory under tri-axial loading.

[b] denotes under 100 kPa.

[c] denotes under 165 kPa.

3.10 Grouting

Quality of the mix during preparation was maintained by producing the mixes in as repeatable a manner as possible. The volume of water added to the colloidal mixer was measured at each mix plant using a totalizing, flowmeter. The volume of superplasticizer or cold weather admixture (accelerator), when added, was measured using a graduated cylinder. Cement was added to a batch on a per bag basis, and finally, bentonite, in its dry form was pre-hydrated at a 6% solution, with the bentonite weighed out prior to mixing using an electronic scale. Bentonite was allowed to pre-hydrate for a minimum of 12 hours prior to use in any grout mix.

Quality of the grout mixes prior to injection was controlled in-situ by regularly sampling the mixed grout and carrying out a Marsh Funnel viscosity measurement (Photograph 88). At the same time, the density of the grout mix was recorded using a mud balance (Photograph 89), and a sample of the mix was taken to determine the percent bleed after a two-hour period. Bleed was measured as the decantation of clear water at the top of a 500-ml graduated cylinder (Photograph 90). Additionally, set times were measured during mix testing using a Pilcon Vane tester (Photograph 91).

The recorded Marsh viscosity, specific gravity and bleed measurements are presented as histograms, separated by mix type, to demonstrate the consistency of the quality of the mixing carried out during the grouting program in Appendix E4. Average values for Marsh Viscosities are summarized in Table 18.

Table 18: Summary of Measured Marsh Viscosities

Mix	Specified	Average Measured Values	
	(sec)	Mean Value (sec)	Standard Deviation (sec)
A	31.5	32	1.3
B	35	36	1.8
C	45	46	1.1
D	60	64	8.9
MF	31.5	32	1.0

3.11 Instrumentation

Instrumentation locations were specified on the construction drawings. TCG carried out the instrumentation installation after the start of lake dewatering. Instrumentation installed included piezometers, slope inclinometers, thermistors, crest survey prisms and survey monitor control points. QA/QC of instrumentation installation included:

- Review of piezometer, slope inclinometers and thermistor installations;
- Direction and details for installation of the survey monitor control points; and
- Specifying and review of grouting mix used to backfill instrumentation boreholes.

Appendix F presents the following instrumentation information:

- Vibrating Wire Pressure Transducer Calibration Record Sheets;
- Vibrating Wire Pressure Transducer Plots - March to August 2009; and
- Thermistor Data Plots - April to August 2009.

Additional piezometers were installed in the deeper section June and July 2009 between Sta. 60+420 and Sta. 60+510 at 10 and 20 m intervals

To date, the crest survey prisms to monitor crest displacements have not been surveyed. AEM has installed a seismograph monitor on the north abutment upstream of the dike location.

3.12 Thermal Cap Placement

QC and QA activities for the thermal cap placement includes ensuring the limits and extents of material placement is to the lines and grades as shown on the drawings and material type conforms to the technical specifications. Elevation was controlled using coloured ribbons along the cut-off trench. Typically, till was placed in a single lift of about 0.3 m to bring the surface elevation to at least El. 135.6 masl. This was followed by a 200 mm minus crush rockfill granular placed by using a 345 excavator and raising this zone to nominal El. 136.1 masl to allow for the grouting operations.

Following grouting operations, AEM raised the downstream rockfill shell and placed some of the remaining thermal cap fill with the dike crest currently at about El. 136.6 masl as shown on the drawings. Following placement of the final thermal cap to El. 137.1 masl, as-built survey should be completed and the drawings updated.

3.13 QC and QA Summary

Construction items which met the requirements of the Technical Specifications included all fill materials, fill material placement, slurry supported excavation, soil-bentonite backfill, and grouting materials.

Based on the method of placement for the Coarse Filter zone, an accurate survey of the actual thickness placed was not achieved and this is noted on the as-built drawings.

Construction items which did not fully meet the requirements of the Technical Specifications included the confirmation of excavation to bedrock, full survey pickup of all fill zones placed, detailed records and survey for the installation of the grouting casings, and quality control testing during grouting.

The method for contact grouting between the soil-bentonite wall and the grouted bedrock foundation that was executed was not as designed and this is discussed further in Section 5.2.

The turbidity barrier failed to contain the TSS in the second portage lake to below the expected levels, partially as a result of the location of the barrier, the high winds and lake currents. AEM and Golder undertook a detailed review of the TSS issues during construction which have been used to prepare a turbidity barrier design for the next dike construction at Meadowbank.

The QC and QA programs evolved with the project as works proceeded and in the future this should be work out ahead of construction. Overall, an acceptable level of QC and QA effort was undertaken as intended in the Technical Specifications.

Not all survey has been completed or received by Golder for QA review and inclusion in the as-built drawings. Survey of the final surfaces and the as-built location of the installed seismograph should be completed and the as-built drawings updated.

4.0 GROUND IMPROVEMENT ACHIEVED THROUGH GROUTING

4.1 General

Following the dike earthworks completed by October 2008, grouting of both the bedrock and contact zone between the SB wall and grouted bedrock was required. As presented in Section 2.11 the grouting contractor proposed a modified contact grouting method which required a series of trials to confirm effectiveness and to develop appropriate procedures. The final method advanced was based on four stages of grouting (Golder 2008a). Stages 1, 2 and 3 were located within bedrock, while Stage 4 was located above the bedrock at the base of the cut-off wall contact.

During the design of the East Dike grouting program, given that the method of construction of the East Dike was via a soil-bentonite cut-off wall excavated through the overlying overburden materials to the underlying, closely fractured, near surface bedrock, it was recognized that the injection of the contact zone between the base of the cut-off wall and the near surface bedrock was one of the most critical components of the program. The contact zone would require grouting to achieve suitable low hydraulic conductivity and prevent erosion at the base of the wall under the expected seepage gradients.

The methodology behind contact grouting was initially planned to be carried out via tube-a-manchette grouting techniques. Originally, the top of Stage 2 was to have been the uppermost stage of bedrock injection. Following the injection of Stage 2, a plastic tube-a-manchette was to have been installed, the casing backfilled with a weak to very weak casing grout, and then pulled back to expose the portion of casing installed through the fractured bedrock and across the bedrock and cut-off wall interface.

The intent of the contact grouting program was to improve the closely fractured, near surface bedrock at the base of the cut-off wall. During construction, it is possible that because of the stiffness of the overburden materials, and the unevenness of the underlying bedrock surface, it may not have been possible to excavate the cut-off trench completely to bedrock, leaving behind some of the overburden materials, known to have sand lenses randomly distributed, even beneath stiffer layers of till. Equally, all of the near surface, closely fractured bedrock, possibly containing exfoliation joints infilled with silt and/or clay sized materials, could not be removed during construction of the cut-off wall. The use of tube-a-manchette grouting techniques, installed across this zone, is a proven technique for improving ground conditions in such circumstances.

Given the extreme cold in which the East Dike grouting program was carried out, it was recognized that this may not have been possible with the drilling equipment available to the contractor to execute the design grouting. One key factor was that the installed casings became frozen into the crest of the dike almost immediately following installation. As such, in the interest of carrying out the works during the winter months, so that dewatering could commence as scheduled in the spring of 2009, the Contractor and Owner presented options, including the use of the contact casing perforator, to improve efficiency while attempting to achieve the same end result.

Therefore, for the purposes of the closure of this contact zone, the injection of Stages 3 and 4, out the bottom of the installed casing and through the perforated interval above the depth to which the casing was installed, are considered to be the two stages located “across” the contact. Stages 1 and 2 are considered to be located within bedrock.

The grouting closure objectives of the East Dike, as stated in the Specifications, were for a target average of 4 Lugeons (approx. 7×10^{-7} m/sec), and with no single test greater than 7 Lugeons (approx 2×10^{-6} m/sec). Because of the limited available information, this target was to have been confirmed by water pressure testing carried out at regular intervals before and between sequences of grouting for each stage. However, because of time constraints, only a limited number of water pressure tests were carried out for comparative purposes. The closure criteria within bedrock was based on achieved penetrability and grout take with associated hydraulic conductivity, and in the contact zone on volume of grout injected and final injection pressure achieved in tertiary grout holes.

4.2 Water Pressure Testing

4.2.1 In Bedrock

Table E5-1, Figures E5-1 and E5-2 in Appendix E5 summarize the limited number of constant rate (Lugeon-type) water pressure tests were carried out within Stages 1 and 2 of tertiary grout holes in bedrock.

Through the North Channel, South Channel and North Shallows work areas, water pressure testing was carried out every 9 to 10 tertiary grout holes (or approximately every 30 m). The water pressure testing purposely focussed on carrying out tests beside adjacent zones of elevated grout takes in primary and secondary grout holes, recognizing that results below the target Lugeon-values indicate that stages with lower grout takes than those beside which testing was carried out are considered to be closed.

The water pressure tests indicate that following secondary grouting, the average hydraulic conductivity adjacent to zones with grout takes < 200 L/min have an average of 3×10^{-6} m/sec. Anomalous testing results, those greater than 7 Lugeons, and the subsequent achieved penetrabilities and grout takes within those stages are listed in Table 19.

Table 19: Water Pressure Test Results in Stages 1, 2: Greater Than Target 7 uL

Hole	Stage	From (m)	To (m)	Lugeons (uL)	Hydraulic Conductivity (m/s)	Grout Take (L/m)	Achieved Penetrability (L/min/m/bar)
60+186.5	2	10.7	13.2	238	2.0E-05	300.4	92.8
60+207.5	2	9.8	12.3	71	7.0E-06	1.6	0.02
60+228.5	1	12	19	8	1.0E-06	148.4	0.03
60+246.5	1	10.4	17.4	9	1.0E-06	12.2	0.03
60+246.5	2	7.9	10.7	157	2.0E-05	99.1	0.06
60+357.5	1	12.6	17.6	15	1.8E-06	77.6	0.03
60+438.5	1	15.1	22.1	8	1.0E-06	31.3	0.05
60+513.5	1	12.7	19.8	13	1.7E-06	16.0	0.01
60+513.5	2	10.3	12.8	72	8.0E-06	8.6	0.03
60+528.5	2	11.9	18.9	243	3.0E-05	300.6	Infinity
60+543.5	2	9.4	11.9	29	3.0E-06	61.2	0.02
60+618.5	2	10.7	17.7	205	2.0E-05	6.0	0.04
60+642.5	2	8.5	11.5	47	5.0E-06	10.9	0
60+669.5	2	9.3	11.8	11	1.0E-06	9.7	0.01

Hole	Stage	From (m)	To (m)	Lugeons (uL)	Hydraulic Conductivity (m/s)	Grout Take (L/m)	Achieved Penetrability (L/min/m/bar)
60+687.5	2	8.9	11.4	18	2.0E-06	143.9	0.08
60+753.5	2	6.1	8.9	15	2.0E-06	6.0	0.05

4.2.2 Across Contact

Water pressure testing of tertiary Stage 3's was not carried out due to time constraints and more importantly, because the majority of adjacent primary and secondary grout holes were not closed. At that time, it was believed that injection grouting carried out through the bottom of the casing was connecting with the soil-bentonite / bedrock interface, and any significant improvement would only be observed during injection grouting of Stage 4.

A select number of single step, water pressure tests in Stage 4 were carried out prior to and following injection grouting of tertiary Stage 4's. The tests carried out are summarized in Table E5-2 in Appendix E5. Initially, these abbreviated tests were carried out before the injection of grout to determine if injection should be started with microfine or Type HE cement. However, after several tests were carried out, it was determined that starting the injection of tertiary Stage 4's with Type HE grout mixes was inappropriate. No conclusive relationship between when to start with microfine versus Type HE could be established and the stages started with Type HE grout mixes closed off too quickly. As the original objective of tertiary grouting of Stage 4's was to seal any potential sand lenses within any overburden materials left in place during the construction of the cut-off wall, it was decided that all injection grouting of tertiary Stage 4's be commenced with microfine cements and thickened to Type HE mixes if necessary.

Abbreviated water pressure test carried out near the completion of tertiary Stage 4 injection did not prove to be an appropriate means of assessing closure along the contact and as such, a more rigorous approach, as discussed in Section 4.3.2, looking at grout takes and pressures achieved in comparison to the anticipated active head of water at the base of the cut-off wall was carried out.

4.3 Closure Achieved

4.3.1 In Bedrock

Closure within bedrock (Stages 1 and 2) was defined as having a penetrability of less than 0.1 L/min/bar/m stage length at the specified maximum injection pressure. Based on the limited number of water pressure tests carried out, this criteria was determined to be an effective measure of closure.

Figures E3-1 through 9 in Appendix E3, and as shown on Figures E6-1 and E6-2 in Appendix E6 present results which show that the majority of Stages 1 and 2 were closed after primary and secondary grouting was carried out.

Tertiary grouting was carried out in all work areas to 5 m depth below the inferred bedrock/overburden contact. Tertiary grout holes were extended at least one stage below all primary and secondary grout holes with grout takes of greater than 200 L/m regardless of achieved penetrability.

As discussed in Technical Memorandum TMO No. 836 "Quaternary Grout Holes – Meadowbank Gold Project", quaternary grout holes were specified on either side of 17 tertiary grout holes based on the detailed inspection of real time P-Q charts. Where grout takes were greater than 200 L/m and the tendency of the stage injected was not trending towards closure, or where conditions such as collapsing boreholes or connection between borehole during drilling and grouting of Stages 1 or 2 were observed, additional quaternary grout holes were specified.

Figure E6-1 shows that no tertiary or quaternary Stage 1's remained unclosed.

Following the completion of quaternary grouting, as summarized in Table 20, four locations of Stage 2 injection grouting were not closed.

Table 20: Quaternary Stage 2 Injection: Not Closed

Work Area	Hole	Stage	From (m)	To (m)	Length (m)	Volume (L)	Final Pressure (bar)	Grout Take (L/m)	Penetrability (L/m/min/bar)
South Channel	60+187.25	2	13.4	8.9	4.5	1350	2	300	0.98
North Channel	60+443.75	2	14.2	11.7	2.5	995	3.2	290	1.8
North Channel	60+473.75	2	17.8	13.3	4.5	725	1.7	310	2.0
North Shallows	60+649.25	2	11.2	8.7	2.5	751	2.6	300	1.67

4.3.2 Across Contact

The method of injection across the contact zone, out the bottom of the casing for Stage 3, was believed to have been injecting some of the surrounding bedrock into which it was installed, but most likely up the annular space of the casing within bedrock and along the base of the cut-off wall and the inferred top of bedrock. Using an injection pressure of 3 bar within primary and secondary Stage 3's, the contact zone was purposely hydraulically jacked to force grout along this interval. As such, no improvement in achieved injection pressures was anticipated between primary, secondary and even tertiary Stage 3's. Figure E6-3 shows that at the quaternary stage of injection, 8 holes remained unclosed in Stage 3 as summarised in Table 21.

Table 21: Stage 3 Injection: Not Closed

Work Area	Hole	Stage	From (m)	To (m)	Length (m)	Volume (L)	Final Pressure (bar)	Grout Take (L/m)	Penetrability (L/m/min/bar)
South Channel	60+218.75	3	10.4	9.4	1	603.3	1.8	603.3	12.6
North Channel	60+422.75	3	11.1	10.1	1	601.9	1.1	601.9	8.15
North Channel	60+443.75	3	11.7	10.7	1	601.3	2.17	601.3	4.93
North Channel	60+473.75	3	13.3	12.3	1	660.2	0.5	660.2	27.12

Work Area	Hole	Stage	From (m)	To (m)	Length (m)	Volume (L)	Final Pressure (bar)	Grout Take (L/m)	Penetrability (L/m/min/bar)
North Channel	60+476.75	3	12.8	11.8	1	600	0.84	600	12.49
North Channel	60+523.25	3	9	8	1	600.5	1.6	600.5	6.74
North Channel	60+527.75	3	9.8	8.8	1	601	2.4	601	3.8
North Shallows	60+620.75	3	8.9	7.9	1	601.1	1.63	601.1	6.28

Table 22 lists, by work area, the approximate water head anticipating to be acting across the base of the cut-off wall upon dewatering. The selected injection pressure of 1.5 bar for tertiary Stage 4's (most notably in the South Channel, North Channel and North Shallows) is greater than 1.9 times that of the acting head.

Table 22: Expected Water Head Across Base of Cut-off Wall

Work Area	Water Pressure Head (m H20)	Water Pressure (bar)	Specified Injection Pressure for Stage 4 (bar)	Ratio: Injection Pressure to Water Head
South Abutment	1	0.10	1.5	15
South Channel	6	0.58	1.5	2.6
Island	1.5	0.15	1.5	10
North Channel	8	0.78	1.5	1.9
North Shallows	5	0.48	1.5	3.1
North Abutment	1	0.10	1.5	15

Very limited to no tertiary Stage 4’s were injected along abutments and through the island section.

Figure E6-4 shows the progression of stages considered to be closed from primary and secondary to tertiary Stage 4's. In the interest of schedule, and as it was anticipated that many of the primary and secondary Stage 4's would be limited by volume, the two sequences were injected as the same sequence (*i.e.,* essentially as primaries only). Thus tertiary Stage 4's were essentially only the secondary sequence of Stage 4 injection. As expected, by inspection of Figure E6-4, no significant difference in the histograms of achieved ground improvement is noticeable between primary and secondary Stage 4's. However, the difference between these two sequences and the tertiary Stage 4's, and in particular the closure pressures achieved is very noticeable. Of the 45 tertiary Stage 4's that had grout takes > 200 L/m, 38 of these stages achieved an injection pressure of > 1.2 bar. As listed in Table 23, only seven tertiary Stage 4's had grout takes of greater than 200 L/m and <= 1.2 bar.

Table 23: Stage 4 Injection: Not Closed

Work Area	Hole	Stage	From (m)	To (m)	Length (m)	Volume (L)	Final Pressure (bar)	Grout Take (L/m)	Penetrability (L/m/min/bar)
South Channel	60+219.5	4	8.88	8.28	0.6	322.7	1.04	322.7	0.04
South Channel	60+228.5	4	7.94	7.34	0.6	609.7	1.08	609.7	7.63
North Channel	60+408.5	4	9.16	8.56	0.6	278.5	1.09	278.5	0.62
North Channel	60+411.5	4	9.16	8.56	0.6	601.4	1.2	601.4	7.63
North Channel	60+426.5	4	9.46	8.86	0.6	603	0.97	603	10.91
North Channel	60+513.5	4	9.18	8.58	0.6	882.2	1.13	882.2	9.81
North Channel	60+576.5	4	8.57	7.97	0.6	236.7	1	236.7	0.89

Note: Stage 4 grout takes calculated for a 1 m injection stage length. Listed values for “from” and “to” are based on perforated zones.

4.4 Grouting Summary

The main grouting activities were completed on March 18, 2009 and downstream lake dewatering began on March 17, 2009. A summary of the as-built grouting details up to March 18, 2009 are presented on the cross section in Figures E3-1 through 9 in Appendix E. Out of the total of about 1850 stages of grout injection completed, it is noted that:

- Stage 1 grouting closed;
- Stage 2, a limited number of locations (4) were not closed (Table 20);
- Stage 3, a limited number of locations (8) were not closed (Table 21); and
- Stage 4, a limited number of locations (7) were not closed (Table 23).

Further, it is noted that based on the grouting records from TCG, some locations of the Stage 4 contact zone grouting were located at a higher elevation than the base of the SB cut-off wall, resulting in a potential gap. A more detailed review of these records shall be undertaken and summarized. Additional grouting may be required.

At the abutments and along the island section, no Stage 3 and 4 tertiary grouting was completed. These areas should be reviewed following dewatering and under seasonal thawed conditions, and additional grouting may be required.

5.0 DESIGN MODIFICATION

5.1 Design Modifications during Construction

A number of design modifications were made during construction based on field conditions encountered, procedure changes proposed by AEM or FGL, or from the results of laboratory testing. Technical memorandums (issued from the design office) and site memorandums (issued from the site QA Manager) were prepared to address design modifications. Table 24 presents a list of the design modification documentation.

Table 24: Design Modification Documentation List

Document No.	Document Type	Summary Description	Issued
728	TMO	Design Change - East Dike alignment modification of Set Out Point #1.	06-Aug-08
729	TMO	Design Change – Revised location for Disposal of the material excavated out of the trench, not placed upstream, used to advance leading edge of initial rockfill.	07-Aug-08
730	SCO	Scope Change - Golder requested to undertake Bathymetry QC of excavation	08-Aug-08
739	TMO	Design Change - East Dike alignment modification of Set Out Point #4.	28-Aug-08
744	TMO	East Dike Construction Organization, roles and responsibility.	05-Sep-08
749	TMO	Recommended Bentonite content for the Slurry Cut-off Wall.	05-Sep-08
751	TMO	Design Chance - East Dike alignment modification near 60+510.	11-Sep-08
755	TMO	Outline of the Grouting Method Trail to be undertaken by TCG	29-Sep-08
1	SM	Request for AEM to stop installing casing at 1.5 m spacing and to only installing casing at 6.0 m spacing in the shallow sections of the East Dike until further notice.	05-Oct-08
2	SM	Bedrock drilling and grouting activities between 60+255 and 60+335, and near 60+110 following the completion of grout mix testing.	06-Oct-08
3	SM	Request AEM to stop installing casing at 1.5 m spacing and to only installing casing at 6.0 m spacing in the shallow sections of the East Dike until further notice.	06-Oct-08
6	SM	AEM can install casing at 6 m spacing and start drilling bedrock and grouting south of 60+110, 60+255 to 60+335, and 60+600 to 60+824 once mix testing and monitoring testing is complete.	14-Oct-08
7	SM	Grouting Field Trial Instructions.	15-Oct-08
8	SM	Grouting field trial instructions for determining if casing can be installed closer than 6 m.	16-Oct-08
758	TMO	Instrumentation locations.	05-Nov-08

Document No.	Document Type	Summary Description	Issued
775	TMO	Grouting Procedure.	07-Nov-08
800	TMO	Revised grouting procedure.	11-Dec-08
803	TMO	Bedrock Grouting Closure Criteria	19-Dec-08
9	SM	Bedrock water pressure testing in tertiary or higher order grout holes.	10-Jan-09
10	SM	Required tertiary grout holes between 60+320 and 60+518.	10-Jan-09
11	SM	Procedure for backfilling grout holes.	10-Jan-09
12	SM	Required tertiary grout holes between 60+131 and 60+263.	11-Jan-09
13	SM	Required tertiary grout holes between 60+600 and 60+760.	17-Jan-09
14	SM	Required tertiary grout holes between 60+320 and 60+518.	23-Jan-09
15	SM	Required tertiary grout holes between 60+765.5 and 60+783.5.	29-Jan-09
16	SM	Grouting direction of grout holes between 60+065 and 60+131.	30-Jan-09
17	SM	Required tertiary grout holes, 60+219.5, 60+222.5, 60+225.5, 60+231.5, 60+519.5, 60+522.5, 60+621.5, 60+648.5, 60+726.5, and 60+738.5.	30-Jan-09
18	SM	Grouting direction of grout holes beyond 60+800.	30-Jan-09
19	SM	Required tertiary grout holes, 60+366.5, 60+369.5, and 60+447.5.	01-Feb-09
20	SM	Required tertiary grout holes between 60+114.5 and 60+123.5 and between 60+789.5 and 60+795.5.	02-Feb-09
21	SM	Required quaternary grout holes, 60+473.75, 60+475.25, and 60+476.75.	02-Feb-09
22	SM	Required tertiary grout holes, T126.5 and T129.5.	02-Feb-09
23	SM	Reduction of grout pressure for the North Abutment.	08-Feb-09
24	SM	Required tertiary grout holes, Island.	09-Feb-09
25	SM	Required tertiary grout holes, North Abutment.	10-Feb-09
832	TMO	Contact Grouting Contingency Plan	11-Feb-09
26	SM	Required tertiary grout holes, South Abutment.	11-Feb-09
835	TMO	Contact Grouting Contingency Plan - Update	17-Feb-09
27	SM	Required tertiary holes at 60+534.5	18-Feb-09
28	SM	Required quaternary holes for the South Channel, North Channel, and the North Shallows.	18-Feb-09
836	TMO	Quaternary Grout Holes	19-Feb-09
29	SM	Required quaternary holes following the completion of the quaternary holes listed in Site Memo 28.	24-Feb-09

Document No.	Document Type	Summary Description	Issued
30	SM	South Channel stage 4 tertiary grout holes, cement type and abbreviated water pressure tests.	03-Mar-09
31	SM	South Channel Stage 4 Tertiary grout holes, Revised Injection Procedures, supersede and replaces Site Memo 30.	08-Mar-09
32	SM	North Channel stage 4 tertiary grout holes, cement type and abbreviated water pressure tests.	10-Mar-09
33	SM	North Shallows stage 4 tertiary grout holes, cement type and abbreviated water pressure tests.	12-Mar-09
34	SM	Instrumentation Backfill Grout.	13-Mar-09

Table 25 presents a summary of the Request for Information (RFI) documents issued by the QA Manager to request clarification of work that was not consistent with the technical specifications during on-going construction or general information not available at the time.

Table 25: Summary of Request for Information for East Dike Construction

RFI No.	Date Issued	Brief Description of Question	Dated Answered	Brief Description of Answer
1	10-Aug-08	Request AEM to prepare a written plan of how they will collect the QC and QA data that is required by the Technical Specifications as construction of the East Dike is proceeding in advance of Golder's QA Team being in-place.	10-Aug-08	Verbal answer by CM and action: Will wait until QA team arrive for trench bathymetry survey prior to coarse filter placement.
2	20-Aug-08	AEM requests the excavated trench volume from 60+090 to 60+620.	20-Aug-08	An estimated volume was provided to AEM based on the draft bathymetry.
3	1-Sep-08	Request AEM to provide as-built survey for the crest of the East Dike, before and after coarse filter placement, the limits of core backfill at a crest elevation of 133.6 m and 135.1 m.	Not answered	
4	7-Oct-08	Request AEM to provide start dates for grout mix testing, contact grouting field trial, and bedrock grouting.	7-Oct-08	Contractor awaiting delivery of supplies.
5	16-Oct-08	Request AEM and TCG to provide a preliminary schedule of drilling and grouting activities for the East Dike construction.	23-Oct-08	Preliminary schedule provided by email

5.2 Summary

In summary, minor design modifications were required for the following:

- To address alignment modification in response to field conditions;
- To arrange for Golder QA staff to undertake some of the required QC testing;
- To remove the requirement for placement of excavated rockfill at the upstream dike toe;
- In response to the required construction schedule, the full range of methods specified to confirm that the excavation for the soil-bentonite cut-off wall was founded on bedrock; and
- Grouting concurrently at 3 m primary and secondary spacing with tertiary grouting following at 1.5 m spacing over the specified split spacing sequencing of all primary holes completed ahead of higher order holes.

A major design change was required to address the method of contact grouting between the soil-bentonite wall and the grouted bedrock foundation. The Golder design included a tube-a-manchette method of contact grouting. TCG and AEM proposed a modified method of contact grouting based on using a perforator tool to punch holes in the steel grouting casings to allow for contact grouting. After a number of trials and refinements to this proposed casing injection method, a modified contact grouting procedure using the perforator tool was prepared and executed, as described in this report. The casing injection method for contact grouting was recognized to be an unproven grouting method, with limited flexibility compared to that of a tube-a-manchette method. During discussions to modify the contact grouting method, it was clearly understood by all and accepted by AEM that this change of technology from the design contact grouting method to the casing injection method has added a level of uncertainty to the performance of the dike.

5.3 Design Variances, Lessons Learned and Improvements Made

The construction of the East Dike at the Meadowbank site was the first of two main dewatering dikes required to support open pit mining operations. A number of design variances were made as documented in Section 5.1, a summary of the design variances along with the actions taken and lessons learned in implementing changes is presented in Table 26.

Table 26: Summary of Design Variances during Construction

Item	Action	Lessons Learned
Turbidity Barrier	Failed before end of construction. Did not fully contain high TSS water within Lake.	Completed review of TSS issues and prepared recommendations for next dike construction.
Excavation QC	No QC documentation of foundation excavation	Clear definition and agreement of QC and QA roles and responsibility prior to construction.
Dynamic compaction QC report from Geopac.	No QC documentation, Dynamic compaction survey provided	Add to technical specification.
QC of Soil Bentonite wall: Filter Press limits and testing procedure	Not specified in Technical Specifications. Soil-bentonite backfill material was tested and sand content results recorded in daily reports.	Include filter press parameters in technical specifications.
QC of Soil-Bentonite: wall items as specified in the Technical Specifications: water source hardness, pH and TDS results.	Some parameters tested by Inquip but not formally documented.	Documentation of Specified QC parameters should be included in the contractor daily reports.
Communication between Owner, Engineer and Contractor:	Not all parties used the Request for Information (RFI) system to document written project communications.	For future construction, implement a RFI system, to document flow of information between all parties. Sufficient time and resources are required to control RFI documents
Laboratory set up	Heating, ventilation and running water for QC/QA laboratory testing were insufficient. Minor improvements made during work.	Recommend increase space for personnel and equipment in an elevated and skirted trailer with running water and water disposal tank below the lab. Heating and ventilation should be adequate for year round work.
Minimum gradation for CF and CB.	4 of 6 required gradations completed for CF; 16 of 36 required gradations completed for CB.	Consider revising frequency of QC material testing or increase QC staff resources to complete tasks.
Survey of East Dike to access road tie-in.	QC Survey not provided to QA manager.	Survey collection and distribution should be tracked and forwarded to the required personnel in a timely manner.

Item	Action	Lessons Learned
Survey of : ■ Crushed rockfill wing limits. ■ Core backfill width limit. ■ Soil-bentonite wall width limit. ■ Granular cap. ■ Thermal cap. ■ Rock fill shell limits post construction.	QC Surveys not completed.	Survey should be sufficient to reproduce limits of construction.
Instrumentation	Not completely installed prior to dewatering.	Review Schedule
Grouting QC	Not performed by contractor. More extensive QA testing was undertaken by QA team.	Clear definition and agreement of roles and responsibility prior to construction in a kick-off meeting.
Grout strength testing	Not performed.	Cube moulds or cylinders should be mobilized to site along with materials to construct a proper saline water bath for setting of samples.
Calibration checks on pressure transducers and gauges and flow meters.	Not performed regularly on a weekly basis. Only performed once at the beginning of the program.	Documentation of calibration checks should be included in the contractor reports on a weekly basis.
Surveying (grouting casings)	Contractor did not fully document installation, modifications, and survey details for the grouting casings.	Survey collection and distribution should be tracked and forwarded to the required personnel in a timely manner. Surveying should be completed regularly as work proceeds and casings are installed/cut.
Labelling of installed casings.	Casings marked only on occasion with written indication of chainage.	Weather proof marking of each casings to be carried out immediately after installation.
Protection of casings	Casings prone to damage by heavy equipment after installation.	Proper protection for individual casings required.
Casing supplies on site.	5'' ID casing supply not sufficient on site. Smaller diameter casing used for Quaternary holes resulting in inability to grout perforated Stage 4 within these holes.	Maintain sufficient supply of casing on site during grouting program.

Item	Action	Lessons Learned
Laboratory space and setup for grout mix testing.	Grout samples cured without proper set up of saline water bath. Samples left to set in TCG garage on occasion due to lack of space and proper temperature control.	Include required lab space and saline bath in technical specifications.
Set time determination.	Check on setting time of grouts not regularly performed.	Include set time checking as part of QA/QC requirements in technical specifications.
Storage of cement.	Cement stored in cold sea-containers and not warmed for sufficient periods prior to use.	Transfer responsibility of cement storage from owner to contractor. Maintain storage of cement in large, temperature controlled environment. Cycle cement to grout plant only after sufficient warming.
Bleed measurements	High bleed percentages outside of specified acceptable range noted. Grout mixed for longer periods of time to bring bleed results down.	Proper storage, warming and cycling of cement required.
Freezing of grout holes between drilling and grouting.	Drill pushed too far ahead of grout holes on consistent basis. Re-drilling required throughout the program.	Scheduling of drilling by contractor in a timely manner relative to grouting progress.
Water pressure testing.	Water pressure testing carried out during tertiary grouting phase only.	Include water pressure testing as requirement during primary and secondary phases in addition to tertiary phase.
Grouting technique	Tube-a-manchette (TAM) not utilized for contact grouting. An alternative contact grouting method developed.	Complete trials ahead of construction to refine alternative method

6.0 CONCLUSION

This report has been prepared to present a summary of the East Dike as-built construction information, including the QC and QA records, the as-built drawings, details and recent readings of instrumentation, and a summary of key design changes.

The major construction activities related to the East Dike construction works were carried out between July 2008 and March 2009, and allowed for dewatering to start in March 2009. Earthworks were completed over the short duration of the limited open water season and during suitable construction weather conditions at this site. Grouting works were undertaken during very cold winter conditions, and the method of contact grouting was modified from the design, together which resulted in a significantly longer construction schedule than originally estimated.

Cooperation between the AEM, FGL and Golder resulted in modifications to the design which were implemented during construction. Overall, an acceptable level of QC and QA effort was undertaken as intended in the Technical Specifications and the East Dike has generally been constructed to meet the original design intent in most areas, except the contact grouting method.

A major design change was required to address the method of contact grouting, and a modified contact grouting procedure was prepared and executed, as described in this report. During discussions to modify the contact grouting method, it was clearly understood by all and accepted by AEM that this change of technology from the design contact grouting method has added a level of uncertainty to the performance of the dike.

Details of instrument reading and monitoring frequency during dewatering and into dike operation phase are included in the East Dike Operation, Maintenance and Surveillance (OMS) manual. AEM should follow and update the OMS manual to reflect the performance of the dike during and following dewatering.

6.1 Deficiencies

The following is a list of deficiencies following construction of the East Dike:

- Design of the downstream seepage collection system has not yet been prepared and should be undertaken following topographic survey of the downstream slope area following lake dewatering;
- Crest prisms along the dike crest have been installed to monitor crest displacements, however these have not yet been regularly monitored;
- The thermal cap over the soil-bentonite wall has not been raised to the design elevation of 137.1 masl;
- Seismographs should be installed as presented on the design drawings on the East Dike crest to monitor Portage Pit development blasting effects on the dike;
- Based on the grouting records, some locations of the Stage 4 contact zone grouting were located at a higher elevation than the base of the SB cut-off wall, resulting in a potential gap. Additional grouting may be required; and,
- Survey of the final surfaces should be completed and the as-built drawings updated.

6.2 Dike Performance during Downstream Lake Dewatering

Following construction of the East Dike, downstream lake dewatering was undertaken between March and July 2009, and was recently restarted again in October 2009. Complete dewatering of the lake from the downstream side of dike is expected be complete by the end of 2009.

Two significant events have occurred during the initial dewatering period between March and July 2009. The first event occurred in late May 2009, when monitoring indicated that the downstream lake elevation was not decreasing even though pumping continued at a rate of 60,000 m^3/day, and the piezometers around the 60+490 section indicated anomalous readings. AEM working with Golder and TCG remobilized the grouting crew and between May 25 and June 4, 2009, completed a remedial drilling and grouting works program between about Sta. 60+450 and 520. At this time, additional instrumentation including six vibrating wire piezometers were installed in downstream of the cut-off wall in the north channel area. Following remedial drilling and grouting, the lake dewatering and dike instruments return to expected ranges and dewatering continued. Details of the May 2009 remedial works and contingency grouting planning are presented in Golder (2009).

The second event occurred in late July 2009 when a sinkhole appeared at the crest of the dike in the zone immediately upstream of the soil-bentonite cut-off wall. This sinkhole has since been investigated and backfilled. Further investigations related to these events have been undertaken by AEM and Golder.

As dewatering continues, ongoing review of the instrumentation and dike performance continues to be closely monitored, and AEM continues to have both a contingency grouting plan and supplies ready for implementation.

7.0 CLOSURE

We trust that the information provided to you in this report is sufficient for your needs at this time. Should you have any questions, please feel free to contact us.

Yours very truly,

GOLDER ASSOCIATES LTD.

ORIGINAL SIGNED

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Geotechnical Engineer

ORIGINAL SIGNED AND SEALED

John Cunning, P.Eng., (NWT/NU)
Associate, Senior Geotechnical Engineer

JEK/JCC/lw/ja

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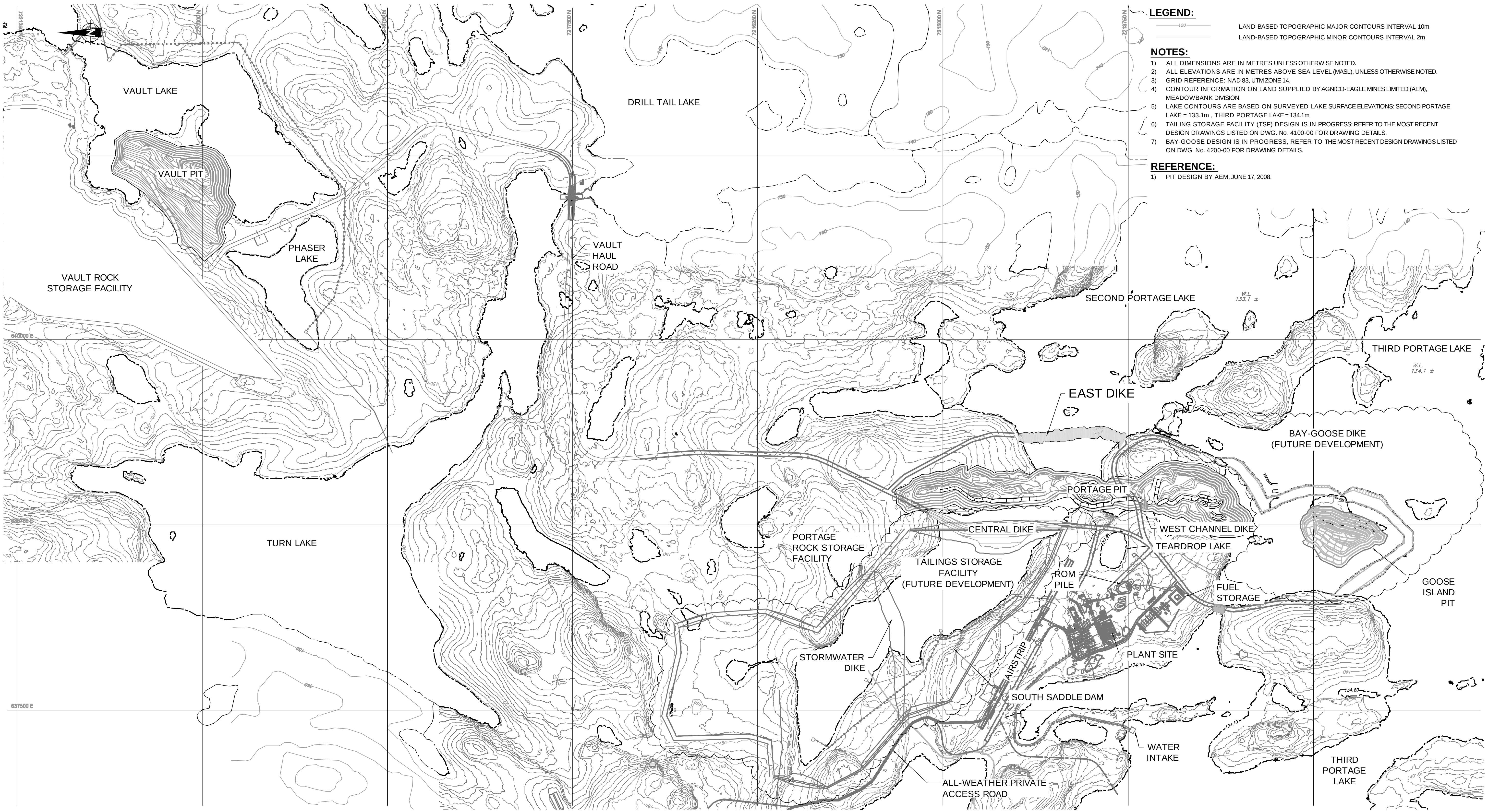
REFERENCES

Golder Associates Ltd. (Golder) 2008. East Dike Design, Meadowbank Gold Project. Report No. 07-14130074/2500/1000 Doc. No. 572 Ver. 0, submitted to Agnico-Eagle Mines Limited, Meadowbank Division, dated October 31, 2008.

Golder Associates Ltd. (Golder 2008a). Technical Memo TMO No. 800 "Proposed Revised Grouting Procedure for the East Dike – Meadowbank Gold Project

Golder Associates Ltd. (Golder 2009). Meadowbank East Dike Grouting Response Plan – Completed Works. Report No. 07-1413-0074 Doc. No. 916 Ver. 0, submitted to Agnico-Eagle Mines Limited, Meadowbank Division, dated July 14, 2009.



LEGEND:

LAND-BASED TOPOGRAPHIC MAJOR CONTOURS INTERVAL 10m
LAND-BASED TOPOGRAPHIC MINOR CONTOURS INTERVAL 2m

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (MASL), UNLESS OTHERWISE NOTED.
3) GRID REFERENCE: NAD 83, UTM ZONE 14.
4) CONTOUR INFORMATION ON LAND SUPPLIED BY AGNICO-EAGLE MINES LIMITED (AEM), MEADOWBANK DIVISION.
5) LAKE CONTOURS ARE BASED ON SURVEYED LAKE SURFACE ELEVATIONS: SECOND PORTAGE LAKE = 133.1m , THIRD PORTAGE LAKE = 134.1m
6) TAILING STORAGE FACILITY (TSF) DESIGN IS IN PROGRESS; REFER TO THE MOST RECENT DESIGN DRAWINGS LISTED ON DWG. No. 4100-00 FOR DRAWING DETAILS.
7) BAY-GOOSE DESIGN IS IN PROGRESS, REFER TO THE MOST RECENT DESIGN DRAWINGS LISTED ON DWG. No. 4200-00 FOR DRAWING DETAILS.

REFERENCE:

1) PIT DESIGN BY AEM, JUNE 17, 2008.

0 200 400 600 800 1000
Scale in Metres

PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE
SITE PLAN

Golder Associates

PROJECT No.	07-1413-0074/2800		FILE No.	FIGURE 1 - SITE PLAN
DESIGN	JEK	27MAY09	SCALE AS SHOWN	REV. 1
CADD	SWD	27MAY09		
CHECK	-	-	Figure 1	
REVIEW	-	-		

CADD FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Figures\dwg\Figure 1 - Site Plan.dwg
REVISION DATE: 09/06/04 09:47AM By: DStover

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

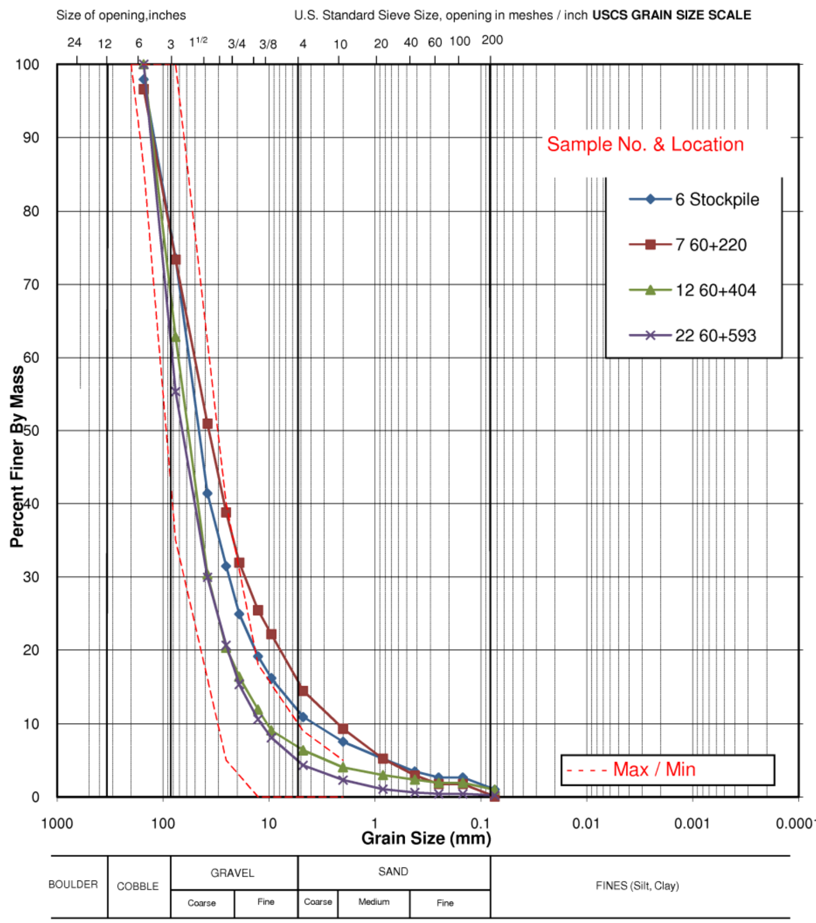
PARTICLE SIZE ANALYSIS OF SOILS

Reference: ASTM D422-63

Project No.:	07-1413-0074/ 2200	**Sample Location:**	**East Dike**
Client:	Agnico-Eagle Mines	**Sample No.:**	As Shown
Project:	Meadowbank	**Depth (m):**	0
Location:	70km from Baker Lake, Nunavut	**Lab ID No:**	0
Visual :	Coarse Filter x	**Other:**	see comment
		Material Specification:	Gradation Limits for Coarse Filter

Specific Gravity (assumed): N/A	**Shape:**	sub- angular	**Method:** SPLIT, WASHED
Max. Particle Size (mm): N/A	**Hardness:**	hard and durable	

Sieve Size (USS)	(mm)	Passing %
6"	152.4	
3"	76.2	
1 1/2 "	38.1	
1"	25.4	
3/4"	19.1	
1/2"	12.7	
3/8"	9.5	
#4	4.8	
#10	2.0	
#20	0.84	
#40	0.42	
#60	0.25	
#100	0.148	
#200	0.074	



	AUG. 2008	JEK	01-May-09
TESTED BY	DATE	CHECKED BY	DATE

PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

GRADATION SUMMARY COARSE FILTER

PROJECT No.	07-1413-0074		FILE No. ----	
DESIGN	JEK	22OCT09	SCALE NTS	REV.
CADD	JEK	22OCT09	FIGURE 2	
CHECK				
REVIEW				

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Figures

Golder Associates

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4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

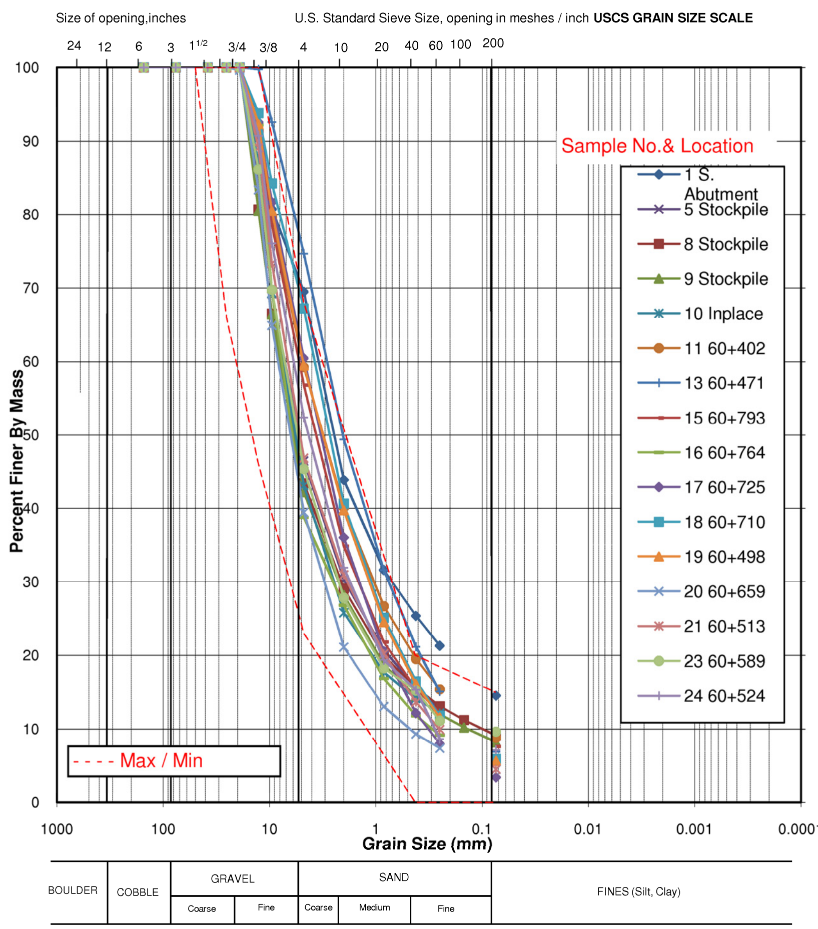
PARTICLE SIZE ANALYSIS OF SOILS

Reference
ASTM D422-63

Project No.:	07-1413-0074/ 2200	**Sample Location:**	**East Dike**
Client:	Agnico-Eagle Mines	**Sample No.:**	As Shown
Project:	Meadowbank	**Depth (m):**	0
Location:	70km from Baker Lake, Nunavut	**Lab ID No:**	0
Visual :	Core Backfill x	**Other:**	see comment
		Material Specification	Gradation Limits for Core Backfill

Specific Gravity (assumed):	N/A	**Shape:**	sub- angular	**Method:**	SPLIT, WASHED
Max. Particle Size (mm):	N/A	**Hardness:**	hard and durable		

Sieve Size (USS)	Sieve Size (mm)	Passing %
6"	152.4	
3"	76.2	
1 1/2 "	38.1	
1"	25.4	
3/4"	19.1	
1/2"	12.7	
3/8"	9.5	
#4	4.8	
#10	2.0	
#20	0.84	
#40	0.42	
#60	0.25	
#100	0.148	
#200	0.074	



	AUG. 2008	JEK	01-May-09
TESTED BY	DATE	CHECKED BY	DATE

PROJECT
AEM
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

GRADATION SUMMARY
CORE BACKFILL

Golder Associates

PROJECT No.	07-1413-0074		FILE No.	----
DESIGN	JEK	22OCT09	SCALE NTS	REV.
CADD	JEK	22OCT09		
CHECK			**FIGURE 3**	
REVIEW				

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Figures

Golder Associates

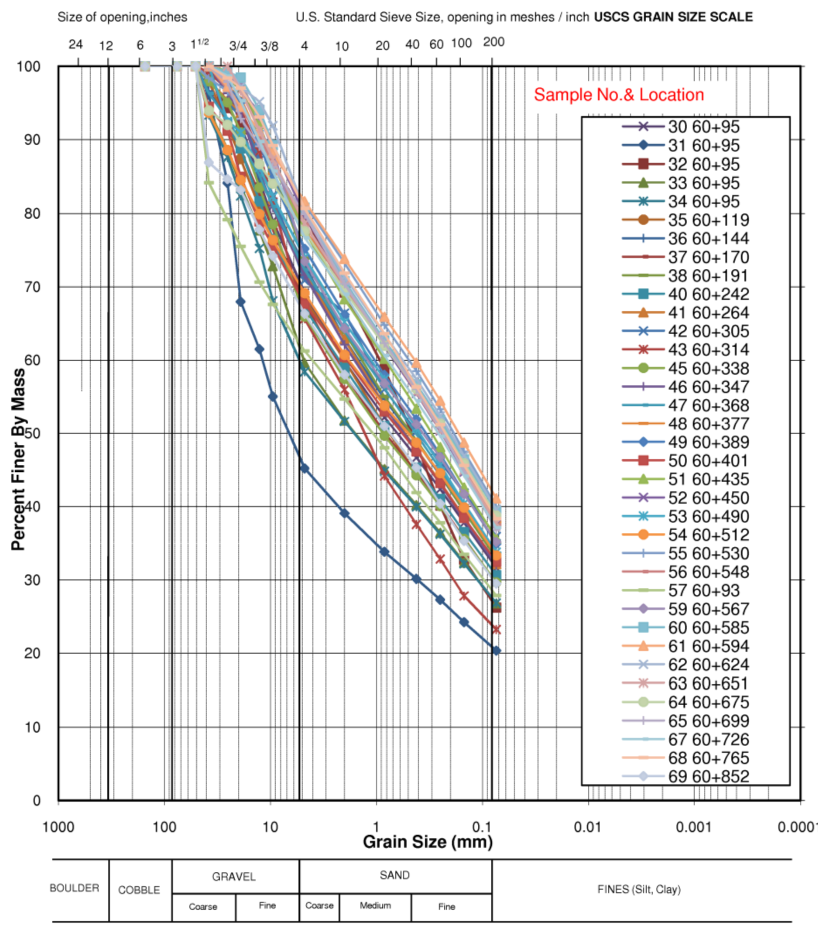
Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

PARTICLE SIZE ANALYSIS OF SOILS	Reference ASTM D422-63

Project No.:	07-1413-0074/ 2200	**Sample Location:**	**East Dike, Staion 60+93 to 60+852**
Client:	Agnico-Eagle Mines	**Sample No.:**	As Shown
Project:	Meadowbank	**Depth (m):**	0
Location:	70km from Baker Lake, Nunavut	**Lab ID No:**	0
Visual :	Soil-Bentonite Backfill	**Other:**	see comment
	x	**Material Specification**	NONE

Specific Gravity (assumed): N/A	**Shape:**	sub- angular	**Method:**	SPLIT, WASHED
Max. Particle Size (mm): N/A	**Hardness:**	hard and durable		

Sieve Size (USS)	(mm)	Passing %
6"	152.4	
3"	76.2	
2"	50.8	
1 1/2 "	38.1	
1"	25.4	
3/4"	19.1	
1/2"	12.7	
3/8"	9.5	
#4	4.76	
#10	2	
#20	0.84	
#40	0.42	
#60	0.25	
#100	0.149	
#200	0.074	



	AUG. 2008 - SEPT. 2008	JEK	01-May-09
TESTED BY	DATE	CHECKED BY	DATE

PROJECT **AEM**
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

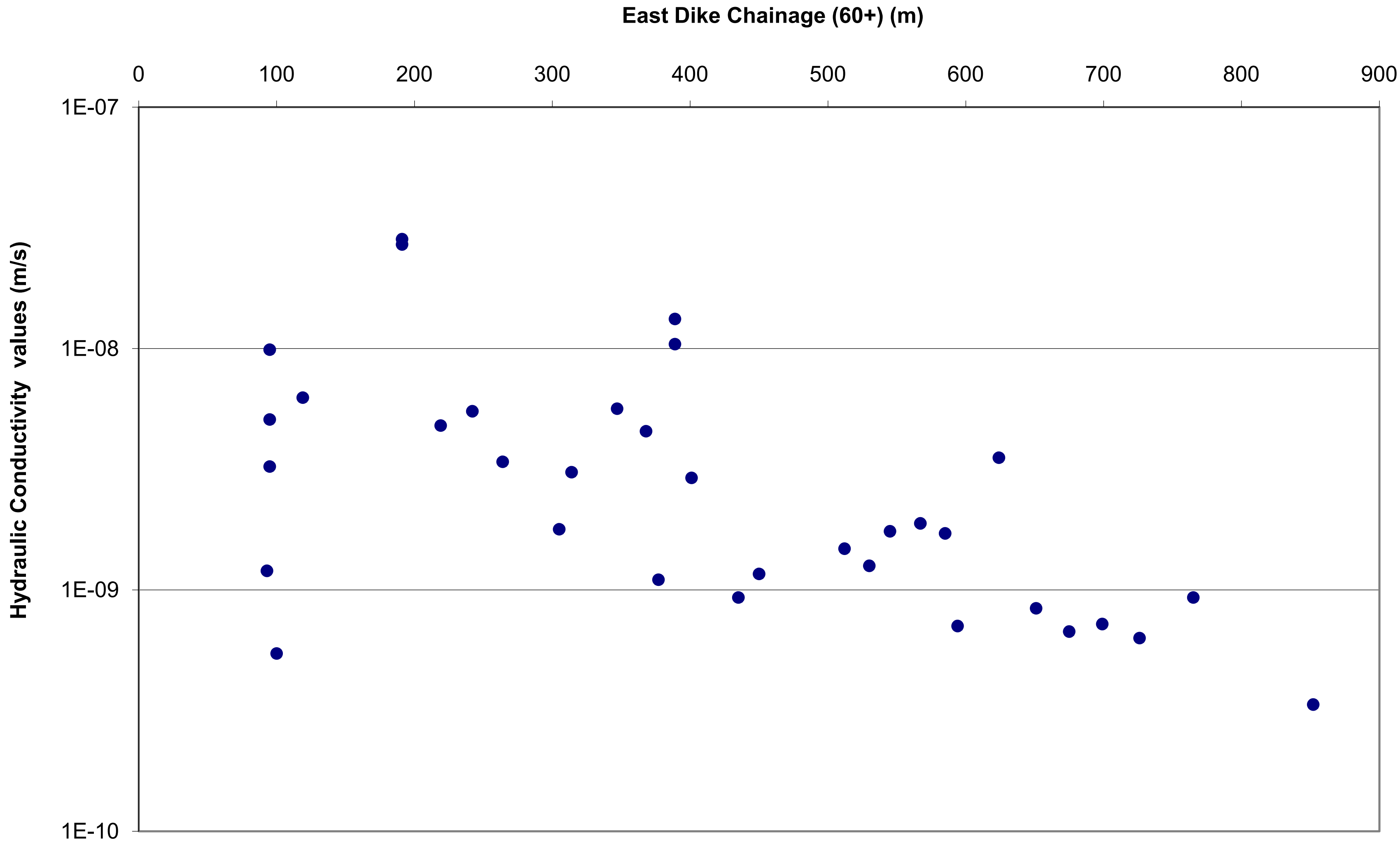
TITLE
GRADATION SUMMARY
SOIL-BENTONITE BACKFILL

Golder Associates

PROJECT No.	07-1413-0074		FILE No.	----
DESIGN	JEK	22OCT09	SCALE NTS	REV.
CADD	JEK	22OCT09	**FIGURE 4**	
CHECK				
REVIEW				

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Figures

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Figures



PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

HYDRAULIC CONDUCTIVITY OF SOIL-BENTONITE BACKFILL SAMPLES

Golder Associates

PROJECT No. 07-1413-0074			FILE No. 07-1413-0074	
DESIGN	JEK	22OCT09	SCALE NTS	REV.
CADD	JEK	22OCT09	**FIGURE 5**	
CHECK	--	--		
REVIEW				

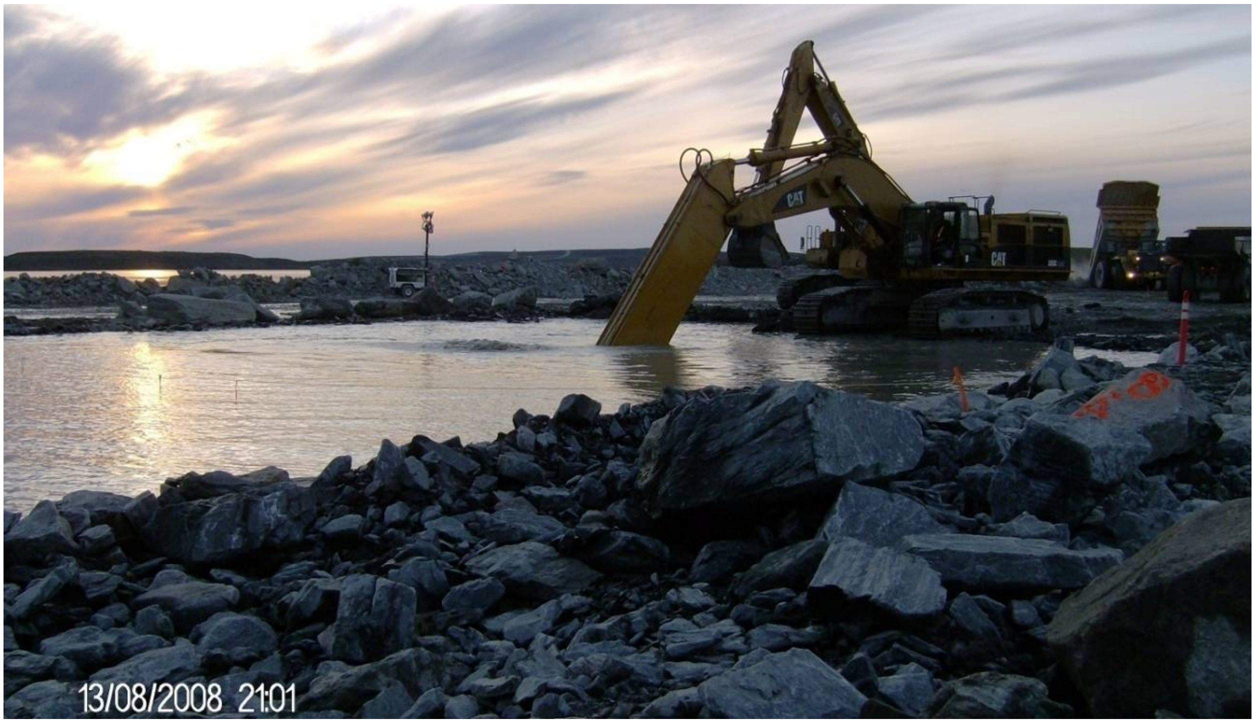
APPENDIX A

Construction Photographs

Photograph 1: East Dike Location looking North, July 24, 2008.

Photograph 2: East Dike rockfill placement to Sta. 60+500, trench excavation to approx. Sta. 60+320, August 9, 2008.

Photograph 3: East Dike trench excavation from Sta. 60+391 to Sta. 60+410, August 11, 2008.



Photograph 4: Trench Excavation looking North at Sta. 60+400. August 13, 2008.

Photograph 5: Turbidity barrier function at East (lake side) of Dike, looking northeast, August 13, 2008.

Photograph 6: Initial rockfill advancement continues towards north abutment, looking West at Sta. 60+650, August 14, 2008.

Photograph 7: Coarse Filter placement looking north-Sta. 60+125, August 16, 2008.

Photograph 8: Excavation of lakebed soils looking north, Sta. 60+550, August 16, 2008.

Photograph 9: Rockfill placement from Sta. 60+800 to the north abutment, looking south, August 16, 2008.

Photograph 10: Core Backfill Placement, looking south at Sta. 60+100, August 17, 2008.

Photograph 11: Core Backfill placement at Sta. 60+200, looking north, August 18, 2008.

Photograph 12: Coarse filter and Core Backfill placement with excavator and loader, respectively, looking west at Sta. 60+310, August 19, 2008.

Photograph 13: Crushed rockfill and core backfill placement at Sta. 60+400, looking south, August 20, 2008.

Photograph 14: Trench Excavation, looking west at Sta. 60+700, August 20, 2008.

Photograph 15: Bathymetry of post excavation at Sta. 60+700, looking north, August 21, 2008.

Photograph 16: Simultaneous Core Backfill and 150 mm minus rockfill wing material placement and nominal compaction with bucket at Sta. 60+325, August 21, 2008.

Photograph 17: Geopac Tech Inc. equipment arrival at work site, August 23, 2008.

Photograph 18: Core Backfill placement looking east at Sta. 60+350, August 23, 2008.

Photograph 19: Core Backfill placement pushing ahead of wing placement at Sta. 60+350, August 23, 2008.

Photograph 20: Raising core backfill in lifts, showing El. 133.2 masl to El. 134.3 masl, south abutment to Sta. 60+220, looking south, August 24, 2008.

Photograph 21: Raising Core Backfill second lift to 135.1 masl and with 150 mm minus coarse rockfill wings, approx. Sta. 60+110, August 25, 2008.

Photograph 22: Coarse Filter Placement at Sta. 60+500, looking south, August 25, 2008.

Photograph 23: AEM excavator placing Core Backfill and 150 mm minus rockfill wing from north end of Dike at Sta. 60+630, looking north, August 28, 2008.

Photograph 24: Cross line bathymetry survey setting up at Sta. 60+502, looking east, August 28, 2008.

Photograph 25: A long reach 385 excavator cleaning the trench base from the south end of the trench at approx. Sta. 60+505, looking east, August 29, 2008.

Photograph 26: 150 mm minus rockfill mixed with selected fine quarry material used for wings area of the core backfill, Sta. 60+621, looking east, August 29, 2008.

Photograph 27: Core Backfill and wing material placement at Sta. 60+600 looking west, August 30, 2008.

Photograph 28: Phase I and Phase II dynamic compaction of core backfill, looking north at Sta. 60+180, August 30, 2008.

Photograph 29: Coarse filter placement tie-in to north abutment at Sta. 60+820 to Sta. 60+840, note-trench foundation preparation at north abutment exposed bedrock.

Photograph 30: Raising Core Backfill with a 4 to 6 m width and 150 mm/quarry run material on downstream side at Sta. 60+560.

Photograph 31: Foundation preparation at Sta. 60+840, removal of cobbles and boulders up to 0.6 m diameter removed from trench base, August 31, 2008.

Photograph 32: Status of East Dike, dynamic compaction continues, note slurry pond construction in background, 100 mm diameter HDPE slurry pipe line layout in foreground, September 3, 2008.

Photograph 33: Hydration of bentonite slurry mix in slurry pond set up (HDPE liner, pump and HDPE slurry lines), September 4, 2008.

Photograph 34: A 2.5 m diameter and 1.0 m deep crater created during Phase 1/Phase 2 dynamic compaction at Sta. 60+860, September 4, 2008.

Photograph 35: Till stockpile for soil-bentonite slurry wall construction, excavator removing oversize boulders, September 4, 2008.

Photograph 36: A 9 m x 11 m pad of till mixed with a bag of bentonite powder in controlled lifts to achieve 1.5% bentonite added content, September 6, 2008.

Photograph 37: Start of cut-off trench excavation by contractor at Sta. 60+096, 100 mm diameter HDPE pipe in place, centerline of trench layout shown in orange, looking north, September 7, 2008.

Photograph 38: Mixing of slurry with soil-bentonite, west of cut-off trench excavation prior to trench backfill, September 7, 2008.

Photograph 39: Phase 4 Dynamic compaction with rig and hammer, at Sta. 60+600. September 7, 2008.

Photograph 40: Phase 4 dynamic compaction, looking south between Sta. 60+600 and Sta. 60+800, September 7, 2008.

Photograph 41: Status of Slurry wall construction excavation at Sta. 60+163, QC sampling and testing by contractor of slurry at Sta. 60+112, September 8, 2008.

Photograph 42: A beam (gate) was installed in the trench to control and hold back the SB backfill from the excavation face at Sta. 60+393 due to sloping bedrock surface, September 13, 2008.

Photograph 43: Ice Removal from the slurry trench in the morning prior to SB mixing and backfilling, looking north at Sta. 60+450, September 16, 2008.

Photograph 44: Cut-off trench excavation looking north 60+450, September 16, 2008.

Photograph 45: A QC sump test result of 75 mm for the SB backfill conducted by FGL at Sta. 60+391, September 16, 2008.

Photograph 46: Rockfill surfacing placement looking North 60+150, September 16, 2008.

Photograph 47: Ice removal from slurry trench looking north at Sta. 60+450, September 17, 2008.

Photograph 48: Thermal Cap placement upstream of SB cut-off wall, looking south at Sta. 60+260, September 17, 2008.

Photograph 49: Till placement over SB backfill prior to 150 mm minus rockfill placement to bring fill material to Elev. 136.1 as part of the SB cut-off wall thermal cap, September 18, 2008.

Photograph 50: Rockfill material of 150 mm minus placed over till and SB backfill as part of the thermal cap and future drilling and grouting pad, Sta. 60+314, September 18, 2008.

Photograph 51: SB cut-off wall excavation at Sta. 60+650, looking south, September 18, 2008.

Photograph 52: Bentonite Enriched Till unloading at Sta. 60+500, looking west, September 18, 2008.

Photograph 53: Backfill with soil-bentonite mix in slurry trench, at Sta. 60+506 looking west, September 18, 2008.

Photograph 54: Compaction of thermal cap over SB cut-off wall from Sta. 60+105 to Sta. 60+275, looking north, September 20, 2008.

Photograph 55: Start of casing installation with Novamac Rockmaster 990 at approx. Sta 60+268. September 20, 2008.

Photograph 56: Start of casing Installation with 2nd rig -Novamac Rockmaster 945 looking west at Sta. 60+200, September 22, 2008.

Photograph 57: SB backfill with excavator from Sta. 60+834 to Sta. 60+871 (north abutment), looking north, September 22, 2008.

Photograph 58: Load of 150 mm minus rockfill placed over till and SB cut-off wall to Elev. 136.1 masl between Sta. 60+392 and Sta. 60+562 looking south, September 23, 2008.

Photograph 59: Start of upstream rockfill re-sloping at approx. Sta. 60+830, September 25, 2008.

Photograph 60: Casing installation at Sta. 60+ 148 and Sta. 60+115, looking north, October 2, 2008.

Photograph 61: Placement of till cap over SB cut-off wall at Sta. 60+600 looking south, October 7, 2008.

Photograph 62: Thermal cap to Elev. 136.1 masl complete to Sta. 60+830, till and rockfill backfill remaining to the north abutment, looking south, October 9, 2008.

Photograph 63: Mobile Grout Plant – January 17, 2009

Photograph 64: Grout Plant Extension – January 22, 2009

Photograph 65: John Deere 450A Timberjack - November 25, 2008

Photograph 66: Grout Plant Mobilization – January 17, 2009

Photograph 67: Rockmaster 990 DTH Drill Rig for Casing Installation – September 26, 2008.

Photograph 68: Rockmaster 945 DTH Drill Rig for Casing Installation – September 26, 2008.

Photograph 69: Modified Casing with Injection Ports – September 26, 2008

Photograph 70: Casing Installation – September 30, 2008

Photograph 71: Casing Cutting – November 12, 2008

Photograph 72: Coverall Tent for Bedrock Drilling – December 18, 2008

Photograph 73: Tamrock 996 Top Hammer Drill Rig for Bedrock Drilling – October 16, 2008

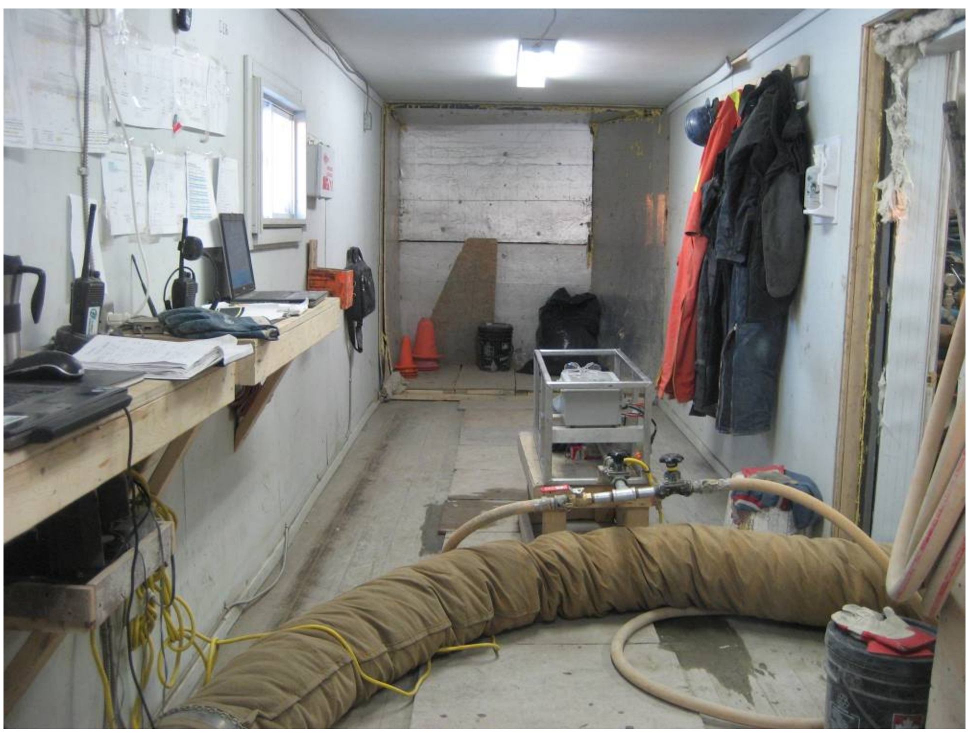
Photograph 74: Atlas Copco DM45 Drill Rig for Perforating – February 17, 2009

Photograph 75: Holte Perforator Tool – January 19, 2009

Photograph 76: Water Supply to Grout Plant – November 17, 2008

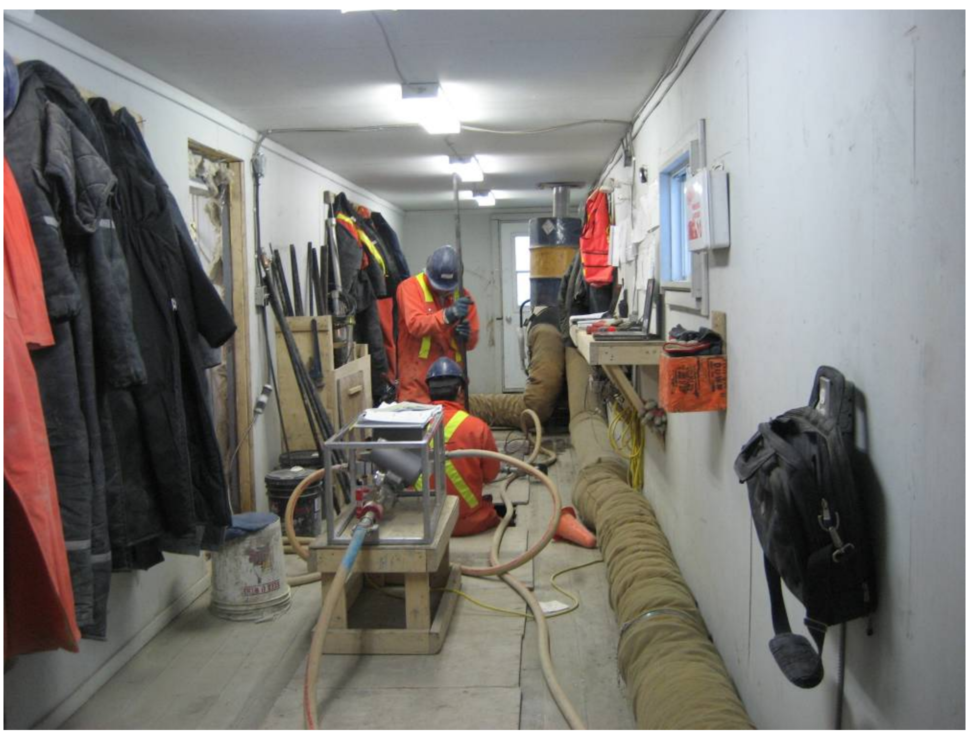
Photograph 77: Grout Plant Water Tank – March 6, 2009

Photograph 78: Mobile Grout Plant, Mixing Side – January 17, 2009



Photograph 79: Mobile Grout Plant, Injection Side – January 17, 2009

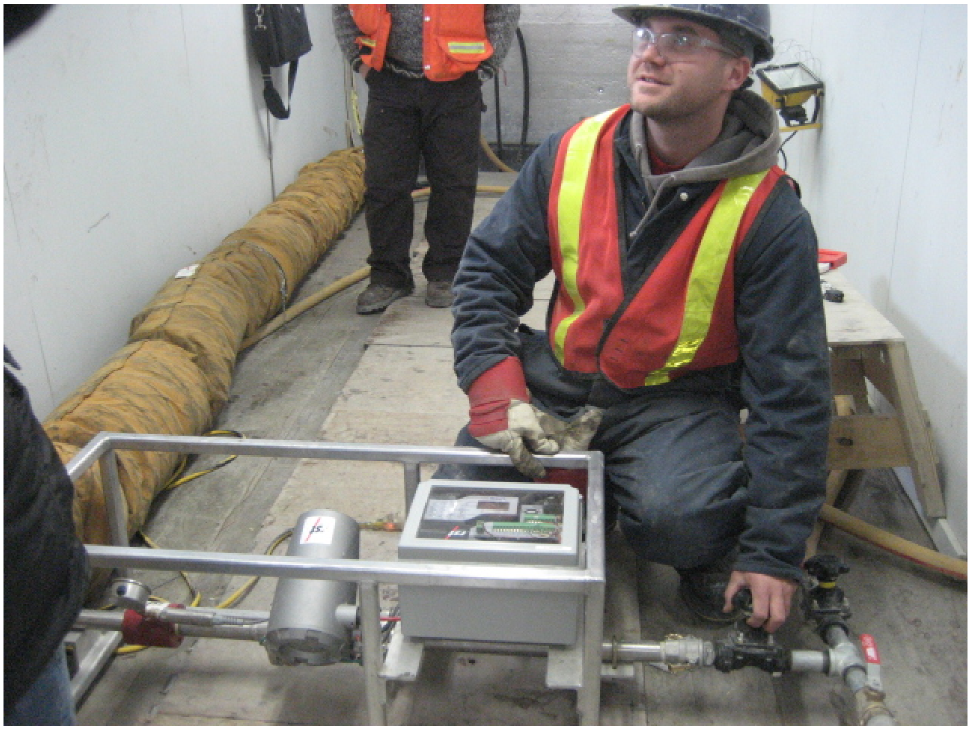
Photograph 80: Grout Plant Heater – January 17, 2009



Photograph 81: Grout Plant Removable Floor – January 10, 2009

Photograph 82: Chemgrout CG-680/3L8/EH High Shear Colloidal Mixer/Agitator/Moyno Pump – October 11, 2008

Photograph 83: Grout Header – February 11, 2009



Photograph 84: RST Permeation Grout Monitoring System – November 5, 2008

Photograph 85: Field Laptop for Real-Time Monitoring and Direction of Injection Process – October 21, 2008

Photograph 86: Geopro (Bimbar) Double Packer – October 17, 2008

Photograph 87: Packer Inflation Hand Pump – October 23, 2008

Photograph 88: Quality Assurance of Mix Viscosity Measuring Marsh Funnel Time – November 11, 2008

Photograph 89: Quality Assurance Measuring Specific Gravity of Grout Mix using Mud Balance – October 12, 2008

Photograph 90: Quality Assurance Measuring Percent Bleed – October 23, 2008

Photograph 91: Grout Mix Design Measuring Set Time Using Pilcon Hand Vane – November 11, 2008

APPENDIX B

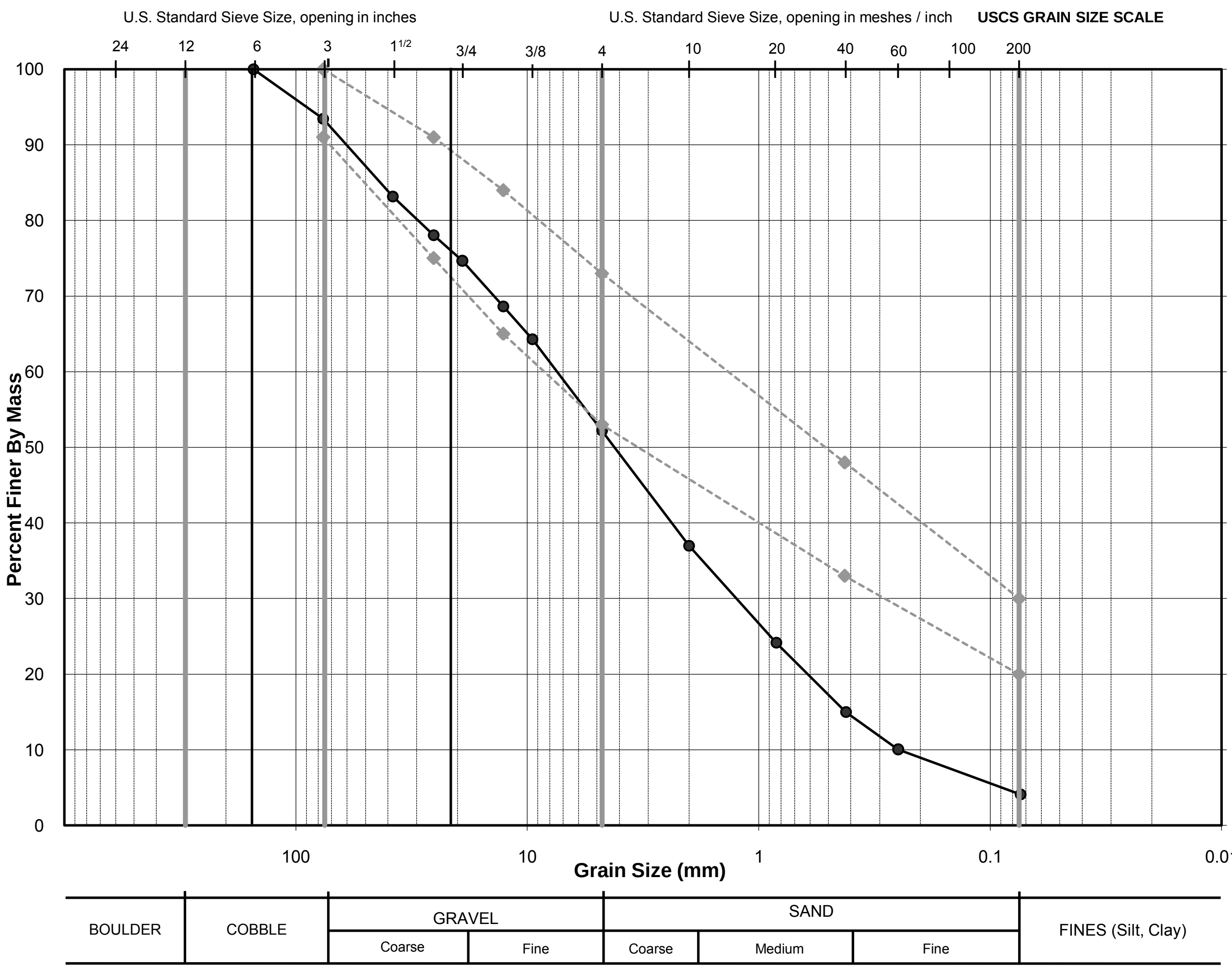
Laboratory Test Results and Soil-bentonite Wall Daily Construction Reports (provided by Inquip Associates Inc.)

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Particle Size Analysis of Soils

Reference ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	4
Project:	Meadowbank	**Sample Location:**	South Abutment Foundation, Sta. 60+100
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Till	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



CS	15-Aug-08	JEK	04-Sep-08
TESTED BY	DATE	CHECKED BY	DATE

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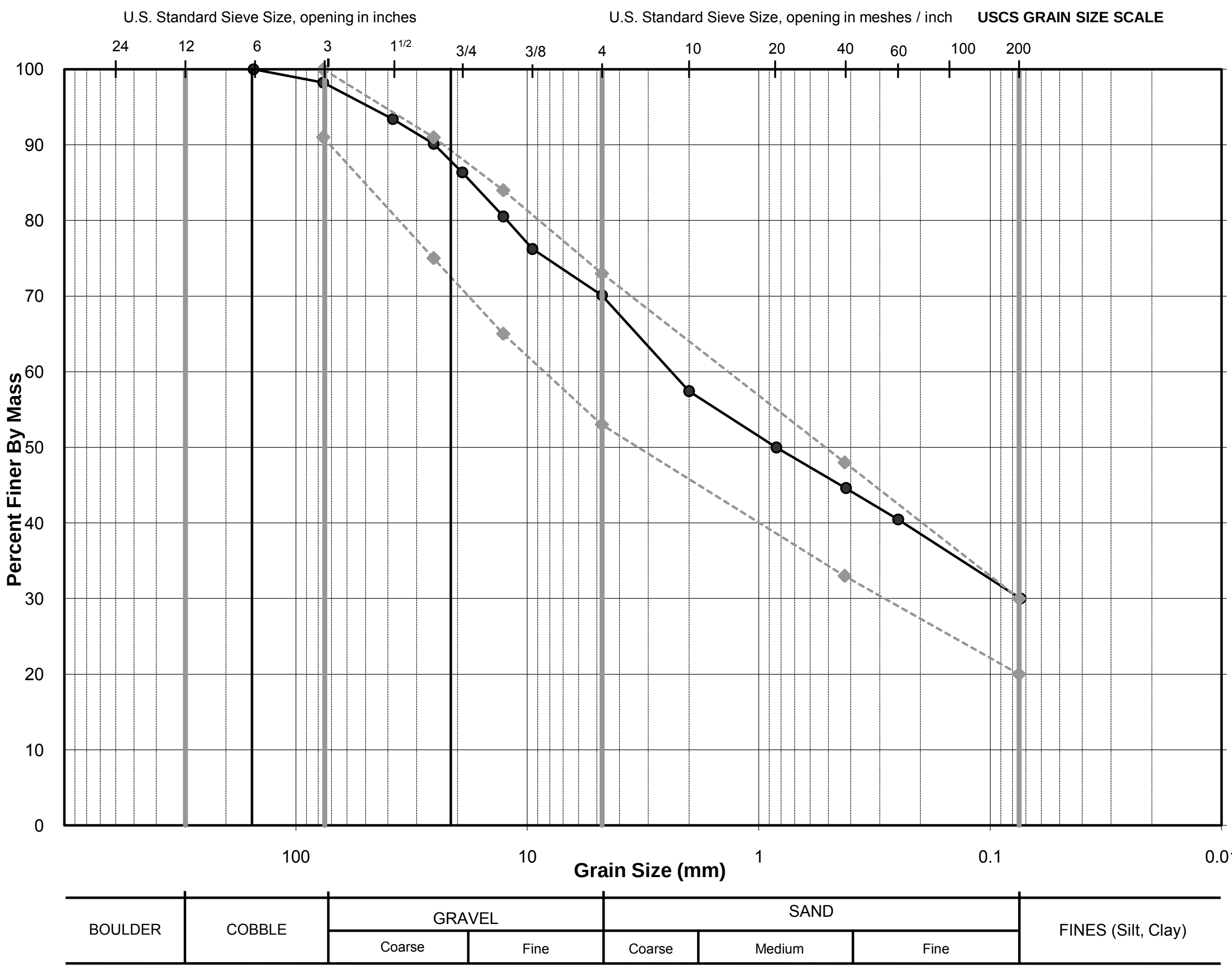
Golder Associates

Particle Size Analysis of Soils

Reference
ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	14
Project:	Meadowbank	**Sample Location:**	Surface
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Till Stockpile by 3PL	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



RB	25-Aug-08	JCC	02-Sep-08
TESTED BY	DATE	CHECKED BY	DATE

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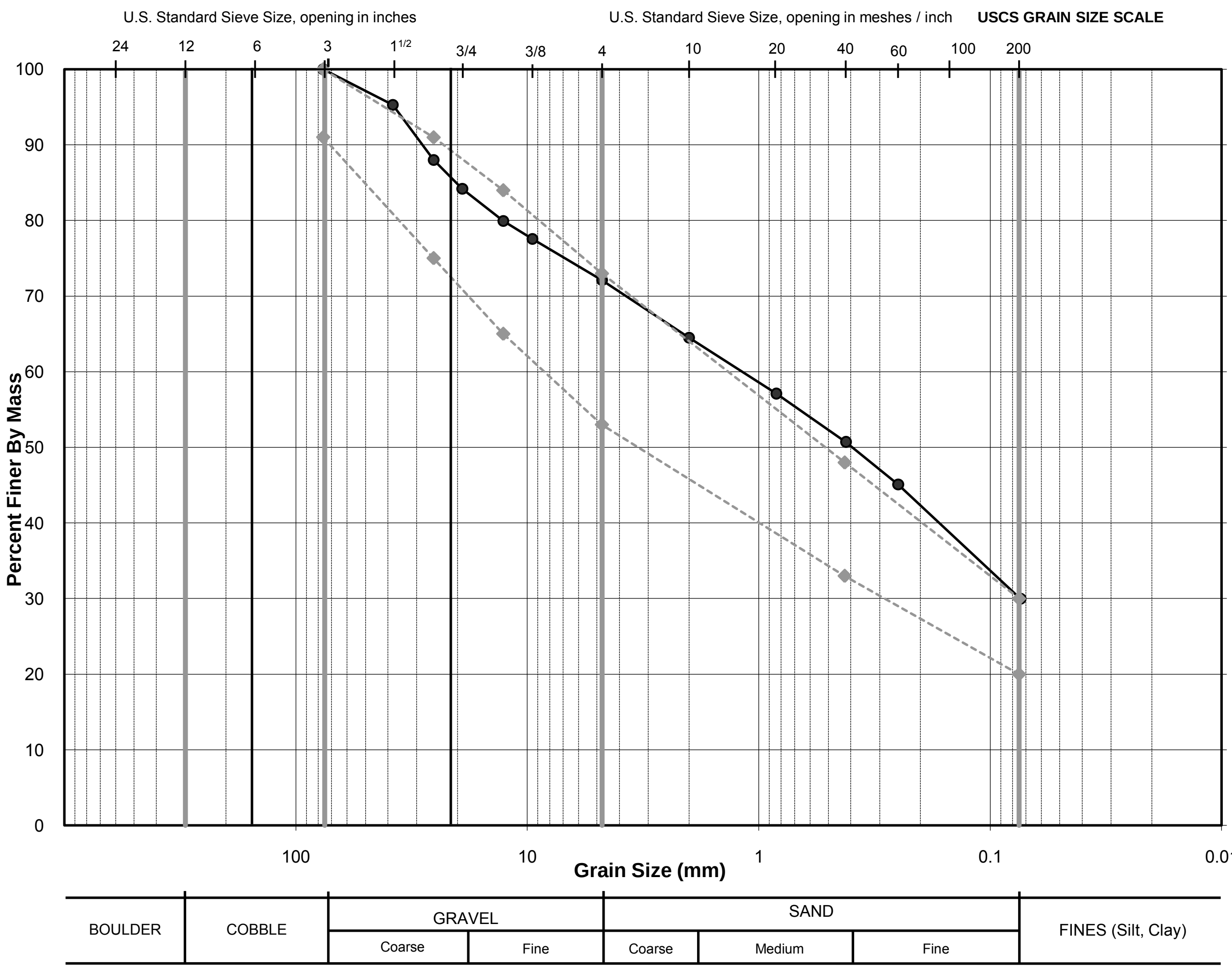
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Particle Size Analysis of Soils

Reference
ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	25
Project:	Meadowbank	**Sample Location:**	North Abutment Foundation Sta.60+855
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Till	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



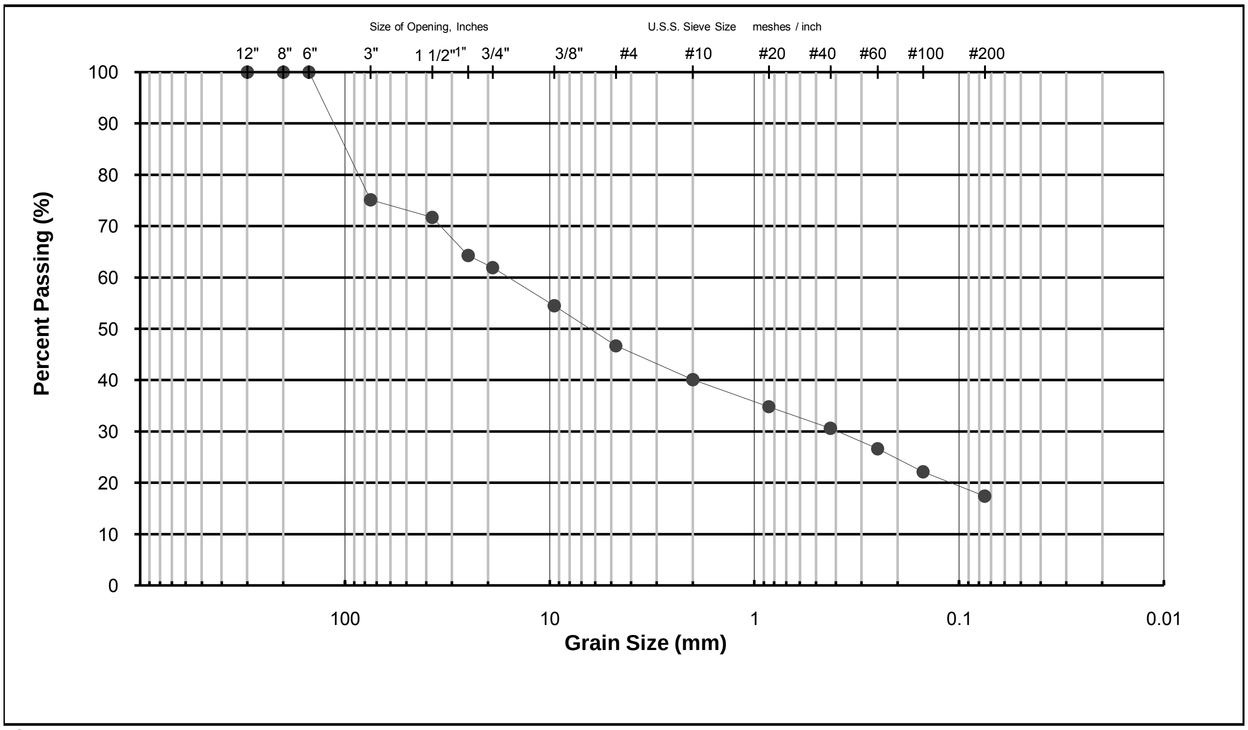
Rb	31-Aug-08	JCC	02-Sep-08
TESTED BY	DATE	CHECKED BY	DATE

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	05-1411-151-8000	**Station**	Till Stockpile taken on September 4th 2008
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	
Tested By	GB	**Sample Date**	07-Sep-08 **Test #:** 27
Percent Gravel (+ 4.75 and coarser) : 53.3%		**Percent Oversize (%):**	**38.1**
Percent Sand Silt and Clay (- 4.75 and finer) : 46.7%		**Weight of Total Sample (g):**	**8387.4**

SIEVE ANALYSIS						**MATERIAL SPECIFICATION: Till**	
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split			
				+ 4.75	- 4.75		
12"	300	0.0	100	0.0			
8"	200	0.0	100	0.0			
6"	150	0.0	100	0.0			
3"	75	24.9	75	46.6			
1 1/2"	37.5	3.4	72	6.4			
1"	25.0	7.4	64	13.9			
3/4"	19.0	2.4	62	4.5			
3/8"	9.5	3.0	54	5.6			
#4	4.75	7.8	47	14.6			
#10	2.00	6.6	40		14.1		
#20	0.85	5.3	35		11.3		
#40	0.425	4.2	31		9.0		
#60	0.250	4.0	27		8.5		
#100	0.150	4.5	22		9.6		
#200	0.075	4.7	17.4		10.2		
	PAN	17.4			37.3		
Total		100.0					



Comments:

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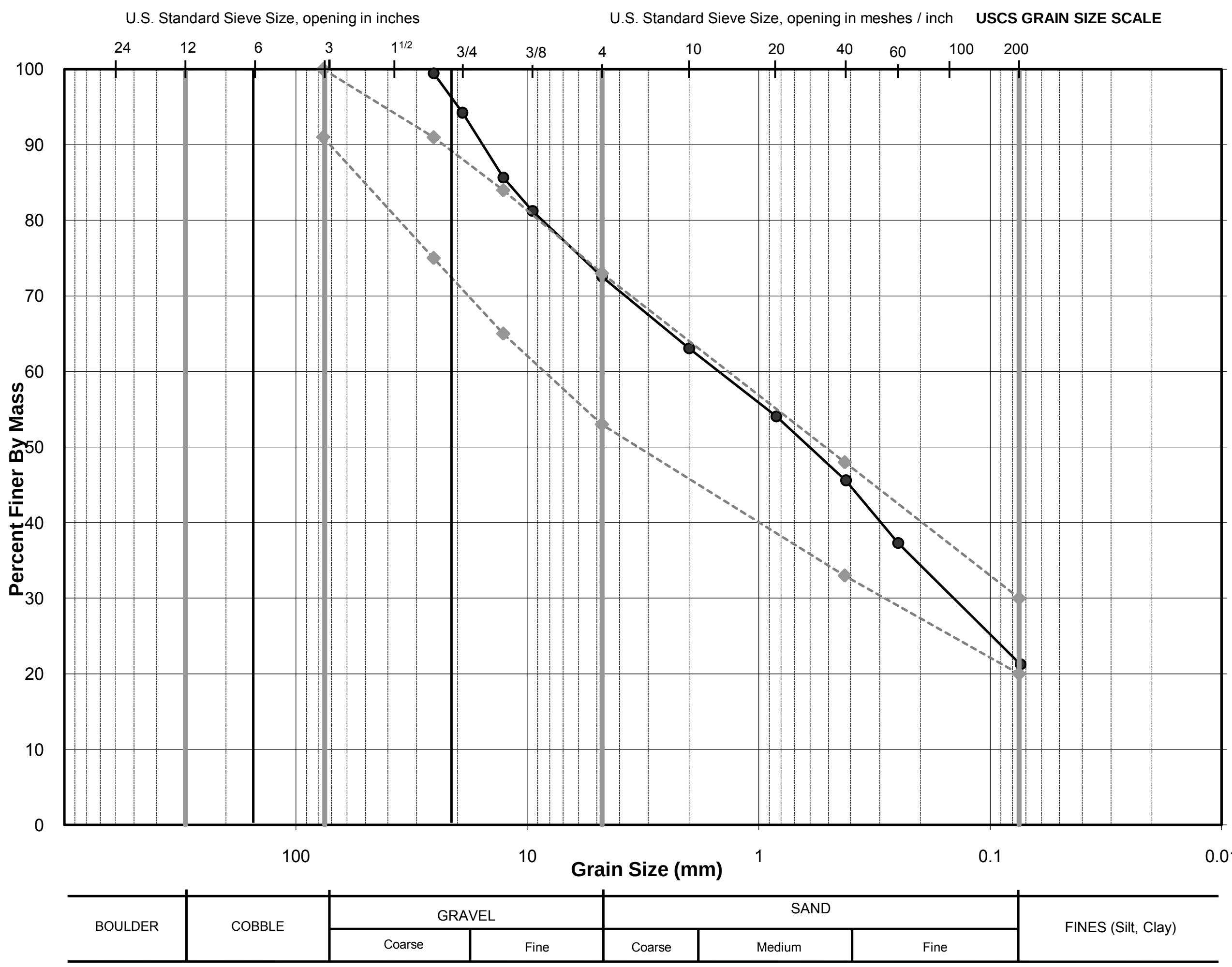
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Particle Size Analysis of Soils

Reference ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	29
Project:	Meadowbank	**Sample Location:**	Stockpile of Till
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Till	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



TS	04-Sep-08	JEK	04-Feb-09
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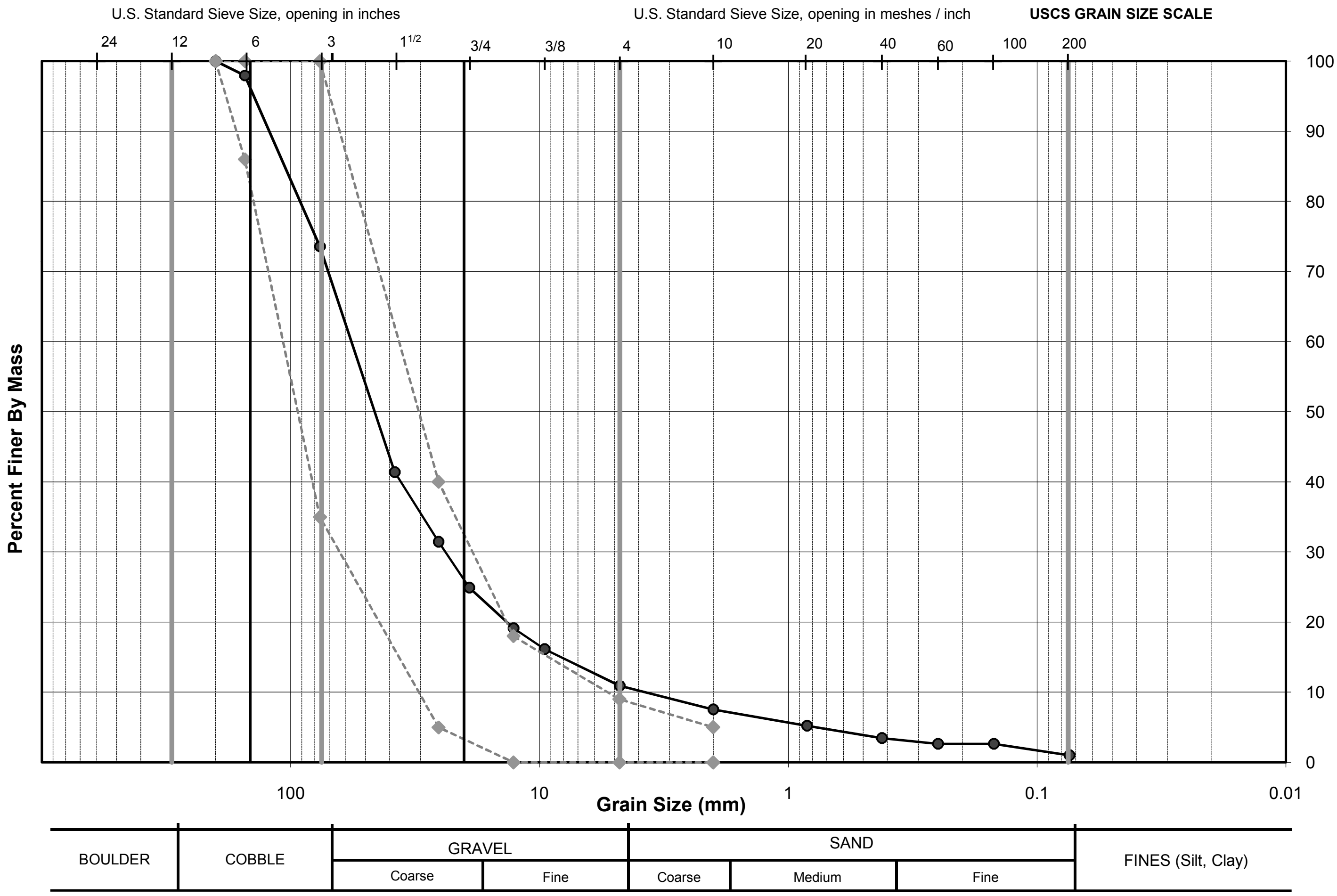
Particle Size Analysis of Soils

Reference ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	6
Project:	Meadowbank	**Sample Location:**	Stockpile
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	Surface
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Coarse Filter x	**Other Remarks:**	see comment x
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



CS	17-Aug-08	JEK	05-Feb-09
TESTED BY	DATE	CHECKED BY	DATE

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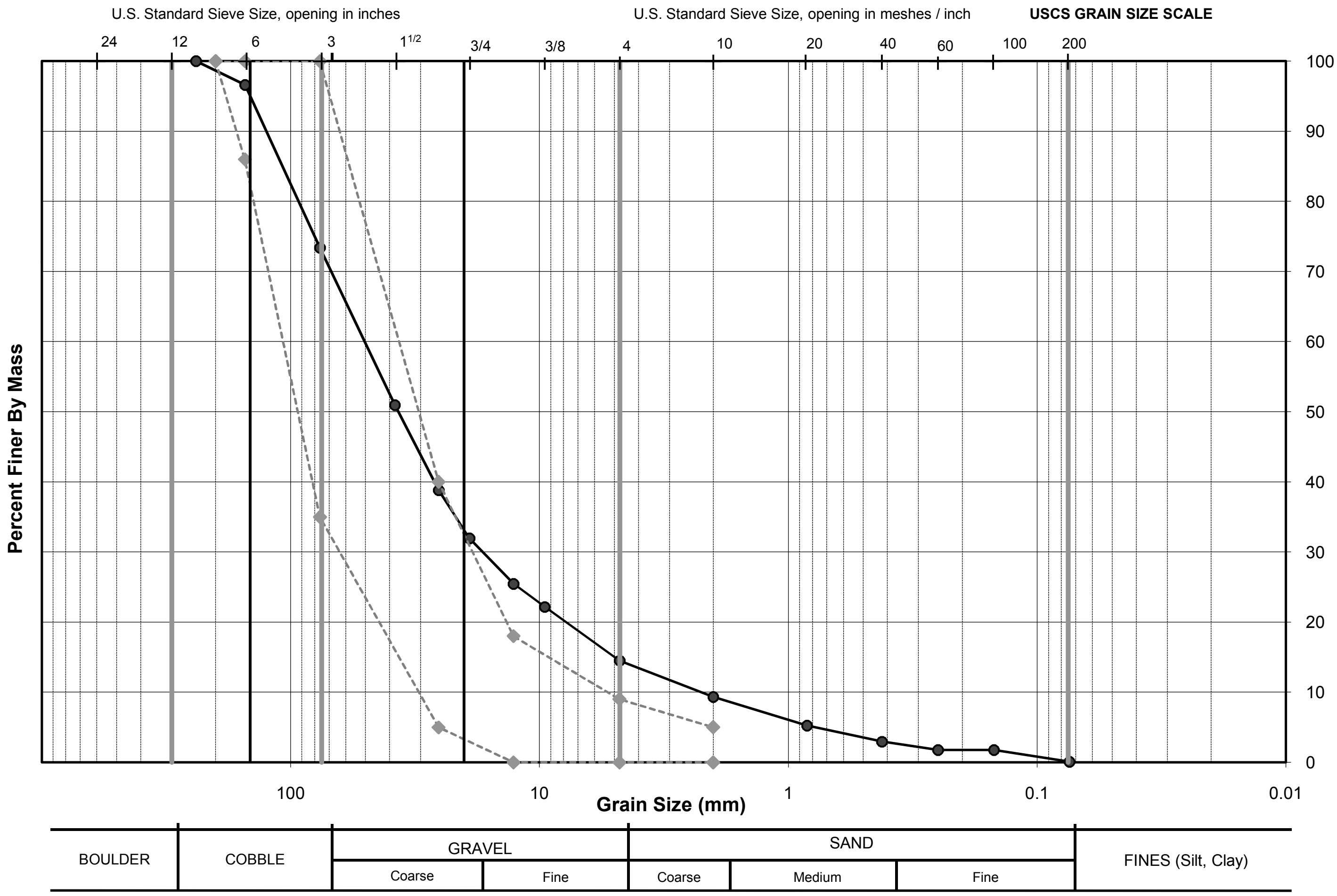
Burnaby, B.C. Canada V5C 6C8

Particle Size Analysis of Soils	**Reference** ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	7
Project:	Meadowbank	**Sample Location:**	Sta. 60+220
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Coarse Filter x	**Other Remarks:**	Coarse Filter
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	240.0
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



CS	18-Aug-08	JEK	05-Feb-09
TESTED BY	DATE	CHECKED BY	DATE

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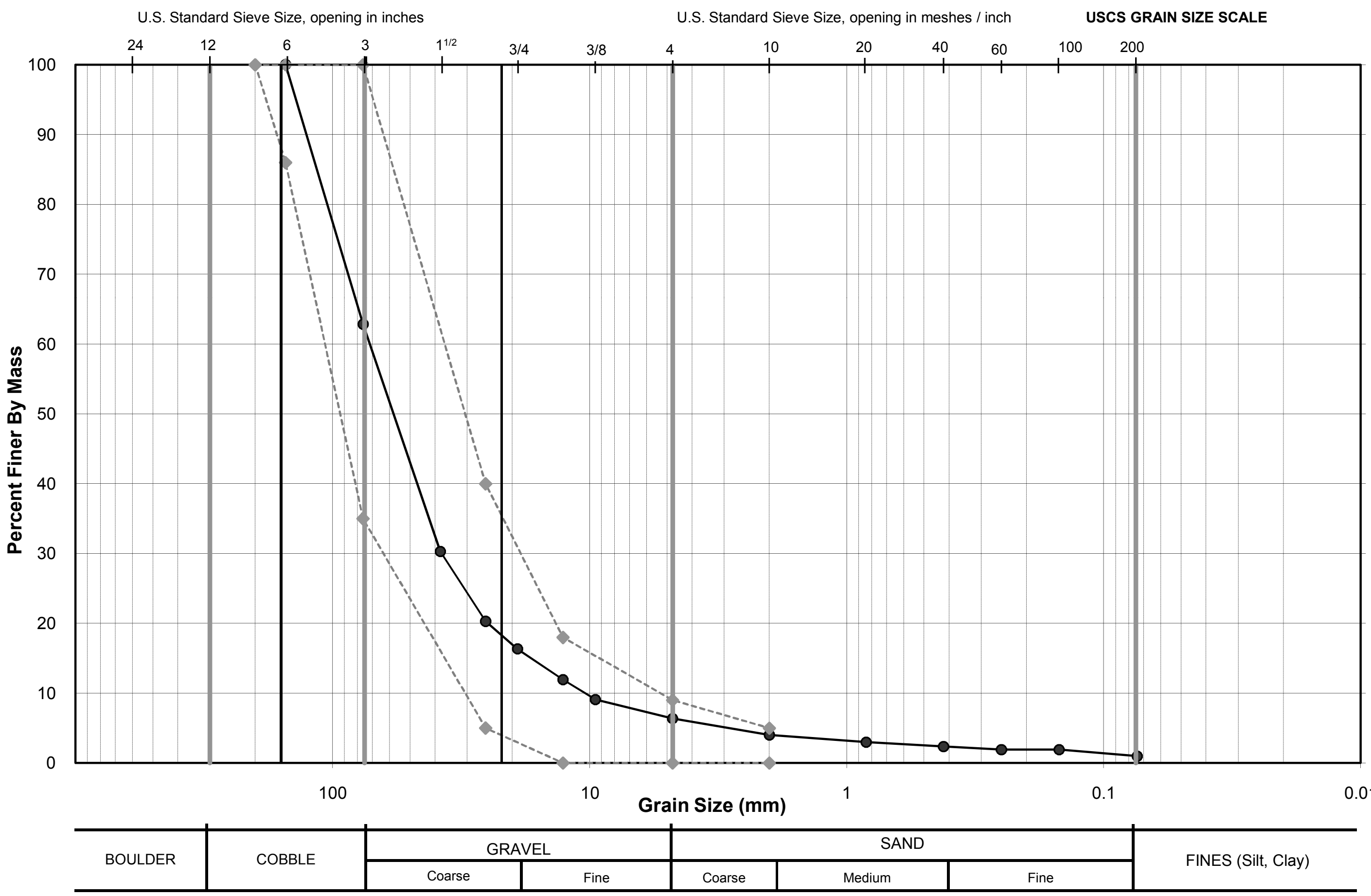
Particle Size Analysis of Soils

Reference ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	12
Project:	Meadowbank	**Sample Location:**	Sta. 60+404
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Coarse Filter	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



RB	23-Aug-08	JEK	05-Feb-09
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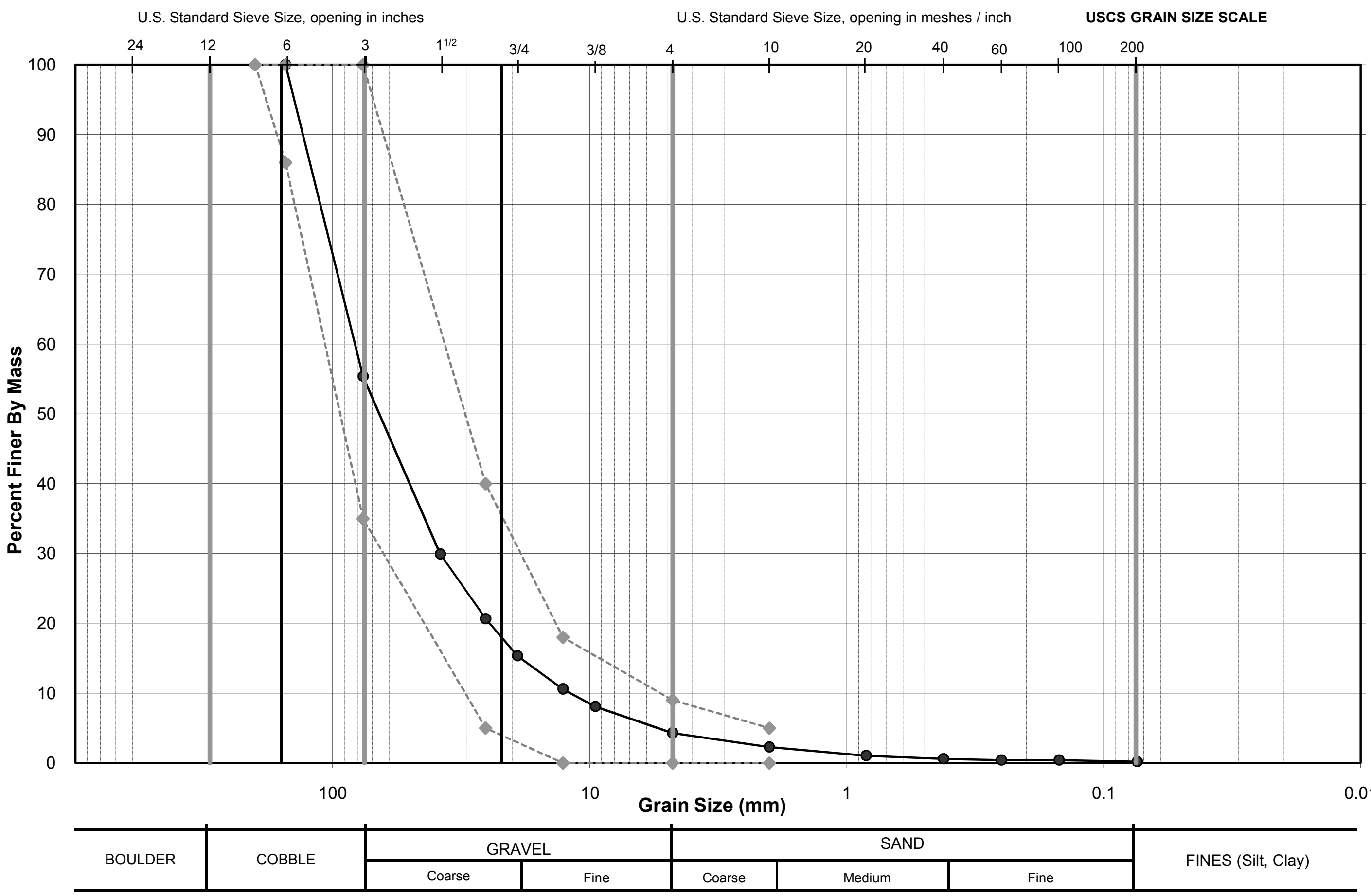
Burnaby, B.C. Canada V5C 6C8

Particle Size Analysis of Soils	Reference ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	22
Project:	Meadowbank	**Sample Location:**	Sta. 60+593
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Coarse Filter	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



RB	30-Aug-08	JEK	05-Feb-09
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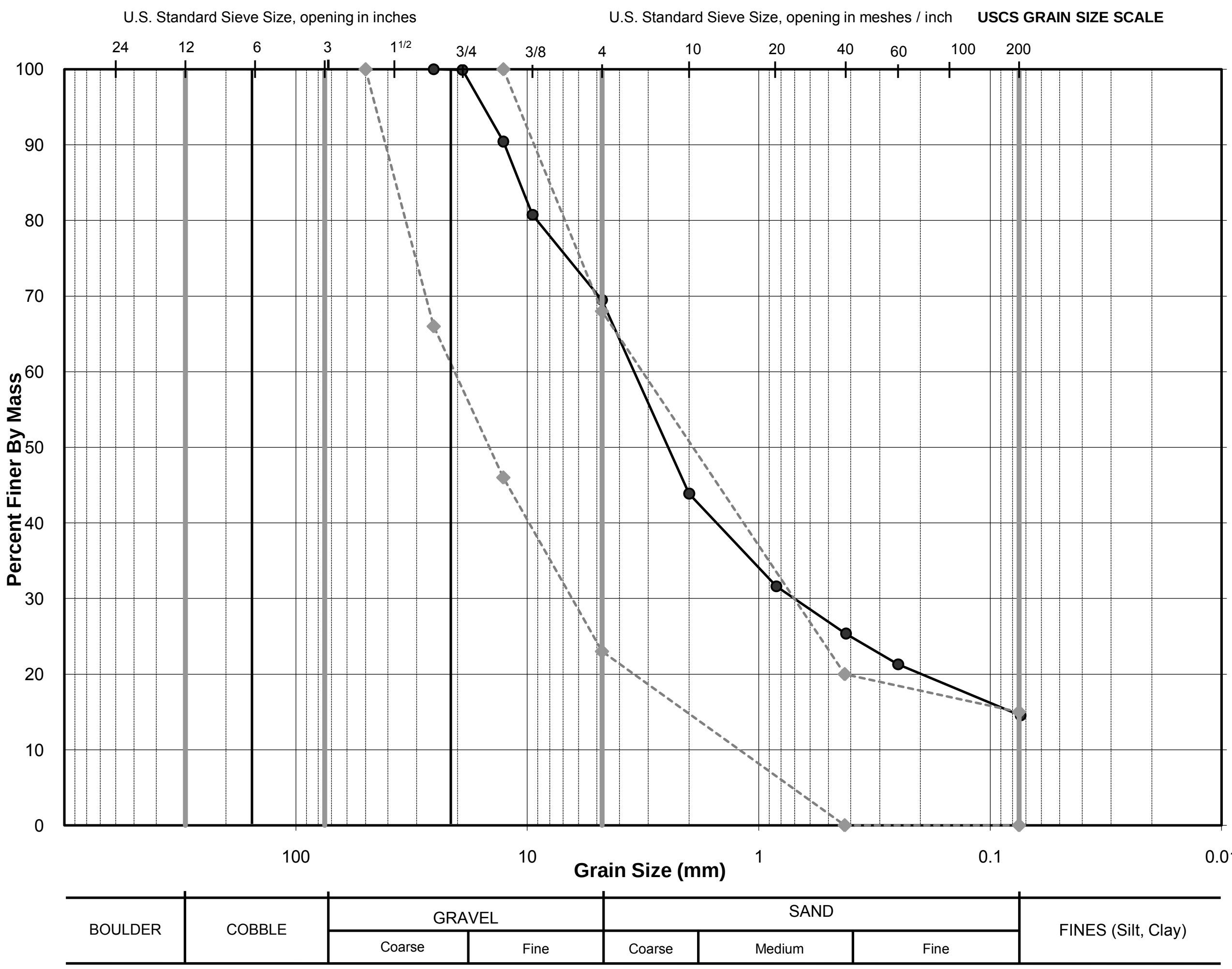
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Particle Size Analysis of Soils

Reference	ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	1
Project:	Meadowbank	**Sample Location:**	South Abutment Sta.60+100
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Core Backfill	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



CS	14-Aug-08	JCC	02-Sep-08
TESTED BY	DATE	CHECKED BY	DATE

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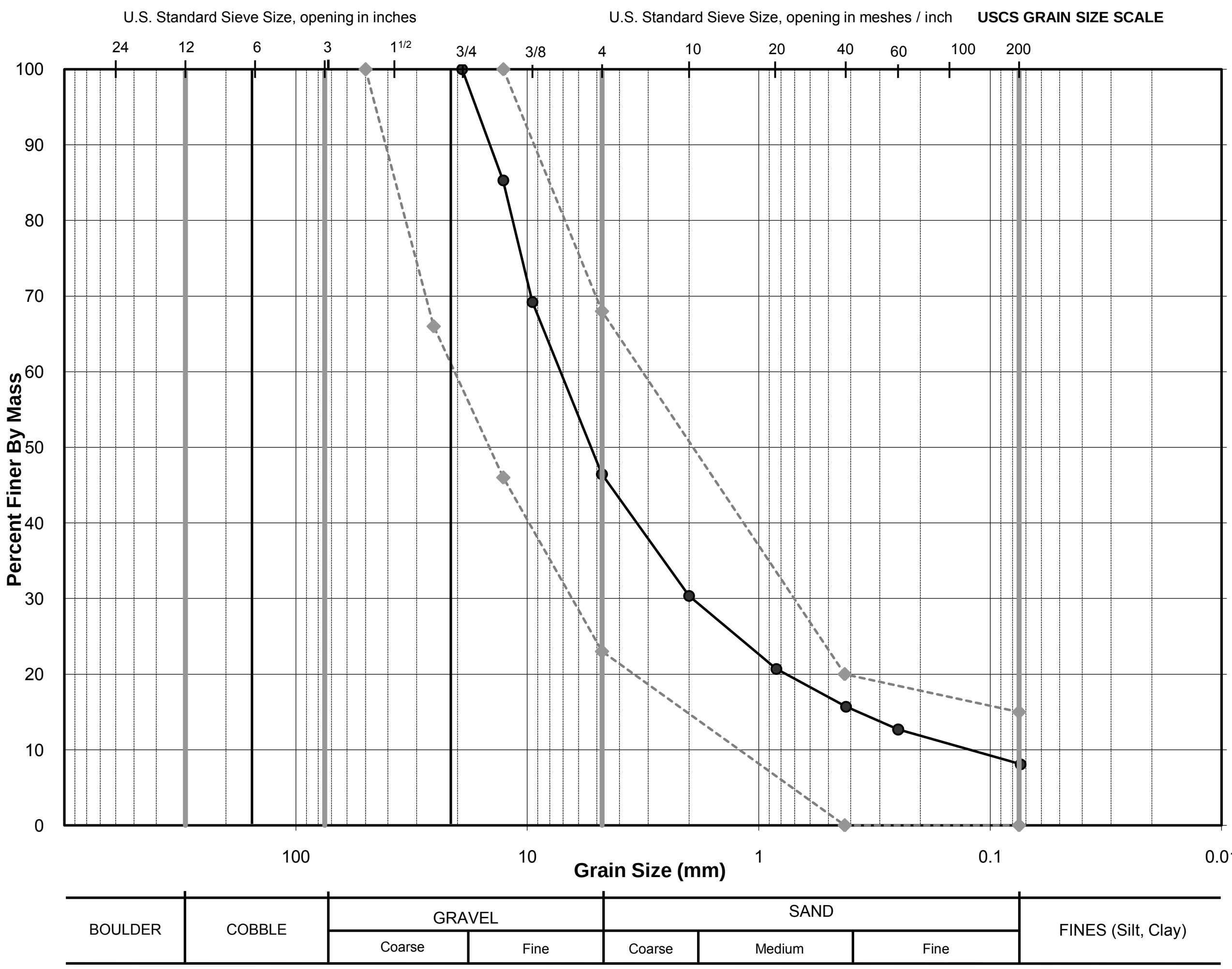
Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Particle Size Analysis of Soils

Reference	ASTM D 422-63 (2007)		
Client:	Agnico-Eagle Mines	**Sample No.:**	5
Project:	Meadowbank	**Sample Location:**	Stockpile
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Core Backfill	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



CS	18-Aug-08	JCC	02-Sep-08
TESTED BY	DATE	CHECKED BY	DATE

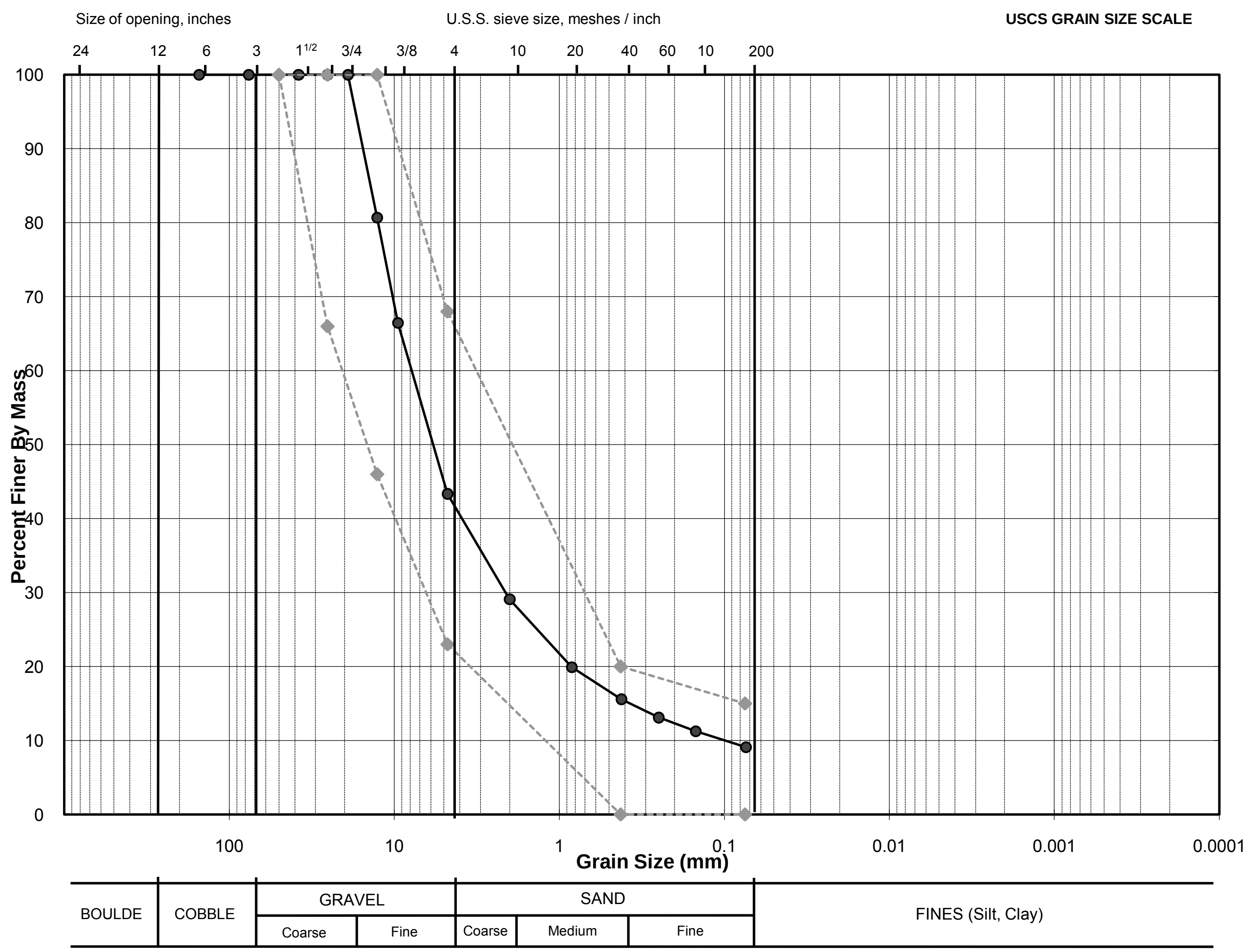
Golder Associates Ltd. - Burnaby Lab
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Particle Size Analysis of Soils

Reference
ASTM D 422-63 (2007

Client:	Agnico-Eagle Mines Ltd.	**Sample No.:**	Stockpile
Project:	Meadowbank Gold Project	**Sample Location:**	8
Location:	Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/2200	**Lab ID No:**	274
Visual Description:	Core backfill	**Other Remarks:**	

Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	N/A
Dispersion Period (min):	N/A	**Hardness:**	N/A



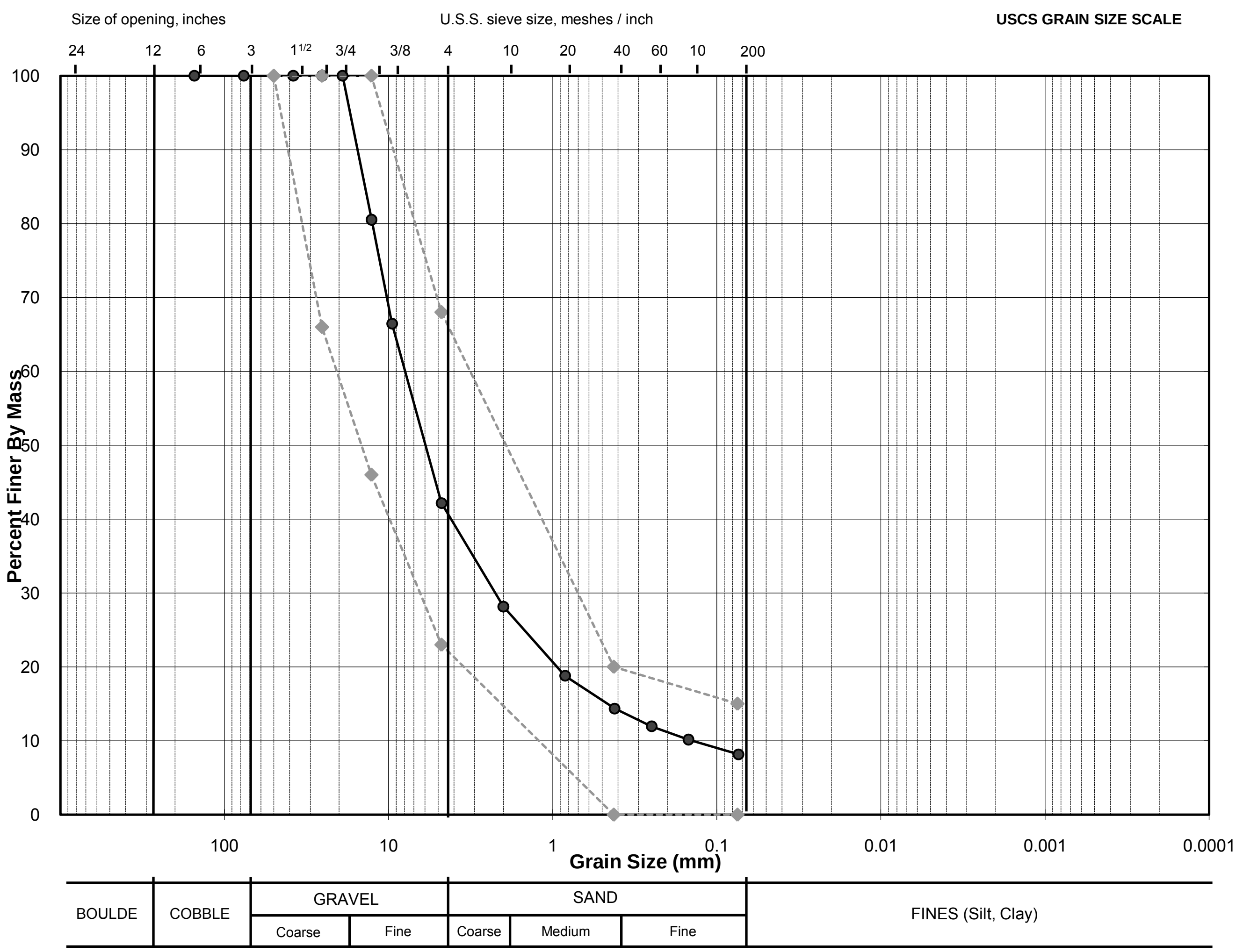
EB/JM	29-Oct-08	LP	01-Nov-08
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Particle Size Analysis of Soils

Reference
ASTM D 422-63 (2007

Client:	Agnico-Eagle Mines Ltd.	**Sample No.:**	Stockpile
Project:	Meadowbank Gold Project	**Sample Location:**	9
Location:	Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/2200	**Lab ID No:**	274
Visual Description:		**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	N/A
Dispersion Period (min):	N/A	**Hardness:**	N/A



EB/JM	29-Oct-08	LP	01-Nov-08
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
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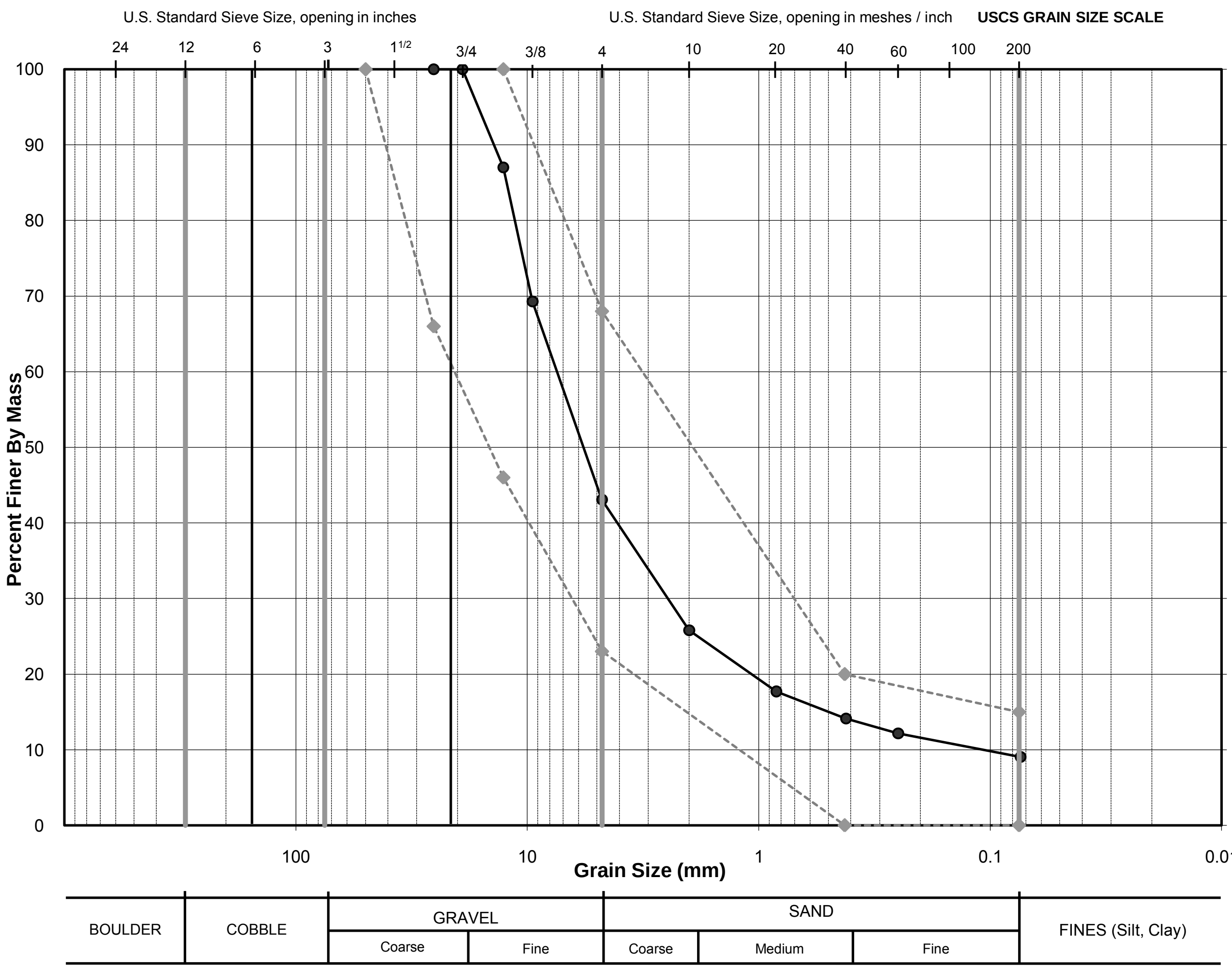
Particle Size Analysis of Soils

Reference	ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	10
Project:	Meadowbank	**Sample Location:**	In Place (60+320)
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Core Backfill	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



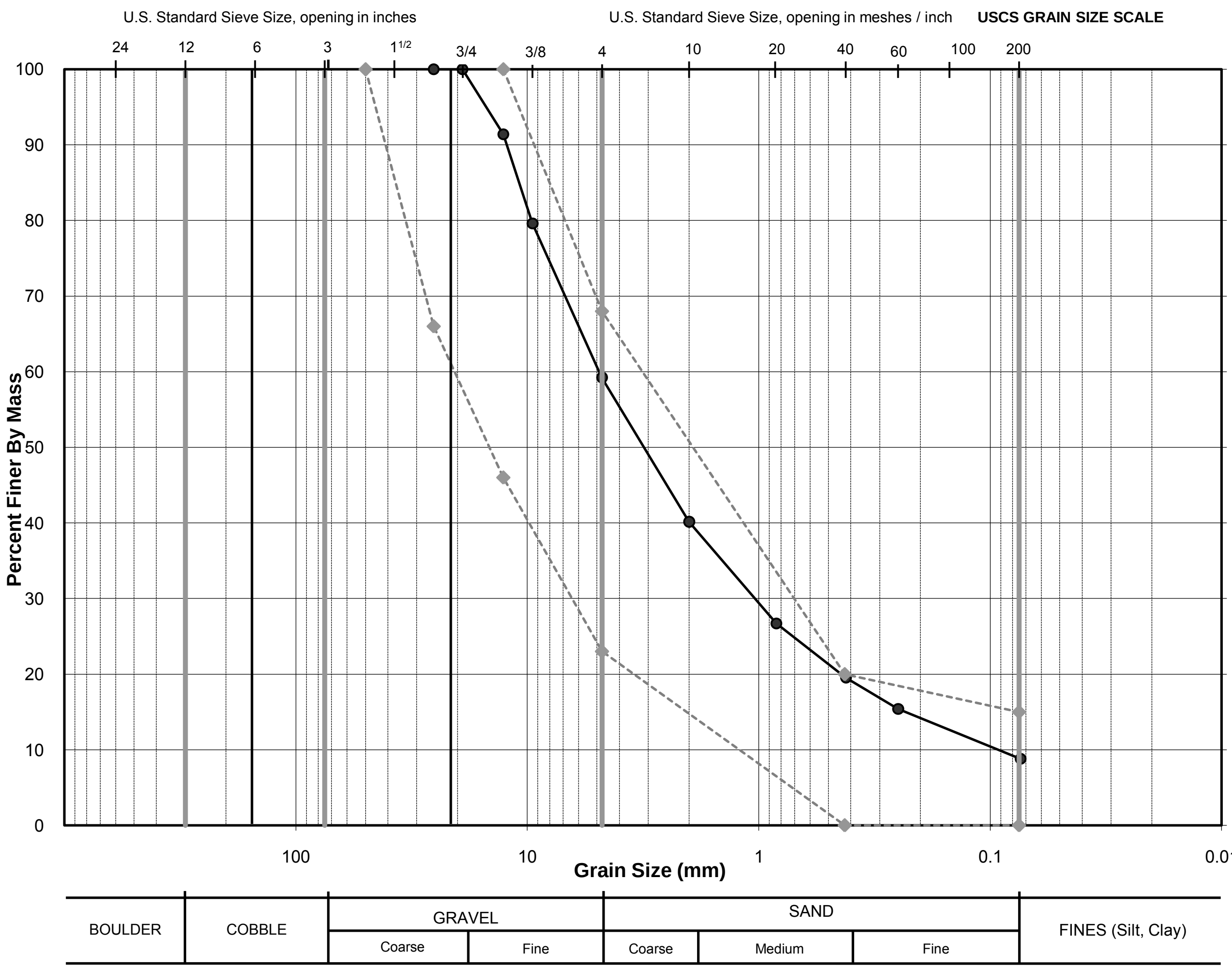
CS	Aug 22, 2008	JEK	Sept 4 2008
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Particle Size Analysis of Soils

Reference
ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	11
Project:	Meadowbank	**Sample Location:**	In Place 60+402
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Core Backfill	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



CS	Aug 23, 2008	JEK	Sept 4 2008
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
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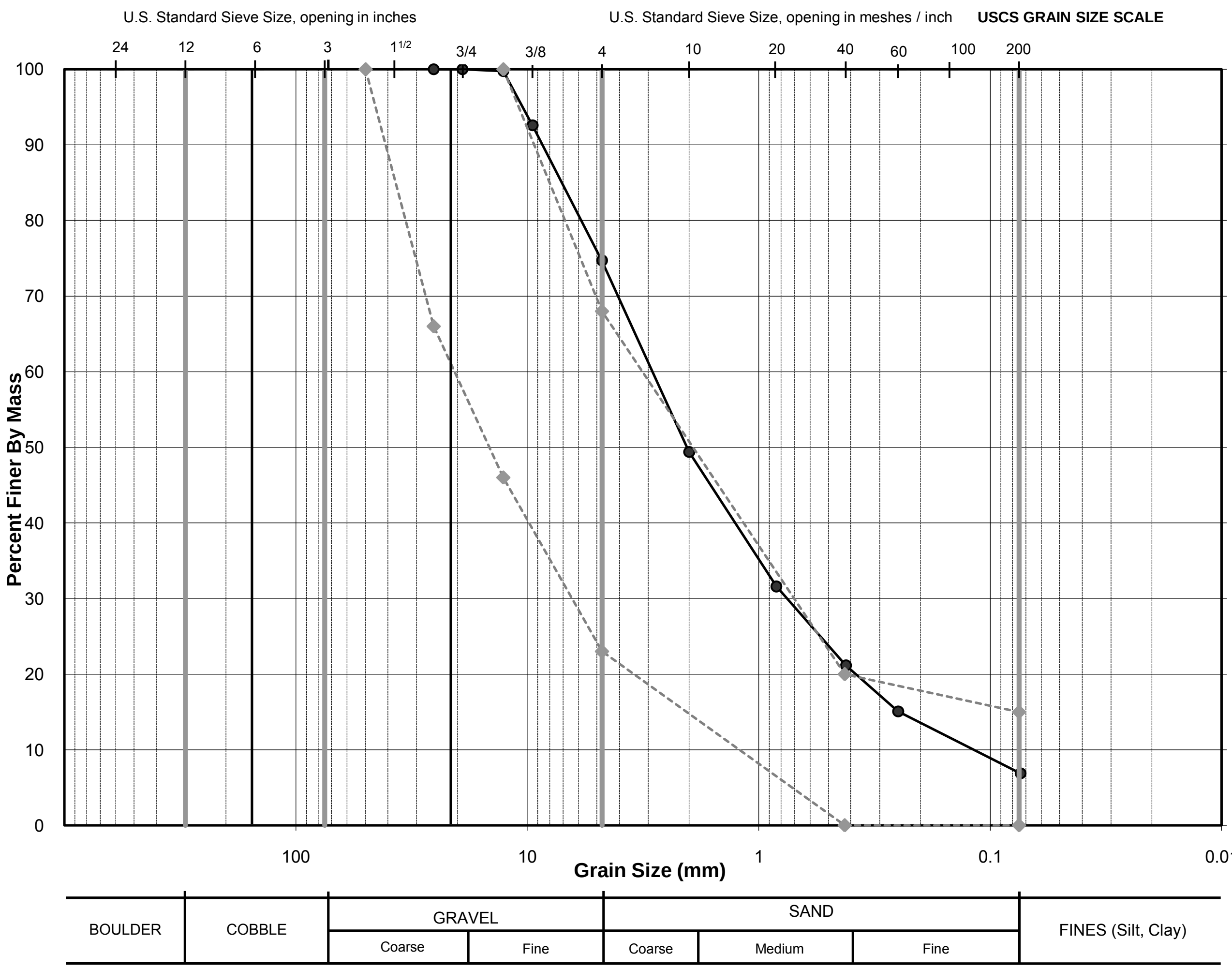
Burnaby, B.C. Canada V5C 6C8

Particle Size Analysis of Soils

Reference
ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	13
Project:	Meadowbank	**Sample Location:**	In Place 60+471
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Core Backfill	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



RB	24-Aug-08	JEK	25-Sep-08
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
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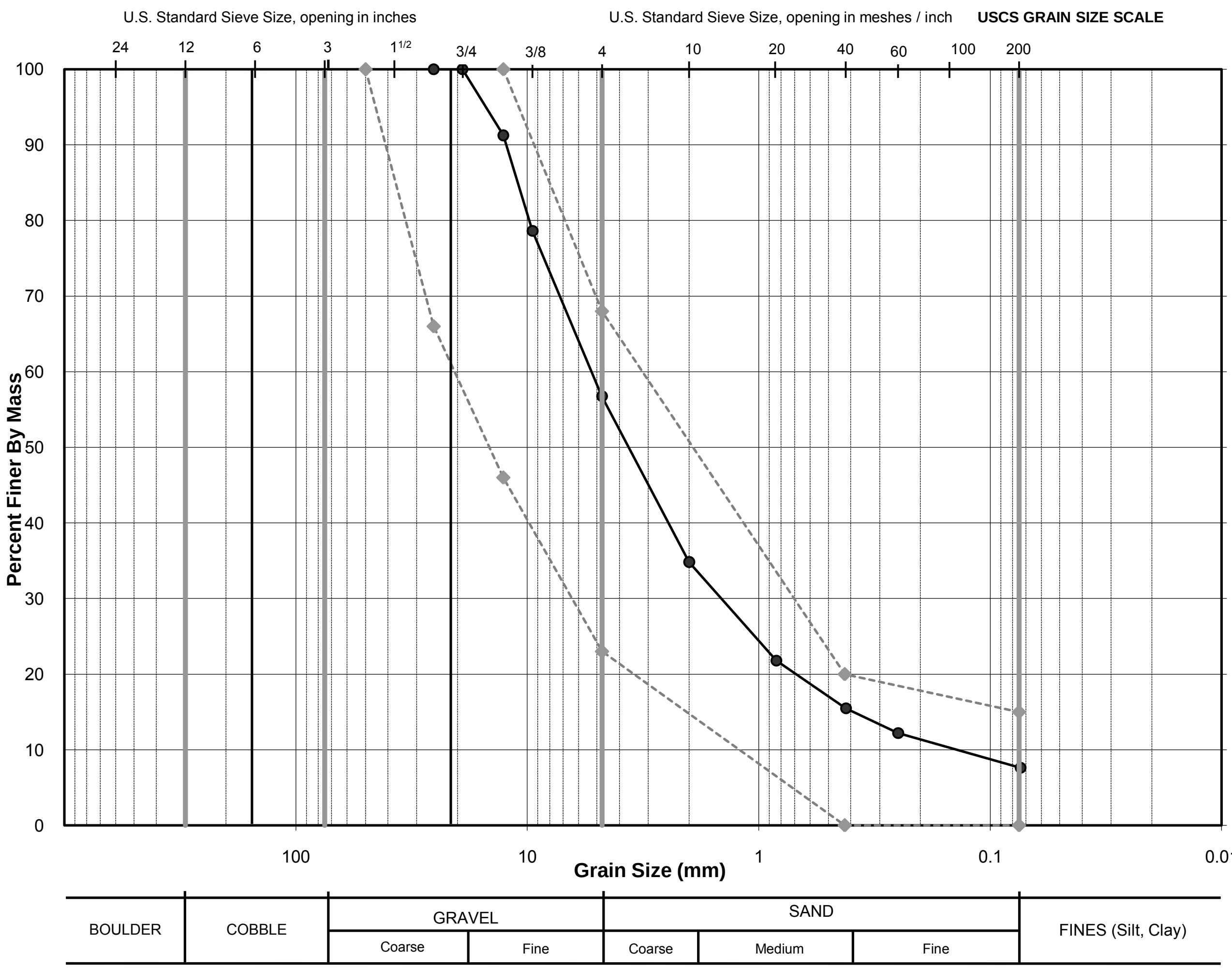
Particle Size Analysis of Soils

Reference	ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	15
Project:	Meadowbank	**Sample Location:**	In Place 60+793
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Core Backfill	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



RB	26-Aug-08	JEK	16-Sep-08
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
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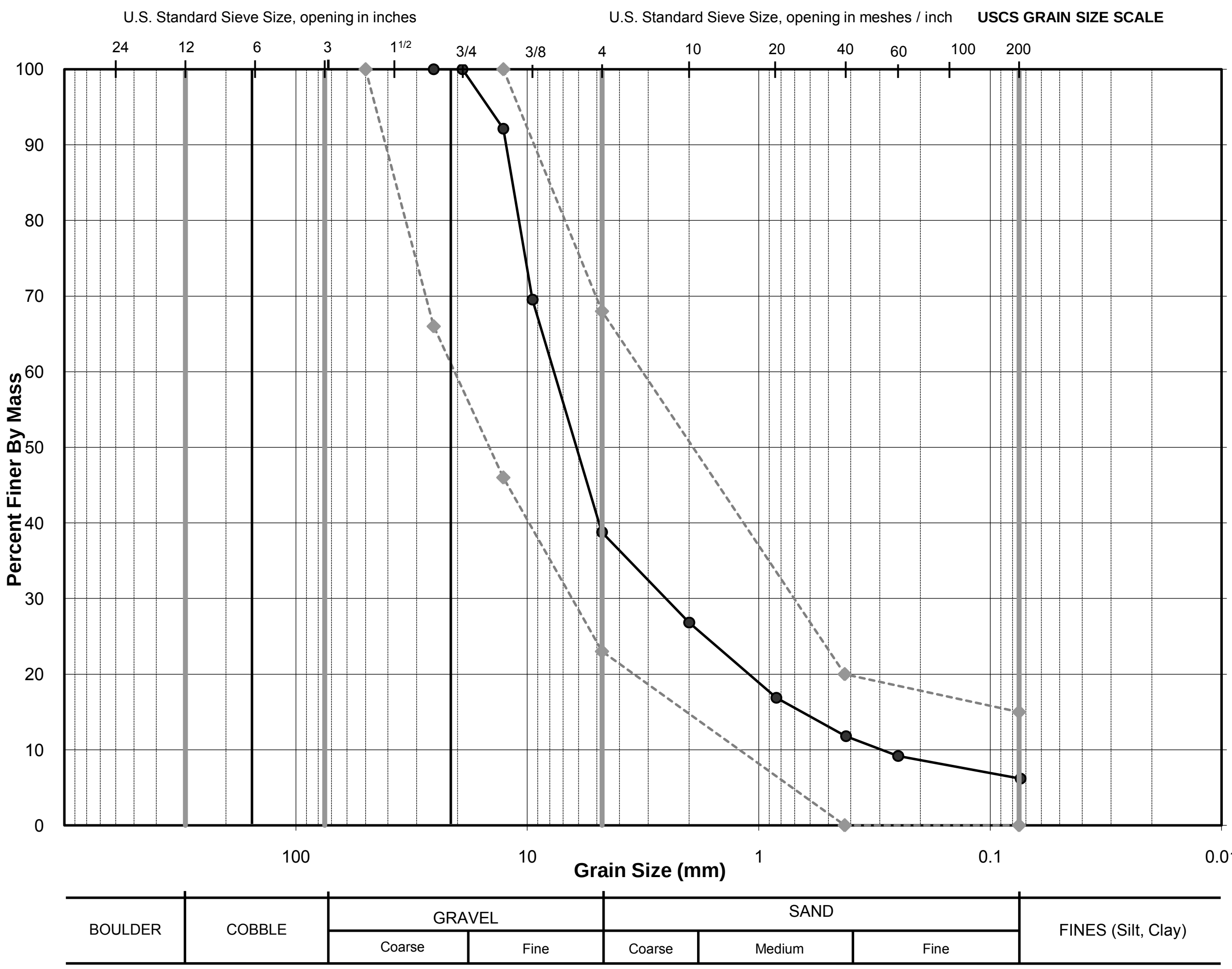
Particle Size Analysis of Soils

Reference ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	16
Project:	Meadowbank	**Sample Location:**	In Place Sta (60+764)
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Core Backfill	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



RB	26-Aug-08	JEK	16-Sep-08
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
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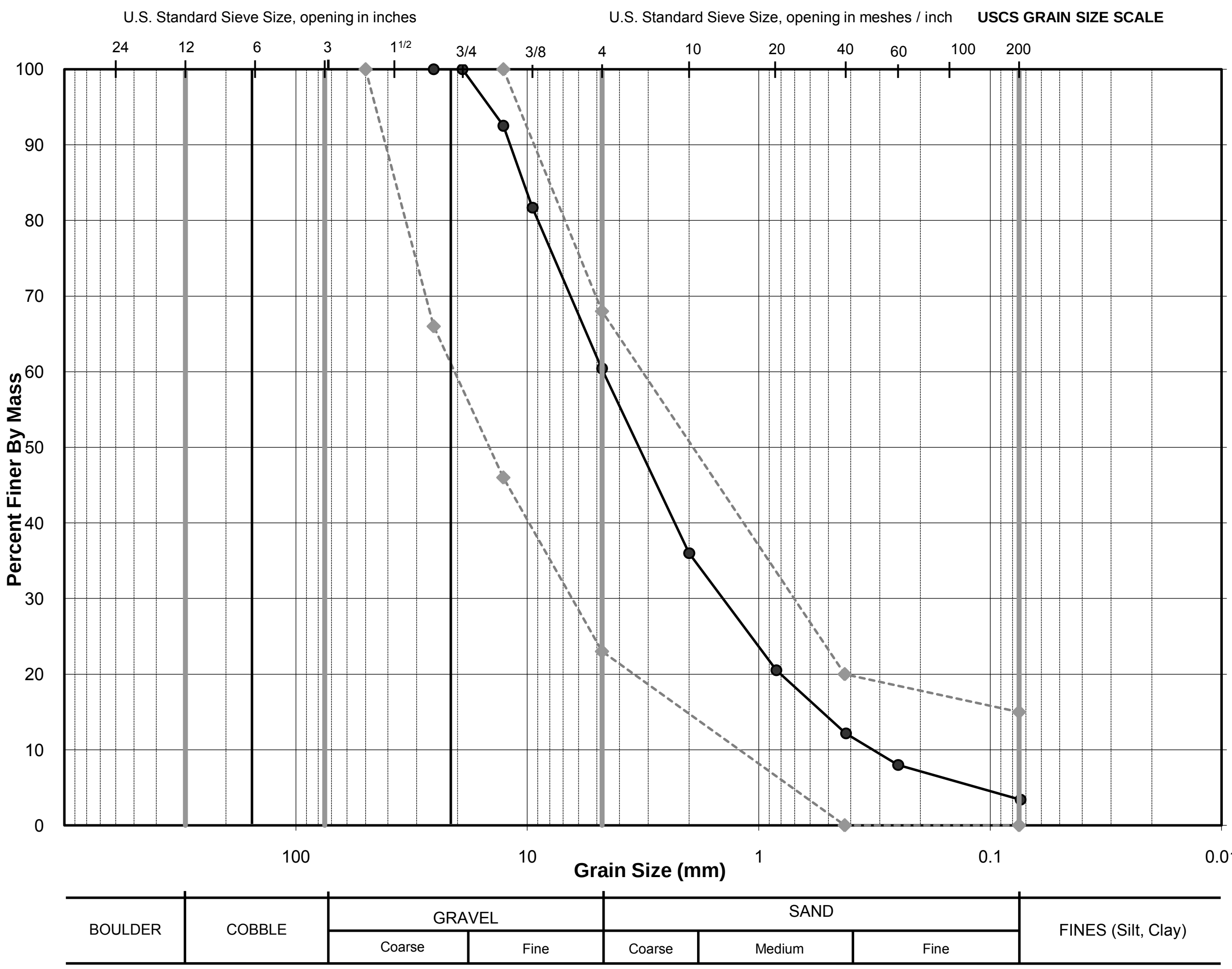
Particle Size Analysis of Soils

Reference
ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	17
Project:	Meadowbank	**Sample Location:**	In Place Sta (60+725)
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Core Backfill	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



RMB	28-Aug-08	JEK	16-Sep-08
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
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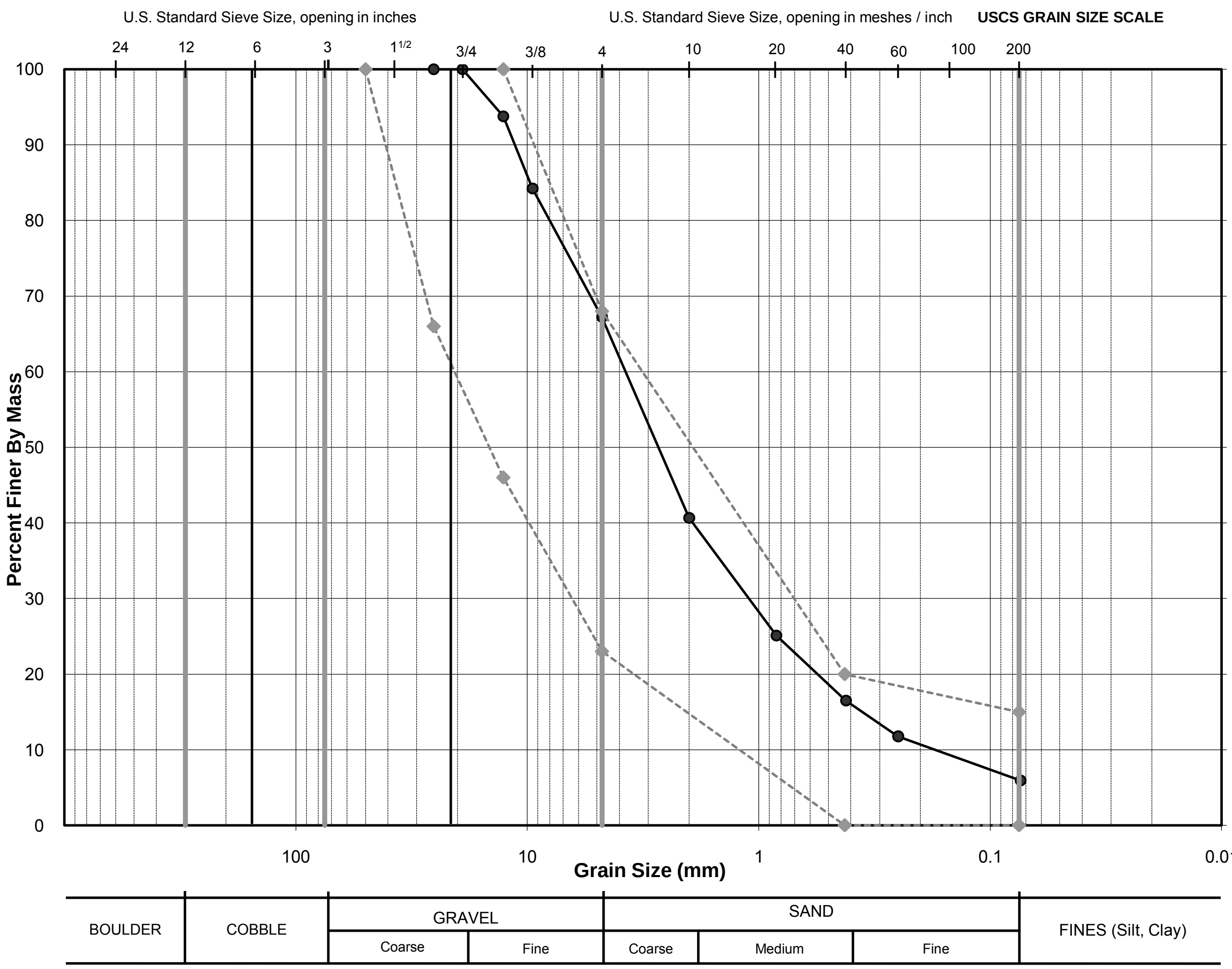
Particle Size Analysis of Soils

Reference
ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	18
Project:	Meadowbank	**Sample Location:**	In Place Sta (60+710)
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Core Backfill	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



RMB	28-Aug-08	JEK	16-Sep-08
TESTED BY	DATE	CHECKED BY	DATE

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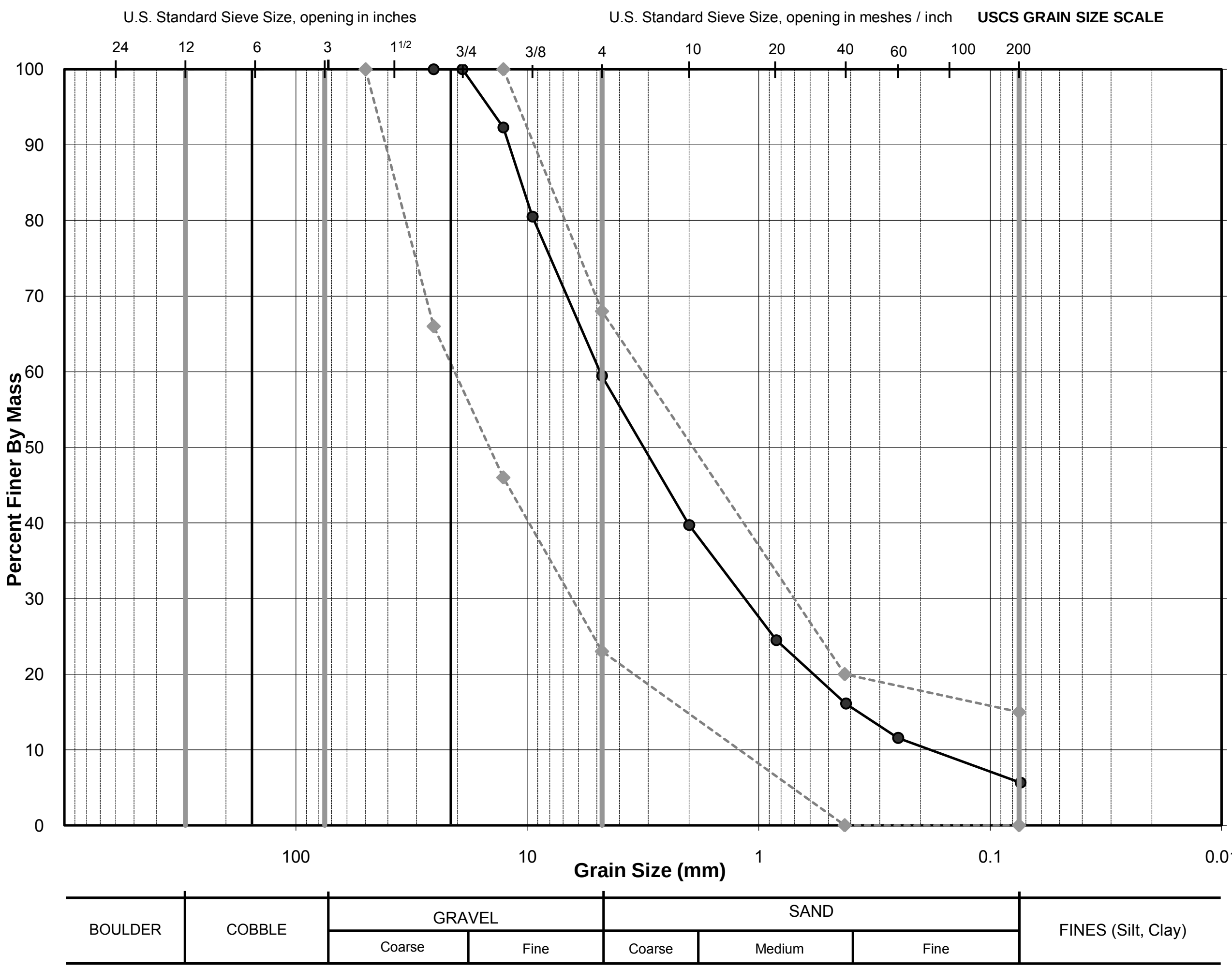
Golder Associates

Particle Size Analysis of Soils

Reference
ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	19
Project:	Meadowbank	**Sample Location:**	In Place Sta (60+498)
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Core Backfill	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



RMB	29-Aug-08	JEK	16-Sep-08
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
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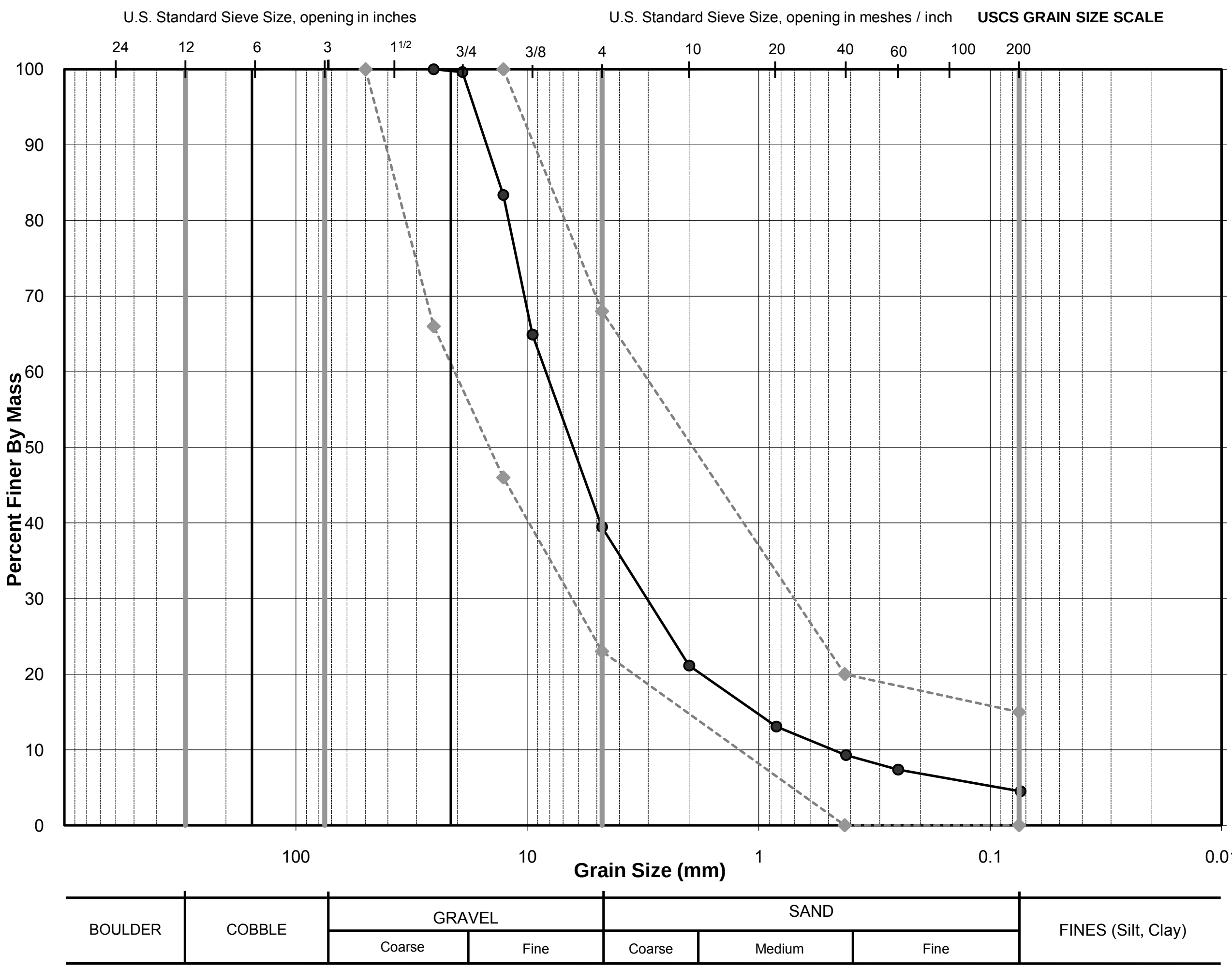
Particle Size Analysis of Soils

Reference ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	20
Project:	Meadowbank	**Sample Location:**	In Place Sta (60+659)
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Core Backfill	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



RMB	29-Aug-08	JEK	16-Sep-08
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
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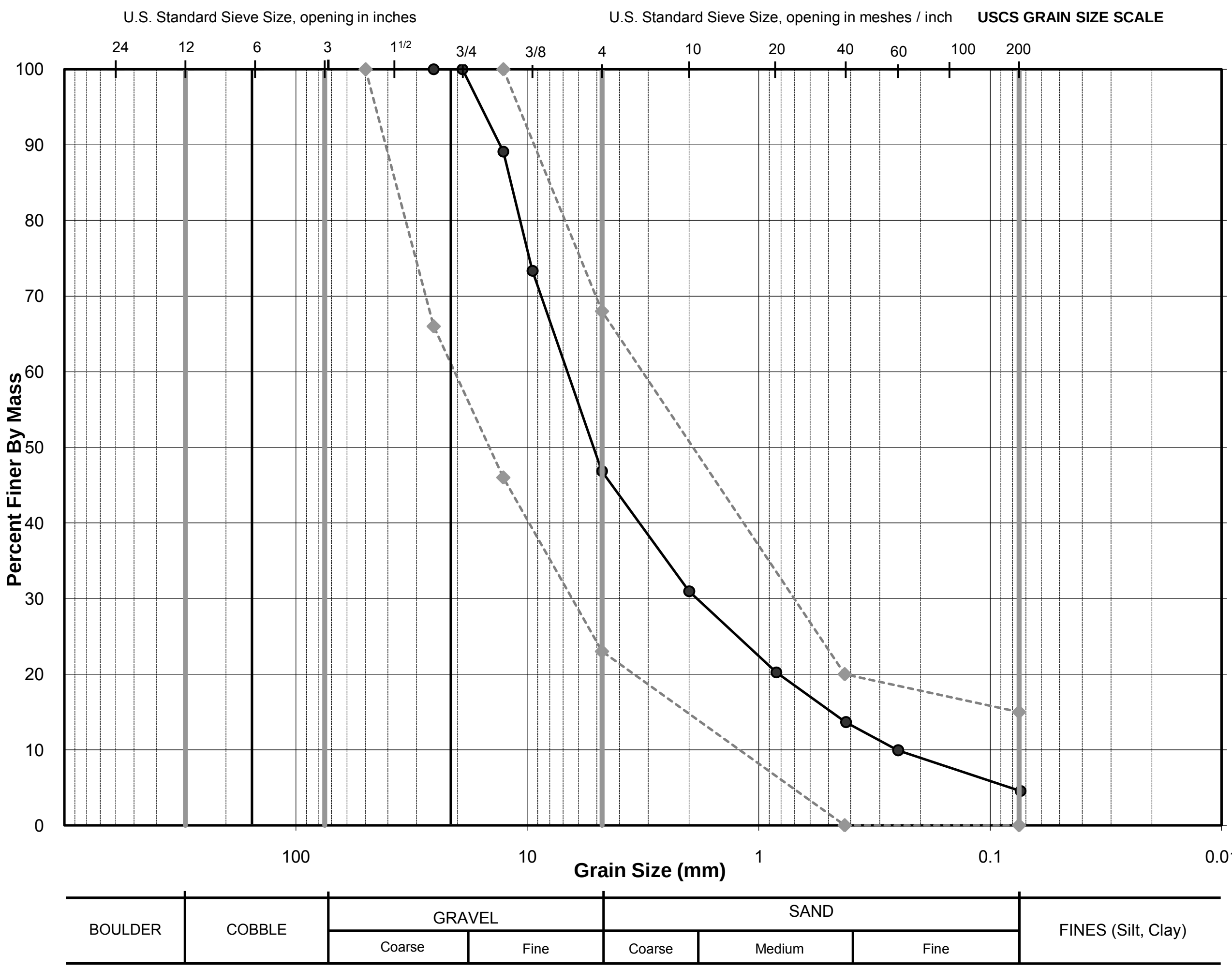
Golder Associates

Particle Size Analysis of Soils

Reference
ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	21
Project:	Meadowbank	**Sample Location:**	In Place Sta (60+513)
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Core Backfill	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



RMB	30-Aug-08	JEK	16-Sep-08
TESTED BY	DATE	CHECKED BY	DATE

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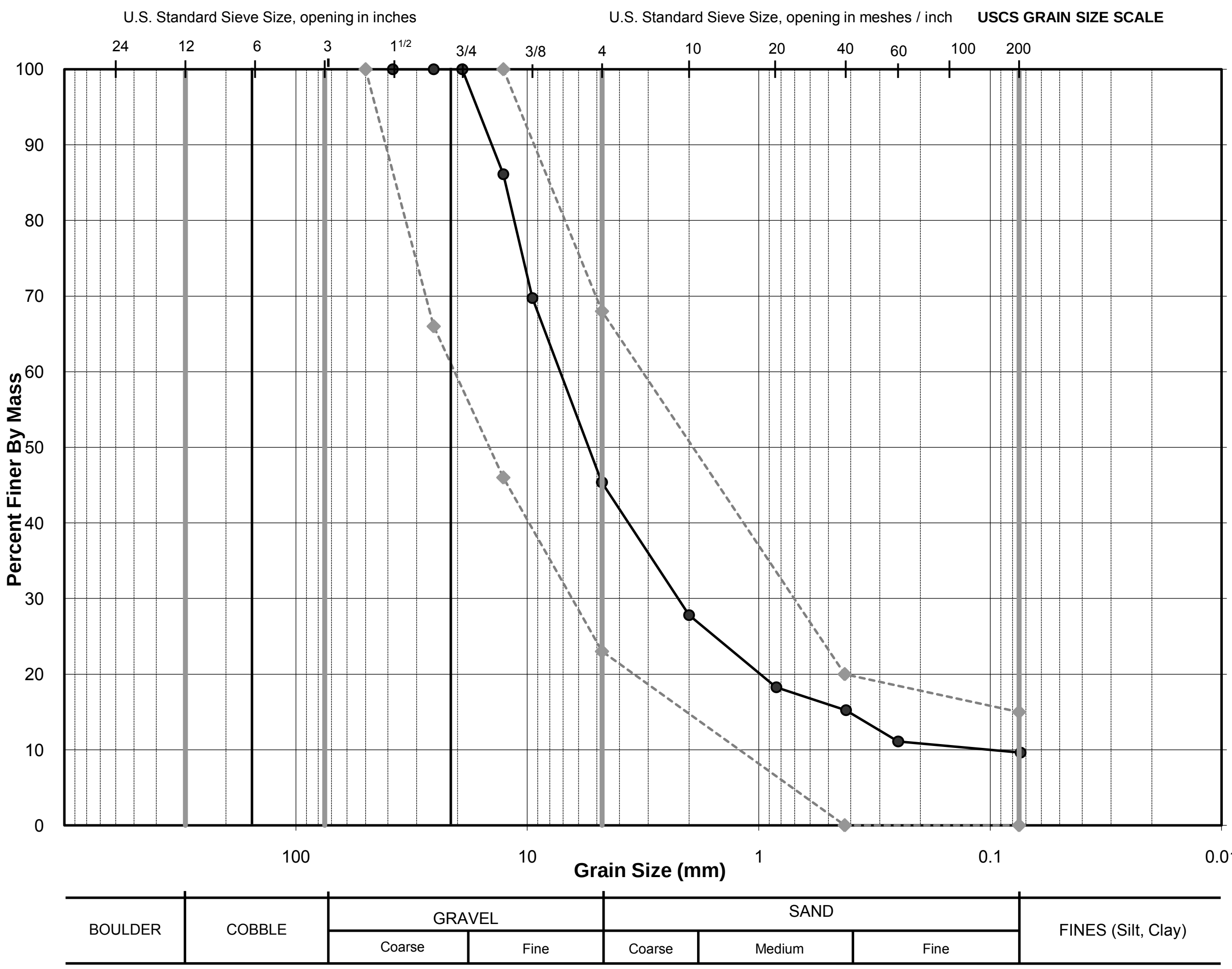
Particle Size Analysis of Soils

Reference ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	23
Project:	Meadowbank	**Sample Location:**	In place Sta 60+589
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	Below water table
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Core Backfill	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



RMB	30-Aug-08	KD	15-Sep-08
TESTED BY	DATE	CHECKED BY	DATE

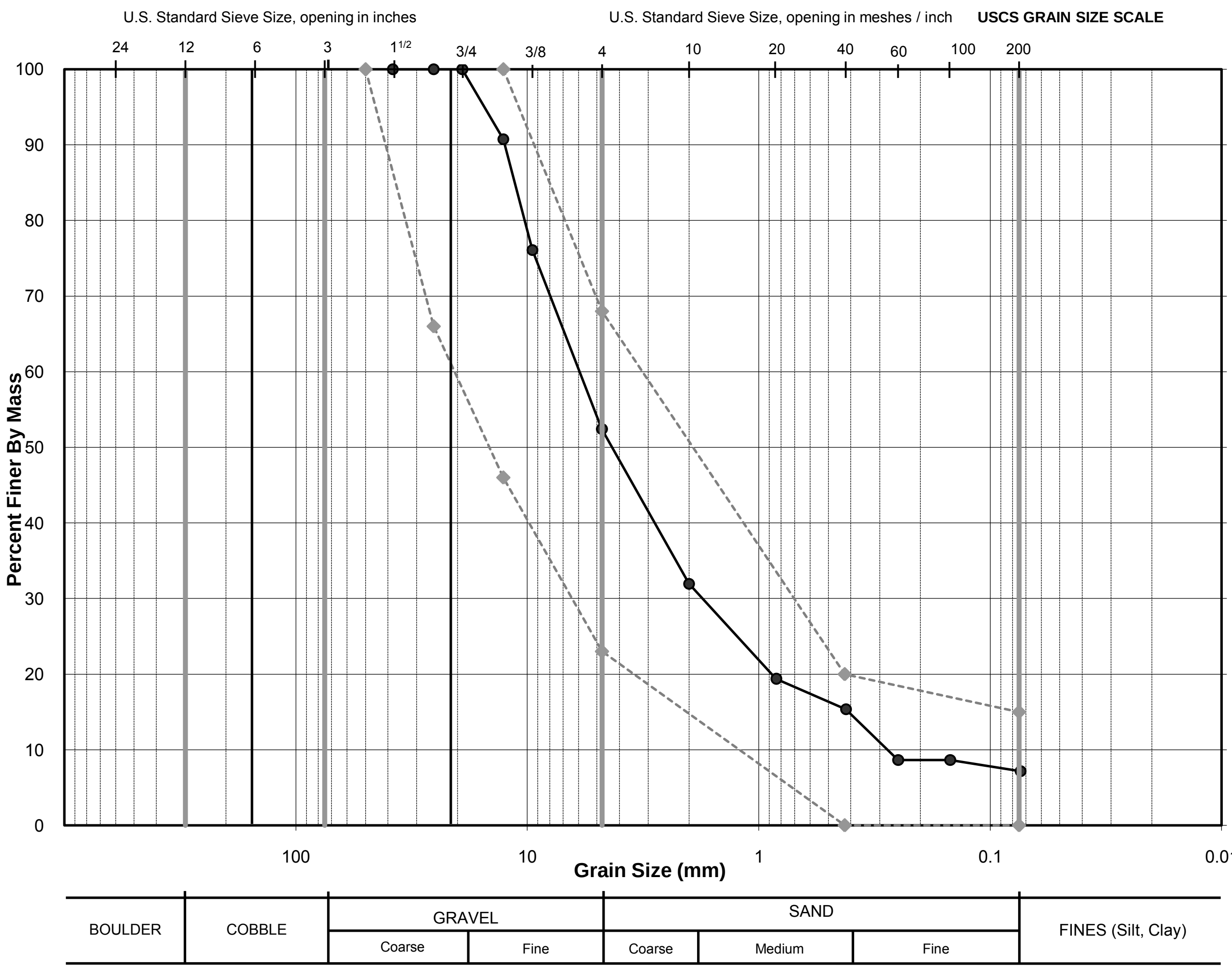
Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Golder Associates

Particle Size Analysis of Soils

Reference
ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	24
Project:	Meadowbank	**Sample Location:**	In place Sta 60+524
Location:	70km from Baker Lake, Nunavut	**Depth (m):**	Below water table
Project No.:	07-1413-0074/ 2200	**Lab ID No:**	
Visual Description:	Core Backfill	**Other Remarks:**	
Specific Gravity (assumed):	N/A	**Max. Particle Size (mm):**	
Dispersion Method:	N/A	**Shape:**	angular
Dispersion Period (min):	N/A	**Hardness:**	hard and durable



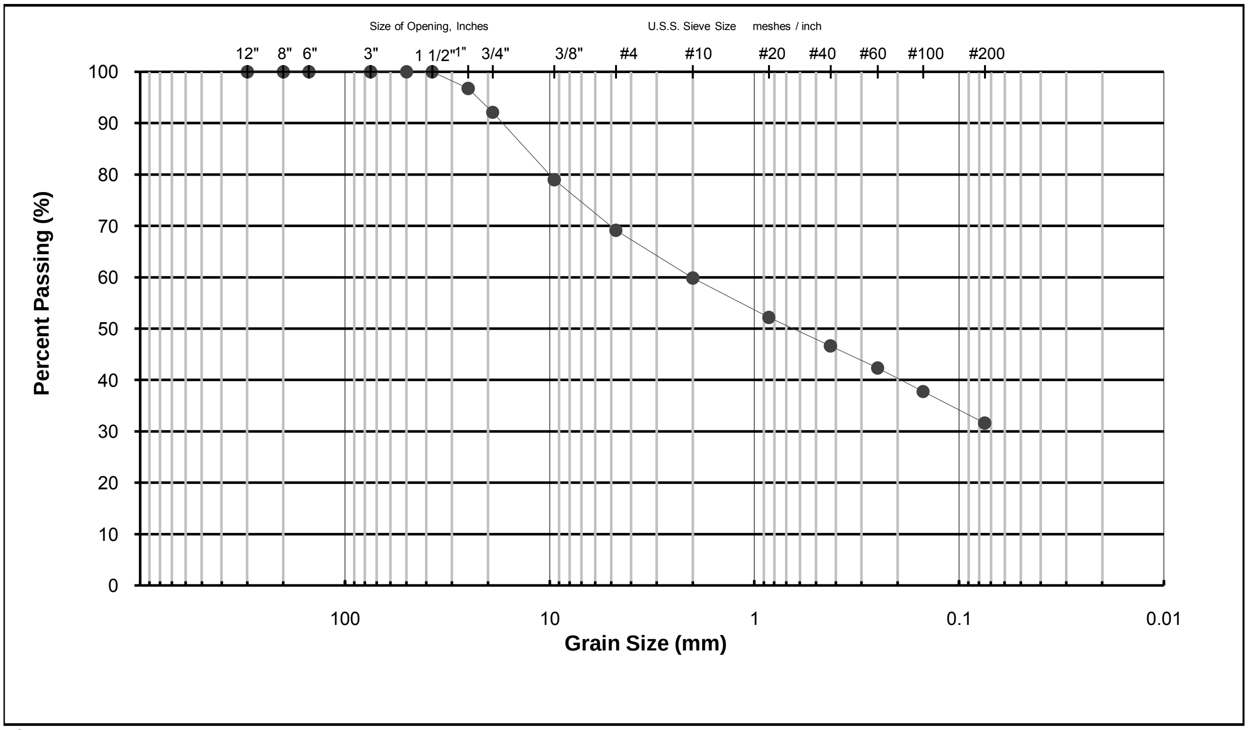
RMB	30-Aug-08	KD	15-Aug-08
TESTED BY	DATE	CHECKED BY	DATE

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-0074-2200	**Station**	60+095 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	TS
Tested By	GB	**Sample Date**	07-Sep-08 **Test #:** **S-30**
Percent Gravel (+ 4.75 and coarser) :	**30.8%**	**Percent Oversize (%):**	**7.9**
Percent Sand Silt and Clay (- 4.75 and finer) :	**69.2%**	**Weight of Total Sample (g):**	**3790.2**

SIEVE ANALYSIS						MATERIAL SPECIFICATION: SB Backfill
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	- 4.75	
12"	300	0.0	100	0.0		
8"	200	0.0	100	0.0		
6"	150	0.0	100	0.0		
3"	75	0.0	100	0.0		
2"	50	0.0	100	0.0		
1 1/2"	37.5	0.0	100	0.0		
1"	25.0	3.2	97	10.5		
3/4"	19.0	4.6	92	15.1		
3/8"	9.5	5.6	79	18.1		
#4	4.75	9.8	69	31.9		
#10	2.00	9.3	60		13.4	
#20	0.85	7.7	52		11.1	
#40	0.425	5.5	47		8.0	
#60	0.250	4.3	42		6.2	
#100	0.150	4.6	38		6.6	
#200	0.075	6.1	31.6		8.9	
	PAN	31.7			45.8	
Total		100.1				



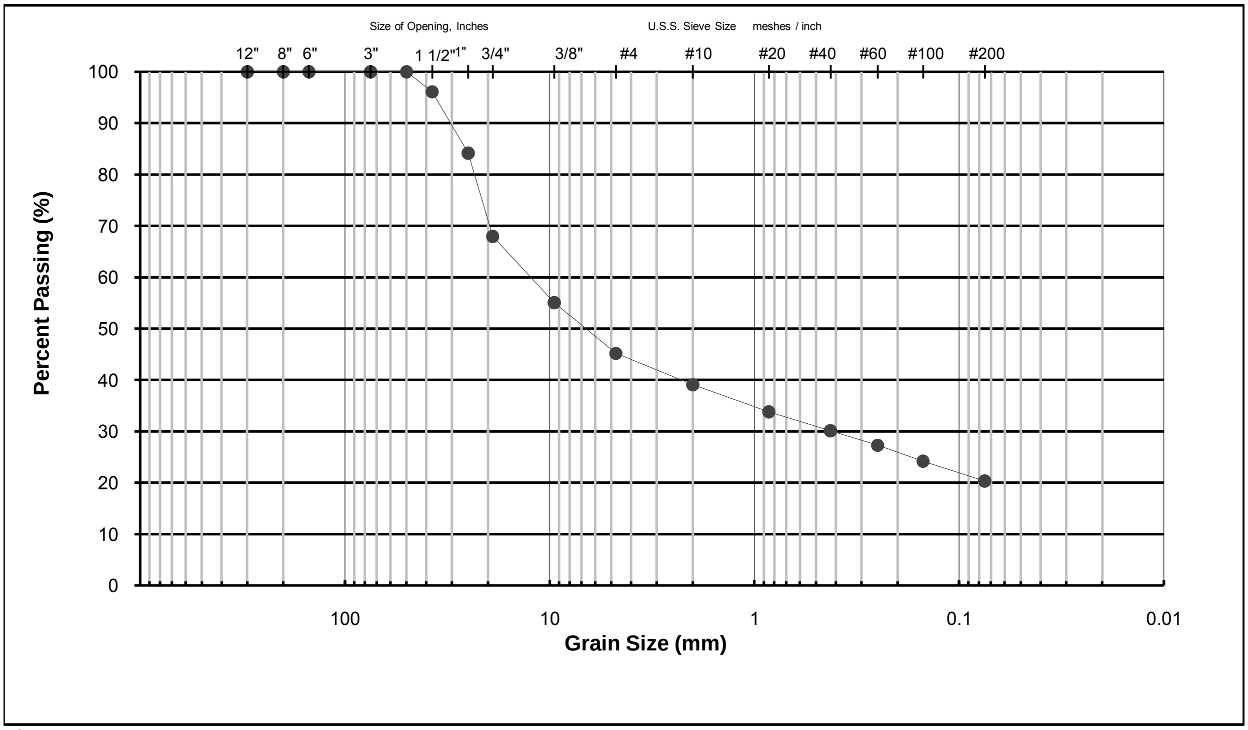
Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Project #	07-1413-0074-2200	**Station**	60+100 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	134.87 m.
Golder Project Manager		**Sampled By**	TS
Tested By	GB	**Sample Date**	08-Sep-08 **Test #:** **S-31**
Percent Gravel (+ 4.75 and coarser) : 54.8%		**Percent Oversize (%):**	**32.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 45.2%		**Weight of Total Sample (g):**	**6265.7**

SIEVE ANALYSIS					
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	- 4.75
12"	300	0.0	100	0.0	
8"	200	0.0	100	0.0	
6"	150	0.0	100	0.0	
3"	75	0.0	100	0.0	
2"	50	0.0	100	0.0	
1 1/2"	37.5	3.9	96	7.1	
1"	25.0	11.9	84	21.8	
3/4"	19.0	16.2	68	29.5	
3/8"	9.5	6.5	55	11.8	
#4	4.75	9.9	45	18.0	
#10	2.00	6.1	39		13.5
#20	0.85	5.3	34		11.6
#40	0.425	3.7	30		8.2
#60	0.250	2.8	27		6.3
#100	0.150	3.1	24		6.8
#200	0.075	3.9	20.3		8.6
	PAN	20.3			45.0
Total		100.0			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

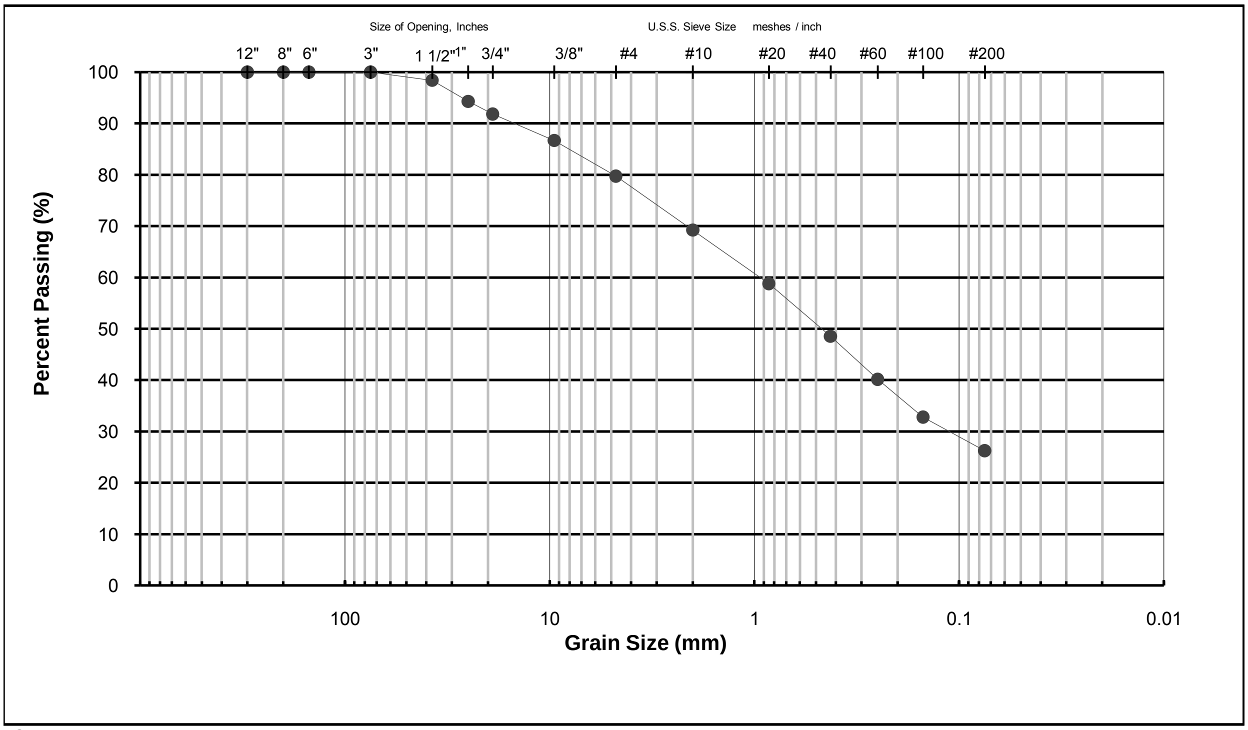
SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	05-1411-151-8000	**Station**	60+100 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	134.87 m.
Golder Project Manager		**Sampled By**	TS
Tested By	GB	**Sample Date**	09-Sep-08 **Test #: 32**
Percent Gravel (+ 4.75 and coarser) : 20.3%		**Percent Oversize (%): 8.2**	
Percent Sand Silt and Clay (- 4.75 and finer) : 79.7%		**Weight of Total Sample (g): 7028.6**	

SIEVE ANALYSIS

Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	Individual % Retained (Split - 4.75	MATERIAL SPECIFICATION: SB Backfill	
12"	300	0.0	100	0.0			
8"	200	0.0	100	0.0			
6"	150	0.0	100	0.0			
3"	75	0.0	100	0.0			
1 1/2"	37.5	1.6	98	7.9			
1"	25.0	4.1	94	20.3			
3/4"	19.0	2.5	92	12.3			
3/8"	9.5	2.2	87	10.6			
#4	4.75	6.9	80	34.2			
#10	2.00	10.5	69		13.2		
#20	0.85	10.4	59		13.1		
#40	0.425	10.2	49		12.8		
#60	0.250	8.4	40		10.5		
#100	0.150	7.3	33		9.2		
#200	0.075	6.6	26.2		8.2		
	PAN	26.2			32.9		
Total		100.0					



Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

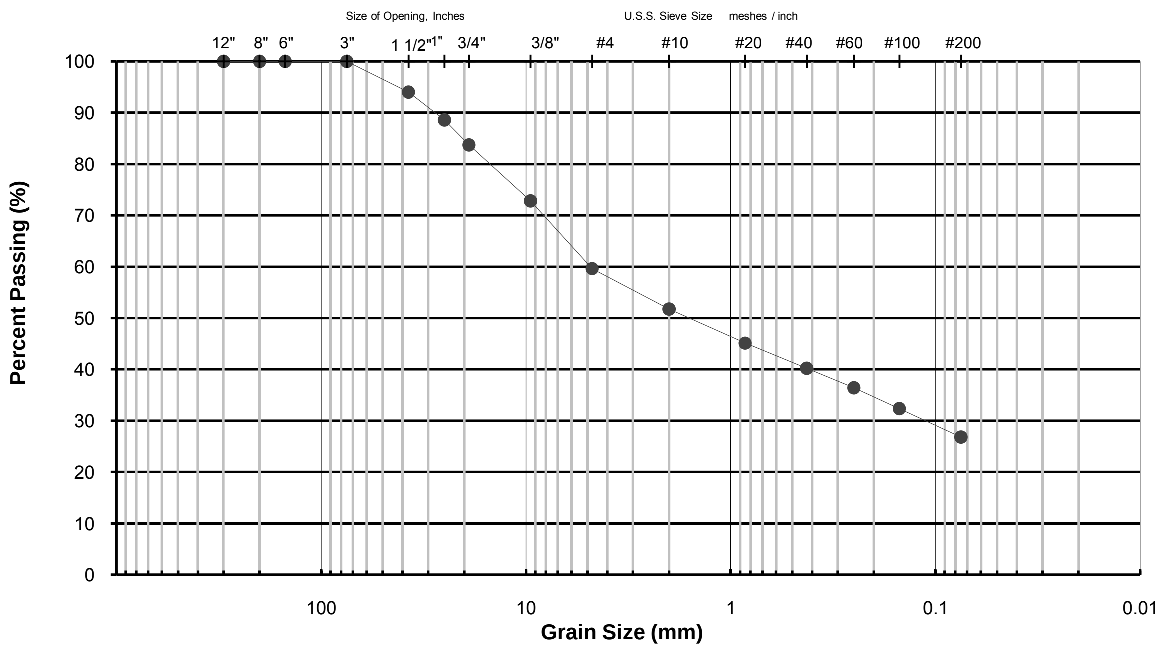
Golder Associates

Project #	07-1413-0074-2200	**Station**	60+085 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	TS
Tested By	GB	**Sample Date**	08-Sep-08 **Test #: 33**
Percent Gravel (+ 4.75 and coarser) : 40.4%		**Percent Oversize (%): 16.3**	
Percent Sand Silt and Clay (- 4.75 and finer) : 59.6%		**Weight of Total Sample (g): 4771.8**	

SIEVE ANALYSIS

Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split) + 4.75	Individual % Retained (Split) - 4.75
12"	300	0.0	100	0.0	
8"	200	0.0	100	0.0	
6"	150	0.0	100	0.0	
3"	75	0.0	100	0.0	
1 1/2"	37.5	6.0	94	14.9	
1"	25.0	5.4	89	13.4	
3/4"	19.0	4.9	84	12.0	
3/8"	9.5	4.9	73	12.1	
#4	4.75	13.2	60	32.7	
#10	2.00	7.9	52		13.2
#20	0.85	6.6	45		11.1
#40	0.425	4.9	40		8.2
#60	0.250	3.8	36		6.3
#100	0.150	4.0	32		6.8
#200	0.075	5.6	26.8		9.3
	PAN	26.9			45.0
Total		100.1			

MATERIAL SPECIFICATION:
SB Backfill



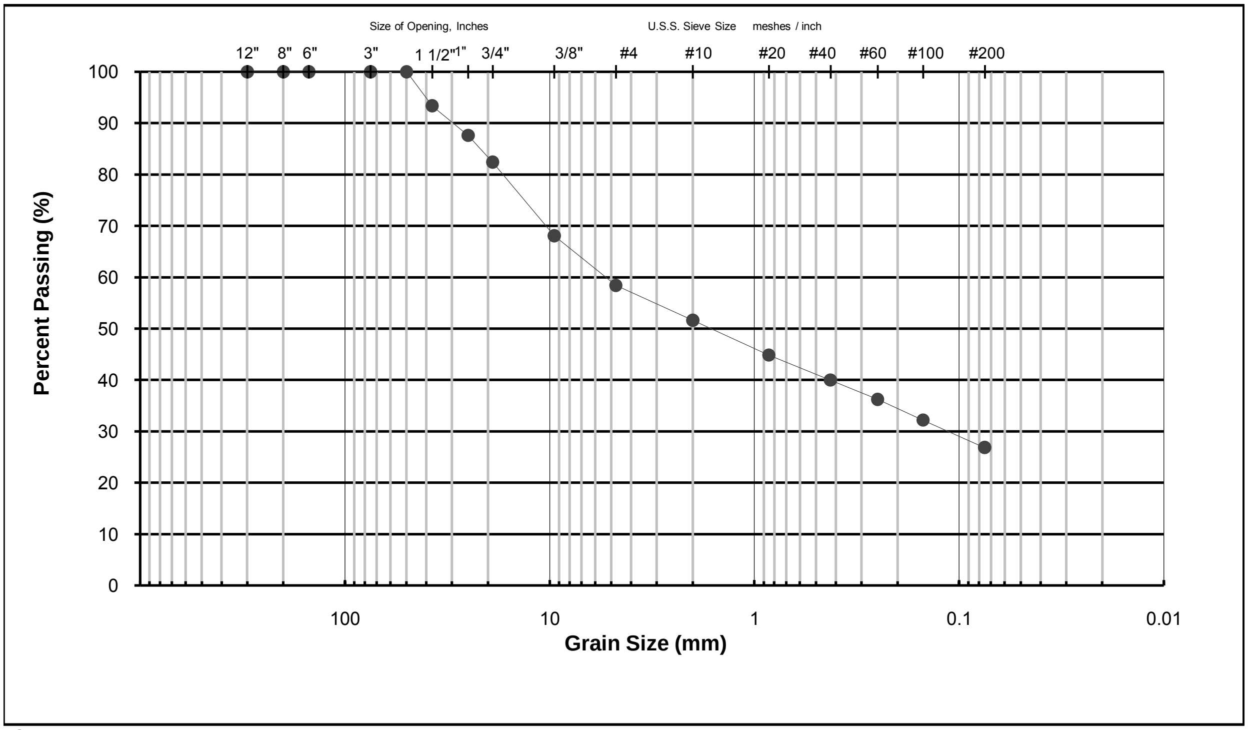
Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-0074-2200	**Station**	60+090 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	TS
Tested By	GB	**Sample Date**	09-Sep-08 **Test #:** 34
Percent Gravel (+ 4.75 and coarser) : 41.6%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 58.4%		**Weight of Total Sample (g):**	**7754**

SIEVE ANALYSIS						**MATERIAL SPECIFICATION: SB Backfill**	
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split			
				+ 4.75	- 4.75		
12"	300	0.0	100	0.0			
8"	200	0.0	100	0.0			
6"	150	0.0	100	0.0			
3"	75	0.0	100	0.0			
2"	50	0.0	100	0.0			
1 1/2"	37.5	6.6	93	16.0			
1"	25.0	5.7	88	13.8			
3/4"	19.0	5.2	82	12.6			
3/8"	9.5	7.2	68	17.2			
#4	4.75	9.7	58	23.3			
#10	2.00	6.8	52		11.6		
#20	0.85	6.8	45		11.6		
#40	0.425	4.9	40		8.3		
#60	0.250	3.7	36		6.4		
#100	0.150	4.0	32		6.9		
#200	0.075	5.3	26.8		9.1		
	PAN	26.9			46.0		
Total		100.0					



Comments:

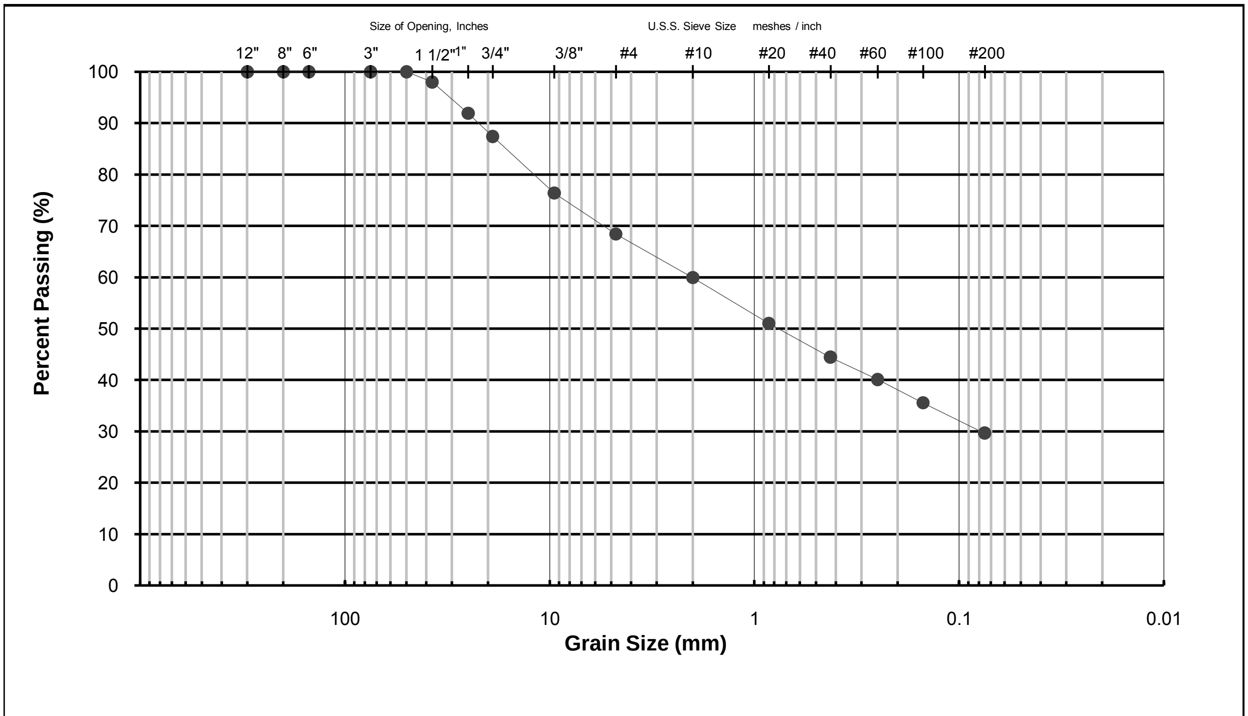
- SB Backfill.

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Project #	07-1413-0074-2200	**Station**	60+119 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	TS
Tested By	RC/RB	**Sample Date**	10-Sep-08 **Test #:** 35
Percent Gravel (+ 4.75 and coarser) : 31.6%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 68.4%		**Weight of Total Sample (g):**	**5199**

SIEVE ANALYSIS

Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	Individual % Retained (Split - 4.75	MATERIAL SPECIFICATION: SB Backfill
12"	300	0.0	100	0.0		
8"	200	0.0	100	0.0		
6"	150	0.0	100	0.0		
3"	75	0.0	100	0.0		
2"	50	0.0	100	0.0		
1 1/2"	37.5	2.0	98	6.4		
1"	25.0	6.1	92	19.2		
3/4"	19.0	4.5	87	14.3		
3/8"	9.5	4.4	76	14.0		
#4	4.75	8.0	68	25.3		
#10	2.00	8.5	60		12.4	
#20	0.85	8.9	51		13.0	
#40	0.425	6.6	44		9.6	
#60	0.250	4.4	40		6.4	
#100	0.150	4.5	36		6.6	
#200	0.075	5.9	29.7		8.6	
	PAN	29.8			43.4	
Total		100.1				



Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

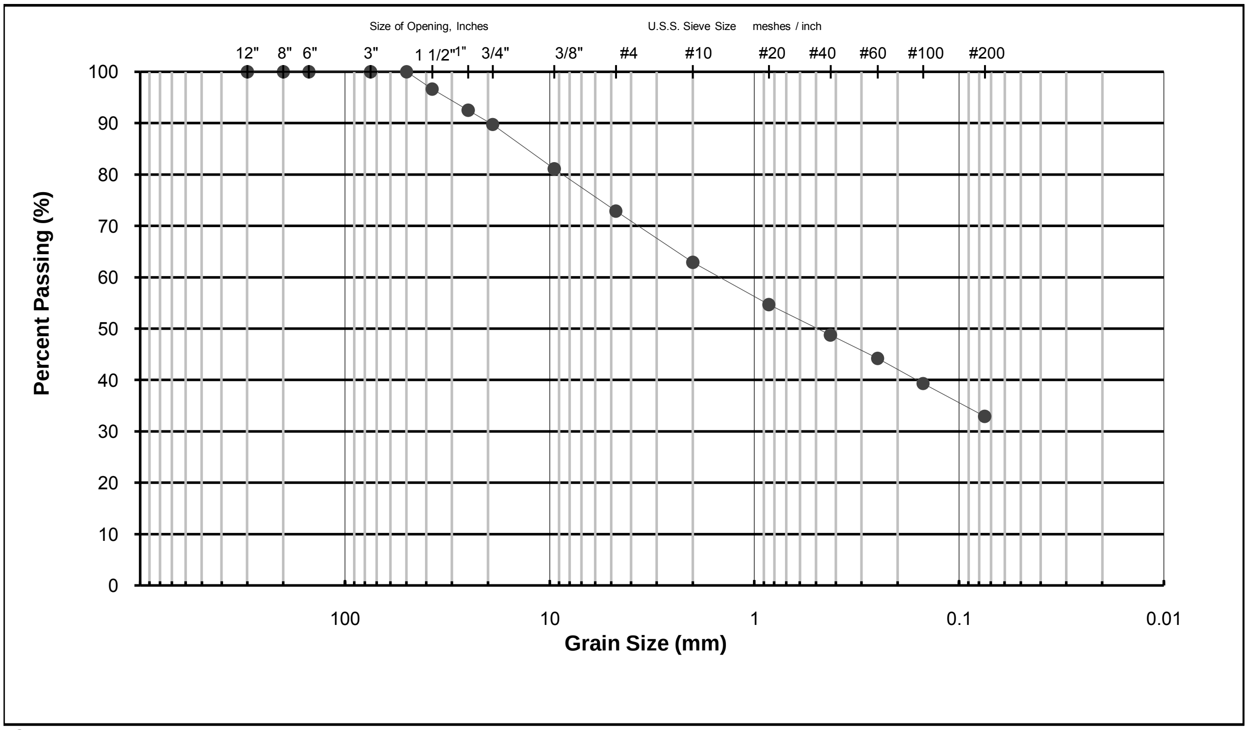
Golder Associates

Project #	07-1413-0074-2200	Station	60+144 - Soil-Bentonite
Client	AEM Ltd.	Offset	
Project	East Dike Construction	Elevation	
Golder Project Manager		Sampled By	RB
Tested By	RC/RB	Sample Date	10-Sep-08 **Test #: 36**
Percent Gravel (+ 4.75 and coarser) : 27.1%		**Percent Oversize (%): 0.0**	
Percent Sand Silt and Clay (- 4.75 and finer) : 72.9%		**Weight of Total Sample (g): 4600.1**	

SIEVE ANALYSIS

Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	Individual % Retained (Split - 4.75
12"	300	0.0	100	0.0	
8"	200	0.0	100	0.0	
6"	150	0.0	100	0.0	
3"	75	0.0	100	0.0	
2"	50	0.0	100	0.0	
1 1/2"	37.5	3.4	97	12.4	
1"	25.0	4.1	93	15.2	
3/4"	19.0	2.8	90	10.2	
3/8"	9.5	3.8	81	14.1	
#4	4.75	8.2	73	30.4	
#10	2.00	10.0	63		13.7
#20	0.85	8.2	55		11.2
#40	0.425	5.9	49		8.1
#60	0.250	4.6	44		6.2
#100	0.150	4.9	39		6.7
#200	0.075	6.4	32.9		8.8
	PAN	33.0			45.3
Total		100.1			

MATERIAL SPECIFICATION:
SB Backfill



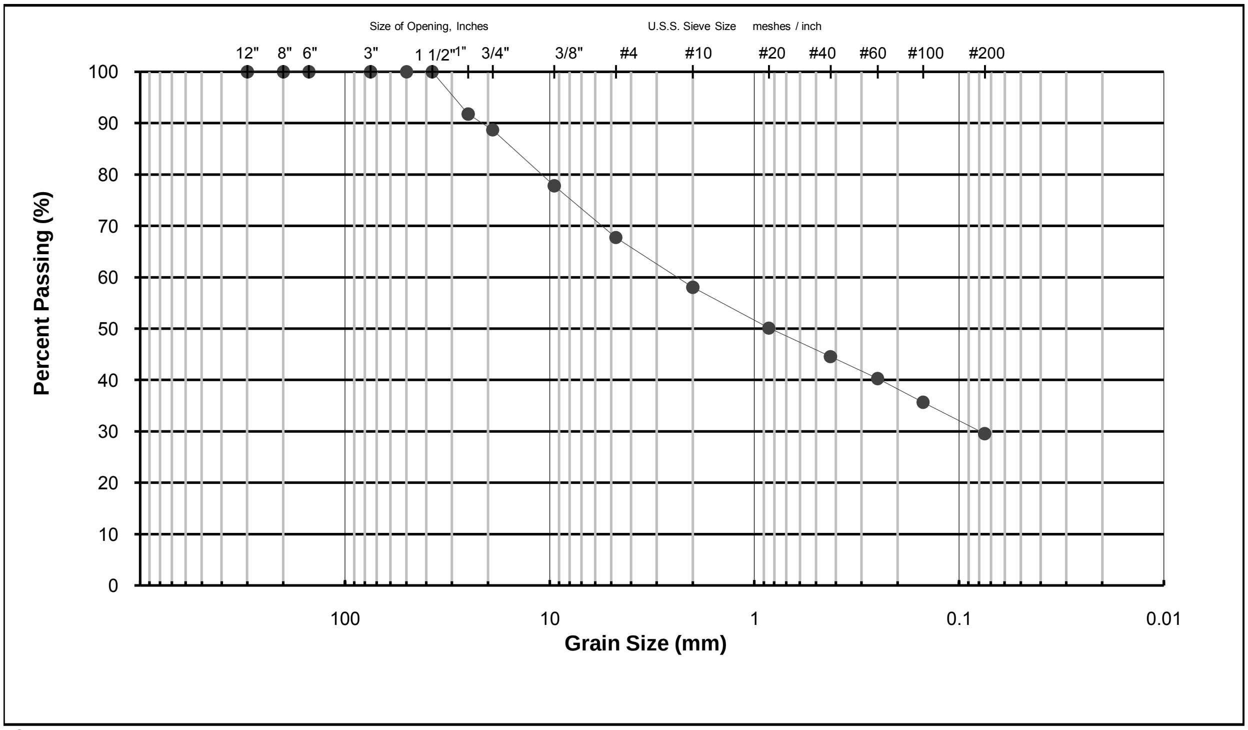
Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-0074-2200	**Station**	60+170 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	JB
Tested By	GB	**Sample Date**	11-Sep-08 **Test #:** 37
Percent Gravel (+ 4.75 and coarser) : 32.3%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 67.7%		**Weight of Total Sample (g):**	**4879.7**

SIEVE ANALYSIS						MATERIAL SPECIFICATION: SB Backfill	
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	- 4.75		
12"	300	0.0	100	0.0			
8"	200	0.0	100	0.0			
6"	150	0.0	100	0.0			
3"	75	0.0	100	0.0			
2"	50	0.0	100	0.0			
1 1/2"	37.5	0.0	100	0.0			
1"	25.0	8.2	92	25.5			
3/4"	19.0	3.1	89	9.6			
3/8"	9.5	4.7	78	14.5			
#4	4.75	10.1	68	31.2			
#10	2.00	9.7	58		14.3		
#20	0.85	8.0	50		11.7		
#40	0.425	5.5	45		8.2		
#60	0.250	4.3	40		6.3		
#100	0.150	4.6	36		6.8		
#200	0.075	6.1	29.6		9.0		
	PAN	29.6			43.7		
Total		100.0					



Comments:

- SB Backfill.

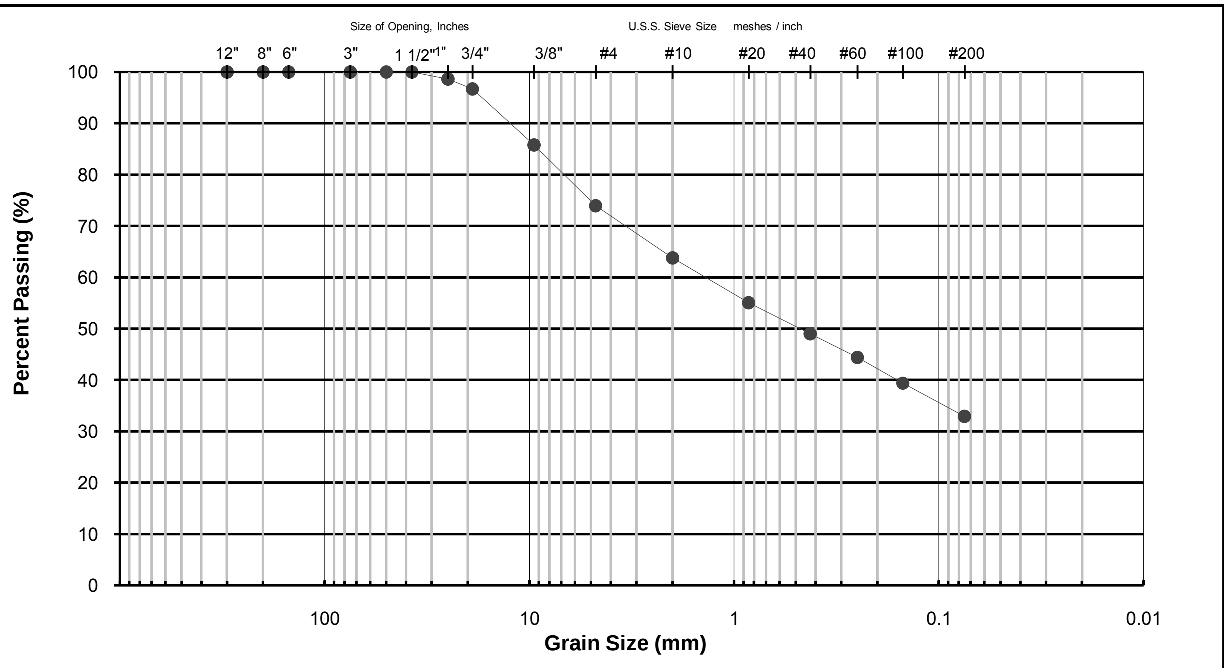
SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Project #	07-1413-0074-2200	**Station**	60+191 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	JB
Tested By	RB	**Sample Date**	11-Sep-08 **Test #: 38**
Percent Gravel (+ 4.75 and coarser) : 26.1%		**Percent Oversize (%): 0.0**	
Percent Sand Silt and Clay (- 4.75 and finer) : 73.9%		**Weight of Total Sample (g): 4958.4**	

SIEVE ANALYSIS

Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	Individual % Retained (Split - 4.75
12"	300	0.0	100	0.0	
8"	200	0.0	100	0.0	
6"	150	0.0	100	0.0	
3"	75	0.0	100	0.0	
2"	50	0.0	100	0.0	
1 1/2"	37.5	0.0	100	0.0	
1"	25.0	1.4	99	5.3	
3/4"	19.0	2.0	97	7.5	
3/8"	9.5	6.1	86	23.5	
#4	4.75	11.9	74	45.5	
#10	2.00	10.1	64		13.7
#20	0.85	8.7	55		11.8
#40	0.425	6.0	49		8.2
#60	0.250	4.6	44		6.3
#100	0.150	5.0	39		6.7
#200	0.075	6.5	32.9		8.7
	PAN	33.0			44.6
Total		100.0			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

- SB Backfill.

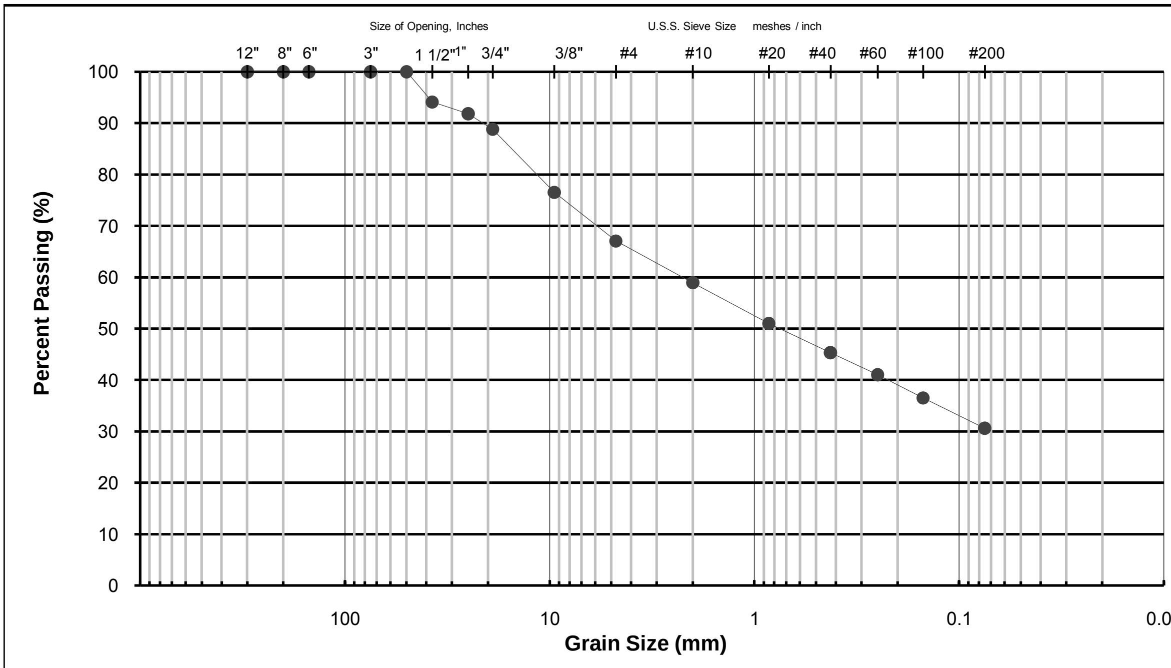
SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Project #	07-1413-0074-2200	**Station**	60+242 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	JB
Tested By	RC/RB	**Sample Date**	12-Sep-08 **Test #:** **40**
Percent Gravel (+ 4.75 and coarser) : 32.9%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 67.1%		**Weight of Total Sample (g):**	**5184.9**

SIEVE ANALYSIS

Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	- 4.75
12"	300	0.0	100	0.0	
8"	200	0.0	100	0.0	
6"	150	0.0	100	0.0	
3"	75	0.0	100	0.0	
2"	50	0.0	100	0.0	
1 1/2"	37.5	5.9	94	17.9	
1"	25.0	2.3	92	6.9	
3/4"	19.0	3.0	89	9.2	
3/8"	9.5	5.1	77	15.6	
#4	4.75	9.5	67	28.7	
#10	2.00	8.1	59		12.1
#20	0.85	7.9	51		11.8
#40	0.425	5.7	45		8.5
#60	0.250	4.3	41		6.4
#100	0.150	4.5	37		6.8
#200	0.075	5.9	30.6		8.8
	PAN	30.5			45.6
Total		99.9			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

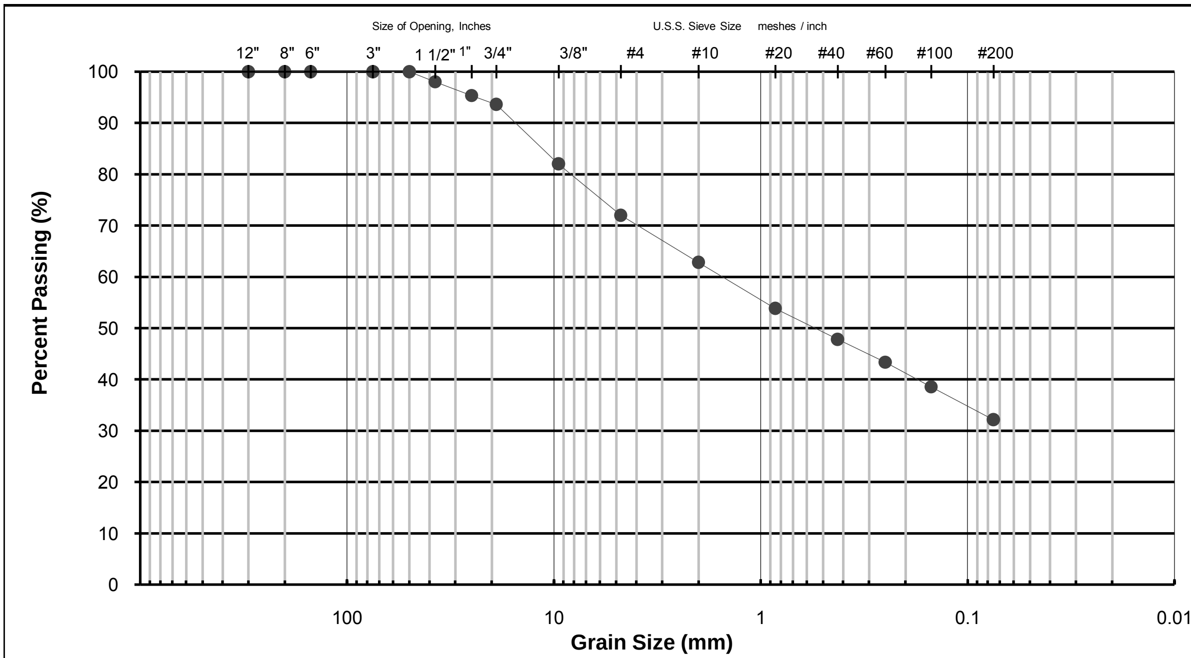
Golder Associates

Project #	07-1413-0074-2000	**Station**	60+264 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	KD/GB
Tested By	RC/RB	**Sample Date**	12-Sep-08 **Test #:** 41
Percent Gravel (+ 4.75 and coarser) : 28%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 72%		**Weight of Total Sample (g):**	**4827.1**

SIEVE ANALYSIS

Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	Individual % Retained (Split - 4.75
12"	300	0.0	100	0.0	
8"	200	0.0	100	0.0	
6"	150	0.0	100	0.0	
3"	75	0.0	100	0.0	
2"	50	0.0	100	0.0	
1 1/2"	37.5	2.0	98	7.1	
1"	25.0	2.7	95	9.6	
3/4"	19.0	1.7	94	6.2	
3/8"	9.5	5.2	82	18.7	
#4	4.75	10.0	72	35.8	
#10	2.00	9.2	63		12.8
#20	0.85	9.0	54		12.5
#40	0.425	6.0	48		8.4
#60	0.250	4.5	43		6.2
#100	0.150	4.8	39		6.7
#200	0.075	6.4	32.1		8.9
	PAN	32.0			44.5
Total		99.9			

MATERIAL SPECIFICATION:
SB Backfill



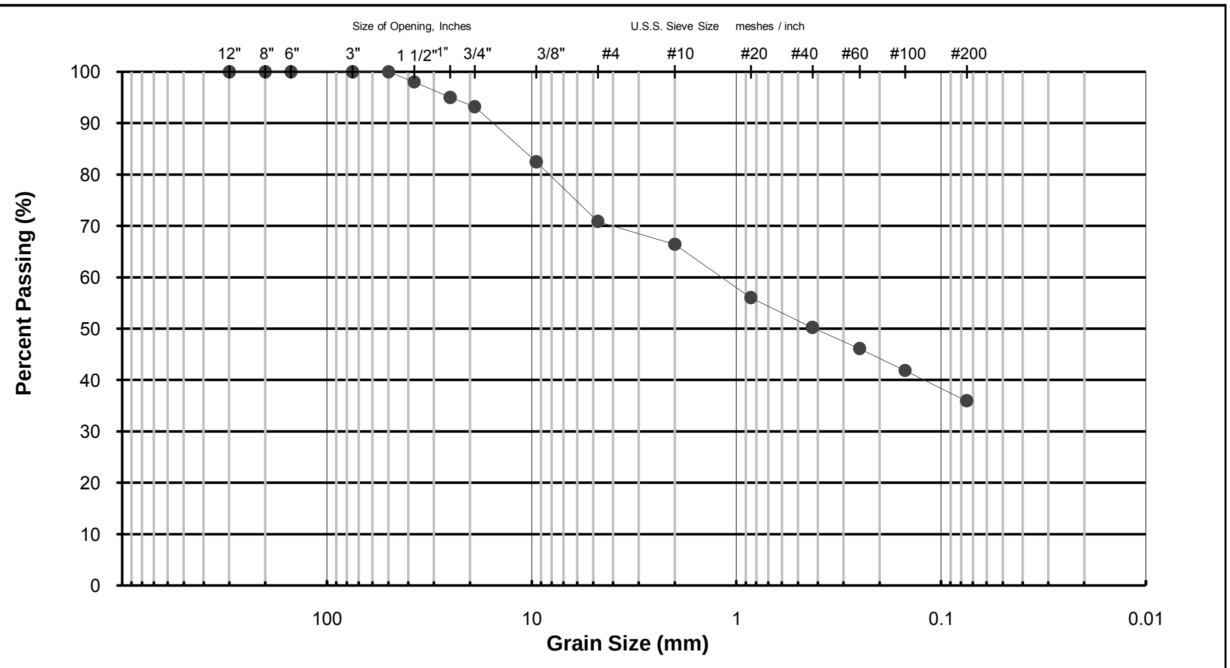
Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-0074-2200	**Station**	60+305 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	JB
Tested By	TS/RB	**Sample Date**	13-Sep-08 **Test #:** 42
Percent Gravel (+ 4.75 and coarser) : 29.1%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 70.9%		**Weight of Total Sample (g):**	**6098.6**

SIEVE ANALYSIS						**MATERIAL SPECIFICATION: SB Backfill**
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	- 4.75	
12"	300	0.0	100	0.0		
8"	200	0.0	100	0.0		
6"	150	0.0	100	0.0		
3"	75	0.0	100	0.0		
2"	50	0.0	100	0.0		
1 1/2"	37.5	2.0	98	6.8		
1"	25.0	3.0	95	10.4		
3/4"	19.0	1.8	93	6.2		
3/8"	9.5	4.8	82	16.4		
#4	4.75	11.6	71	39.8		
#10	2.00	4.4	66	15.3		
#20	0.85	10.4	56		2.7	
#40	0.425	5.8	50		1.5	
#60	0.250	4.1	46		1.1	
#100	0.150	4.3	42		1.1	
#200	0.075	5.9	35.9		1.5	
	PAN	37.7			9.7	
Total		101.7				



Comments:

- SB Backfill.

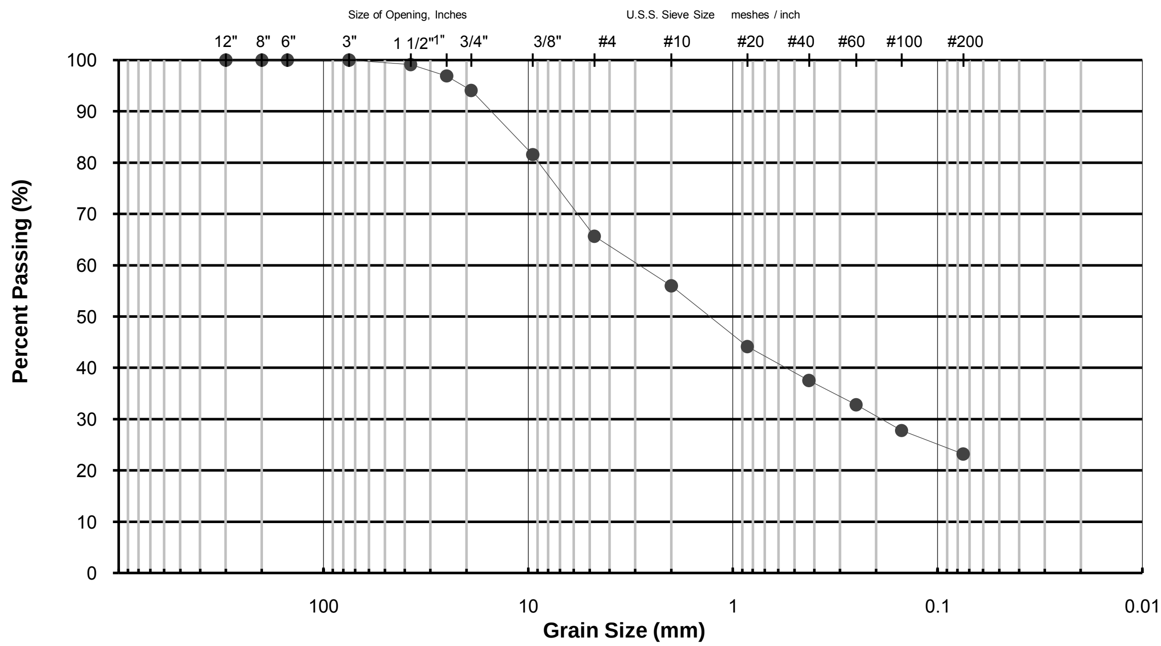
SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Project #	05-1411-151-8000	**Station**	60+314 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	134.87 m.
Golder Project Manager		**Sampled By**	TS
Tested By	TS	**Sample Date**	13-Sep-08 **Test #: 43**
Percent Gravel (+ 4.75 and coarser) : 34.4%		**Percent Oversize (%): 0.0**	
Percent Sand Silt and Clay (- 4.75 and finer) : 65.6%		**Weight of Total Sample (g): 6812.6**	

SIEVE ANALYSIS

Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	Individual % Retained (Split - 4.75
12"	300	0.0	100	0.0	
8"	200	0.0	100	0.0	
6"	150	0.0	100	0.0	
3"	75	0.0	100	0.0	
1 1/2"	37.5	0.9	99	2.5	
1"	25.0	2.2	97	6.5	
3/4"	19.0	2.8	94	8.3	
3/8"	9.5	6.8	82	19.8	
#4	4.75	15.9	66	46.4	
#10	2.00	9.7	56		14.7
#20	0.85	11.8	44		18.0
#40	0.425	6.6	38		10.1
#60	0.250	4.7	33		7.2
#100	0.150	5.0	28		7.7
#200	0.075	4.6	23.2		7.0
	PAN	23.3			35.5
Total		100.1			

MATERIAL SPECIFICATION:
SB Backfill



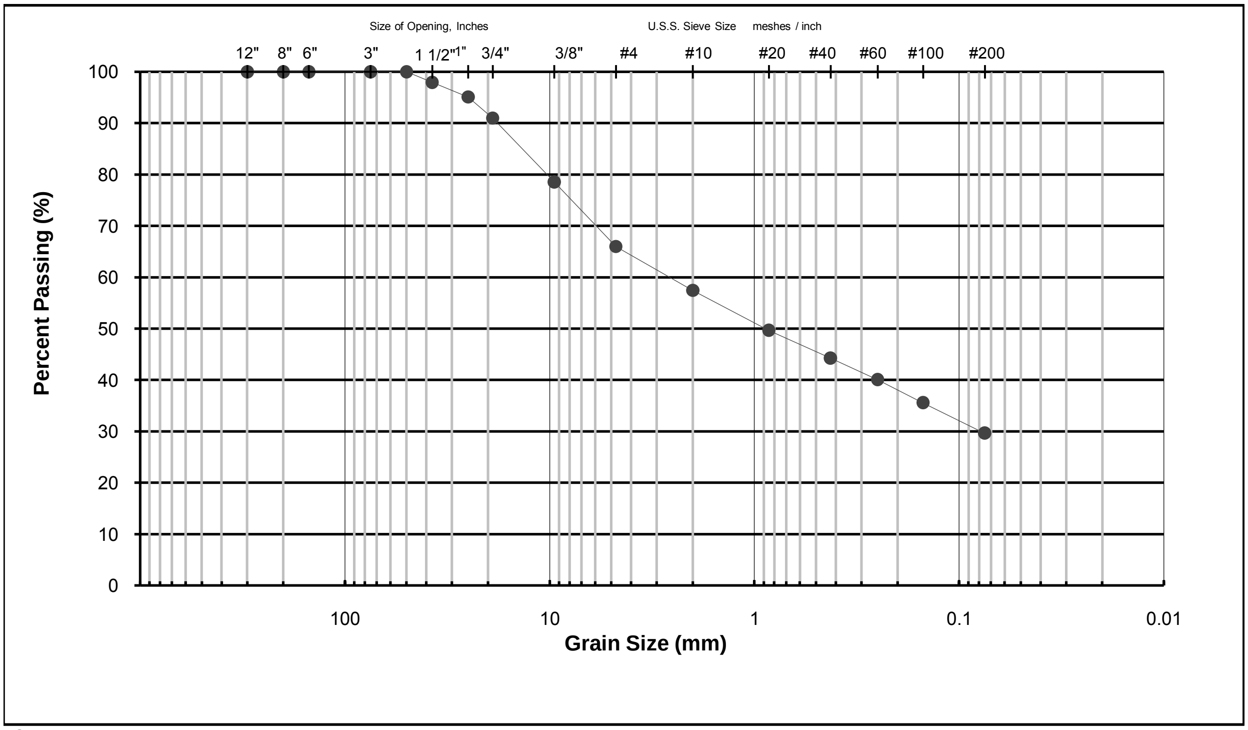
Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-0074-2200	**Station**	60+338 - Soil-Bentonite		
Client	AEM Ltd.	**Offset**			
Project	East Dike Construction	**Elevation**			
Golder Project Manager		**Sampled By**	TS		
Tested By	RC/RB	**Sample Date**	14-Sep-08	**Test #:**	**45**
Percent Gravel (+ 4.75 and coarser) : 34%		**Percent Oversize (%):**	**0.0**		
Percent Sand Silt and Clay (- 4.75 and finer) : 66%		**Weight of Total Sample (g):**	**8891.5**		

SIEVE ANALYSIS						MATERIAL SPECIFICATION: SB Backfill
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	Individual % Retained (Split - 4.75	
12"	300	0.0	100	0.0		
8"	200	0.0	100	0.0		
6"	150	0.0	100	0.0		
3"	75	0.0	100	0.0		
2"	50	0.0	100	0.0		
1 1/2"	37.5	2.1	98	6.1		
1"	25.0	2.8	95	8.4		
3/4"	19.0	4.1	91	12.1		
3/8"	9.5	5.0	79	14.7		
#4	4.75	12.6	66	36.9		
#10	2.00	8.5	57		12.9	
#20	0.85	7.8	50		11.8	
#40	0.425	5.4	44		8.2	
#60	0.250	4.2	40		6.3	
#100	0.150	4.5	36		6.8	
#200	0.075	5.9	29.7		9.0	
	PAN	29.7			45.0	
Total		100.0				



Comments:

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

ASTM D422 & D1140 (no Hydrometer)

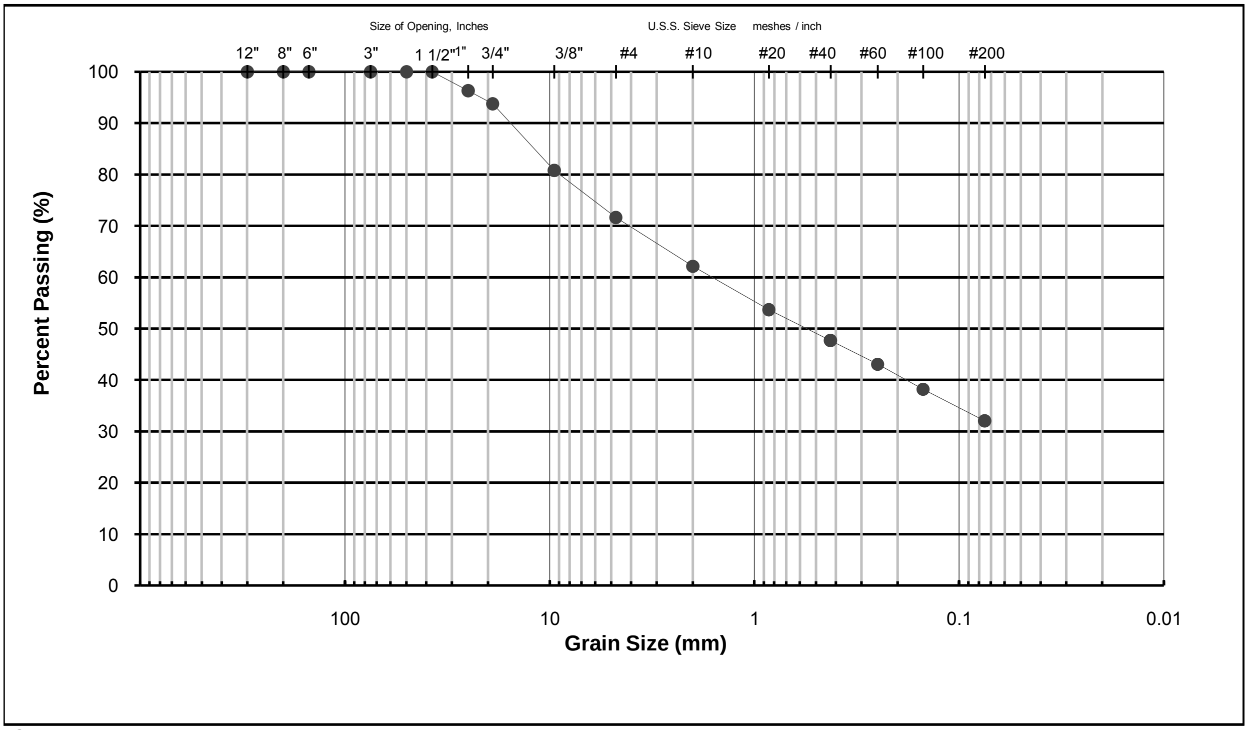
Golder Associates

Project #	07-1413-0074-2200	**Station**	60+347 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	JB
Tested By	RC/RB	**Sample Date**	14-Sep-08 **Test #: 46**
Percent Gravel (+ 4.75 and coarser) : 28.4%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 71.6%		**Weight of Total Sample (g):**	**5032.5**

SIEVE ANALYSIS

Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split) + 4.75	Individual % Retained (Split) - 4.75
12"	300	0.0	100	0.0	
8"	200	0.0	100	0.0	
6"	150	0.0	100	0.0	
3"	75	0.0	100	0.0	
2"	50	0.0	100	0.0	
1 1/2"	37.5	0.0	100	0.0	
1"	25.0	3.7	96	13.0	
3/4"	19.0	2.5	94	8.9	
3/8"	9.5	5.0	81	17.5	
#4	4.75	9.2	72	32.3	
#10	2.00	9.5	62		13.2
#20	0.85	8.5	54		11.8
#40	0.425	6.0	48		8.4
#60	0.250	4.6	43		6.5
#100	0.150	4.9	38		6.8
#200	0.075	6.2	32.0		8.6
	PAN	32.1			44.8
Total		100.1			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

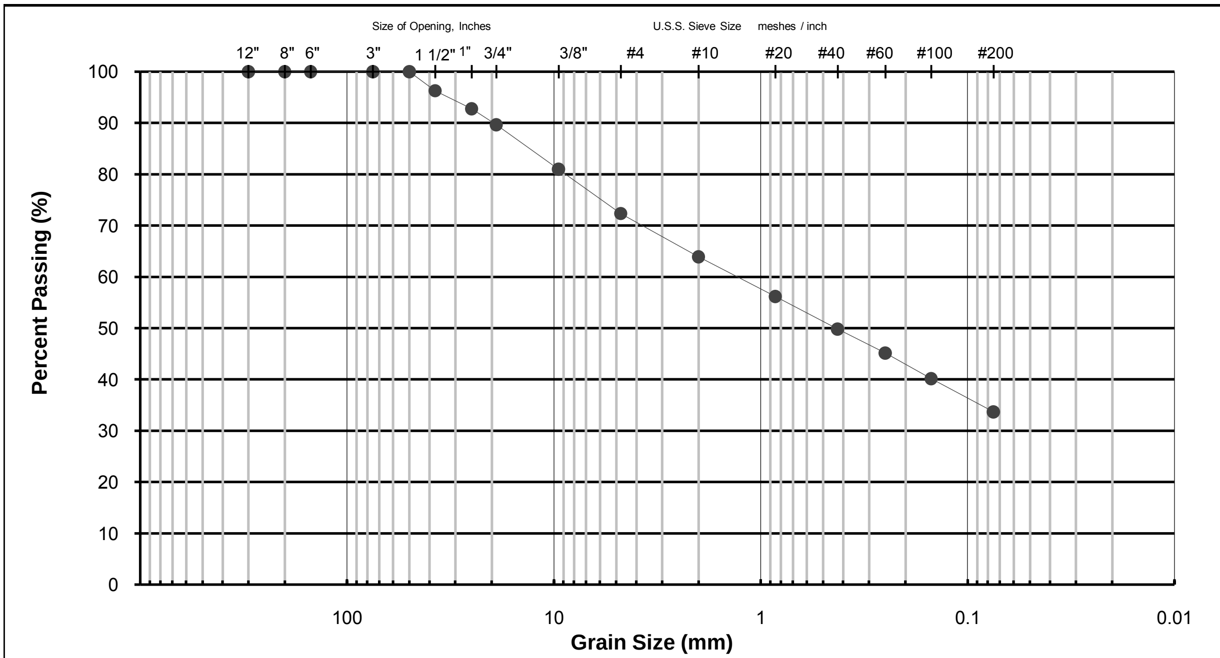
Golder Associates

Project #	07-1413-0074-2200	**Station**	60+368 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	JB
Tested By	RC/RB	**Sample Date**	15-Sep-08 **Test #:** 47
Percent Gravel (+ 4.75 and coarser) : 27.6%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 72.4%		**Weight of Total Sample (g):**	**4823.4**

SIEVE ANALYSIS

MATERIAL SPECIFICATION: SB Backfill

Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	Individual % Retained (Split - 4.75
12"	300	0.0	100	0.0	
8"	200	0.0	100	0.0	
6"	150	0.0	100	0.0	
3"	75	0.0	100	0.0	
2"	50	0.0	100	0.0	
1 1/2"	37.5	3.7	96	13.4	
1"	25.0	3.5	93	12.8	
3/4"	19.0	3.1	90	11.2	
3/8"	9.5	4.2	81	15.3	
#4	4.75	8.6	72	31.2	
#10	2.00	8.5	64		11.8
#20	0.85	7.7	56		10.7
#40	0.425	6.3	50		8.8
#60	0.250	4.7	45		6.5
#100	0.150	5.0	40		6.9
#200	0.075	6.5	33.7		9.0
	PAN	33.2			46.2
Total		99.6			



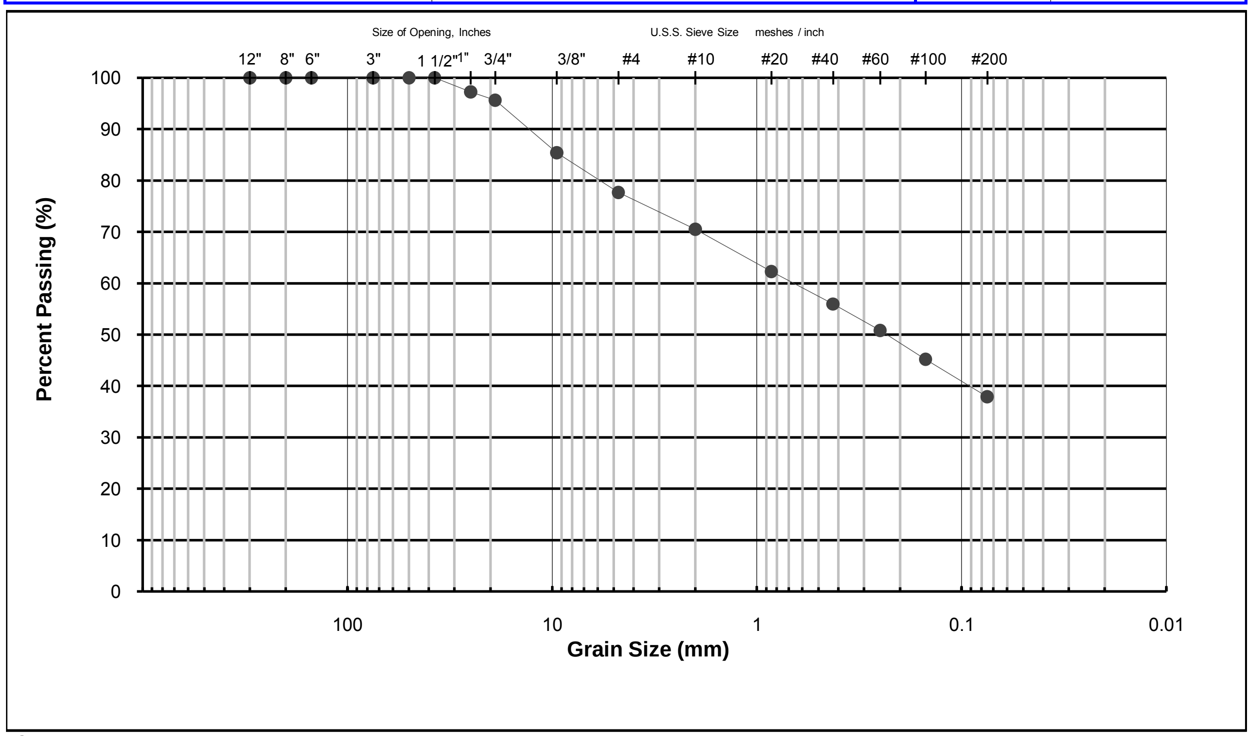
Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-0074-2200	**Station**	60+377 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	KD
Tested By	RC/RB	**Sample Date**	18-Sep-08 **Test #:** **48**
Percent Gravel (+ 4.75 and coarser) : 22.3%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 77.7%		**Weight of Total Sample (g):**	**4871.2**

SIEVE ANALYSIS						MATERIAL SPECIFICATION: SB Backfill	
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split			
				+ 4.75	- 4.75		
12"	300	0.0	100	0.0			
8"	200	0.0	100	0.0			
6"	150	0.0	100	0.0			
3"	75	0.0	100	0.0			
2"	50	0.0	100	0.0			
1 1/2"	37.5	0.0	100	0.0			
1"	25.0	2.8	97	12.4			
3/4"	19.0	1.6	96	7.1			
3/8"	9.5	4.5	85	20.0			
#4	4.75	7.8	78	34.7			
#10	2.00	7.2	71		9.2		
#20	0.85	8.2	62		10.6		
#40	0.425	6.3	56		8.2		
#60	0.250	5.1	51		6.6		
#100	0.150	5.6	45		7.2		
#200	0.075	7.3	37.9		9.4		
	PAN	38.0			48.8		
Total		100.1					



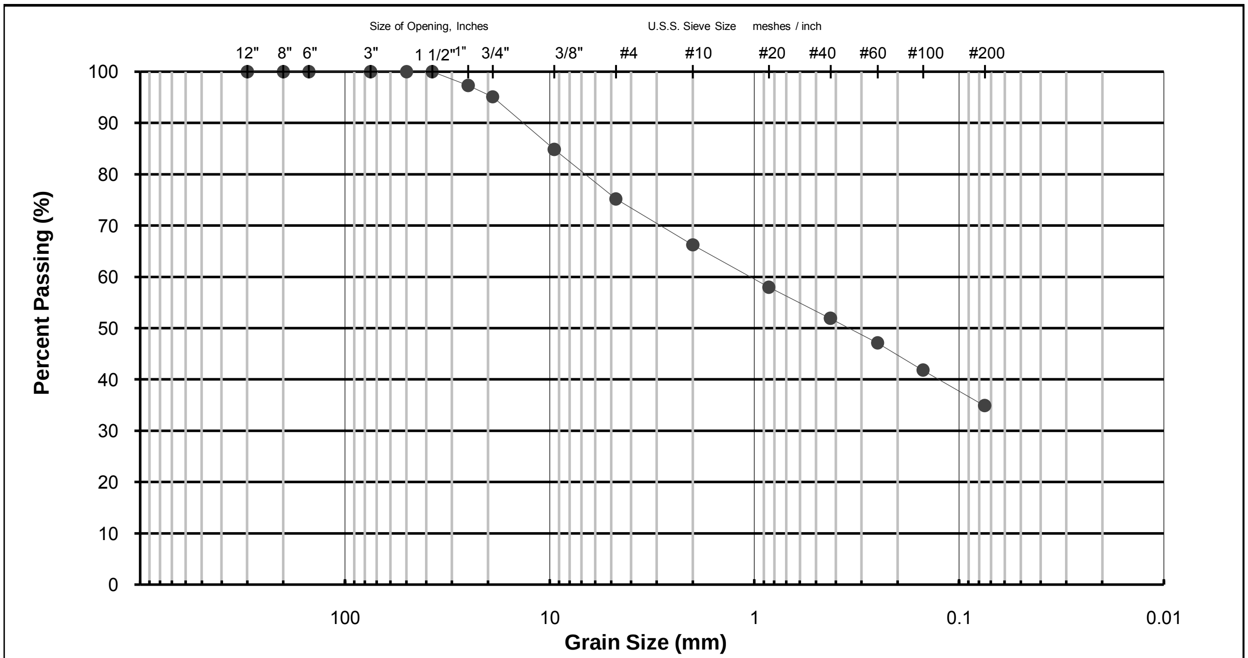
Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-0074-2200	**Station**	60+389 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	JB
Tested By	GB	**Sample Date**	16-Sep-08 **Test #:** 49
Percent Gravel (+ 4.75 and coarser) : 24.8%		**Percent Oversize (%):**	0.0
Percent Sand Silt and Clay (- 4.75 and finer) : 75.2%		**Weight of Total Sample (g):**	5077.8

SIEVE ANALYSIS						MATERIAL SPECIFICATION: SB Backfill
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	Individual % Retained (Split - 4.75	
12"	300	0.0	100	0.0		
8"	200	0.0	100	0.0		
6"	150	0.0	100	0.0		
3"	75	0.0	100	0.0		
2"	50	0.0	100	0.0		
1 1/2"	37.5	0.0	100	0.0		
1"	25.0	2.7	97	10.8		
3/4"	19.0	2.2	95	9.0		
3/8"	9.5	4.6	85	18.4		
#4	4.75	9.7	75	38.9		
#10	2.00	9.0	66		11.9	
#20	0.85	8.2	58		10.9	
#40	0.425	6.1	52		8.1	
#60	0.250	4.8	47		6.4	
#100	0.150	5.3	42		7.1	
#200	0.075	6.9	34.9		9.2	
	PAN	34.9			46.4	
Total		100.0				



Comments:

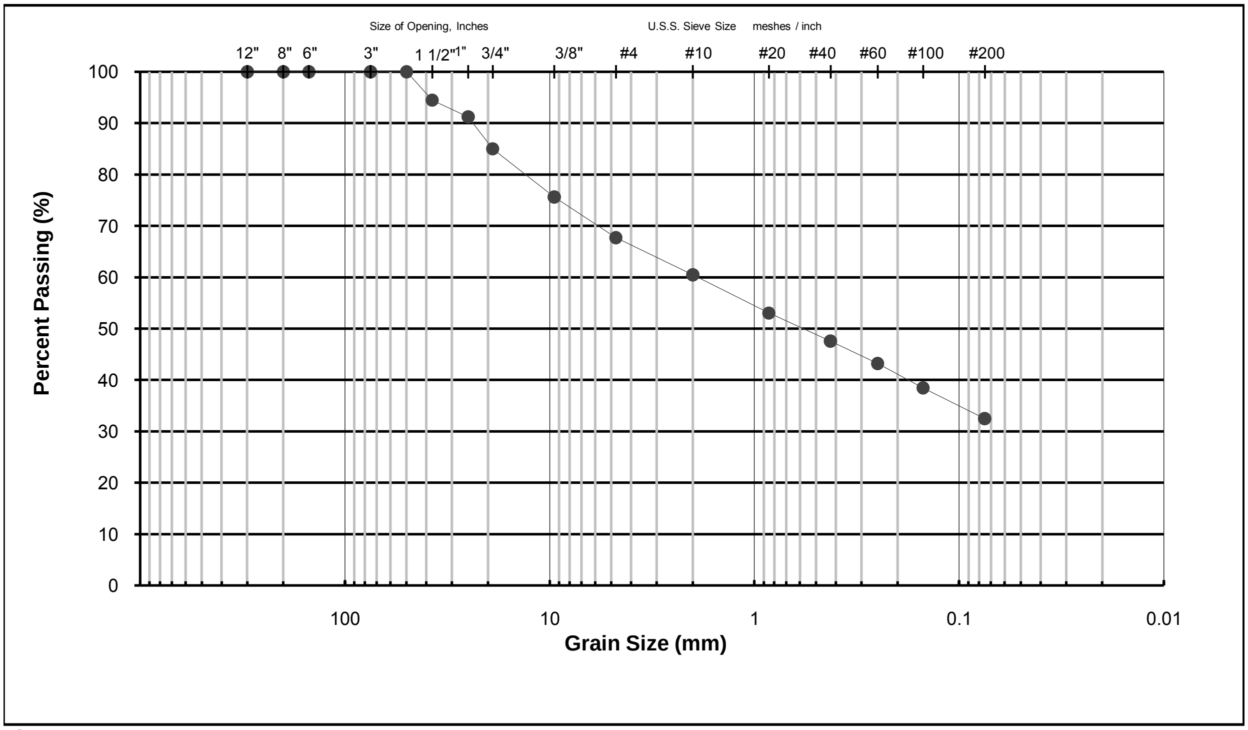
- SB Backfill.

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-0074-2200	**Station**	60+401 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	134.87 m.
Golder Project Manager		**Sampled By**	JB
Tested By	RC/RB	**Sample Date**	18-Sep-08 **Test #:** 50
Percent Gravel (+ 4.75 and coarser) : 32.3%		**Percent Oversize (%):**	0.0
Percent Sand Silt and Clay (- 4.75 and finer) : 67.7%		**Weight of Total Sample (g):**	9288.9

SIEVE ANALYSIS						MATERIAL SPECIFICATION: SB Backfill
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	- 4.75	
12"	300	0.0	100	0.0		
8"	200	0.0	100	0.0		
6"	150	0.0	100	0.0		
3"	75	0.0	100	0.0		
2"	50	0.0	100	0.0		
1 1/2"	37.5	5.5	94	17.1		
1"	25.0	3.2	91	10.0		
3/4"	19.0	6.2	85	19.3		
3/8"	9.5	3.3	76	10.2		
#4	4.75	7.9	68	24.6		
#10	2.00	7.2	60		10.6	
#20	0.85	7.5	53		11.0	
#40	0.425	5.5	48		8.1	
#60	0.250	4.3	43		6.4	
#100	0.150	4.8	38		7.0	
#200	0.075	6.0	32.5		8.8	
	PAN	32.5			48.0	
Total		100.0				



Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

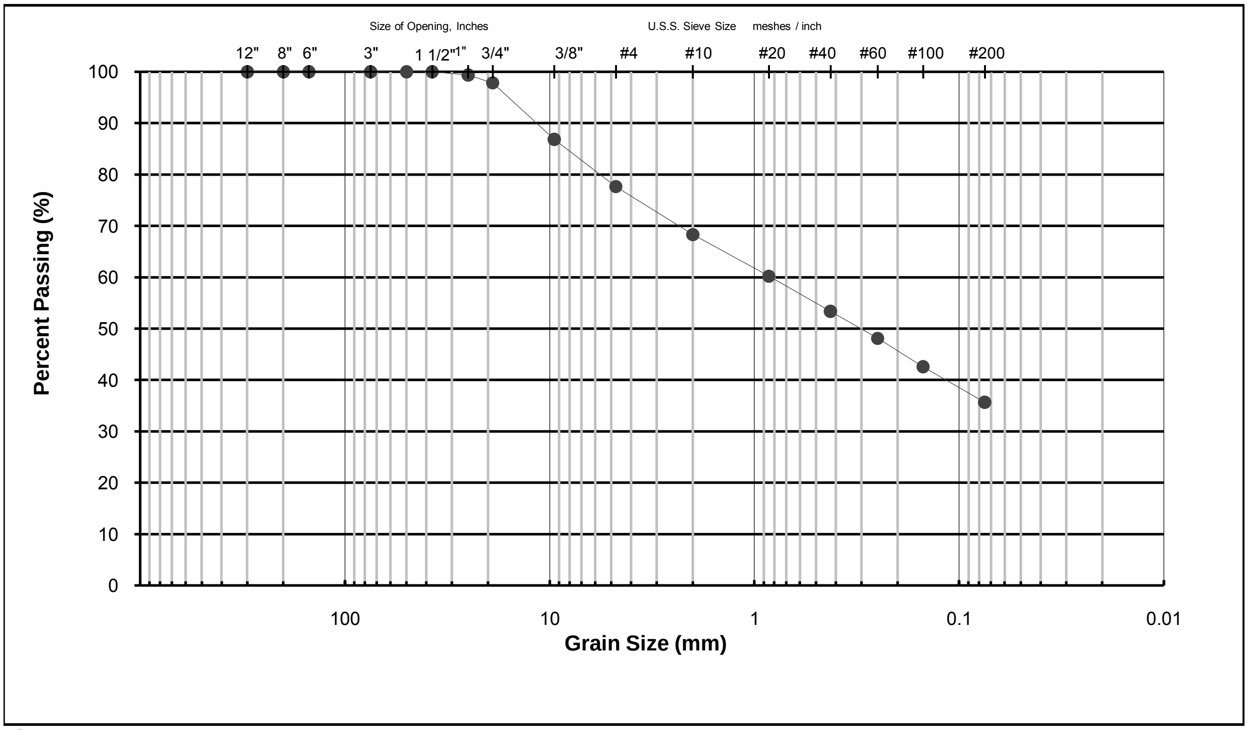
Golder Associates

Project #	07-1413-0074-2200	**Station**	60+435 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	JB
Tested By	RC/RB	**Sample Date**	17-Sep-08 **Test #:** **51**
Percent Gravel (+ 4.75 and coarser) :	**22.4%**	**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) :	**77.6%**	**Weight of Total Sample (g):**	**4887.8**

SIEVE ANALYSIS

Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	- 4.75)
12"	300	0.0	100	0.0	
8"	200	0.0	100	0.0	
6"	150	0.0	100	0.0	
3"	75	0.0	100	0.0	
2"	50	0.0	100	0.0	
1 1/2"	37.5	0.0	100	0.0	
1"	25.0	0.6	99	2.9	
3/4"	19.0	1.5	98	6.8	
3/8"	9.5	5.3	87	23.7	
#4	4.75	9.2	78	41.1	
#10	2.00	9.3	68		12.0
#20	0.85	8.1	60		10.4
#40	0.425	6.8	53		8.8
#60	0.250	5.3	48		6.8
#100	0.150	5.5	43		7.1
#200	0.075	6.9	35.7		8.9
	PAN	35.8			46.1
Total		100.2			

MATERIAL SPECIFICATION:
SB Backfill



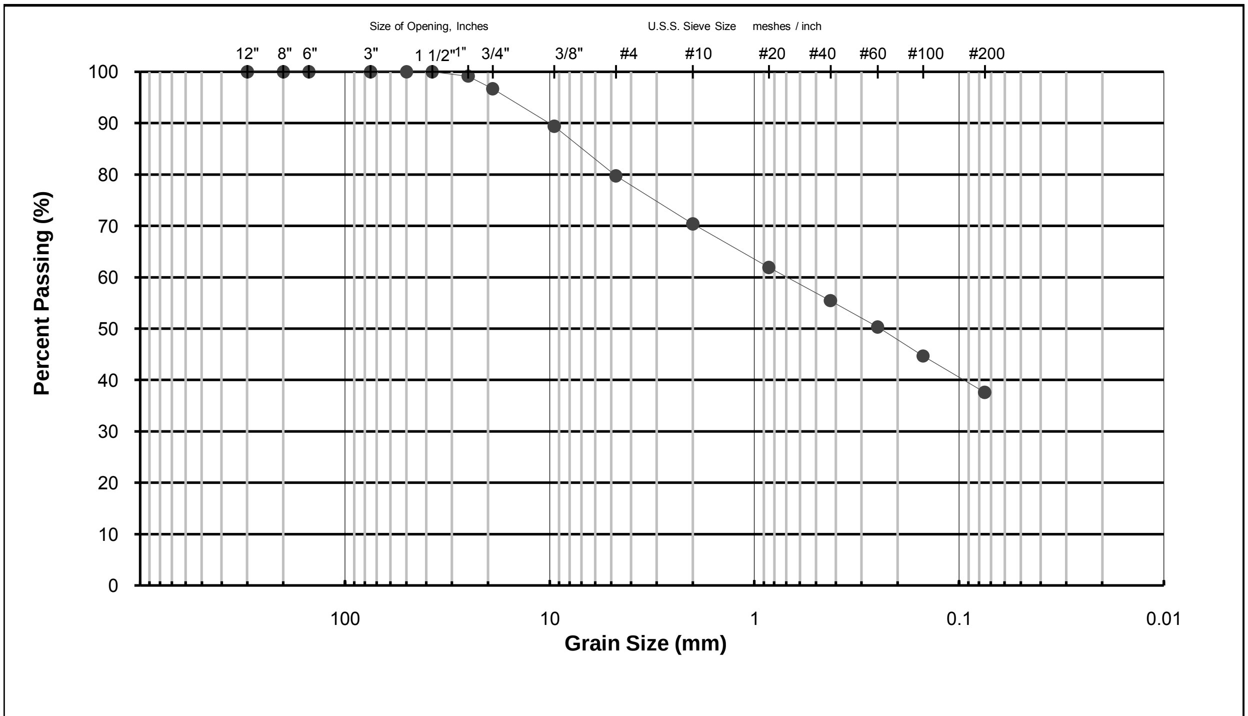
Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-0074-2200	**Station**	60+450 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	JB
Tested By	RC/RB	**Sample Date**	17-Sep-08 **Test #:** **52**
Percent Gravel (+ 4.75 and coarser) : 20.3%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 79.7%		**Weight of Total Sample (g):**	**4738**

SIEVE ANALYSIS						MATERIAL SPECIFICATION: SB Backfill
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	- 4.75	
12"	300	0.0	100	0.0		
8"	200	0.0	100	0.0		
6"	150	0.0	100	0.0		
3"	75	0.0	100	0.0		
2"	50	0.0	100	0.0		
1 1/2"	37.5	0.0	100	0.0		
1"	25.0	0.8	99	4.2		
3/4"	19.0	2.5	97	12.2		
3/8"	9.5	4.3	89	21.2		
#4	4.75	9.6	80	47.6		
#10	2.00	9.3	70		11.7	
#20	0.85	8.5	62		10.6	
#40	0.425	6.4	55		8.1	
#60	0.250	5.1	50		6.4	
#100	0.150	5.6	45		7.1	
#200	0.075	7.1	37.6		8.9	
	PAN	37.7			47.2	
Total		100.0				



Comments:

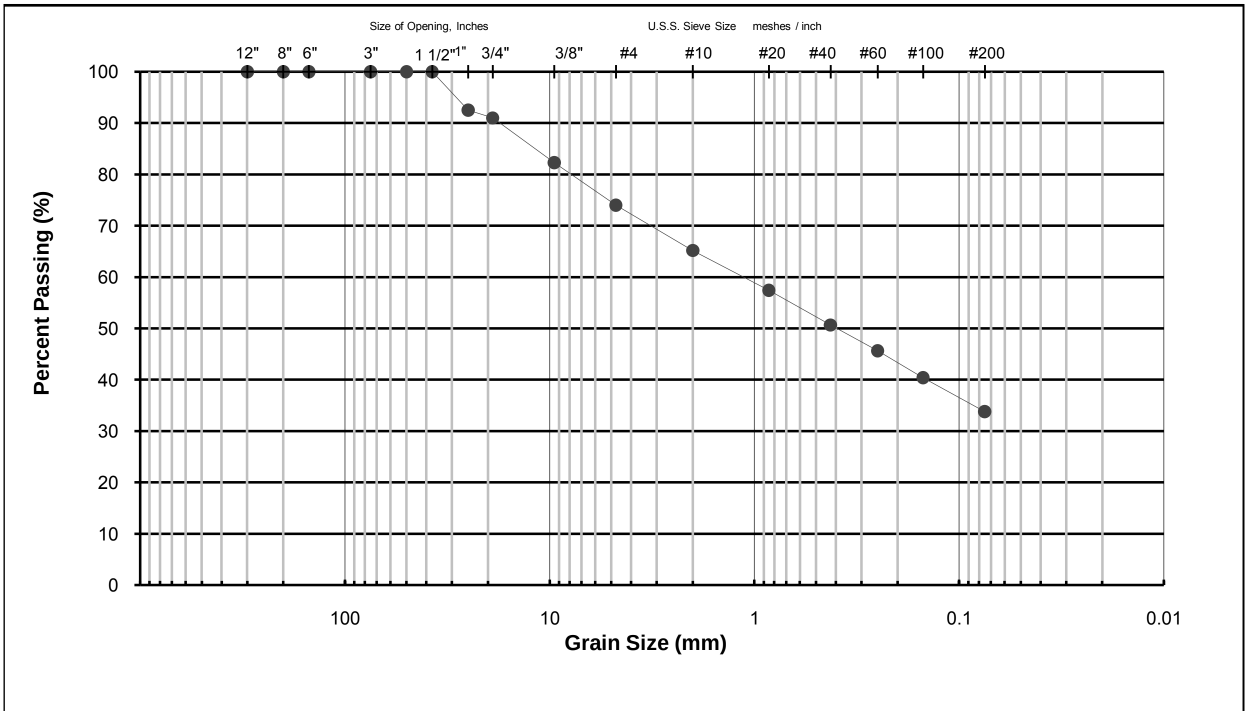
SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Project #	07-1413-0074-2200	**Station**	60+490 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	JB
Tested By	RC/RB	**Sample Date**	18-Sep-08 **Test #:** 53
Percent Gravel (+ 4.75 and coarser) : 26%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 74%		**Weight of Total Sample (g):**	**5165.7**

SIEVE ANALYSIS

Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	Individual % Retained (Split - 4.75
12"	300	0.0	100	0.0	
8"	200	0.0	100	0.0	
6"	150	0.0	100	0.0	
3"	75	0.0	100	0.0	
2"	50	0.0	100	0.0	
1 1/2"	37.5	0.0	100	0.0	
1"	25.0	7.5	93	28.8	
3/4"	19.0	1.5	91	5.9	
3/8"	9.5	4.0	82	15.3	
#4	4.75	8.3	74	31.9	
#10	2.00	8.8	65		11.9
#20	0.85	7.8	57		10.5
#40	0.425	6.7	51		9.1
#60	0.250	5.0	46		6.8
#100	0.150	5.2	40		7.1
#200	0.075	6.6	33.8		9.0
	PAN	33.7			45.6
Total		99.9			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

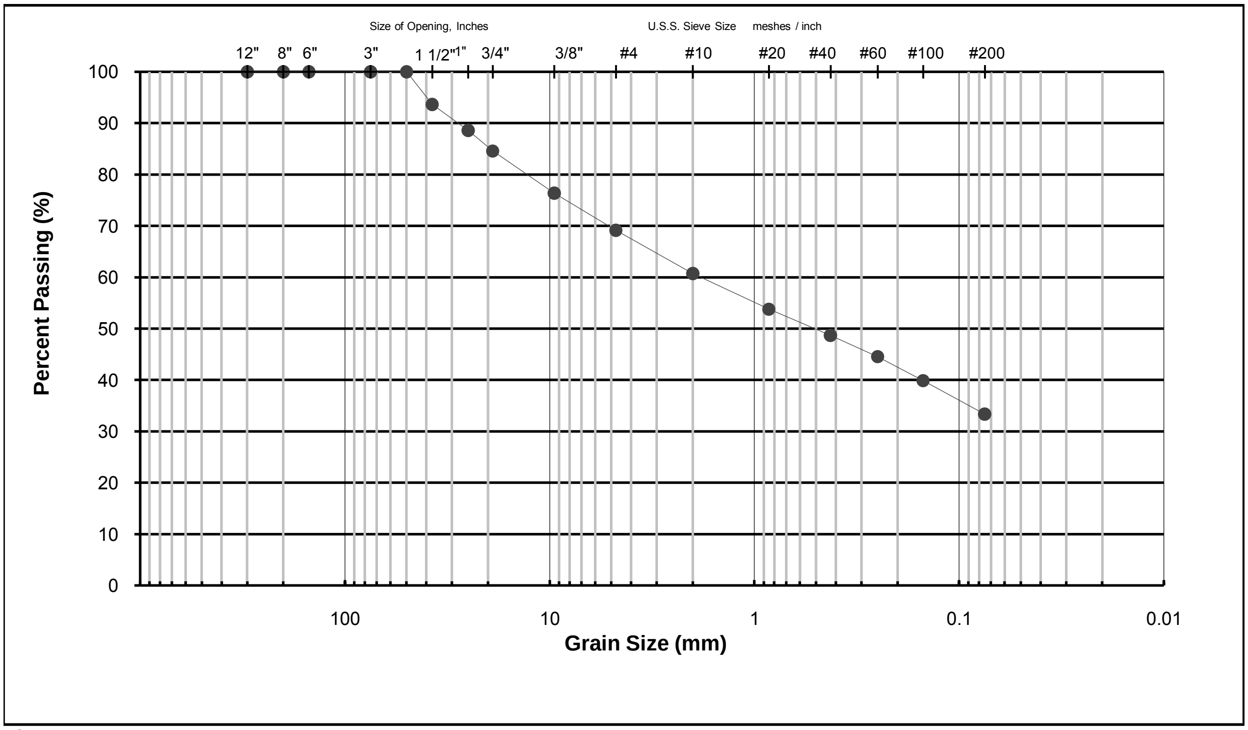
SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Project #	07-1413-0074-2200	**Station**	60+512 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	JB
Tested By	RC/RB	**Sample Date**	18-Sep-08 **Test #:** **54**
Percent Gravel (+ 4.75 and coarser) : 30.9%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 69.1%		**Weight of Total Sample (g):**	**4740**

SIEVE ANALYSIS

Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	Individual % Retained (Split - 4.75
12"	300	0.0	100	0.0	
8"	200	0.0	100	0.0	
6"	150	0.0	100	0.0	
3"	75	0.0	100	0.0	
2"	50	0.0	100	0.0	
1 1/2"	37.5	6.4	94	20.6	
1"	25.0	5.1	89	16.4	
3/4"	19.0	4.0	85	13.0	
3/8"	9.5	3.5	76	11.5	
#4	4.75	7.2	69	23.4	
#10	2.00	8.4	61		12.2
#20	0.85	6.9	54		10.0
#40	0.425	5.1	49		7.3
#60	0.250	4.2	45		6.0
#100	0.150	4.7	40		6.7
#200	0.075	6.5	33.4		9.4
	PAN	33.5			48.3
Total		100.1			

MATERIAL SPECIFICATION:
SB Backfill



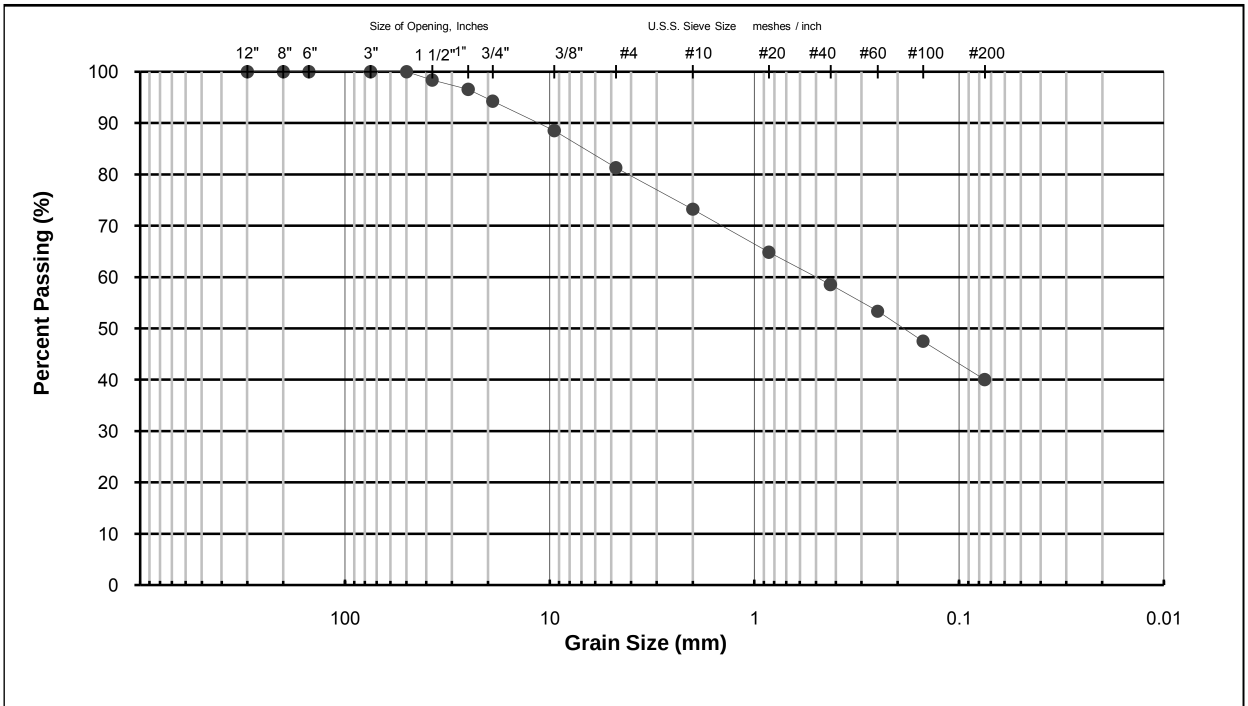
Comments:

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-0074-2200	**Station**	60+530 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	KD
Tested By	RC/RB	**Sample Date**	18-Sep-08 **Test #: 55**
Percent Gravel (+ 4.75 and coarser) : 18.7%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 81.3%		**Weight of Total Sample (g):**	**4728.3**

SIEVE ANALYSIS						**MATERIAL SPECIFICATION: SB Backfill**
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split) + 4.75	- 4.75	
12"	300	0.0	100	0.0		
8"	200	0.0	100	0.0		
6"	150	0.0	100	0.0		
3"	75	0.0	100	0.0		
2"	50	0.0	100	0.0		
1 1/2"	37.5	1.6	98	8.7		
1"	25.0	1.8	97	9.7		
3/4"	19.0	2.3	94	12.2		
3/8"	9.5	2.7	89	14.5		
#4	4.75	7.2	81	38.6		
#10	2.00	8.1	73		9.9	
#20	0.85	8.4	65		10.3	
#40	0.425	6.3	59		7.7	
#60	0.250	5.2	53		6.4	
#100	0.150	5.8	48		7.2	
#200	0.075	7.5	40.0		9.2	
	PAN	40.0			49.2	
Total		100.0				



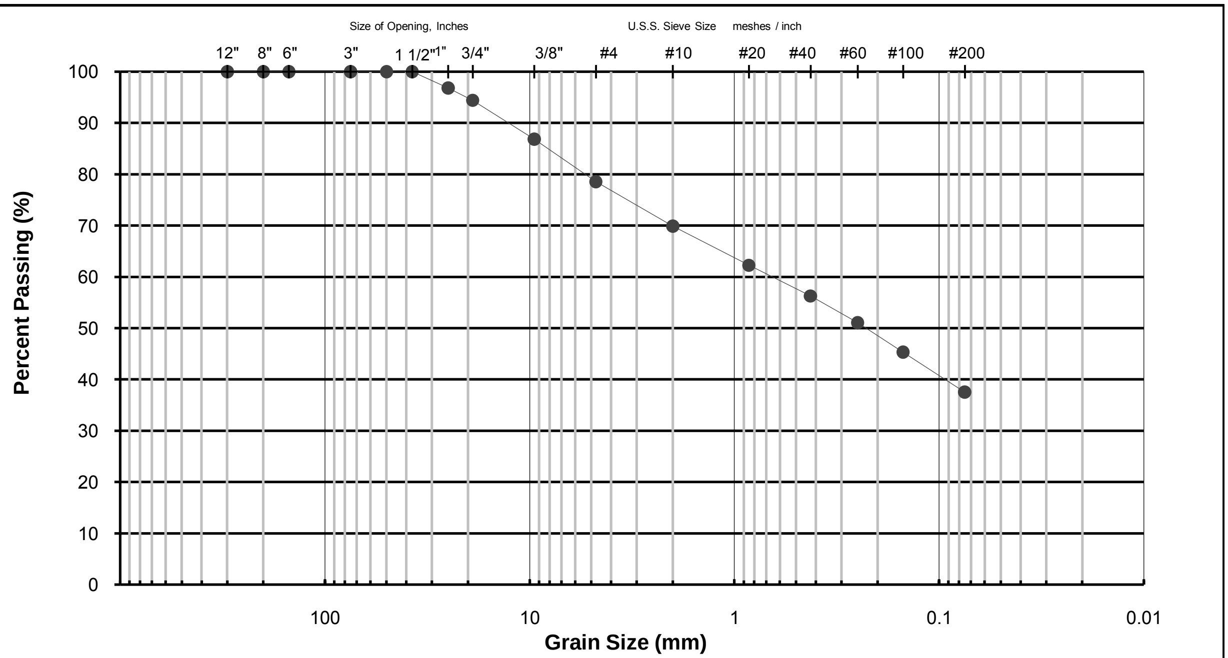
Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-0074-2200	**Station**	60+548 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	JB
Tested By	GB	**Sample Date**	19-Sep-08 **Test #:** 56
Percent Gravel (+ 4.75 and coarser) : 21.5%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 78.5%		**Weight of Total Sample (g):**	**5243**

SIEVE ANALYSIS						MATERIAL SPECIFICATION: SB Backfill
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split) + 4.75	- 4.75	
12"	300	0.0	100	0.0		
8"	200	0.0	100	0.0		
6"	150	0.0	100	0.0		
3"	75	0.0	100	0.0		
2"	50	0.0	100	0.0		
1 1/2"	37.5	0.0	100	0.0		
1"	25.0	3.2	97	14.9		
3/4"	19.0	2.4	94	11.2		
3/8"	9.5	3.4	87	16.0		
#4	4.75	8.3	79	38.7		
#10	2.00	8.6	70		11.0	
#20	0.85	7.6	62		9.7	
#40	0.425	6.0	56		7.6	
#60	0.250	5.2	51		6.6	
#100	0.150	5.8	45		7.3	
#200	0.075	7.8	37.5		9.9	
	PAN	37.6			47.8	
Total		100.0				



Comments:

- SB Backfill.

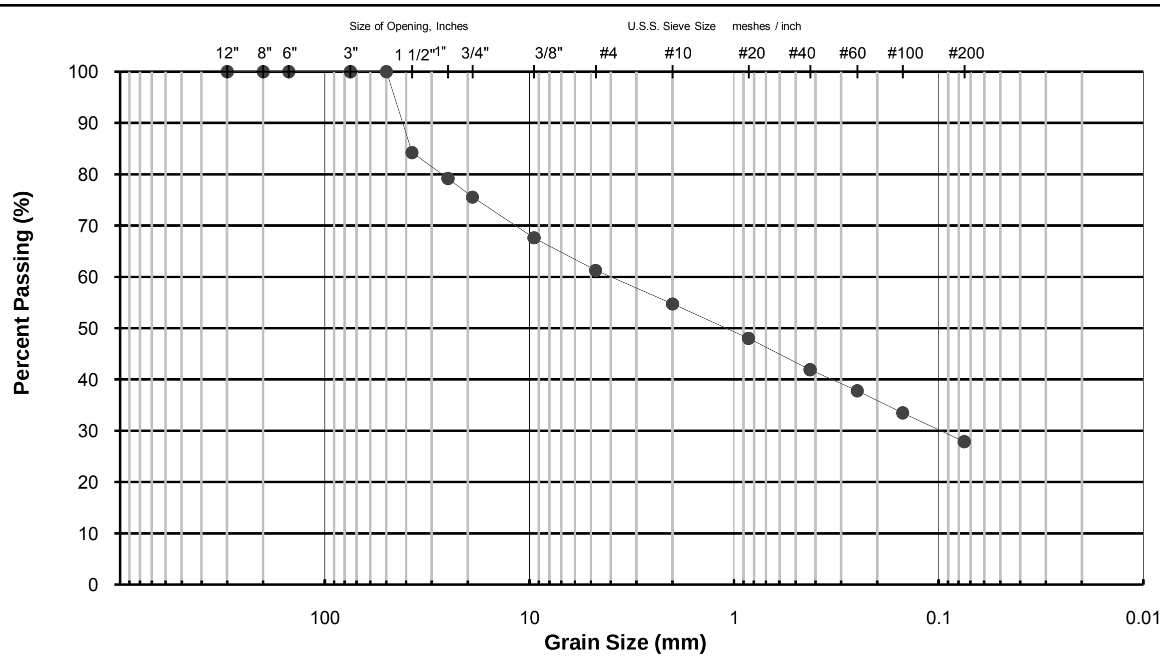
SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-0074-2200	**Station**	60+093 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	JB
Tested By	RC/RB	**Sample Date**	19-Sep-08 **Test #:** **57**
Percent Gravel (+ 4.75 and coarser) : 38.7%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 61.3%		**Weight of Total Sample (g):**	**5654.2**

SIEVE ANALYSIS

Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	Individual % Retained (Split - 4.75	MATERIAL SPECIFICATION: SB Backfill	
12"	300	0.0	100	0.0			
8"	200	0.0	100	0.0			
6"	150	0.0	100	0.0			
3"	75	0.0	100	0.0			
2"	50	0.0	100	0.0			
1 1/2"	37.5	15.8	84	40.8			
1"	25.0	5.0	79	13.0			
3/4"	19.0	3.6	76	9.4			
3/8"	9.5	3.0	68	7.8			
#4	4.75	6.4	61	16.4			
#10	2.00	6.5	55		10.7		
#20	0.85	6.7	48		10.9		
#40	0.425	6.1	42		10.0		
#60	0.250	4.1	38		6.7		
#100	0.150	4.3	33		7.0		
#200	0.075	5.6	27.9		9.1		
	PAN	28.0			45.6		
Total		100.2					



Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

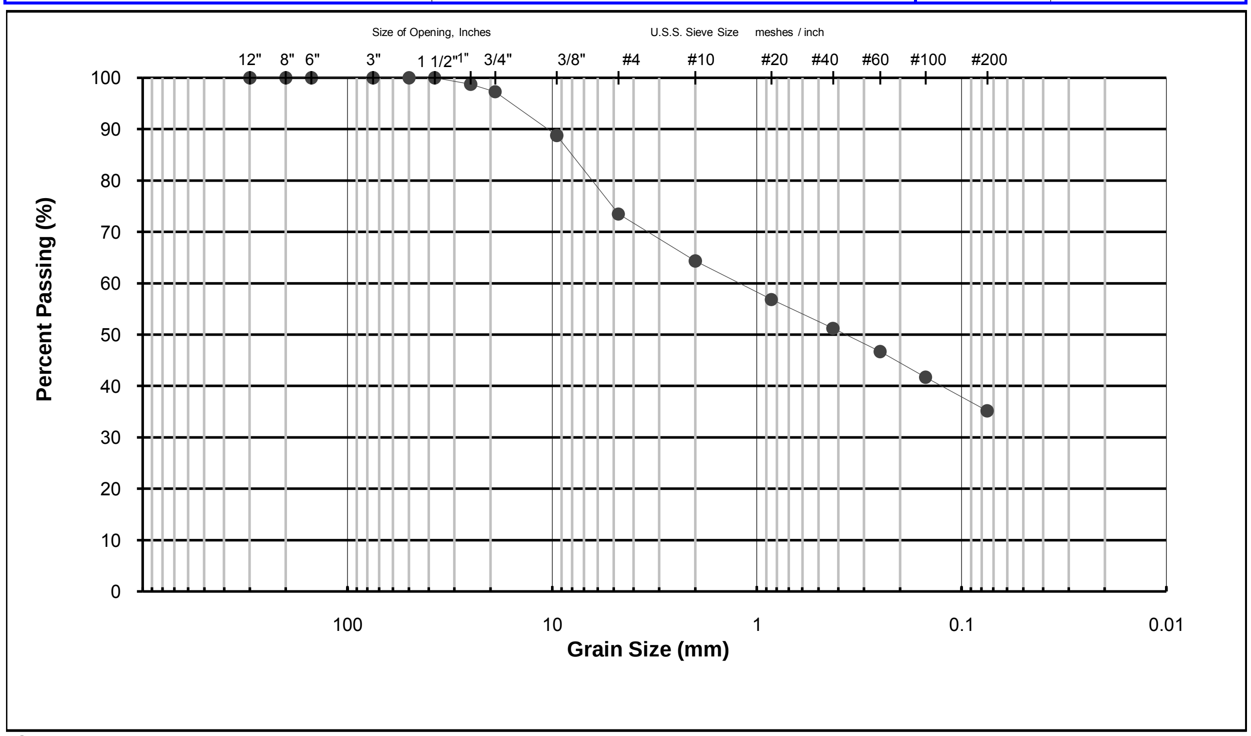
Golder Associates

Project #	07-1413-0074-2200	**Station**	60+567 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	KD
Tested By	RC/RB	**Sample Date**	19-Sep-08 **Test #: 59**
Percent Gravel (+ 4.75 and coarser) : 26.5%		**Percent Oversize (%): 0.0**	
Percent Sand Silt and Clay (- 4.75 and finer) : 73.5%		**Weight of Total Sample (g): 4855**	

SIEVE ANALYSIS

Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	Individual % Retained (Split - 4.75
12"	300	0.0	100	0.0	
8"	200	0.0	100	0.0	
6"	150	0.0	100	0.0	
3"	75	0.0	100	0.0	
2"	50	0.0	100	0.0	
1 1/2"	37.5	0.0	100	0.0	
1"	25.0	1.3	99	4.8	
3/4"	19.0	1.5	97	5.5	
3/8"	9.5	4.5	89	16.9	
#4	4.75	15.3	73	57.6	
#10	2.00	9.1	64		12.4
#20	0.85	7.5	57		10.2
#40	0.425	5.6	51		7.6
#60	0.250	4.5	47		6.1
#100	0.150	5.0	42		6.8
#200	0.075	6.5	35.2		8.8
	PAN	35.6			48.1
Total		100.4			

MATERIAL SPECIFICATION:
SB Backfill



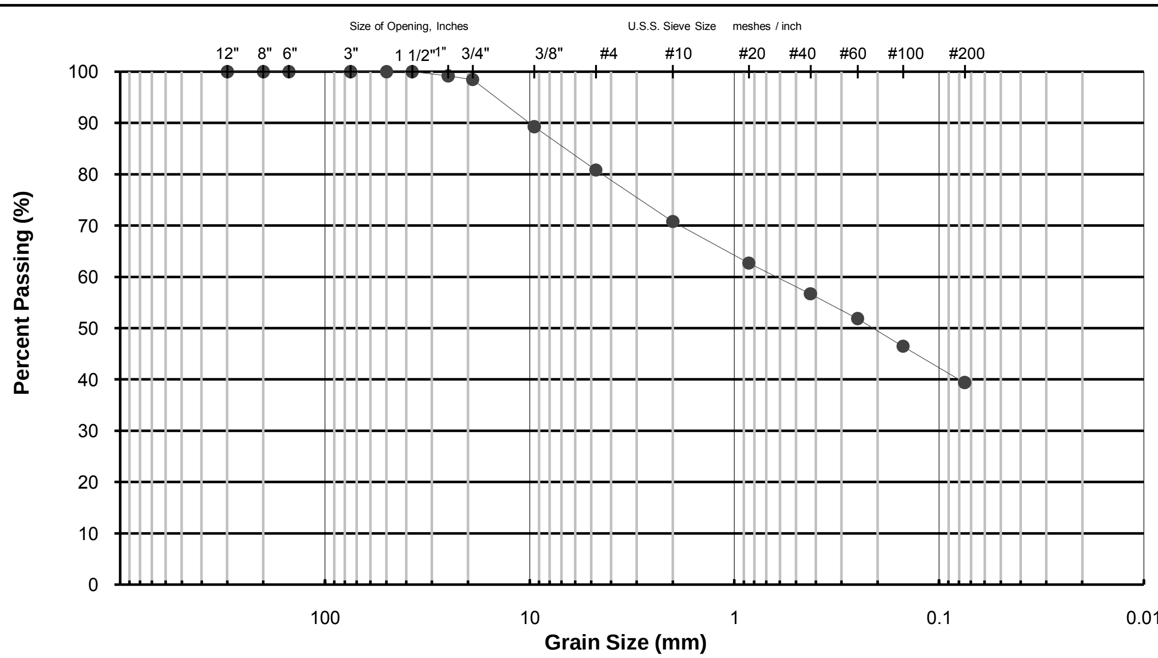
Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-0074-2200	**Station**	60+585 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	KD
Tested By	RC/RB	**Sample Date**	20-Sep-08 **Test #:** 60
Percent Gravel (+ 4.75 and coarser) : 19.2%		**Percent Oversize (%):** 0.0	
Percent Sand Silt and Clay (- 4.75 and finer) : 80.8%		**Weight of Total Sample (g):** 4523.4	

SIEVE ANALYSIS						MATERIAL SPECIFICATION: SB Backfill
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	- 4.75	
12"	300	0.0	100	0.0		
8"	200	0.0	100	0.0		
6"	150	0.0	100	0.0		
3"	75	0.0	100	0.0		
2"	50	0.0	100	0.0		
1 1/2"	37.5	0.0	100	0.0		
1"	25.0	0.8	99	4.3		
3/4"	19.0	0.7	98	3.8		
3/8"	9.5	4.8	89	25.0		
#4	4.75	8.5	81	44.1		
#10	2.00	10.0	71		12.4	
#20	0.85	8.1	63		10.0	
#40	0.425	6.0	57		7.4	
#60	0.250	4.8	52		6.0	
#100	0.150	5.4	46		6.7	
#200	0.075	7.1	39.4		8.7	
	PAN	39.5			48.8	
Total		100.1				



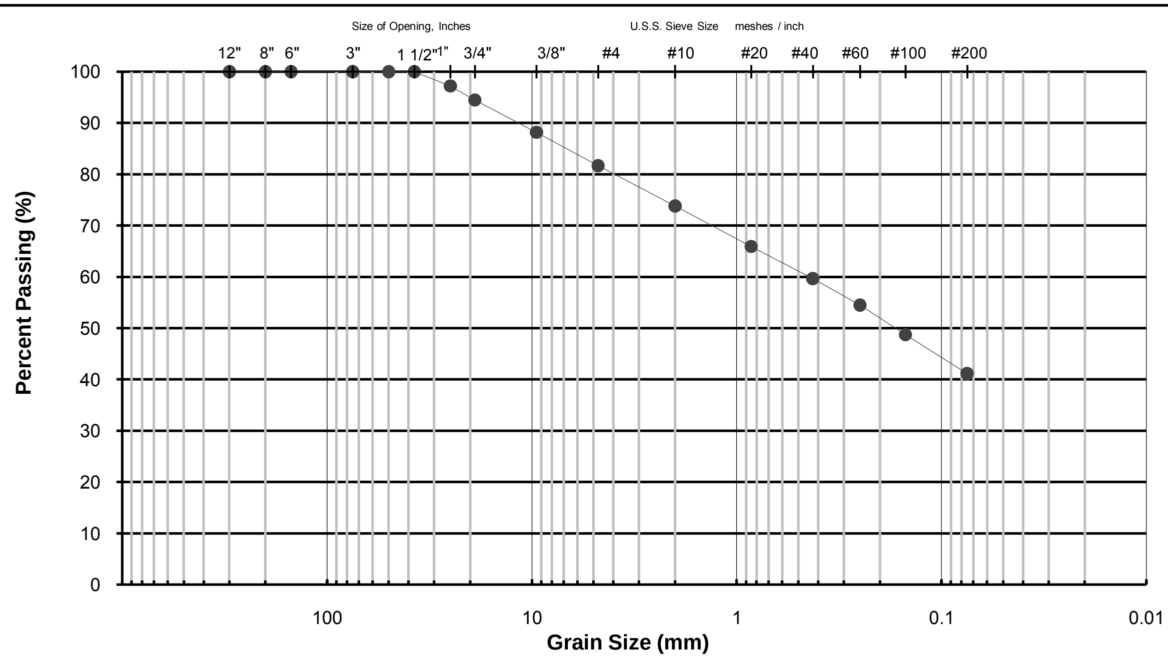
Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-0074-2200	**Station**	60+594 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	KD
Tested By	RB	**Sample Date**	20-Sep-08 **Test #:** 61
Percent Gravel (+ 4.75 and coarser) : 18.3%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 81.7%		**Weight of Total Sample (g):**	**4760.6**

SIEVE ANALYSIS						MATERIAL SPECIFICATION: SB Backfill	
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	- 4.75		
12"	300	0.0	100	0.0			
8"	200	0.0	100	0.0			
6"	150	0.0	100	0.0			
3"	75	0.0	100	0.0			
2"	50	0.0	100	0.0			
1 1/2"	37.5	0.0	100	0.0			
1"	25.0	2.8	97	15.2			
3/4"	19.0	2.7	94	15.0			
3/8"	9.5	3.0	88	16.3			
#4	4.75	6.5	82	35.5			
#10	2.00	7.9	74		9.6		
#20	0.85	7.9	66		9.7		
#40	0.425	6.3	60		7.7		
#60	0.250	5.2	54		6.3		
#100	0.150	5.8	49		7.1		
#200	0.075	7.6	41.1		9.3		
	PAN	41.2			50.4		
Total		100.0					



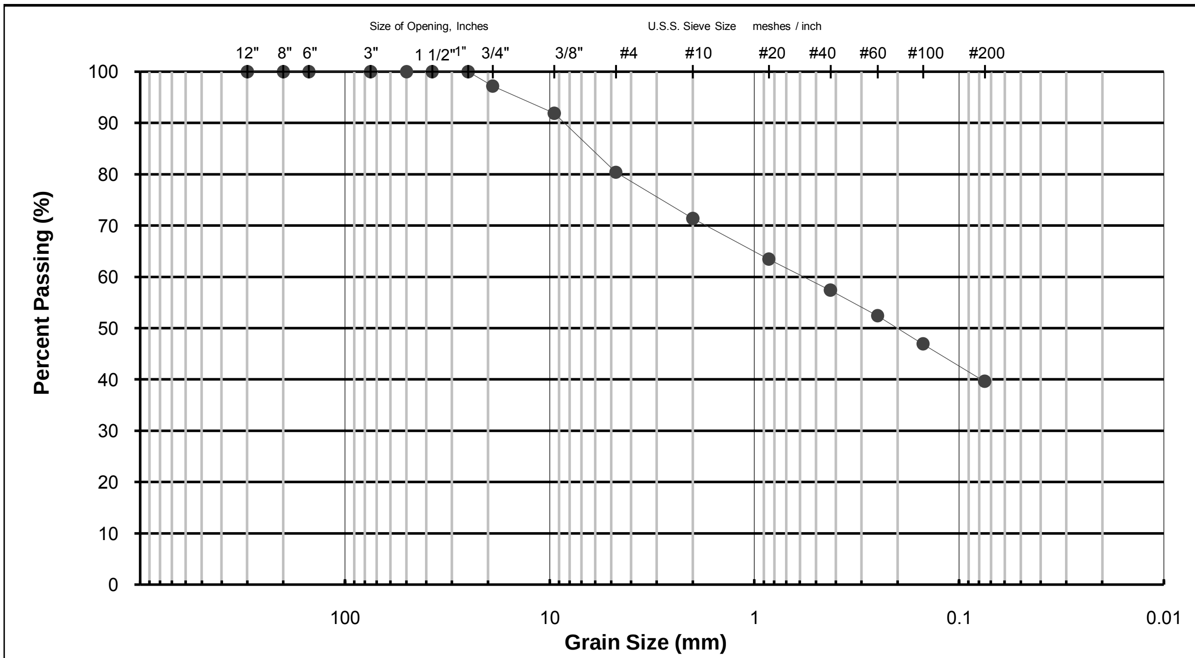
Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-	**Station**	60+624 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	RB
Tested By	RB/RC	**Sample Date**	20-Sep-08 **Test #:** 62
Percent Gravel (+ 4.75 and coarser) : 19.6%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 80.4%		**Weight of Total Sample (g):**	**5408.2**

SIEVE ANALYSIS						MATERIAL SPECIFICATION: SB Backfill
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	Individual % Retained (Split - 4.75	
12"	300	0.0	100	0.0		
8"	200	0.0	100	0.0		
6"	150	0.0	100	0.0		
3"	75	0.0	100	0.0		
2"	50	0.0	100	0.0		
1 1/2"	37.5	0.0	100	0.0		
1"	25.0	0.0	100	0.0		
3/4"	19.0	2.8	97	14.4		
3/8"	9.5	3.3	92	16.6		
#4	4.75	11.5	80	58.7		
#10	2.00	9.0	71		11.2	
#20	0.85	7.9	63		9.9	
#40	0.425	6.0	57		7.5	
#60	0.250	5.0	52		6.2	
#100	0.150	5.5	47		6.8	
#200	0.075	7.3	39.6		9.1	
	PAN	39.7			49.3	
Total		100.1				



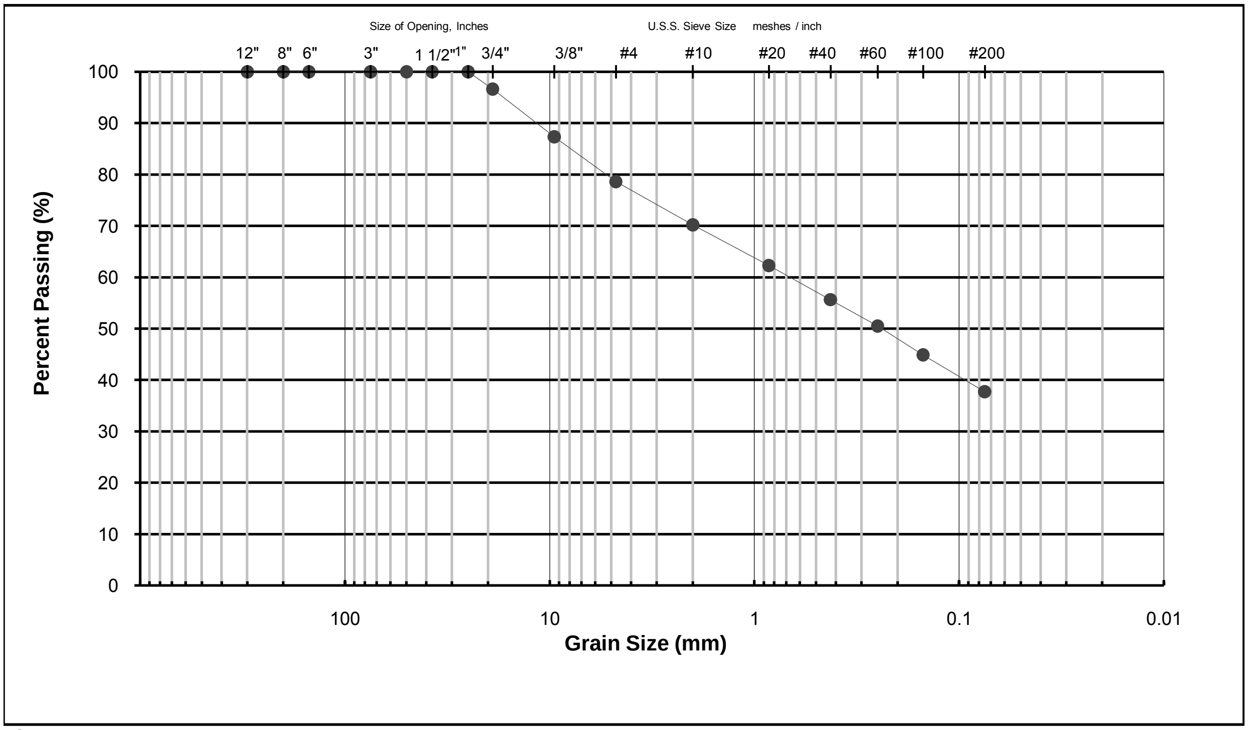
Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-0074-2200	**Station**	60+651 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	KD
Tested By	RC/RB	**Sample Date**	21-Sep-08 **Test #:** 63
Percent Gravel (+ 4.75 and coarser) : 21.4%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 78.6%		**Weight of Total Sample (g):**	**4903.5**

SIEVE ANALYSIS						MATERIAL SPECIFICATION: SB Backfill
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	Individual % Retained (Split - 4.75	
12"	300	0.0	100	0.0		
8"	200	0.0	100	0.0		
6"	150	0.0	100	0.0		
3"	75	0.0	100	0.0		
2"	50	0.0	100	0.0		
1 1/2"	37.5	0.0	100	0.0		
1"	25.0	0.0	100	0.0		
3/4"	19.0	3.4	97	15.8		
3/8"	9.5	3.9	87	18.4		
#4	4.75	8.7	79	40.8		
#10	2.00	8.4	70		10.7	
#20	0.85	7.9	62		10.1	
#40	0.425	6.6	56		8.4	
#60	0.250	5.1	51		6.6	
#100	0.150	5.6	45		7.1	
#200	0.075	7.2	37.7		9.2	
	PAN	37.6			47.9	
Total		99.9				



Comments:

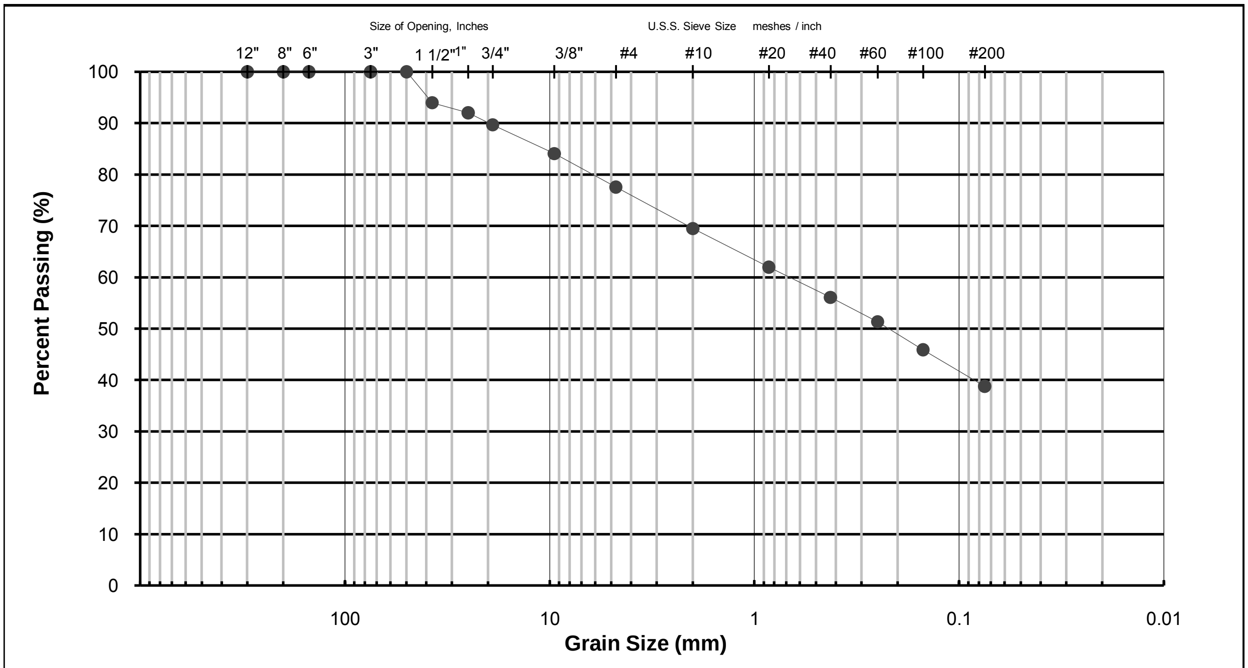
SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-0074-2200	**Station**	60+675 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	KD
Tested By	RC/RB	**Sample Date**	21-Sep-08 **Test #: 64**

Percent Gravel (+ 4.75 and coarser) : 22.4%	**Percent Oversize (%): 0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 77.6%	**Weight of Total Sample (g): 5165.7**

SIEVE ANALYSIS						**MATERIAL SPECIFICATION: SB Backfill**
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split) + 4.75	Individual % Retained (Split) - 4.75	
12"	300	0.0	100	0.0		
8"	200	0.0	100	0.0		
6"	150	0.0	100	0.0		
3"	75	0.0	100	0.0		
2"	50	0.0	100	0.0		
1 1/2"	37.5	6.0	94	26.9		
1"	25.0	2.0	92	8.8		
3/4"	19.0	2.3	90	10.4		
3/8"	9.5	2.7	84	11.8		
#4	4.75	6.5	78	29.0		
#10	2.00	8.1	69		10.4	
#20	0.85	7.5	62		9.7	
#40	0.425	5.9	56		7.6	
#60	0.250	4.7	51		6.1	
#100	0.150	5.5	46		7.0	
#200	0.075	7.1	38.8		9.2	
	PAN	38.9			50.0	
Total		100.1				



Comments:

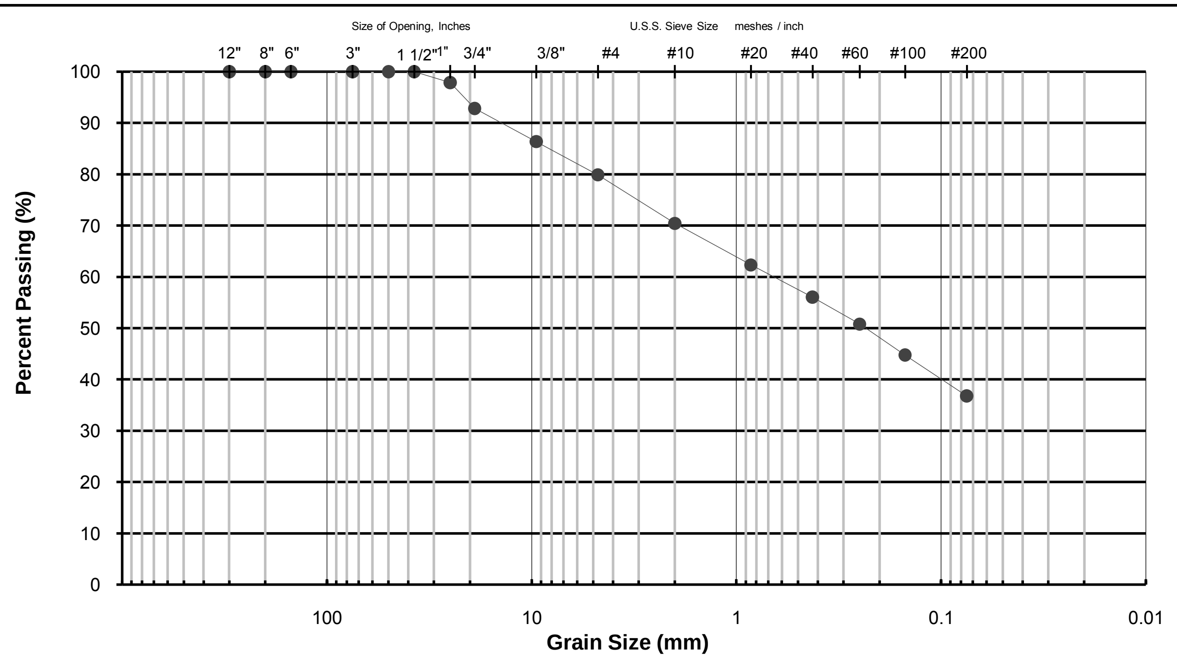
SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Project #	07-1413-0074-2200	**Station**	60+699 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	RB
Tested By	RC/RB	**Sample Date**	21-Sep-08 **Test #:** 65
Percent Gravel (+ 4.75 and coarser) : 20.1%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 79.9%		**Weight of Total Sample (g):**	**4366.3**

SIEVE ANALYSIS

Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	Individual % Retained (Split - 4.75
12"	300	0.0	100	0.0	
8"	200	0.0	100	0.0	
6"	150	0.0	100	0.0	
3"	75	0.0	100	0.0	
2"	50	0.0	100	0.0	
1 1/2"	37.5	0.0	100	0.0	
1"	25.0	2.1	98	10.6	
3/4"	19.0	5.0	93	25.1	
3/8"	9.5	2.7	86	13.6	
#4	4.75	6.5	80	32.2	
#10	2.00	9.5	70		11.9
#20	0.85	8.1	62		10.1
#40	0.425	6.3	56		7.8
#60	0.250	5.3	51		6.6
#100	0.150	6.0	45		7.6
#200	0.075	8.0	36.8		10.0
	PAN	36.7			46.0
Total		100.0			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

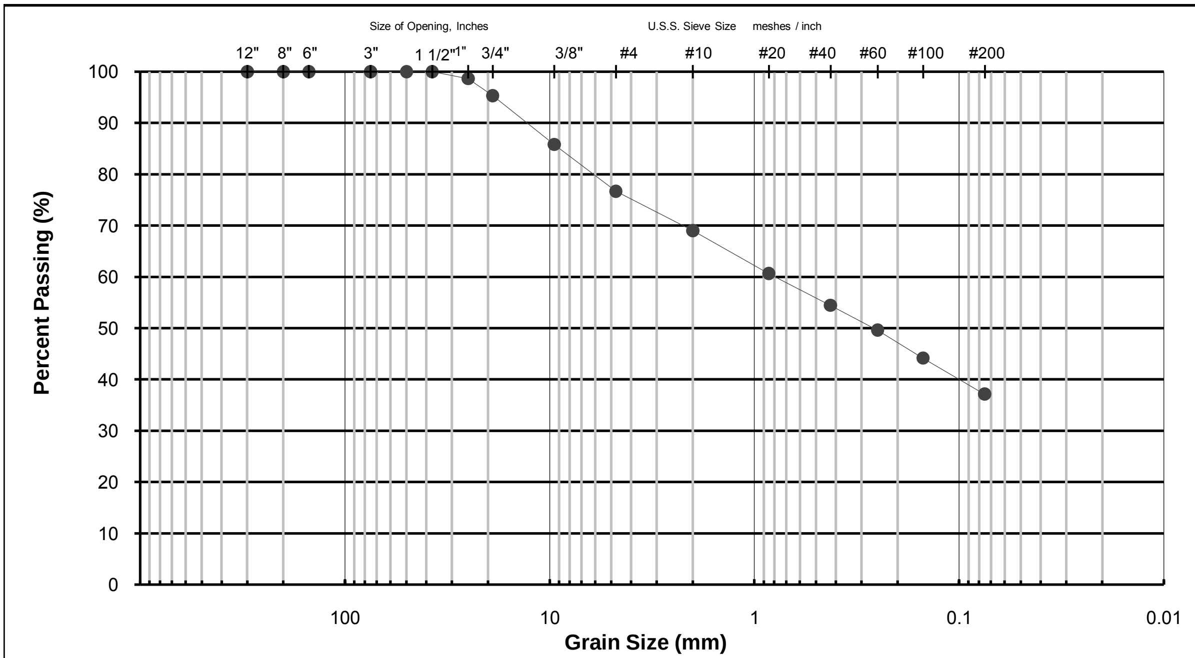
SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-0074-2200	**Station**	60+726 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	KD
Tested By	RC/RB	**Sample Date**	22-Sep-08 **Test #:** **67**
Percent Gravel (+ 4.75 and coarser) : 23.3%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 76.7%		**Weight of Total Sample (g):**	**5073.2**

Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split) + 4.75	Individual % Retained (Split) - 4.75
12"	300	0.0	100	0.0	
8"	200	0.0	100	0.0	
6"	150	0.0	100	0.0	
3"	75	0.0	100	0.0	
2"	50	0.0	100	0.0	
1 1/2"	37.5	0.0	100	0.0	
1"	25.0	1.3	99	5.8	
3/4"	19.0	3.3	95	14.3	
3/8"	9.5	3.9	86	16.9	
#4	4.75	9.1	77	39.1	
#10	2.00	7.7	69		10.0
#20	0.85	8.4	61		10.9
#40	0.425	6.2	54		8.0
#60	0.250	4.9	50		6.3
#100	0.150	5.4	44		7.1
#200	0.075	7.0	37.1		9.1
	PAN	37.3			48.5
Total		100.2			

MATERIAL SPECIFICATION:
SB Backfill



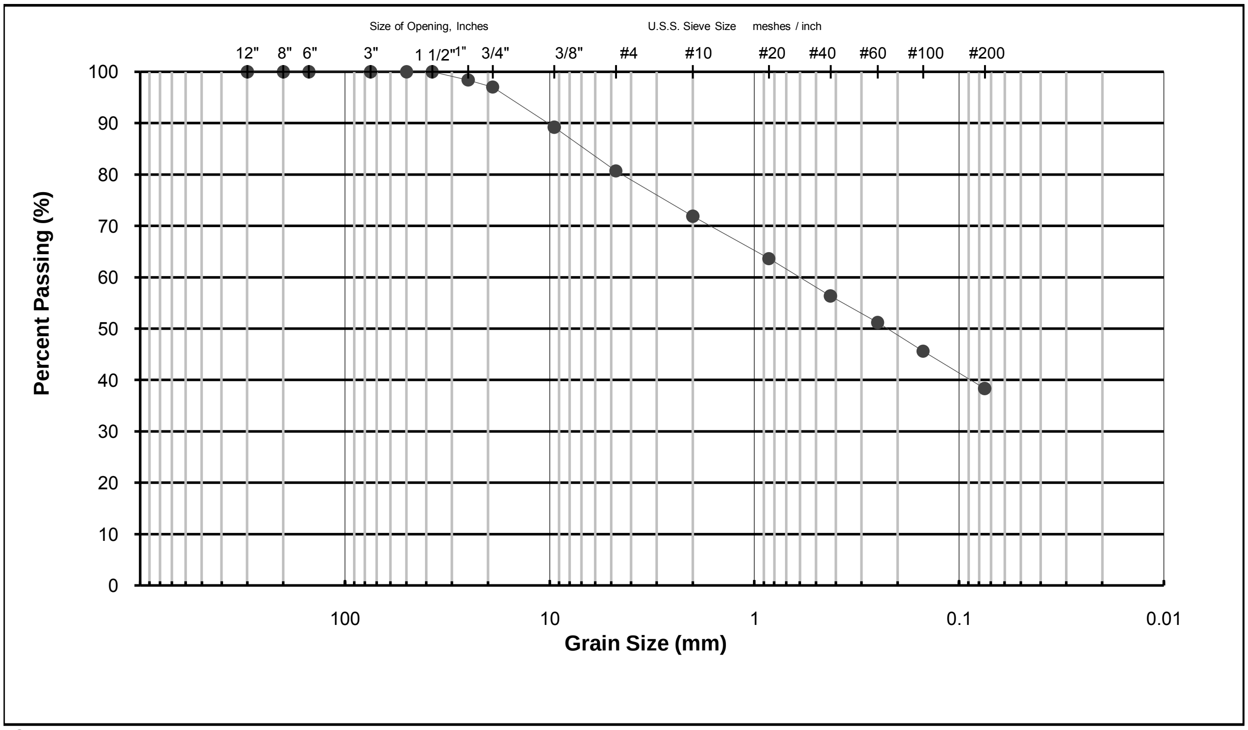
Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-0074-2200	**Station**	60+765 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	KD
Tested By	RC/RB	**Sample Date**	22-Sep-08 **Test #:** **68**
Percent Gravel (+ 4.75 and coarser) : 19.3%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 80.7%		**Weight of Total Sample (g):**	**4854.3**

SIEVE ANALYSIS						MATERIAL SPECIFICATION: SB Backfill
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split) + 4.75	- 4.75	
12"	300	0.0	100	0.0		
8"	200	0.0	100	0.0		
6"	150	0.0	100	0.0		
3"	75	0.0	100	0.0		
2"	50	0.0	100	0.0		
1 1/2"	37.5	0.0	100	0.0		
1"	25.0	1.6	98	8.3		
3/4"	19.0	1.4	97	7.1		
3/8"	9.5	3.9	89	20.2		
#4	4.75	8.5	81	44.0		
#10	2.00	8.8	72		10.9	
#20	0.85	8.3	64		10.2	
#40	0.425	7.3	56		9.0	
#60	0.250	5.1	51		6.4	
#100	0.150	5.6	46		6.9	
#200	0.075	7.3	38.4		9.0	
	PAN	38.5			47.6	
Total		100.1				



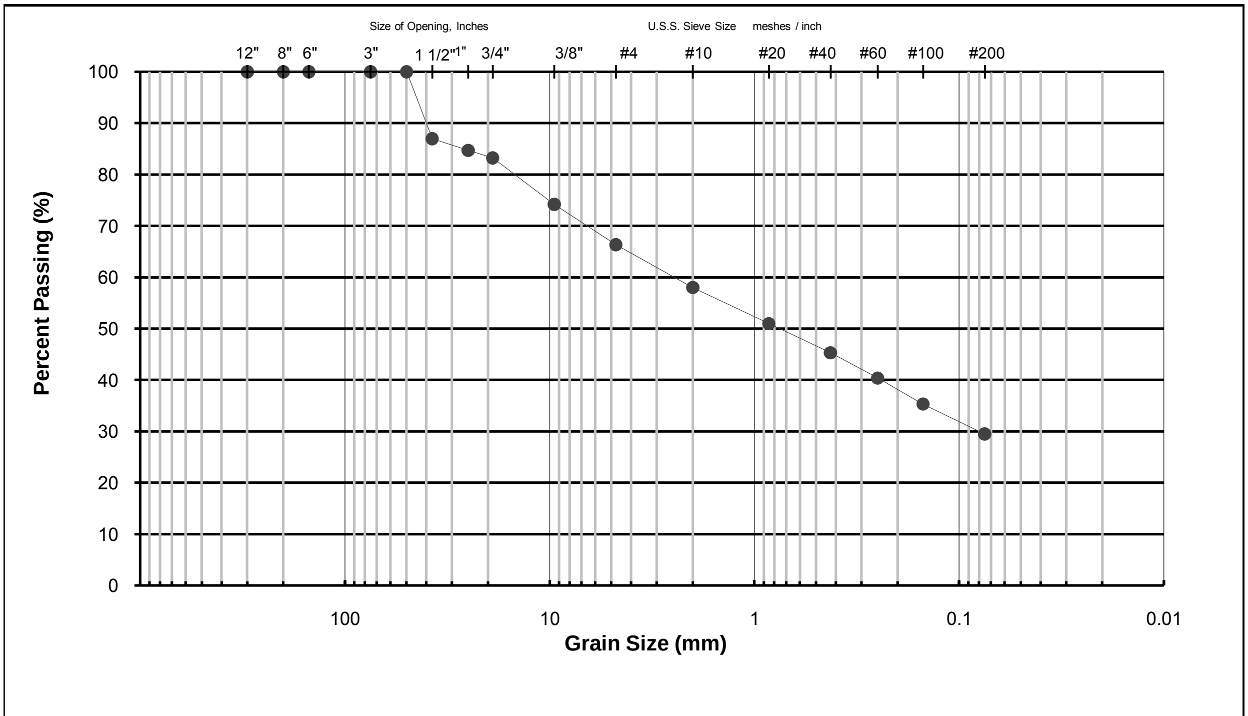
Comments:

SIEVE ANALYSIS OF
FINE AND COARSE AGGREGATE
ASTM D422 & D1140 (no Hydrometer)

Golder Associates

Project #	07-1413-0074-2200	**Station**	60+852 - Soil-Bentonite
Client	AEM Ltd.	**Offset**	
Project	East Dike Construction	**Elevation**	
Golder Project Manager		**Sampled By**	JEK
Tested By	RC/RB	**Sample Date**	22-Sep-08 **Test #:** 69
Percent Gravel (+ 4.75 and coarser) : 33.7%		**Percent Oversize (%):**	**0.0**
Percent Sand Silt and Clay (- 4.75 and finer) : 66.3%		**Weight of Total Sample (g):**	**5214**

SIEVE ANALYSIS						MATERIAL SPECIFICATION: SB Backfill
Sieve Size (inches)	Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split + 4.75	- 4.75	
12"	300	0.0	100	0.0		
8"	200	0.0	100	0.0		
6"	150	0.0	100	0.0		
3"	75	0.0	100	0.0		
2"	50	0.0	100	0.0		
1 1/2"	37.5	13.1	87	38.8		
1"	25.0	2.2	85	6.7		
3/4"	19.0	1.5	83	4.4		
3/8"	9.5	3.6	74	10.8		
#4	4.75	7.9	66	23.4		
#10	2.00	8.3	58		12.5	
#20	0.85	7.0	51		10.6	
#40	0.425	5.7	45		8.6	
#60	0.250	4.9	40		7.4	
#100	0.150	5.1	35		7.6	
#200	0.075	5.8	29.5		8.8	
	PAN	29.5			44.5	
Total		100.0				



Comments:

INQUIP

Associates, Inc.

Daily Construction Report
SOIL BENTONITE WALL

PROJECT:#0808 MEDOWBANK GOLDPROJECT-EAST DIKE	GENERAL: F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/6/08 05 SAT
Weather; pt/cloudy / FLURRYS	Temperature (Degrees C):	Ground Conditions: WET	
	High: 4 Low:1		

MANPOWER		MATERIALS (Daily)			EQUIPMENT		
Name/Craft	Onsite	Descrip	Deli' total	Used total	Type	ON Rent!	Stdby
FRANK DAVIS/SUPP	12	bentonit	373ton		DIGESTOR MIXER	9/2	
LAMAR POWELL	12	3000lb	249bg	20	2980' HDPE PIPE	9/2	
					2 -60HP MISSION Pump	9/2	
		Excavation (Square Feet)					
		Today	Prior	Total			

SUMMARY OF DAYS WORK: MIXING BENTONITE,WELDING SLURRY LINE , AM QC TESTING, TESTED SLURRY PIPE TO DITCH WITH WATER. BUILDING REMOTE MIXING PADS WITH CONEX BOXES NEXT TO SLURRY PONDS. PREMIXING TILL WITH 1.6 % BENTONITE.

POND SLURRY 63 VIS 64.5 DEN 9 PH

Verbal or Written Instructions Received From Engineer:

Delays, Including Cause, Location and Event; NO TILL ON PAD YET.

SAFETY TOPIC: PPE, SAFETY GLASSES!

INQUIP Associates, Inc.	**Daily Construction Report** SOIL BENTONITE WALL	Page 1 of 1

PROJECT:#0808 MEDOWBANK GOLDPROJECT-EAST DIKE	GENERAL: F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/7/08 06 SUN
Weather; pt/cloudy / SHOWERS	Temperature (Degrees C): High: 5 Low:1	Ground Conditions: WET	

MANPOWER		MATERIALS (Daily)			EQUIPMENT		
Name/Craft	Onsite	Descrip	Deli' total	Used total	Type	ON Rent!	Stdby
FRANK DAVIS/SUPP	12	bentonit	373ton		DIGESTOR MIXER	9/2	
LAMAR POWELL	12	3000lb	249bg	28bag	2980' HDPE PIPE	9/2	
					2 -60HP MISSION Pump	9/2	

Excavation (Square Feet)		
Today	Prior	Total

SUMMARY OF DAYS WORK: MIXING BENTONITE , MOVING TILL,STARTED ESCAVATION AT 60 + 94 TO 60+112 AT 11:00AM. RECHECKED SLURRY LINE FOR LEAK.TRAINING CREW FOR EVERTHING!

Verbal or Written Instructions Received From Engineer: BACKFILLING ON FIRST CUT FOR CONTACT TO ROCK (GASTON)

Delays, Including Cause, Location and Event;

SAFETY TOPIC: SAFETY TALK ABOUT SWING RADIOUS OF ESCAVATOR.

INQUIP Associates, Inc.	SOIL BENTONITE Daily Construction Report			
PROJECT: 0808 MEDOWBANK GOLD PROJECT-EAST DIKE	GENERAL:F.GILBERT/AGNICO EAGLE MINES	Date:	9/7/08	
		Report No:	06/SUN	

bentonite Slurry Test Results: (S)torage Tank, (D)ischarge and (T)rench at "X" feet bgs

	Time	Location	Marsh Funnel	DENSITY PCF.	Filter	DEPTH	Ph	SAND	SLUMP
01	1:38 PM	PIPE	46	1.02	15		9		
02	2:15PM	6+100	48	1.10	15.8	1M	9	3.5	
03	4:00PM	6+94		2.00					5.5 SAMPLE!
04	5:30PM	PIPE	49	1.02		1M	9		
05									
06									
07									
08									
09									
10									

Excavation Data

	Depth To rock!		TOTAL. SQ FT.		elvati on	backfill slope	backfill slope	Prev Days Total Sq Ft
60+94	2.95							
60+97	3.05		90					600
60+100	2.80		90					
60+103	2.85		90					
60+106	3.25		90					
60+109	3.90		120					
60+112	3.80		120					
			TOTAL	600 SQ.FT				
								Prel
								Total
								to Date
								600
								Job total!

Contractors Verification: The above report is complete and correct and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.**Submitted By:** FRANK DAVIS

Distribution: Engineer, Inquip Site Office, Inquip CA Office

INQUIP Associates, Inc.	**Daily Construction Report** SOIL BENTONITE WALL	

PROJECT:#0808 MEDOWBANK GOLDPROJECT-EAST DIKE	GENERAL: F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/8/08 07 MON
Weather; pt/cloudy / SHOWERS	Temperature (Degrees C): High: 3 Low:1	Ground Conditions: WET	

MANPOWER		MATERIALS (Daily)			EQUIPMENT		
Name/Craft	Onsite	Descrip	Deli' total	Used total	Type	ON Rent!	Stdby
FRANK DAVIS/SUPP	15	bentonit	373ton	51	DIGESTOR MIXER	9/2	
LAMAR POWELL	15	3000lb	249bg	34bag	2980' HDPE PIPE	9/2	
					2 -60HP MISSION Pump	9/2	

Excavation (Square Feet)		
Today	Prior	Total

SUMMARY OF DAYS WORK: MIXING BENTONITE , MOVING TILL, ESCAVATION TODAY 60 + 112 TO 60+160 ,INSTALLED BOOSTER PUMP IN SLURRY LINE,PERFORMING QC TESTING. ELEVATION MATCHING WITH BOTTOM SOUNDINGS.

Verbal or Written Instructions Received From Engineer: GOLDER CONFIRMED TO RUN ONLY ONE FILTER PRESS ON DITCH SLURRY PER SHIFT- KARINE FROM GOLDER.

Delays, Including Cause, Location and Event;

SAFETY TOPIC:USING LIFE VEST WILL TACKING ALL MEASUREMENT AT TRENCH!

INQUIP Associates, Inc.	SOIL BENTONITE Daily Construction Report	Page 2 of 2

PROJECT: 0808 MEDOWBANK GOLD PROJECT-EAST DIKE	GENERAL:F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/8/08 07MON

bentonite Slurry Test Results: (S)torage Tank, (D)ischarge and (T)rench at "X" feet bgs

	Time	Location	Marsh Funnel	DENSITY PCF.	Filter	DEPTH	Ph	SAND	BACKFILL SLUMP
01	8:15 AM	PIPE	49	1.02	14		9		
02	8:25AM	60+100	50	1.12	14.246	2M	9	3%	
03	8:45AM	60+94		2.01					5"
04	1:15PM	60+94	54	1.08		1M	9	2.5%	
05	1:20PM	PIPE	52	1.04			9		
06	4:40PM	60+121	43	1.07		1M	9	3.5%	
07	4:50PM	PIPE	43	1.02			9		
08	5:30PM	60+94		2.04					4.5"
09									
10									

Excavation Data

	Bottom of rock!	Back fill slope depth! PM	TOTAL. SQ FT. Backfill AM slope!		Bottom of rock!	backfill slope depth! PM	backfill slope depth! AM	Prev Days Total Sq Ft
60+94		1.50 pm	1.40	60+160	7.40	6.85	6.15	
60+97		1.55	1.70			clean!		
60+100		2.00	2.10					
60+103		2.55	2.45					
60+106		2.75	2.75					
60+109		3.05	3.10					
60+112		3.30	3.25					
60+115	4.70	3.55	3.75					
60+118	5.35	3.80	3.85					
60+121	5.45	3.75	3.85					
60+124	5.85	4.20	4.20					
60+127	6.20	4.35	4:40					
60+130	6.00	4.55	4.55					
60+133	5.95	4.70	4.80					
60+136	6.15	4.95	5.10					
60+139	6.15	5.15	5.05					
60+142	6.25	5.30	5.35					
60+145	6.25	5.55	5.55					Prel
60+148	7.10	5.80	5.90					Total
60+151	7.10	6.20	6.15					to Date
60+154	7.70	6.45	6.45					
60+157	7.80	6.85	6.15					Job total!

Contractors Verification: The above report is complete and correct and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.**Submitted By:** _____FRANK DAVIS______DISTRIBUTION OF INQUIP ASSOC MC LEAN ,VIRGINIA______________________________

INQUIP Associates, Inc.

Daily Construction Report
SOIL BENTONITE WALL

PROJECT:#0808 MEDOWBANK GOLDPROJECT-EAST DIKE	GENERAL: F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/9/08 08 TUES
Weather; pt/cloudy / SHOWERS	Temperature (Degrees C): High: 3 Low:-2	Ground Conditions: WET	

MANPOWER		MATERIALS (Daily)			EQUIPMENT		
Name/Craft	Onsite	Descrip	Deli' total	Used total	Type	ON Rent!	Stdby
FRANK DAVIS/SUPP	15	bentonit	373ton	66	DIGESTOR MIXER	9/2	
LAMAR POWELL	15	3000lb	249bg	44bag	2980' HDPE PIPE	9/2	
					2 -60HP MISSION Pump	9/2	

Excavation (Square Feet)		
Today	Prior	Total

SUMMARY OF DAYS WORK: MIXING BENTONITE , MOVING TILL, ESCAVATION TODAY 60 + 160 TO 60+194 ,INSTALLED PUMP FOR BACKFILL DOZER,PERFORMING QC TESTING. WILL START NIGHT SHIFT TO MIX BENTONITE.ORINGATATION WITH MINE 7:00PM.

Verbal or Written Instructions Received From Engineer:

Delays, Including Cause, Location and Event;

SAFETY TOPIC:SAFETY MEETING WITH F.GILBERT 7:00AM.

INQUIP Associates, Inc.

SOIL BENTONITE Daily Construction Report

PROJECT: 0808 MEDOWBANK GOLD PROJECT-EAST DIKE	GENERAL:F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/9/08 08 TUES

bentonite Slurry Test Results: (S)torage Tank, (D)ischarge and (T)rench at "X" feet bgs

	Time	Location	Marsh Funnel	DENSITY PCF.	Filter	DEPTH	Ph	SAND	BACKFILL SLUMP
01	8:30 AM	PIPE	47	1.04	12		9		
02	9:00AM	60+154	44	1.09		3M	9	3%	
03	9:30AM	60+94		2.12					5"
04	1:00PM	PIPE	51	1.04			9		
05	2:00PM	60+100		2.10					4.75
06	3:15PM	60+130	52	1.08	11.2	2M	9	3.5%	
07									
08									
09									
10									

Excavation Data

	Bottom of rock!	Back fill slope depth! PM	Backfill slope!am		Bottom of rock!	backfill slope depth! PM	backfill slope depth! AM	Prev Days Total Sq Ft
				60+160		5.55	5.45	
				60+163	8.00	5.95	5.75	
				60+167	7.90	6.00	6.05	
				60+170	8.30	6.30	6.25	
60+106		Top		60+173	7.75	6.45	6.20	
60+109		0.55	0.55	60+176	7.10	6.75	6.55	
60+112		1.10	1.05	60+179	7.90	6.80	6.60	
60+115		1.40	1.40	60+182	7.15	6.95	6.85	
60+118		1.85	1.80	60+185	7.95	6.95	6.95	
60+121		2.15	2.25	60+188	7.75	7.25	7.55	
60+124		2.65	2.65	60+191	8.25	7.45	7.55	
60+127		3.10	3.05	60+194	7.90	7.75	7.50	
60+130		3.40	3.20					
60+133		3.55	3.55					
60+136		3.85	3.90					
60+139		4.15	4.15					
60+142		4.55	4.60					
60+145		4.70	4.85					Prel
60+148		4.90	4.85					Total
60+151		5.15	5.30					to Date
60+154		5.35	5.45					
60+157		5.45	5.40					Job total!

Contractors Verification: The above report is complete and correct and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.**Submitted By:** _____FRANK DAVIS______DISTRIBUTION OF INQUIP ASSOC MC LEAN ,VIRGINIA____________________________

INQUIP
Associates, Inc.

Daily Construction Report
SOIL BENTONITE WALL

PROJECT:#0808 MEDOWBANK GOLDPROJECT-EAST DIKE	GENERAL: F.GILBERT/AGNICO EAGLE MINES	Date: / Report No:	9/10/08 / 09 WED
Weather; pt/cloudy / SHOWERS	Temperature (Degrees C): High: 1 Low:-3	Ground Conditions: WET	

MANPOWER		MATERIALS (Daily)			EQUIPMENT		
Name/Craft	Onsite	Descrip	Deli' total	Used total	Type	ON Rent!	Stdby
FRANK DAVIS/SUPP	17	bentonit	373ton	88	DIGESTOR MIXER	9/2	
LAMAR POWELL	17	3000lb	249bg	59bag	2980' HDPE PIPE	9/2	
					2 -60HP MISSION Pump	9/2	
		Excavation (Square Feet)					
		Today	Prior	Total			

SUMMARY OF DAYS WORK: MIXING BENTONITE , MOVING TILL, ESCAVATION TODAY 60 + 194 TO 60+278 ,BOTTOM ROCK MATCHING PROFILE. BACKFILLING ALL DAY TO CATCH UP TO ESCAVATOR.

Verbal or Written Instructions Received From Engineer: VERIFACATION OF DEPTH TO GOLDER 60+191= 8.25 TO ROCK@ 60 +194= 7.90 TO ROCK (JUSTIN)GOLDER.

Delays, Including Cause, Location and Event;

SAFETY TOPIC: LIFE VEST USED AT TRENCH!

INQUIP Associates, Inc.	SOIL BENTONITE Daily Construction Report	9/10/08

PROJECT: 0808 MEDOWBANK GOLD PROJECT-EAST DIKE	GENERAL:F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	~~9/9/08~~ 08 TUES

bentonite Slurry Test Results: (S)torage Tank, (D)ischarge and (T)rench at "X" feet bgs

	Time	Location	Marsh Funnel	DENSITY PCF.	Filter	DEPTH	Ph	SAND	BACKFILL SLUMP
01	8:00 AM	60+ 170	48	1.10		2M	9	3.25%	
02	8:15AM	PIPE	43	1.04			9		
03	9:00AM	60+109		2.10					4.75"
04	10:00am	PIPE	41	1.04			9		
05	1:00PM	60+119		2.14					4.50"sample!
06	1:15PM	60+154	53	1.09	14.8	3M	9	4%	
07	2:00PM	PIPE	47	1.04			9		
08	4 :00PM	60+136		2.11					5.00"
09									
10									

Excavation Data

	Bottom of rock!	Back fill slope depth! PM	Backfill slope!AM		Bottom of rock!	backfill slope depth! PM	backfill slope depth! AM	Prev Days Total Sq Ft
60+154		TOP	TOP	60+221	7.80	5.15	5.35	
60+157		.80	.65	60+224	7.45	5.60	5.65	
60+160		1.30	1.15	60+227	7.25	5.80	5.85	
60+163		1.70	1.75	60+230	7.55	6.10	6.05	
60+167		2.05	2.05	60+233	7.50	6.90	6.90	
60+170		2.45	2.40	60+236	7.50	7.05	6.75	
60+173		2.75	2.55	60+239	6.85	6.40	6.75	
60+176		2.95	2.85	60+242	6.85	6.70	6.65	
60+179		2.95	3.10	60+245	6.50			
60+182		3.35	3.30	60+248	5.10			
60+185		3.60	3.60	60+251	5.10			
60+188		3.80	3.70	60+254	3.20			
60+191		3.90	3.85	60+257	2.95			
60+194		4.05	4.05	60+260	2.45			
60+197	7.85	4.35	4.35	60+263	2.55			
60+200	7.40	4.50	4.50	60+266	2.05			
60+203	7.20	4.70	4.67	60+269	2.50			
60+206	7.25	4.85	4.65	60+272	2.65			Prel
60+209	6.50	4.90	4.90	60+275	2.70			Total
60+212	6.75	4.95	4.95	60+278	2.65			to Date
60+215	6.85	4.90	5.00					
60+218	7.50	5.25	5.20					Job total!

Contractors Verification: The above report is complete and correct and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.**Submitted By:** _____FRANK DAVIS______DISTRIBUTION OF INQUIP ASSOC MC LEAN ,VIRGINIA______________________________

INQUIP Associates, Inc.

Daily Construction Report
SOIL BENTONITE WALL

PROJECT:#0808 MEDOWBANK GOLDPROJECT-EAST DIKE	GENERAL: F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/11/08 10 THUR
Weather; pt/cloudy / flurry/wind	Temperature (Degrees C): High: -3 Low:-5		Ground Conditions: WET

MANPOWER		MATERIALS (Daily)			EQUIPMENT		
Name/Craft	Onsite	Descrip	Deli' total	Used total	Type	ON Rent!	Stdby
FRANK DAVIS/SUPP	16	bentonit	373ton	120	DIGESTOR MIXER	9/2	
LAMAR POWELL	16	3000lb	249bg	80bag	2980' HDPE PIPE	9/2	
					2 -60HP MISSION Pump	9/2	

Excavation (Square Feet)		
Today	Prior	Total

SUMMARY OF DAYS WORK: ESCAVATION TODAY:60+275 TO 60 +347, PERFORMING QC,PREPARING TO DEAL WITH FREEZING TEMP. HAUL TILL BARROW,MIXING BENTONITE 24HR. SHIFT.

Verbal or Written Instructions Received From Engineer; DUE TO RAPID CHANGE OF BEDROCK ELEVATION WAS NOT ABLE TO MAINTAIN BACFILL DISTANCE FOR THE ESCAVATION AND WAS INSTRUCTED TO STOP TO CLOSE THE GAP .GOLDER @ (GASTON)

Delays, Including Cause, Location and Event;

SAFETY TOPIC: WEAR ALL PPE REQUIRED!

INQUIP Associates, Inc.

SOIL BENTONITE Daily Construction Report

PROJECT: 0808 MEDOWBANK GOLD PROJECT-EAST DIKE	GENERAL:F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/11/08 10 THUR

bentonite Slurry Test Results: (S)torage Tank, (D)ischarge and (T)rench at "X" feet bgs

	Time	Location	Marsh Funnel	DENSITY PCF.	Filter	DEPTH	Ph	SAND	BACKFILL SLUMP
01	8:00 AM	PIPE	52	1.12		2M	9	3.25%	
02	8:30AM	60+151		2.09					5.50"
03	9:45AM	PIPE/no use	44	1.04			9		
04	12:45am	60+212	48	1.12	14.2		9	4.5%	
05	2:30PM	60+197		2.13					5.50"
06	2:45PM	60+169		2.10					4.5"SAMPLE!
07	7:50PM	60+311	46	1.16			9	4.5%	
08									
09									
10									

Excavation Data

	Bottom of rock!	Back fill slope depth! PM	Backfill slope!AM		Bottom of rock!	backfill slope depth! PM	backfill slope depth! AM	Prev Days Total Sq Ft
60+233		.65	.70	60+299	2.80			
60+236		.60	1.00	60+302	2.70			
60+239		1.05	1.00	60+305	3.00			
60+242		1.05	1.40	60+308	2.90			
60+245		1.45	1.70	60+311	2.85			
60+248		1.70	1.75	60+314	2.85			
60+251		1.75	1.85	60+317	2.70			
60+254		1.80	1.95	60+320	3.05			
60+257		1.90	1.95	60+323	2.75			
60+260		2.00	2.25	60+326	3.40			
60+263		2.25	1.95	60+329	3.45			
60+266		1.95	1.95	60+332	3.05			
60+269		2.15	2.25	60+335	3.40			
60+272		2.50	2.50	60+338	3.60			
60+275	2.60	2.55	2.65	60+341	4.35			
60+278	2.85	2.85	2.75	60+344	4.65			
60+281	3.85	3.55	3.55	60+347	4.55			
60+284	3.90	3.50	3.30					Prel
60+287	3.35	3.35	3.20					Total
60+290	3.05	2.90	2.90					to Date
60+293	2.55	3.05	3.05					
60+296	2.95	2.65	2.65TOE!					Job total!

Contractors Verification: The above report is complete and correct and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.**Submitted By:** _____FRANK DAVIS______DISTRIBUTION OF INQUIP ASSOC MC LEAN ,VIRGINIA____________________________

INQUIP Associates, Inc.	**Daily Construction Report** SOIL BENTONITE WALL	

PROJECT:#0808 MEDOWBANK GOLDPROJECT-EAST DIKE	GENERAL: F.GILBERT/AGNICO EAGLE MINES	Date: 9/12/08 Report No: 12 FRI
Weather; pt/cloudy / ice/wind	Temperature (Degrees C): High: -3 Low:-6	Ground Conditions: dry

MANPOWER		MATERIALS (Daily)			EQUIPMENT		
Name/Craft	Onsite	Descrip	Deli' total	Used total	Type	ON Rent!	Stdby
FRANK DAVIS/SUPP	16	bentonit	373ton	136.5t	DIGESTOR MIXER	9/2	
LAMAR POWELL	16	3000lb	249bg	91bag	2980' HDPE PIPE	9/2	
					2 -60HP MISSION Pump	9/2	

Excavation (Square Feet)		
Today	Prior	Total

SUMMARY OF DAYS WORK: ESCAVATION TODAY:60+347 TO 60 +365, PERFORMING QC,PREPARING TO DEAL WITH FREEZING TEMP. HAUL TILL BARROW,MIXING BENTONITE 24HR. SHIFT.BACKFILL ING ALL DAY TO PROCEED UP SLOPE, PUMPING SLURRY BACK TO PONDS.

Verbal or Written Instructions Received From Engineer;

Delays, Including Cause, Location and Event; BACK FILL SLOPE WAS STOPPED BECAUSE OF UP LIFT OF THE ROCK AND THE DIFFERENTS OF PAD ELEVATION.9HR DELAY,BY NOT USING BEAM METHOD ON THE EXTREME SLOPE WILL CAUSE DELAYS ,OF WAITING ON SLURRY,SNC.LAVALLIN WAS ADVISED.

SAFETY TOPIC: COLD WHEATHER!

INQUIP Associates, Inc.

SOIL BENTONITE Daily Construction Report

PROJECT: 0808 MEDOWBANK GOLD PROJECT-EAST DIKE	GENERAL:F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/12/08 12 FRI

bentonite Slurry Test Results: (S)torage Tank, (D)ischarge and (T)rench at "X" feet bgs

	Time	Location	Marsh Funnel	DENSITY PCF.	Filter	DEPTH	Ph SAND BACKFILL SLUMP
01	7:30 AM	60+335	47	1.11		1M	9 3.50%
02	8:30AM	60+240		2.12			5.50"
03	2:30PM	60+323	51	1.14			9 4.5%
04	3:00PM	60+213		2.14			5.00"
05	7:30PM	60+300		2.10			4.00"
06							
07							
08	1:45PM	60+194		BACKUP!			BACKFILL SAMPLE RETIVED!
09							
10							

Excavation Data

	Bottom of rock!	Back fill slope depth! PM	Backfill slope!AM		Bottom of rock!	backfill slope depth! PM	backfill slope depth! AM	Prev Days Total Sq Ft
60+305		TOP	TOP					
60+308		0.50	0.65					
60+311		0.65	0.75					
60+314		0.85	0.95					
60+317		1.05	1.05					
60+320		1.35	1.03					
60+323		1.45	1.55					
60+326		1.65	1.65					
60+329		1.75	1.75					
60+332		2.15	2.15					
60+335		2.85	2.30					
60+338		2.65	2.45					
60+341		2.90	2.80					
60+344		3.40	3.15					
60+347		3.55	3.65					
60+350	5.15	3.65	3.70					
60+353	5.35	3.90	4.10					
60+356	5.20	3.95	3.95					Prel
60+359	5.30	4.05	4.00					Total
60+362	5.25	4.00	3.90					to Date
60+365	5.05	4.01	3.85					
								Job total!

Contractors Verification: The above report is complete and correct and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.**Submitted By:** _____FRANK DAVIS______DISTRIBUTION OF INQUIP ASSOC MC LEAN ,VIRGINIA____________________________

INQUIP
Associates, Inc.

Daily Construction Report
SOIL BENTONITE WALL

PROJECT:#0808 MEDOWBANK GOLDPROJECT-EAST DIKE	GENERAL: F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/13/08 13 SAT
Weather; pt/cloudy / ice/wind	Temperature (Degrees C):	Ground Conditions: WET	
	High: 1	Low:-4	

MANPOWER		MATERIALS (Daily)			EQUIPMENT		
Name/Craft	Onsit e	Descrip	Deli' total	Used total	Type	ON Rent!	Stdby
FRANK DAVIS/SUPP	16	bentonit	373ton	151.5t	DIGESTOR MIXER	9/2	
LAMAR POWELL	16	3000lb	249bg	101bg	2980' HDPE PIPE	9/2	
					2 -60HP MISSION Pump	9/2	
		Excavation (Square Feet)					
		Today	Prior	Total			

SUMMARY OF DAYS WORK: ESCAVATION TODAY:60+365 TO 60 +419, PERFORMING QC,CLEANING SITE OF BENTONITE SPILL. HAULING TILL BARROW,FABRICATING CROSS BEAM TO INSTALL IN TRENCH TO SLOW MOVEMENT OF BACKFILL ON THE SLOPE. WAS POSTION AT 60+393,LENGTH OF CROSS IS 6.50, BOTTOM OF TRENCH AT THIS LOCATION IS 7.10 METERS.5HR. ASSEMBLE TIME!

Verbal or Written Instructions Received From Engineer; PERMISSION TO PLACE BEAM! SNC.LAVALLIN

Delays, Including Cause, Location and Event; 5 HR. DOWNTIME WITH WATER IN DISEAL FUEL FROM MINE.

SAFETY TOPIC: TRIPS SLIPS @FALLS

INQUIP Associates, Inc.	SOIL BENTONITE Daily Construction Report	

PROJECT: 0808 MEDOWBANK GOLD PROJECT-EAST DIKE	GENERAL:F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/13/08 13 SAT

bentonite Slurry Test Results: (S)torage Tank, (D)ischarge and (T)rench at "X" feet bgs

	Time	Location	Marsh Funnel	DENSITY PCF.	Filter	DEPTH	Ph	SAND	BACKFILL SLUMP
01	7:15AM	60+350	52	1.20		2M	9	4%	
02	8:00AM	60+311		2.12					4"
03	8:45AM	PIPE	44	1.05			9	1%	
04	1:00PM	60+368	53	1.15	15.1		9	5%	
05	1:30PM	60+311		2.13					4.5"
06	3:30pm	PIPE	46	1.05			9	1%	
07	5:00PM	60+323		2.14					3.75%
08									
09									
10									

Excavation Data

	Bottom of rock!	Back fill slope depth! PM	Backfill slope!AM		Bottom of rock!	backfill slope depth! PM	backfill slope depth! AM	Prev Days Total Sq Ft
60+332		0.80	0.70	60+398	7.70	6.75	6.85	
60+335		1.00	1.05	60+401	8.15	7.10	7.20	
60+338		1.25	1.25	60+404	8.15	7.15	7.20	
60+341		1.55	1.60	60+407	8.10	7.35	7.30	
60+344		2.05	2.05	60+410	8.45	7.65	7.85	
60+347		2.35	2.40	60+413	8.55	8.30toe!	8.15toe!	
60+350		2.65	2.55	60+416	8.70	Clean!	Clean!	
60+353		3.15	3.00	60+419	8.45			
60+356		3.35	3.25					
60+359		3.90	4.15					
60 +362		4.35	4.40					
60+365		4.80	4.80					
60+368	5.95	5.00	5.25					
60+371	5.85	5.10	5.15					
60+374	6.30	5.15	5.25					
60+377	6.35	5.55	5.50					
60+380	7.25	5.55	5.70					
60+383	7.20	5.80	5.75					Prel
60+386	7.40	5.85	5.90					Total
60+389	7.00	6.10	6.15					to Date
60+392	7.10	6.00 beam!	6.15					
60+395	7.35	6.15	6.25					Job total!

Contractors Verification: The above report is complete and correct and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.**Submitted By:** _____FRANK DAVIS______DISTRIBUTION OF INQUIP ASSOC MC LEAN ,VIRGINIA______________________________

INQUIP

Associates, Inc.

Daily Construction Report
SOIL BENTONITE WALL

PROJECT:#0808 MEDOWBANK GOLDPROJECT-EAST DIKE	GENERAL: F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/14/08 14 SUN
Weather; pt/cloudy / WET SNOW	Temperature (Degrees C): High: -3 Low:-6	Ground Conditions: WET	

MANPOWER		MATERIALS (Daily)			EQUIPMENT		
Name/Craft	Onsite	Descrip	Deli' total	Used total	Type	ON Rent!	Stdby
FRANK DAVIS/SUPP	17	bentonit	373ton	163.5t	DIGESTOR MIXER	9/2	
LAMAR POWELL	17	3000lb	249bg	109bg	2980' HDPE PIPE	9/2	
					2 -60HP MISSION Pump	9/2	

Excavation (Square Feet)		
Today	Prior	Total

SUMMARY OF DAYS WORK: ESCAVATION TODAY:60+419 TO 60 +464, PERFORMING QC,CLEANING SITE OF BENTONITE SPILL. HAULING TILL BARROW,ESCAVATING BOULDER FROM 60+434 TO 60+ 449.

Verbal or Written Instructions Received From Engineer; SNC.LAVALLIN IS CONSISTILY HAVING THE OPERATOR PULL ON SLOPE OF THE BACK FILL.

Delays, Including Cause, Location and Event;

SAFETY TOPIC: LIGHT PLANT MOVE FOR MAXIUM LIGHT!

INQUIP Associates, Inc.	SOIL BENTONITE Daily Construction Report	

PROJECT: 0808 MEDOWBANK GOLD PROJECT-EAST DIKE	GENERAL:F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/14/08 14 SUN

bentonite Slurry Test Results: (S)torage Tank, (D)ischarge and (T)rench at "X" feet bgs

	Time	Location	Marsh Funnel	DENSITY PCF.	Filter	DEPTH	Ph	SAND	BACKFILL SLUMP
01	7:30AM	60+383	52	1.10		1M	9	3%	
02	8:00AM	PIPE	52	1.04					
03	8:30AM			2.12					4"
04	1:30PM			2.10					4.25"
05	1:30PM	60+311		2.13					4.5"
06	2:00pm	60+398	48	1.11	13.2	3M	9	4.5%	
07	2:15PM	PIPE	46	1.06			9	½%	
08	5:00pm	60+359		2.11					4"
09									
10									

Excavation Data

	Bottom of rock!	Back fill slope depth! PM	Backfill slope!AM		Bottom of rock!	backfill slope depth! PM	backfill slope depth! AM	Prev Days Total Sq Ft
60+365		0.75	0.80	60+431	9.65	7.05	7.05	
60+368		1.45	1.40	60+434	9.05	7.15	7.15	
60+371		1.75	1.85	60+437	9.20	7.20	7.10	
60+374		2.20	2.20	60+440	8.55BF	7.35	7.20	
60+377		2.90	2.70	60+443	8.55BF	7.55	7.35	
60+380		3.15	3.30	60+446	8.65	7.60	7.55	
60+383		3.55	3.70	60+449	8.95	7.85	7.75	
60+386		3.85	3.70	60+452	8.75	7.85	7.80	
60+389		4.35	4.40	60+455	8.60	8.05	8.15	
60+392		3.95 BEAM!	5.10	60+458	9.00	9.15toe!	8.80toe	
60+395		5.35	5.65	60+461	9.15			
60+398		5.55	5.55	60+464	8.55			
60+401		5.60	5.70					
60+404		5.80	5.75					
60+407		5.95	6.10					
60+410		6.05	6.15					
60+413		6.25	6.25					
60+416		6.25	6.25					Prel
60+419		6.45	6.40					Total
60+422	8.15	6.55	6.65					to Date
60+425	8.45	6.60	6.70					
60+428	8.40	6.95	6.95					Job total!

Contractors Verification: The above report is complete and correct and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.**Submitted By:** _____FRANK DAVIS______DISTRIBUTION OF INQUIP ASSOC MC LEAN ,VIRGINIA____________________________

INQUIP Associates, Inc.

Daily Construction Report
SOIL BENTONITE WALL

PROJECT:#0808 MEDOWBANK GOLDPROJECT-EAST DIKE	GENERAL: F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/15/08 15 TUES
Weather; pt/cloudy / WET SNOW	Temperature (Degrees C):	Ground Conditions: WET	
	High: -2 Low:-8		

MANPOWER		MATERIALS (Daily)			EQUIPMENT		
Name/Craft	Onsite	Descrip	Deli' total	Used total	Type	ON Rent!	Stdby
FRANK DAVIS/SUPP	17	bentonit	373ton	186.5t	DIGESTOR MIXER	9/2	
LAMAR POWELL	17	3000lb	249bg	124bg	2980' HDPE PIPE	9/2	
					2 -60HP MISSION Pump	9/2	

Excavation (Square Feet)		
Today	Prior	Total

SUMMARY OF DAYS WORK: ESCAVATION TODAY:60+464 TO 60 +515, PERFORMING QC,CLEANING SITE OF BENTONITE SPILL. HAULING TILL BARROW FOR START OF BACKFILL, DE-ICEING TRENCH @ REMOVING ANY FROZEN MATERIAL TO THE SIDE. MAKING PUMPS LEAK FREE. BACKFILL WAS AT ESCAVATOR TWICE THIS SHIFT!

Verbal or Written Instructions Received From Engineer;

Delays, Including Cause, Location and Event; 2 HR. COLD WHETHER STARTS SLOW!

SAFETY TOPIC: BRAKES TO WARM UP!

INQUIP Associates, Inc.	SOIL BENTONITE Daily Construction Report	Page 2 of 2

PROJECT: 0808 MEDOWBANK GOLD PROJECT-EAST DIKE	GENERAL:F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/15/08 15 MON

bentonite Slurry Test Results: (S)torage Tank, (D)ischarge and (T)rench at "X" feet bgs

	Time	Location	Marsh Funnel	DENSITY PCF.	Filter	DEPTH	Ph	SAND	BACKFILL SLUMP
01	7:45AM	60+446	52	1.10		1M	9	3%	
02	9:00AM	PIPE	53	1.05			9	.05%	
03	10:00am	60+368		2.15					4"
04	1:00PM	60+377		2.16					4.25"
05	1:30PM	PIPE	49	1.05			9		
06	2:00pm	60+464	46	1.09	15.8	3M	9	4.5%	
07	5:30PM	60+386		2.12					5"
08	7:45pm	PIPE	52	1.04			9		
09									
10									

Excavation Data

	Bottom of rock!	Back fill slope depth! PM	Backfill slope!AM		Bottom of rock!	backfill slope depth! PM	backfill slope depth! AM	Prev Days Total Sq Ft
60+395		0.80	1.00	60+461		6.40	6.45	
60+398		1.85	1.65	60+464		6.60	6.75	
60+401		2.15	2.35	60+467	9.40	6.65	6.70	
60+404		2.10	2.70	60+470	8.80	6.90	7.05	
60+407		2.70	3.15	60+473	8.60	7.05	7.10	
60+410		3.05	3.20	60+476	8.95	7.20	7.15	
60+413		3.45	3.65	60+479	8.50	7.85	7.85	
60+416		3.65	3.85	60+482	8.60	7.90	8.30	
60+419		4.90	4.15	60+485	9.05	8.05	8.00	
60+422		4.85	4.65	60+488	8.90	8.20	8.10	
60+425		4.60 beam!	4.70	60+491	9.50	8.15	8.15	
60+428		4.80	4.95	60+494	9.40	8.25	8.15	
60+431		4.85	5.20	60+497	9.15	8.08	8.15	
60+434		5.25	5.35	60+500	9.05	8.35	8.45	
60+437		5.15	5.20	60+503	8.70	8.15	8.20	
60+440		5.30	5.65	60+506	9.30	7.70	7.90toe!	
60+443		5.55	5.55	60+509	8.60	8.25	8.60	
60+446		5.70	5.70	60+512	8.25	8.15clean!	8.25	Prel
60+449		5.85	5.80	60+515	7.60	Clean!		Total
60+452		6.20	6.10					to Date
60+455		6.15	6.10					
60+458		6.35	6.20					Job total!

Contractors Verification: The above report is co6mplete and correct and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.**Submitted By:** _____FRANK DAVIS______DISTRIBUTION OF INQUIP ASSOC MC LEAN ,VIRGINIA_______________________________

INQUIP Associates, Inc.	**Daily Construction Report** SOIL BENTONITE WALL KARINE	

PROJECT:#0808 MEDOWBANK GOLDPROJECT-EAST DIKE	GENERAL: F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/16/08 16 TUES
Weather; pt/cloudy / blizzard	Temperature (Degrees C):	Ground Conditions: WET	
	High: -8 Low:-11		

MANPOWER		MATERIALS (Daily)			EQUIPMENT		
Name/Craft	Onsite	Descrip	Deli' total	Used total	Type	ON Rent!	Stdby
FRANK DAVIS/SUPP	16	bentonit	373tn	199tn	DIGESTOR MIXER	9/2	
LAMAR POWELL	16	3000lb	249bg	133bg	2980' HDPE PIPE	9/2	
			Us tns	Us tns	2 -60HP MISSION Pump	9/2	
		Excavation (Square Feet)					
		Today	Prior	Total			

SUMMARY OF DAYS WORK: ESCAVATION TODAY:60+515 TO 60 +564, PERFORMING QC,CLEANING SITE OF BENTONITE SPILL AT SLURRY PLANT AND DIKE HAUL ROAD AJACENT TO EXCAVATION. REMOVING EXCESS SLURRY LINE. REMOVING ICE CAP FROM TRENCH AND FROM BACKFILL MIX ING AREA. BEAM WAS REMOVED AT 60 +473 AT 2:00PM TO MOVE BACKFILL UP GRADE CHANGE AT 60 +536. DID NOT UP FRESH SLURRY PAST 10AM.

Verbal or Written Instructions Received From Engineer; SNC.LAVALLIN STOP EXCAVATION AT 3:00PM TO 5:00PM TO BACKFILL UP IN 6- AREA AT RELINEMENT,WAS AFRAID OFSLURRY LOSE IN THIS AREA. WE HAD BACKFILL WITH IN 15METERS OF THE ESCAVATOR.WE NEVER WAS OUT OF SPEC THEY JUST NEED BACKFILL CLOSER. RESTARTED AT 5:00PM.

Delays, Including Cause, Location and Event; 2 HR. COLD WHETHER STARTS SLOW! STOP ESCAVATOR AT5 5:30PM WHEN WE BROKE A SHANK AT 60 +557 ON RUFF BEDROCK THAT WAS NOT PREVIOUS CLEANED DID NOT START ESCAVATION INTILL 6:30PM. DEEP CONFIRMED GOOD BEDROCK MEASUREMENTS AND NO BOULDERS.

SAFETY TOPIC: EYEWEAR PROTECTION WHILE BLOWING ICE FROM SLURRY LINE REQUIRED!

INQUIP Associates, Inc.

SOIL BENTONITE Daily Construction Report

PROJECT: 0808 MEDOWBANK GOLD PROJECT-EAST DIKE	GENERAL:F.GILBERT/AGNICO EAGLE MINES	Date:	9/16/08
		Report No:	16 TUES

bentonite Slurry Test Results: (S)torage Tank, (D)ischarge and (T)rench at "X" feet bgs

	Time	Location	Marsh Funnel	DENSITY PCF.	Filter	DEPTH	Ph	SAND	BACKFILL SLUMP
01	8AM	60+441	51	1.08		2M	9	4.5%	
02	9:20AM	60+392		2.10					3"
03	10:00am	PIPE	42	1.04			9		
04	12:45PM	60+488	48	1.08			9	4.5%	
05	4PM	60+413		2.12					5.5"
06	5PM	60+536	53	1.14	15.2	2M	9	5%	
07									
08									
09									
10									

Excavation Data

	Bottom of rock!	Back fill slope depth! PM	Backfill slope!AM		Bottom of rock!	backfill slope depth! PM	backfill slope depth! AM	Bedrock!
60+428		TOP!	Top!	60+494		5.90	6.05	+561=5.85
60+431		1.05	0.90	60+497		6.20	5.90	+564=5.85
60+434		1.30	1.25	60+500		6.15	6.60	
60+437		1.60	1.55	60+503		6.55	6.15	
60+440		1.90	2.00	60+506		6.90	6.65	
60+443		2.15	2.25	60+509		6.60	6.60	
60+446		2.40	2.45	60+512		7.10	6.80	
60+449		2.70	2.80	60+515	7.55	6.95	6.90	
60+452		3.00	2.95	60+518	7.45	7.30	7.50	
60+455		3.35	3.20	60+521	7.00	6.70	6.30	
60+458		3.65	3.60	60+524	7.35	6.50	6.65	
60+461		4.00	4.00	60+527	7.50	6.40	6.60	
60+464		4.15	4.15	60+530	7.20	6.50	6.65	
60+467		4.30	4.25	60+533	6.30	6.05	6.85	
60+470		4.75	4.50	60+536	6.35	6.10	6.15	
60+473		4.75	4.80	60+539	6.50	5.90	6.05	
60+476		4.95	5.12	60+542	6.65	6.35	6.30	
60+479		5.15	5.35	60+545	6.25	6.40	6.20	Prel
60+482		5.25	5.30	60+548	5.90	5.40	5.45	Total
60+485		5.60	5.50	60+551	5.70	5.50	5.45toe!	to Date
60+488		5.60	5.60	60+554	5.80	5.55	Clean!	
60+491		5.70	5.65	60+557	5.55	5.75	Clean!	Job total!

Contractors Verification: The above report is co6mplete and correct and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.**Submitted By:** _____FRANK DAVIS______DISTRIBUTION OF INQUIP ASSOC MC LEAN ,VIRGINIA____________________________

INQUIP Associates, Inc.	**Daily Construction Report** SOIL BENTONITE WALL	

PROJECT:#0808 MEDOWBANK GOLDPROJECT-EAST DIKE	GENERAL: F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/17/08 17 WED
Weather; pt/cloudy / WET- SNOW	Temperature (Degrees C): High: -3 Low:-1	Ground Conditions: WET	

MANPOWER		MATERIALS (Daily)			EQUIPMENT		
Name/Craft	Onsite	Descrip	Deli' total	Used total	Type	ON Rent!	Stdby
FRANK DAVIS/SUPP	16	bentonit	373tn	199tn	DIGESTOR MIXER	9/2	
LAMAR POWELL	16	3000lb	249bg	133bg	2980' HDPE PIPE	9/2	
			Us tns	Us tns	2 -60HP MISSION Pump	9/2	
		Excavation (Square Feet)					
		Today	Prior	Total			

SUMMARY OF DAYS WORK: ESCAVATION TODAY:60+564 TO 60 +609, PERFORMING QC,BACKFILL ONLY TODAY,NO SLURRY FROM POND USED TODAY . WORKING AGAINST THE GRADE ELEVATION. STARTED TO DEMOB SOME EQUIP. NO MIXING BENTONITE TODAY! ONE FULL POND- DOMINQUE

Verbal or Written Instructions Received From Engineer;

Delays, Including Cause, Location and Event;

SAFETY TOPIC: CLEANING WINDOW FOR SAFETY!

INQUIP Associates, Inc.	SOIL BENTONITE Daily Construction Report	

PROJECT: 0808 MEDOWBANK GOLD PROJECT-EAST DIKE	GENERAL:F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/17/08 17 WED

bentonite Slurry Test Results: (S)torage Tank, (D)ischarge and (T)rench at "X" feet bgs

	Time	Location	Marsh Funnel	DENSITY PCF.	Filter	DEPTH	Ph	SAND	BACKFILL SLUMP
01	7:30AM	60+524	65	1.08		2M	9	2%	
02	8:45AM	60+431		2.14					4.5%
03	12:30am	60+518	50	1.19			9	5%	
04	1:00PM	60+443		2.11					5"
05	4:45PM	60+561	51	1.15	14.8	1M	9	4.5%	
06	6:00PM	60 +485		2.12					4"
07									
08									
09									
10									

Excavation Data

	Bottom of rock!	Back fill slope depth! PM	Backfill slope!AM		Bottom of rock!	backfill slope depth! PM	backfill slope depth! AM	Bedrock!
60+491		0.70	0.65	60+557		4.35	4.55	
60+494		0.90	0.80	60+561		5.15	4.85	
60+497		1.35	1.45	60+564		5.40	5.45	
60+500		1.45	1.60	60+567	6.30	5.65	5.70	
60+503		1.75	1.80	60+570	6.50	5.75	6.00	
60+506		1.90	1.85	60+573	6.35	6.20	6.35	
60+509		2.30	2.20	60+576	7.20	6.40	6.35	
60+512		2.45	2.15	60+579	6.60	5.95	5.80	
60+515		2.45	2.35	60+582	6.10	5.75	5.70	
60+518		2.60	2.45	60+585	5.60	5.40	5.50	
60+521		2.85	2.70	60+588	6.10	5.70	5.75	
60+524		2.95	2.85	60+591	5.85	5.60	5.55	
60+527		3.05	3.05	60+594	5.85	5.65	5.50	
60+530		3.30	3.10	60+597	5.85	5.40	5.50toe!	
60+533		3.50	3.25	60+600	5.95			
60+536		3.45	3.25	60+603	6.10			
60+539		3.55	3.60	60+606	5.90			
60+542		3.70	3.75	60+609	5.85			Prel
60+545		3.90	3.50					Total
60+548		4.00	3.95					to Date
60+551		4.25	4.30					
60+554		4.35	4.45					Job total!

Contractors Verification: The above report is co6mplete and correct and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.**Submitted By:** _____FRANK DAVIS______DISTRIBUTION OF INQUIP ASSOC MC LEAN ,VIRGINIA____________________________

INQUIP Associates, Inc.	SOIL BENTONITE WALL → POUR KARINE ←	

PROJECT:#0808 MEDOWBANK GOLDPROJECT-EAST DIKE	GENERAL: F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/18/08 18 THUR
Weather; pt/cloudy / MILD	Temperature (Degrees C):		Ground Conditions: WET
	High: -5	Low:-4	

MANPOWER		MATERIALS (Daily)			EQUIPMENT		
Name/Craft	Onsite	Descrip	Deli' total	Used total	Type	ON Rent!	Stdby
FRANK DAVIS/SUPP	16	bentonit	373tn	199tn	DIGESTOR MIXER	9/2	
LAMAR POWELL	16	3000lb	249bg	133bg	2980' HDPE PIPE	9/2	
			Us tns	Us tns	2 -60HP MISSION Pump	9/2	
		Excavation (Square Feet)					
		Today	Prior	Total			

SUMMARY OF DAYS WORK: ESCAVATION TODAY:60+609 TO 60 +660, PERFORMING QC,
. WORKING AGAINST THE GRADE ELEVATION.
STARTED TO DEMOB SOME EQUIP. NO MIXING BENTONITE TODAY! ONE FULL POND- DOMINQUE

Verbal or Written Instructions Received From Engineer;

Delays, Including Cause, Location and Event;

SAFETY TOPIC: TRUCK TRAFFIC!

INQUIP Associates, Inc.

Daily Construction Report

PROJECT: 0808 MEDOWBANK GOLD PROJECT-EAST DIKE	GENERAL:F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/18/08 18 THUR

bentonite Slurry Test Results: (S)torage Tank, (D)ischarge and (T)rench at "X" feet bgs

	Time	Location	Marsh Funnel	DENSITY PCF.	Filter	DEPTH	Ph	SAND	BACKFILL SLUMP
01	7:30AM	60+561	47	1.09		2M	9	5%	
02	8:30AM	60+494		2.11					5"
03	1:00Pm	60+597	57	1.20	14.8	1M	9	9%	
04	1:00PM	60+506		2.14					5.75"
05	4:00PM	PIPE	43	1.05			9		
06	8:00PM	60 +621	53	1.19		2M	9	7%	
07									
08									
09									
10									

Excavation Data

	Bottom of rock!	Back fill slope depth! PM	Backfill slope!AM		Bottom of rock!	backfill slope depth! PM	backfill slope depth! AM	Bedrock!
60+542		TOP	TOP	60+609		4.05	3.95	
60+545		0.50	0.60	60+612	6.05	3.95	4.00	
60+548		0.65	0.75	60+615	6.00	4.10	4.05	
60+551		0.85	0.90	60+618	6.05	4.15	4.35	
60+554		1.10	1.05	60+621	6.25	4.35	4.45	
60+557		1.25	1.25	60+624	6.25	4.30	4.40	
60+561		1.50	1.65	60+627	6.05	4.45	4.35	
60+564		1.70	1.70	60+630	5.75	4.50	4.50	
60+567		1.95	1.90	60+633	5.90	4.50	4.60	
60+570		2.10	2.05	60+636	6.30	4.70	4.70	
60+573		2.50	2.15	60+639	6.15	4.90	4.85	
60+576		2.45	2.30	60+642	6.35	5.00	4.90	
60+579		2.40	2.40	60+645	6.50	4.95	4.85	
60+582		2.55	2.50	60+648	6.35	5.10	5.05	
60+585		2.85	2.80	60+651	5.75	5.20	5.10	
60+588		3.00	2.95	60+654	6.25	5.35	5.05	
60+591		3.20	3.15	60+657	6.10	5.60	4.95	
60+594		3.40	3.30	60+660	6.10	5.30TOE!	5.00TOE	Prel
60+597		3.60	3.55					Total
60+600		3.65	3.60					to Date
60+603		3.85	3.75					
60+606		3.75	3.85					Job total!

Contractors Verification: The above report is co6mplete and correct and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.**Submitted By:** _____FRANK DAVIS______DISTRIBUTION OF INQUIP ASSOC MC LEAN ,VIRGINIA___________________________

INQUIP Associates, Inc.	**Daily Construction Report** SOIL BENTONITE WALL	

PROJECT:#0808 MEDOWBANK GOLDPROJECT-EAST DIKE	GENERAL: F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/19/08 19 FRI
Weather; pt/cloudy / VERY COLD	Temperature (Degrees C): High: -1 Low:-7	Ground Conditions: WET	

MANPOWER		MATERIALS (Daily)			EQUIPMENT		
Name/Craft	Onsite	Descrip	Deli' total	Used total	Type	ON Rent!	Stdby
FRANK DAVIS/SUPP	16	bentonit	373tn	199tn	DIGESTOR MIXER	9/2	
LAMAR POWELL	16	3000lb	249bg	133bg	2980' HDPE PIPE	9/2	
			Us tns	Us tns	2 -60HP MISSION Pump	9/2	
		Excavation (Square Feet)					
		Today	Prior	Total			

SUMMARY OF DAYS WORK: ESCAVATION TODAY:60+660 TO 60 +687, PERFORMING QC, . WORKING AGAINST THE GRADE ELEVATION.ALSO PERFORMED 60+93 TO 60+61. MIXED WITH EXCAVATOR ON WORK PAD. HELD EXSITING BACKFILL BACK WITH ANOTHER EXCAVATOR. FINISHED 4PM. ICE CONDITONS HAVE EXISTED FOR 7 DAYS .HAVE REMOVE ICE THE BEST WE CAN IN POND,DITCH @ WORK PAD. Used concrete truck to haul slurry to trench 60+93.

Verbal or Written Instructions Received From Engineer;

Delays, Including Cause, Location and Event; COLD WHETHER!

SAFETY TOPIC: LIFEVEST USE AT TRENCH!

INQUIP Associates, Inc.	**SOIL BENTONITE Daily Construction Report**	

PROJECT: 0808 MEDOWBANK GOLD PROJECT-EAST DIKE	GENERAL:F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/19/08 19 FRI

bentonite Slurry Test Results: (S)torage Tank, (D)ischarge and (T)rench at "X" feet bgs

	Time	Location	Marsh Funnel	DENSITY PCF.	Filter	DEPTH	Ph	SAND	BACKFILL SLUMP
01	7:30AM	60+624	50	1.19		1M	9	7%	
02	10:30am	60+90 truck!	43	1.05		top	9		
03	3:45Pm	PIPE	44	1.05			9		
04	4:30Pm	60+651	48	1.16	15.5	1M	9	4%	
05	5:00PM	60+554		2.12					6" 1/2
06	7:15PM	60+566		2.11					4"
07									
08									
09									
10									

Excavation Data

	Bottom of rock!	Back fill slope depth! PM	Backfill slope!AM		Bottom of rock!	backfill slope depth! PM	backfill slope depth! AM	Bedrock! Depth!
60+576		0.55	0.45	60+642		3.85	3.85	
60+579		0.75	0.55	60+645		3.90	3.85	
60+582		0.90	0.80	60+648		4.00	3.95	
60+585		1.15	1.20	60+651		4.05	3.95	
60+588		1.40	1.30	60+654		4.10	4.20	
60+591		1.50	1.55	60+657		4.25	4.20	
60+594		1.90	1.80	60+660		4.60	4.60	
60+597		2.00	2.10	60+663	6.30	4.35	4.30	
60+600		2.15	2.25	60+666	6.80	4.50	4.50	
60+603		2.30	2.35	60+669	6.80	4.65	4.60	
60+606		2.45	2.40	60+672	6.60	5.20	4.95	
60+609		2.55	2.50	60+675	6.40	5.15	4.85	
60+612		2.75	2.60	60+678	6.35	5.15	4.90	
60+615		2.90	2.80	60+681	5.55	5.40	4.90	
60+618		3.10	3.05	60+684	5.65	5.10	4.75	
60+621		3.40	3.30	60+687	5.50	4.10toe!	4.45toe!	
60+624		3.30	3.25					
60+627		3.40	3.35					Prel
60+630		3.55	3.45					Total
60+633		3.55	3.60					to Date
60+636		3.75	3.75					
60+639		3.85	3.80					Job total!

Contractors Verification: The above report is co6mplete and correct and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.**Submitted By:** _____FRANK DAVIS______DISTRIBUTION OF INQUIP ASSOC MC LEAN ,VIRGINIA________________________________

INQUIP Associates, Inc.

Daily Construction Report
SOIL BENTONITE WALL

Karine or Jeffrey

PROJECT:#0808 MEDOWBANK GOLDPROJECT-EAST DIKE	GENERAL: F.GILBERT/AGNICO EAGLE MINES	Date: 9/20/08 Report No: 20 SAT
Weather; pt/cloudy / VERY COLD	Temperature (Degrees C): High: -3 Low:-5	Ground Conditions: WET

MANPOWER		MATERIALS (Daily)			EQUIPMENT		
Name/Craft	Onsite	Descrip	Deli' total	Used total	Type	ON Rent!	Stdby
FRANK DAVIS/SUPP	16	bentonit	373tn	199tn	DIGESTOR MIXER	9/2	
LAMAR POWELL	16	3000lb	249bg	133bg	2980' HDPE PIPE	9/2	
			Us tns	Us tns	2 -60HP MISSION Pump	9/2	

Excavation (Square Feet)		
Today	Prior	Total

SUMMARY OF DAYS WORK: ESCAVATION TODAY:60+687 TO 60 +744, PERFORMING QC,HAULING TILL ON BOTH ENDS TO KEEP UP WITH SUPPLY . MIXING AT LEAST 30%MORE MATERIAL BECAUSE OF THE QUALITY OF MATERIAL WE HAVE.RELOACATED BEAM AT 60+690 TO SLOW THE SPEED OF THE BACKFILL SO WE CAN CLOSE THE DITCH WITH MINIUM SLURRY LEFT AT THE END OF TRENCH. WE ARE ON DAY 8 OF COLD TEMPS , REMOVING ICE FROM DITCH , PONDS AND BACKFILL MIXING AREA THE BEST WE CAN.

Verbal or Written Instructions Received From Engineer;

Delays, Including Cause, Location and Event; COLD WHETHER! STARTS @STOPS +2HR. A DAY!

SAFETY TOPIC: USING SAFETY HARNESS TO REMOVE SUCTION FROM POND!

INQUIP Associates, Inc.	SOIL BENTONITE Daily Construction Report	

PROJECT: 0808 MEDOWBANK GOLD PROJECT-EAST DIKE	GENERAL:F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/20/08 20 SAT

bentonite Slurry Test Results: (S)torage Tank, (D)ischarge and (T)rench at "X" feet bgs

	Time	Location	Marsh Funnel	DENSITY PCF.	Filter	DEPTH	Ph	SAND	BACKFILL SLUMP
01	7:30AM	PIPE	43	1.05			9		
02	8:00Am	60+621	54	1.19		2M	9	4%	
03	8:30Am	60+567		2.14					5"
04	2:00Pm	60+657	49	1.20	16.3		9	5%	
05	2:30PM	PIPE	42	1.04			9		
06	3:00PM	60+591		2.15					4.5"
07	6:00PM	60+708	45	1.08			9	4%	
08									
09									
10									

Excavation Data

	Bottom of rock!	Back fill slope depth! PM	Backfill slope!AM		Bottom of rock!	backfill slope depth! PM	backfill slope depth! AM	Bedrock! Depth!
60+633		Top!	Top!	60+699	6.10	4.35	4.35	
60+636		.60	.40	60+702	6.15	4.30	4.40	
60+639		.60	.60	60+705	6.05	4.70	4.50	
60+642		.80	.75	60+708	6.20	4.55	4.50	
60+645		.95	.95	60+711	6.15	4.65	4.60	
60+648		1.00	1.00	60+714	5.65	4.85	4.60	
60+651		1.15	1.20	60+717	5.60	4.80	4.70	
60+654		1.15	1.20	60+720	5.85	4.85	4.70	
60+657		1.25	1.35	60+723	5.80	4.95	4.80	
60+660		1.35	1.40	60+726	5.65	4.85	4.80	
60+663		1.55	1.50	60+729	5.90	5.20	5.00	
60+666		1.75	1.70	60+732	5.75	5.65	5.45	
60+669		1.90	1.90	60+735	6.05	5.45	5.40	
60+672		2.20	2.15	60+738	6.05	5.90	5.80	
60+675		2.30	2.30	60+741	6.10	5.70toe!	5.45toe!	
60+678		2.35	2.35	60+744	5.75	5.20	4.85	Clean!
60+681		2.50	2.40					
60+684		2.55	2.55					Prel
60+687		2.75	2.75					Total
60+690Beam	6.30	3.35 beam 6:30pm	2.95					to Date
60+693	5.95	4.15	4.05					
60+696	6.10	4.35	4.35					Job total!

Contractors Verification: The above report is co6mplete and correct and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.**Submitted By:** _____FRANK DAVIS______DISTRIBUTION OF INQUIP ASSOC MC LEAN ,VIRGINIA_______________________________

INQUIP Associates, Inc.	**Daily Construction Report** SOIL BENTONITE WALL		
PROJECT:#0808 MEDOWBANK GOLDPROJECT-EAST DIKE	GENERAL: F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/21/08 21 SUN
Weather; SUNNY	Temperature (Degrees C):		Ground Conditions: AM/ICE
	High: 5	Low:-1	

MANPOWER		MATERIALS (Daily)			EQUIPMENT		
Name/Craft	Onsite	Descrip	Deli' total	Used total	Type	ON Rent!	Stdby
FRANK DAVIS/SUPP	16	bentonit	373tn	199tn	DIGESTOR MIXER	9/2	
LAMAR POWELL	16	3000lb	249bg	133bg	2980' HDPE PIPE	9/2	
			Us tns	Us tns	2 -60HP MISSION Pump	9/2	
		Excavation (Square Feet)					
		Today	Prior	Total			

SUMMARY OF DAYS WORK: ESCAVATION TODAY:60+744 TO 60 +816, PERFORMING QC,HAULING TILL ON BOTH ENDS TO KEEP UP WITH SUPPLY . MIXING AT LEAST 30%MORE MATERIAL BECAUSE OF THE QUALITY OF MATERIAL WE HAVE.RELOACATED BEAM AT 60+756 TO SLOW THE SPEED OF THE BACKFILL SO WE CAN CLOSE THE DITCH WITH LESS SLURRY LEFT AT THE END OF TRENCH. WE ARE ON DAY 9 OF COLD TEMPS , REMOVING ICE FROM DITCH , PONDS AND BACKFILL MIXING AREA THE BEST WE CAN. PUMPED REST OF SLURRY TO TRENCH!

Verbal or Written Instructions Received From Engineer;

Delays, Including Cause, Location and Event; COLD WHETHER! STARTS @STOPS +2HR. A DAY!

SAFETY TOPIC: ICE = SLIPS, TRIPS @ FALLS

INQUIP Associates, Inc.

SOIL BENTONITE Daily Construction Report

PROJECT: 0808 MEDOWBANK GOLD PROJECT-EAST DIKE	GENERAL:F.GILBERT/AGNICO EAGLE MINES	Date:	9/21/08
		Report No:	21 SUN

bentonite Slurry Test Results: (S)torage Tank, (D)ischarge and (T)rench at "X" feet bgs

	Time	Location	Marsh Funnel	DENSITY PCF.	Filter	DEPTH	Ph	SAND	BACKFILL SLUMP
01	8:00AM	60+693	46	1.13		1M	9	4%	
02	8:15Am	PIPE	46	1.04			9		
03	8:30Am	60+633		2.12					5"
04	1:00Pm	60+729	48	1.15	15.8		9	4.5%	
05	1:30PM	60+666		2.10					4.75"
06	3:00PM	60+777	53	1.16		2M	9	5%	
07									
08									
09									
10									

Excavation Data

	Bottom of rock!	Back fill slope depth! PM	Backfill slope!AM		Bottom of rock!	backfill slope depth! PM	backfill slope depth! AM	Bedrock! Depth!
60+708		TOP	TOP	60+774	5.85	3.20	3.25	
60+711		.90	.45	60+777	5.35	3.15	3.30	
60+714		.95	.80	60+780	5.50	3.45	3.50	
60+717		1.05	.80	60+783	5.40	3.65	3.60	
60+720		1.10	1.00	60+786	5.35	3.65	3.80	
60+723		1.15	1.20	60+789	5.25	3.80	3.90	
60+726		1.30	1.35	60+792	5.15	3.80	3.90	
60+729		1.50	1.55	60+795	5.30	4.05	4.00	
60+732		1.60	1.65	60+798	5.65	4.00	4.10	
60+735		1.80	1.80	60+801	5.60	4.35	4.30	
60+738		1.85	2.00	60+804	5.54	4.40	4.35	
60+741		2.00	2.05	60+807	5.45	4.60	4.35	
60+744	5.90	2.10	2.15	60+810	5.05	4.75	4.50	
60+747	6.05	2.15	2.25	60+813	4.80	4.65	4.55	
60+750	6.05	2.10	2.35	60+816	4.95	4.65toe!	4.45toe!	
60+753	5.75	2.25	2.35					Clean!
60+756	5.80	2.30	2.45					
60+759	5.55	2.75	2.80					Prel
60+762	5.60	2.65	2.75					Total
60+765	5.85	2.75	2.90					to Date
60+768	5.90	2.90	3.00					
60+771	5.95	2.95	3.15					Job total!

Contractors Verification: The above report is co6mplete and correct and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.**Submitted By:** _____FRANK DAVIS______DISTRIBUTION OF INQUIP ASSOC MC LEAN ,VIRGINIA________________________________

INQUIP Associates, Inc.	**Daily Construction Report** SOIL BENTONITE WALL Pour o Karine	

PROJECT:#0808 MEDOWBANK GOLDPROJECT-EAST DIKE	GENERAL: F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/22/08 22 MON
Weather; SUNNY	Temperature (Degrees C):	Ground Conditions: AM/ICE	
	High: 5 Low:-1		

MANPOWER		MATERIALS (Daily)			EQUIPMENT		
Name/Craft	Onsite	Descrip	Deli' total	Used total	Type	ON Rent!	Stdby
FRANK DAVIS/SUPP	16	bentonit	373tn	199tn	DIGESTOR MIXER	9/2	
LAMAR POWELL	16	3000lb	249bg	133bg	2980' HDPE PIPE	9/2	
			Us tns	Us tns	2 -60HP MISSION Pump	9/2	
		Excavation (Square Feet)					
		Today	Prior	Total			

SUMMARY OF DAYS WORK: ESCAVATION TODAY:60+816 TO 60 +861, PERFORMING QC,HAULING TILL ON BOTH ENDS TO KEEP UP WITH SUPPLY . MIXING AT LEAST 30%MORE MATERIAL .DEMBO EQUIP TO TOP OF THE HILL. BACKFILLED OUT 6:30 PM.

Verbal or Written Instructions Received From Engineer;

Delays, Including Cause, Location and Event; COLD WHETHER! STARTS @STOPS +2HR. A DAY!

SAFETY TOPIC: EYE CONTACT WITH OPERATOR!

INQUIP Associates, Inc.	SOIL BENTONITE Daily Construction Report	

PROJECT: 0808 MEDOWBANK GOLD PROJECT-EAST DIKE	GENERAL:F.GILBERT/AGNICO EAGLE MINES	Date: Report No:	9/22/08 22 MON

bentonite Slurry Test Results: (S)torage Tank, (D)ischarge and (T)rench at "X" feet bgs

	Time	Location	Marsh Funnel	DENSITY PCF.	Filter	DEPTH	Ph	SAND	BACKFILL SLUMP
01	7:40AM	60+798	65	1.22		2M	9	5%	
02	9:30Am	60+729		2.11					6.5"WILL AJUST!
03	10:30Am	60+744		2.14					4.5" AJUSTED!
04	12:30Pm	60+792	50	1.21	16		9	6%	
05	12:45PM	60+757		2.12					5"
06	4:00PM	60+816		2.11					4"
07	5:00PM	60+840		2.14					5.5"
08									
09									
10									

Excavation Data

	Bottom of rock!	Back fill slope depth! PM	Backfill slope!AM		Bottom of rock!	backfill slope depth! PM	backfill slope depth! AM	Bedrock! Depth!
60+816	5.00							
60+819	5.15							
60+822	4.95							
60+825	4.85							
60+828	3.95							
60+831	4.20							
60+834	3.70							
60+837	3.60							
60+840	3.40							
60+843	3.25							
60+846	3.05							
60+849	2.20							
60+852	2.45							
60+855	2.40							
60+858	1.70							
60+861	1.30							Clean!
60+864	1.15							
60+867	1.15 end!							Prel
								Total
								to Date
								Job total!

Contractors Verification: The above report is co6mplete and correct and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.**Submitted By:** _____FRANK DAVIS______DISTRIBUTION OF INQUIP ASSOC MC LEAN ,VIRGINIA___________________________

APPENDIX C

QC and QA Construction Checklists for Foundation Preparation and Excavation

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60 + 090 Offset

SHIFT: NIGHT : ☐ DAY : ☒

DATE : Aug 15 2008

SHEET 1 OF 1

To Sta. 60+1143 Offset

LOCATION: : East Dike

EQUIPMENT: –

DESCRIPTION Foundation preparation of inner downstream slope before placement of coarse filter material

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	GB	KD
2.	Storage areas planned for disposal of removed materials	GB	KD
3.	Occurrence of snow and ice removal method in place	GB	KD
4.	Occurrence of boulders and removal method in place	GB	KD
5.	Occurrence of hummocks and scalping method in place	GB	KD
6.	Occurrence of surface and ground water and its impact mitigation in place	GB	KD
7.	Presence of other unsuitable materials and removal method in place	GB	KD
8.	Soil frozen or thawed and measures taken	GB	KD
9.	Blasting requirement to remove unsuitable material and safety measure checked	GB	KD
10.	Adjustment made to suit design in field	GB	KD
11.	Final walkover inspection before re-sloping or fill placement	GB	KD
12.	"As-excavated" survey conducted	GB	KD
13.	Final sounding conducted of lake bottom surface	GB	KD

REMARKS :

DEVIATIONS : (Attach list if necessary)

DATE OF RECTIFICATION :

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: CABOT MARC	NAME: Karine Drouet	NAME: G. BLANCHETTE
SIGNATURE: [signature]	SIGNATURE :	SIGNATURE : [signature]
DATE 16/VIII/08	DATE 15/08/08	DATE AUGUST 16, 2008

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+113 Offset	SHIFT: NIGHT :☐ DAY :☒	DATE: Aug 16 2008	SHEET 1 OF
To Sta. 60+150 Offset	LOCATION:: East Dike		
EQUIPMENT:			

DESCRIPTION Foundation preparation before placement of coarse filter material

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	GB	KD
2.	Storage areas planned for disposal of removed materials	GB	KD
3.	Occurrence of snow and ice removal method in place	GB	KD
4.	Occurrence of boulders and removal method in place	GB	KD
5.	Occurrence of hummocks and scalping method in place	GB	KD
6.	Occurrence of surface and ground water and its impact mitigation in place	GB	KD
7.	Presence of other unsuitable materials and removal method in place	GB	KD
8.	Soil frozen or thawed and measures taken	GB	KD
9.	Blasting requirement to remove unsuitable material and safety measure checked	GB	KD
10.	Adjustment made to suit design in field	GB	KD
11.	Final walkover inspection before re-sloping or fill placement	GB	KD
12.	"As-excavated" survey conducted * see remarks	GB	KD
13.	Final sounding conducted of lake bottom surface	GB	KD

REMARKS: It has been accepted by the client that Golder will perform a Bathymetry before the placement of coarse filter. AEM also accepted that if they backfill before Golder looked at bathymetry data, they may have to go back in certain area ~~to~~ that doesn't respect the dike design.

DEVIATIONS : (Attach list if necessary)

DATE OF RECTIFICATION :

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: C.Boutin MTC	NAME: Karine Doucet	NAME: G. BLANCHETTE
SIGNATURE: [signature]	SIGNATURE: [signature]	SIGNATURE: [signature]
DATE 16/VIII/08	DATE 17/08/08	DATE AUGUST 16, 2008

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+160	SHIFT: NIGHT :☐ DAY :☒	DATE : Aug 17 2008	SHEET 1 OF 1
To Sta. 60+477.5	LOCATION: : East Dike		
EQUIPMENT:			
DESCRIPTION Foundation preparation before placement of course Filter material			

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	B.P.	KD
2.	Storage areas planned for disposal of removed materials	B.P.	KD
3.	Occurrence of snow and ice removal method in place	B.P.	KD
4.	Occurrence of boulders and removal method in place	B.P.	KD
5.	Occurrence of hummocks and scalping method in place	B.P.	KD
6.	Occurrence of surface and ground water and its impact mitigation in place	B.P.	KD
7.	Presence of other unsuitable materials and removal method in place	B.P.	KD
8.	Soil frozen or thawed and measures taken	B.P.	KD
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.P.	KD
10.	Adjustment made to suit design in field	B.P.	KD
11.	Final walkover inspection before re-sloping or fill placement	B.P.	KD
12.	"As-excavated" survey conducted	B.P.	KD
13.	Final sounding conducted of lake bottom surface	B.P.	KD

REMARKS : This considered that no bathymetry or accurate survey is being perform between the final clean-up of trench bottom and inner downstream slope due to slope stability issues. If the bathymetry performed after and before course filter placement will

~~DEVIATIONS : (Attach list if necessary)~~ have not being looked at, it is understood that the contractor or owner will have to go back to fix some areas that are not respecting design

No bathymetry between 60+260 to 60+320 because ~~DATE OF RECTIFICATION~~ : shallow water and [illegible]

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Manzer	NAME: Karine Doucet	NAME: G. BLANCHETTE
SIGNATURE : [signature]	SIGNATURE : Karine Doucet	SIGNATURE : [signature]
DATE Aug. 21/2008	DATE Aug 17 2008	DATE AUGUST 19, 2008

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+471.5 Offset	SHIFT: NIGHT : ☐ DAY : ☒	DATE: Aug 18 2008	SHEET 1 OF 1
To Sta. 60+610 Offset	LOCATION: : East Dike		
EQUIPMENT:			

DESCRIPTION Final preparation before placement of coarse filter material

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	B.P.	KD
2.	Storage areas planned for disposal of removed materials	B.P.	KD
3.	Occurrence of snow and ice removal method in place	B.P.	KD
4.	Occurrence of boulders and removal method in place	B.P.	KD
5.	Occurrence of hummocks and scalping method in place	B.P.	KD
6.	Occurrence of surface and ground water and its impact mitigation in place	B.P.	KD
7.	Presence of other unsuitable materials and removal method in place	B.P.	KD
8.	Soil frozen or thawed and measures taken	B.P.	KD
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.P.	KD
10.	Adjustment made to suit design in field	B.P.	KD
11.	Final walkover inspection before re-sloping or fill placement	B.P.	KD
12.	"As-excavated" survey conducted	B.P.	KD
13.	Final sounding conducted of lake bottom surface	B.P.	KD

REMARKS: This agreement considered that no bathymetry or accurate survey was being perform between the final clean-up of trench bottom and mine-downstream slope due to slope stability issues. The bathymetry performed before and after coarse filter placement will not have being looked at

DEVIATIONS : (Attach list if necessary) It is understood that the contractor or owner will have to go back to fix some areas that are not respecting design

DATE OF RECTIFICATION :

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Manzer	NAME: Karine Dancet	NAME: G. BLANCHETTE
SIGNATURE : [signature]	SIGNATURE : [signature]	SIGNATURE : [signature]
DATE Aug. 21 2008	DATE Aug 19 2008	DATE AUGUST 19, 2008

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+620 Offset	SHIFT: NIGHT :☐ DAY :☒	DATE: Aug 18 2008	SHEET 1 OF 1
To Sta. 60+640 Offset	LOCATION: : East Dike		
EQUIPMENT:			

DESCRIPTION Fnd preparation prior coarse filter placement

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings * see note	B.P.	see below.
2.	Storage areas planned for disposal of removed materials	B.P.	KD
3.	Occurrence of snow and ice removal method in place	B.P.	KD
4.	Occurrence of boulders and removal method in place	B.P.	KD
5.	Occurrence of hummocks and scalping method in place	B.P.	KD
6.	Occurrence of surface and ground water and its impact mitigation in place	B.P.	KD
7.	Presence of other unsuitable materials and removal method in place	B.P.	KD
8.	Soil frozen or thawed and measures taken	B.P.	KD
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.P.	KD
10.	Adjustment made to suit design in field	B.P.	KD
11.	Final walkover inspection before re-sloping or fill placement	B.P.	KD
12.	"As-excavated" survey conducted	B.P.	see below
13.	Final sounding conducted of lake bottom surface	B.P.	see below

REMARKS: No bathymetry survey performed before placement of coarse filter, therefore, no QA was performed on fnd preparation for this section

DEVIATIONS : (Attach list if necessary)

DATE OF RECTIFICATION :

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: [illegible]	NAME: Karine, Doucet	NAME: Y. Jalbert
SIGNATURE: [signature]	SIGNATURE: [signature]	SIGNATURE: [signature]
DATE [illegible]	DATE Aug 18 2008	DATE 24/08/08

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION			
From Sta. 60+640 Offset	SHIFT: NIGHT :☐ DAY :☑	DATE: Aug 24 2007	SHEET 1 OF 1
To Sta. 60+825 Offset EQUIPMENT:	LOCATION: : East Dike		
DESCRIPTION Fnd preparation prior Course filter placement			

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	B.P.	KD
2.	Storage areas planned for disposal of removed materials	B.P.	KD
3.	Occurrence of snow and ice removal method in place	B.P.	KD
4.	Occurrence of boulders and removal method in place	B.P.	KD
5.	Occurrence of hummocks and scalping method in place	B.P.	KD
6.	Occurrence of surface and ground water and its impact mitigation in place	B.P.	KD
7.	Presence of other unsuitable materials and removal method in place	B.P.	KD
8.	Soil frozen or thawed and measures taken	B.P.	KD
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.P.	KD
10.	Adjustment made to suit design in field	B.P.	KD
11.	Final walkover inspection before re-sloping or fill placement	B.P.	KD
12.	"As-excavated" survey conducted	B.P.	KD
13.	Final sounding conducted of lake bottom surface	B.P.	KD

REMARKS: Trench bottom need to be cleaned from center line to downstream between Sta. 60+640 to 60+642 and to be cleaned from centerline to upstream ~~between~~ around Sta. 653. Remove boulder @ 60+667. Check @ 743.6 (u/s to q) clean slide @ 719 (d/s to q) clean slide

DEVIATIONS : (Attach list if necessary)
Golder was present when area mentioned above were cleaned and approve that d/s slope is acceptable for course filter placement

DATE OF RECTIFICATION: Aug 24 2008

SURVEY VERIFICATION	ACCEPTED BY QA Manager:	ACCEPTED BY OWNER:
NAME: Karl Manzer	NAME: Karine Drouet	NAME: Y. Jolbert
SIGNATURE: [signature]	SIGNATURE: [signature]	SIGNATURE: [signature]
DATE Aug. 25/2008	DATE Aug 24 2008	DATE 24/08/08

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+640 Offset	SHIFT: NIGHT :☐ DAY :☒	DATE: Aug 24 2007	SHEET 1 OF 1
To Sta. 60+825 Offset	LOCATION: : East Dike		
EQUIPMENT:			

DESCRIPTION Final preparation prior course filter placement.

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	B.P.	KD
2.	Storage areas planned for disposal of removed materials	B.P.	KD
3.	Occurrence of snow and ice removal method in place	B.P.	KD
4.	Occurrence of boulders and removal method in place	B.P.	KD
5.	Occurrence of hummocks and scalping method in place	B.P.	KD
6.	Occurrence of surface and ground water and its impact mitigation in place	B.P.	KD
7.	Presence of other unsuitable materials and removal method in place	B.P.	KD
8.	Soil frozen or thawed and measures taken	B.P.	KD
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.P.	KD
10.	Adjustment made to suit design in field	B.P.	KD
11.	Final walkover inspection before re-sloping or fill placement	B.P.	KD
12.	"As-excavated" survey conducted	B.P.	KD
13.	Final sounding conducted of lake bottom surface	B.P.	KD

REMARKS: Trench bottom need to be cleaned from center line to downstream between Sta. 60+640 to 60+642 and to be cleaned from centerline to upstream ~~between~~ around Sta. 653. Remove boulder @ 60+667. Check @ 743.6 (u/s to ¢) clean slide @ 719 (u/s to ¢) clean slide

DEVIATIONS: (Attach list if necessary)
Golder was present when area mentioned above were cleaned and approve that d/s slope is acceptable for course filter placement

DATE OF RECTIFICATION: Aug 24 2008

SURVEY VERIFICATION	ACCEPTED BY QA Manager:	ACCEPTED BY OWNER:
NAME: Karl Manzer	NAME: Karine Druet	NAME: Y. Jalbert
SIGNATURE: [signature]	SIGNATURE: Karine Druet	SIGNATURE: [signature]
DATE Aug. 25/2008	DATE Aug 24 2008	DATE 24/08/08

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+820 Offset	SHIFT: NIGHT :☐ DAY :☒	DATE: SEPT 1/08	SHEET 1 OF 1
To Sta. 60+840 Offset	LOCATION: : EAST DIKE		
EQUIPMENT: /			
DESCRIPTION FOUNDATION PRIOR TO COARSE FILTER PLACEMENT (D/S SIDE)			

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	B.P.	[signature]
2.	Storage areas planned for disposal of removed materials	B.P.	[signature]
3.	Occurrence of snow and ice removal method in place	B.P.	[signature]
4.	Occurrence of boulders and removal method in place	B.P.	[signature]
5.	Occurrence of hummocks and scalping method in place	B.P.	[signature]
6.	Occurrence of surface and ground water and its impact mitigation in place	B.P.	[signature]
7.	Presence of other unsuitable materials and removal method in place	B.P.	[signature]
8.	Soil frozen or thawed and measures taken	B.P.	[signature]
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.P.	[signature]
10.	Adjustment made to suit design in field	B.P.	[signature]
11.	Final walkover inspection before re-sloping or fill placement	B.P.	[signature]
12.	"As-excavated" survey conducted	B.P.	[signature]
13.	Final sounding conducted of lake bottom surface	B.P.	[signature]

REMARKS: 60+820 TO BE 1.0m THICK AND TIE INTO NORTH ABUTMENT ~~AT~~ STA 60+840 SURVEY REQUESTED BY GOLDER FOR END OF C/F PLACEMENT AND LIMITS OF C/F.

DEVIATIONS : (Attach list if necessary)

/

DATE OF RECTIFICATION :

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME:	NAME: JEFFREY KWOK	NAME: G. BLANCHETTE
SIGNATURE :	SIGNATURE : [signature]	SIGNATURE : [signature]
DATE	DATE Sept 3/08	DATE SEPT 05, 2008

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+040 Offset	SHIFT: NIGHT :☐ DAY :☒	DATE : Aug 16 2008	SHEET 1 OF 1
To Sta. 60+115 Offset	LOCATION: : East Dike		
EQUIPMENT:			

DESCRIPTION Foundation Preparation and Excavation before core Backfill Material

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	GB	KD
2.	Storage areas planned for disposal of removed materials	GB	KD
3.	Occurrence of snow and ice removal method in place	GB	KD
4.	Occurrence of boulders and removal method in place	GB	KD
5.	Occurrence of hummocks and scalping method in place	GB	KD
6.	Occurrence of surface and ground water and its impact mitigation in place	GB	KD
7.	Presence of other unsuitable materials and removal method in place	GB	KD
8.	Soil frozen or thawed and measures taken	GB	KD
9.	Blasting requirement to remove unsuitable material and safety measure checked	GB	KD
10.	Adjustment made to suit design in field	GB	KD
11.	Final walkover inspection before re-sloping or fill placement	GB	KD
12.	"As-excavated" survey conducted	GB	KD
13.	Final sounding conducted of lake bottom surface	GB	KD

REMARKS : No sonar survey was performed by Golder for this section. It has been confirmed by Golder and AEM. that core backfill can be place in this section without sonar survey. A detail clean up of the bedrock surface at bottom of trench will be done by excavator prior fill placement

DEVIATIONS : (Attach list if necessary)

DATE OF RECTIFICATION :

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: C. Bot...	NAME: Karine Doucet	NAME: G. BLANCHETTE
SIGNATURE : CBabot	SIGNATURE : Karine Doucet	SIGNATURE : G. Blanchette
DATE 17/VIII/08	DATE Aug 17 2008	DATE AUGUST 18, 2008

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+115 Offset	SHIFT: NIGHT :☐ DAY :☑	DATE : Aug 17 2008	SHEET 1 OF 1
To Sta. 60+145 Offset	LOCATION: : East Dike		
EQUIPMENT:			

DESCRIPTION Foundation preparation and excavation before core backfill material placement

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	B.P.	KD
2.	Storage areas planned for disposal of removed materials	B.P.	KD
3.	Occurrence of snow and ice removal method in place	B.P.	KD
4.	Occurrence of boulders and removal method in place	B.P.	KD
5.	Occurrence of hummocks and scalping method in place	B.P.	KD
6.	Occurrence of surface and ground water and its impact mitigation in place	B.P.	KD
7.	Presence of other unsuitable materials and removal method in place	B.P.	KD
8.	Soil frozen or thawed and measures taken	B.P.	KD
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.P.	KD
10.	Adjustment made to suit design in field	B.P.	KD
11.	Final walkover inspection before re-sloping or fill placement	B.P.	KD
12.	"As-excavated" survey conducted	B.P.	KD
13.	Final sounding conducted of lake bottom surface	B.P.	KD

REMARKS : No sonar survey was performed by Golder for this section. It has been agreed by Golder and AEM that core backfill can be place in this section without sonar survey. A detail clean up of the bedrock surface at bottom of trench will be done prior core backfill placement.

DEVIATIONS : (Attach list if necessary)

DATE OF RECTIFICATION :

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Manzer	NAME: Karine Pouet	NAME: G. BLANCHETTE
SIGNATURE : [signature]	SIGNATURE : [signature]	SIGNATURE : [signature]
DATE Aug 24/2008	DATE Aug 17 2008	DATE AUGUST 17, 2008

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION			
From Sta. 60+195 Offset –	SHIFT: NIGHT :☐ DAY :☒	DATE : Aug 18 2008	SHEET 1 OF 1
To Sta. 60+260 Offset –	LOCATION: : East Dike		
EQUIPMENT:			
DESCRIPTION Fnd preparation before placement of core Backfill material			

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	B.P.	KD
2.	Storage areas planned for disposal of removed materials	B.P.	KD
3.	Occurrence of snow and ice removal method in place	B.P.	KD
4.	Occurrence of boulders and removal method in place	B.P.	KD
5.	Occurrence of hummocks and scalping method in place	B.P.	KD
6.	Occurrence of surface and ground water and its impact mitigation in place	B.P.	KD
7.	Presence of other unsuitable materials and removal method in place	B.P.	KD
8.	Soil frozen or thawed and measures taken	B.P.	KD
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.P.	KD
10.	Adjustment made to suit design in field	B.P.	KD
11.	Final walkover inspection before re-sloping or fill placement	B.P.	KD
12.	"As-excavated" survey conducted	B.P.	KD
13.	Final sounding conducted of lake bottom surface	B.P.	KD

REMARKS : No sonar survey was performed by Golder for this section, neither the bathymetry data where looked at. It was agreed by Golder and AEM that core backfill can be place in this section without sonar survey. A detail clean-up at the bedrock surface at bottom of trench will be done prior core backfill placement

DEVIATIONS : (Attach list if necessary)

DATE OF RECTIFICATION :

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Manzer	NAME: Karine Doucet	NAME: G. BLANCHETTE
SIGNATURE : [signature]	SIGNATURE : [signature]	SIGNATURE : [signature]
DATE Aug 21 /08	DATE Aug 19 2008	DATE August 19, 2008

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+260 Offset	SHIFT: NIGHT :☐ DAY :☒	DATE : Aug 21 2008	SHEET 1 OF 1
To Sta. 60+318 Offset	LOCATION: : East Dike		
EQUIPMENT:			

DESCRIPTION Foundation preparation before placement of core backfill and coarse filter simultaneously

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	~~A~~ B.P.	KD
2.	Storage areas planned for disposal of removed materials	B.P.	KD
3.	Occurrence of snow and ice removal method in place	B.P.	KD
4.	Occurrence of boulders and removal method in place	B.P.	KD
5.	Occurrence of hummocks and scalping method in place	B.P.	KD
6.	Occurrence of surface and ground water and its impact mitigation in place	B.P.	KD
7.	Presence of other unsuitable materials and removal method in place	B.P.	KD
8.	Soil frozen or thawed and measures taken	B.P.	KD
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.P.	KD
10.	Adjustment made to suit design in field	B.P.	KD
11.	Final walkover inspection before re-sloping or fill placement	B.P.	KD
12.	"As-excavated" survey conducted	B.P.	KD
13.	Final sounding conducted of lake bottom surface	B.P.	KD

REMARKS : Golder was not to perform bathymetry survey due to shallow water on island shore.

DEVIATIONS : (Attach list if necessary)

DATE OF RECTIFICATION :

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME:	NAME: Karine Doucet	NAME: Y. Jalbert
SIGNATURE :	SIGNATURE : Karine Doucet	SIGNATURE : [signature]
DATE	DATE Aug 21 2008	DATE 22/8/08

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+ Offset 318	SHIFT: NIGHT :☐ DAY :☒	DATE: Aug 21 2008	SHEET 1 OF 1
To Sta. 60+375 Offset	LOCATION: : East Dike		
EQUIPMENT:			

DESCRIPTION Foundation preparation before placement of core backfill and coarse filter simultaneously

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	B.P.	KD
2.	Storage areas planned for disposal of removed materials	B.P.	KD
3.	Occurrence of snow and ice removal method in place	B.P.	KD
4.	Occurrence of boulders and removal method in place	B.P.	KD
5.	Occurrence of hummocks and scalping method in place	B.P.	KD
6.	Occurrence of surface and ground water and its impact mitigation in place	B.P.	KD
7.	Presence of other unsuitable materials and removal method in place	B.P.	KD
8.	Soil frozen or thawed and measures taken	B.P.	KD
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.P.	KD
10.	Adjustment made to suit design in field	B.P.	KD
11.	Final walkover inspection before re-sloping or fill placement	B.P.	KD
12.	"As-excavated" survey conducted	B.P.	KD
13.	Final sounding conducted of lake bottom surface	B.P.	KD

REMARKS: Sta. 350 to Sta. 358. Golder or AEM should be watching excavator cleaning bottom of trench to ensure that bottom of trench was clean
Bathymetry was done between 350 to 360 after cleaning

DEVIATIONS : (Attach list if necessary) Golder and AEM present when final clean-up with excavator and approve area for Backfill

DATE OF RECTIFICATION : Aug 22 2008

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Manzer	NAME: Karine Dessert	NAME: Y. Jalbert
SIGNATURE : Karl Manzer	SIGNATURE : Karine Dessert	SIGNATURE : [signature]
DATE Aug. 23/08.	DATE Aug 21 2008	DATE 22/08/08

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION			
From Sta. 60+375 Offset	SHIFT: NIGHT :☐ DAY :☒	DATE : Aug 22 2008	SHEET 1 OF 1
To Sta. 60+~~[illegible]~~ Offset 410	LOCATION: : East Dike		
EQUIPMENT:			
DESCRIPTION Final preparation before core backfill placement			

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	Yi	KD
2.	Storage areas planned for disposal of removed materials	Yi	KD
3.	Occurrence of snow and ice removal method in place	Yi	KD
4.	Occurrence of boulders and removal method in place	Yi	KD
5.	Occurrence of hummocks and scalping method in place	Yi	KD
6.	Occurrence of surface and ground water and its impact mitigation in place	Yi	KD
7.	Presence of other unsuitable materials and removal method in place	Yi	KD
8.	Soil frozen or thawed and measures taken	Yi	KD
9.	Blasting requirement to remove unsuitable material and safety measure checked	Yi	KD
10.	Adjustment made to suit design in field	Yi	KD
11.	Final walkover inspection before re-sloping or fill placement	Yi	KD
12.	"As-excavated" survey conducted	Yi	KD
13.	Final sounding conducted of lake bottom surface	Yi	KD

REMARKS :

DEVIATIONS : (Attach list if necessary)

DATE OF RECTIFICATION :

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Manzer	NAME: Karine Davet	NAME: Y. Jalbert
SIGNATURE : Karl Manzer	SIGNATURE : Karine Davet	SIGNATURE : [illegible]
DATE Aug. ~~2~~23, 2008.	DATE Aug 22 2008	DATE 23/08/08

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+410 Offset	SHIFT: NIGHT : ☐ DAY : ☒	DATE : Aug 23 2008	SHEET 1 OF 1
To Sta. 60+420 Offset	LOCATION: : East Dike		
EQUIPMENT:			
DESCRIPTION Fnd preparation before core and coarse backfill			

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	yj	KD
2.	Storage areas planned for disposal of removed materials	yj	KD
3.	Occurrence of snow and ice removal method in place	yj	KD
4.	Occurrence of boulders and removal method in place	yj	KD
5.	Occurrence of hummocks and scalping method in place	yj	KD
6.	Occurrence of surface and ground water and its impact mitigation in place	yj	KD
7.	Presence of other unsuitable materials and removal method in place	yj	KD
8.	Soil frozen or thawed and measures taken	yj	KD
9.	Blasting requirement to remove unsuitable material and safety measure checked	yj	KD
10.	Adjustment made to suit design in field	yj	KD
11.	Final walkover inspection before re-sloping or fill placement	yj	KD
12.	"As-excavated" survey conducted	yj	KD
13.	Final sounding conducted of lake bottom surface	yj	KD

REMARKS : Bathymetry ~~[illegible]~~ will be performed before placement of core and coarse backfill since some rocks were removed ~~[illegible]~~ around 413 and 420. On the night of Aug 22 2008.

DEVIATIONS : (Attach list if necessary)

DATE OF RECTIFICATION :

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Manzer	NAME: Karine Daust	NAME: Y. Jolbert
SIGNATURE : [signature]	SIGNATURE : [signature]	SIGNATURE : [signature]
DATE Aug. 23/08	DATE Aug 23 2008	DATE 23/08/08

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+420 Offset	SHIFT: NIGHT : ☐ DAY : ☒	DATE : Aug 23 2008	SHEET 1 OF 1
To Sta. 60+440 Offset EQUIPMENT:	LOCATION: : East Dike		

DESCRIPTION Fnd preparation prior Core and Coarse backfill

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	B.P.	KD
2.	Storage areas planned for disposal of removed materials	B.P.	KD
3.	Occurrence of snow and ice removal method in place	B.P.	KD
4.	Occurrence of boulders and removal method in place	B.P.	KD
5.	Occurrence of hummocks and scalping method in place	B.P.	KD
6.	Occurrence of surface and ground water and its impact mitigation in place	B.P.	KD
7.	Presence of other unsuitable materials and removal method in place	B.P.	KD
8.	Soil frozen or thawed and measures taken	B.P.	KD
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.P.	KD
10.	Adjustment made to suit design in field	B.P.	KD
11.	Final walkover inspection before re-sloping or fill placement	B.P.	KD
12.	"As-excavated" survey conducted	B.P.	KD
13.	Final sounding conducted of lake bottom surface	B.P.	KD

REMARKS : Golder and AEM need to be present to see excavator cleaning ~~spot~~ bottom from 425 to 431, @ ~~from~~ 60+437, ~~from Sta. 447 to 455~~, ~~[illegible]~~

DEVIATIONS : (Attach list if necessary) Golder and AEM were present when cleaning occured and approved that cleaning was perform to the best of excavator performance

DATE OF RECTIFICATION : Aug 23 2008

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Manzer	NAME: Karine Durpot	NAME: Y. Jalbert
SIGNATURE : [signature]	SIGNATURE : [signature]	SIGNATURE : [signature]
DATE Aug 25 / 2008.	DATE Aug 24 2008	DATE 24/08/08

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+440 Offset	SHIFT: NIGHT :☐ DAY :☒	DATE : Aug 24 2008	SHEET 1 OF 1
To Sta. 60+477 Offset	LOCATION: : East Dike		
EQUIPMENT:			

DESCRIPTION Foundation preparation before placement of core backfill and coarse filter simultaneously

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	B.P.	KD
2.	Storage areas planned for disposal of removed materials	B.P.	KD
3.	Occurrence of snow and ice removal method in place	B.P.	KD
4.	Occurrence of boulders and removal method in place	B.P.	KD
5.	Occurrence of hummocks and scalping method in place	B.P.	KD
6.	Occurrence of surface and ground water and its impact mitigation in place	B.P.	KD
7.	Presence of other unsuitable materials and removal method in place	B.P.	KD
8.	Soil frozen or thawed and measures taken	B.P.	KD
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.P.	KD
10.	Adjustment made to suit design in field	B.P.	KD
11.	Final walkover inspection before re-sloping or fill placement	B.P.	KD
12.	"As-excavated" survey conducted	B.P.	KD
13.	Final sounding conducted of lake bottom surface	B.P.	KD

REMARKS : Sta. 447 to 451, clean from ℄ . u/s
Sta. 447 to 453, clean from u/s edge to d/s edge
Sta. ~~4~~55 ; clean push from ℄ to toe.

DEVIATIONS : (Attach list if necessary)
Golder and SNC (AEM) were present when excavator clean specified area, and approve that area were cleaned

DATE OF RECTIFICATION : Aug 23 2008

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Manzer	NAME: Karine Doucet	NAME: Y. Jalbert
SIGNATURE : [signature]	SIGNATURE : [signature]	SIGNATURE : [signature]
DATE Aug. 24 / 2008	DATE Aug 24 2008	DATE 24/08/08

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION			
From Sta. 60+477 Offset	SHIFT: NIGHT :☐ DAY :☒	DATE : Aug 24 08	SHEET 1 OF 1
To Sta. 60+ ~~Offset~~ 498	LOCATION: : East Dike		
EQUIPMENT:			
DESCRIPTION Foundation preparation before placement of core backfill and coarse filter simultaneously			

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	Y B.P.	KD
2.	Storage areas planned for disposal of removed materials	B.P.	KD
3.	Occurrence of snow and ice removal method in place	B.P.	KD
4.	Occurrence of boulders and removal method in place	B.P.	KD
5.	Occurrence of hummocks and scalping method in place	B.P.	KD
6.	Occurrence of surface and ground water and its impact mitigation in place	B.P.	KD
7.	Presence of other unsuitable materials and removal method in place	B.P.	KD
8.	Soil frozen or thawed and measures taken	B.P.	KD
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.P.	KD
10.	Adjustment made to suit design in field	B.P.	KD
11.	Final walkover inspection before re-sloping or fill placement	B.P.	KD
12.	"As-excavated" survey conducted	B.P.	KD
13.	Final sounding conducted of lake bottom surface	B.P.	KD

REMARKS :

DEVIATIONS : (Attach list if necessary)

DATE OF RECTIFICATION :

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Manzer	NAME: Karine Doucet	NAME: Y. Jalbert
SIGNATURE : [signature]	SIGNATURE : [signature]	SIGNATURE : [signature]
DATE Aug. 25 / 2008.	DATE Aug 24 2008	DATE 25/08/08

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+825 Offset

SHIFT: NIGHT : ☐ DAY : ☒

DATE : Aug 25 2008

SHEET 1 OF 1

To Sta. 60+~~7~~ ~~Offset~~ 763

LOCATION: : East Dike

EQUIPMENT:

DESCRIPTION Fnd preparation prior core and coarse backfill placement

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	B.P.	✓
2.	Storage areas planned for disposal of removed materials	B.P.	✓
3.	Occurrence of snow and ice removal method in place	B.P.	✓
4.	Occurrence of boulders and removal method in place	B.P.	✓
5.	Occurrence of hummocks and scalping method in place	B.P.	✓
6.	Occurrence of surface and ground water and its impact mitigation in place	B.P.	✓ Karine Daoust
7.	Presence of other unsuitable materials and removal method in place	B.P.	✓
8.	Soil frozen or thawed and measures taken	B.P.	✓
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.P.	✓
10.	Adjustment made to suit design in field	B.P.	✓
11.	Final walkover inspection before re-sloping or fill placement	B.P.	✓
12.	"As-excavated" survey conducted	B.P.	✓
13.	Final sounding conducted of lake bottom surface	B.P.	✓

REMARKS : Golder has to be present when cleaning @ Sta. 788. and approve placement behind going south.

DEVIATIONS : (Attach list if necessary)
Golder was present and observed that 2 boulders of ~0,5m ϕ were removed in this area (~Sta 788.)

DATE OF RECTIFICATION : Aug 25 2008

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Munzer	NAME: Karine Daoust	NAME: Y. Jolbert
SIGNATURE : Karl Munzer	SIGNATURE : Karine Daoust	SIGNATURE : [signature]
DATE Aug 26, 2008.	DATE Aug 25 2008	DATE 25/08/08

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+740 Offset	SHIFT: NIGHT :☐ DAY :☑	DATE : Aug 26 2008	SHEET 1 OF 1
To Sta. 60+763 Offset	LOCATION: : East Dike		
EQUIPMENT: —			
DESCRIPTION Fnd preparation prior CORE and coarse backfill placement			

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	B.P.	KD
2.	Storage areas planned for disposal of removed materials	B.P.	KD
3.	Occurrence of snow and ice removal method in place	B.P.	KD
4.	Occurrence of boulders and removal method in place	B.P.	KD
5.	Occurrence of hummocks and scalping method in place	B.P.	KD
6.	Occurrence of surface and ground water and its impact mitigation in place	B.P.	KD
7.	Presence of other unsuitable materials and removal method in place	B.P.	KD
8.	Soil frozen or thawed and measures taken	B.P.	KD
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.P.	KD
10.	Adjustment made to suit design in field	B.P.	KD
11.	Final walkover inspection before re-sloping or fill placement	B.P.	KD
12.	"As-excavated" survey conducted	B.P.	KD
13.	Final sounding conducted of lake bottom surface	B.P.	KD

REMARKS :

DEVIATIONS : (Attach list if necessary)

DATE OF RECTIFICATION :

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Manzer	NAME: Karine Dubet	NAME: Y. Gilbert
SIGNATURE : [signature]	SIGNATURE : [signature]	SIGNATURE : [signature]
DATE Aug 27/08	DATE Aug 26 2008	DATE 27/08/08

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+675 Offset	SHIFT: NIGHT : ☒ DAY : [redacted] DAY SHIFT	DATE : AUG 27/08	SHEET / OF
To Sta. 60+740 Offset	LOCATION: : EAST DIKE		
EQUIPMENT: —			

DESCRIPTION FOUNDATION PREP PRIOR TO CORE BACKFILL PLACEMENT + CF PLACEMENT

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	B.P.	JK
2.	Storage areas planned for disposal of removed materials	B.P.	JK
3.	Occurrence of snow and ice removal method in place	B.P.	JK
4.	Occurrence of boulders and removal method in place	B.P.	JK
5.	Occurrence of hummocks and scalping method in place	B.P.	JK
6.	Occurrence of surface and ground water and its impact mitigation in place	B.P.	JK
7.	Presence of other unsuitable materials and removal method in place	B.P.	JK
8.	Soil frozen or thawed and measures taken	B.P.	JK
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.P.	JK
10.	Adjustment made to suit design in field	B.P.	JK
11.	Final walkover inspection before re-sloping or fill placement	B.P.	JK
12.	"As-excavated" survey conducted	B.P.	JK
13.	Final sounding conducted of lake bottom surface	B.P.	JK

REMARKS : BASED ON BATHYMETRY + X.SECTION SURVEY, GOLDER RECOMMEND CLEANING AT 60+695, 664 TO 668, 706-710 (CL. BOTH), 725 (C/L WEST), 727-729, 732 OF ROCKFILL OR BOULDER (POSSIBLE)
AEM NOW BACKFILLING FROM NORTH 24 Hours/DAY

DEVIATIONS : (Attach list if necessary) CLEANING AT ABOVE LOCATIONS COMPLETED EXCEPT 60+664-668 AS SURVEY LINES MISSING. POST CLEANING BATHY. SURVEY

DATE OF RECTIFICATION : AUG 26/08

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Manzer	NAME: JEFFREY KWOK	NAME: G. BLANCHETTE
SIGNATURE : [signature]	SIGNATURE : [signature]	SIGNATURE : [signature]
DATE Aug. 30/08	DATE AUG 27/08	DATE SEPT 05, 2008

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+498 Offset	SHIFT: NIGHT : ☐ DAY : ☒	DATE: AUG 28/08	SHEET 1 OF 1
To Sta. 60+504 Offset	LOCATION: : EAST DIKE		
EQUIPMENT: —			
DESCRIPTION FOUNDATION PREPARATION PRIOR TO CORE BACKFILL AND 6" MINUS PLACEMENT			

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	O.C.	JK
2.	Storage areas planned for disposal of removed materials	O.C.	JK
3.	Occurrence of snow and ice removal method in place	O.C.	JK
4.	Occurrence of boulders and removal method in place	O.C.	JK
5.	Occurrence of hummocks and scalping method in place	O.C.	JK
6.	Occurrence of surface and ground water and its impact mitigation in place	O.C.	JK
7.	Presence of other unsuitable materials and removal method in place	O.C.	JK
8.	Soil frozen or thawed and measures taken	O.C.	JK
9.	Blasting requirement to remove unsuitable material and safety measure checked	O.C.	JK
10.	Adjustment made to suit design in field	O.C.	JK
11.	Final walkover inspection before re-sloping or fill placement	O.C.	JK
12.	"As-excavated" survey conducted	O.C.	JK
13.	Final sounding conducted of lake bottom surface	O.C.	JK

REMARKS: POST FILTER SURVEY + OBSERVATION OF UPSTREAM SLOPE SHOWS MATERIAL MOVEMENT. CLEANING AND CORRECTION COMPLETED FOLLOWED BY SURVEY OF CORRECTION IN 1.0m SPACING OF CROSS SECTION FOLLOWED BY IMMEDIATE BACKFILL, ONCE APPROVED BY GOLDER.

DEVIATIONS : (Attach list if necessary) CLEANING

DATE OF RECTIFICATION :

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Manzer	NAME: JEFFREY KWOK	NAME: G. BLANCHETTE
SIGNATURE : [signature]	SIGNATURE : [signature]	SIGNATURE : [signature]
DATE Aug. 30/08	DATE AUGUST 29/08	DATE SEPT 05, 2008

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+640 Offset ~~FROM WEST...~~	SHIFT: NIGHT : ☐ DAY : ☒	DATE : AUG 28/08	SHEET 1 OF 1
To Sta. 60+675 Offset ~~[illegible]~~	LOCATION: : EAST DIKE		
EQUIPMENT:			

DESCRIPTION: FOUNDATION PREPARATION PRIOR TO CORE BACKFILL PLACEMENT + 6" minus PLACEMENT

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	GR	JK
2.	Storage areas planned for disposal of removed materials	GR	JK
3.	Occurrence of snow and ice removal method in place	GR	JK
4.	Occurrence of boulders and removal method in place	GR	JK
5.	Occurrence of hummocks and scalping method in place	GR	JK
6.	Occurrence of surface and ground water and its impact mitigation in place	GR	JK
7.	Presence of other unsuitable materials and removal method in place	GR	JK
8.	Soil frozen or thawed and measures taken	GR	JK
9.	Blasting requirement to remove unsuitable material and safety measure checked	GR	JK
10.	Adjustment made to suit design in field	GR	JK
11.	Final walkover inspection before re-sloping or fill placement	GR	JK
12.	"As-excavated" survey conducted	GR	JK
13.	Final sounding conducted of lake bottom surface	GR	JK

REMARKS : BATHYMETRY POST FILTER + POST CORRECTION REQUIRED AT 60+664 TO 60+668

~~[illegible]~~

DEVIATIONS : (Attach list if necessary) CLEANING WAS DONE, TILL + ROCK FILL REMOVED
POST CORRECTION BATHYMETRY SURVEY CONDUCTED

DATE OF RECTIFICATION : AUG 27/08

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Munzer	NAME: JEFFREY KNOX	NAME: G. BLANCHETTE
SIGNATURE : [signature]	SIGNATURE : [signature]	SIGNATURE : [signature]
DATE Aug. 30/08	DATE AUGUST 29/ 2008	DATE SEPT 05, 2008

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION			
From Sta. 60+504 Offset	SHIFT: NIGHT : ☐ DAY : ☒	DATE : AUGUST 29/08	SHEET OF 1
To Sta. 60+540 Offset	LOCATION: :		
EQUIPMENT:			
DESCRIPTION FOUNDATION PREPARATION PRIOR TO COREBACKFILL + 6" MINUS PLACEMENT			

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	B.P.	[signature]
2.	Storage areas planned for disposal of removed materials	B.P.	[signature]
3.	Occurrence of snow and ice removal method in place	B.P.	[signature]
4.	Occurrence of boulders and removal method in place	B.P.	[signature]
5.	Occurrence of hummocks and scalping method in place	B.P.	[signature]
6.	Occurrence of surface and ground water and its impact mitigation in place	B.P.	[signature]
7.	Presence of other unsuitable materials and removal method in place	B.P.	[signature]
8.	Soil frozen or thawed and measures taken	B.P.	[signature]
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.P.	[signature]
10.	Adjustment made to suit design in field	B.P.	[signature]
11.	Final walkover inspection before re-sloping or fill placement	B.P.	[signature]
12.	"As-excavated" survey conducted	B.P.	[signature]
13.	Final sounding conducted of lake bottom surface	B.P.	[signature]

REMARKS: BASED ON BATH. SURVEY, CLEANING OF FOUNDATION OF TRENCH WITH EXCAVATOR AT 60+530 IN PRESENCE OF GOLDER + SNC. SIGNS OF MATERIAL MOVEMENT FROM SIDE SLOPES FROM 60+504 TO 60+525. CLEANING FOLLOWED BY SURVEY OF CORRECTION AT 1.0 m CROSS-SECTION SPACING SURVEY TO BE DONE.

DEVIATIONS : (Attach list if necessary)
GOLDER PERFORM BATH. SURVEY OF CROSS-SECTION AREA OF EXCAVATION BOTTOM AND APPROVAL FOR FILL PLACEMENT. GOLDER + SNC OBSERVED CLEANING AT 60+530

DATE OF RECTIFICATION : AUG 29/08

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Manzer	NAME: JEFFREY KINCK	NAME: G. BLANCHETTE
SIGNATURE : [signature]	SIGNATURE : [signature]	SIGNATURE : [signature]
DATE Aug. 30/08	DATE Aug 30/2008	DATE SEPT 05, 2008

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+557 Offset	SHIFT: NIGHT :☐ DAY :☒	DATE : 29/ AUGUST /08	SHEET 1 OF 1
To Sta. 60+640 Offset	LOCATION: :		
EQUIPMENT:			
DESCRIPTION FOUNDATION PREPARATION PRIOR TO COREBACKFILL +6" MINS PLACEMENT			

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	B.P.	
2.	Storage areas planned for disposal of removed materials	B.P.	
3.	Occurrence of snow and ice removal method in place	B.P.	
4.	Occurrence of boulders and removal method in place	B.P.	
5.	Occurrence of hummocks and scalping method in place	B.P.	
6.	Occurrence of surface and ground water and its impact mitigation in place	B.P.	
7.	Presence of other unsuitable materials and removal method in place	B.P.	
8.	Soil frozen or thawed and measures taken	B.P.	
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.P.	
10.	Adjustment made to suit design in field	B.P.	
11.	Final walkover inspection before re-sloping or fill placement	B.P.	
12.	"As-excavated" survey conducted	B.P.	
13.	Final sounding conducted of lake bottom surface	B.P.	

REMARKS : BASED ON BATHYMETRY SURVEY CLEANING OF ~~BEDROCK~~ BOTTOM SURFACE AT 60+~~[illegible]~~ 580, ~~[illegible]~~ AND 60+550 IN PRESENCE OF GOLDER AND SNC TO BE OBSERVED

DEVIATIONS : (Attach list if necessary)
GOLDER+SNC PRESENT TO OBSERVE REMOVAL OF TILL (gr., SA, SILT) FROM TRENCH WIDTH AT 60+550, AT 60+580 BEDROCK SLOPING FROM NORTH TO SOUTH ABOUT 0.3m HEIGHT OVER 1.0m LENGTH. POST CORRECTION SURVEY CONDUCTED AT 60+548 TO 60+553.

DATE OF RECTIFICATION : AUG 29/08

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Manzer	NAME: JEFFREY KWOK	NAME: G. BLANCHETTE
SIGNATURE :	SIGNATURE :	SIGNATURE : G Blanchette
DATE Aug. 30/08	DATE Aug 30/08	DATE SEPT 05, 2008

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+540 Offset	SHIFT: NIGHT :☐ DAY :☑	DATE: AUG 30/08	SHEET 1 OF 1
To Sta. 60+557 Offset	LOCATION: : EAST DIKE		
EQUIPMENT:			

DESCRIPTION FOUNDATION PREPARATION PRIOR TO CORE BACKFILL + COARSE BACKFILL

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	GS	JK
2.	Storage areas planned for disposal of removed materials	GS	JK
3.	Occurrence of snow and ice removal method in place	GS	JK
4.	Occurrence of boulders and removal method in place	GS	JK
5.	Occurrence of hummocks and scalping method in place	GS	JK
6.	Occurrence of surface and ground water and its impact mitigation in place	GS	JK
7.	Presence of other unsuitable materials and removal method in place	GS	JK
8.	Soil frozen or thawed and measures taken	GS	JK
9.	Blasting requirement to remove unsuitable material and safety measure checked	GS	JK
10.	Adjustment made to suit design in field	GS	JK
11.	Final walkover inspection before re-sloping or fill placement	GS	JK
12.	"As-excavated" survey conducted	GS	JK
13.	Final sounding conducted of lake bottom surface	GS	JK

REMARKS: CLEANING OF TRENCH BOTTOM FOUNDATION AT ~60+550 TO BE OBSERVED BY GOLDER + SNC.

DEVIATIONS: (Attach list if necessary) GOLDER + SNC OBSERVED SEDIMENT & TILL REMOVED AT BASE OF TRENCH EXCAVATION AT ~ 60+548 TO 60+552. BATHYMETRY SURVEY POST CORRECTION WAS DONE FOR THIS INTERVAL.

DATE OF RECTIFICATION: AUG 29/08

SURVEY VERIFICATION	ACCEPTED BY QA Manager:	ACCEPTED BY OWNER:
NAME: Karl Manzer	NAME: J. KWOK	NAME: G. BLANCHETTE
SIGNATURE: [signature]	SIGNATURE: [signature]	SIGNATURE: [signature]
DATE Aug 30/08	DATE Aug 30/08	DATE SEPT 05, 2008

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+820 Offset	SHIFT: NIGHT :☐ DAY :☒	DATE : SEPT 1/2008	SHEET OF
To Sta. 60+880 Offset	LOCATION: :		
EQUIPMENT: ———			

DESCRIPTION FOUNDATION PREPARATION PRIOR TO CORE BACKFILL +150mm MINUS PLACEMENT

NO.	ITEMS TO BE INSPECTED	INSPECTED BY QC Manager	INSPECTED BY QA Manager
1.	Survey lines and layout checked to ensure the locations conform with the drawings	B.P.	
2.	Storage areas planned for disposal of removed materials	B.P.	
3.	Occurrence of snow and ice removal method in place	B.P.	
4.	Occurrence of boulders and removal method in place	B.P.	
5.	Occurrence of hummocks and scalping method in place	B.P.	
6.	Occurrence of surface and ground water and its impact mitigation in place	B.P.	
7.	Presence of other unsuitable materials and removal method in place	B.P.	
8.	Soil frozen or thawed and measures taken	B.P.	
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.P.	
10.	Adjustment made to suit design in field	B.P.	
11.	Final walkover inspection before re-sloping or fill placement	B.P.	
12.	"As-excavated" survey conducted	B.P.	
13.	Final sounding conducted of lake bottom surface	B.P.	

ALONG REVISED ALIGNMENT

REMARKS: PRE FILTER SURVEY CONDUCTED. NO POST FILTER BATHYMETRY CONDUCTED AS BACKFILLING COMMENCED THE SAME DAY. FOUNDATION PREPARATION WAS OBSERVED BY GOLDER AND FGL CONTRACTOR FOREMAN. ABOUT 0.3m AND 0.7m OF TILL EXCAVATED FROM BASE OF TRENCH FROM 60+820 TO 60+845

DEVIATIONS : (Attach list if necessary) INFERRED BEDROCK ENCOUNTERED AT 2.1m BELOW WATER LEVEL AT ABOUT STA.60+825.

DATE OF RECTIFICATION :

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME:	NAME: JEFFREY KWOK	NAME: G. BLANCHETTE
SIGNATURE :	SIGNATURE :	SIGNATURE : G Blanchette
DATE	DATE SEPT 3/08	DATE SEPT 05, 2008

APPENDIX D

As-Built Drawings, East Dike - Meadowbank Gold Project

AGNICO-EAGLE MINES LIMITED
MEADOWBANK DIVISION
MEADOWBANK GOLD PROJECT
EAST DIKE

LOCATION PLAN

DRAWING INDEX			
DWG NO.	DRAWING TITLE	REVISION	REVISION TITLE
2100-00	EAST DIKE LOCATION MAP AND DRAWING INDEX	1	AS-BUILT
2100-01	EAST DIKE SITE PLAN	1	AS-BUILT
2100-02	EAST DIKE BOREHOLE LOCATION PLAN	1	AS-BUILT
2100-03	EAST DIKE ROCKFILL SETOUT PLAN	2	AS-BUILT
2100-04	EAST DIKE ROCKFILL LAYOUT PLAN (1 OF 3)	1	AS-BUILT
2100-05	EAST DIKE ROCKFILL LAYOUT PLAN (2 OF 3)	1	AS-BUILT
2100-06	EAST DIKE ROCKFILL LAYOUT PLAN (3 OF 3)	1	AS-BUILT
2100-10	EAST DIKE TYPICAL SECTIONS AND DETAILS	1	AS-BUILT
2100-11	EAST DIKE CROSS SECTIONS	1	AS-BUILT
2100-12	EAST DIKE CENTRELINE REALIGNMENT	0	AS-BUILT
2100-14	EAST DIKE CENTRELINE PROFILE	1	AS-BUILT
2100-15	EAST DIKE ABUTMENT DETAIL	1	AS-BUILT
2100-16	EAST DIKE INSTRUMENTATION PLAN	1	AS-BUILT
2100-17	EAST DIKE INSTRUMENTATION TYPICAL SECTION AND GROUTING PLAN	1	AS-BUILT
2100-24	EAST DIKE GROUTING DETAILS	0	AS-BUILT
2100-25	EAST DIKE DENSIFICATION PLAN PHASE 1 AND PHASE 2	0	AS-BUILT
2100-26	EAST DIKE DENSIFICATION PLAN PHASE 3	0	AS-BUILT
2100-27	EAST DIKE DENSIFICATION PLAN PHASE 4	0	AS-BUILT
2100-28	EAST DIKE SOUTH CHANNEL INSTRUMENTATION DETAILS	0	AS-BUILT
2100-29	EAST DIKE NORTH CHANNEL INSTRUMENTATION DETAILS	0	AS-BUILT
2100-30	EAST DIKE NORTH SHALLOW INSTRUMENTATION DETAILS	0	AS-BUILT

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER
P 049
GOLDER ASSOCIATES LTD.

LIST OF SPECIFICATIONS		
SPECIFICATION NO.	TITLE	REVISION
S1	ADMINISTRATION	0
S2	FOUNDATION PREPARATION	0
S3	SB CUTOFF WALL	0
S4	DRILLING AND GROUTING	0
S5	INSTRUMENTATION	0
S6	QC AND QA REQUIREMENTS	0
S7	CARE OF WATER	0
S8	FILL PLACEMENT	0
S9	TURBIDITY BARRIER	0

NOTES:
1) DRAWING NUMBERS NOT USED: 2100-07, 2100-08, 2100-09 and 2100-13
2) EAST DIKE SEEPAGE COLLECTION SYSTEM DRAWING NUMBERS 2100-18 TO 2100-21 NOT INCLUDED.
3) WEST CHANNEL DIKE DRAWING NUMBERS 2100-22 AND 2100-23 NOT INCLUDED.

DRAWING NO.	REFERENCES

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	30OCT09	JEK	AS-BUILT	MSH		
0	01AUG08	BW	ISSUED FOR CONSTRUCTION	EA	BW	TLE

STAMP

ORIGINAL SIGNED AND SEALED

PROJECT
AEM
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE
LOCATION MAP AND DRAWING INDEX

Golder Associates

PROJECT No.	07-1413-0074/2800	
DESIGN	BW	04JUL08
CADD	MJH	04JUL08
CHECK	BW	25JUL08
REVIEW	TLE	25JUL08

FILE No. 0814280028-4200-ASBUILT-00
SCALE AS SHOWN REV. 1

2100-00

LEGEND:

LAND-BASED TOPOGRAPHIC MAJOR CONTOURS INTERVAL 10m

LAND-BASED TOPOGRAPHIC MINOR CONTOURS INTERVAL 2m

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (MASL) UNLESS OTHERWISE NOTED.
3) GRID REFERENCE: NAD 83, UTM ZONE 14.
4) CONTOUR INFORMATION ON LAND SUPPLIED BY AGNICO-EAGLE MINES LIMITED (AEM), MEADOWBANK DIVISION.
5) LAKE CONTOURS ARE BASED ON SURVEY LAKE SURFACE ELEVATIONS: SECOND PORTAGE LAKE = 133.1m, THIRD PORTAGE LAKE =134.1m.
6) TAILING STORAGE FACILITY AND BAY-GOOSE DESIGN ARE IN PROGRESS, REFER TO THE MOST RECENT DESIGN DRAWINGS LISTED ON DWG. No. 4100-00 AND 4200-00, RESPECTIVELY FOR DRAWING DETAILS.

REFERENCE:

1) PIT DESIGN BY AEM, JUNE 17, 2008.

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER P 049
GOLDER ASSOCIATES LTD.

REDUCED SIZE NOT TO SCALE

ORIGINAL SIGNED AND SEALED

PROJECT: AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE: **EAST DIKE SITE PLAN**

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	30OCT09	JEK	AS-BUILT	SWD		
0	01AUG08	BW	ISSUED FOR CONSTRUCTION	EA	BW	TLE

DRAWING NO.	REFERENCES

PROJECT No.	07-1413-0074/2800	
DESIGN	BW	04JUL08
CADD	MJH	04JUL08
CHECK	BW	25JUL08
REVIEW	TLE	25JUL08

FILE No. 0814280028-4200-ASBUILT-01
SCALE AS SHOWN REV. 1

2100-01

Golder Associates

CADD FILE: N:\Bur-Graphics\Projects\2007\1413\07-1413-0074\Drafting\2800-As-Built Apr2009\0814280028-4200-ASBUILT-01.dwg
REVISION DATE: 09/11/27 02:00PM By: jkoenicki

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (MASL) UNLESS OTHERWISE NOTED.
3) GRID REFERENCE: NAD 83, UTM ZONE 14.
4) CONTOUR INFORMATION ON LAND SUPPLIED BY AGNICO-EAGLE MINES LIMTED (AEM), MEADOWBANK DIVISION.
5) LAKEBED SURFACE INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
6) LAKE CONTOURS ARE BASED ON SURVEY LAKE SURFACE ELEVATIONS: SECOND PORTAGE LAKE = 133.1m.
7) SURVEY OF 2008 BOREHOLES BY AEM.

LEGEND:

03GT-GI-7	BOREHOLE WITH THERMISTOR INSTALLATION
03GT-GI-6 2.5	BOREHOLE WITH SOIL THICKNESS
	SHORELINE
	DIKE / PIT FOOTPRINT
120	LAND-BASED TOPOGRAPHIC MAJOR CONTOURS INTERVAL 10m
	LAND-BASED TOPOGRAPHIC MINOR CONTOURS INTERVAL 2m
120	BATHYMETRIC MAJOR CONTOURS INTERVAL 10m
	BATHYMETRIC MINOR CONTOURS INTERVAL 2m
	DETAILED BATHYMETRIC CONTOUR AT MAJOR INTERVAL 2m.
	DETAILED BATHYMETRIC CONTOUR AT MINOR INTERVAL 0.5m

REFERENCE:

1) PIT DESIGN BY AEM, JUNE 17, 2008.

BOREHOLE COORDINATES TABLE

POINT ID	EASTING	NORTHING
08-MB-GD-01	639390.0	7214457.6
08-MB-GD-02	639389.8	7214357.8
08-MB-GD-03	639388.9	7214207.7
08-MB-GD-04	639391.2	7214157.7
08-MB-GD-05	639392.3	7214107.7
08-MB-GD-06	639389.9	7214057.2
08-MB-GD-07	639385.3	7214007.8
08-MB-GD-08	639376.6	7213883.3
08-MB-GD-10	639364.4	7213809.3
08-MB-GD-11	639354.0	7213760.3
08-MB-GD-13	639387.6	7214407.8
08-MB-GD-14	639388.3	7214308.1
08-MB-GD-15	639388.3	7214257.2
08-MB-GD-16	639383.4	7214008.3
08-MB-GD-17	639378.7	7213958.9
08-MB-GD-18	639389.8	7214196.8
08-MB-GD-19	639390.9	7214146.5
08-MB-GD-20	639389.5	7214096.5
08-MB-GD-21	639385.9	7214043.8
08-MB-GD-22	639373.3	7213873.8

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER
P 049
GOLDER ASSOCIATES LTD.

REDUCED SIZE NOT TO SCALE

PROJECT: AEM AGNICO-EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT

TITLE

EAST DIKE BOREHOLE LOCATION PLAN

STAMP

ORIGINAL SIGNED AND SEALED

DRAWING NO.	REFERENCES
2100-14	CENTRELINE PROFILE

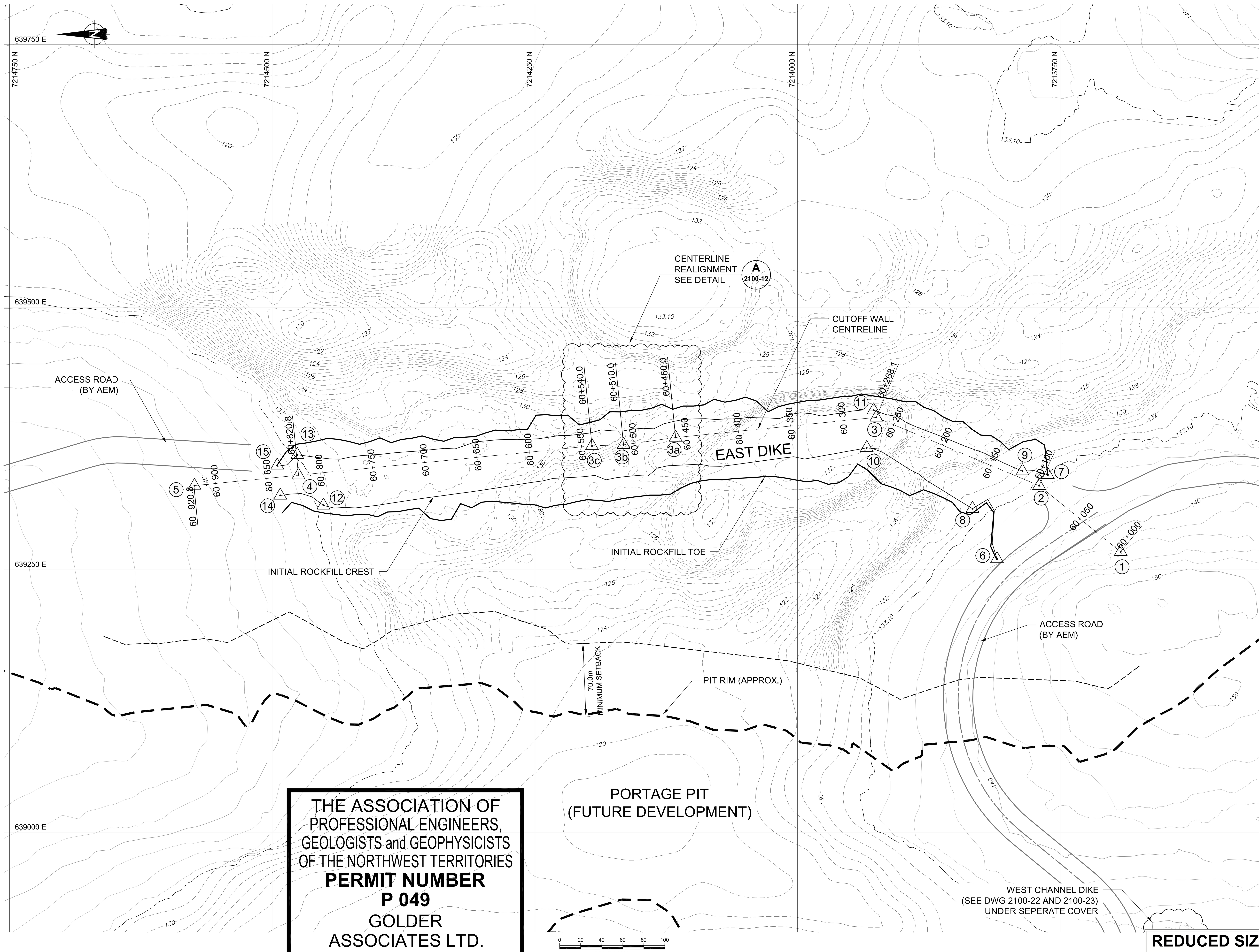
REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	30OCT09	JEK	AS-BUILT	SWD		
0	01AUG08	BW	ISSUED FOR CONSTRUCTION	EA	BW	TLE

Golder Associates

PROJECT No.	07-1413-0074/2800	
DESIGN	BW	04JUL08
CADD	MJH	04JUL08
CHECK	BW	25JUL08
REVIEW	TLE	25JUL08

FILE No. 0814280028-4200-ASBUILT-02
SCALE AS SHOWN REV. 1

2100-02



THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES

PERMIT NUMBER
P 049
GOLDER ASSOCIATES LTD.

LEGEND:

- LAND-BASED TOPOGRAPHIC MAJOR CONTOURS INTERVAL 10m
- LAND-BASED TOPOGRAPHIC MINOR CONTOURS INTERVAL 2m
- BATHYMETRIC MAJOR CONTOURS INTERVAL 10m
- BATHYMETRIC MINOR CONTOURS INTERVAL 2m.
- SHORE LINE
- PIT FOOTPRINT
- SETOUT POINT
- SETBACK LIMIT

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (MASL) UNLESS OTHERWISE NOTED.
3) GRID REFERENCE: NAD 83, UTM ZONE 14.
4) CONTOUR INFORMATION ON LAND SUPPLIED BY AGNICO-EAGLE MINES LIMTED (AEM), MEADOWBANK DIVISION.
5) LAKEBED SURFACE INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
6) LAKE CONTOURS ARE BASED ON SURVEY LAKE SURFACE ELEVATIONS: SECOND PORTAGE LAKE = 133.1m.
7) CENTRELINE DESIGN MODIFIED BASED ON FIELD CONDITIONS AND GOLDER TECHNICAL MEMORANDUM DOCUMENT No. 751 REV. 0, DATED SEPTEMBER 11, 2008.
8) EAST DIKE SURVEY ABOVE 133.1 masl PROVIDED BY AEM ON AUGUST 21, 2008 AND FERNAND GILBERT LIMITÉ ON AUGUST 15, SEPTEMBER 18 & 23, 2008. IN AREAS OF COMMON COVERAGE, THE MOST RECENT DATA IS PRESENTED. EAST DIKE SURVEY BELOW 133.1 masl BY GOLDER ASSOCIATES LTD. ON OCT 28, 2008. INTERPRETATION WAS USED IN AREAS OF NON-SURVEYED AREAS.

REFERENCE:

1) PIT DESIGN BY AEM, JUNE 17,2008.
2) ACCESS ROAD BY AEM.

EAST DIKE CUTOFF WALL CENTRELINE SETOUT TABLE

POINT ID	CHAINAGE	EASTING	NORTHING	OFFSET
1	60+000.0	639267.0	7213692.3	
2	60+100.0	639330.0	7213770.0	
3	60+268.1	639395.0	7213925.0	
3A	60+460.0	639375.9	7214116.0	0.00
3b	60+510.0	639368.9	7214165.5	-2.00
3c	60+540.0	639367.9	7214195.6	0.00
4	60+820.8	639340.0	7214475.0	
5	60+920.8	639330.1	7214574.0	

EAST DIKE ROCKFILL SETOUT TABLE

POINT ID	EASTING	NORTHING	ELEV
6	639260.3	7213810.1	136.1
7	639340.3	7213761.7	133.3
8	639308.1	7213833.4	133.1
9	639344.0	7213785.8	133.4
10	639366.0	7213934.1	134.4
11	639401.9	7213927.6	134.4
12	639311.2	7214451.2	134.2
13	639359.4	7214476.1	133.8
14	639320.8	7214492.4	136.1
15	639349.4	7214495.2	134.9

REDUCED SIZE NOT TO SCALE

ORIGINAL SIGNED AND SEALED

PROJECT: AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE: **EAST DIKE ROCKFILL SETOUT PLAN**

DRAWING NO.	REFERENCES
2100-01	SITE PLAN

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
2	30OCT09	JEK	AS-BUILT	SWD		
1	09SEP08	BW	UPDATED CUTOFF ALIGNMENT	EA	BW	JCC
0	01AUG08	BW	ISSUED FOR CONSTRUCTION	EA	BW	TLE

PROJECT No. 07-1413-0074/2800		
DESIGN	JEK	14APR09
CADD	MJH	04JUL08
CHECK	BW	25JUL08
REVIEW	TLE	25JUL08

FILE No. 0814280028-4200-ASBUILT-03
SCALE AS SHOWN REV. 2

2100-03

A INITIAL ROCKFILL EMBANKMENT PLACEMENT PLAN

SCALE 1:1500

B EXCAVATION TO BEDROCK PLAN

SCALE 1:1500

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (MASL) UNLESS OTHERWISE NOTED.
3) GRID REFERENCE: NAD 83, UTM ZONE 14.
4) CONTOUR INFORMATION ON LAND SUPPLIED BY AGNICO-EAGLE MINES LIMTED (AEM), MEADOWBANK DIVISION.
5) LAKEBED SURFACE INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
6) LAKE CONTOURS ARE BASED ON SURVEY LAKE SURFACE ELEVATIONS: SECOND PORTAGE LAKE = 133.1m.
7) TRAFFIC BERMS NOT SHOWN FOR CLARITY. A 1.9m HEIGHT REQUIRED FOR CAT 777 SIZE HAUL TRUCK TRAFFIC.
8) SURVEY OF ACCESS ROAD TIE-IN NOT PROVIDED AT THE TIME OF ISSUE OF THIS DRAWING.
9) EAST DIKE SURVEY ABOVE 133.1 masl PROVIDED BY AEM ON AUGUST 21, 2008 AND FERNAND GILBERT LIMITÉ ON AUGUST 15, SEPTEMBER 18 & 23, 2008. IN AREAS OF COMMON COVERAGE, THE MOST RECENT DATA IS PRESENTED. EAST DIKE SURVEY BELOW 133.1 masl BY GOLDER ASSOCIATES LTD. ON OCT 28, 2008. INTERPRETATION WAS USED IN AREAS OF NON-SURVEYED AREAS.
10) LIMTS OF EXCAVATION ARE BASED ON IN GOLDER IN-TRENCH BATHYMETRY DURING CONSTRUCTION AND DEPTH TO INFERRED BEDROCK.

LEGEND:

- LAND-BASED TOPOGRAPHIC MAJOR CONTOURS INTERVAL 10m
- LAND-BASED TOPOGRAPHIC MINOR CONTOURS INTERVAL 2m
- BATHYMETRIC MAJOR CONTOURS INTERVAL 2m
- BATHYMETRIC MINOR CONTOURS INTERVAL 0.5m
- SHORE LINE
- ROCKFILL
- BASE OF EXCAVATION / INFERRED BEDROCK

THIS DRAWING IS THE PROPERTY OF GOLDER ASSOCIATES LTD. AND IS NOT TO BE LOANED OR REPRODUCED IN ANY WAY WITHOUT THE PERMISSION OF GOLDER ASSOCIATES LTD.

REDUCED SIZE NOT TO SCALE

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER P 049
GOLDER ASSOCIATES LTD.

PROJECT: AEM — AGNICO-EAGLE MINES LIMITED, MEADOWBANK GOLD PROJECT, NUNAVUT

TITLE: **EAST DIKE ROCKFILL LAYOUT PLAN (1 OF 3)**

DRAWING NO.	REFERENCES
2100-10	TYPICAL SECTIONS AND DETAILS

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	30OCT09	JEK	AS-BUILT	SWD		
0	01AUG08	BW	ISSUED FOR CONSTRUCTION	EA	BW	TLE

STAMP

ORIGINAL SIGNED AND SEALED

Golder Associates

PROJECT No.	07-1413-0074/2800	
DESIGN	BW	04JUL08
CADD	MJH	04JUL08
CHECK	BW	25JUL08
REVIEW	TLE	25JUL08

FILE No. 0814280028-4200-ASBUILT-04
SCALE AS SHOWN REV. 1

2100-04

CADD FILE: N:\Bur-Graphics\Projects\2007\1413\07-1413-0074\Drafting\2800-As-Built\Apr2009\0814280028-4200-ASBUILT-04.dwg By: jkowalski REVISION DATE: 09/10/30 11:06AM

C COARSE FILTER PLACEMENT PLAN

SCALE 1:1500

D CORE BACKFILL PLACEMENT PLAN

SCALE 1:1500

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (MASL) UNLESS OTHERWISE NOTED.
3) GRID REFERENCE: NAD 83, UTM ZONE 14.
4) CONTOUR INFORMATION ON LAND SUPPLIED BY AGNICO-EAGLE MINES LIMITED (AEM), MEADOWBANK DIVISION.
5) LAKEBED SURFACE INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
6) LAKE CONTOURS ARE BASED ON SURVEY LAKE SURFACE ELEVATIONS: SECOND PORTAGE LAKE = 133.1m.
7) TRAFFIC BERMS NOT SHOWN FOR CLARITY. A 1.9m HEIGHT REQUIRED FOR CAT 777 SIZE HAUL TRUCK TRAFFIC.
8) TIE-IN TO ACCESS ROAD SURVEY NOT PROVIDED AT THE TIME OF ISSUE OF THIS DRAWING.
9) EAST DIKE SURVEY ABOVE 133.1 masl PROVIDED BY AEM ON AUGUST 21, 2008 AND FERNAND GILBERT LIMITÉ ON AUGUST 15, SEPTEMBER 18 & 23, 2008. IN AREAS OF COMMON COVERAGE, THE MOST RECENT DATA IS PRESENTED. EAST DIKE SURVEY BELOW 133.1 masl BY GOLDER ASSOCIATES LTD. ON OCT 28, 2008. INTERPRETATION WAS USED IN AREAS OF NON-SURVEYED AREAS.
10) COARSE FILTER PLACED AFTER SLOPE TRIMMING THAT WAS NOT SURVEYED DUE TO TIME CONSTRAINTS AT SOME LOCAL AREAS, COARSE FILTER THICKNESS MAY BE LESS THAN 1m AT SOME LOCATIONS. NO SURVEY DATA FOR COARSE FILTER FROM STA. 60+260 TO STA. 60+325.
11) BASED ON VISUAL OBSERVATION, THE CREST OF CORE BACKFILL MEETS THE MINIMUM 4.0m WIDTH IN AREAS OF UNSURVEYED AREAS.

LEGEND:

LAND-BASED TOPOGRAPHIC MAJOR CONTOURS INTERVAL 10m
LAND-BASED TOPOGRAPHIC MINOR CONTOURS INTERVAL 2m
BATHYMETRIC MAJOR CONTOURS INTERVAL 2m
BATHYMETRIC MINOR CONTOURS INTERVAL 0.5m
SHORE LINE
CORE BACKFILL
ROCKFILL
COARSE FILTER
BASE OF EXCAVATION / INFERRED BEDROCK

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER
P 049
GOLDER ASSOCIATES LTD.

REDUCED SIZE NOT TO SCALE

ORIGINAL SIGNED AND SEALED

PROJECT: AEM — AGNICO-EAGLE MINES LIMITED, MEADOWBANK GOLD PROJECT, NUNAVUT

TITLE: **EAST DIKE ROCKFILL LAYOUT PLAN (2 OF 3)**

DRAWING NO.	REFERENCES
2100-10	TYPICAL SECTIONS AND DETAILS

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	30OCT09	JEK	AS-BUILT	SWD		
0	01AUG08	BW	ISSUED FOR CONSTRUCTION	EA	BW	TLE

STAMP

Golder Associates

PROJECT No.	07-1413-0074/2800	
DESIGN	BW	04JUL08
CADD	MJH	04JUL08
CHECK	BW	25JUL08
REVIEW	TLE	25JUL08

FILE No. 0814280028-4200-ASBUILT-05
SCALE AS SHOWN REV. 1

2100-05

CADD FILE: N:\Bur-Graphics\Projects\2007\1413\07-1413-0074\Drafting\2800-As-Built\Apr2009\0814280028-4200-ASBUILT-05.dwg By: jkowalski
REVISION DATE: 09/10/30 11:10AM

E
-
GRANULAR CAP AND CUTOFF WALL PLACEMENT PLAN

SCALE 1:1500

F
-
ROCKFILL SURFACING AND THERMAL CAP PLACEMENT PLAN

SCALE 1:1500

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER P 049
GOLDER ASSOCIATES LTD.

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (MEASL) UNLESS OTHERWISE NOTED.
3) GRID REFERENCE: NAD 83, UTM ZONE 14.
4) CONTOUR INFORMATION ON LAND SUPPLIED BY AGNICO-EAGLE MINES LIMITED (AEM), MEADOWBANK DIVISION.
5) LAKEBED SURFACE INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
6) LAKE CONTOURS ARE BASED ON SURVEY LAKE SURFACE ELEVATIONS: SECOND PORTAGE LAKE = 133.1m.
7) TRAFFIC BERMS NOT SHOWN FOR CLARITY. A 1.9m HEIGHT REQUIRED FOR CAT 777 SIZE HAUL TRUCK TRAFFIC.
8) SURVEY OF ACCESS ROAD TIE-IN NOT PROVIDED AT THE TIME OF ISSUE OF THIS DRAWING.
9) EAST DIKE SURVEY ABOVE 133.1 masl PROVIDED BY AEM ON AUGUST 21, 2008 AND FERNAND GILBERT LIMITÉ ON AUGUST 15, SEPTEMBER 18 & 23, 2008. IN AREAS OF COMMON COVERAGE, THE MOST RECENT DATA IS PRESENTED. EAST DIKE SURVEY BELOW 133.1 masl BY GOLDER ASSOCIATES LTD. ON OCT 28, 2008. INTERPRETATION WAS USED IN AREAS OF NON-SURVEYED AREAS.
10) THERMAL CAP AND GRANULAR CAP SURVEY DATA NOT PROVIDED AT THE TIME OF ISSUE OF THIS DRAWING. THE DESIGN LAYOUT HAS BEEN ASSUMED FOR THESE DRAWINGS. AS-BUILT SURVEY DATA SHOULD BE PROVIDED AND THESE DRAWINGS UPDATED ONCE AVAILABLE.
11) AEM WIDENED DOWNSTREAM ROCKFILL IN MAY 2009 TO ALLOW FOR TWO-WAY HAUL TRUCK TRAFFIC. SURVEY DATA NOT PROVIDED AT THE TIME OF DRAWING ISSUE AND IS NOT SHOWN.
12) UM ROCKFILL SURFACING REQUIRED ON FINAL ROCKFILL SURFACE ABOVE 134.1 masl.

LEGEND:

- LAND-BASED TOPOGRAPHIC MAJOR CONTOURS INTERVAL 10m
- LAND-BASED TOPOGRAPHIC MINOR CONTOURS INTERVAL 2m
- BATHYMETRIC MAJOR CONTOURS INTERVAL 10m
- BATHYMETRIC MINOR CONTOURS INTERVAL 2m
- SHORE LINE
- ASSUMED WALL OF SOIL BENTONITE CUTOFF CRESTS BASED ON EXCAVATOR BUCKET WIDTH.
- GRANULAR CAP
- ROCKFILL
- UM ROCKFILL NOT YET PLACED (SEE NOTE 12)
- SOIL BENTONITE BACKFILL

REDUCED SIZE NOT TO SCALE

PROJECT: AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE: **EAST DIKE
ROCKFILL LAYOUT PLAN (3 OF 3)**

ORIGINAL SIGNED AND SEALED

DRAWING NO.	REFERENCES
2100-12	CENTERLINE REALIGNMENT
2100-10	TYPICAL SECTIONS AND DETAILS

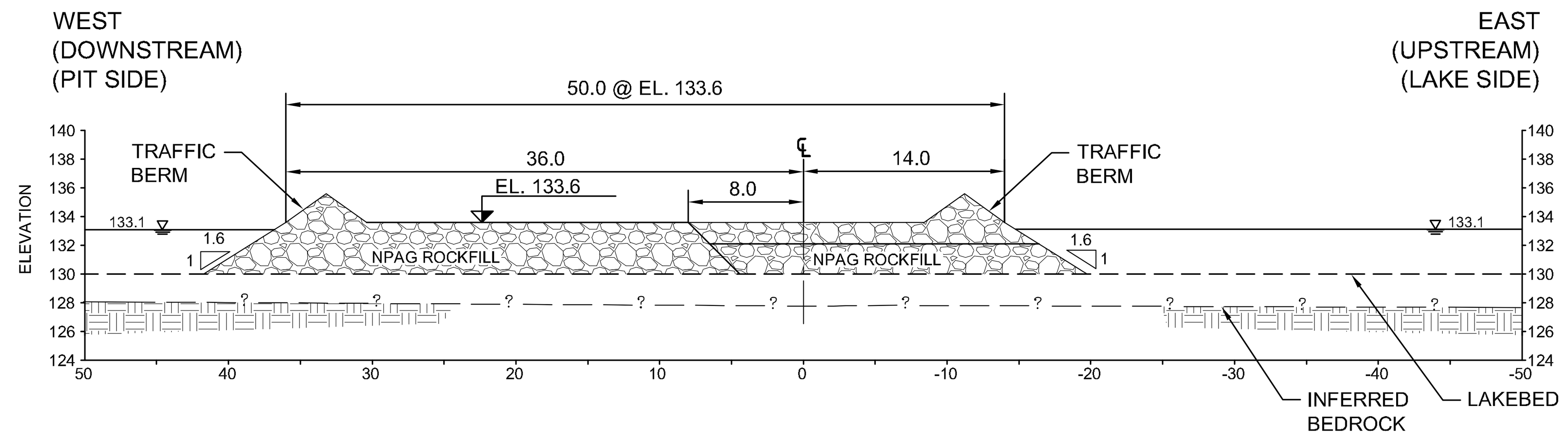
REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	30OCT09	JEK	AS-BUILT	SWD		
0	01AUG08	BW	ISSUED FOR CONSTRUCTION	EA	BW	TLE

Golder Associates

PROJECT No.	07-1413-0074/2800	
DESIGN	BW	04JUL08
CADD	MJH	04JUL08
CHECK	BW	25JUL08
REVIEW	TLE	25JUL08

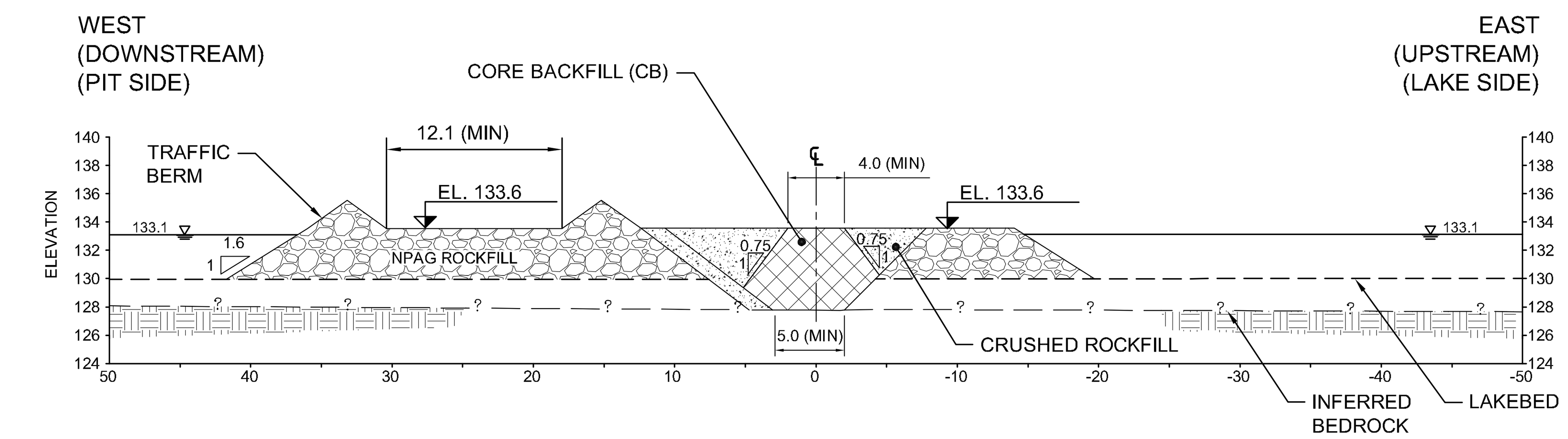
FILE No. 0814280028-4200-ASBUILT-06
SCALE AS SHOWN REV. 1

2100-06



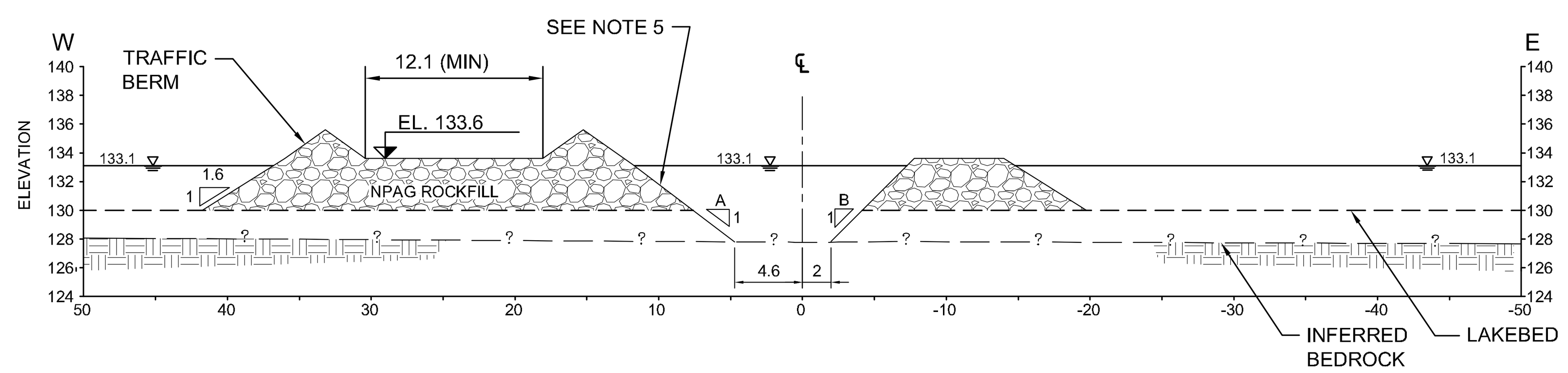
A 04 INITIAL ROCKFILL EMBANKMENT PLACEMENT SECTION

SCALE 1:400



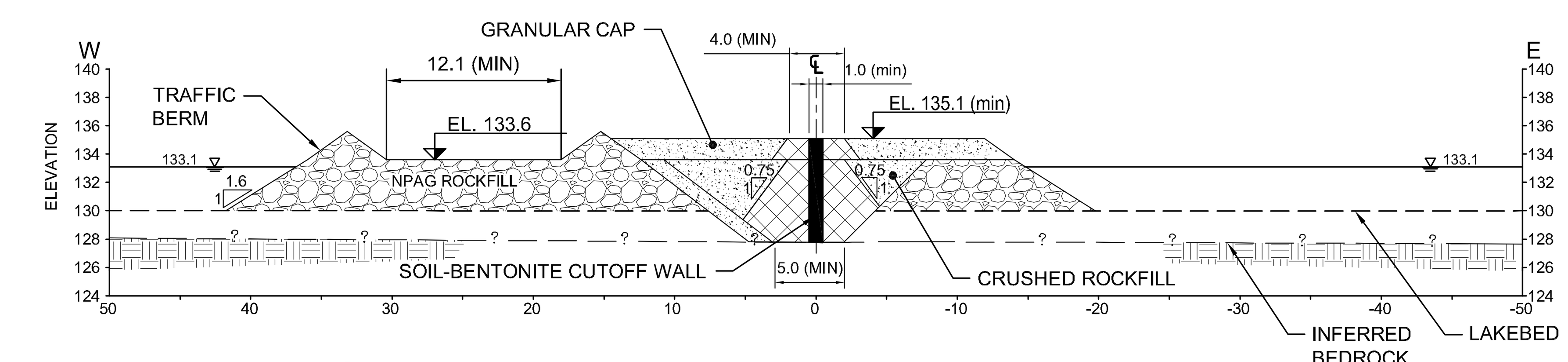
D 05 CORE BACKFILL PLACEMENT SECTION

SCALE 1:400



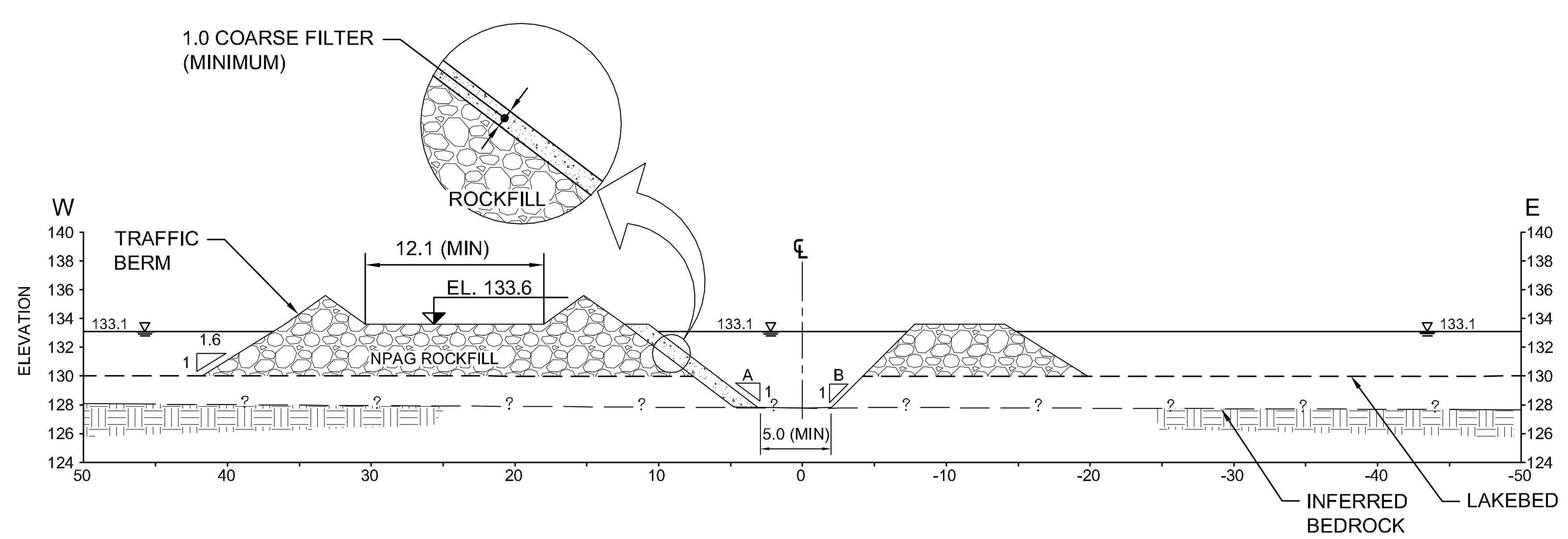
B 04 EXCAVATION TO BEDROCK SECTION

SCALE 1:400



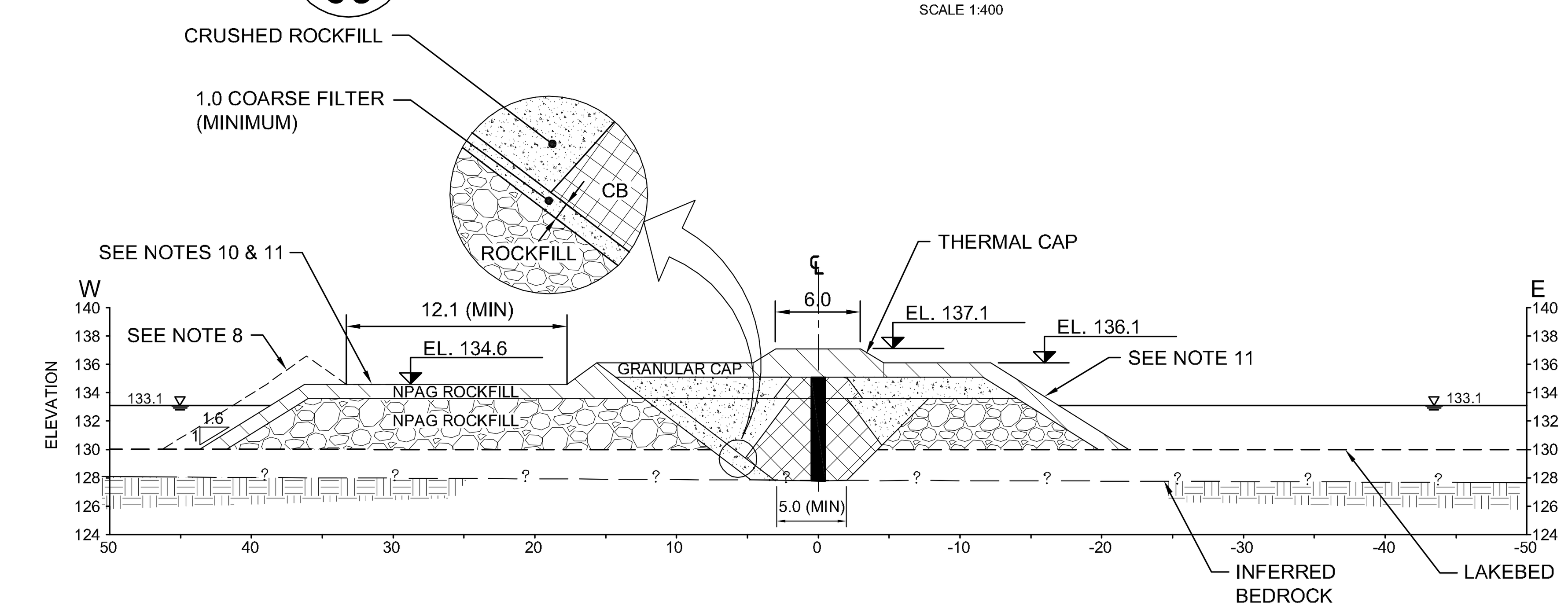
E 06 GRANULAR CAP AND CUTOFF WALL PLACEMENT SECTION

SCALE 1:400



C 05 COARSE FILTER PLACEMENT SECTION

SCALE 1:400



F 06 ROCKFILL SURFACING AND THERMAL CAP PLACEMENT SECTION

SCALE 1:400

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (MEASL) UNLESS OTHERWISE NOTED.
3) GRID REFERENCE: NAD 83, UTM ZONE 14.
4) LAKEBED SURFACE INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
5) "A" TO BE LARGER THAN 1.32 TO ALLOW STABLE PLACEMENT OF COARSE FILTER. MINIMUM WIDTH OF BEDROCK EXPOSED IS 6.6m. "B" TO BE AS SMALL AS POSSIBLE ALLOWING FOR SAFE CONSTRUCTION.
6) USE OF COARSE FILTER AGAINST WEST FACE OF EXCAVATION IS REQUIRED, UNLESS APPROVED IN WRITING BY THE ENGINEER.
7) ALL SLOPES SHOWN ARE NOMINAL VALUES.
8) ADDITIONAL ROCKFILL MAY BE REQUIRED TO MAINTAIN HAUL ROAD MINIMUM WIDTH.
9) WIDTH OF ROCKFILL TO BE ADJUSTED IN FIELD TO SUIT CONDITIONS. ADDITIONAL WIDTH MAY BE REQUIRED TO PROVIDE STABLE UPSTREAM EXCAVATION SLOPE.
10) SURFACING BY AEM.
11) UM ROCKFILL SURFACING REQUIRED ON FINAL ROCKFILL SURFACE ABOVE 134.1 masl.

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER
P 049
GOLDER ASSOCIATES LTD.

REDUCED SIZE NOT TO SCALE

PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE
TYPICAL SECTIONS AND DETAILS

DRAWING NO.	REFERENCES
2100-06	ROCKFILL LAYOUT PLAN (3 OF 3)
2100-05	ROCKFILL LAYOUT PLAN (2 OF 3)
2100-04	ROCKFILL LAYOUT PLAN (1 OF 3)

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	30OCT09	JEK	AS-BUILT	SWD		
0	01AUG08	BW	ISSUED FOR CONSTRUCTION	EA	BW	TLE

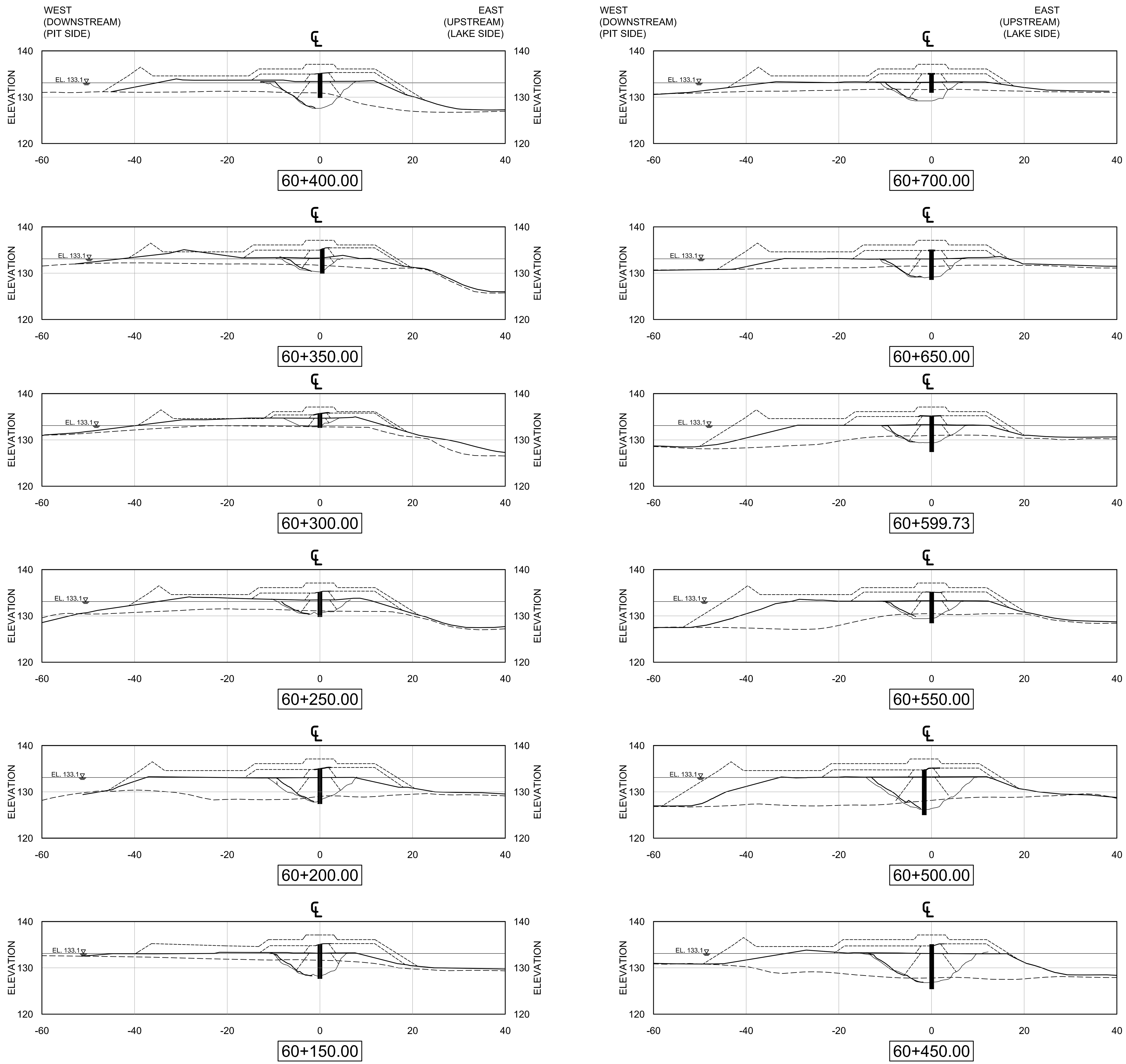
STAMP

ORIGINAL SIGNED AND SEALED

PROJECT No.	07-1413-0074/2800	
DESIGN	BW	16JUN08
CADD	MJH	04JUL08
CHECK	BW	25JUL08
REVIEW	TLE	25JUL08

FILE No. 0814280028-4200-ASBUILT-10
SCALE AS SHOWN REV. 1

2100-10



LEGEND:

- LAKE BED
- ASSUMED ROCKFILL SURFACE/GRANULAR CAP/CORE BACKFILL LIMITS
- INITIAL ROCKFILL
- SOIL-BENTONITE WALL
- COARSE FILTER LIMITS

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (MASL) UNLESS OTHERWISE NOTED.
3) CONTOUR INFORMATION ON LAND SUPPLIED BY AGNICO-EAGLE MINES LIMTED (AEM), MEADOWBANK DIVISION.
4) LAKEBED SURFACE INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
5) LAKE CONTOURS ARE BASED ON SURVEYED LAKE SURFACE ELEVATIONS: SECOND PORTAGE LAKE = 133.1m.
6) EAST DIKE SURVEY ABOVE 133.1 masl PROVIDED BY AEM ON AUGUST 21, 2008 AND FERNAND GILBERT LIMITÉ ON AUGUST 15, SEPTEMBER 18 & 23, 2008. IN AREAS OF COMMON COVERAGE, THE MOST RECENT DATA IS PRESENTED. EAST DIKE SURVEY BELOW 133.1 masl BY GOLDER ASSOCIATES LTD. ON OCT 28, 2008. INTERPRETATION WAS USED IN AREAS OF NON-SURVEYED AREAS.
7) STATION SHOWN IS ALONG CUT-OFF CENTRELINE ALIGNMENT.
8) THERMAL CAP AND GRANULAR CAP SURVEY DATA NOT PROVIDED AT THE TIME OF ISSUE OF THIS DRAWING. THE DESIGN LAYOUT HAS BEEN ASSUMED FOR THESE DRAWINGS. AS-BUILT SURVEY DATA SHOULD BE PROVIDED AND THESE DRAWINGS UPDATED ONCE AVAILABLE.
9) FOUNDATION OF CUT-OFF WALL ELEVATION IS BASED ON EXCAVATION SOUNDING PRIOR TO SOIL-BENTONITE BACKFILL.
10) REFER TO TYPICAL ON DWG. 2100-12 FOR DETAILS.

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER P 049
GOLDER ASSOCIATES LTD.

REDUCED SIZE NOT TO SCALE

SCALE 1:500 (0 5 10 15 20 25)

PROJECT: AEM — AGNICO-EAGLE MINES LIMITED, MEADOWBANK GOLD PROJECT, NUNAVUT

TITLE: **EAST DIKE CROS SECTIONS**

STAMP

ORIGINAL SIGNED AND SEALED

Golder Associates

PROJECT No. 07-1413-0074/2800			FILE No. 0814280074-2800-ASBUILT-11
DESIGN	BW	04JUL08	SCALE AS SHOWN · REV. 1
CADD	MJH	04JUL08	2100-11
CHECK	BW	25JUL08	
REVIEW	TLE	25JUL08	

DRAWING NO.	REFERENCES
2100-06	ROCKFILL LAYOUT PLAN (3 OF 3)
2100-05	ROCKFILL LAYOUT PLAN (2 OF 3)
2100-04	ROCKFILL LAYOUT PLAN (1 OF 3)

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	30OCT09	JEK	AS-BUILT	SWD		
0	01AUG08	BW	ISSUED FOR CONSTRUCTION	EA	BW	TLE

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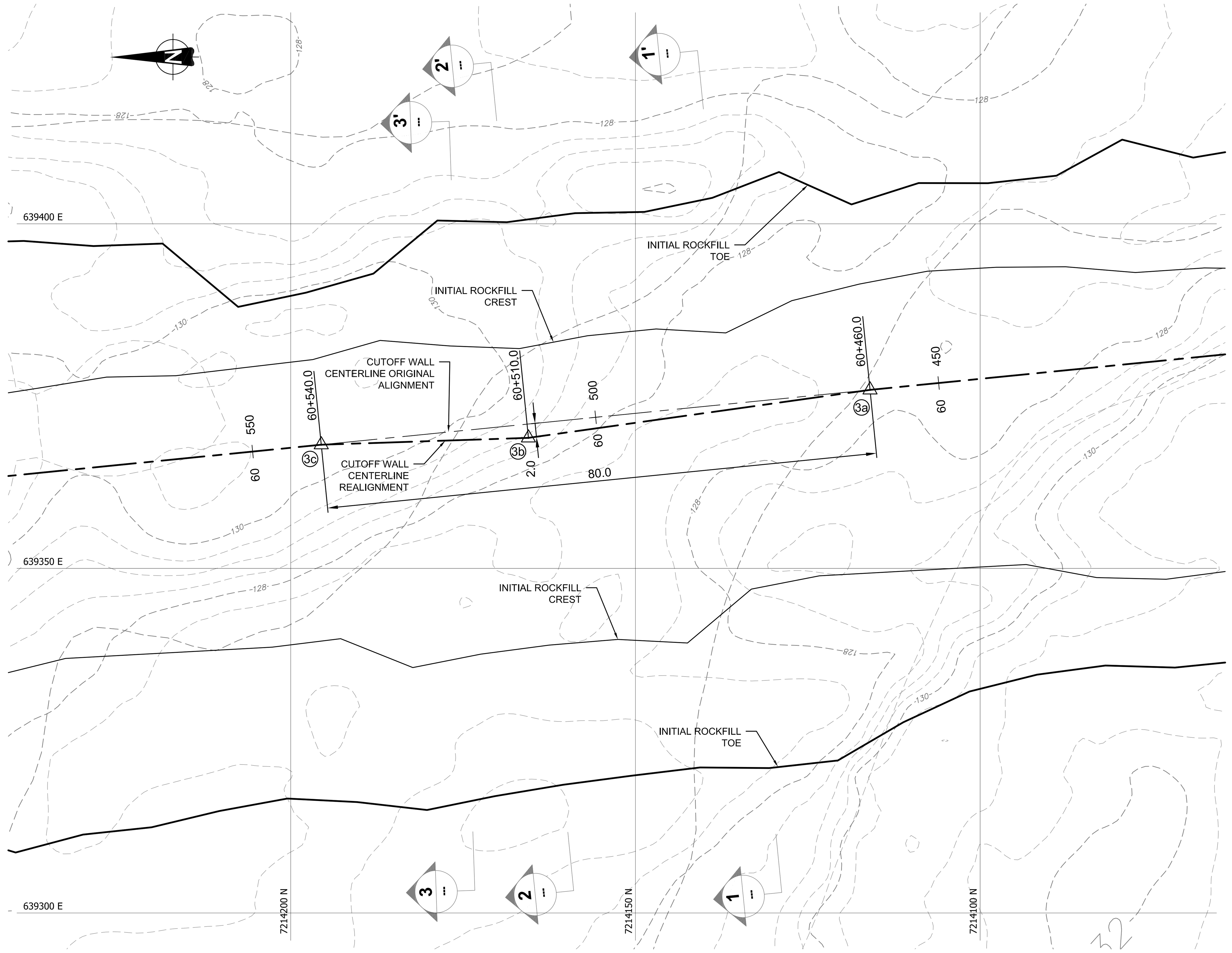
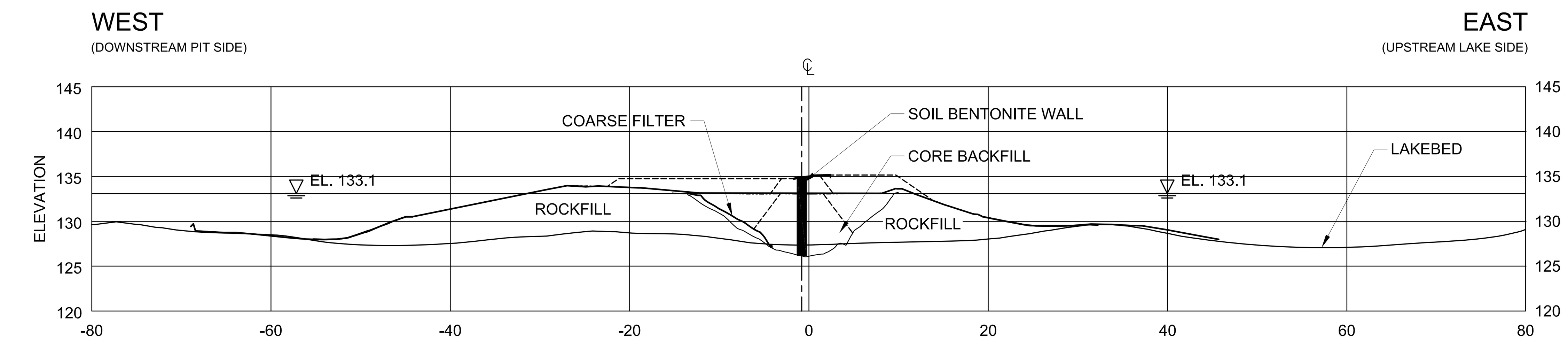


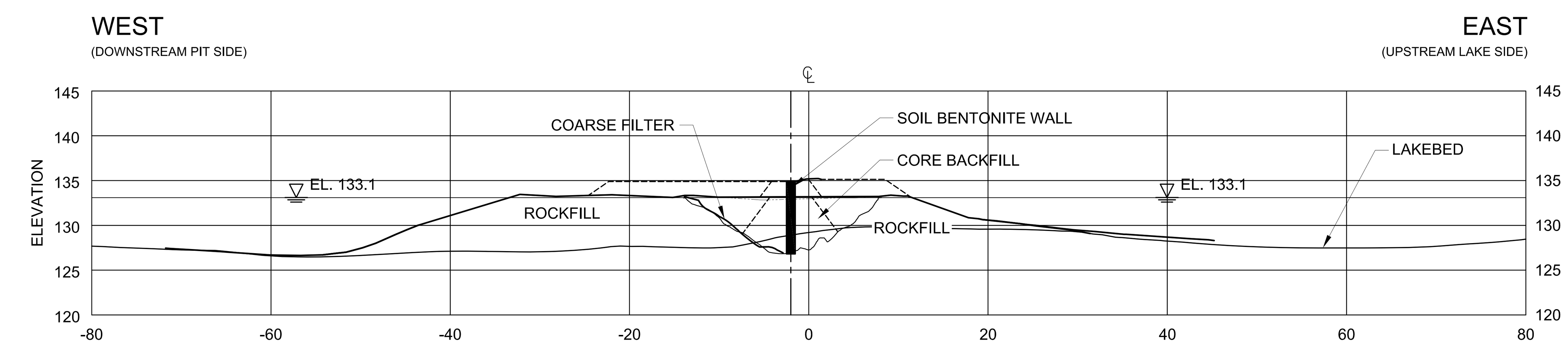
A 2100-03 **CENTERLINE REALIGNMENT**

SCALE 1:500



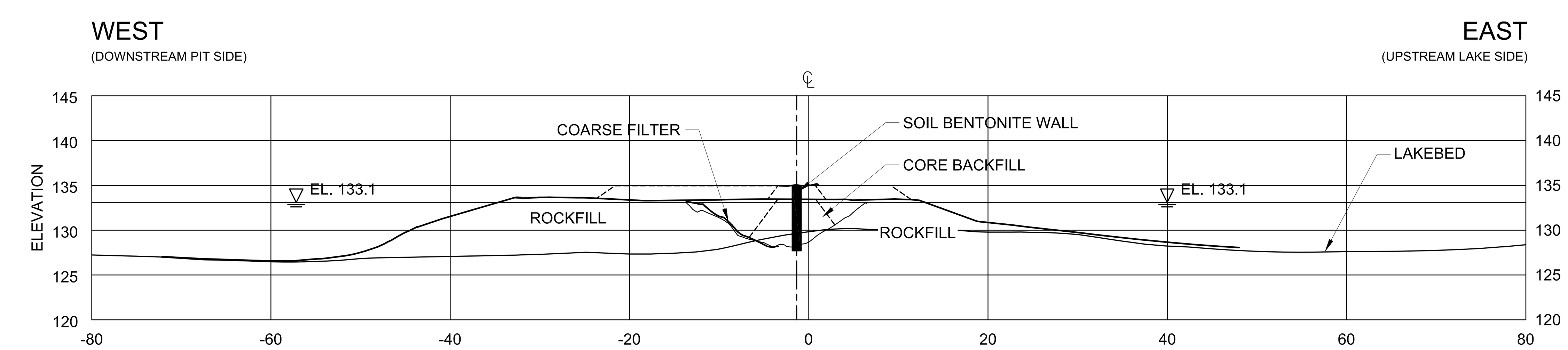
1 **STA. 60+480**

SCALE 1:500



2 **STA. 60+510**

SCALE 1:500



3 **STA. 60+520**

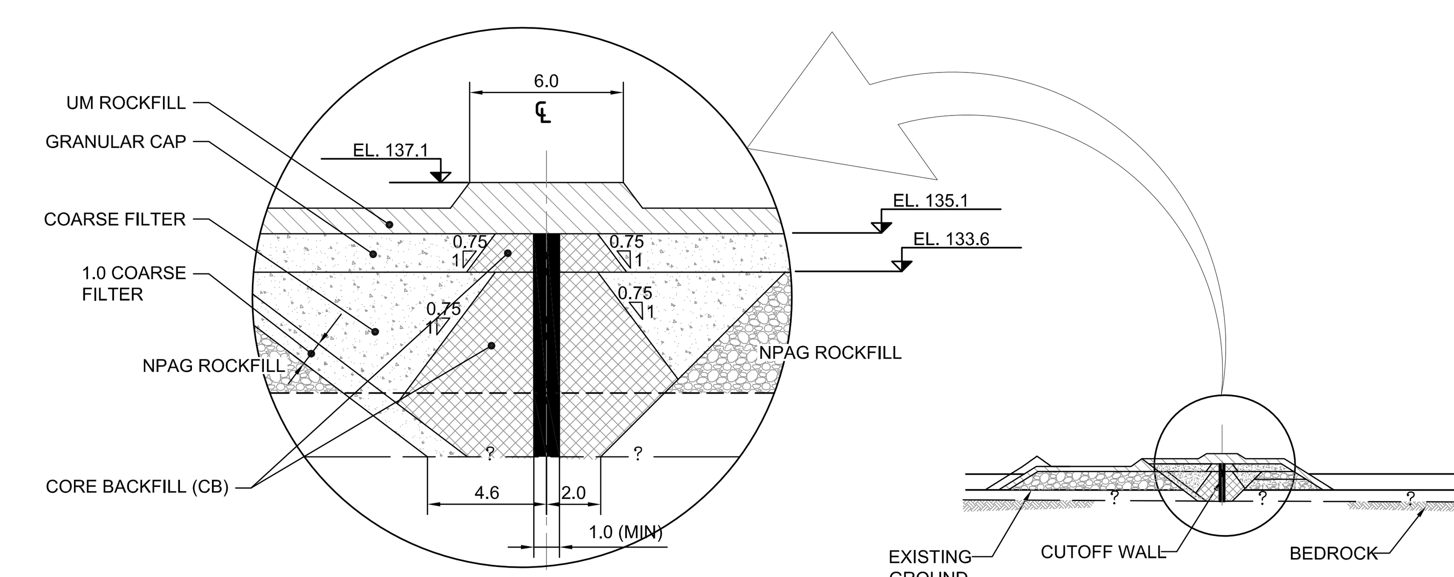
SCALE 1:500

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (MASL) UNLESS OTHERWISE NOTED.
3) CONTOUR INFORMATION ON LAND SUPPLIED BY AGNICO-EAGLE MINES LIMITED (AEM), MEADOWBANK DIVISION.
4) GRID REFERENCE: NAD 83, UTM ZONE 14.
5) LAKEBED SURFACE BASED ON BATHYMETRIC SURVEY AND SEISMIC SURVEYS BY GOLDER ASSOCIATES LTD., 2006. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
6) LAKE CONTOURS ARE BASED ON SURVEYED LAKE SURFACE ELEVATIONS: SECOND PORTAGE LAKE = 133.1m.
7) STATION SHOWN IS ALONG CUT-OFF CENTRELINE ALIGNMENT..
8) CENTRELINE DESIGN MODIFIED BASED ON FIELD CONDITIONS AND GOLDER TECHNICAL MEMORANDUM DOCUMENT No. 751 REV. 0, DATED SEPTEMBER 11, 2008.
9) FOUNDATION OF CUT-OFF WALL ELEVATION IS BASED ON EXCAVATION SOUNDING PRIOR TO SOIL-BENTONITE BACKFILL.

EAST DIKE CUTOFF WALL CENTRELINE REALIGNMNET SETOUT TABLE

POINT ID	CHAINAGE	EASTING	NORTHING	OFFSET
3a	60+460.0	639375.9	7214116.0	0.00
3b	60+510.0	639368.9	7214165.5	- 2.00
3c	60+540.0	639367.9	7214195.6	0.00



A **TYPICAL SECTION**

(NOT TO SCALE)

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER
P 049
GOLDER ASSOCIATES LTD.

0 5 10 15 20 25
1:500

REDUCED SIZE NOT TO SCALE

PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE
CENTRELINE REALIGNMENT

DRAWING NO.	REFERENCES
2100-06	ROCKFILL LAYOUT PLAN (3 OF 3)
2100-03	ROCKFILL SETOUT PLAN
2100-01	SITE PLAN

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
0	30OCT09	JEK	AS-BUILT	SWD		

STAMP

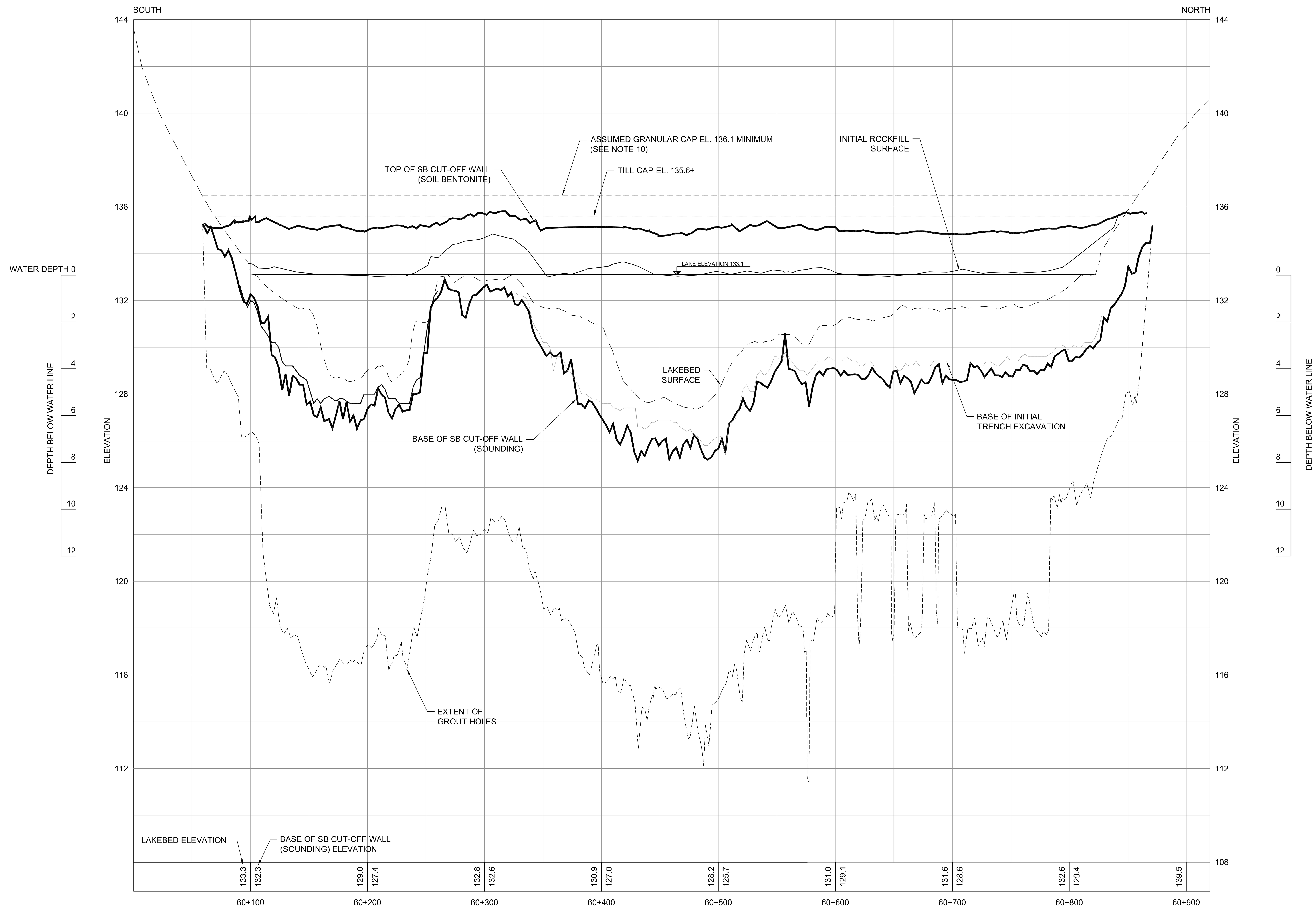
ORIGINAL SIGNED AND SEALED

Golder Associates

PROJECT No.	07-1413-0074/2800	
DESIGN	JEK	16APR09
CADD	MJH	04JUL08
CHECK	BW	25JUL08
REVIEW	TLE	25JUL08

FILE No. 0814280074-2800-ASBUILT-12
SCALE AS SHOWN REV. 0

2100-12



A-A' 2100-02 **CENTRELINE PROFILE**

HORIZONTAL SCALE 1:2000

VERTICAL SCALE 1:100

LEGEND:

- ASSUMED GRANULAR CAP
- TILL CAP
- SOIL BENTONITE WALL LIMITS
- INITIAL ROCKFILL SURFACE
- LAKEBED
- BASE OF INITIAL TRENCH EXCAVATION
- EXTENT OF GROUT HOLES

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (MASL) UNLESS OTHERWISE NOTED.
3) CONTOUR INFORMATION ON LAND SUPPLIED BY AGNICO-EAGLE MINES LIMITED (AEM), MEADOWBANK DIVISION.
4) LAKEBED SURFACE INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
5) TRENCH BATHYMETRY IS BASED ON SURVEYED LAKE SURFACE ELEVATIONS: SECOND PORTAGE LAKE = 133.1m.
6) STATION SHOWN IS ALONG CUT-OFF CENTRELINE ALIGNMENT.
7) TRENCH EXCAVATION BASED ON QUALITY CONTROL BATHYMETRY BY GOLDER DURING CONSTRUCTION.
8) FOUNDATION OF CUT-OFF WALL ELEVATION IS BASED ON EXCAVATION SOUNDING PRIOR TO SOIL-BENTONITE BACKFILL.
9) GROUT CURTAIN ELEVATIONS BASED ON SURVEY PROVIDED BY AEM DURING GROUTING PROGRAM.
10) GRANULAR CAP HAS BEEN PLACED TO ASSUMED MINIMUM ELEV. 136.1m. SURVEY TO BE PROVIDED BY AEM ONCE AVAILABLE TO UPDATE THE CURRENT DRAWING.

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER
P 049
GOLDER ASSOCIATES LTD.

REDUCED SIZE NOT TO SCALE

ORIGINAL SIGNED AND SEALED

PROJECT: AGNICO-EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT

TITLE: **EAST DIKE CENTRELINE PROFILE**

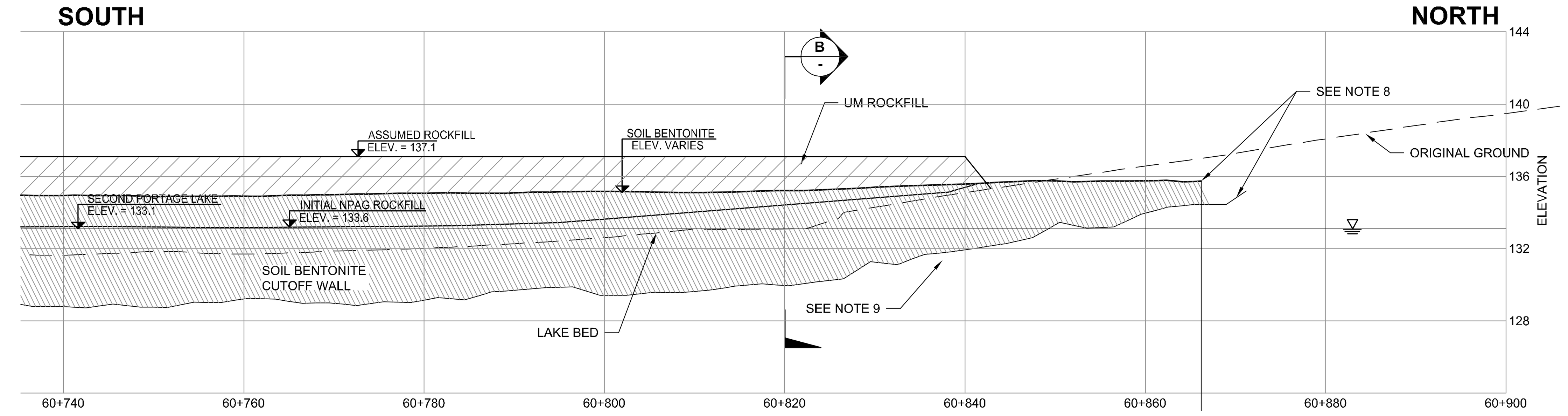
REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	30OCT09	JEK	AS-BUILT	SWD		
0	01AUG08	BW	ISSUED FOR CONSTRUCTION	EA	BW	TLE

DRAWING NO.	REFERENCES
2100-02	BOREHOLE LOCATION PLAN

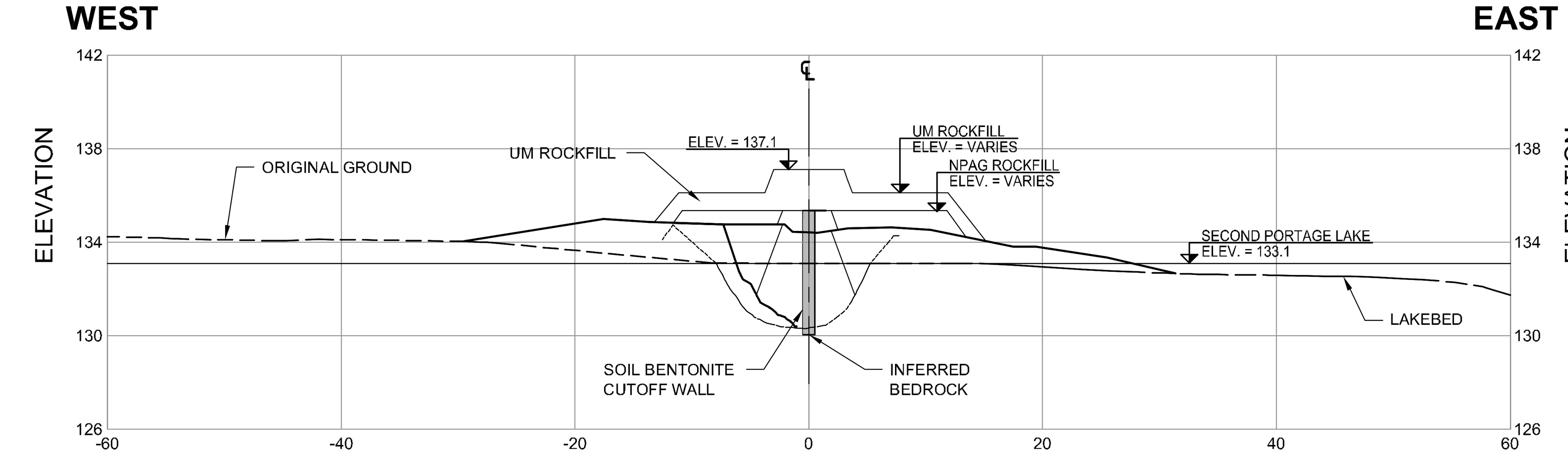
PROJECT No.	07-1413-0074/2800	
DESIGN	BW	04JUL08
CADD	MJH	04JUL08
CHECK	BW	25JUL08
REVIEW	TLE	25JUL08

FILE No. 0814280028-4200-ASBUILT-14
SCALE AS SHOWN REV. 1

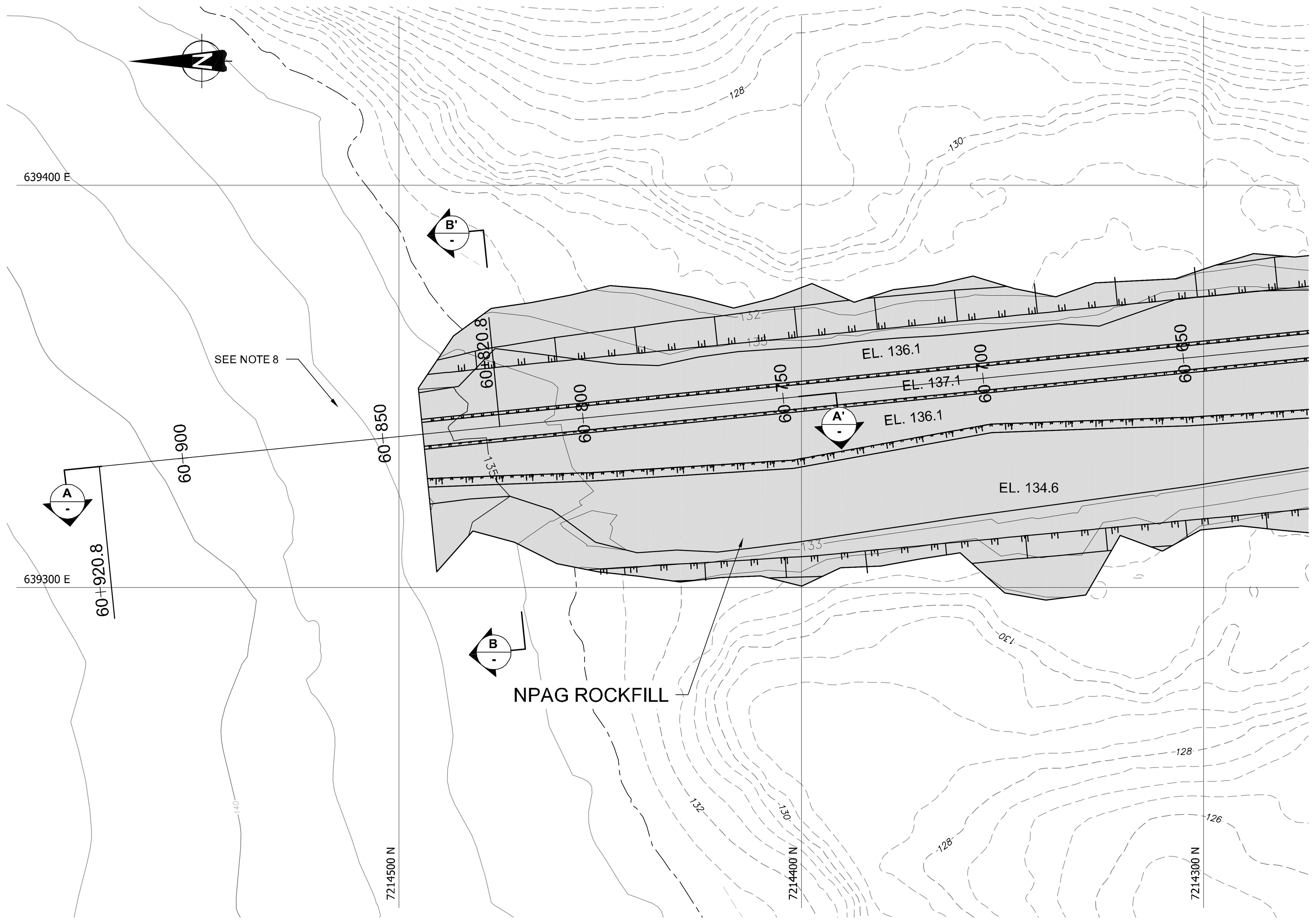
2100-14



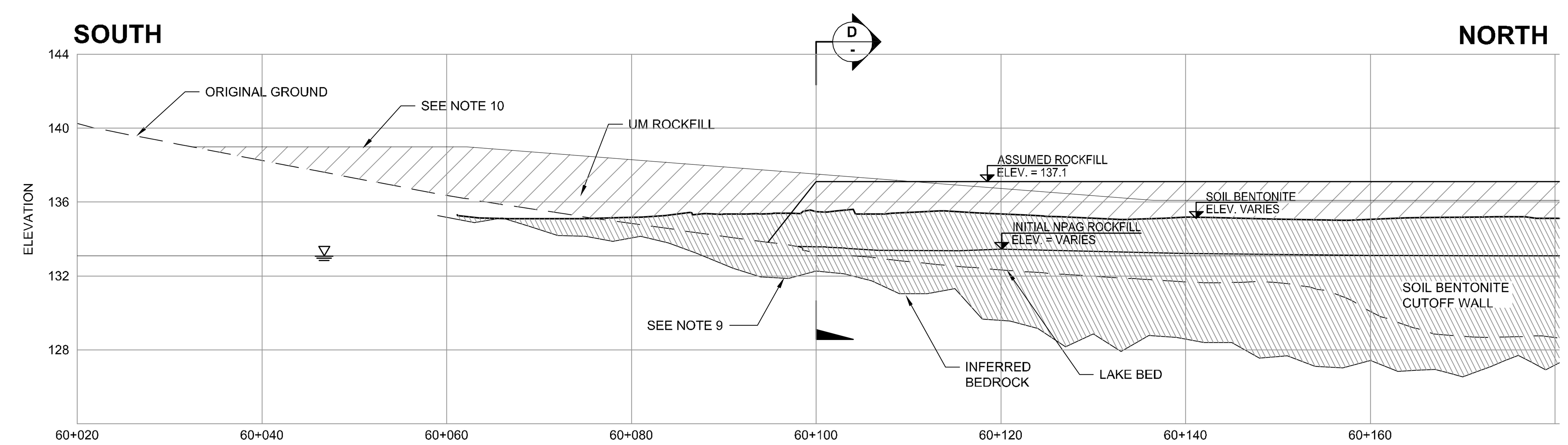
A NORTH ABUTMENT PROFILE
SCALE : H 1:500
V 1:250



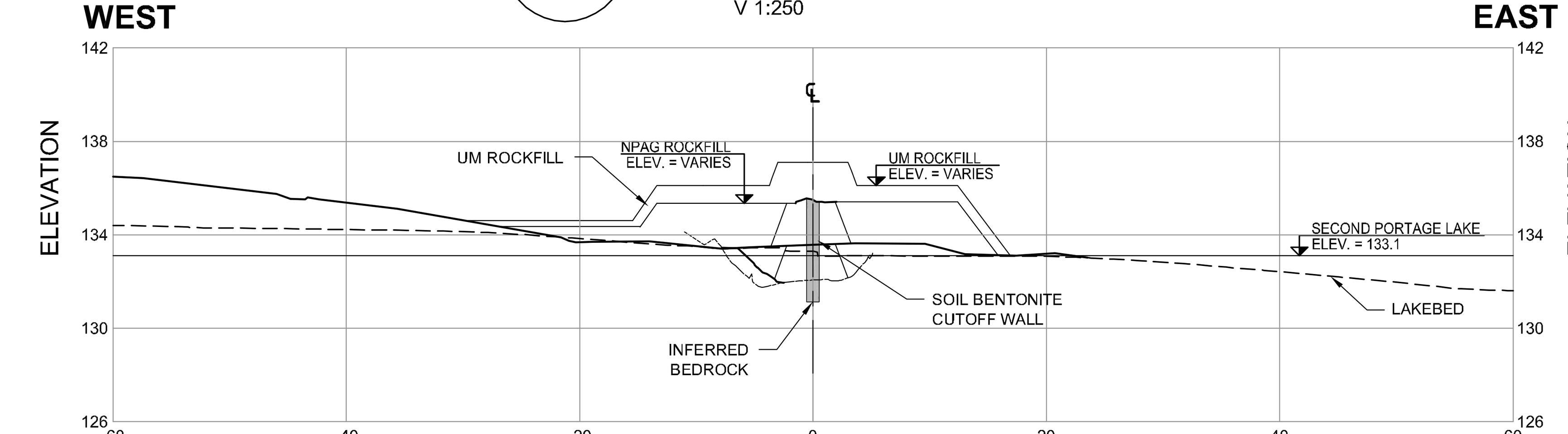
B NORTH ABUTMENT SECTION
SCALE : H 1:500
V 1:250
STN 60+820



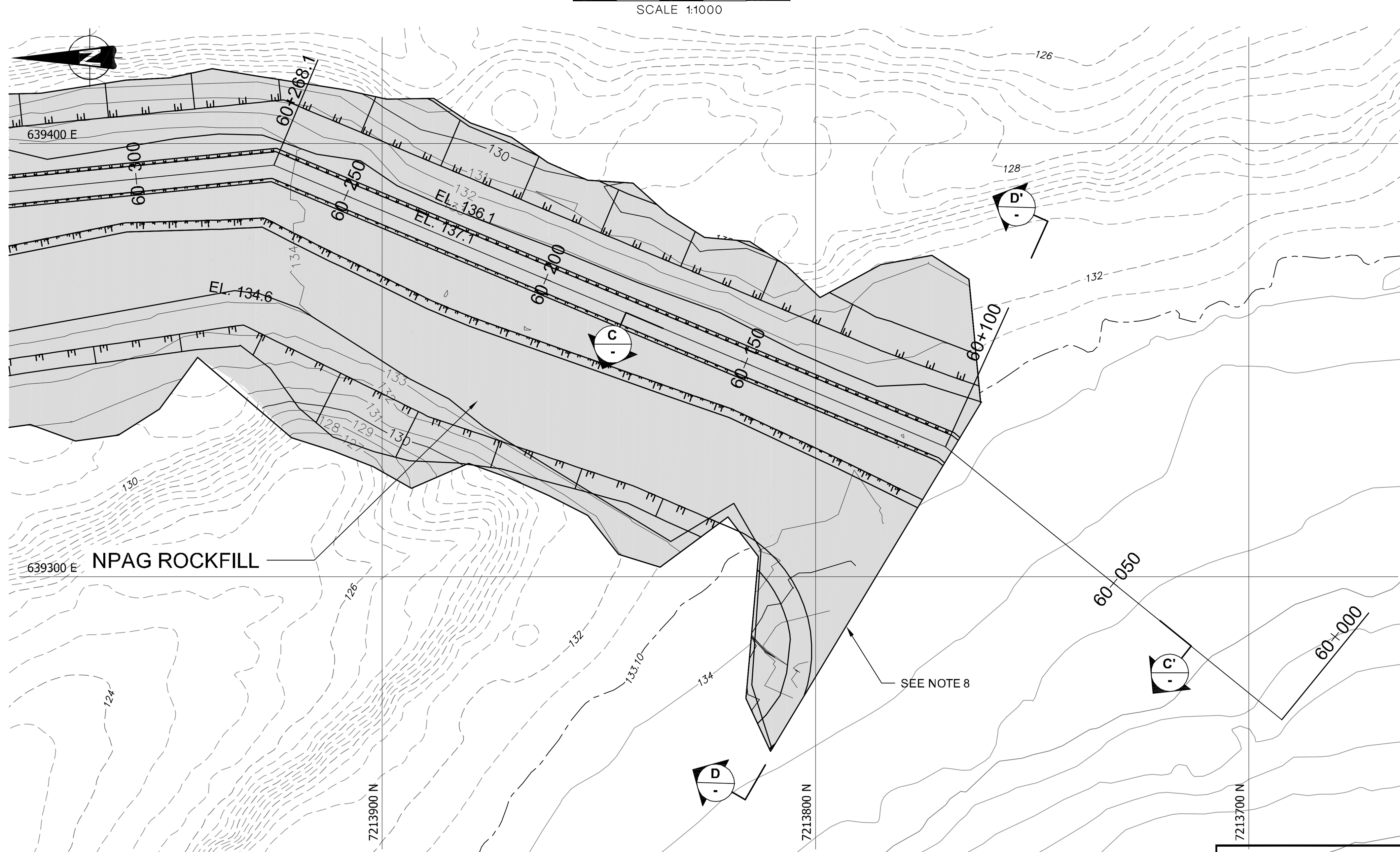
NORTH ABUTMENT PLAN
SCALE 1:1000



C SOUTH ABUTMENT PROFILE
SCALE : H 1:500
V 1:250



D SOUTH ABUTMENT SECTION
SCALE : H 1:500
V 1:250
STN 60+100



SOUTH ABUTMENT PLAN
SCALE 1:1000

LEGEND:

- LAND-BASED TOPOGRAPHIC MAJOR CONTOURS INTERVAL 10m
- LAND-BASED TOPOGRAPHIC MINOR CONTOURS INTERVAL 2m
- BATHYMETRIC MAJOR CONTOURS INTERVAL 2m
- BATHYMETRIC MINOR CONTOURS INTERVAL 0.5m
- SHORE LINE

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (MASL) UNLESS OTHERWISE NOTED.
3) CONTOUR INFORMATION ON LAND SUPPLIED BY AGNICO-EAGLE MINES LIMITED (AEM), MEADOWBANK DIVISION.
4) GRID REFERENCE: NAD 83, UTM ZONE 14.
5) LAKEBED SURFACE INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
6) TRENCH BATHYMETRY IS BASED ON SURVEYED LAKE SURFACE ELEVATION: SECOND PORTAGE LAKE = 133.1m.
7) TRAFFIC BERMS NOT SHOWN FOR CLARITY - 1.9m HEIGHT REQUIRED FOR HAUL TRUCK TRAFFIC.
8) SURVEY OF ACCESS ROAD TIE-IN NOT PROVIDED AT THE TIME OF ISSUE OF THIS DRAWING.
9) FOUNDATION OF CUT-OFF WALL ELEVATION IS BASED ON EXCAVATION SOUNDING PRIOR TO SOIL-BENTONITE BACKFILL.

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER P 049
GOLDER ASSOCIATES LTD.

REDUCED SIZE NOT TO SCALE

PROJECT: AEM — AGNICO-EAGLE MINES LIMITED, MEADOWBANK GOLD PROJECT, NUNAVUT

TITLE: **EAST DIKE ABUTMENT DETAIL**

ORIGINAL SIGNED AND SEALED

STAMP

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	30OCT09	JEK	EAST DIKE	SWD		
0	01AUG08	BW	ISSUED FOR CONSTRUCTION	EA	BW	TLE

DRAWING NO.	REFERENCES

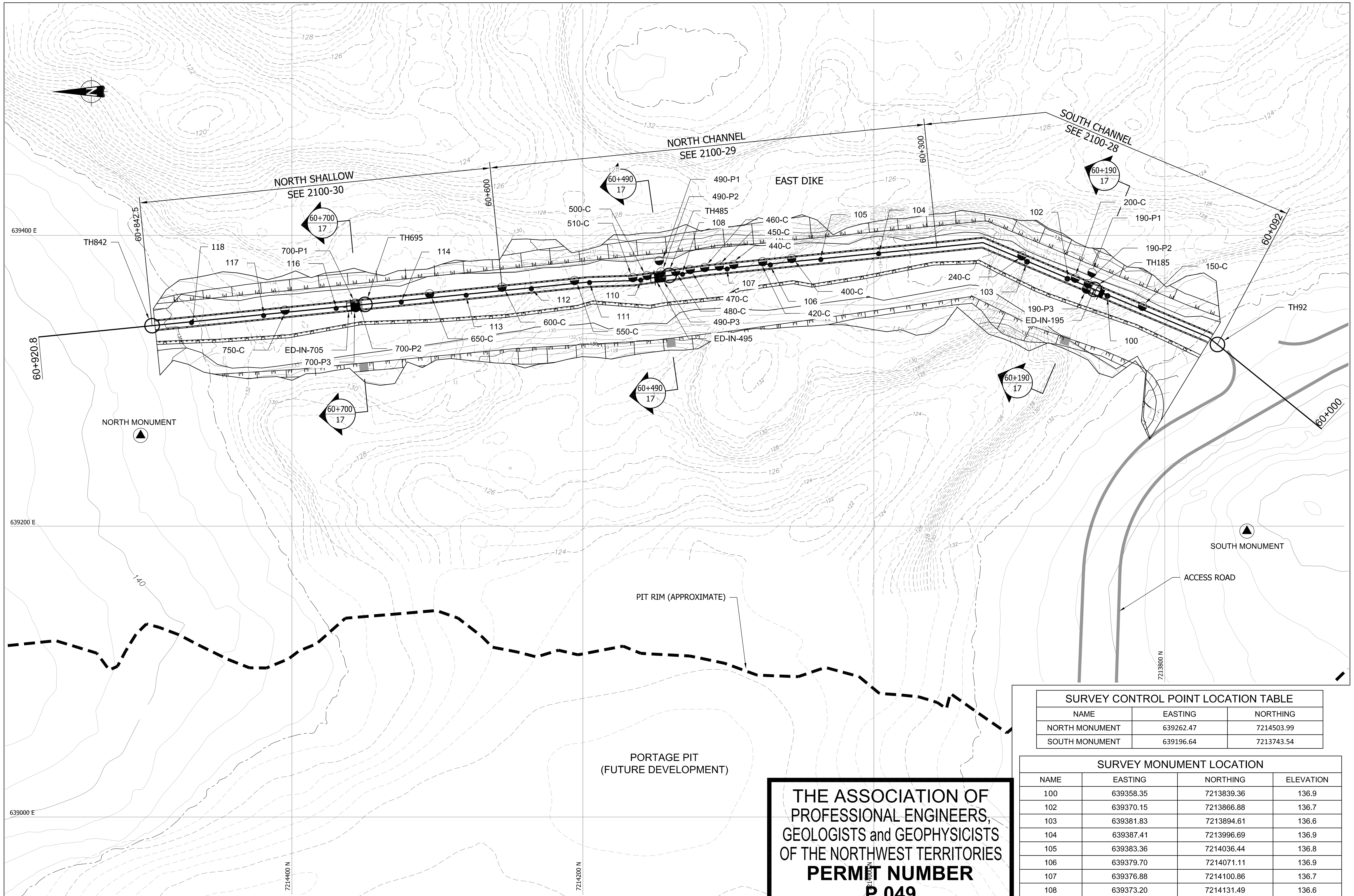
PROJECT No.	07-1413-0074/2800	
DESIGN	BW	16JUN08
CADD	MJH	04JUL08
CHECK	BW	25JUL08
REVIEW	TLE	25JUL08

FILE No. 0814280028-4200-ASBUILT-15
SCALE AS SHOWN REV. 1

Golder Associates

2100-15

REVISION DATE: 09/10/30 11:29AM By: jkowalski CADD FILE: N:\Bur-Graphics\Projects\2007\1413\07-1413-0074\Drafting\2800-As-Built\Apr2009\0814280028-4200-ASBUILT-15.dwg



THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER
P 049
GOLDER ASSOCIATES LTD.

0 15 30 45 60 75
SCALE: 1:1500

REDUCED SIZE NOT TO SCALE

LEGEND:

- LAND-BASED TOPOGRAPHIC MAJOR CONTOURS INTERVAL 10m
- LAND-BASED TOPOGRAPHIC MINOR CONTOURS INTERVAL 2m
- BATHYMETRIC MAJOR CONTOURS INTERVAL 2m
- BATHYMETRIC MINOR CONTOURS INTERVAL 0.5m
- SHORE LINE
- PIT FOOTPRINT
- EXISTING THERMISTOR
- SURVEY MONUMENT LOCATION
- PENDING SEISMOGRAPH LOCATION
- PIEZOMETER
- INCLINOMETER
- SURVEY CONTROL MONUMENT

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (MASL) UNLESS OTHERWISE NOTED.
3) GRID REFERENCE: NAD 83, UTM ZONE 14.
4) CONTOUR INFORMATION ON LAND SUPPLIED BY AGNICO-EAGLE MINES LIMITED (AEM), MEADOWBANK DIVISION.
5) LAKEBED SURFACE INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
6) LAKE CONTOURS ARE BASED ON SURVEYED LAKE SURFACE ELEVATION: SECOND PORTAGE LAKE = 133.1m.
7) SEISMOGRAPH LOCATIONS ARE 0.3mx0.3m CONCRETE PAD OR EQUIVALENT.
8) SURVEY MONUMENTS ARE TO BE SPACED 25m ALONG CUT-OFF WALL CENTRELINE.
9) SURVEY CONTROL MONUMENTS SHALL BE CONSTRUCTED ON LAND AS TYPE D GIVEN IN U.S. ARMY CORPS OF ENGINEERS EM1110-1-1002.
10) SEISMOGRAPH ROCKFILL PAD AT DOWNSTREAM TOE NOT SHOWN.
11) INSTRUMENTATION LOCATIONS PROVIDED BY AEM.

REFERENCE:

1) PIT DESIGN BY AEM, JUNE 17,2008.
2) ACCESS ROAD BY AEM.

PIEZOMETER LOCATION TABLE

NAME	STATION	EASTING	NORTHING
150-C	60+149.94	639347.4	7213816.4
190-P1	60+190.54	639355.8	7213857.4
190-P2	60+190.15	639363.0	7213853.9
190-P3	60+189.86	639366.6	7213852.1
200-C	60+200.00	639370.5	7213861.5
240-C	60+239.86	639382.3	7213899.7
400-C	60+400.00	639379.7	7214056.0
420-C	60+420.00	639381.9	7214076.4
440-C	60+440.00	639379.9	7214096.3
450-C	60+450.14	639375.0	7214106.0
460-C	60+460.00	639377.8	7214116.2
470-C	60+470.00	639376.5	7214126.2
480-C	60+480.00	639375.1	7214136.2
490-P1	60+489.91	639361.9	7214144.6
490-P2	60+490.21	639369.8	7214145.7
490-P3	60+490.40	639373.8	7214146.3
500-C	60+500.00	639372.3	7214155.8
510-C	60+510.00	639370.9	7214165.6
550-C	60+550.24	639365.0	7214205.60
600-C	60+600.06	639360.0	7214255.1
650-C	60+650.13	639355.0	7214304.9
700-P1	60+701.54	639342.0	7214355.3
700-P2	60+700.53	639350.0	7214355.1
700-P3	60+700.14	639353.9	7214355.1
750-C	60+750.06	639345.5	7214404.4

THERMISTOR LOCATION TABLE

NAME	STATION	EASTING	NORTHING
TH92	60+092	639325.0	7213763.8
TH185	60+185	639362.9	7213848.4
TH485	60+485	639372.4	7214140.7
TH695	60+695	639352.5	7214349.8
TH842	60+842	639337.9	7214496.1

INCLINOMETER LOCATION TABLE

NAME	STATION	EASTING	NORTHING
ED-IN-705	60+704.80	639351.5	7214359.6
ED-IN-495	60+495	639371 *	7214151 *
ED-IN-195	60+194.69	639366.6	7213857.3

* COORDINATE ASSUMED, TO BE CONFIRMED BY SURVEY

SURVEY CONTROL POINT LOCATION TABLE

NAME	EASTING	NORTHING
NORTH MONUMENT	639262.47	7214503.99
SOUTH MONUMENT	639196.64	7213743.54

SURVEY MONUMENT LOCATION

NAME	EASTING	NORTHING	ELEVATION
100	639358.35	7213839.36	136.9
102	639370.15	7213866.88	136.7
103	639381.83	7213894.61	136.6
104	639387.41	7213996.69	136.9
105	639383.36	7214036.44	136.8
106	639379.70	7214071.11	136.9
107	639376.88	7214100.86	136.7
108	639373.20	7214131.49	136.6
110	639369.23	7214160.27	136.6
111	639367.55	7214195.40	136.3
112	639363.28	7214235.42	136.5
113	639358.81	7214280.23	136.7
114	639354.14	7214324.81	136.8
116	639349.76	7214369.55	136.8
117	639344.85	7214419.42	136.7
118	639340.03	7214468.97	136.7

DRAWING NO.	REFERENCES
2100-30	NORTH SHALLOW INSTRUMENTATION DETAIL
2100-29	NORTH CHANNEL INSTRUMENTATION DETAIL
2100-28	SOUTH CHANNEL INSTRUMENTATION DETAIL
2100-17	INSTRUMENTATION TYPICAL SECTION AND GROUTING PLAN

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	30OCT09	JEK	AS-BUILT	SWD		
0	01AUG08	BW	ISSUED FOR CONSTRUCTION	EA	BW	TLE

STAMP

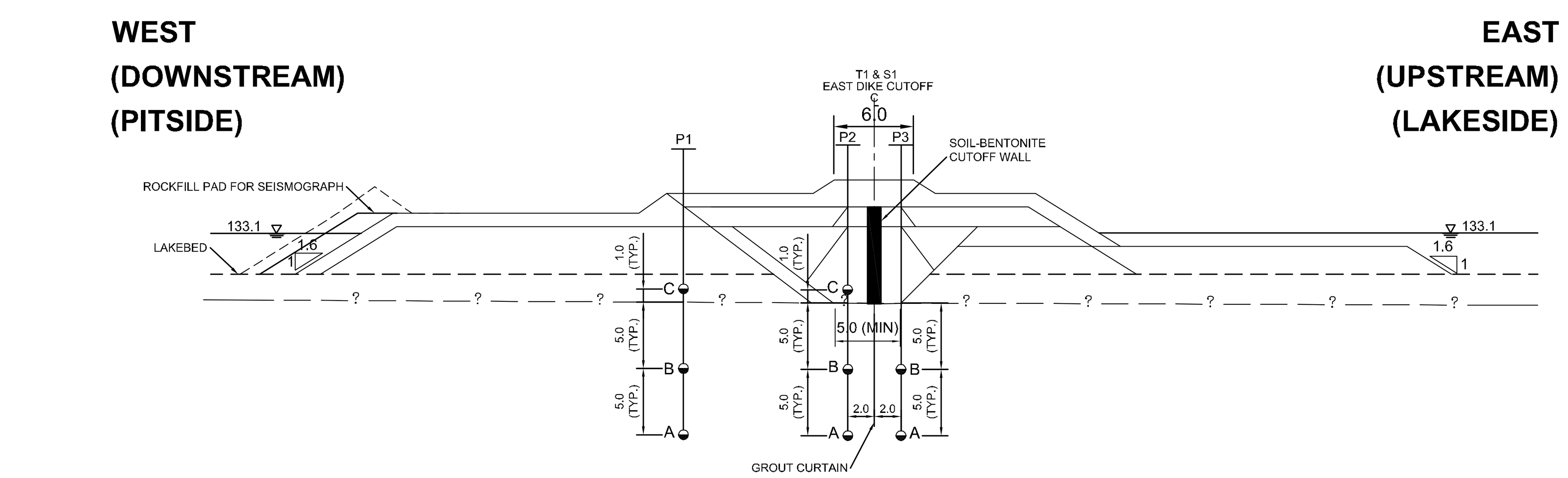
ORIGINAL SIGNED AND SEALED

PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE INSTRUMENTATION PLAN

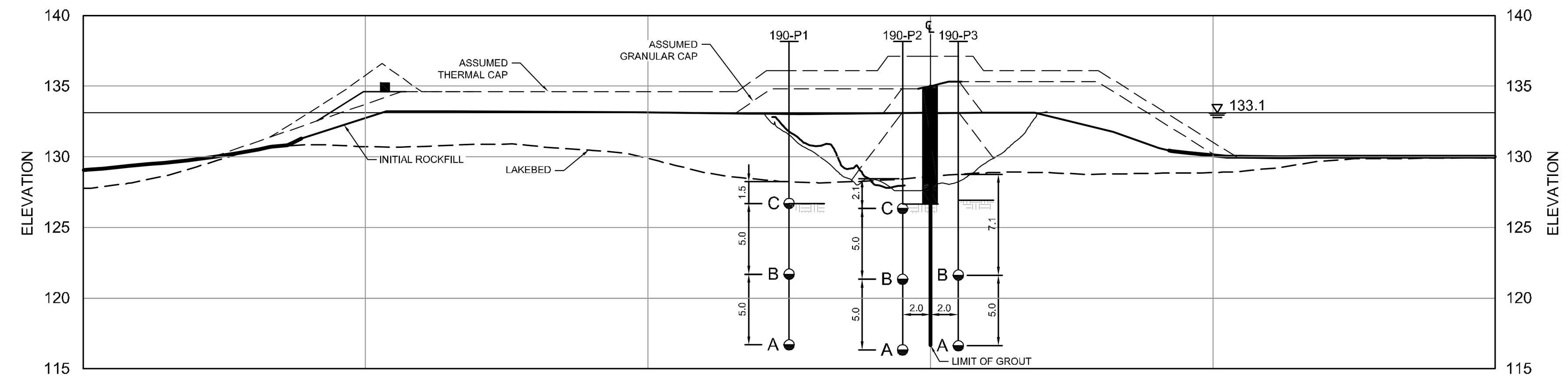
Golder Associates

PROJECT No.	07-1413-0074/2800		FILE No. 0814280028-4200-ASBUILT-16
DESIGN	BW	16JUN08	SCALE AS SHOWN REV. 1
CADD	MJH	04JUL08	2100-16
CHECK	BW	25JUL08	
REVIEW	TLE	25JUL08	



A - TYPICAL SECTION - INSTRUMENTATION

SCALE 1:400



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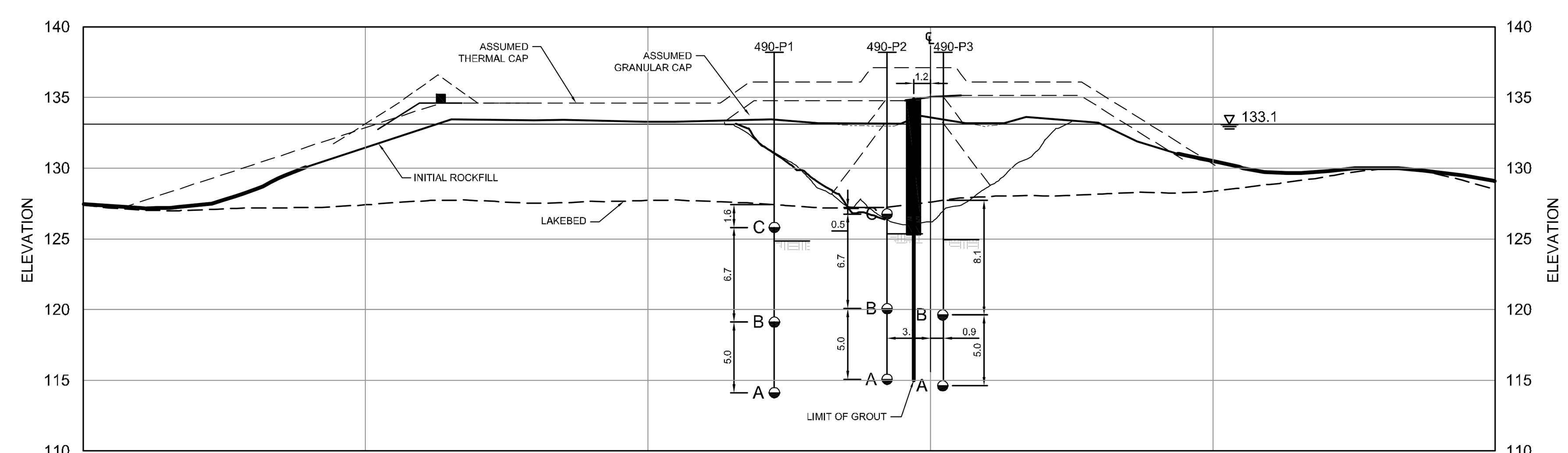
STA: 60+190

SCALE 1:400



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STA: 60+490

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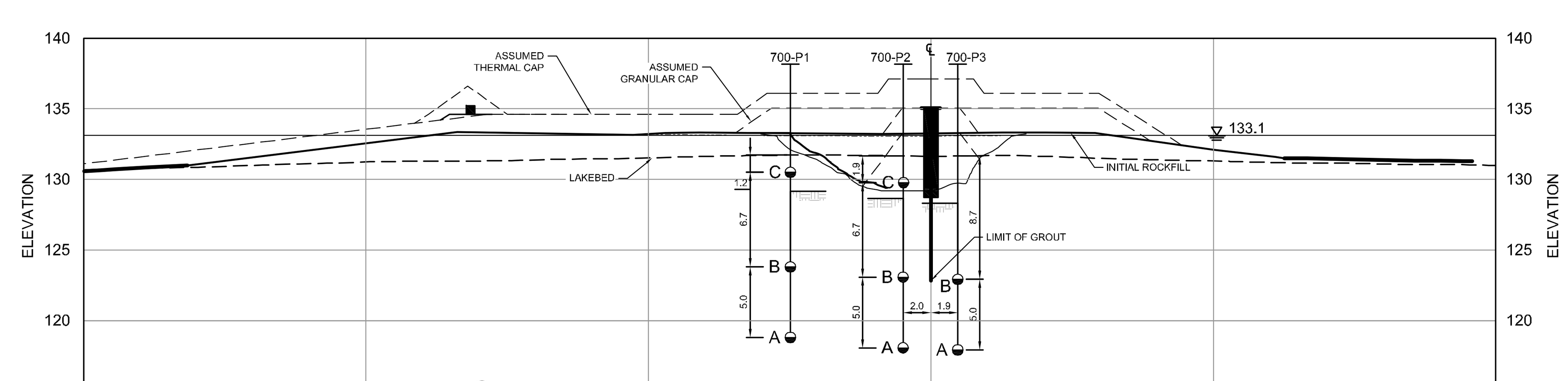
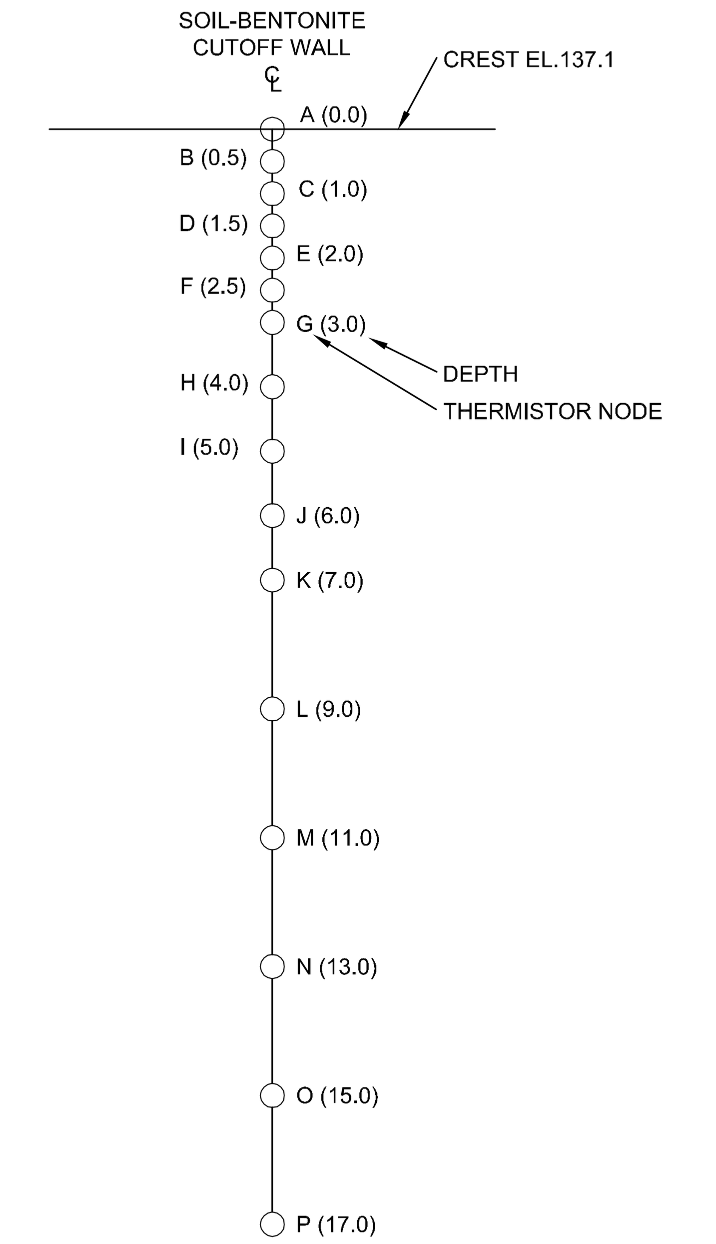


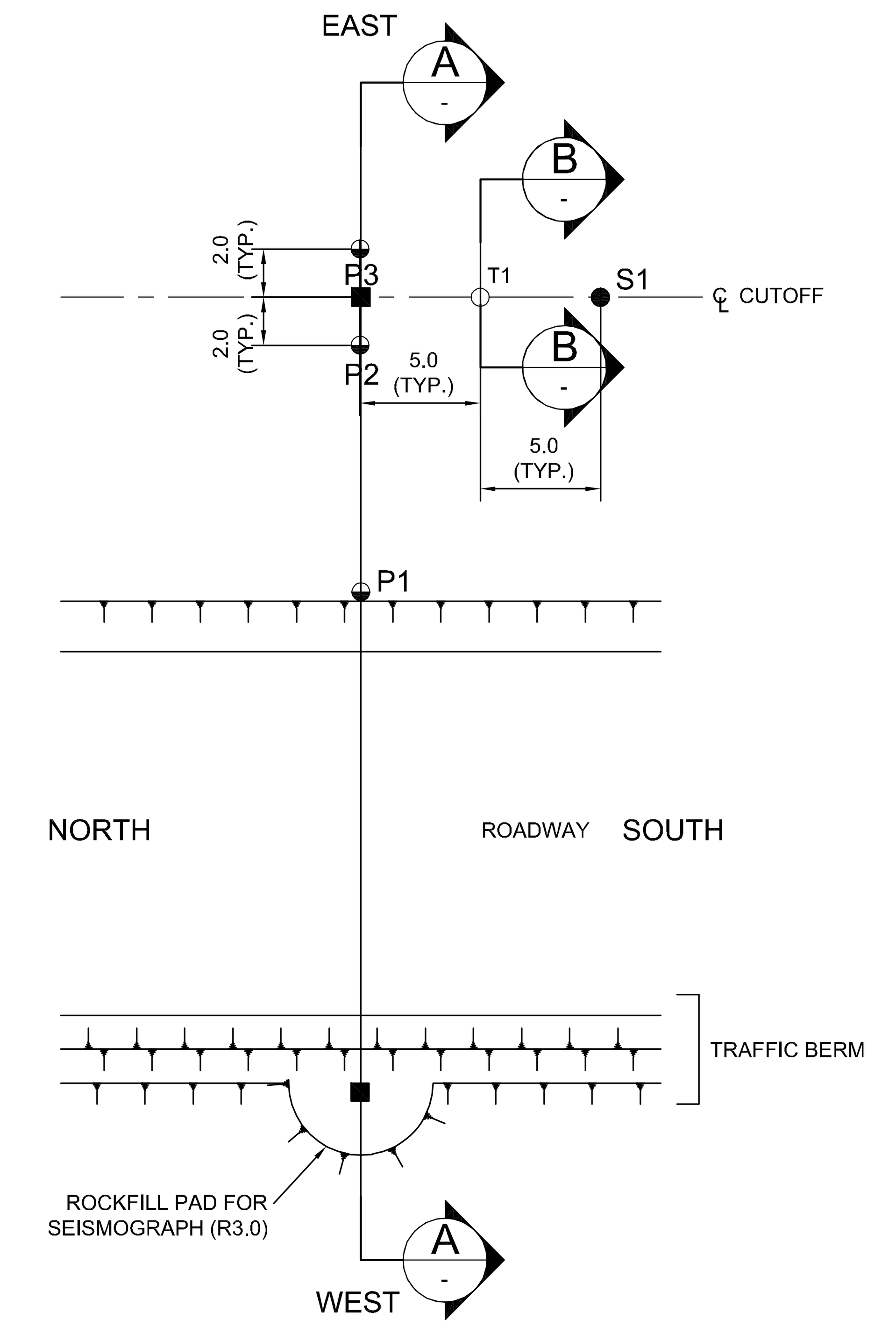
3 - SECTION - INSTRUMENTATION
STA: 60+700

SCALE 1:400



B - TYPICAL THERMISTOR SECTION

SCALE 1:100



TYPICAL EAST DIKE DETAIL INSTRUMENTATION PLAN

NOT TO SCALE

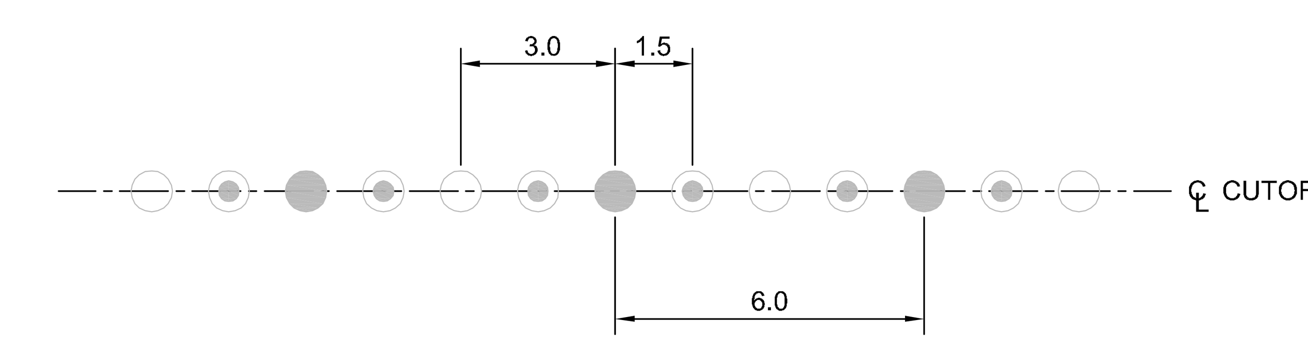
PRIMARY HOLES (6.0 SPACING)

SECONDARY HOLES (3.0 SPACING)

TERTIARY HOLES (1.5 SPACING)

QUATERNARY HOLES WHERE NEEDED

REFER TO DRAWING 2100-24 FOR GROUTING DETAILS



GROUTING PLAN

NOT TO SCALE

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER
P 049
GOLDER ASSOCIATES LTD.

LEGEND:

- P1 PIEZOMETER.
- T1 THERMISTOR STRING INSTALLATION
- S1 PENDING SLOPE INCLINOMETER INSTALLATION
- PENDING SEISMOGRAPH STATION

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (MASL) UNLESS OTHERWISE NOTED.
3) LAKEBED SURFACE INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
4) EAST DIKE SURVEY ABOVE 133.1 masl PROVIDED BY AEM ON AUGUST 21, 2008 AND FERNAND GILBERT LIMITÉ ON AUGUST 15, SEPTEMBER 18 & 23, 2008. IN AREAS OF COMMON COVERAGE, THE MOST RECENT DATA IS PRESENTED. EAST DIKE SURVEY BELOW 133.1 masl BY GOLDER ASSOCIATES LTD. ON OCT 28, 2008. INTERPRETATION WAS USED IN AREAS OF NON-SURVEYED AREAS.
5) AS-BUILT THERMISTOR STRING, PIEZOMETER AND INCLINOMETER INSTALLATION DETAILS AT EACH LOCATION SHOULD REFER TO THE EAST DIKE AS-BUILT REPORT AND DRAWINGS 2100-28, 2100-29 AND 2100-30.
6) THERMAL CAP AND GRANULAR CAP SURVEY DATA NOT PROVIDED AT THE TIME OF ISSUE OF THIS DRAWING. THE DESIGN LAYOUT HAS BEEN ASSUMED FOR THESE DRAWINGS. AS-BUILT SURVEY SHOULD BE PROVIDED AND THESE DRAWINGS UPDATED ONCE AVAILABLE.

REDUCED SIZE NOT TO SCALE

ORIGINAL SIGNED AND SEALED

PROJECT: AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE: **EAST DIKE INSTRUMENTATION TYPICAL SECTION AND GROUTING PLAN**

DRAWING NO.	REFERENCES
2100-16	INSTRUMENTATION PLAN

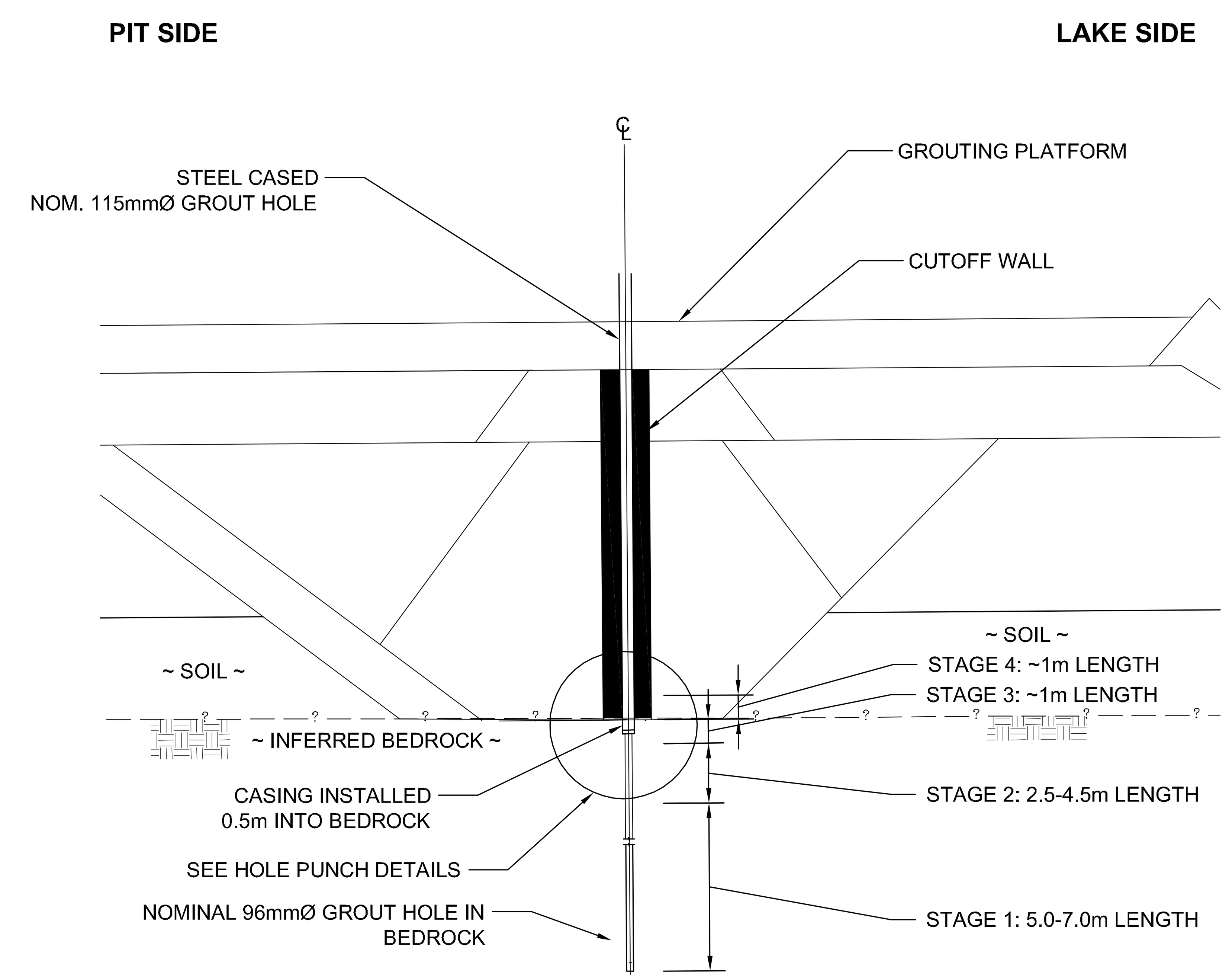
REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	30OCT09	JEK	AS-BUILT	SWD		
0	01AUG08	BW	ISSUED FOR CONSTRUCTION	EA	BW	TLE

PROJECT No. 07-1413-0074/2800		
DESIGN	BW	16JUN08
CADD	MJH	04JUL08
CHECK	BW	25JUL08
REVIEW	TLE	25JUL08

FILE No. 0814280028-4200-ASBUILT-17
SCALE AS SHOWN REV. 1

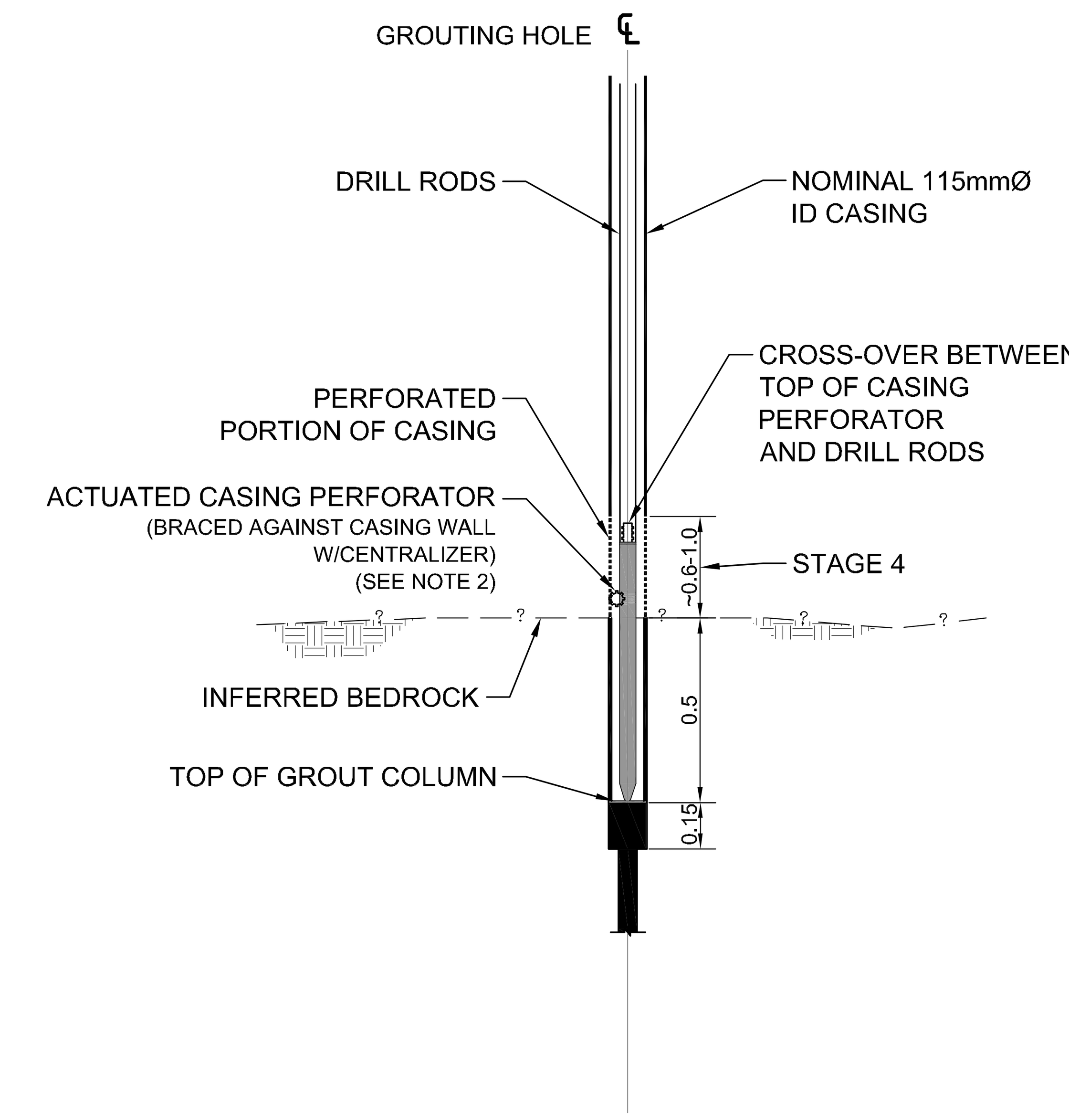
2100-17

REVISION DATE:09/10/30 11:37AM By: jkowncki CADD FILE: N:\Bur-Graphics\Projects\2007\1413\07-1413-0074\Drafting\2800-As-Built\Apr2009\0814280028-4200-ASBUILT-17.dwg



1
-
TYPICAL GROUT CURTAIN DETAIL (WITH CUTOFF WALL EXTENDED TO BEDROCK)

SCHEMATIC ONLY (NOT TO SCALE)



2
-
HOLE PUNCH DETAIL

SCHEMATIC ONLY (NOT TO SCALE)

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER
P 049
GOLDER ASSOCIATES LTD.

NOTES:
1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) THE CASING PERFORATOR HAD CAPABILITY OF PUNCHING SINGLE ROWS OF 6mm WIDE, 30mm LONG SLOTS SPACED AT 35 mm THROUGH STEEL CASING.

REDUCED SIZE NOT TO SCALE

PROJECT
AEM
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE
GROUTING DETAILS

DRAWING NO.	REFERENCES
2100-17	INSTRUMENTATION TYPICAL SECTION AND GROUTING PLAN

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
0	30OCT09	VTR	AS-BUILT	SWD		

STAMP
ORIGINAL SIGNED AND SEALED

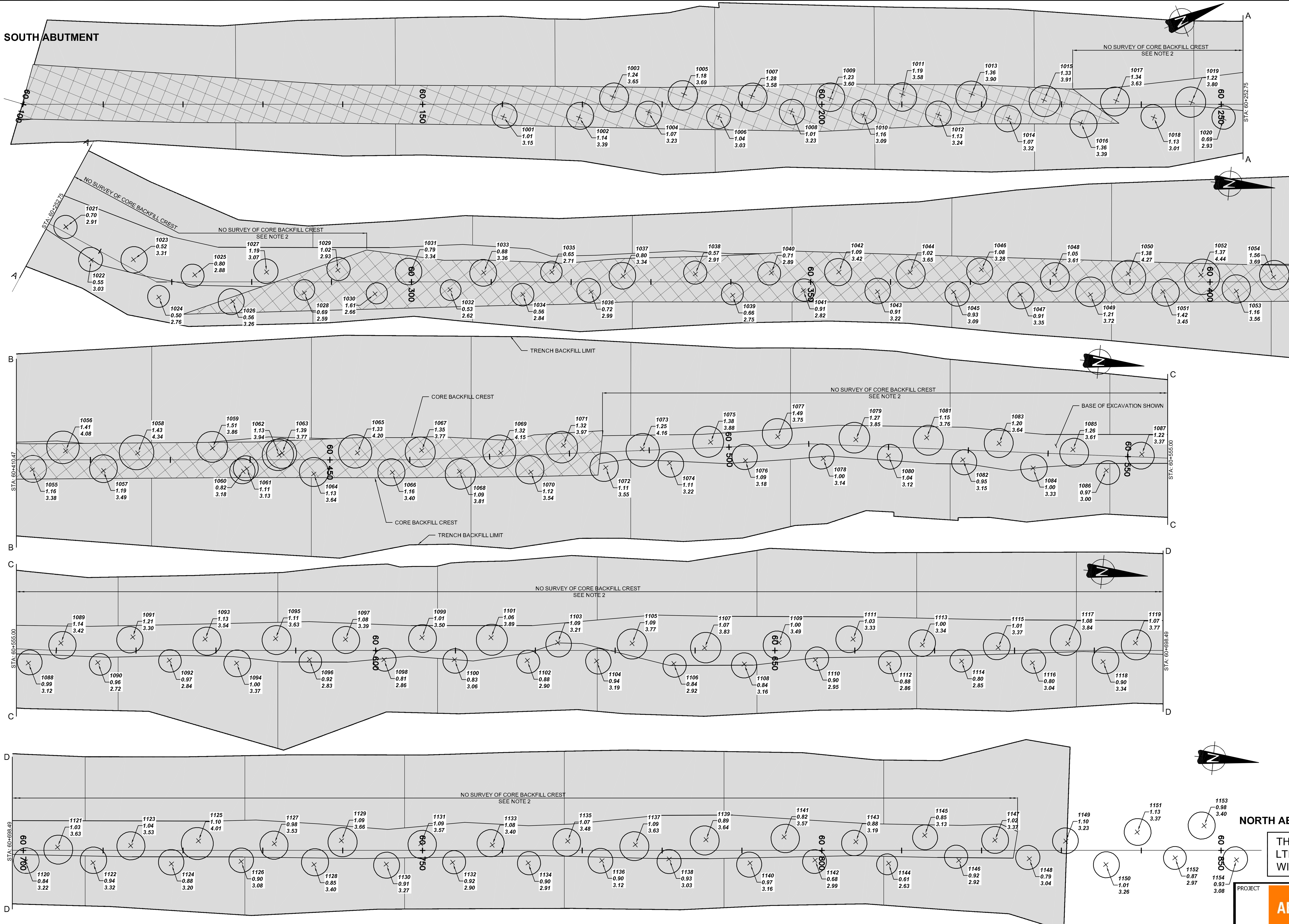
Golder Associates

PROJECT No.	07-1413-0074/2800	
DESIGN	VTR	28MAY09
CADD	SWD	28MAY09
CHECK	JEK	30OCT09
REVIEW	TLE	30OCT09

FILE No. 0814280028-4200-ASBUILT-24
SCALE AS SHOWN REV. 0

2100-24

REVISION DATE: 09/10/30 02:12PM By: jkoenicki CADD FILE: N:\Bur-Graphics\Projects\2007\1413\07-1413-0074\Drafting\2800-As-Built\Apr2009\0814280028-4200-ASBUILT-24.dwg



LEGEND:

PHASE 1 AND 2
1001 CRATER NUMBER
1.01 CRATER DEPTH
3.15 CRATER DIAMETER

CORE BACKFILL

TRENCH BACKFILL LIMITS

NOTES:

1) SURVEY PROVIDED BY FERNAND GILBERT LTÉE SEPTEMBER 2008.
2) BASED ON VISUAL OBSERVATION, THE CREST OF CORE BACKFILL MEETS THE MINIMUM 4.0m WIDTH IN AREAS OF UNSURVEYED AREAS.

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER
P 049
GOLDER ASSOCIATES LTD.

REDUCED SIZE NOT TO SCALE

0 2.5 5 7.5 10 12.5
SCALE: 1:250

PROJECT
AEM
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE
DENSIFICATION PLAN
PHASE 1 AND PHASE 2

PROJECT No.	07-1413-0074/2800		FILE No.0814280028-4200-ASBUILT-25	
DESIGN	JEK	30OCT09	SCALE 1:250	REV. 0
CADD	MSH	30OCT09		
CHECK	JEK	30OCT09	2100-25	
REVIEW	JCC	30OCT09		

STAMP

ORIGINAL SIGNED AND SEALED

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
0	30OCT09	JEK	AS-BUILT	MSH		

DRAWING NO. | REFERENCES

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LEGEND:

1001 CRATER NUMBER
1.01 CRATER DEPTH
3.15 CRATER DIAMETER

CORE BACKFILL

TRENCH BACKFILL LIMITS

NOTES:

1) SURVEY PROVIDED BY FERNAND GILBERT LTÉE SEPTEMBER 2008.
2) BASED ON VISUAL OBSERVATION, THE CREST OF CORE BACKFILL MEETS THE MINIMUM 4.0m WIDTH IN AREAS OF UNSURVEYED AREAS.

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER P 049
GOLDER ASSOCIATES LTD.

REDUCED SIZE NOT TO SCALE

SCALE: 1:250

PROJECT: AEM AGNICO-EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT

TITLE: **EAST DIKE DENSIFICATION PLAN PHASE 3**

PROJECT No.	07-1413-0074/2800	FILE No.0814280028-4200-ASBUILT-26
DESIGN	JEK	30OCT09
CADD	MSH	30OCT09
CHECK	JEK	30OCT09
REVIEW	JCC	30OCT09

SCALE 1:250 REV. 0

2100-26

Golder Associates

STAMP

ORIGINAL SIGNED AND SEALED

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
0	30OCT09	JEK	AS-BUILT	MSH		

DRAWING NO.	REFERENCES

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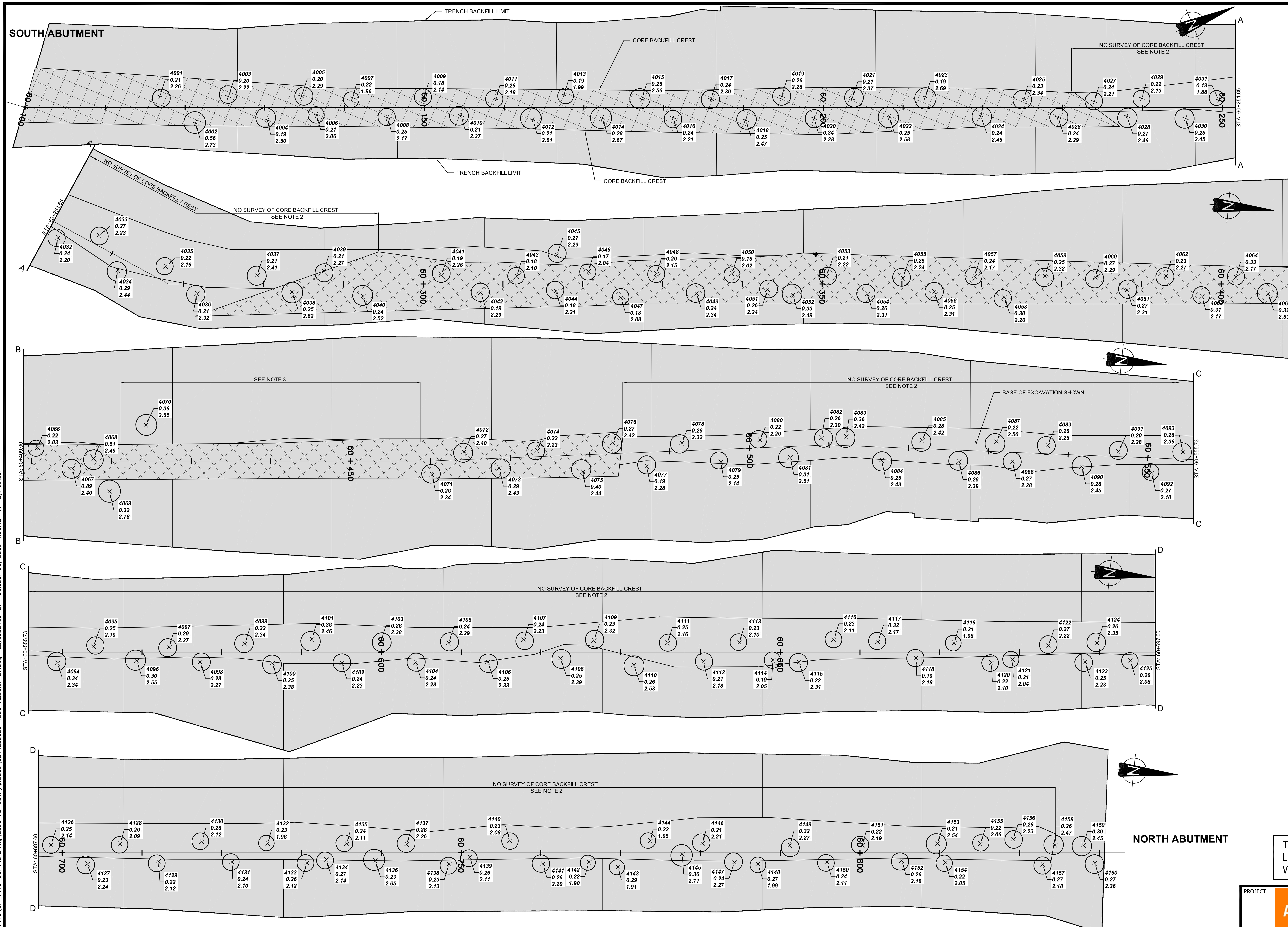

LEGEND:

1001	CRATER NUMBER
1.01	CREATER DEPTH
3.15	CREATER DIAMETER
	CORE BACKFILL
	TRENCH BACKFILL LIMITS

NOTES:

1) SURVEY PROVIDED BY FERNAND GILBERT LTÉE SEPTEMBER 2008.
2) BASED ON VISUAL OBSERVATION, THE CREST OF CORE BACKFILL MEETS THE MINIMUM 4.0m WIDTH IN AREAS OF UNSURVEYED AREAS.
3) SURVEY OF CRATERS BETWEEN STATION 60+420 AND STATION 60+460 WERE UNAVAILABLE AT THE TIME OF THIS DRAWING ISSUE.

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER
P 049
GOLDER ASSOCIATES LTD.

REDUCED SIZE NOT TO SCALE

0 2.5 5 7.5 10 12.5
SCALE: 1:250

PROJECT
AEM
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE DENSIFICATION PLAN PHASE 4

PROJECT No.	07-1413-0074/2800	
DESIGN	JEK	30OCT09
CADD	MSH	30OCT09
CHECK	JEK	30OCT09
REVIEW	JCC	30OCT09

FILE No.0814280028-4200-ASBUILT-27
SCALE 1:250 REV. 0
2100-27

Golder Associates

STAMP
ORIGINAL SIGNED AND SEALED

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
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DRAWING NO.	REFERENCES

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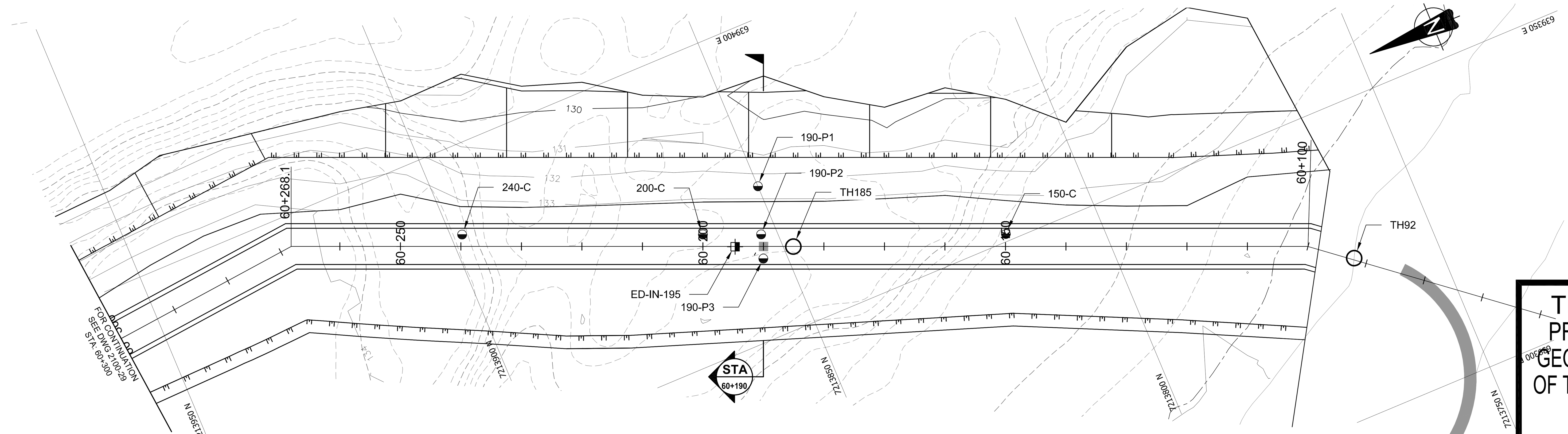


SOUTH CHANNEL

SCALE: 1:500

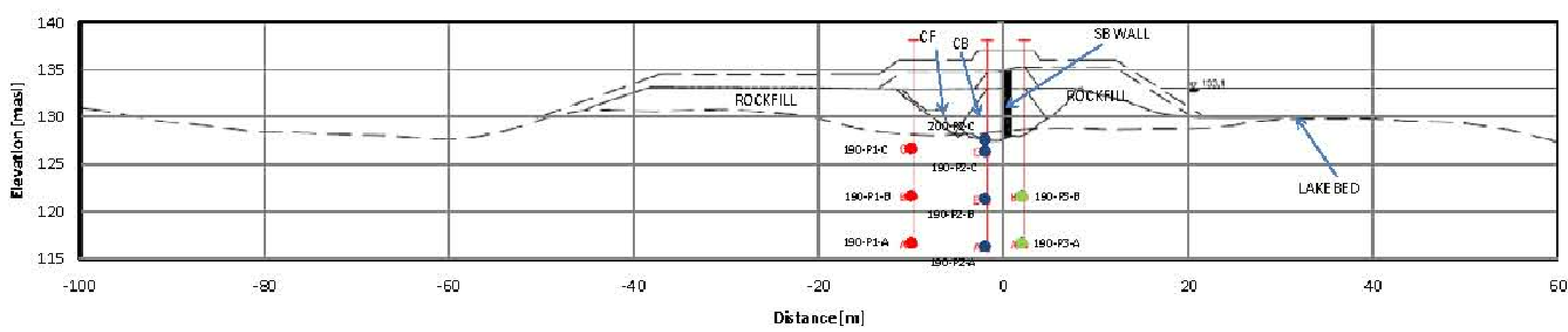
LEGEND

	LAND-BASED TOPOGRAPHIC MAJOR CONTOURS INTERVAL 10m
	LAND-BASED TOPOGRAPHIC MINOR CONTOURS INTERVAL 2m
	BATHYMETRIC MAJOR CONTOURS INTERVAL 2m
	BATHYMETRIC MINOR CONTOURS INTERVAL 0.5m
	SHORE LINE
	PIT FOOTPRINT
	EXISTING THERMISTOR
	INCLINOMETER
	PENDING SEISMOGRAPH LOCATION
	PEIZOMETER

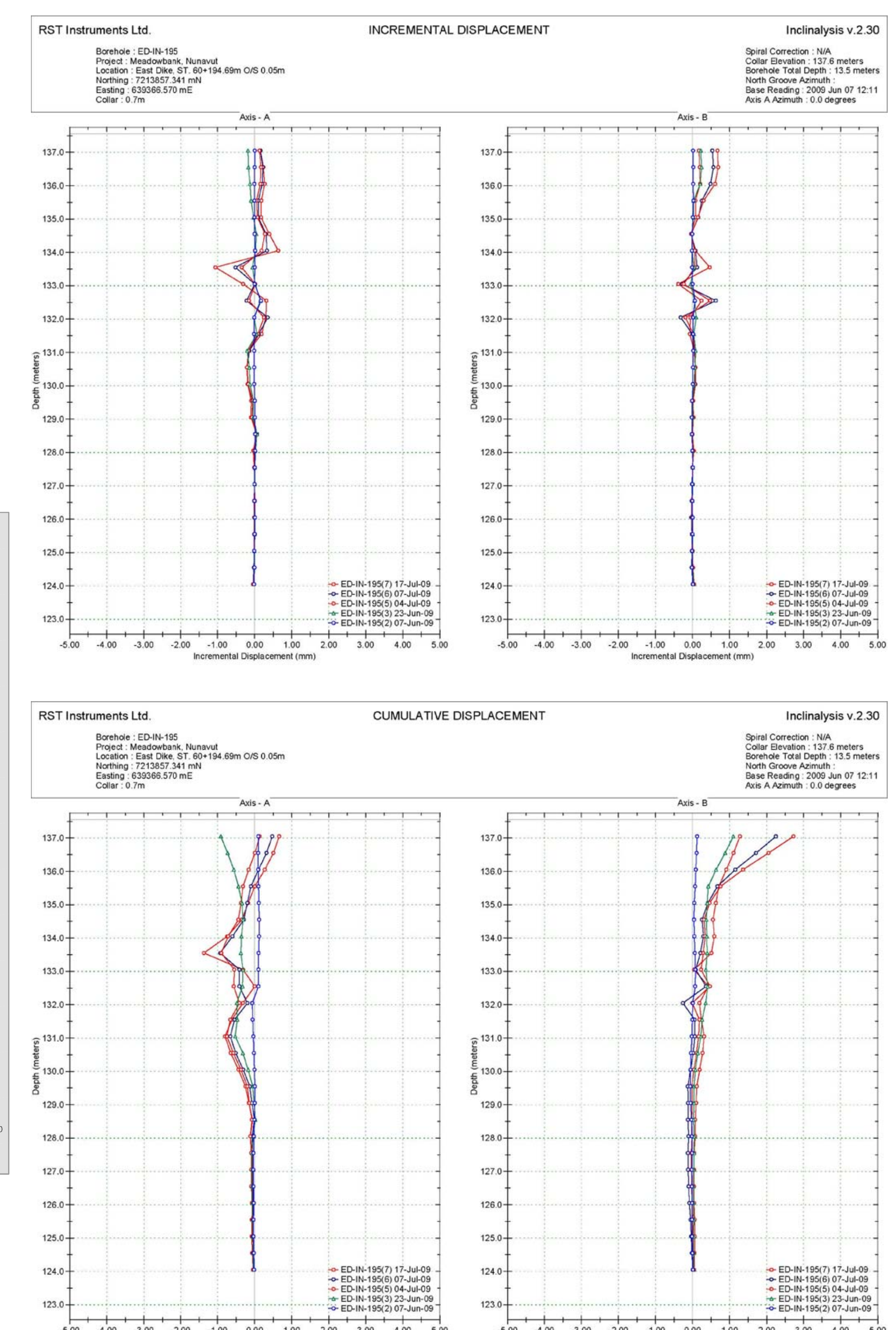
NOTES

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED. COORDINATE SYSTEM IS NAD83 UTM ZONE 14.
2) LAKEBED SURFACE INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
3) AS-BUILT INSTRUMENTATION LOCATION PROVIDED BY AEM.
4) PENDING SURVEY MONUMENT LOCATIONS NOT SHOWN. DRAWING TO BE UPDATED UPON INSTALLATION AND AS-BUILT SURVEY COMPLETED.

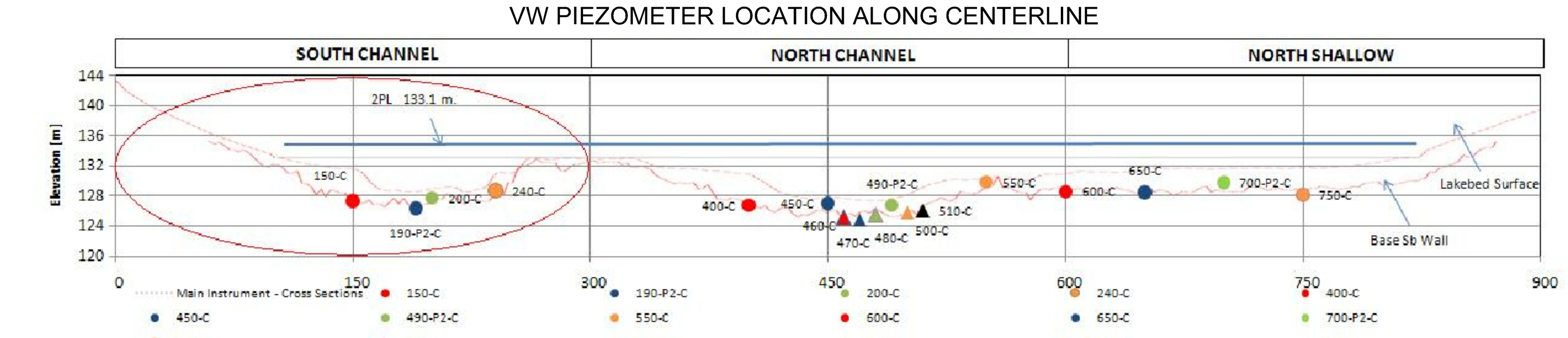
THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER P 049
GOLDER ASSOCIATES LTD.

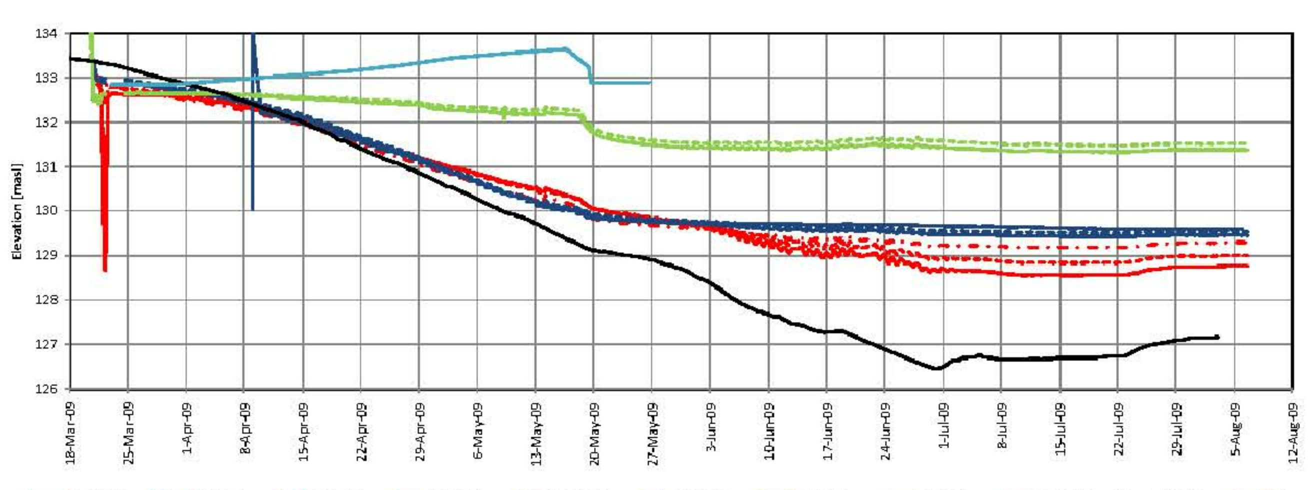


CROSS-SECTION
STA: 60+190

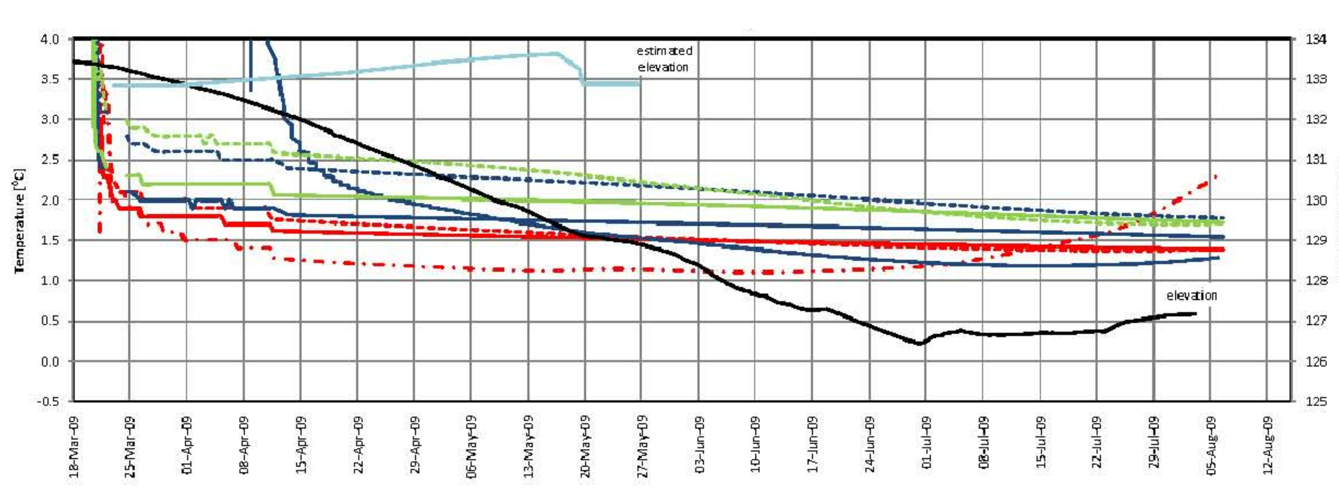


EAST DIKE PROFILE
VW PIEZOMETER LOCATION ALONG CENTERLINE

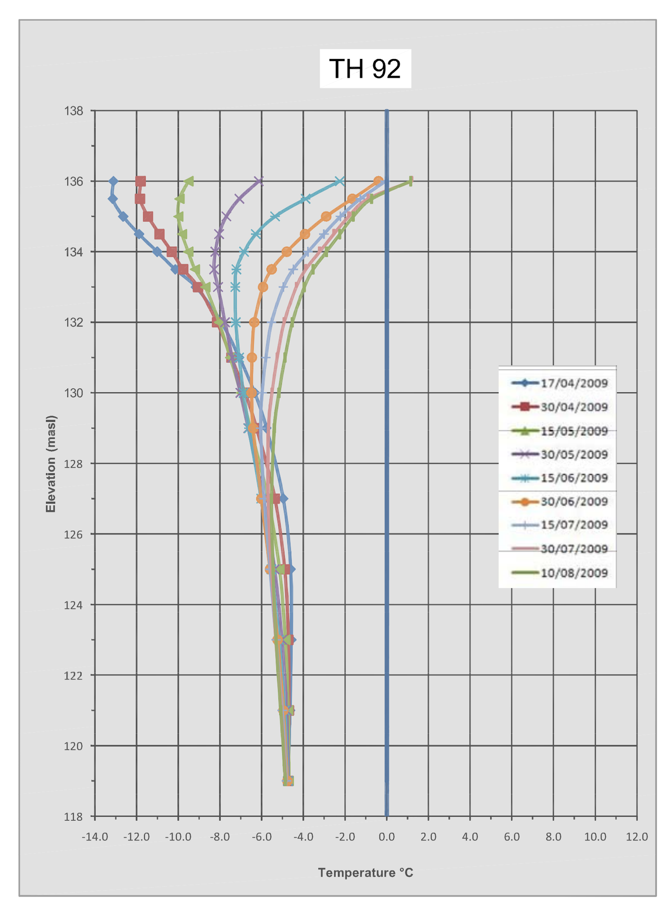


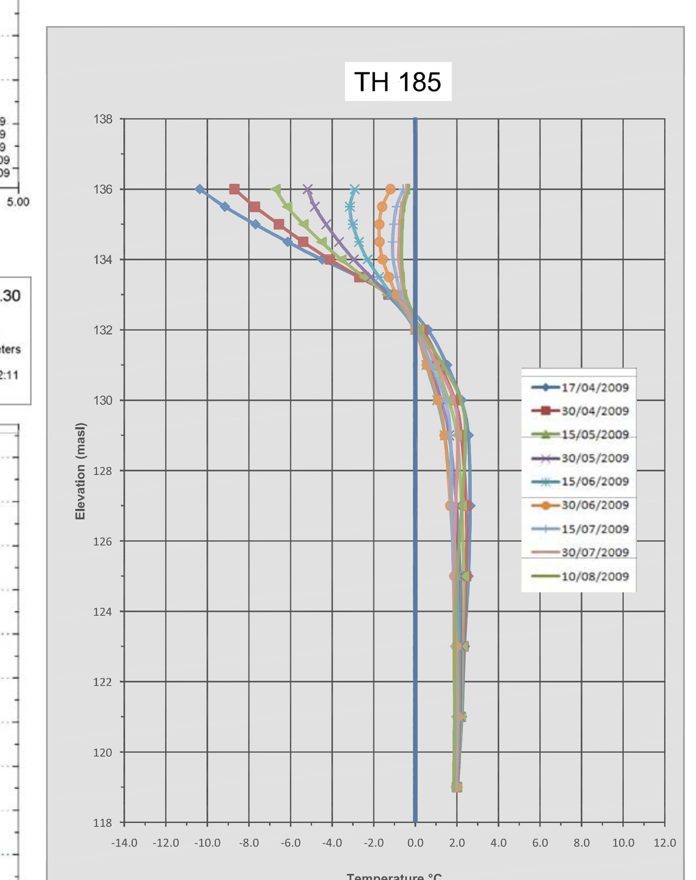


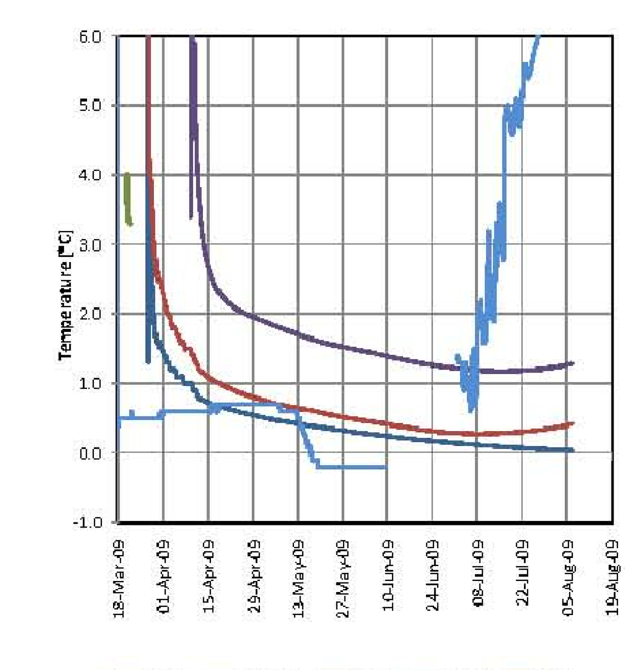
Piezometers - Total Head at Sta: 60+190



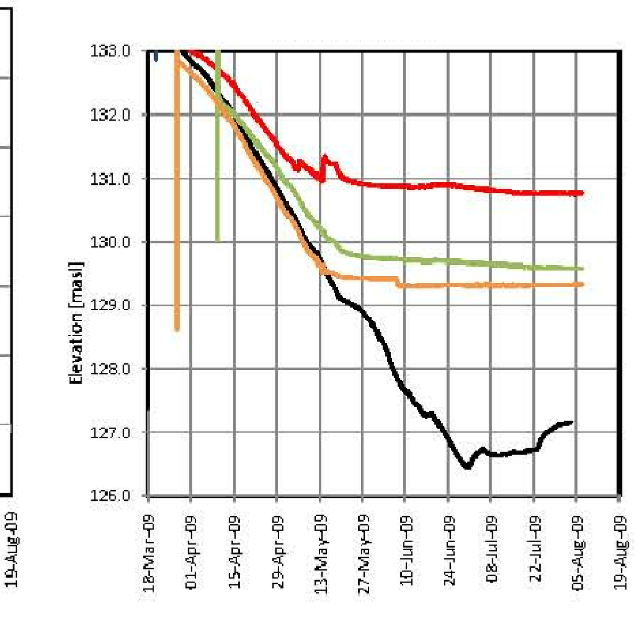
Piezometers - Temperature at Sta: 60+190







Piezometers - Temperature Along Centerline



Piezometers - Total Head Along Centerline

REDUCED SIZE NOT TO SCALE

PROJECT: AGNICO-EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT

TITLE: **EAST DIKE SOUTH CHANNEL INSTRUMENTATION DETAILS**

ORIGINAL SIGNED AND SEALED

DRAWING NO.	REFERENCES
2100-16	INSTRUMENTATION PLAN

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
0	30OCT09	JEK	AS-BUILT	MSH		

PROJECT No.	07-1413-0074/2800	
DESIGN	JEK	30OCT09
CADD	MSH	30OCT09
CHECK	JEK	30OCT09
REVIEW	JCC	30OCT09

FILE No. 0814280028-4200-ASBUILT-28
SCALE AS SHOWN REV. 0

2100-28

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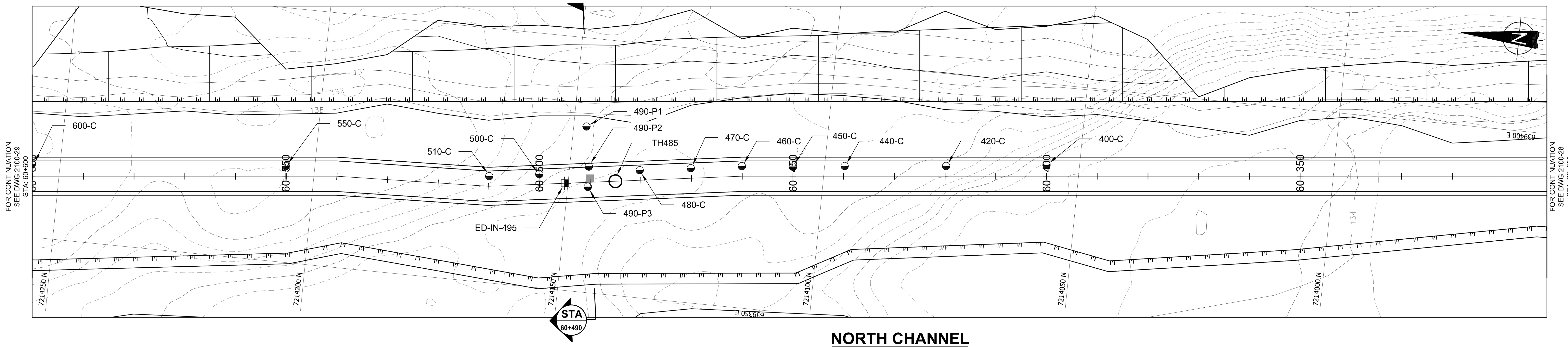

NORTH CHANNEL

SCALE: 1:500

LEGEND

- LAND-BASED TOPOGRAPHIC MAJOR CONTOURS INTERVAL 10m
- LAND-BASED TOPOGRAPHIC MINOR CONTOURS INTERVAL 2m
- BATHYMETRIC MAJOR CONTOURS INTERVAL 2m
- BATHYMETRIC MINOR CONTOURS INTERVAL 0.5m
- SHORE LINE
- PIT FOOTPRINT
- EXISTING THERMISTOR
- INCLINOMETER
- PENDING SEISMOGRAPH LOCATION
- PIEZOMETER

NOTES

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED. COORDINATE SYSTEM IS NAD83 UTM ZONE 14.
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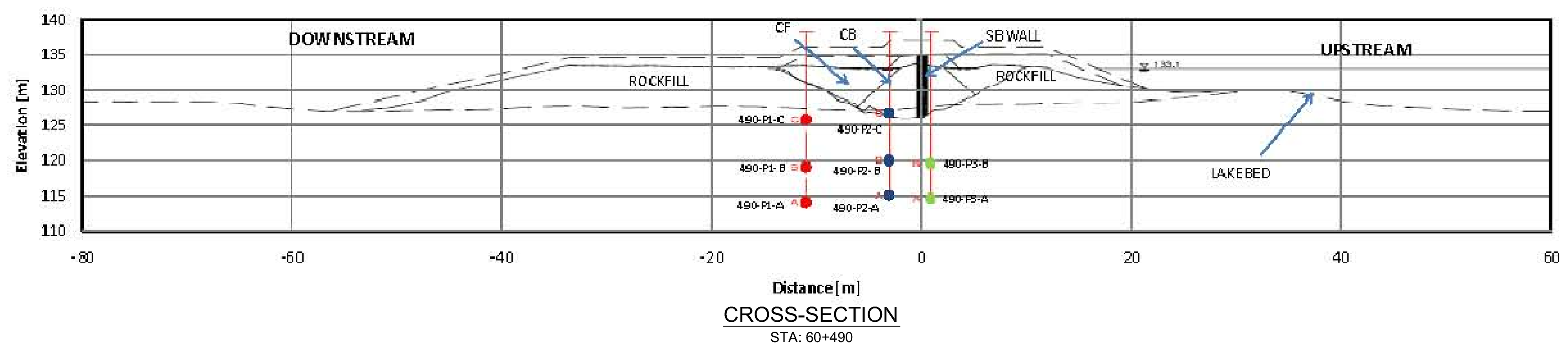
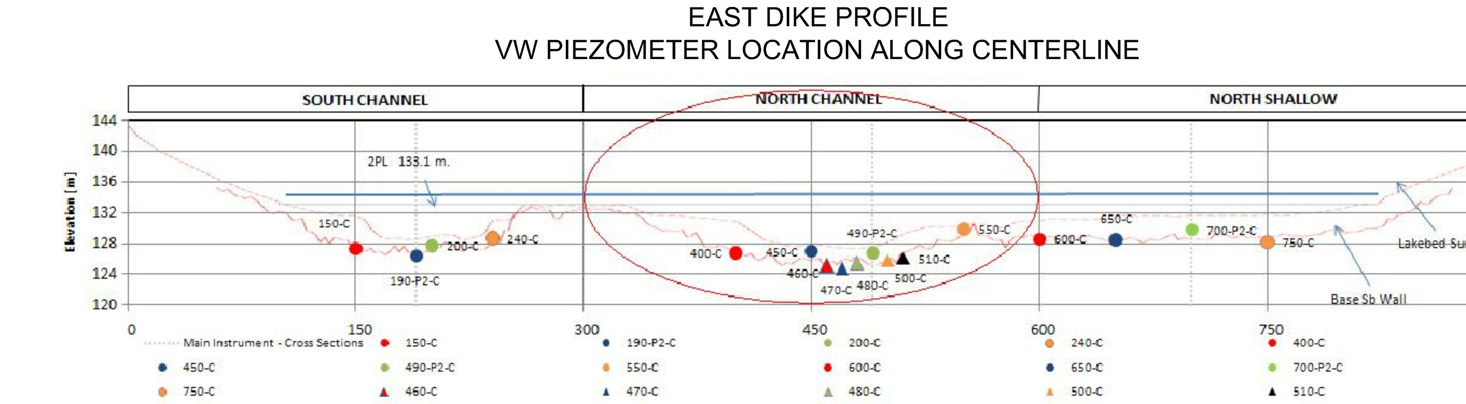
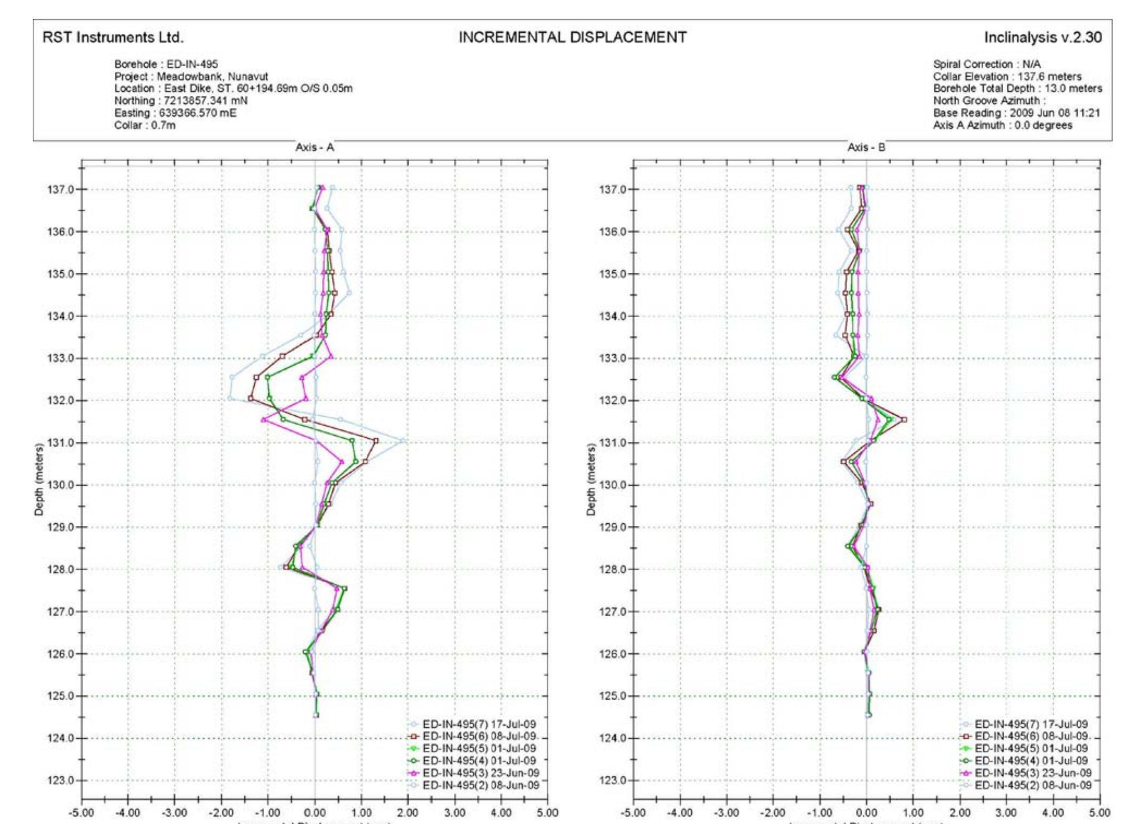
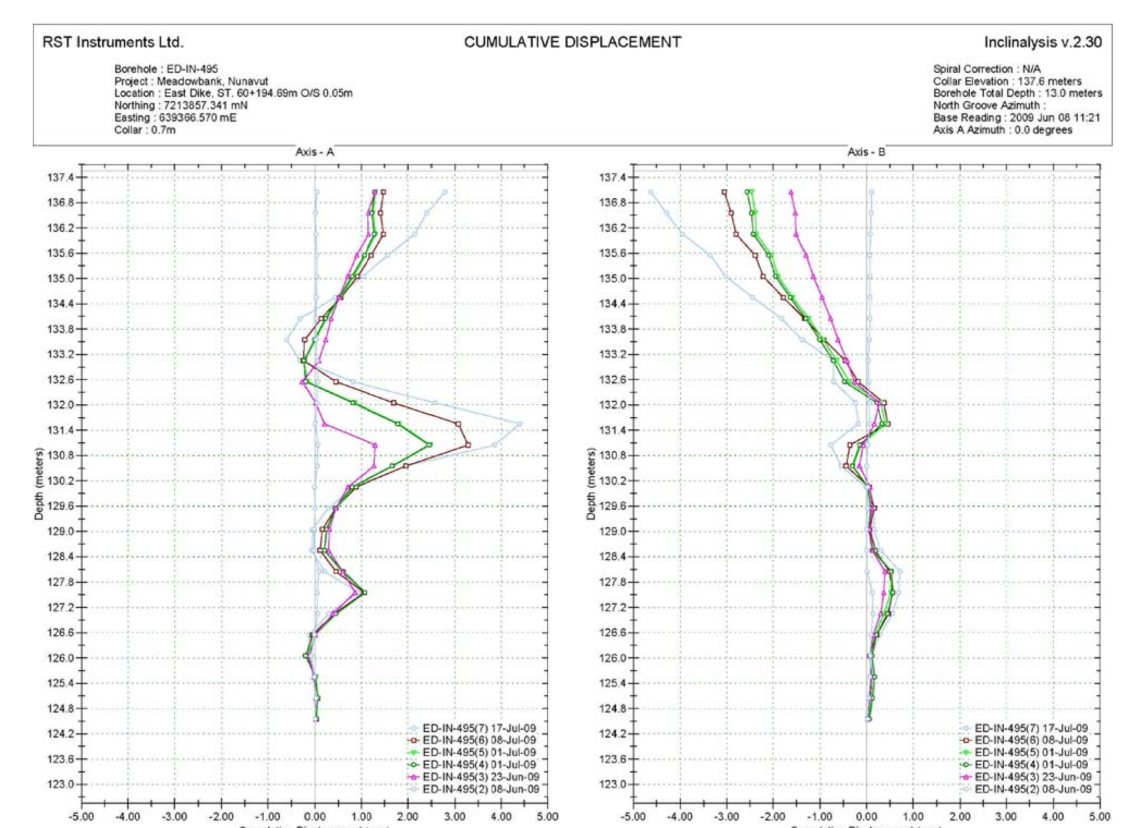
4) PENDING SURVEY MONUMENT LOCATIONS NOT SHOWN. DRAWING TO BE UPDATED UPON INSTALLATION AND AS-BUILT SURVEY COMPLETED.



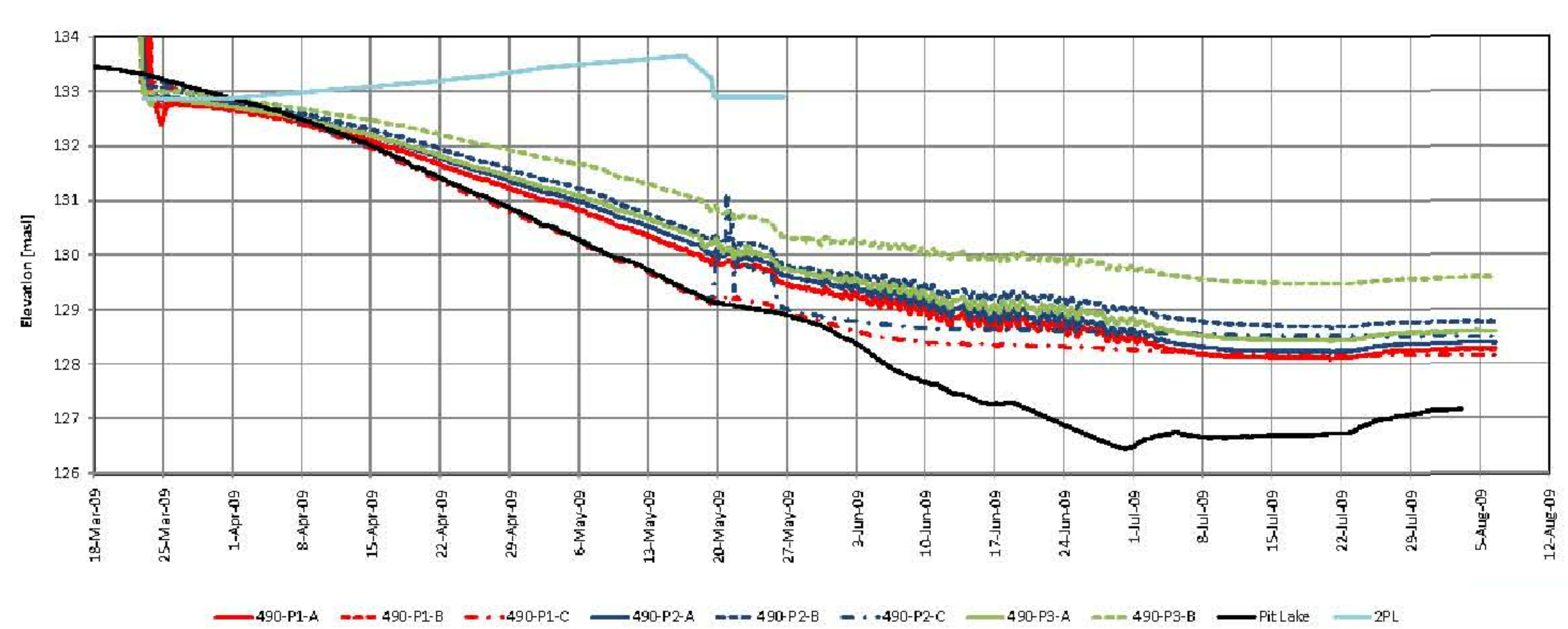
CROSS-SECTION
STA: 60+490



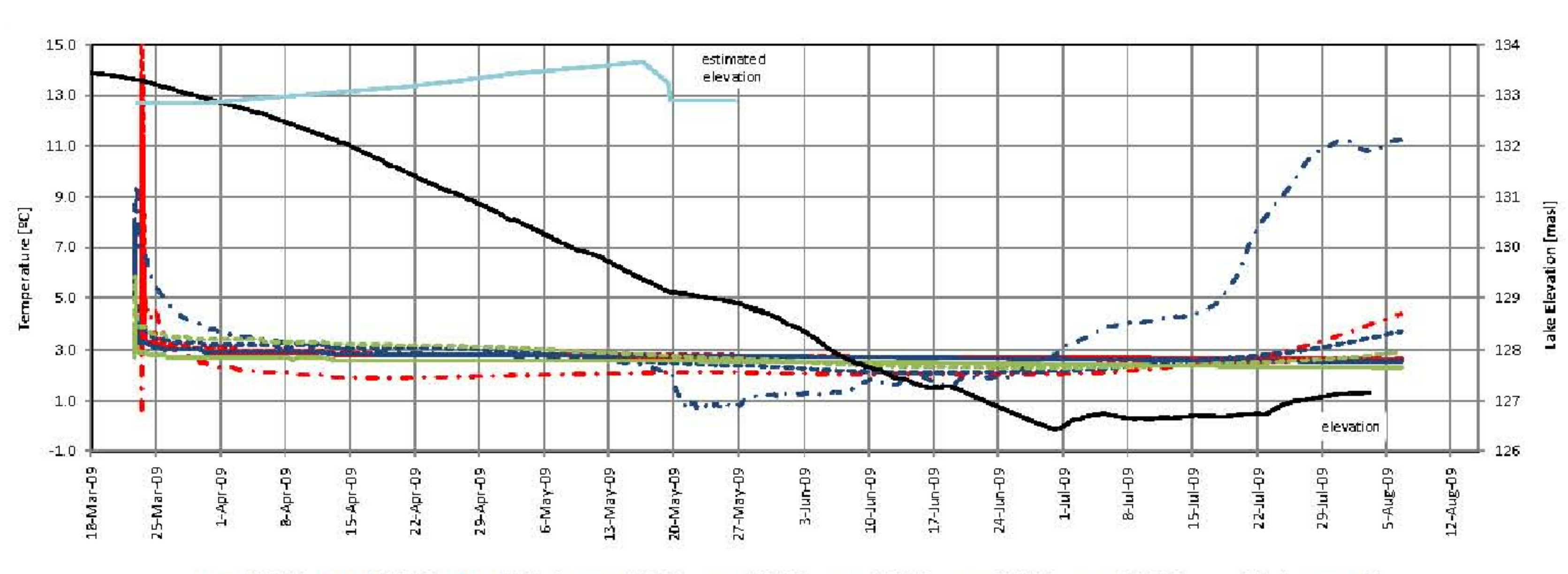




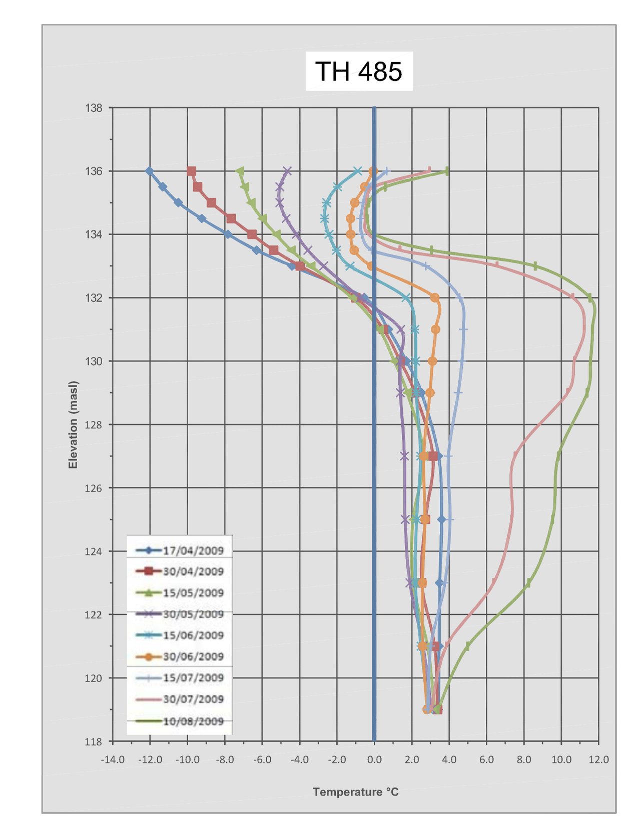
THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER
P 049
GOLDER ASSOCIATES LTD.

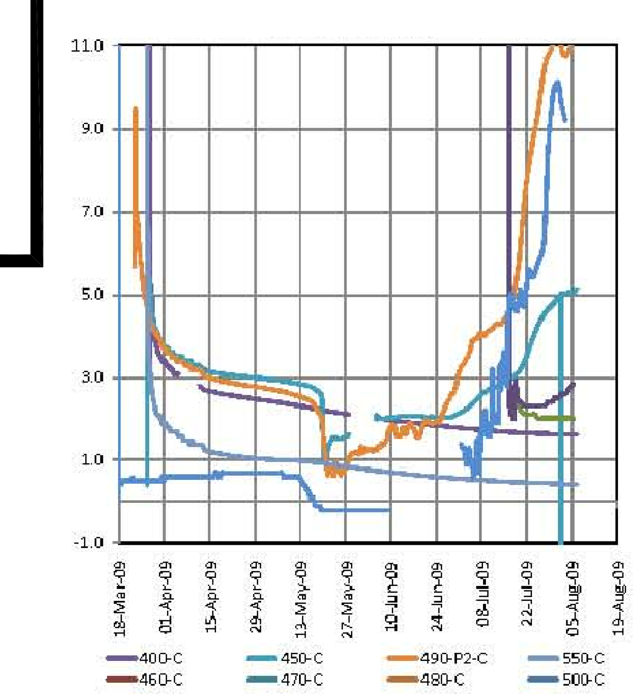


Piezometers - Total Head at Sta: 60+490

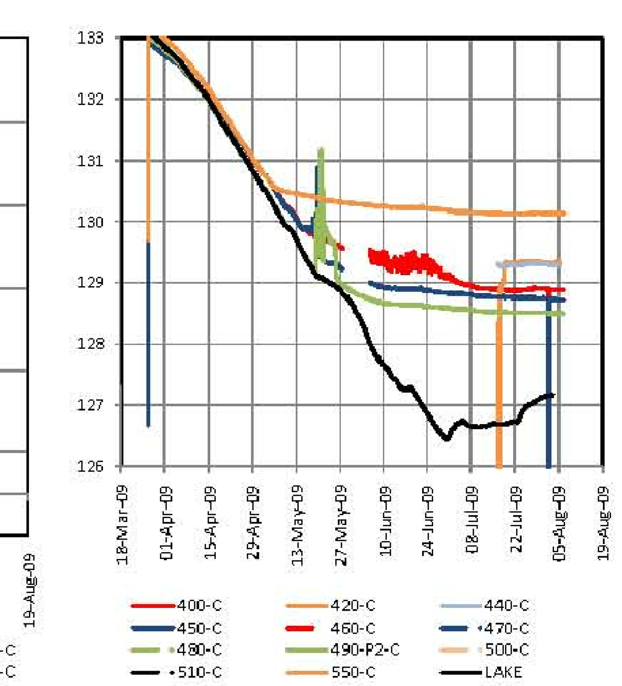


Piezometers - Temperature at Sta: 60+490





Piezometers - Temperature Along Centerline



Piezometers - Total Head Along Centerline

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REDUCED SIZE NOT TO SCALE

ORIGINAL SIGNED AND SEALED

DRAWING NO.	REFERENCES
2100-16	INSTRUMENTATION PLAN

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
0	30OCT09	JEK	AS-BUILT	MSH		

STAMP

PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE
NORTH CHANNEL
INSTRUMENTATION DETAILS

PROJECT No.	07-1413-0074/2800	FILE No.	0814280028-4200-ASBUILT-29
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CADD	MSH	30OCT09	
CHECK	JEK	30OCT09	2100-29
REVIEW	JCC	30OCT09	

Golder Associates

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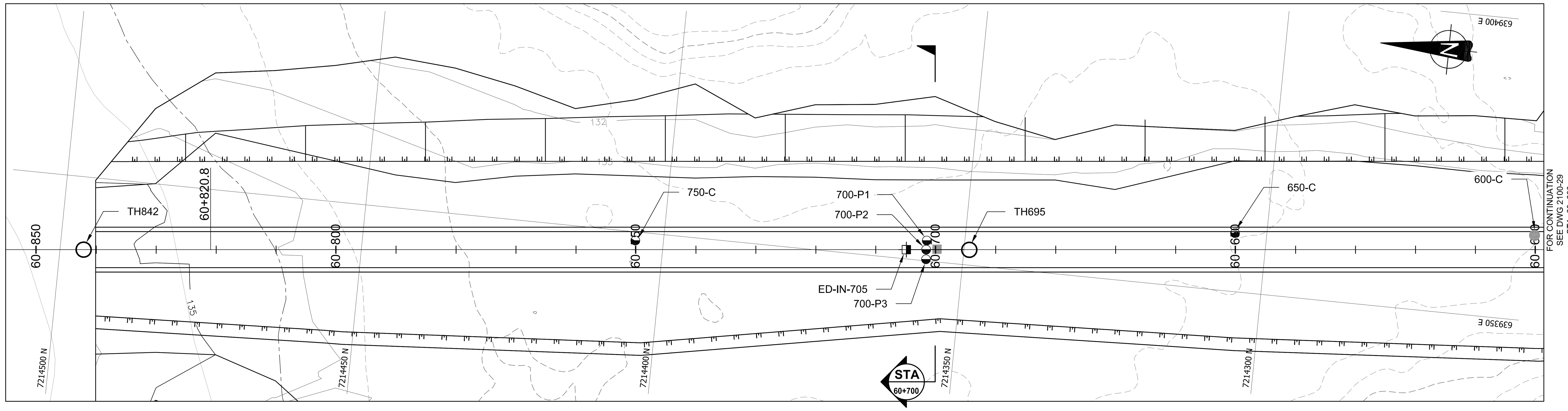

NORTH SHALLOW

SCALE: 1:500

LEGEND

- LAND-BASED TOPOGRAPHIC MAJOR CONTOURS INTERVAL 10m
- LAND-BASED TOPOGRAPHIC MINOR CONTOURS INTERVAL 2m
- BATHYMETRIC MAJOR CONTOURS INTERVAL 2m
- BATHYMETRIC MINOR CONTOURS INTERVAL 0.5m
- SHORE LINE
- PIT FOOTPRINT
- EXISTING THERMISTOR
- INCLINOMETER
- PENDING SEISMOGRAPH LOCATION
- PEIZOMETER

NOTES

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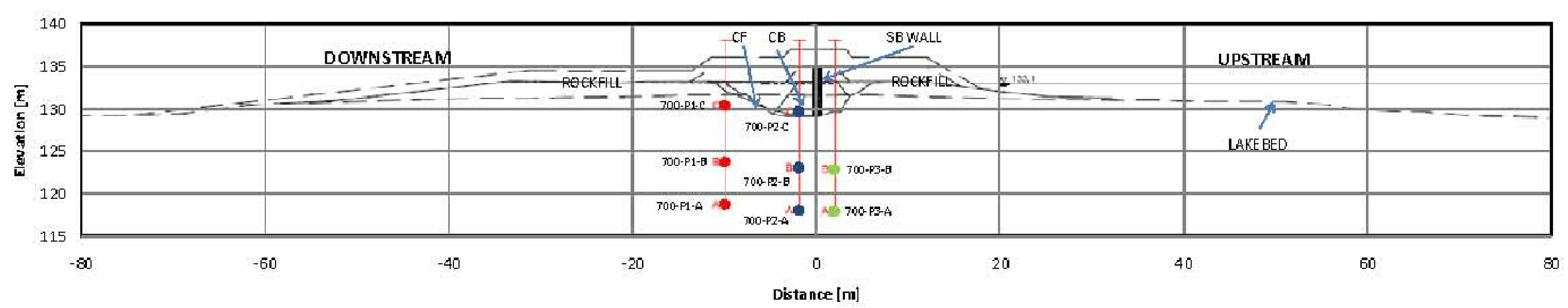
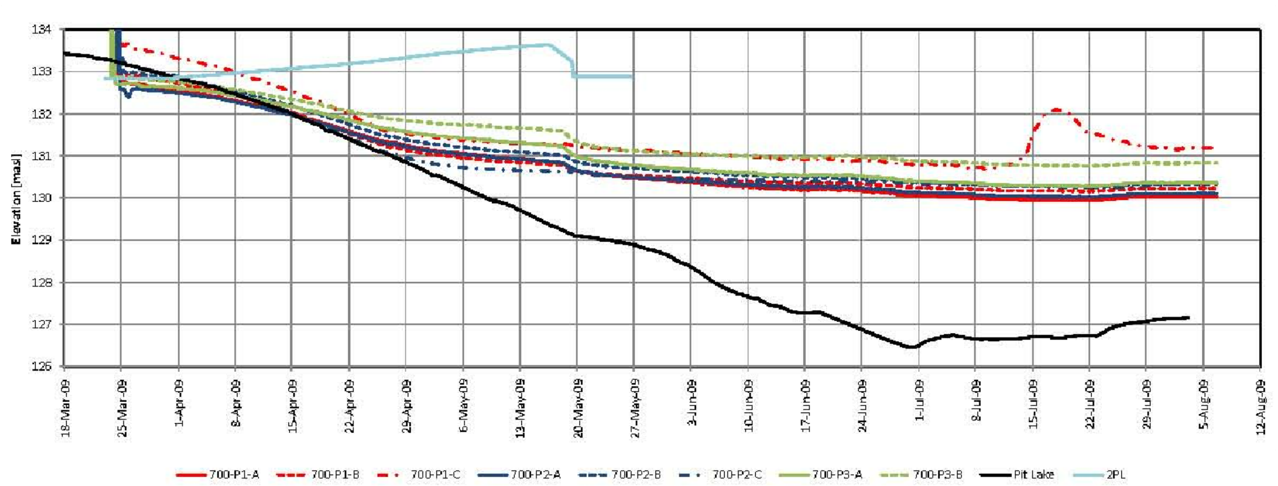
3) AS-BUILT INSTRUMENTATION LOCATION PROVIDED BY AEM.
4) PENDING SURVEY MONUMENT LOCATIONS NOT SHOWN. DRAWING TO BE UPDATED UPON INSTALLATION AND AS-BUILT SURVEY COMPLETED.

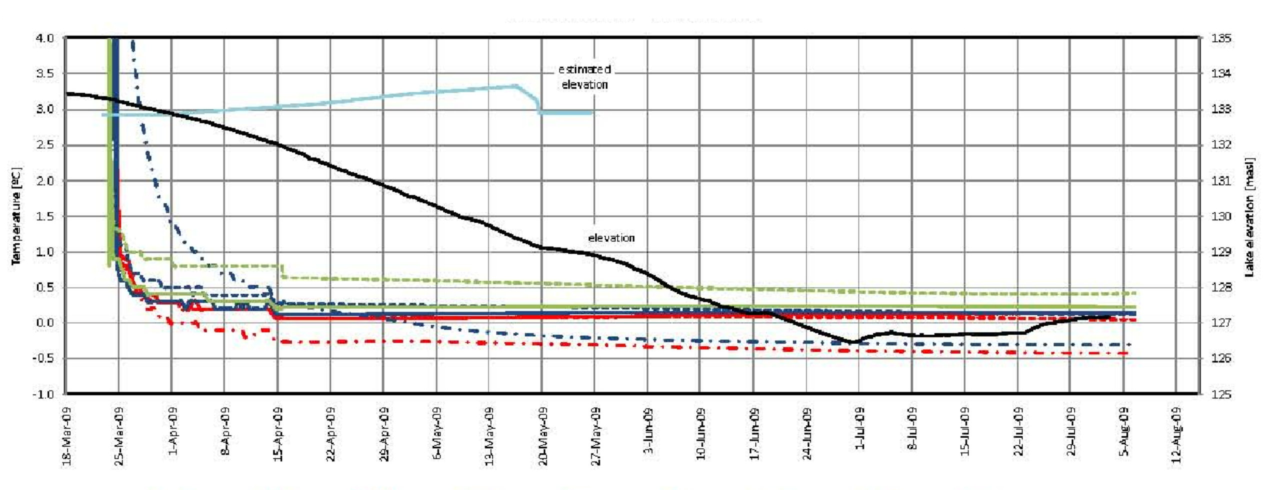


CROSS-SECTION

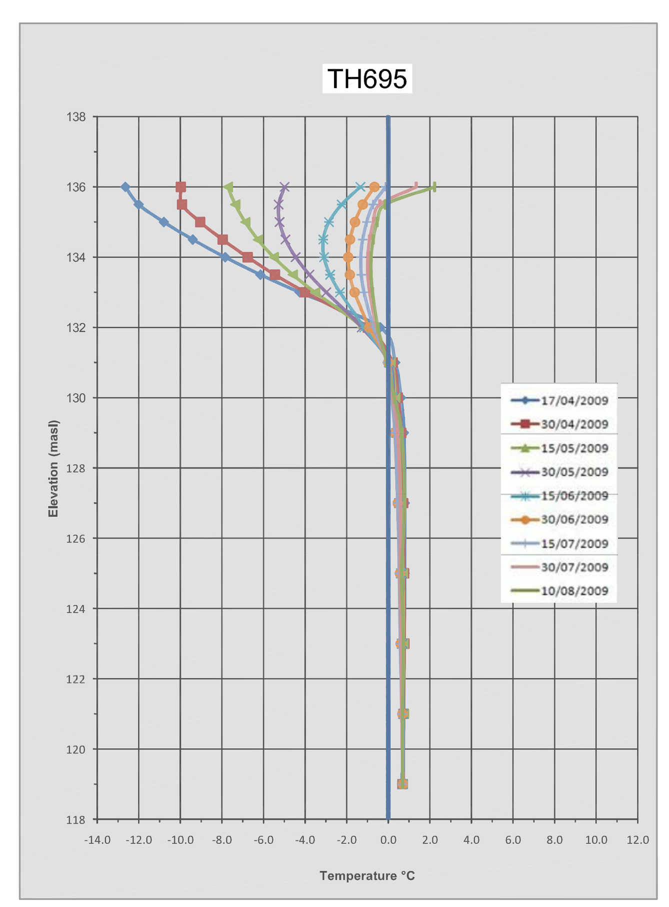
STA: 60+700

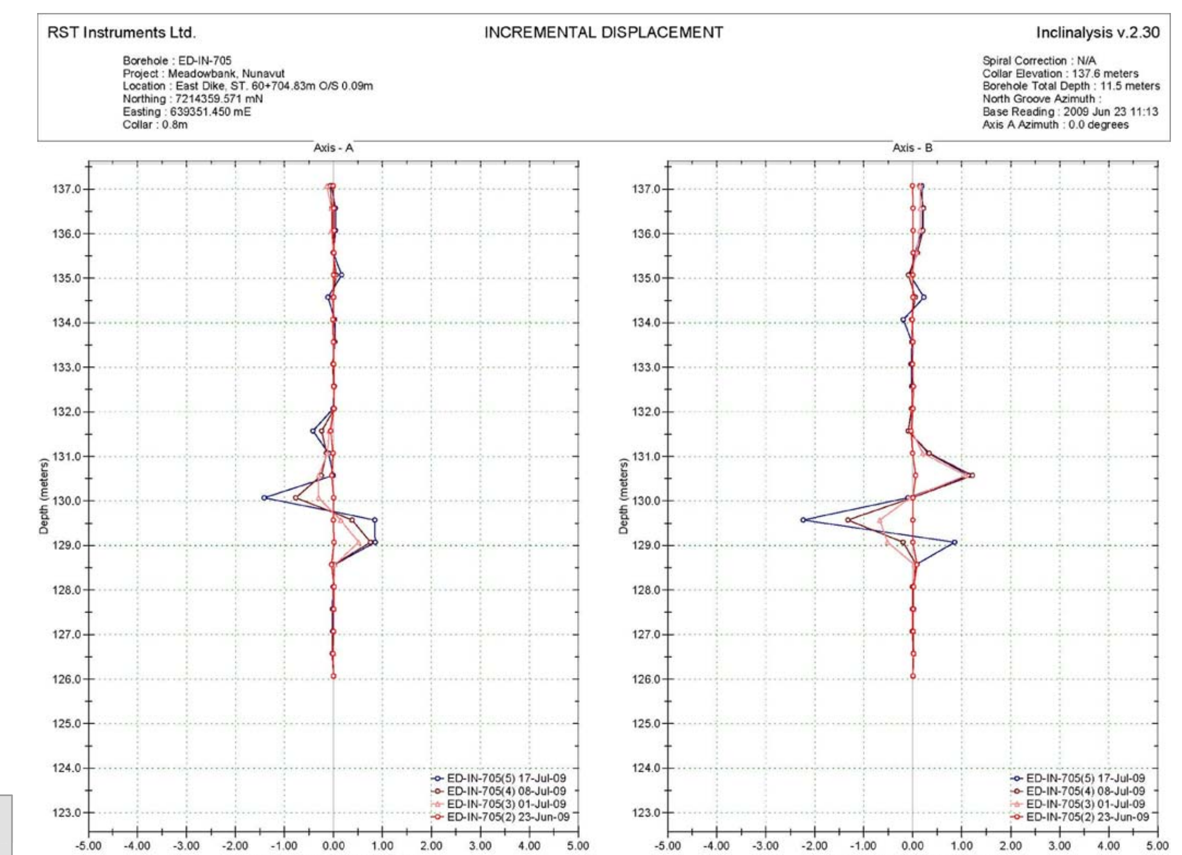


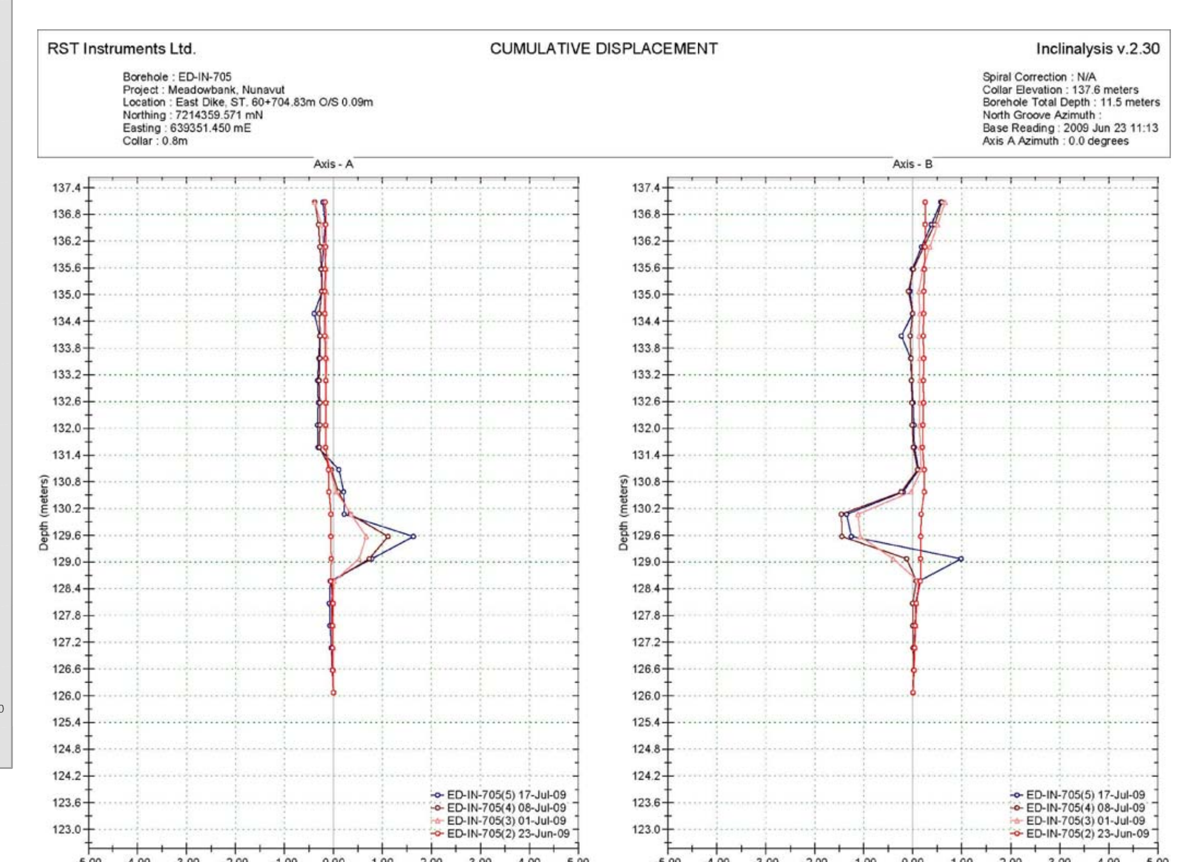
Peizometer - Total Head at Sta: 60+700

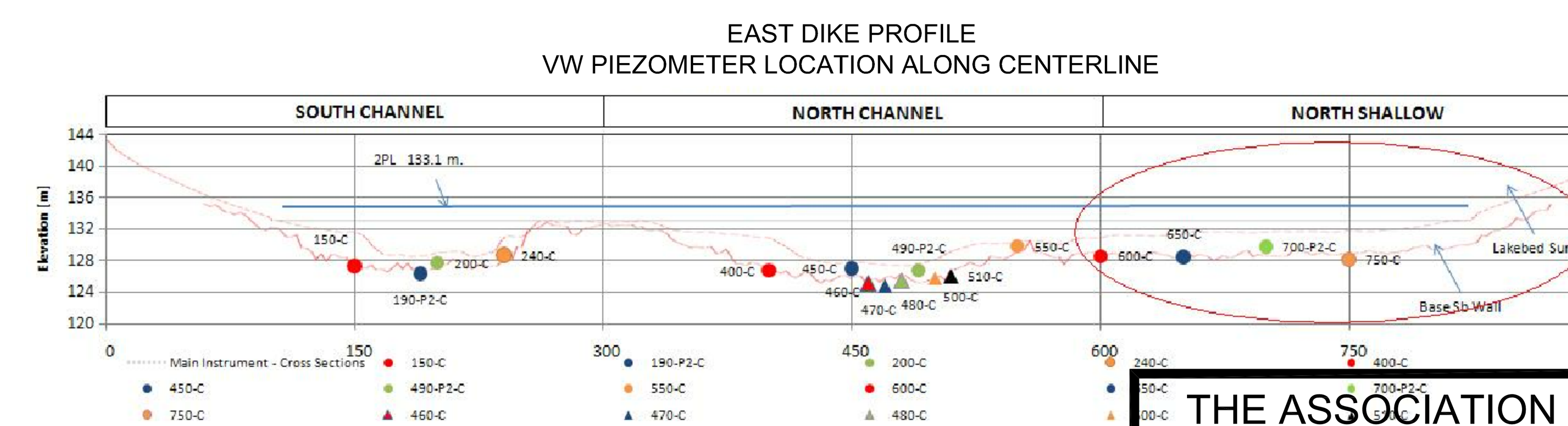


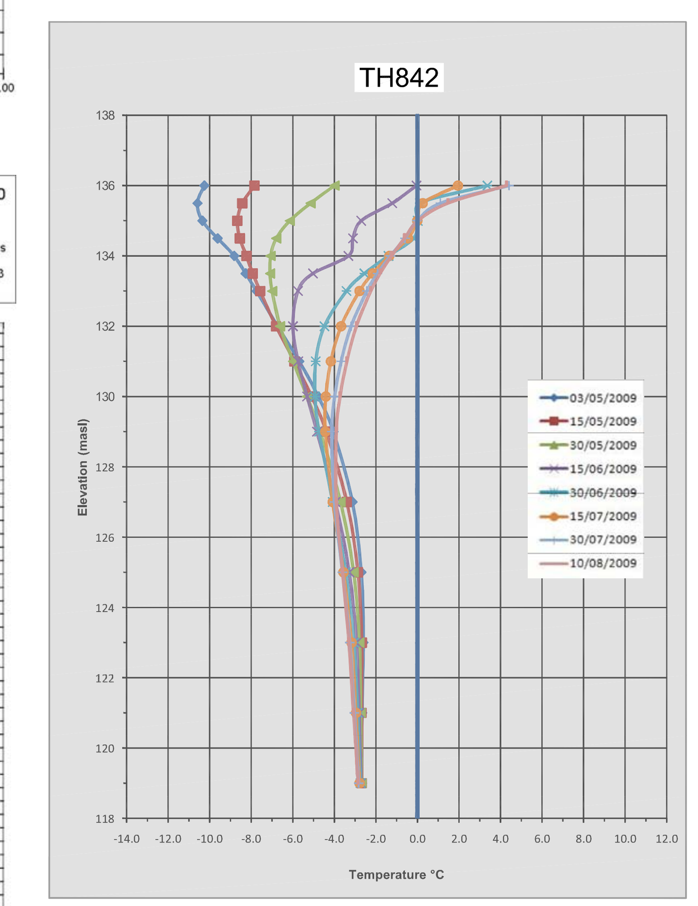
Peizometer - Temperature at Sta: 60+700









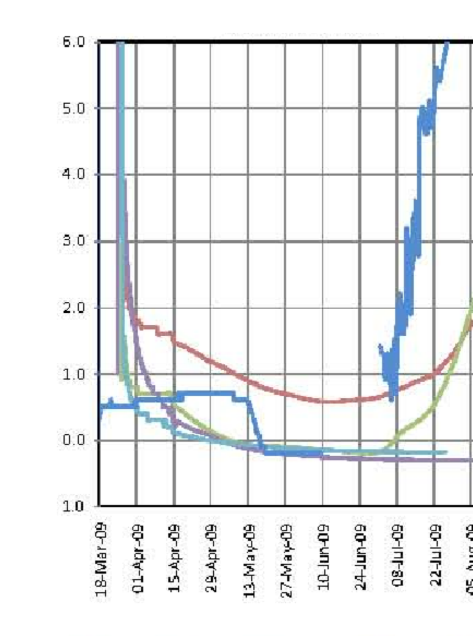


THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES

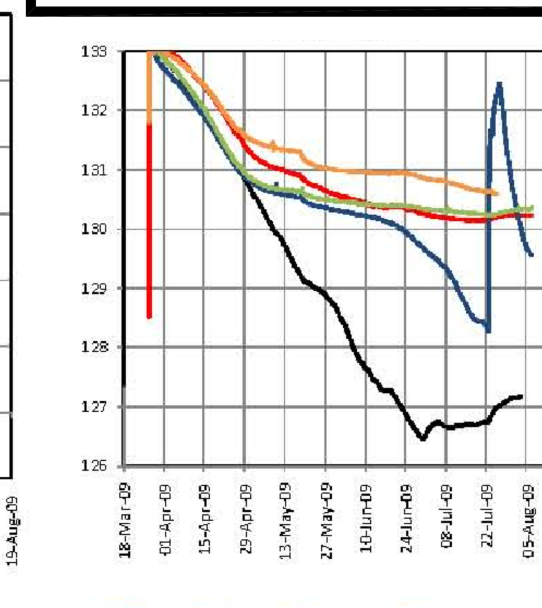
PERMIT NUMBER

P 049

GOLDER ASSOCIATES LTD.



Peizometer - Temperature Along Centerline



Peizometer - Total Head Along Centerline

REDUCED SIZE NOT TO SCALE

PROJECT: AGNICO-EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT

TITLE: **EAST DIKE NORTH SHALLOW INSTRUMENTATION DETAILS**

ORIGINAL SIGNED AND SEALED

STAMP

DRAWING NO.	REFERENCES
2100-16	INSTRUMENTATION PLAN

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
0	30OCT09	JEK	AS-BUILT	MSH		

PROJECT No.	07-1413-0074/2800	
DESIGN	JEK	30OCT09
CADD	MSH	30OCT09
CHECK	JEK	30OCT09
REVIEW	JCC	30OCT09

FILE No. 0814280028-4200-ASBUILT-30 | SCALE AS SHOWN | REV. 0

2100-30

Golder Associates

Drawing File: N:\Bur-Graphics\Projects\2007\1413\07-1413-0074\Drafting\2800-As-Built\Apr2009\0814280028-4200-ASBUILT-30.dwg Layout:2100-30 October 30, 2009 3:40:11 PM By: jkowinski

APPENDIX E

East Dike Grouting:
-Figures
-Table of Quantities
-Quality Control Data

AEM

TABLE E1-1: In-situ Mix Testing Results with St.Lawrence Type 30 (HE) Cement

Date	w:c + additive	Temperatures Cement (°C)	Water (°C)	Ambient (°C)	SuperP (°C)	Bentonite (°C)	Pozzutec (°C)	Mix (°C)	Type 30 (Kg)	Water (L)	Dry Bentonite (%)	(gr)	Additive (%)	(ml)	Marsh (seg)	Density (gr/cc)	Bleed (%) 2 hour	Approx. Initial Set (hrs)	Notes / Observations
MIXES WITHOUT ADDITIVES																			
13-Oct-08	0.7:1	21.0	16	-	-	-	-	-	80.0	56.0	-	-	-	-	35.0	1.64	2.0	-	Selected Mix B
14-Oct-08	0.76:1	19.8	15	-	-	-	-	-	80.0	61.0	-	-	-	-	32.6	1.64	-	-	Attempt at Mix A w/out SuperP (No Glenium on site)
14-Oct-08	0.83:1	19.8	15	-	-	-	-	-	80.0	67.0	-	-	-	-	32.3	1.63	-	-	Attempt at Mix A w/out SuperP (No Glenium on site)
14-Oct-08	0.89:1	19.8	15	-	-	-	-	-	80.0	72.0	-	-	-	-	31.3	1.58	6.0	-	Attempt at Mix A w/out SuperP (No Glenium on site)
18-Oct-08	0.5:1	23.0	14	8.5	-	-	-	23	80.0	40.0	-	-	-	-	78.0	1.85	0.5	-	Field Trial Plug Mix
18-Oct-08	0.7:1	20.0	13	3.5	-	-	-	22	80.0	56.0	-	-	-	-	34.9	1.66	2.0	-	Field Trial Plug Mix
11-Nov-08	0.75:1	7.0	9	14.1	-	-	-	24.5	80.0	56.0	-	-	-	-	35.6	1.64	1.0	6.2	For Comparison with Poz. Mixes. Cured in Ice Bath (~Zero Degrees)
25-Nov-08	0.7:1	10.0	7	11.1	-	-	-	20	80.0	56.0	-	-	-	-	37.9	1.65	1.5	11.0	For Comparison with Poz. Mixes. Cured in Ice Bath (Btwn 0 and Neg. Temp.)
MIXES WITH GLENIUM 3030 NS																			
15-Oct-08	0.7:1 + 0.5% Glenium	28.0	15.0	11.7	8.0	-	-	21.0	80.0	56.0	-	-	0.5	380	32.1	1.65	2.0	-	
15-Oct-08	0.7:1 + 0.4% Glenium	26.0	15.0	11.2	9.0	-	-	21.0	80.0	56.0	-	-	0.4	300	32.2	1.65	5.0	-	Selected Mix A
MIXES WITH BENTONITE																			
13-Oct-08	0.7:1 + 0.6% Bentonite	-	-	-	-	-	-	-	80.0	56.0	0.6	480	-	-	44.3	1.68	1.0	-	Dry Bentonite
13-Oct-08	0.7:1 + 1.2% Bentonite	-	-	-	-	-	-	-	80.0	56.0	1.2	768	-	-	59.0	1.72	1.0	-	Dry Bentonite
18-Oct-08	1.6:1 + 5% Bentonite	18.0	15	5	-	-	-	22	40.0	41.0	5.0	2000	-	-	No Flow	1.36	0.0	-	Field Trial Casing Mix, Bentonite Pre-hydrated at 8%
21-Oct-08	0.7:1 + 0.4% Bentonite	16.0	15	11.9	-	16.1	-	24	80.0	51.0	0.4	320	-	-	53.5	-	-	-	Bentonite Pre-Hydrated at 6%
21-Oct-08	0.7:1 + 0.3% Bentonite	15.0	15.5	8.8	-	14.5	-	23.5	80.0	52.2	0.3	240	-	-	44	1.68	1.0	-	Selected Mix C
22-Oct-08	0.7:1 + 1.0% Bentonite	13.5	7	8.2	-	13	-	19	80.0	43.5	1.0	800	-	-	No Flow	-	-	-	Bentonite Pre-Hydrated at 6%
22-Oct-08	0.7:1 + 0.6% Bentonite	9.0	7.0	9.4	-	13.5	-	17.0	80.0	48.5	0.6	480	-	-	> 60	-	-	-	Bentonite Pre-Hydrated at 6%
22-Oct-08	0.7:1 + 0.5% Bentonite	9.0	7.0	-	-	12.0	-	18.0	80.0	49.7	0.5	400	-	-	94.0	-	-	-	Bentonite Pre-Hydrated at 6%
22-Oct-08	0.7:1 + 0.45% Bentonite	6.0	7.5	10.2	-	12.0	-	17.0	80.0	50.4	0.45	360	-	-	58.0	1.67	-	-	Selected Mix D (extra 2 min mixed)
MIXES WITH POZZUTEC 20+																			
11-Nov-08	0.75:1 + 2% Poz.	10.0	9.0	14.7	-	-	11.5	20.5	80.0	60.0	-	-	2.0	1185	36.0	1.63	1.0	3.5	Cured in Ice bath (~ Zero Degrees)
11-Nov-08	0.75:1 + 3% Poz.	7.0	7.0	15.2	-	-	10.5	20.0	80.0	60.0	-	-	3.0	1780	34.7	1.61	1.0	3.8	Cured in Ice bath (~ Zero Degrees)
11-Nov-08	0.7:1 + 0.4% Gl. + 2% Poz.	8.0	10.0	-	-	-	14.0	20.0	80.0	56.0	-	-	2.0	1185	30.8	1.66	1.0	3.8	Cured in Ice bath (~ Zero Degrees)
25-Nov-08	0.75:1 + 0.5% Poz.	9.0	7.0	9.9	-	-	6.0	19.0	80.0	60.0	-	-	0.50	300	36.7	1.64	1.0	8.4	Cured in Ice Bath (Between 0 and Neg. Temp.)
25-Nov-08	0.75:1 + 1.0% Poz.	10.0	9.0	10.0	-	-	8.0	18.0	80.0	60.0	-	-	1.0	600	36.7	1.62	1.0	7.2	Cured in Ice Bath (Between 0 and Neg. Temp.)
25-Nov-08	0.75:1 + 1.5% Poz.	10.0	9.0	10.8	-	-	7.0	20.0	80.0	60.0	-	-	1.50	900	37.9	1.62	0.0	5.6	Cured in Ice Bath (Between 0 and Neg. Temp.)
12-Feb-09	0.7:1 + 0.4% Gl. + 0.75% Poz.	19.5	10.5	18	20	-	20	23.5	80.0	56.0	-	-	0.75	440	31.0	1.64	-	4.8	Selected Type30 Pozzutec Mix for Abutment Grouting
12-Feb-09	0.7:1 + 0.4% Gl. + 1.0% Poz.	26.0	13.7	13	16	-	16	19.2	80.0	56.0	-	-	1.0	590	29.0	1.6	-	7.0	Cured on Plant Floor (Between 1 and -1 Degrees)
12-Feb-09	0.7:1 + 0.4% Gl. + 1.25% Poz.	7.0	10	17	12	-	13	19	80.0	56.0	-	-	1.25	740	31.0	1.65	-	3.7	Cured on Plant Floor (Between 1 and -1 Degrees)

TABLE E1-2: In-situ Mix Testing Results with Nittetsu Superfine Cement

Date	w:c + additive	Temperatures Cement (°C)	Water (°C)	Ambient (°C)	SuperP (°C)	Bentonite (°C)	Pozzutec (°C)	Mix (°C)	Microfine (Kg)	Water (L)	Dry Bentonite (%)	(gr)	Additive (%)	(ml)	Marsh (seg)	Density (gr/cc)	Bleed (%) 2 hour	Approx. Initial Set (hrs)	Notes / Observations
MIXES WITHOUT ADDITIVES																			
18-Feb-09	1.2:1	12.4	14.6	-	-	-	-	21.2	40.0	48.0	-	-	-	-	30.9	1.42	3.0	38.0	Cement Stored/Kept Warm in TCG Garage >2 Months.
19-Feb-09	1.1:1	20.0	16.0	-	-	-	-	25.4	40.0	44.0	-	-	-	-	-	-	-	-	Improperly Stored Cement, Warmed in Plant ~24hrs. Flash / Gel in Mixer.
19-Feb-09	1.1:1	15.0	15.0	-	-	-	-	20.0	40.0	44.0	-	-	-	-	-	-	-	-	Improperly Stored Cement, Warmed in Plant ~24hrs. Flash / Gel in Mixer.
19-Feb-09	1.5:1	5.0	16.0	-	-	-	-	20.0	40.0	60.0	-	-	-	-	-	-	-	-	Improperly Stored Cement, Warmed in Plant ~36hrs. Flash / Gel in Mixer.
21-Feb-09	1.2:1	8.0	8.0	-	-	-	-	18.0	40.0	48.0	-	-	-	-	31.8	1.43	1.0	20.0	Cement from Green Container Warmed 36 hrs. 3 Min Mixing Time.
21-Feb-09	1.2:1	3.5	8.0	-	-	-	-	13.3	40.0	48.0	-	-	-	-	31.0	1.43	2.0	40.0	Cement from Orange Container Warmed 12 hrs. 3 Min Mixing Time.
24-Feb-09	1.2:1	6.0	13.0	-	-	-	-	15.0	40.0	48.0	-	-	-	-	30.9	1.43	1.0	38.0	Selected Microfine Mix for Stage 4 Grouting
MIXES WITH BENTONITE and/or MIGHTY 150																			
23-Oct-08	1.1:1+0.3%Be.+1%M150	9.0	14.5	12.8	5.5	12	-	18.0	40.0	42.1	0.3	120	1.0	323	29	1.46	-	-	Field Trial Mix. Fresh Cement from Shipment.
24-Oct-08	1.1:1+0.3%Be.+1%M150	21.0	11.0	10.3	19.0	18.0	-	18.5	40.0	42.1	0.3	120	1.0	323	29	1.46	3.0	-	Field Trial Mix. Fresh Cement from Shipment.
19-Feb-09	1.2:1 + 1% M150	16.0	16.0	-	17.0	-	-	23.0	40.0	48.0	-	-	1.0	330	-	-	-	-	Improperly Stored Cement, Warmed ~36hrs. Flash / Gel in Mixer.
24-Feb-09	1.2:1 + 1% M150	6.0	13.0	-	-	-	-	13.0	40.0	48.0	-	-	1.0	330	29.1	1.41	4.0	49.0	Cement Warmed 5 Days Prior To Use. 30 Second Mixing Time.
MIXES WITH POZZUTEC 20+																			
18-Feb-09	1.2:1 + 0.75% Poz.	14.5	16.0	-	-	-	-	21.0	40.0	47.78	-	-	0.75	220	30.0	1.39	1.0	37.0	Cement Stored/Kept Warm in TCG Garage >2 Months.

CHECK: GRB

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

			Stage				Take				Duration		Termination			QA			Temperatures							
Hole	Order (P, S, T, Q)	Date	Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	Comments
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+062	P	06-Mar-09	4	1.43	0.83	0.6	A*	603.7	603.7	603.7	17:15	18:28	0.2	18.5	138.7	-	-	-	-	-	-	-	-	-	-	Max Volume
		08-Feb-09	3	3.1	2.1	1	A*	43.7	43.7	43.7	22:20	22:33	2.2	0	0	-	-	-	-	-	-	-	-	-	-	By-Pass
		08-Feb-09	2	5.6	3.1	2.5	A*	39.9	39.9	16.0	21:00	21:21	1.9	0.2	0.05	-	-	-	-	-	-	-	-	-	-	
		08-Feb-09	1	12.6	5.6	7	A*	6.7	6.7	1.0	20:33	20:50	3.5	0	0	32.0	9	1.65	25	18	-	28	27	-	25	
60+063.5	T	11-Feb-09	3	3.2	2.2	1	A*	5.7	5.7	5.7	18:13	18:27	2.1	0.02	0.01	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	5.7	3.2	2.5	A*	10.4	10.4	4.2	17:54	18:08	2.4	0.02	0	-	-	-	-	-	-	-	-	-	-	
60+065	S	06-Mar-09	4	1.33	0.73	0.6	A*	0.3	0.3	0.3	16:40	16:57	1.7	0	0.02	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	3	3.1	2.1	1	A*	8.6	8.6	8.6	8:32	8:47	1.9	0	0.01	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	2	7.6	3.1	4.5	A*	23.5	23.5	5.2	8:09	8:26	2.3	0	0	32.0	1	1.58	14	10	11	16	16	-	22	
60+066.5	T	11-Feb-09	3	3.1	2.1	1	A*	7.4	7.4	7.4	19:00	19:13	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	5.6	3.1	2.5	A*	13.3	13.3	5.3	18:37	18:51	2.0	0	0	31.5	4	1.64	16	9	16	12	10	-	20	
60+068	P	06-Mar-09	4	2.02	1.42	0.6	A*	1.0	1.0	1.0	16:17	16:35	2.0	0	0.1	-	-	-	-	-	-	-	-	-	-	
		08-Feb-09	3	3.6	2.6	1	A*	7.4	7.4	7.4	23:17	23:34	2.2	0	0	-	-	-	-	-	-	-	-	-	-	
		08-Feb-09	2	8.1	3.6	4.5	A*	19.6	19.6	4.4	22:50	23:10	2.3	0	0	-	-	-	-	-	-	-	-	-	-	
60+069.5	T	11-Feb-09	3	3.8	2.8	1	A*	9.7	9.7	9.7	19:40	19:56	2.8	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	6.3	3.8	2.5	A*	7.6	7.6	3.0	19:21	19:38	2.3	0	0	-	-	-	-	-	-	-	-	-	-	
60+071	S	06-Mar-09	4	2.12	1.52	0.6	A*	3.2	3.2	3.2	15:45	16:13	2.2	0	0	32.3	-	1.65	18	4	-	16	14	-	19	
		10-Feb-09	3	3.8	2.8	1	A*	4.3	4.3	4.3	9:29	9:42	2.3	0	0	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	2	8.3	3.8	4.5	A*	29.9	29.9	6.6	8:54	9:27	2.3	0.1	0	-	-	-	-	-	-	-	-	-	-	
60+072.5	T	11-Feb-09	3	3.4	2.4	1	A*	4.7	4.7	4.7	20:19	20:32	3.0	0	0	32.0	3	1.65	12	10	15	14	11	-	22	
		11-Feb-09	2	5.9	3.4	2.5	A*	3.6	3.6	1.4	20:03	20:16	1.8	0	0	-	-	-	-	-	-	-	-	-	-	
60+074	P	07-Mar-09	4	2.02	1.42	0.6	A*	10.5	10.5	10.5	8:52	9:10	2.8	0.1	0.03	-	-	-	-	-	-	-	-	-	-	
		08-Feb-09	3	3.5	2.5	1	A*	10.0	10.0	10.0	3:56	4:14	1.8	0	0	-	-	-	-	-	-	-	-	-	-	
		08-Feb-09	2	6	3.5	2.5	A*	16.5	16.5	6.6	3:30	3:49	1.8	0	0	-	-	-	-	-	-	-	-	-	-	
		08-Feb-09	1	13	6	7	A*	64.6	64.6	9.2	2:52	3:21	4.1	0	0	30.1	4	1.64	26	14	16	29	28	-	25	
60+075.5	T	11-Feb-09	3	3.3	2.3	1	A*	8.9	8.9	8.9	21:28	21:44	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	5.8	3.3	2.5	A*	4.2	4.2	1.7	21:12	21:23	2.0	0	0	-	-	-	-	-	-	-	-	-	-	
60+077	S	05-Mar-09	4	2.02	1.42	0.6	A*	2.1	2.1	2.1	14:21	14:39	1.9	0	0.02	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	3	3.4	2.4	1	A*	10.6	10.6	10.6	10:15	10:31	2.2	0	0	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	2	7.9	3.4	4.5	A*	23.6	23.6	5.2	9:50	10:10	2.3	0.1	0.01	-	-	-	-	-	-	-	-	-	-	
60+078.5	T	11-Feb-09	3	3.6	2.6	1	A*	5.3	5.3	5.3	2:18	2:32	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	6.1	3.6	2.5	A*	9.8	9.8	3.9	1:59	2:15	2.0	0	0	32.2	4	1.64	15	8	17	10	11	-	20	
60+080	P	05-Mar-09	4	2.25	1.65	0.6	A*	1.6	1.6	1.6	14:00	14:16	2.3	0	0.01	-	-	-	-	-	-	-	-	-	-	
		08-Feb-09	3	3.6	2.6	1	A*	11.1	11.1	11.1	5:10	5:27	2.2	0	0	-	-	-	-	-	-	-	-	-	-	
		08-Feb-09	2	8.1	3.6	4.5	A*	22.2	22.2	4.9	4:46	5:05	2.3	0	0.01	-	-	-	-	-	-	-	-	-	-	
60+081.5	T	11-Feb-09	3	3.9	2.9	1	A*	7.7	7.7	7.7	2:58	3:12	3.2	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	6.4	3.9	2.5	A*	15.2	15.2	6.1	2:39	2:55	2.0	0	0	-	-	-	-	-	-	-	-	-	-	
60+083	S	05-Mar-09	4	2.19	1.59	0.6	A*	1.6	1.6	1.6	13:39	13:56	2.1	0	0	32.3	3	1.65	14	5	-	13	11	-	18	
		10-Feb-09	3	3.9	2.9	1	A*	9.1	9.1	9.1	13:59	14:17	2.0	0	0.01	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	2	8.4	3.9	4.5	A*	30.5	30.5	6.8	13:27	13:46	2.3	0	0	30.0	-	1.63	20	17	0	16	15	-	24	
60+084.5	T	11-Feb-09	3	3.9	2.9	1	A*	10.2	10.2	10.2	3:36	3:50	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	6.4	3.9	2.5	A*	9.1	9.1	3.6	3:17	3:32	2.1	0	0	-	-	-	-	-	-	-	-	-	-	
60+086	P	05-Mar-09	4	2.47	1.87	0.6	A*	1.3	1.3	1.3	10:17	10:36	2.1	0	0.01	-	-	-	-	-	-	-	-	-	-	
		09-Feb-09	3	3.9	2.9	1	A*	8.1	8.1	8.1	6:57	7:15	2.0	0	0	-	-	-	-	-	-	-	-	-	-	
		09-Feb-09	2	6.4	3.9	2.5	A*	22.1	22.1	8.8	6:20	6:47	1.8	0.2	0.04	-	-	-	-	-	-	-	-	-	-	
		09-Feb-09	1	13.4	6.4	7	A*	46.7	46.7	6.7	5:45	6:08	4.5	0.2	0.01	-	-	-	-	-	-	-	-	-	-	
60+087.5	T	11-Feb-09	3	4.2	3.2	1	A*	11.7	11.7	11.7	4:17	4:32	3.0	0	0	32.0	-	1.65	13	9	16	11	11	-	23	
		11-Feb-09	2	6.7	4.2	2.5	A*	12.9	12.9	5.2	3:57	4:13	2.0	0	0	-	-	-	-	-	-	-	-	-	-	
60+089	S	05-Mar-09	4	3.26	2.66	0.6	A*	0.8	0.8	0.8	9:57	10:13	1.9	0	0.01	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	3	4.7	3.7	1	A*	9.5	9.5	9.5	15:00	15:16	2.1	0	0.01	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	2	9.2	4.7	4.5	A*	20.9	20.9	4.6	14:39	14:57	2.6	0	0	-	-	-	-	-	-	-	-	-	-	

Check: GRB

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+090.5	T	11-Feb-09	3	5.1	4.1	1	A*	3.3	3.3	3.3	4:58	5:30	3.1	0	0	-	-	-	-	-	-	-	-	-	-	By-Pass
		11-Feb-09	2	7.6	5.1	2.5	A*	18.5	18.5	7.4	4:39	4:53	2.0	0	0	-	-	-	-	-	-	-	-	-	-	
60+092	P	05-Mar-09	4	3.64	3.04	0.6	A*	2.0	2.0	2.0	8:05	8:23	2.1	0	0.01	-	-	-	-	-	-	-	-	-	-	
		09-Feb-09	3	5.9	4.9	1	A*	9.5	9.5	9.5	8:15	8:30	2.1	0	0	-	-	-	-	-	-	-	-	-	-	
		09-Feb-09	2	10.4	5.9	4.5	A*	25.6	25.6	5.7	7:51	8:10	2.2	0	0	32.0	4	1.62	20	12	15	11	11	-	21	
60+093.5	T	12-Feb-09	3	5.4	4.4	1	A*	6.5	6.5	6.5	7:59	8:12	2.0	0	0	-	-	-	-	-	-	-	-	-	-	
		12-Feb-09	2	7.9	5.4	2.5	A*	13.0	13.0	5.2	7:39	7:55	2.5	0.2	0.04	30.0	1	1.52	16	14	14	16	16	-	22	
60+095	S	05-Mar-09	4	4.33	3.73	0.6	A*	3.3	3.3	3.3	7:39	8:02	2.0	0	0.01	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	3	5.9	4.9	1	A*	6.7	6.7	6.7	15:52	16:06	2.2	0	0	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	2	10.4	5.9	4.5	A*	17.4	17.4	3.9	15:26	15:44	2.5	0	0	-	-	-	-	-	-	-	-	-	-	
60+096.5	T	12-Feb-09	3	6	5	1	A*	7.0	7.0	7.0	8:45	9:05	2.5	0	0	-	-	-	-	-	-	-	-	-	-	
		12-Feb-09	2	8.5	6	2.5	A*	13.6	13.6	5.4	8:23	8:39	2.1	0	0	-	-	-	-	-	-	-	-	-	-	
60+098	P	05-Mar-09	4	4.48	3.88	0.6	A*	6.3	6.3	6.3	7:09	7:35	2.2	0	0.01	-	-	-	-	-	-	-	-	-	-	
		09-Feb-09	3	5.6	4.6	1	A*	1.7	1.7	1.7	15:35	15:48	2.1	0	0	-	-	-	-	-	-	-	-	-	-	
		09-Feb-09	2	8.1	5.6	2.5	A*	81.5	81.5	32.6	14:53	15:30	2.0	0	0	-	-	-	-	-	-	-	-	-	-	By-Pass
		09-Feb-09	1	15.1	8.1	7	A*	49.1	49.1	7.0	14:20	14:44	4.2	0	0	-	-	-	-	-	-	-	-	-	-	
60+099.5	T	12-Feb-09	3	4.8	3.8	1	A*	9.7	9.7	9.7	9:30	9:45	2.1	0.02	0.04	-	-	-	-	-	-	-	-	-	-	
		12-Feb-09	2	7.3	4.8	2.5	A*	10.9	10.9	4.4	9:12	9:26	2.3	0	0	-	-	-	-	-	-	-	-	-	-	
60+101	S	05-Mar-09	4	3.72	3.12	0.6	A*	41.4	41.4	41.4	6:09	6:59	2.8	0	0	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	3	5.5	4.5	1	A*	10.0	10.0	10.0	18:52	19:07	2.1	0	0	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	2	10	5.5	4.5	A*	21.2	21.2	4.7	17:47	18:05	2.3	0	0	31.0	1	1.64	17	13	16	14	14	-	24	
60+102.5	T	12-Feb-09	3	6.5	5.5	1	A*	600.0	600.0	600.0	10:20	12:25	0.0	10.5	inf	31.0	1	1.58	10	12	-	14	16	-	20	Max Volume
		12-Feb-09	2	9	6.5	2.5	A*	1.9	1.9	0.8	9:57	10:18	2.2	0	0	-	-	-	-	-	-	-	-	-	-	
60+104	P	04-Mar-09	4	4.28	3.68	0.6	A*	37.7	37.7	37.7	5:35	5:55	2.6	0.1	0.03	33.2	-	1.64	5	10	17	14	15	-	21	
		09-Feb-09	3	5.7	4.7	1	A*	1.6	1.6	1.6	13:50	14:05	2.0	0	0	-	-	-	-	-	-	-	-	-	-	
		09-Feb-09	2	10.2	5.7	4.5	A*	1.1	1.1	0.2	13:14	13:35	2.1	0	0	33.0	5	1.65	22	14	17	12	12	-	25	
60+105.5	T	12-Feb-09	3	6.2	5.2	1	A*	1.8	1.8	1.8	14:52	15:06	2.1	0	0	-	-	-	-	-	-	-	-	-	-	
		12-Feb-09	2	8.7	6.2	2.5	A*	1.5	1.5	0.6	14:37	14:49	2.4	0	0	30.0	3	1.58	10	13	12	15	16	-	21	
60+107	S	10-Feb-09	3	6	5	1	A*	1.7	1.7	1.7	19:38	19:50	3.1	0	0	32.0	2	1.65	17	14	17	14	15	-	23	
		10-Feb-09	2	10.5	6	4.5	A*	3.5	3.5	0.8	19:19	19:30	2.1	0	0	-	-	-	-	-	-	-	-	-	-	
60+108.5	T	12-Feb-09	3	6.6	5.6	1	A*	17.9	17.9	17.9	15:35	15:56	2.0	0	0.01	-	-	-	-	-	-	-	-	-	-	
		12-Feb-09	2	9.1	6.6	2.5	A*	7.4	7.4	3.0	15:15	15:30	2.3	0.1	0.03	-	-	-	-	-	-	-	-	-	-	
60+110	P	04-Mar-09	4	5.24	4.64	0.6	A*	418.0	418.0	418.0	19:12	20:20	2.4	0	0	30.2	4	1.62	-5	10	16	14	13	-	19	
		09-Feb-09	3	5.6	4.6	1	A*	1.4	1.4	1.4	10:19	10:31	1.9	0	0.01	-	-	-	-	-	-	-	-	-	-	
		09-Feb-09	2	8.1	5.6	2.5	A*	2.4	2.4	1.0	10:01	10:14	1.8	0	0	-	-	-	-	-	-	-	-	-	-	
		09-Feb-09	1	15.1	8.1	7	A*	80.0	80.0	11.4	9:07	9:55	4.4	0	0	-	-	-	-	-	-	-	-	-	-	
60+111.5	T	18-Mar-09	4	4.91	4.31	0.6	MF	2.2	2.2	2.2	21:20	21:31	1.3	0	0.01	-	-	-	-	-	-	-	-	-	-	
		12-Feb-09	3	6.3	5.3	1	A*	391.6	391.6	391.6	16:27	20:01	2.1	0	0	-	-	-	-	-	-	-	-	-	-	
		12-Feb-09	2	8.8	6.3	2.5	A*	4.7	4.7	1.9	16:08	16:22	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
60+113	S	04-Mar-09	4	5.09	4.49	0.6	A*	604.9	604.9	604.9	17:11	18:17	1.6	11.6	12.43	-	-	-	-	-	-	-	-	-	-	Max Volume
		01-Feb-09	3	6.7	5.7	1	A	4.3	4.3	4.3	1:31	1:45	2.9	0	0.01	-	-	-	-	-	-	-	-	-	-	
		02-Feb-09	3	7.5	6.5	1	A	3.5	3.5	3.5	4:37	4:51	3.0	0	0.01	-	-	-	-	-	-	-	-	-	-	
		01-Feb-09	2	9.2	6.7	2.5	A	6.5	6.5	2.6	1:13	1:27	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
		02-Feb-09	2	12	7.5	4.5	A	4.2	4.2	0.9	4:10	4:23	3.3	0.3	0.02	33.0	4	1.63	15	13	17	24	-	-	24	
		01-Feb-09	1	16.2	9.2	7	A	56.5	56.5	8.1	0:38	1:04	5.1	0.7	0.02	31.8	4	1.62	13	9	25	15	-	-	25	
60+114.5	T	18-Mar-09	4	5.8	5.2	0.6	MF	6.7	6.7	6.7	20:58	21:11	1.4	0.1	0.09	-	-	-	-	-	-	-	-	-	-	
		03-Feb-09	3	7.5	6.5	1	A	9.0	9.0	9.0	5:59	6:20	3.0	0	0.01	-	-	-	-	-	-	-	-	-	-	
		02-Feb-09	2	12	7.5	4.5	A	27.3	27.3	6.1	5:33	5:51	3.4	2.9	0.19	-	-	-	-	-	-	-	-	-	-	
60+116	P	04-Mar-09	4	6.13	5.53	0.6	A*	1.2	1.2	1.2	16:40	17:05	2.3	0	0.01	31.7	2	1.66	21	18	18	12	14	-	24	
		01-Feb-09	3	8.2	7.2	1	A	1.1	1.1	1.1	8:20	8:31	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		01-Feb-09	2	10.7	8.2	2.5	A	1.1	1.1	0.4	8:00	8:12	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		01-Feb-09	1	17.7	10.7	7	A	115.7	115.7	16.5	7:27	7:45	4.9	0.1	0	31.0	2	1.63	-10	17	10	6	-	-	18	

Check: GRB

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage: Stage #	Stage: From	Stage: To	Stage: Length	Take: Mix	Take: Volume	Take: V_{TOTAL}	Take: Take	Duration: Start	Duration: End	Termination: P_{FINAL}	Termination: Q_{FINAL}	Termination: Penetrab	QA: Marsh	QA: Bleed	QA: Specific Gravity	Temperatures: Cement	Temperatures: Water	Temperatures: Ambient	Temperatures: Glenium	Temperatures: Pozzutec	Temperatures: Bentonite	Temperatures: Mix	Comments
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+117.5	T	18-Mar-09	4	6.74	6.14	0.6	MF	1.7	1.7	1.7	20:38	20:49	1.5	0	0.05	-	-	-	-	-	-	-	-	-	-	
		03-Feb-09	3	8.2	7.2	1	A	36.1	36.1	36.1	8:10	8:40	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
		03-Feb-09	2	12.7	8.2	4.5	A	23.2	23.2	5.2	7:35	7:55	3.1	0	0	33.5	4	1.61	17	9	13	15	-	-	20	
60+119	S	04-Mar-09	4	7.12	6.52	0.6	A*	6.0	6.0	6.0	16:12	16:32	2.3	0	0	-	-	-	-	-	-	-	-	-	-	
		01-Feb-09	3	8.2	7.2	1	A	400.0	-	-	2:58	3:42	-	-	-	-	-	-	-	-	-	-	-	-	-	
		01-Feb-09	3	8.2	7.2	1	B	205.3	605.3	605.3	3:42	4:01	1.2	9.3	7.7	37.2	1	1.61	14	8	19	7	-	-	19	Max Volume
		01-Feb-09	2	10.7	8.2	2.5	A	4.4	4.4	1.8	2:38	2:52	2.6	0	0	-	-	-	-	-	-	-	-	-	-	
		01-Feb-09	1	17.7	10.7	7	A	59.5	59.5	8.5	2:07	2:31	5.0	0	0	-	-	-	-	-	-	-	-	-	-	
60+120.5	T	18-Mar-09	4	6.95	6.35	0.6	MF	1.9	1.9	1.9	20:12	20:23	1.4	0	0	-	-	-	-	-	-	-	-	-	-	
		03-Feb-09	3	8.3	7.3	1	A	602.0	602.0	602.0	14:58	16:05	1.4	10.3	7.51	-	-	-	-	-	-	-	-	-	-	Max Volume
		03-Feb-09	2	12.8	8.3	4.5	A	394.3	394.3	87.6	8:48	14:15	1.6	12	1.5	-	-	-	-	-	-	-	-	-	-	By-Pass
60+122	P	12-Dec-08	1, 2, 3	17.5	7.5	10	A	395.9	-	-	8:26	9:30	2.9	6.6	4.31	-	-	-	-	-	-	-	-	-	-	Rods broke downhole while drilling. Packers could not go past 8.5 meters.
		12-Dec-08	1, 2, 3	17.5	7.5	10	B	119.0	514.9	51.5	9:30	10:00	2.8	0	0	34.0	4	1.65	-	-	-	-	-	-	-	
60+123.5	T	18-Mar-09	4	7.38	6.78	0.6	MF	4.8	4.8	4.8	19:50	20:02	1.3	0	0.01	32.9		1.46	24	7	25	-	-	-	15	
		03-Feb-09	3	8.8	7.8	1	A	0.6	0.6	0.6	16:58	17:26	2.9	0	0	33.0	4	1.66	13	10	13	17	-	-	18	
		03-Feb-09	2	13.3	8.8	4.5	A	20.4	20.4	4.5	16:25	16:44	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
60+125	S	14-Feb-09	4	7.45	6.55	0.9	A	600.7	600.7	600.7	16:09	15:27	1.6	10.5	3.27	32.0	4	1.64	11	12	14	14	-	-	22	Max Volume
		02-Feb-09	3	8.8	7.8	1	A	602.0	602.0	602.0	6:43	7:49	0.9	9.1	10.2	-	-	-	-	-	-	-	-	-	-	Max Volume
		02-Feb-09	2	11.3	8.8	2.5	A	133.0	133.0	53.2	6:10	6:38	0.1	9	20.4	31.7	1	`	12	9	18	16	-	-	19	By-Pass
		01-Feb-09	1	18.3	11.3	7	A	36.9	36.9	5.3	4:54	5:15	5.0	0	0	31.7	-	1.63	12	9	18	16	-	-	19	
60+126.5	T	06-Mar-09	4	7.43	6.83	0.6	MF	421.1	421.1	421.1	17:46	18:38	1.6	9.5	10.22	31.8	1	1.43	20	3	24	-	-	-	11	Max Volume
		03-Feb-09	3	9	8	1	A	1019.0	1019.0	1019.0	17:47	19:50	1.4	9.6	6.85	-	-	-	-	-	-	-	-	-	-	Max Volume
		03-Feb-09	2	13.5	9	4.5	A	14.2	14.2	3.2	17:26	17:40	3.3	0	0	-	-	-	-	-	-	-	-	-	-	
60+128	P	14-Feb-09	4	7.73	6.83	0.9	A	600.3	600.3	600.3	17:45	19:07	1.4	10.2	4.9	-	-	-	-	-	-	-	-	-	-	Max Volume
		23-Jan-09	3	8.9	7.9	1	A	9.4	9.4	9.4	16:37	16:50	2.9	0	0	34.0	-	-	-	-	-	-	-	-	24	
		23-Jan-09	2	11.4	8.9	2.5	A	23.4	23.4	9.4	16:05	16:30	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
		23-Jan-09	1	18.4	11.4	7	A	28.2	28.2	4.0	15:34	15:52	5.1	0	0	-	-	-	-	-	-	-	-	-	-	
60+129.5	T	06-Mar-09	4	7.25	6.65	0.6	MF	420.5	420.5	420.5	18:57	20:04	1.5	9.3	10.16	-	-	-	-	-	-	-	-	-	-	By-Pass. Max Volume
		03-Feb-09	3	8.8	7.8	1	A	600.5	600.5	600.5	20:41	21:46	1.5	10	6.67	-	-	-	-	-	-	-	-	-	-	Max Volume
		03-Feb-09	2	13.3	8.8	4.5	A	7.0	7.0	1.6	20:21	20:32	3.8	0.22	0.01	32.5	3	1.62	15	14	15	14	-	-	14	
60+131	S	14-Feb-09	4	7.58	6.68	0.9	A	601.8	601.8	601.8	19:26	20:30	1.6	10.4	4.32	32.0	3	1.62	11	7	19	8	-	-	21	Max Volume
		02-Feb-09	3	8.7	7.7	1	A	601.1	601.1	601.1	9:44	10:49	1.0	10.8	11.29	31.0	3	1.64	15	21	16	9	-	-	23	Max Volume
		02-Feb-09	2	11.2	8.7	2.5	A	10.0	10.0	4.0	9:15	9:34	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		02-Feb-09	1	18.2	11.2	7	A	15.5	15.5	2.2	8:50	9:06	4.9	0.2	0	-	-	-	-	-	-	-	-	-	-	
60+132.5	T	06-Mar-09	4	6.44	5.84	0.6	MF	420.2	420.2	420.2	20:23	21:20	1.6	8.3	8.81	32.2	4	1.42	16	5	14	-	-	-	14	Max Volume
		01-Feb-09	3	8.5	7.5	1	A	600.6	600.6	600.6	10:10	11:01	1.0	1.01	15.35	-	-	-	-	-	-	-	-	-	-	Max Volume
		01-Feb-09	2	13	8.5	4.5	A	8.4	8.4	1.9	9:10	9:21	3.3	0.4	0.03	-	-	-	-	-	-	-	-	-	-	
60+134	P	14-Feb-09	4	7.35	6.45	0.9	A	600.9	600.9	600.9	20:42	21:47	1.6	10	4.18	-	-	-	-	-	-	-	-	-	-	Max Volume
		13-Dec-08	3	9.3	8.3	1	A	401.2	-	-	16:11	16:58	-	10.1	inf	31.0	-	1.66	-	-	-	-	-	-	-	
		13-Dec-08	3	9.3	8.3	1	B	238.1	639.3	639.3	16:58	17:23	0.3	10.1	18	36.0	-	1.66	-	-	-	-	-	-	-	
		13-Dec-08	2	11.8	9.3	2.5	A	214.0	214.0	85.6	15:02	16:00	2.4	0.5	0.08	31.0	10	1.62	-	-	-	-	-	-	-	
		12-Dec-08	1	18.8	11.8	7	A	1.2	1.2	0.2	7:42	7:54	5.0	0	0	31.0	7	1.62	-	-	-	-	-	-	-	
60+135.5	T	06-Mar-09	4	7.35	6.75	0.6	MF	357.3	357.3	357.3	21:36	0:00	1.4	0	0.01	32.0	3	1.43	14	6	15	-	-	-	16	
		01-Feb-09	3	8.7	7.7	1	A	28.5	28.5	28.5	13:37	14:10	2.8	0	0	-	-	-	-	-	-	-	-	-	-	
		01-Feb-09	2	13.2	8.7	4.5	A	9.9	9.9	2.2	13:18	13:30	3.6	0.6	0.04	30.0	7	1.64	9	16	20	26	-	-	25	
60+137	S	14-Feb-09	4	7.71	6.81	0.9	A	600.4	600.4	600.4	22:01	23:07	1.8	10.5	3.91	-	-	-	-	-	-	-	-	-	-	Max Volume
		23-Jan-09	3	9.1	8.1	1	A	418.0	418.0	418.0	17:57	20:21	2.7	0	0	-	-	-	-	-	-	-	-	-	-	
		23-Jan-09	2	11.6	9.1	2.5	A	56.3	56.3	22.5	17:24	17:51	2.8	0.4	0.06	-	-	-	-	-	-	-	-	-	-	
		23-Jan-09	1	18.6	11.6	7	A	3.0	3.0	0.4	17:05	17:17	5.2	0	0	31.0	-	1.66	12	7	14	-	-	-	21	
60+138.5	T	06-Mar-09	4	7.33	6.73	0.6	MF	47.9	47.9	47.9	2:18	3:05	1.7	0	0	32.5	1	1.43	16	8	14	-	-	-	16	
		01-Feb-09	3	8.8	7.8	1	A	14.3	14.3	14.3	15:10	15:34	3.0	0.3	0.09	-	-	-	-	-	-	-	-	-	-	
		01-Feb-09	2	13.3	8.8	4.5	A	136.7	136.7	30.4	14:25	15:05	3.3	0.7	0.05	-	-	-	-	-	-	-	-	-	-	

Golder Associates

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+140	P	14-Feb-09	4	7.89	6.99	0.9	A	600.3	600.3	600.3	2:17	3:22	1.7	8.1	3.17	32.0	4	1.63	12	6	18	8	-	-	20	Max Volume
		18-Dec-08	3	9.2	8.2	1	A	404.9	-	-	10:39	11:15	-	14.5	inf	33.0	-	1.63	10	9	16	19	-	-	15	
		18-Dec-08	3	9.2	8.2	1	B	204.3	609.2	609.2	11:15	11:28	0.2	15.3	99.2	35.0	-	1.64	10	13	17	-	-	-	16	Max Volume
		18-Dec-08	2	11.7	9.2	2.5	A	407.0	-	-	9:18	10:06	-	15.6	inf	-	-	-	-	-	-	-	-	-	-	
		18-Dec-08	2	11.7	9.2	2.5	B	344.5	751.5	300.6	10:06	10:28	0.0	13.9	inf	36.0	6	1.64	8	12	16	-	-	-	16	Max Volume
		18-Dec-08	1	18.7	11.7	7	A	3.4	3.4	0.5	8:49	9:00	4.3	0	0	31.0	6	1.65	18	16	18	20	-	-	22	
60+141.5	T	06-Mar-09	4	8.17	7.57	0.6	MF	5.8	5.8	5.8	4:04	4:20	1.4	0	0.01	-	-	-	-	-	-	-	-	-	-	
		01-Feb-09	3	9.6	8.6	1	A	18.7	18.7	18.7	16:20	16:45	2.7	0.1	0.5	-	-	-	-	-	-	-	-	-	-	
		01-Feb-09	2	14.1	9.6	4.5	A	131.4	131.4	29.2	15:55	16:15	0.0	15	inf	32.0	-	1.65	0	11	16	16	-	-	22	By-pass
60+143	S	14-Feb-09	4	8.37	7.47	0.9	A	600.3	600.3	600.3	3:45	4:46	1.9	10.1	3.54	-	-	-	-	-	-	-	-	-	-	Max Volume
		18-Dec-08	3	9.7	8.7	1	A	387.5	-	-	14:31	15:15	0.2	11.2	50.73	33.0	-	1.65	-	-	-	-	-	-	-	
		18-Dec-08	3	9.7	8.7	1	B	217.9	605.4	605.4	15:15	15:30	0.2	14.1	62.96	36.0	-	1.64	-9	11	15	-	-	-	14	Max Volume
		18-Dec-08	2	12.2	9.7	2.5	A	7.6	7.6	3.0	14:09	14:21	3.0	0.4	0.05	-	-	-	-	-	-	-	-	-	-	
		18-Dec-08	1	19.2	12.2	7	A	7.7	7.7	1.1	13:44	13:54	4.3	0.3	0.02	32.0	-	1.65	19	11	17	17	-	-	18	
60+144.5	T	06-Mar-09	4	8.72	8.12	0.6	MF	60.3	60.3	60.3	4:38	5:31	1.9	0.1	0.1	33.0	1	1.43	14	9	11	-	-	-	9	
		23-Jan-09	3	9.8	8.8	1	A	16.6	16.6	16.6	6:05	6:37	2.9	0.3	0.09	-	-	-	-	-	-	-	-	-	-	
		23-Jan-09	2	14.3	9.8	4.5	A	53.5	53.5	11.9	5:29	5:57	3.5	1	0.07	-	-	-	-	-	-	-	-	-	-	
60+146	P	11-Dec-08	3	11	10	1	A	400.0	-	-	14:28	15:20	-	-	-	33.0	-	1.64	-	-	-	-	-	-	-	
		11-Dec-08	3	11	10	1	B	207.4	607.4	607.4	15:20	15:34	1.5	11.3	7.01	35.0	-	1.66	-	-	-	-	-	-	-	
		11-Dec-08	2	13.5	11	2.5	A	400.0	-	-	12:00	12:50	-	-	-	31.0	-	1.64	-	-	-	-	-	-	-	
		11-Dec-08	2	13.5	11	2.5	B	296.7	696.7	278.7	12:50	14:08	2.8	0.7	0.1	35.0	3	1.65	-	-	-	-	-	-	-	
		11-Dec-08	1	20.5	13.5	7	A	309.0	309.0	44.1	11:05	11:50	5.2	0.8	0.03	30.0	-	1.65	-	-	-	-	-	-	-	
60+147.5	T	07-Mar-09	4	9.21	8.61	0.6	MF	30.7	30.7	30.7	6:04	6:37	1.5	0.2	0.09	-	-	-	-	-	-	-	-	-	-	
		23-Jan-09	3	10.7	9.7	1	A	601.0	601.0	601.0	3:56	5:06	2.8	11.2	4.03	-	-	-	-	-	-	-	-	-	-	Max Volume
		23-Jan-09	2	13.2	10.7	2.5	A	78.9	78.9	31.6	2:44	3:50	2.8	0.3	0.04	-	-	-	-	-	-	-	-	-	-	
		23-Jan-09	1	20.2	13.2	7	A	27.4	27.4	3.9	2:20	2:38	5.2	0.6	0.02	-	-	-	-	-	-	-	-	-	-	
60+149	S	15-Feb-09	4	9.13	8.23	0.9	A	114.0	114.0	114.0	16:41	17:15	2.6	0.1	0.03	31.0	4	1.60	12	14	19	16	-	-	22	
		19-Dec-08	3	10.5	9.5	1	A	409.8	-	-	8:17	8:59	1.3	13.1	19.73	33.0	-	1.64	-	-	-	-	-	-	-	
		19-Dec-08	3	10.5	9.5	1	B	199.3	609.1	609.1	8:59	9:18	1.4	10.6	14.08	37.0	9	1.64	1	11	19	-	-	-	17	Max Volume
		19-Dec-08	2	13	10.5	2.5	A	18.8	18.8	7.5	7:51	8:09	2.7	0.4	0.06	-	-	-	-	-	-	-	-	-	-	
		19-Dec-08	1	20	13	7	A	61.8	61.8	8.8	7:20	7:42	5.0	0.7	0.02	30.0	10	1.65	-1	13	22	-	-	-	22	
60+150.5	T	07-Mar-09	4	9.03	8.43	0.6	MF	5.2	5.2	5.2	7:06	7:28	1.3	0	0.01	-	-	-	-	-	-	-	-	-	-	
		24-Jan-09	3	10.6	9.6	1	A	601.3	601.3	601.3	7:36	8:44	1.8	10.5	5.73	-	-	-	-	-	-	-	-	-	-	Max Volume
		24-Jan-09	2	15.1	10.6	4.5	A	51.9	51.9	11.5	7:05	7:30	3.3	0.4	0.03	-	-	-	-	-	-	-	-	-	-	
60+152	P	13-Feb-09	4	9.13	8.23	0.9	A	243.2	243.2	243.2	13:20	14:23	0.2	10	25	-	-	-	-	-	-	-	-	-	-	
		12-Feb-09	4	9.13	8.23	0.9	A	362.7	362.7	362.7	0:10	1:00	0.8	10	12	32.0	-	1.62	2	5	18	6	-	-	18	Communicate to 60+155.
		17-Dec-08	3	10.9	9.9	1	A	379.5	-	-	15:52	16:37	3.1	8.3	5.57	31.0	-	1.66	18	11	16	-	-	-	16	
		17-Dec-08	3	10.9	9.9	1	B	53.0	432.5	432.5	16:37	17:32	2.8	0	0.01	34.0	-	1.63	7	15	17	-	-	-	20	
		17-Dec-08	2	13.4	10.9	2.5	A	17.7	17.7	7.1	15:28	15:44	2.9	0.2	0.03	-	-	-	-	-	-	-	-	-	-	
		17-Dec-08	1	20.4	13.4	7	A	12.0	12.0	1.7	15:03	15:15	4.7	0.4	0.01	-	-	-	-	-	-	-	-	-	-	
60+153.5	T	07-Mar-09	4	8.88	8.28	0.6	A	1.4	1.4	1.4	16:38	17:15	1.1	0	0.2	33.0	-	1.67	12	5	17	14	-	-	20	
		24-Jan-09	3	10.7	9.7	1	A	600.6	600.6	600.6	9:31	10:39	2.2	10.2	4.63	-	-	-	-	-	-	-	-	-	-	Max Volume
		24-Jan-09	2	15.2	10.7	4.5	A	49.0	49.0	10.9	8:58	9:21	3.5	1	0.06	-	-	-	-	-	-	-	-	-	-	
60+155	S	13-Feb-09	4	9.08	8.18	0.9	A	424.0	424.0	424.0	14:30	15:25	0.5	9.5	20.76	31.0	3	1.60	14	12	12	16	-	-	20	Communicate to 60+158
		19-Dec-08	3	10.9	9.9	1	A	0.7	0.7	0.7	13:25	13:35	2.5	0	0.02	31.0	-	1.65	-	-	-	-	-	-	-	
		19-Dec-08	2	13.4	10.9	2.5	A	157.0	157.0	62.8	10:30	11:20	2.7	0.4	0.06	-	-	-	-4	9	16	-	-	-	17	
		19-Dec-08	1	20.4	13.4	7	A	78.9	78.9	11.3	9:58	10:20	4.2	0.7	0.03	32.0	-	1.63	-2	9	16	-	-	-	14	
60+156.5	T	07-Mar-09	4	8.85	8.25	0.6	A	533.7	533.7	533.7	13:55	16:11	1.3	0.4	0.57	31.5	3	1.63	16	7	17	13	-	-	20	
		24-Jan-09	3	10.4	9.4	1	A	19.5	19.5	19.5	18:09	18:32	2.8	0	0	-	-	-	-	-	-	-	-	-	-	
		24-Jan-09	2	14.9	10.4	4.5	A	52.8	52.8	11.7	17:37	18:02	3.5	0.9	0.06	30.8	-	1.60	-13	9	14	22	-	-	-	
60+158	P	13-Feb-09	4	8.95	8.05	0.9	A	600.5	600.5	600.5	16:03	17:24	1.1	9.6	9.02	-	-	-	-	-	-	-	-	-	-	Communicate to 60+155.
		11-Dec-08	3	10.9	9.9	1	A	401.0	-	-	9:39	10:30	-	-	-	29.0	-	1.64	-	-	-	-	-	-	-	
		11-Dec-08	3	10.9	9.9	1	B	201.5	602.5	602.5	10:30	10:46	0.8	10.5	13.2	33.0	-	1.63	-	-	-	-	-	-	-	
		11-Dec-08	2	13.4	10.9	2.5	A	64.8	64.8	25.9	9:03	9:31	2.7	0.5	0.09	-	-	-	-	-	-	-	-	-	-	
		11-Dec-08	1	20.4	13.4	7	A	44.0	44.0	6.3	8:33	8:51	4.8	0.6	0.02	30.0	11	1.65	-	-	-	-	-	-	-	

Check: GRB

Golder Associates

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+159.5	T	07-Mar-09	4	8.85	8.25	0.6	A	114.1	114.1	114.1	9:50	10:49	1.4	0	0.01	32.3	2	1.64	17	7	16	13	-	-	20	
		24-Jan-09	3	10.3	9.3	1	A	124.4	124.4	124.4	20:04	20:42	3.1	0.2	0.06	-	-	-	-	-	-	-	-	-	-	
		24-Jan-09	2	14.8	10.3	4.5	A	136.2	136.2	30.3	19:14	19:54	3.0	0.3	0.02	-	-	-	-	-	-	-	-	-	-	
60+161	S	13-Feb-09	4	9.33	8.43	0.9	A	200.4	200.4	200.4	2:40	3:15	1.0	2.4	1.66	-	-	-	-	-	-	-	-	-	-	Communicate to 60+164
		19-Dec-08	3	10.8	9.8	1	A	61.4	61.4	61.4	17:35	18:30	3.1	0	0	32.0	-	1.65	-9	9	19	16	-	-	19	
		19-Dec-08	2	13.3	10.8	2.5	A	357.0	-	-	14:40	15:46	2.6	4.8	0.75	34.0	-	1.64	3	15	16	17	-	-	13	
		19-Dec-08	2	13.3	10.8	2.5	B	270.4	627.4	251.0	15:46	17:19	2.9	0	0	38.0	-	1.65	7	8	14	-	-	-	14	
		19-Dec-08	1	20.3	13.3	7	A	226.5	226.5	32.4	13:52	14:32	5.1	3	0.09	33.0	-	1.64	-	-	-	-	-	-	-	
60+162.5	T	24-Jan-09	3	10.5	9.5	1	A	602.5	602.5	602.5	22:35	0:03	0.6	5	7.85	42.0	4	1.58	-32	9	15	15	-	-	15	Max Volume
		24-Jan-09	2	13	10.5	2.5	A	11.8	11.8	4.7	21:37	21:56	2.3	0.5	0.08	-	-	-	-	-	-	-	-	-	-	
		24-Jan-09	1	20	13	7	A	14.6	14.6	2.1	21:14	21:26	5.1	0.8	0.02	-	-	-	-	-	-	-	-	-	-	
60+164	P	12-Feb-09	4	9.08	8.18	0.9	A	336.3	-	-	1:30	2:30	0.6	10	12.3	-	-	-	-	-	-	-	-	-	-	Communicate to 60+161
		13-Feb-09	4	9.08	8.18	0.9	A	601.8	601.8	601.8	0:59	2:02	1.1	9.9	6.17	32.0	3	1.62	21	10	17	29	-	-	22	
		17-Dec-08	3	10.5	9.5	1	A	247.0	247.0	247.0	13:57	14:50	2.9	0	0	29.0	-	1.67	12	13	21	-	-	-	21	
		17-Dec-08	2	13	10.5	2.5	A	340.7	340.7	136.3	11:02	12:35	3.0	0.8	0.09	31.0	-	1.62	-	-	-	-	-	-	-	
		17-Dec-08	1	20	13	7	A	122.5	122.5	17.5	10:23	10:54	4.8	2	0.06	31.0	6	1.64	19	17	15	-	-	-	19	
60+165.5	T	08-Mar-09	4	8.95	8.35	0.6	A	11.2		-	8:13	8:45	0.1	0	0.12	32.0	6	1.63	16	6	24	11	-	-	18	
		08-Mar-09	4	8.95	8.35	0.6	MF	1.9	13.1	13.1	10:52	11:10	1.5	0	0.02	32.0	3	1.42	4	6	24	-	-	-	16	
		24-Jan-09	3	10.8	9.8	1	A	600.5	600.5	600.5	0:41	1:52	2.9	7	2.45	-	-	-	-	-	-	-	-	-	-	Max Volume
		24-Jan-09	2	15.3	10.8	4.5	A	6.3	6.3	1.4	0:22	0:35	3.0	0.2	0.02	32.9	7	1.62	15	9	16	14	-	-	16	
60+167	S	13-Feb-09	4	9.82	8.92	0.9	A	216.5	216.5	216.5	5:43	6:08	0.9	6.3	5.57	32.7	-	1.63	16	11	18	17	-	-	22	Communicate to 60+161
		20-Dec-08	3	11.1	10.1	1	A	13.7	13.7	13.7	9:15	10:00	3.0	0.1	0.08	33.0	-	1.65	-	-	-	-	-	-	-	
		20-Dec-08	2	13.6	11.1	2.5	A	43.0	43.0	17.2	8:41	9:09	2.9	0.3	0.05	-	-	-	-	-	-	-	-	-	-	
		20-Dec-08	1	20.6	13.6	7	A	41.8	41.8	6.0	8:14	8:32	5.0	1	0.04	32.0	-	1.64	25	12	19	12	-	-	21	
60+168.5	T	07-Mar-09	4	9.23	8.63	0.6	MF	47.4	47.4	47.4	13:50	14:22	1.2	0.3	0.26	33.0	1	1.40	17	11	13	-	-	-	14	
		24-Jan-09	3	10.9	9.9	1	A	15.1	15.1	15.1	4:38	5:05	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		24-Jan-09	2	13.4	10.9	2.5	A	22.7	22.7	9.1	4:02	4:31	2.8	0.7	0.09	32.8	3	1.64	12	10	19	15	-	-	18	
60+170	P	15-Feb-09	4	9.36	8.46	0.9	A	12.9	12.9	12.9	20:20	20:36	2.7	0	0	33.0	3	1.63	35	10	17	27	-	-	23	
		10-Dec-08	3	11	10	1	A	58.6	58.6	58.6	17:34	18:06	3.0	0	0.03	-	-	-	-	-	-	-	-	-	-	
		10-Dec-08	2	13.5	11	2.5	A	113.4	113.4	45.4	16:56	17:27	2.7	0	0	29.0	-	1.59	-	-	-	-	-	-	-	
		10-Dec-08	1	20.5	13.5	7	A	271.1	271.1	38.7	16:01	16:50	5.0	1.9	0.05	30.5	8	1.60	-	-	-	-	-	-	-	
60+171.5	T	07-Mar-09	4	9.08	8.48	0.6	MF	204.0	204.0	204.0	14:37	15:35	1.3	0.6	0.7	-	-	-	-	-	-	-	-	-	-	
		24-Jan-09	3	10.6	9.6	1	A	14.3	14.3	14.3	5:39	6:00	3.0	0.1	0.03	-	-	-	-	-	-	-	-	-	-	
		24-Jan-09	2	13.1	10.6	2.5	A	3.9	3.9	1.6	5:20	5:33	2.9	0.2	0.03	-	-	-	-	-	-	-	-	-	-	
60+173	S	15-Feb-09	4	9.13	8.23	0.9	A	10.8	10.8	10.8	8:50	9:30	3.4	0	0	33.0	2	1.59	16	11	22	14	-	-	20	
		20-Dec-08	3	10.6	9.6	1	A	10.4	10.4	10.4	13:21	13:54	3.0	0	0.01	-	-	-	-	-	-	-	-	-	-	
		20-Dec-08	2	13.1	10.6	2.5	A	69.2	69.2	27.7	10:39	11:20	2.7	0.6	0.1	-	-	-	-	-	-	-	-	-	-	
		20-Dec-08	1	20.1	13.1	7	A	16.0	16.0	2.3	10:16	10:27	5.3	0.5	0.01	33.0	-	1.67	26	18	17	19	-	-	20	
60+174.5	T	07-Mar-09	4	8.88	8.28	0.6	MF	4.8	4.8	4.8	16:00	16:10	1.2	0.3	0.4	32.0	1	1.42	-	-	-	-	-	-	-	
		25-Jan-09	3	10.2	9.2	1	A	603.1	603.1	603.1	7:12	8:19	1.0	10	8.73	33.3	5	1.65	0	13	15	12	-	-	18	Max Volume
		25-Jan-09	2	14.7	10.2	4.5	A	55.6	55.6	12.4	6:37	7:04	3.2	0.3	0.02	-	-	-	-	-	-	-	-	-	-	
60+176	P	15-Feb-09	4	9	8.1	0.9	A	10.0	10.0	10.0	9:32	9:56	2.7	0.6	0.07	-	-	-	-	-	-	-	-	-	-	
		17-Dec-08	3	10.4	9.4	1	A	221.3	221.3	221.3	7:40	8:45	3.4	0	0	-	-	-	-	-	-	-	-	-	-	
		17-Dec-08	2	12.9	10.4	2.5	A	2.1	2.1	0.8	7:20	7:33	2.8	0	0	32.0	-	1.60	7	10	17	-	-	-	21	
		16-Dec-08	1	19.9	12.9	7	A	260.8	260.8	37.3	16:54	17:36	5.2	0.24	0.01	32.0	4	1.60	-	-	-	-	-	-	-	
60+177.5	T	07-Mar-09	4	9.31	8.71	0.6	MF	41.2	41.2	41.2	16:30	17:01	1.2	0.5	0.63	-	-	-	-	-	-	-	-	-	-	
		25-Jan-09	3	10.6	9.6	1	A	136.8	136.8	136.8	9:02	10:13	2.9	0.2	0.05	32.3	-	1.64	1	16	15	-	-	-	19	
		25-Jan-09	2	15.1	10.6	4.5	A	53.1	53.1	11.8	8:30	8:56	3.4	0.6	0.04	-	-	-	-	-	-	-	-	-	-	
60+179	S	15-Feb-09	4	9.26	8.36	0.9	A	14.4	14.4	14.4	21:31	21:47	2.6	0	0	-	-	-	-	-	-	-	-	-	-	
		20-Dec-08	3	10.6	9.6	1	A	70.9	70.9	70.9	14:56	15:40	2.9	0.1	0.08	31.0	-	1.67	22	23	19	-	-	-	23	
		20-Dec-08	2	13.1	10.6	2.5	A	7.9	7.9	3.2	14:37	14:48	3.0	0.5	0.06	-	-	-	-	-	-	-	-	-	-	
		20-Dec-08	1	20.1	13.1	7	A	43.0	43.0	6.1	14:10	14:27	4.9	0.9	0.03	31.0	-	1.65	-	-	-	-	-	-	-	
60+180.5	T	07-Mar-09	4	8.93	8.33	0.6	MF	503.8	503.8	503.8	9:25	11:04	1.5	0.5	0.42	31.2	1	1.43	12	9	11	-	-	-	12	
		25-Jan-09	3	10.5	9.5	1	A	12.4	12.4	12.4	2:57	3:30	2.9	0.2	0.08	-	-	-	-	-	-	-	-	-	-	
		25-Jan-09	2	15	10.5	4.5	A	15.0	15.0	3.3	2:33	2:49	2.9	0.4	0.03	32.1	8	1.63	21	12	24	18	-	-	27	

Check: GRB

Golder Associates

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+182	P	10-Dec-08	3	10.7	9.7	1	A	595.3	595.3	595.3	12:20	13:35	2.5	8.3	5	31.0	-	1.65	-	-	-	-	-	-	-	
		10-Dec-08	2	13.2	10.7	2.5	A	242.2	242.2	96.9	11:08	12:13	2.7	0	0	31.0	-	1.62	-	-	-	-	-	-	-	
		10-Dec-08	1	20.2	13.2	7	A	70.2	70.2	10.0	10:42	11:01	5.3	1.6	0.03	-	-	-	-	-	-	-	-	-	-	
60+183.5	T	07-Mar-09	4	8.95	8.35	0.6	MF	60.6	60.6	60.6	20:39	21:14	1.0	0.6	0.91	32.1	3	1.42	16	9	15	-	-	-	15	
		25-Jan-09	3	10.3	9.3	1	A	400.0	-	-	23:19	0:06	-	-	-	-	-	-	-	-	-	-	-	-	-	Max Volume
		25-Jan-09	3	10.3	9.3	1	B	200.8	600.8	600.8	0:06	0:26	1.8	9.9	5.39	38.9	1	1.64	-5	10	17	14	-	-	20	
		25-Jan-09	2	14.8	10.3	4.5	A	22.8	22.8	5.1	22:50	23:10	3.0	0.5	0.04	-	-	-	-	-	-	-	-	-	-	
60+185	S	15-Feb-09	4	9.21	8.31	0.9	A	6.4	6.4	6.4	1:39	1:52	2.5	0	0	32.0	4	1.64	27	11	19	12	-	-	22	
		21-Dec-08	3	10.5	9.5	1	A	599.9	599.9	599.9	8:09	9:13	0.1	0	0.2	-	-	-	-	-	-	-	-	-	-	Max Volume
		21-Dec-08	2	13	10.5	2.5	A	6.7	6.7	2.7	7:51	8:01	2.8	0.3	0.04	-	-	-	-	-	-	-	-	-	-	
		21-Dec-08	1	20	13	7	A	13.9	13.9	2.0	7:29	7:39	4.9	0.1	0	-	-	-	-	-	-	-	-	-	-	
60+185.75	Q	25-Feb-09	3	11.1	10.1	1	A	10.4	10.4	10.4	11:05	11:26	3.2	0	0.01	-	-	-	-	-	-	-	-	-	-	
		25-Feb-09	2	15.6	11.1	4.5	A	17.5	17.5	3.9	10:48	11:00	3.5	1	0.06	-	-	-	-	-	-	-	-	-	-	
60+186.5	T	07-Mar-09	4	9.36	8.76	0.6	MF	304.0	304.0	304.0	21:40	23:29	1.5	0.2	0.21	-	-	-	-	-	-	-	-	-	-	By-Pass
		25-Jan-09	3	10.7	9.7	1	A	400.0	-	-	19:34	20:16	-	-	-	33.2	4	1.65	-2	9	12	15	-	-	15	Max Volume
		25-Jan-09	3	10.7	9.7	1	B	201.8	601.8	601.8	20:16	20:36	0.7	13.3	18.67	-	-	-	-	-	-	-	-	-	-	
		25-Jan-09	2	13.2	10.7	2.5	A	400.0	-	-	18:07	18:51	-	-	-	-	-	-	-	-	-	-	-	-	-	Max Volume
		25-Jan-09	2	13.2	10.7	2.5	B	350.9	750.9	300.4	18:51	19:14	0.1	15.7	92.8	-	-	-	-	-	-	-	-	-	-	
		25-Jan-09	1	20.2	13.2	7	A	6.5	6.5	0.9	17:48	17:59	5.4	0.5	0.01	31.3	-	1.61	16	23	12	-	-	-	19	
60+187.25	Q	25-Feb-09	3	8.9	7.9	1	A	1.3	1.3	1.3	10:24	10:35	3.2	0.1	0.04	33.0	3	1.64	-5	8	23	12	-	-	14	
		25-Feb-09	2	13.4	8.9	4.5	A	500.0	-	-	7:37	8:42	1.0	15.5	7.5	34.0	4	1.63	-1	10	18	12	-	-	14	
		25-Feb-09	2	13.4	8.9	4.5	B	850.0	1350.0	300.0	8:42	10:10	2.0	9	0.98	38.0	1	1.64	-16	10	16	12	-	-	16	Max Volume
60+188	P	15-Feb-09	4	9.26	8.36	0.9	A	15.4	15.4	15.4	2:01	2:16	2.5	0	0	-	-	-	-	-	-	-	-	-	-	
		16-Dec-08	3	10.5	9.5	1	A	381.2	-	-	15:23	16:06	1.9	10.1	10.55	-	-	-	-	-	-	-	-	-	-	
		16-Dec-08	3	10.5	9.5	1	B	220.0	601.2	601.2	16:06	16:28	2.7	10.2	7.95	-	-	-	-	-	-	-	-	-	-	Max Volume
		16-Dec-08	2	13	10.5	2.5	A	18.7	18.7	7.5	15:02	15:19	3.1	0.5	0.07	32.0	5	1.60	-	-	-	-	-	-	-	
		16-Dec-08	1	20	13	7	A	115.7	115.7	16.5	11:20	11:49	4.9	1.4	0.04	33.0	4	1.64	18	12	12	13	-	-	14	
60+189.5	T	18-Mar-09	4	9.03	8.13	0.9	MF	143.0	143.0	143.0	17:17	17:47	1.3	0	0.02	-	-	-	-	-	-	-	-	-	-	
		25-Jan-09	3	10.6	9.6	1	A	194.1	194.1	194.1	21:52	22:32	3.3	0	0	-	-	-	-	-	-	-	-	-	-	
		25-Jan-09	2	15.1	10.6	4.5	A	58.1	58.1	12.9	21:14	21:45	3.1	0.9	0.06	32.8	5	1.67	10	9	11	12	-	-	16	
60+191	S	16-Feb-09	4	9.92	9.02	0.9	A	55.2	55.2	55.2	14:36	15:02	2.6	0.9	0.22	31.0	3	1.60	15	16	18	13	-	-	24	
		21-Dec-08	3	11.5	10.5	1	A	242.9	242.9	242.9	11:13	11:23	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		21-Dec-08	2	14	11.5	2.5	A	19.0	19.0	7.6	9:59	10:16	3.1	0.5	0.02	-	-	-	-	-	-	-	-	-	-	
		21-Dec-08	1	21	14	7	A	19.2	19.2	2.7	9:34	9:49	4.1	0.4	0.01	-	-	-	-	-	-	-	-	-	-	
60+192.5	T	07-Mar-09	4	9.51	8.91	0.6	MF	69.5	69.5	69.5	1:30	2:05	1.2	0.2	1.17	32.8	1	1.43	15	10	16	-	-	-	14	
		26-Jan-09	3	11	10	1	A	49.3	49.3	49.3	6:01	6:48	2.3	0.2	0.1	-	-	-	-	-	-	-	-	-	-	
		25-Jan-09	2	15.5	11	4.5	A	10.8	10.8	2.4	5:40	5:53	2.9	0.7	0.06	32.3	-	1.64	-12	10	12	13	-	-	18	
60+194	P	16-Feb-09	4	8.88	7.98	0.9	A	127.5	127.5	127.5	15:15	15:46	2.3	0.1	0.04	-	-	-	-	-	-	-	-	-	-	
		10-Dec-08	3	10.7	9.7	1	A	601.3	601.3	601.3	09:25	10:34	1.4	9.9	7.03	34.0	3	1.64	-	-	-	-	-	-	-	
		10-Dec-08	2	13.2	10.7	2.5	A	37.0	37.0	14.8	08:55	09:17	2.6	0.2	0	30.5	-	1.68	-	-	-	-	-	-	-	
		10-Dec-08	1	20.2	13.2	7	A	231.8	231.8	33.1	07:54	08:40	5.3	2.1	0.03	31.0	4	1.67	-	-	-	-	-	-	-	
60+195.5	T	07-Mar-09	4	8.75	8.15	0.6	MF	365.8	365.8	365.8	3:26	4:53	1.5	0.4	0.47	32.0	1	1.44	7	10	17	-	-	-	14	
		26-Jan-09	3	10	9	1	A	601.0	601.0	601.0	7:24	8:33	2.7	10	3.73	34.0	-	1.61	-15	16	20	-	-	-	20	Max Volume
		26-Jan-09	2	14.5	10	4.5	A	20.8	20.8	4.6	7:03	7:17	2.9	0.5	0.04	-	-	-	-	-	-	-	-	-	-	
60+197	S	17-Feb-09	4	8.44	7.54	0.9	A	600.2	600.2	600.2	13:08	14:07	1.2	10.4	5.67	31.0	2	1.60	15	13	24	15	-	-	22	Max Volume
		21-Dec-08	3	10	9	1	A	602.5	602.5	602.5	14:18	15:20	0.4	10.1	0.04	-	-	-	-	-	-	-	-	-	-	Max Volume
		21-Dec-08	2	12.5	10	2.5	A	6.3	6.3	2.5	13:56	14:06	2.8	0.3	0.04	-	-	-	-	-	-	-	-	-	-	
		21-Dec-08	1	19.5	12.5	7	A	57.9	57.9	8.3	13:37	13:47	4.8	0.6	0.02	-	-	-	-	-	-	-	-	-	-	
60+198.5	T	08-Mar-09	4	8.65	8.05	0.6	MF	83.9	83.9	83.9	6:20	6:42	1.2	0.6	0.82	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	3	10.1	9.1	1	A	600.5	600.5	600.5	9:22	10:32	1.6	10.6	6.78	-	-	-	-	-	-	-	-	-	-	Max Volume
		26-Jan-09	2	14.6	10.1	4.5	A	8.6	8.6	1.9	9:01	9:14	3.6	0.2	0.01	32.3	-	1.59	-11	11	20	6	-	-	16	

Golder Associates

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

			Stage				Take				Duration		Termination			QA			Temperatures							
Hole	Order (P, S, T, Q)	Date	Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	Comments
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+200	P	17-Feb-09	4	8.34	7.44	0.9	A	59.1	59.1	59.1	14:40	15:10	5.2	0.2	0.03	32.0	5	1.63	15	17	23	16	-	-	26	
		16-Dec-08	3	9.8	8.8	1	A	520.0	-	-	9:51	10:48	0.7	10.4	19.28	32.0	5	1.66	18	12	17	13	-	-	18	
		16-Dec-08	3	9.8	8.8	1	B	110.2	630.2	630.2	10:48	10:59	0.7	10.4	30.6	34.0	5	1.61	18	13	16	-	-	-	18	Max Volume
		16-Dec-08	2	12.3	9.8	2.5	A	33.2	33.2	13.3	9:22	9:46	2.8	0.34	0.08	-	-	-	-	-	-	-	-	-	-	
		16-Dec-08	1	19.3	12.3	7	A	39.8	39.8	5.7	8:54	9:12	5.1	1.1	0.03	31.0	10	1.63	22	13	21	14	-	-	21	
60+201.5	T	08-Mar-09	4	8.29	7.69	0.6	MF	3.1	3.1	3.1	7:14	7:28	1.1	0.3	0.43	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	3	9.7	8.7	1	A	400.0	-	-	18:10	19:02	-	-	-	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	3	9.7	8.7	1	B	200.7	600.7	600.7	19:02	19:24	1.8	9.2	5.23	38.4	1	1.64	-15	8	17	17	-	-	18	Max Volume
		26-Jan-09	2	14.2	9.7	4.5	A	61.0	61.0	13.6	17:39	18:01	3.3	0.4	0.03	33.0	1	1.65	-15	17	18	-	-	-	20	
60+203	S	17-Feb-09	4	8.24	7.34	0.9	A	600.0	600.0	600.0	15:20	16:27	1.9	10.5	3.94	33.5	2	1.64	10	19	26	15	-	-	20	Max Volume
		07-Jan-09	3	10.1	9.1	1	A	400.0	-	-	6:20	7:00	-	-	-	-	-	-	-	-	-	-	-	-	-	
		07-Jan-09	3	10.1	9.1	1	B	253.8	653.8	653.8	7:00	7:35	1.5	10	6.74	34.9	-	1.64	40	6	-	-	-	-	22	Max Volume
		06-Jan-09	2	12.6	10.1	2.5	A	6.2	6.2	2.5	5:57	6:10	4.0	0.3	0.03	30.2	-	1.62	-	-	-	-	-	-	23	
		06-Jan-09	1	19.6	12.6	7	A	36.3	36.3	5.2	5:31	5:46	4.8	0.4	0.01	31.8	-	1.66	36	11	-	20	-	-	23	
60+204.5	T	08-Mar-09	4	8.57	7.97	0.6	MF	480.2	480.2	480.2	7:53	8:18	1.4	0.3	0.4	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	3	10.1	9.1	1	A	3.1	3.1	3.1	20:12	20:26	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	2	14.6	10.1	4.5	A	10.9	10.9	2.4	19:52	20:05	3.3	0.3	0.02	33.1	2	1.63	-16	11	15	16	-	-	16	
60+206	P	17-Feb-09	4	8.62	7.72	0.9	A	80.3	80.3	80.3	18:05	18:56	5.2	0	0	32.0	3	1.62	16	10	19	14	-	-	22	
		09-Dec-08	3	10.5	9.5	1	A	91.3	91.3	91.3	16:25	17:05	3.0	0.1	0.03	32.0	5	1.62	-	-	-	-	-	-	-	
		09-Dec-08	2	13	10.5	2.5	A	10.3	10.3	4.1	16:00	16:15	2.8	0	0	32.5	5	1.62	14	7	15	9	-	-	13	
		09-Dec-08	1	20	13	7	A	605.0	-	-	13:50	14:55	5.2	6.4	0.18	30.0	5	1.63	16	8	15	7	-	-	15	
		09-Dec-08	1	20	13	7	B	101.2	706.2	100.9	14:55	15:50	5.2	0.72	0.02	34.0	5	1.60	15	7	14	8	-	-	14	
60+207.5	T	08-Mar-09	4	8.01	7.41	0.6	MF	660.1	660.1	660.1	13:56	15:57	1.3	0.1	0.06	30.4	1	-	10	7	13	-	-	-	12	By-Pass
		26-Jan-09	3	9.8	8.8	1	A	605.9	605.9	605.9	16:07	17:16	1.8	9.4	5.14	-	-	-	-	-	-	-	-	-	-	Max Volume
		26-Jan-09	2	12.3	9.8	2.5	A	4.1	4.1	1.6	15:47	15:59	2.7	0.2	0.02	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	1	19.3	12.3	7	A	11.0	11.0	1.6	15:25	15:38	5.2	0.4	0.01	33.4	1	1.58	8	20	27	20	-	-	17	
60+209	S	17-Feb-09	4	7.78	6.88	0.9	A	600.4	600.4	600.4	19:13	20:37	1.0	10.3	6.04	31.0	-	-	-	-	-	-	-	-	20	Max Volume
		07-Jan-09	3	9.1	8.1	1	A	601.8	601.8	601.8	11:01	12:07	1.4	12.9	9.12	31.9	11	1.65	29	9	21	23	-	-	22	Max Volume
		07-Jan-09	2	11.6	9.1	2.5	A	165.4	165.4	66.2	10:15	10:52	2.3	0	0	-	-	-	-	-	-	-	-	-	-	
		07-Jan-09	1	18.6	11.6	7	A	1.6	1.6	0.2	9:55	10:06	5.0	0.4	0.02	29.4	7	1.65	30	10	17	23	-	-	18	
60+210.5	T	08-Mar-09	4	8.06	7.46	0.6	MF	7.2	7.2	7.2	9:07	9:20	1.4	0.3	0.4	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	3	9.5	8.5	1	A	567.4	567.4	567.4	21:01	11:16	3.2	0	0	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	2	14	9.5	4.5	A	17.1	17.1	3.8	20:40	20:56	3.3	0.4	0.03	-	-	-	-	-	-	-	-	-	-	
60+212	P	16-Feb-09	4	7.45	6.55	0.9	A	370.0	-	-	2:25	3:00	0.7	10.7	7.97	31.0	4	1.64	19	13	18	32	-	-	25	
		16-Feb-09	4	7.45	6.55	0.9	B	231.1	601.1	601.1	3:00	3:29	1.0	10.1	6.98	36.0	3	1.65	19	12	19	-	-	-	22	
		15-Dec-08	3	9.4	8.4	1	A	390.2	-	-	5:09	5:52	0.3	10.8	60.28	-	-	-	-	-	-	-	-	-	-	
		15-Dec-08	3	9.4	8.4	1	B	215.8	606.0	606.0	5:52	6:16	0.8	9.82	22.23	36.1	-	1.64	-	-	-	-	-	-	-	Max Volume
		15-Dec-08	2	11.9	9.4	2.5	A	6.4	6.4	2.6	4:52	5:07	2.9	0.3	0.03	-	-	-	-	-	-	-	-	-	-	
		15-Dec-08	1	18.9	11.9	7	A	12.1	12.1	1.7	4:31	4:44	5.3	0.6	0.02	30.6	-	1.64	-	-	-	-	-	-	17	
60+213.5	T	08-Mar-09	4	8.06	7.46	0.6	MF	613.8	613.8	613.8	16:26	17:36	1.3	10.9	14.17	32.4	2	1.44	13	6	13	-	-	-	13	Max Volume
		26-Jan-09	3	9.5	8.5	1	A	113.8	113.8	113.8	1:15	2:24	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	2	14	9.5	4.5	A	36.6	36.6	8.1	0:48	1:10	3.8	0.1	0.01	32.6	7	1.62	-14	9	15	16	-	-	17	
60+215	S	16-Feb-09	4	7.15	6.25	0.9	A	400.0	-	-	3:59	4:45	0.8	9.3	8.02	33.0	4	1.64	16	12	20	18	-	-	21	
		16-Feb-09	4	7.15	6.25	0.9	B	201.9	601.9	601.9	4:45	5:03	1.2	10.2	5.5	37.0	2	1.64	15	12	19	-	-	-	23	
		07-Jan-09	3	9.2	8.2	1	A	6.6	6.6	6.6	14:55	15:18	2.8	0	0.01	-	-	-	-	-	-	-	-	-	-	
		07-Jan-09	2	11.7	9.2	2.5	A	7.4	7.4	3.0	14:30	14:47	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
		07-Jan-09	1	18.7	11.7	7	A	20.3	20.3	2.9	14:06	14:20	5.2	0.7	0.02	31.8	3	1.66	25	11	23	22	-	-	20	
60+216.5	T	18-Mar-09	4	8.47	7.57	0.9	MF	3.8	3.8	3.8	10:45	10:57	1.4	0.1	0.03	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	3	10	9	1	A	2.6	2.6	2.6	17:46	17:57	2.7	0	0	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	2	12.5	10	2.5	A	2.0	2.0	0.8	17:26	17:37	2.9	0.1	0.01	32.5	-	-	-	-	-	-	-	-	20	
60+218	P	17-Feb-09	4	8.42	7.52	0.9	A	600.9	600.9	600.9	5:28	6:35	0.3	11.9	24	-	-	-	-	-	-	-	-	-	-	
		08-Dec-08	3	10.8	9.8	1	A	26.0	26.0	26.0	17:04	17:23	3.0	0.2	0.06	29.0	-	1.55	-	-	-	-	-	-	20	
		08-Dec-08	2	13.3	10.8	2.5	A	5.5	5.5	2.2	16:45	16:58	2.8	0.2	0.01	-	-	-	-	-	-	-	-	-	21	
		08-Dec-08	1	20.3	13.3	7	A	127.0	127.0	18.1	16:03	16:35	5.2	1.7	0.05	-	-	-	-	-	-	-	-	-	17	

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+218.75	Q	03-Mar-09	3	10.4	9.4	1	A	603.3	603.3	603.3	15:20	16:19	1.8	11.6	12.6	-	-	-	-	-	-	-	-	-	-	Max Volume
		03-Mar-09	2	14.9	10.4	4.5	A	173.8	173.8	38.6	14:20	15:13	3.6	0	0	32.0	3	1.63	15	6	8	14	-	-	20	
60+219.5	T	09-Mar-09	4	8.88	8.28	0.6	MF	322.7	322.7	322.7	6:27	8:36	1.0	0	0.04	33.0	1	1.43	15	8	23	-	-	-	16	
		27-Jan-09	3	10.4	9.4	1	A	600.0	600.0	600.0	15:32	17:14	3.0	4.9	1.66	32.9	1	1.66	-16	12	20	-	-	-	20	Max Volume
		27-Jan-09	2	12.9	10.4	2.5	A	450.0	-	-	14:01	14:50	-	-	-	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	2	12.9	10.4	2.5	B	300.0	750.0	300.0	14:50	15:18	2.8	7.7	1.1	38.5	2	1.65	-12	18	19	-	-	-	22	Max Volume
		31-Jan-09	1	19.9	12.9	7	A	2.8	2.8	0.4	2:08	2:23	5.1	0	0	31.7	4	1.62	5	9	17	18	-	-	19	
60+220.25	Q	03-Mar-09	3	10.5	9.5	1	A	598.5	598.5	598.5	16:53	18:05	3.2	7.9	4.67	-	-	-	-	-	-	-	-	-	-	Max Volume
		03-Mar-09	2	15	10.5	4.5	A	26.4	26.4	5.9	16:29	16:49	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
60+221	S	17-Feb-09	4	8.98	8.08	0.9	A	600.9	600.9	600.9	22:27	23:30	0.9	9.8	7.25	33.0	3	1.63	20	10	16	20	-	-	20	Max Volume
		07-Jan-09	3	10.4	9.4	1	A	77.6	77.6	77.6	18:15	18:25	3.1	0.1	0.04	-	-	-	-	-	-	-	-	-	-	
		07-Jan-09	2	12.9	10.4	2.5	A	19.2	19.2	7.7	17:19	17:39	2.8	0.3	0.05	-	-	-	-	-	-	-	-	-	-	
		07-Jan-09	1	19.9	12.9	7	A	10.1	10.1	1.4	16:55	17:10	5.6	0.2	0.01	29.9	14	1.62	32	11	24	17	-	-	23	
60+222.5	T	10-Mar-09	4	8.34	7.74	0.6	MF	330.8	330.8	330.8	8:00	9:42	1.5	0.4	0.39	32.0	1	1.44	16	7	11	-	-	-	18	
		27-Jan-09	3	10	9	1	A	10.0	10.0	10.0	13:33	13:48	2.8	0	0	32.0	6	1.61	12	19	-	22	-	-	22	
		27-Jan-09	2	14.5	10	4.5	A	297.2	297.2	66.0	10:15	11:18	3.3	0.1	0.01	32.7	3	1.63	4	16	11	-	-	-	20	
		31-Jan-09	1	19.5	14.5	5	A	14.9	14.9	3.0	2:46	3:00	5.4	0.4	0.01	-	-	-	-	-	-	-	-	-	-	
60+224	P	17-Feb-09	4	8.6	7.7	0.9	A	600.9	600.9	600.9	23:51	0:55	0.4	10.1	10.49	33.0	-	-	-	-	-	-	-	-	21	Max Volume
		15-Dec-08	3	10.1	9.1	1	A	399.8	-	-	3:08	3:48	0.0	10	37.66	32.3	-	1.64	-	-	-	-	-	-	15	
		15-Dec-08	3	10.1	9.1	1	B	200.4	600.2	600.2	3:48	4:11	0.0	10.5	76.16	35.6	-	1.65	18	9	16	-	-	-	19	Max Volume
		15-Dec-08	2	12.6	10.1	2.5	A	400.1	-	-	1:41	2:23	0.0	10.9	10.6	-	-	-	-	-	-	-	-	-	18	
		15-Dec-08	2	12.6	10.1	2.5	B	350.7	750.8	300.3	2:23	2:56	0.0	10.7	39.63	35.5	3	1.64	-	-	-	-	-	-	15	Max Volume
		15-Dec-08	1	19.6	12.6	7	A	220.6	220.6	31.5	12:53	1:28	5.3	2.8	0.08	31.6	2	1.64	17	9	18	15	-	-	18	
60+225.5	T	09-Mar-09	4	7.4	6.8	0.6	MF	160.3	160.3	160.3	16:15	17:10	1.4	0.8	0.3	32.0	1	1.41	14	6	17	-	-	-	17	
		27-Jan-09	3	10.1	9.1	1	A	5.1	5.1	5.1	0:05	0:21	3.0	0.1	0.04	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	2	14.6	10.1	4.5	A	5.5	5.5	1.2	23:46	23:59	3.3	0	0	31.4	1	1.62	10	7	9	12	-	-	19	
		31-Jan-09	1	19.6	14.6	5	A	12.5	12.5	2.5	3:15	3:28	5.0	0.4	0.02	-	-	-	-	-	-	-	-	-	-	
60+227	S	17-Feb-09	4	8.7	7.8	0.9	A	600.5	600.5	600.5	3:13	3:50	0.9	10.1	7.17	32.0	3	1.63	3	8	14	19	-	-	19	Max Volume
		07-Jan-09	3	9.8	8.8	1	A	12.0	12.0	12.0	23:51	0:07	3.0	0	0.02	32.1	-	1.67	-	-	-	-	-	-	21	
		07-Jan-09	2	12.3	9.8	2.5	A	630.0	-	-	21:40	23:01	-	-	-	31.2	16	1.61	-	-	-	-	-	-	17	
		07-Jan-09	2	12.3	9.8	2.5	B	141.0	771.0	308.4	23:01	23:25	2.2	5.6	1.01	-	-	-	-	-	-	-	-	-	-	Max Volume
		07-Jan-09	1	19.3	12.3	7	A	700.0	-	-	19:15	20:46	-	-	-	30.6	12	1.64	16	8	-	10	-	-	17	
		07-Jan-09	1	19.3	12.3	7	B	28.3	728.3	104.0	20:46	20:58	5.0	1.1	0.03	34.2	8	1.62	-	-	-	-	-	-	17	
60+228.5	T	10-Mar-09	4	7.94	7.34	0.6	MF	609.7	609.7	609.7	10:15	11:40	1.1	10.8	7.63	31.0	1	1.43	16	8	16	-	-	-	18	Max Volume
		27-Jan-09	3	9.5	8.5	1	A	45.7	45.7	45.7	8:58	9:40	3.3	0.2	0.06	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	2	12	9.5	2.5	A	3.1	3.1	1.2	8:39	8:50	3.0	0.4	0.06	33.3	2	1.61	-17	9	17	8	-	-	16	
		27-Jan-09	1	19	12	7	A	850.0	-	-	6:46	7:30	-	-	-	32.0	2	1.62	4	14	-	20	-	-	19	
		27-Jan-09	1	19	12	7	B	189.0	1039.0	148.4	7:30	8:26	5.1	0	0.03	39.0	1	1.64	-18	12	16	-	-	-	20	
60+230	P	17-Feb-09	4	8.39	7.79	0.6	A	350.8	350.8	350.8	4:37	5:20	1.2	11.6	8.4	32.0	-	-	-	-	-	-	-	-	21	Communicate to 60+236
		08-Dec-08	3	10.3	9.3	1	A	313.3	313.3	313.3	14:19	15:55	3.3	0	0.01	30.0	-	1.63	-	-	-	-	-	-	18	
		08-Dec-08	2	12.8	10.3	2.5	A	147.1	147.1	58.8	13:20	14:10	2.8	0.5	0.07	29.0	-	1.55	-	-	17	-	-	-	-	
		08-Dec-08	1	19.8	12.8	7	A	500.0	-	-	09:42	10:30	-	-	-	30.5	5	1.62	-	-	12	-	-	-	20	
		08-Dec-08	1	19.8	12.8	7	B	300.0	-	-	10:30	10:50	-	-	-	35.5	3	1.63	-	-	14	-	-	-	-	
		08-Dec-08	1	19.8	12.8	7	C	321.0	1121.0	160.1	10:50	11:21	5.2	0.1	0.01	45.0	1	1.67	-	-	-	-	-	-	17	
60+231.5	T	10-Mar-09	4	9.33	8.73	0.6	MF	601.0	601.0	601.0	14:07	16:00	1.5	7.4	6.37	31.0	1	1.41	17	6	17	-	-	-	18	Max Volume
		27-Jan-09	3	10.4	9.4	1	A	600.8	600.8	600.8	1:39	2:47	1.8	9.9	5.63	31.3	5	1.62	12	9	11	14	-	-	20	Max Volume
		27-Jan-09	2	14.9	10.4	4.5	A	65.6	65.6	14.6	1:05	1:32	3.3	0.3	0.02	-	-	-	-	-	-	-	-	-	-	
		31-Jan-09	1	19.9	14.9	5	A	458.6	458.6	91.7	3:45	4:48	5.3	0.4	0.01	-	-	-	-	-	-	-	-	-	-	
60+233	S	18-Feb-09	4	9.44	8.84	0.6	A	599.7	599.7	599.7	8:18	9:09	1.5	10.4	5.96	32.0	2	1.62	14	13	23	16	-	-	20	Max Volume
		07-Jan-09	3	10.7	9.7	1	A	3.3	3.3	3.3	2:54	3:12	3.2	0	0.01	-	-	-	-	-	-	-	-	-	-	
		07-Jan-09	2	13.2	10.7	2.5	A	302.1	302.1	120.8	0:56	2:44	2.7	0.5	0.07	-	-	-	-	-	-	-	-	-	-	
		07-Jan-09	1	20.2	13.2	7	A	136.0	136.0	19.4	0:20	0:49	5.8	2.3	0.08	29.5	-	1.61	-	-	-	-	-	-	-	
60+234.5	T	10-Mar-09	4	9.16	8.56	0.6	MF	92.6	92.6	92.6	16:15	17:10	1.5	0.6	0.66	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	3	10.6	9.6	1	A	18.3	18.3	18.3	3:25	4:06	3.0	0.2	0.08	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	2	15.1	10.6	4.5	A	35.6	35.6	7.9	2:59	3:21	3.0	0.9	0.06	-	-	-	-	-	-	-	-	-	-	

Golder Associates

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+236	P	18-Feb-09	4	8.09	7.49	0.6	A	600.2	600.2	600.2	9:56	11:02	0.9	9	8.36	32.8	3	1.66	14	12	23	16	-	-	20	Communicate to 60+233
		15-Dec-08	3	9.9	8.9	1	A	416.0	-	-	16:11	17:00	0.0	9.9	69.94	31.0	-	1.67	-	-	-	-	-	-	-	
		15-Dec-08	3	9.9	8.9	1	B	191.1	607.1	607.1	17:00	17:18	0.0	10.1	119	35.0	-	1.66	-	-	-	-	-	-	-	Max Volume
		15-Dec-08	2	12.4	9.9	2.5	A	47.1	47.1	18.8	15:44	16:05	2.8	0.4	0.06	-	-	-	-	-	-	-	-	-	-	
		15-Dec-08	1	19.4	12.4	7	A	341.4	341.4	48.8	14:48	15:36	5.1	1.1	0.03	32.0	-	1.54	-	-	-	-	-	-	-	
60+237.5	T	18-Mar-09	4	8.39	7.49	0.9	MF	430.2	-	-	13:30	14:52	0.6	11.9	19.46	32.0	4	1.65	10	8	21	-	-	-	18	
		18-Mar-09	4	8.39	7.49	0.9	A	375.8	806.0	806.0	14:53	15:40	1.3	10.1	7.77	-	-	-	-	-	-	-	-	-	-	Max Volume
		27-Jan-09	3	10	9	1	A	7.6	7.6	7.6	5:13	5:32	3.2	0.2	0.05	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	2	14.5	10	4.5	A	59.2	59.2	13.2	4:43	5:07	3.1	0.5	0.03	33.1	0	1.63	-10	9	13	13	-	-	17	
60+239	S	08-Jan-09	3	8.8	7.8	1	A	5.6	5.6	5.6	7:29	7:46	3.0	0.2	0.06	-	-	-	-	-	-	-	-	-	-	
		08-Jan-09	2	11.3	8.8	2.5	A	58.7	58.7	23.5	6:59	7:24	2.7	0.2	0.04	-	-	-	-	-	-	-	-	-	-	
		08-Jan-09	1	18.3	11.3	7	A	114.0	114.0	16.3	6:09	6:48	5.4	0.3	0.01	31.6	7	1.62	-	-	-	-	-	-	-	
60+240.5	T	11-Mar-09	4	8.8	7.8	1	MF	224.4	224.4	224.4	8:45	9:55	1.4	0	0	32.0	2	1.43	15	8	16	-	-	-	18	
		28-Jan-09	3	9.1	8.1	1	A	603.1	603.1	603.1	6:01	7:13	1.3	12.7	9.9	-	-	-	-	-	-	-	-	-	-	Max Volume
		27-Jan-09	2	11.6	9.1	2.5	A	3.3	3.3	1.3	5:45	5:56	2.7	0	0	-	-	-	-	-	-	-	-	-	-	
60+242	P	18-Feb-09	4	7.25	6.65	0.6	A	117.0	117.0	117.0	14:18	14:37	0.7	8.6	9.79	32.0	4	1.63	14	10	22	16	-	-	19	Communicate to 60+248
		04-Dec-08	3	9.3	8.3	1	A	28.6	28.6	28.6	16:16	16:51	2.5	0.018	0.002	-	-	-	-	-	-	-	-	-	-	
		04-Dec-08	2	13.8	9.3	4.5	A	56.5	56.5	12.6	15:37	16:13	3.2	0.02	0.002	-	-	-	-	-	-	-	-	-	-	Grouting by remote radio
		04-Dec-08	1	18.8	13.8	5	A	354.6	354.6	70.9	13:09	15:30	2.8	0.0004	0.003	32.0	5	1.58	28	8	11	14	-	-	18	instructions all day.
60+243.5	T	11-Mar-09	4	7.53	6.93	0.6	MF	54.2	54.2	54.2	10:05	10:45	1.5	0.5	0.69	-	-	-	-	-	-	-	-	-	-	
		22-Jan-09	3	8.9	7.9	1	A	600.7	600.7	600.7	5:58	7:09	2.5	9.6	3.94	-	-	-	-	-	-	-	-	-	-	
		21-Jan-09	2	13.4	8.9	4.5	A	158.4	158.4	35.2	5:13	5:50	2.6	0.1	0.01	-	-	-	-	-	-	-	-	-	-	
60+245	S	18-Feb-09	4	6.92	6.32	0.6	A	419.9	419.9	419.9	14:56	15:47	1.4	9.1	5.39	-	-	-	-	-	-	-	-	-	-	Communicate to 60+248
		08-Jan-09	3	8.6	7.6	1	A	400.0	-	-	9:08	0:00	-	-	-	32.5	5	1.63	-7	10	18	15	-	-	17	
		08-Jan-09	3	8.6	7.6	1	B	251.4	651.4	651.4	0:00	10:20	1.3	10.7	8.23	36.0	-	1.67	-	-	-	-	-	-	-	Max Volume
		08-Jan-09	2	11.1	8.6	2.5	A	8.5	8.5	3.4	8:41	8:59	2.9	0.2	0.02	-	-	-	-	-	-	-	-	-	-	
		08-Jan-09	1	18.1	11.1	7	A	131.0	131.0	18.7	8:02	8:32	5.1	0.2	0.01	-	-	-	-	-	-	-	-	-	-	
60+246.5	T	11-Mar-09	4	6.67	6.07	0.6	MF	61.3	61.3	61.3	11:13	11:50	1.4	0.6	0.65	-	-	-	-	-	-	-	-	-	-	
		21-Jan-09	3	7.9	6.9	1	A	350.0	-	-	3:19	3:55	-	-	-	-	-	-	-	-	-	-	-	-	-	
		21-Jan-09	3	7.9	6.9	1	B	250.4	600.4	600.4	3:55	4:29	1.2	9.4	7.57	36.3	-	1.64	13	7	10	18	-	-	16	Max Volume
		21-Jan-09	2	10.4	7.9	2.5	A	277.5	277.5	111.0	2:14	3:13	2.8	0.3	0.05	-	-	-	-	-	-	-	-	-	-	
		21-Jan-09	1	17.4	10.4	7	A	85.1	85.1	12.2	1:39	2:04	5.2	1.2	0.03	33.3	4	1.65	24	3	12	22	-	-	16	
60+248	P	18-Feb-09	4	5.88	5.28	0.6	A	600.5	600.5	600.5	15:58	17:09	1.7	9	4.42	33.5	3	1.63	-10	9	21	15	-	-	19	Max Volume
		15-Dec-08	3	7.5	6.5	1	A	420.0	-	-	9:41	10:30	1.1	10.4	19.28	33.0	-	1.61	-	-	-	-	-	-	-	
		15-Dec-08	3	7.5	6.5	1	B	180.7	600.7	600.7	10:30	10:54	1.8	10.6	12.2	37.0	-	1.67	-	-	-	-	-	-	-	Max Volume
		15-Dec-08	2	10	7.5	2.5	A	450.9	-	-	8:02	8:54	1.0	10.2	4.03	30.0	10	1.64	-	-	-	-	-	-	-	
		15-Dec-08	2	10	7.5	2.5	B	306.1	757.0	302.8	8:54	9:24	1.6	10.1	2.58	34.0	6	1.64	-	-	-	-	-	-	-	
		14-Dec-08	1	17	10	7	A	314.3	314.3	44.9	16:58	17:47	4.7	2.7	0.08	33.0	-	1.59	-	-	-	-	-	-	-	
60+249.5	T	11-Mar-09	4	5.22	4.62	0.6	MF	46.3	46.3	46.3	13:10	14:45	1.4	0.4	0.24	32.0	2	1.43	16	7	19	-	-	-	-	
		23-Jan-09	3	6.7	5.7	1	A	600.3	600.3	600.3	8:25	9:35	2.3	10.4	4.53	31.7	7	1.61	18	17	14	22	-	-	17	Max Volume
		23-Jan-09	2	11.2	6.7	4.5	A	27.8	27.8	6.2	8:00	8:19	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
60+251	S	08-Jan-09	3	6.3	5.3	1	A	600.7	600.7	600.7	13:34	14:41	3.1	8.6	2.72	35.0	-	1.64	-5	13	14	-	-	-	19	Max Volume
		08-Jan-09	2	8.8	6.3	2.5	A	49.0	49.0	19.6	13:02	13:28	2.9	0.2	0.03	32.9	-	1.60	-8	11	14	20	-	-	14	
		08-Jan-09	1	15.8	8.8	7	A	94.7	94.7	13.5	10:40	11:08	4.9	0.9	0.03	33.0	-	1.65	-	-	-	-	-	-	-	
60+252.5	T	11-Mar-09	4	4.81	4.21	0.6	MF	1.0	1.0	1.0	14:55	15:10	1.4	0	0.02	-	-	-	-	-	-	-	-	-	-	
		23-Jan-09	3	5.9	4.9	1	A	600.5	600.5	600.5	10:17	11:23	1.4	9.6	6.85	33.6	8	1.65	18	17	14	13	-	-	17	Max Volume
		23-Jan-09	2	10.4	5.9	4.5	A	87.1	87.1	19.4	9:45	10:12	3.3	0.9	0.06	-	-	-	-	-	-	-	-	-	-	
60+254	P	18-Feb-09	4	3.85	3.25	0.6	A	10.4	10.4	10.4	21:35	22:01	5.3	0	0	32.7	3	1.63	12	7	16	20	-	-	15	
		04-Dec-08	3	5.53	4.53	1	A	354.0	354.0	354.0	-	-	3.0	-	-	-	-	-	-	-	-	-	-	-	-	
		04-Dec-08	2	10.03	5.53	4.5	A	94.3	94.3	21.0	12:15	13:02	1.9	0.4	0.05	-	-	-	-	-	-	-	-	-	-	
		04-Dec-08	1	15.03	10.03	5	A	30.3	30.3	6.1	11:07	12:15	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
60+255.5	T	23-Jan-09	3	5.2	4.2	1	A	14.2	14.2	14.2	13:36	14:02	2.8	0	0	-	-	-	-	-	-	-	-	-	-	
		23-Jan-09	2	9.7	5.2	4.5	A	10.7	10.7	2.4	13:15	13:30	2.3	0	0	-	-	-	-	-	-	-	-	-	-	

Golder Associates

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage: Stage #	Stage: From	Stage: To	Stage: Length	Take: Mix	Take: Volume	Take: V_{TOTAL}	Take: Take	Duration: Start	Duration: End	Termination: P_{FINAL}	Termination: Q_{FINAL}	Termination: Penetrab	QA: Marsh	QA: Bleed	QA: Specific Gravity	Temperatures: Cement	Temperatures: Water	Temperatures: Ambient	Temperatures: Glenium	Temperatures: Pozzutec	Temperatures: Bentonite	Temperatures: Mix	Comments
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+257	S	02-Mar-09	4	3.47	2.87	0.6	A*	18.3	18.3	18.3	10:50	11:07	2.4	0	0	-	-	-	-	-	-	-	-	-	-	
		08-Jan-09	3	5	4	1	A	622.4	622.4	622.4	17:49	18:58	1.6	4.3	2.73	-	-	-	-	-	-	-	-	-	-	Max volume
		08-Jan-09	2	7.5	5	2.5	A	51.8	51.8	20.7	17:12	17:41	2.5	0.4	0.07	-	-	-	-	-	-	-	-	-	-	
		08-Jan-09	1	14.5	7.5	7	A	59.3	59.3	8.5	16:45	17:05	5.3	1.4	0.04	-	-	-	-	-	-	-	-	-	-	
60+258.5	T	20-Jan-09	3	5	4	1	A	10.8	10.8	10.8	3:09	3:35	2.7	0.3	0.1	-	-	-	-	-	-	-	-	-	-	
		20-Jan-09	2	9.5	5	4.5	A	32.6	32.6	7.2	2:38	3:05	2.5	0.5	0.05	-	-	-	-	-	-	-	-	-	-	
60+260	P	02-Mar-09	4	3.06	2.46	0.6	A*	16.1	16.1	16.1	13:48	14:16	2.4	0	0	-	-	-	-	-	-	-	-	-	-	
		14-Dec-08	3	4.7	3.7	1	A	486.0	-	-	11:32	0:00	0.7	10.1	26.03	-	-	-	-	-	-	-	-	-	-	
		14-Dec-08	3	4.7	3.7	1	B	155.9	641.9	641.9	0:00	12:40	0.7	10.2	25.03	35.0	-	1.66	-	-	-	-	-	-	-	
		14-Dec-08	2	7.2	4.7	2.5	A	25.4	25.4	10.2	11:06	11:24	2.5	0	0	33.0	-	1.60	-	-	-	-	-	-	-	
		31-Oct-08	1	14.16	7.16	7	A	42.8	42.8	6.1	03:00	03:45	4.0	0.2	0	30.0	-	-	22	18	22	19	-	-	21	
60+261.5	T	20-Jan-09	3	4.7	3.7	1	A	1.8	1.8	1.8	2:05	2:17	3.8	0	0.01	-	-	-	-	-	-	-	-	-	-	
		20-Jan-09	2	9.2	4.7	4.5	A	63.4	63.4	14.1	1:11	1:53	2.4	0.9	0.09	32.9	5	1.64	10	5	-	10	-	-	16	
60+263	S	02-Mar-09	4	2.75	2.15	0.6	A*	1.0	1.0	1.0	14:27	14:56	2.4	0.01	0	-	-	-	-	-	-	-	-	-	-	
		08-Jan-09	3	4.4	3.4	1	A	2.9	2.9	2.9	20:35	21:00	2.9	0	0.01	-	-	-	-	-	-	-	-	-	-	
		08-Jan-09	2	6.9	4.4	2.5	A	6.5	6.5	2.6	20:12	20:25	2.5	0.3	0.04	-	-	-	-	-	-	-	-	-	-	
		08-Jan-09	1	13.9	6.9	7	A	52.0	52.0	7.4	19:40	20:00	4.4	1.3	0.04	-	-	-	-	-	-	-	-	-	-	
60+264.5	T	09-Feb-09	3	4.4	3.4	1	A*	7.1	7.1	7.1	5:48	6:03	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		09-Feb-09	2	8.9	4.4	4.5	A*	13.0	13.0	2.9	5:26	5:43	2.5	0.2	0.02	-	-	-	-	-	-	-	-	-	-	
60+266	P	02-Mar-09	4	2.8	2.2	0.6	A*	1.4	1.4	1.4	15:10	15:24	2.4	0	0	-	-	-	-	-	-	-	-	-	-	
		14-Dec-08	3	4.4	3.4	1	A	415.7	-	-	9:27	10:19	0.8	10.3	25.88	-	-	-	-	-	-	-	-	-	-	
		14-Dec-08	3	4.4	3.4	1	B	233.5	649.2	649.2	10:19	10:42	1.2	10.6	18.49	36.0	5	1.65	-	-	-	-	-	-	-	
		14-Dec-08	2	6.9	4.4	2.5	A	6.7	6.7	2.7	9:08	9:22	0.2	0	0.02	32.0	10	1.65	-	-	-	-	-	-	-	
		02-Nov-08	1	13.91	6.91	7	A	135.8	135.8	19.4	15:36	16:21	4.0	0.15	0.005	30.0	-	1.59	14	9	13	9	-	-	-	
60+267.5	T	09-Feb-09	3	4.4	3.4	1	A*	8.0	8.0	8.0	5:03	5:17	3.0	0	0	-	-	-	-	-	-	-	-	-	23	
		09-Feb-09	2	8.9	4.4	4.5	A*	23.6	23.6	5.2	4:40	4:58	2.1	0	0	31.0	-	1.64	17	12	18	5	4	-	22	
60+269	S	02-Mar-09	4	3.08	2.48	0.6	A*	1.5	1.5	1.5	9:49	10:00	2.4	0.01	0	-	-	-	-	-	-	-	-	-	-	
		07-Jan-09	2, 3	7.09	3.59	3.5	A	400.0	-	-	18:34	19:27	-	-	-	-	-	-	-	-	-	-	-	-	-	By-pass
		07-Jan-09	2, 3	7.09	3.59	3.5	B	105.2	505.2	144.3	19:27	19:58	2.7	0.2	0.04	33.1	5	-	-	-	-	-	-	-	15	By-pass
		07-Jan-09	1	14.09	7.09	7	A	5.3	5.3	0.8	17:57	18:19	4.5	0.3	0.01	-	-	-	-	-	-	-	-	-	-	
60+270.5	T	09-Feb-09	3	4.6	3.6	1	A*	10.4	10.4	10.4	1:08	1:21	3.4	0	0	-	-	-	-	-	-	-	-	-	22	
		09-Feb-09	2	9.1	4.6	4.5	A*	40.5	40.5	9.0	0:38	1:01	2.5	0	0	-	-	-	-	-	-	-	-	-	-	
60+272	P	25-Nov-08	5	4.03	3.03	1	A	26.4	26.4	52.8	02:45	03:09	7.3	0	0	-	-	-	-	-	-	-	-	-	-	
		25-Nov-08	4	4.03	3.03	1	A	25.0	25.0	25.0	02:12	02:31	7.8	0	0	34.8	-	-	-	-	-	-	-	-	-	
		02-Mar-09	4	3.39	2.79	0.6	A*	1.3	1.3	1.3	9:29	9:41	2.6	0.02	0	-	-	-	-	-	-	-	-	-	-	
		25-Nov-08	3	5.03	4.03	1	A	8.6	8.6	8.6	05:12	05:25	3.6	0	0	32.5	-	-	-	-	-	-	-	-	-	
		25-Nov-08	2	7.53	5.03	2.5	A	16.0	16.0	6.4	04:44	05:01	2.2	0	0	36.1	-	-	-	-	-	-	-	-	-	
		31-Oct-08	1	14.52	7.52	7	A	45.2	45.2	6.5	05:35	06:02	4.9	0.3	0	31.0	-	-	-	-	-	-	-	-	-	
60+273.5	T	09-Feb-09	3	5	4	1	A*	19.6	19.6	19.6	0:11	0:30	3.2	0	0	32.0	3	1.65	21	12	19	16	21	-	23	
		09-Feb-09	2	7.5	5	2.5	A*	31.9	31.9	12.8	23:42	0:04	2.0	0	0	-	-	-	-	-	-	-	-	-	-	
60+275	S	02-Mar-09	4	3.69	3.09	0.6	A*	2.8	2.8	2.8	9:06	9:22	2.4	0.01	0.02	31.3	3	1.62	15	7	15	13	11	-	19	
		07-Jan-09	3	5.1	4.1	1	A	36.0	36.0	36.0	2:20	2:48	2.8	0	0	-	-	-	-	-	-	-	-	-	-	By-Pass. Max Volume
		07-Jan-09	2	7.6	5.1	2.5	A	3.7	3.7	1.5	2:01	2:14	2.0	0	0	-	-	-	-	-	-	-	-	-	-	
		07-Jan-09	1	14.6	7.6	7	A	7.9	7.9	1.1	1:36	1:51	5.7	0.1	0	31.0	8	1.64	28	8	-	16	-	-	17	
60+276.5	T	09-Feb-09	3	5.1	4.1	1	A*	32.7	32.7	32.7	23:09	23:30	3.0	0	0	-	-	-	-	-	-	-	-	-	25	
		09-Feb-09	2	7.6	5.1	2.5	A*	151.1	151.1	60.4	22:00	23:00	2.1	0	0	32.0	4	1.66	21	11	18	17	23	-	25	
60+278	P	26-Nov-08	5	4.5	3.5	1	A	647.7	647.7	647.7	08:32	10:21	5.5	0	0	29.4	6	1.56	-	-	-	-	-	-	-	
		26-Nov-08	4	4.5	3.5	1	A	0.8	0.8	0.8	08:14	08:17	11.6	0	0	-	-	-	-	-	-	-	-	-	-	
		26-Nov-08	3	5.5	4.5	1	A	1.1	1.1	1.1	11:10	11:20	7.1	0	0	-	-	-	-	-	-	-	-	-	-	
		26-Nov-08	2	8	5.5	2.5	A	18.1	18.1	7.2	10:47	11:00	3.4	0	0	32.0	7	1.63	-	-	-	-	-	-	20	
		02-Nov-08	1	15	8	7	A	42.9	42.9	6.1	16:27	16:57	4.3	0.01	0.001	32.0	-	-	19	10	9	3	-	-	19	
60+279.5	T	10-Feb-09	3	5.8	4.8	1	A*	6.1	6.1	6.1	21:59	22:14	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	2	10.3	5.8	4.5	A*	20.0	20.0	4.4	21:37	21:54	2.6	0	0	32.0	2	1.66	17	15	16	15	16	-	21	

Check: GRB

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

			Stage				Take				Duration		Termination			QA			Temperatures							
Hole	Order (P, S, T, Q)	Date	Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	Comments
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+281	S	02-Mar-09	4	4.3	3.7	0.6	A*	13.6	13.6	13.6	8:35	8:57	2.5	0.02	0.02	33.0	4	1.61	18	9	14	13	10	-	20	
		07-Jan-09	3	5.7	4.7	1	A	213.7	213.7	213.7	11:35	11:52	2.6	0	0.01	32.7	-	1.64	24	7	15	13	-	-	19	
		07-Jan-09	2	8.2	5.7	2.5	A	0.0	-	-	10:10	11:00	-	-	-	30.0	5	1.64	26	7	14	15	-	-	18	
		07-Jan-09	2	8.2	5.7	2.5	A	400.0	-	-	10:10	11:00	-	-	-	33.0	-	1.65	26	6	14	14	-	-	18	By-pass
		07-Jan-09	2	8.2	5.7	2.5	B	350.8	750.8	300.3	11:00	11:20	0.8	11.7	6.14	34.8	5	1.68	26	6	15	14	-	-	19	By-pass
		07-Jan-09	1	15.2	8.2	7	A	1.3	1.3	0.2	9:46	10:00	4.4	0	0	-	-	-	-	-	-	-	-	-	-	
60+282.5	T	10-Feb-09	3	6.2	5.2	1	A*	26.8	26.8	26.8	22:43	23:18	2.9	0	0	32.0	2	1.65	18	16	15	15	12	-	22	
		10-Feb-09	2	10.7	6.2	4.5	A*	8.1	8.1	1.8	22:21	22:33	2.4	0	0	-	-	-	-	-	-	-	-	-	-	
60+284	P	26-Nov-08	5	4.9	3.9	1	A	801.0	801.0	801.0	14:30	17:04	1.0	5.1	2.57	32.0	1	1.63	14	13	8	13	-	-	22	Port injection
		26-Nov-08	3, 4	5.9	3.9	2	A	10.1	10.1	5.1	17:13	17:21	7.2	0	0	-	-	-	-	-	-	-	-	-	-	Unable to break port
		01-Nov-08	1	15.76	8.76	7	A	44.7	44.7	6.4	14:50	15:25	4.3	0	0	31.0	3	1.65	14	12	14	17	-	-	21	
60+285.5	T	10-Feb-09	3	5.9	4.9	1	A*	2.7	2.7	2.7	1:54	2:05	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	2	8.4	5.9	2.5	A*	3.3	3.3	1.3	1:39	1:50	2.0	0	0	32.0	2	1.66	22	10	16	19	11	-	23	
60+287	S	01-Mar-09	4	4.07	3.47	0.6	A	6.6	6.6	6.6	14:28	14:41	2.7	0	0	-	-	-	-	-	-	-	-	-	-	
		07-Jan-09	3	5.7	4.7	1	A	55.9	55.9	55.9	15:35	16:05	3.2	0.1	0.03	-	-	-	-	-	-	-	-	-	-	
		07-Jan-09	2	8.2	5.7	2.5	A	10.0	10.0	4.0	15:13	15:28	1.9	0	0.01	-	-	-	-	-	-	-	-	-	-	
		07-Jan-09	1	15.2	8.2	7	A	7.2	7.2	1.0	14:52	15:04	4.3	0.1	0	32.7	7	1.63	24	7	14	13	-	-	20	
60+288.5	T	10-Feb-09	3	5.4	4.4	1	A*	8.1	8.1	8.1	2:34	2:49	3.0	0	0	32.0	2	1.65	21	15	17	16	14	-	22	
		10-Feb-09	2	7.9	5.4	2.5	A*	12.8	12.8	5.1	2:14	2:29	2.2	0	0	-	-	-	-	-	-	-	-	-	-	
60+290	P	01-Mar-09	4	3.69	3.09	0.6	A*	8.1	8.1	8.1	14:05	14:20	2.4	0	0.1	32.0	-	1.62	20	9	13	12	9	-	20	
		11-Dec-08	3	5.4	4.4	1	A	5.5	5.5	5.5	5:48	6:01	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Dec-08	2	7.9	5.4	2.5	A	17.6	17.6	7.0	5:28	5:45	2.5	0	0	-	-	-	-	-	-	-	-	-	-	
		03-Nov-08	1	14.85	7.85	7	A	55.6	55.6	7.9	09:28	10:23	4.1	0.3	0.01	30.0	-	1.62	19	10	9	3	-	-	19	
60+291.5	T	10-Feb-09	3	5.2	4.2	1	A*	19.1	19.1	19.1	3:14	3:37	3.0	0	0	-		-	-	-	-	-	-	-	-	
		10-Feb-09	2	7.7	5.2	2.5	A*	6.3	6.3	2.5	2:56	3:09	2.2	0	0	-	-	-	-	-	-	-	-	-	-	
60+293	S	01-Mar-09	4	3.59	2.99	0.6	A	25.5	25.5	25.5	10:32	10:50	2.3	0	0	-	-	-	-	-	-	-	-	-	-	
		07-Jan-09	3	5.2	4.2	1	A	6.3	6.3	6.3	9:18	9:36	3.1	0.2	0.06	-	-	-	-	-	-	-	-	-	-	
		07-Jan-09	2	7.7	5.2	2.5	A	11.9	11.9	4.8	9:01	9:15	1.9	0.1	0.01	-	-	-	-	-	-	-	-	-	-	
		07-Jan-09	1	14.7	7.7	7	A	58.9	58.9	8.4	8:30	8:55	4.2	0.1	0	31.7	6	1.65	29	10	9	17	-	-	18	
60+294.5	T	10-Feb-09	3	5.3	4.3	1	A*	5.3	5.3	5.3	5:28	5:45	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	2	7.8	5.3	2.5	A*	19.9	19.9	8.0	5:07	5:23	2.0	0	0	33.0	4	1.63	21	6	16	9	2	-	18	
60+296	P	01-Mar-09	4	3.52	2.92	0.6	A*	6.2	6.2	6.2	10:13	10:25	2.4	0	0	33.0	2	1.63	19	8	11	11	10	-	18	
		11-Dec-08	3	5	4	1	A	8.4	8.4	8.4	2:51	3:07	3.2	0.1	0.07	32.0	-	-	-	-	-	-	-	-	20	
		11-Dec-08	2	7.5	5	2.5	A	16.3	16.3	6.5	2:24	2:42	1.9	0	0.05	-	-	-	-	-	-	-	-	-	-	
		01-Nov-08	1	14.5	7.5	7	A	43.1	43.1	6.2	15:30	15:57	4.1	0.03	0.001	32.0	-	-	16	7	15	15	-	-	15	
60+297.5	T	11-Feb-09	3	4.8	3.8	1	A*	4.7	4.7	4.7	6:09	6:29	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	7.3	4.8	2.5	A*	10.9	10.9	4.4	5:49	6:05	1.6	0	0	-	-	-	-	-	-	-	-	-	-	
60+299	S	01-Mar-09	4	3.39	2.79	0.6	A*	0.0	0.0	0.0	8:46	9:00	2.5	0	0	34.0	2	1.62	19	8	10	12	10	-	18	RST broken. Manual reading
		21-Dec-08	3	4.8	3.8	1	A	9.1	9.1	9.1	20:43	21:00	3.2	0	0.004	-	-	-	-	-	-	-	-	-	-	
		21-Dec-08	2	7.3	4.8	2.5	A	17.9	17.9	7.2	20:19	20:37	2.9	0	0.003	-	-	-	-	-	-	-	-	-	-	
		21-Dec-08	1	14.3	7.3	7	A	33.5	33.5	4.8	19:53	20:13	5.2	0.1	0.004	-	-	-	-	-	-	-	-	-	-	
60+300.5	T	11-Feb-09	3	5	4	1	A*	6.3	6.3	6.3	7:14	7:27	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	7.5	5	2.5	A*	12.1	12.1	4.8	6:40	7:00	2.6	0	0	-	-	-	-	-	-	-	-	-	-	
60+302	P	03-Mar-09	4	3.69	3.09	0.6	A*	1.4	1.4	1.4	7:01	7:22	2.4	0	0.01	31.3	4	1.63	16	8	12	12	11	-	20	
		11-Dec-08	3	5	4	1	A	4.5	4.5	4.5	3:35	3:47	3.1	0.1	0.01	32.0	-	-	-	-	-	-	-	-	19	
		11-Dec-08	2	7.5	5	2.5	A	20.9	20.9	8.4	3:14	3:31	2.0	0	0	-	-	-	-	-	-	-	-	-	-	
		03-Nov-08	1	14.5	7.5	7	A	43.4	43.4	6.2	10:26	10:58	4.1	0.03	0.001	31.0	-	-	-	-	-	-	-	-	-	
60+303.5	T	11-Feb-09	3	5	4	1	A*	4.5	4.5	4.5	7:55	8:09	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	7.5	5	2.5	A*	13.0	13.0	5.2	7:35	7:50	2.5	0.1	0.02	-	-	-	-	-	-	-	-	-	-	
60+305	S	03-Mar-09	4	3.36	2.76	0.6	A*	1.7	1.7	1.7	7:30	7:47	2.5	0	0.01	-	-	-	-	-	-	-	-	-	-	
		21-Dec-08	3	4.8	3.8	1	A	1.6	1.6	1.6	19:24	19:36	3.3	0	0.001	-	-	-	-	-	-	-	-	-	-	
		21-Dec-08	2	7.3	4.8	2.5	A	3.3	3.3	1.3	19:06	19:18	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		21-Dec-08	1	14.3	7.3	7	A	3.1	3.1	0.4	18:44	18:57	3.1	0.01	0	-	-	-	-	-	-	-	-	-	-	

Check: GRB

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+306.5	T	11-Feb-09	3	4.9	3.9	1	A*	7.4	7.4	7.4	8:34	8:48	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	7.4	4.9	2.5	A*	11.3	11.3	4.5	8:15	8:30	2.4	0	0	-	-	-	-	-	-	-	-	-	-	
60+308	P	03-Mar-09	4	3.54	2.94	0.6	A*	1.6	1.6	1.6	7:55	8:07	2.6	0	0.02	-	-	-	-	-	-	-	-	-	-	
		11-Dec-08	3	4.9	3.9	1	A	2.8	2.8	2.8	2:04	2:19	3.1	0.1	0	-	-	-	-	-	-	-	-	-	-	
		11-Dec-08	2	7.4	4.9	2.5	A	62.2	62.2	24.9	1:35	1:55	2.0	0	0	33.0	5	1.62	19	12	13	11	-	-	22	
		01-Nov-08	1	14.4	7.4	7	A	60.3	60.3	8.6	07:35	08:25	4.2	0.2	0.007	31.0	3	1.62	19	8	16	9		-	-	
60+309.5	T	11-Feb-09	3	4.9	3.9	1	A*	5.3	5.3	5.3	10:56	11:11	3.1	0.01	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	7.4	4.9	2.5	A*	11.1	11.1	4.4	10:36	10:51	2.6	0	0	30.0	1	1.62	18	11	16	13	14	-	22	
60+311	S	03-Mar-09	4	3.41	2.81	0.6	A*	2.1	2.1	2.1	8:15	8:31	2.7	0	0.01	-	-	-	-	-	-	-	-	-	-	
		21-Dec-08	3	4.9	3.9	1	A	28.6	28.6	28.6	17:50	18:06	3.2	0	0	-	-	-	-	-	-	-	-	-	-	
		21-Dec-08	2	7.4	4.9	2.5	A	9.3	9.3	3.7	17:30	17:45	2.1	0.2	0.04	-	-	-	-	-	-	-	-	-	-	
		21-Dec-08	1	14.4	7.4	7	A	2.2	2.2	0.3	17:08	17:23	4.2	0	0	-	-	-	-	-	-	-	-	-	-	
60+312.5	T	11-Feb-09	3	4.8	3.8	1	A*	0.7	0.7	0.7	15:09	15:21	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	7.3	4.8	2.5	A*	2.3	2.3	0.9	14:53	15:04	2.5	0	0	30.0	-	1.61	15	11	15	13	15	-	23	
60+314	P	03-Mar-09	4	3.52	2.92	0.6	A*	1.3	1.3	1.3	8:36	8:53	2.6	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Dec-08	3	4.7	3.7	1	A	5.7	5.7	5.7	15:08	15:21	3.0	0	0.01	32.5	-	1.58	-	-	-	-	-	-	-	
		11-Dec-08	2	7.2	4.7	2.5	A	21.0	21.0	8.4	14:42	15:00	1.9	0	0	-	-	-	-	-	-	-	-	-	-	
		03-Nov-08	1	14.2	7.2	7	A	43.6	43.6	6.2	14:52	15:21	4.0	0	0	30.0	-	1.62	20	10	14	7	-	-	17	
60+315.5	T	11-Feb-09	3	5	4	1	A*	4.7	4.7	4.7	16:01	16:15	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	7.5	5	2.5	A*	15.4	15.4	6.2	15:39	15:57	1.9	0	0	-	-	-	-	-	-	-	-	-	-	
60+317	S	03-Mar-09	4	3.36	2.76	0.6	A*	1.6	1.6	1.6	10:20	10:35	2.6	0	0.01	32.2	3	1.62	15	8	6	14	13	-	19	
		21-Dec-08	3	4.8	3.8	1	A	5.2	5.2	5.2	15:30	15:50	2.9	0.1	0.05	-	-	-	-	-	-	-	-	-	-	
		21-Dec-08	2	7.3	4.8	2.5	A	2.4	2.4	1.0	15:13	15:25	2.0	0.1	0.02	-	-	-	-	-	-	-	-	-	-	
		21-Dec-08	1	14.3	7.3	7	A	1.6	1.6	0.2	14:51	15:03	2.8	0	0	-	-	-	-	-	-	-	-	-	-	
60+318.5	T	11-Feb-09	3	4.8	3.8	1	A*	7.2	7.2	7.2	5:42	5:59	2.6	0.05	0.02	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	7.3	4.8	2.5	A*	11.0	11.0	4.4	6:04	6:22	1.9	0.03	0.01	-	-	-	-	-	-	-	-	-	-	
60+320	P	03-Mar-09	4	3.8	3.2	0.6	A*	1.4	1.4	1.4	10:43	10:55	2.9	0	0.01	-	-	-	-	-	-	-	-	-	-	
		11-Dec-08	3	5.1	4.1	1	A	5.3	5.3	5.3	15:57	16:09	3.0	0	0.01	-	-	-	-	-	-	-	-	-	-	
		11-Dec-08	2	7.6	5.1	2.5	A	13.3	13.3	5.3	15:30	15:45	1.9	0	0	-	-	-	-	-	-	-	-	-	-	
		01-Nov-08	1	14.6	7.6	7	A	46.1	46.1	6.6	09:40	10:22	4.8	0.1	0.003	31.0	-	-	-	-	-	-	-	-	16	
60+321.5	T	10-Feb-09	3	5.1	4.1	1	A*	8.2	8.2	8.2	5:10	5:26	3.2	0	0	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	2	7.6	5.1	2.5	A*	4.6	4.6	1.8	4:46	5:00	1.9	0	0	-	-	-	-	-	-	-	-	-	-	
60+323	S	04-Mar-09	4	3.8	3.2	0.6	A*	21.6	21.6	21.6	22:45	23:12	2.5	0	0.02	32.9	3	1.66	8	9	12	14	15	-	21	
		21-Dec-08	3	5.2	4.2	1	A	1.2	1.2	1.2	14:15	14:27	2.8	0	0	-	-	-	-	-	-	-	-	-	-	
		21-Dec-08	2	7.7	5.2	2.5	A	1.9	1.9	0.8	13:59	14:11	2.4	0	0	-	-	-	-	-	-	-	-	-	-	
		21-Dec-08	1	14.7	7.7	7	A	69.1	69.1	9.9	13:20	13:50	4.0	1.3	0.05	-	-	-	-	-	-	-	-	-	-	
60+324.5	T	10-Feb-09	3	5.2	4.2	1	A*	13.8	13.8	13.8	4:08	4:27	3.0	0	0	32.0	2	1.63	24	9	16	15	15	-	18	
		10-Feb-09	2	7.7	5.2	2.5	A*	24.0	24.0	9.6	3:42	4:00	2.5	0	0	32.0	-	1.66	21	13	17	16	15	-	19	
60+326	P	04-Mar-09	4	3.72	3.12	0.6	A*	18.1	18.1	18.1	23:28	23:46	2.5	0.1	0.04	-	-	-	-	-	-	-	-	-	-	
		11-Dec-08	3	5.2	4.2	1	A	10.5	10.5	10.5	14:20	14:31	3.0	0.1	0.01	-	-	-	-	-	-	-	-	-	-	
		11-Dec-08	2	7.7	5.2	2.5	A	12.0	12.0	4.8	13:57	14:10	1.9	0	0	32.8	-	1.62	18	15	11	10	-	-	17	
		03-Nov-08	1	14.7	7.7	7	A	44.0	44.0	6.3	15:28	16:02	4.1	0.05	0.001	32.0	-	-	13	6	10	5	-	-	17	
60+327.5	T	08-Jan-09	3	5.2	4.2	1	A	10.9	10.9	10.9	23:45	23:59	3.1	0.1	0.09	-	-	-	-	-	-	-	-	-	-	
		08-Jan-09	2	9.7	5.2	4.5	A	25.6	25.6	5.7	23:10	23:27	2.4	0.1	0.01	32.1	14	1.62	-	-	-	-	-	-	-	
60+329	S	04-Mar-09	4	3.9	3.3	0.6	A*	23.4	23.4	23.4	2:10	2:32	2.5	0	0	32.1	4	1.65	10	10	18	15	14	-	22	
		21-Dec-08	3	4.9	3.9	1	A	600.4	600.4	600.4	9:46	10:56	1.3	9.7	7.8	-	-	-	-	-	-	-	-	-	-	Max Volume
		21-Dec-08	2	7.4	4.9	2.5	A	750.5	750.5	300.2	8:33	9:43	1.1	12.5	4.4	-	-	-	-	-	-	-	-	-	-	Max Volume
		21-Dec-08	1	14.4	7.4	7	A	14.6	14.6	2.1	7:49	8:25	4.2	1.5	0.05	30.0	-	1.64	21	14	-	19	-	-	19	
60+330.5	T	08-Jan-09	3	5.7	4.7	1	A	5.9	5.9	5.9	0:49	1:02	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
		08-Jan-09	2	10.2	5.7	4.5	A	12.1	12.1	2.7	0:24	0:39	2.4	0.7	0.07	-	-	-	-	-	-	-	-	-	-	

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
	(P, S, T, Q)		Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+332	P	04-Mar-09	4	3.92	3.32	0.6	A*	21.2	21.2	21.2	2:46	3:07	2.8	0	0.01	-	-	-	-	-	-	-	-	-	-	
		11-Dec-08	3	5.3	4.3	1	A	10.1	10.1	10.1	18:39	18:54	3.2	0.089	0.06	33.2	-	-	-	-	-	-	-	-	21	
		11-Dec-08	2	7.8	5.3	2.5	A	18.0	18.0	7.2	18:01	18:18	1.9	0.3	0.06	30.5	-	1.58	19	12	12	10	-	-	17	
		01-Nov-08	1	14.8	7.8	7	A	47.5	47.5	6.8	01:00	01:30	4.0	0.1	0.004	32.0	-	-	-	-	-	-	-	-	19	
60+333.5	T	20-Jan-09	3	5.7	4.7	1	A	1.5	1.5	1.5	20:06	20:18	2.7	0	0	-	-	-	-	-	-	-	-	-	-	
		20-Jan-09	2	8.2	5.7	2.5	A	63.8	63.8	25.5	19:29	19:59	1.9	0	0	33.3	4	1.64	8	9	20	14	-	-	-	
60+335	S	04-Mar-09	4	3.72	3.12	0.6	A*	26.0	26.0	26.0	3:21	3:41	2.2	0	0	-	-	-	-	-	-	-	-	-	-	
		20-Dec-08	3	5.4	4.4	1	A	3.3	3.3	3.3	4:43	4:56	3.3	0.1	0.04	-	-	-	-	-	-	-	-	-	-	
		20-Dec-08	2	7.9	5.4	2.5	A	6.2	6.2	2.5	4:13	4:28	3.0	0.3	0.03	32.7	-	1.64	-	-	-	-	-	-	19	
		20-Dec-08	1	14.9	7.9	7	A	7.9	7.9	1.1	3:54	4:06	5.4	0	0	-	-	-	-	-	-	-	-	-	-	
60+336.5	T	08-Mar-09	4	4.35	3.75	0.6	MF	3.2	3.2	3.2	14:13	14:25	1.1	0.2	0.3	-	-	-	-	-	-	-	-	-	-	
		20-Jan-09	3	5.7	4.7	1	A	8.3	8.3	8.3	17:52	18:06	3.0	0.3	0.09	-	-	-	-	-	-	-	-	-	-	
		20-Jan-09	2	10.2	5.7	4.5	A	16.1	16.1	3.6	17:35	17:47	3.5	0.4	0.03	-	-	-	-	-	-	-	-	-	-	
60+338	P	18-Feb-09	4	4.76	4.16	0.6	A	7.1	7.1	7.1	1:45	2:16	5.0	0	0	32.0	4	1.63	-3	10	19	19	-	-	20	
		11-Dec-08	3	6.4	5.4	1	A	430.0	-	-	7:57	8:46	-	-	-	30.5	-	1.63	18	8	16	15	-	-	17	
		11-Dec-08	3	6.4	5.4	1	B	169.8	599.8	599.8	8:46	9:07	3.0	9	3.2	37.5	-	1.65	18	10	16	9	-	-	20	
		11-Dec-08	2	8.9	6.4	2.5	A	31.5	31.5	12.6	7:13	7:36	3.0	0.4	0.06	-	-	-	-	-	-	-	-	-	-	
		11-Dec-08	1	15.9	8.9	7	A	25.7	25.7	3.7	6:46	7:01	5.4	0.5	0.01	31.3	9	1.65	18	8	16	15	-	-	17	
60+339.5	T	08-Mar-09	4	4.76	4.16	0.6	MF	7.0	7.0	7.0	14:36	14:48	1.2	0.3	0.37	-	-	-	-	-	-	-	-	-	-	
		20-Jan-09	3	6.2	5.2	1	A	13.1	13.1	13.1	16:45	17:18	3.1	0.3	0.09	32.8	-	1.60	18	20	21	32	-	-	22	
		20-Jan-09	2	10.7	6.2	4.5	A	13.5	13.5	3.0	16:26	16:38	3.6	0.5	0.03	-	-	-	-	-	-	-	-	-	-	
60+341	S	18-Feb-09	4	5.73	5.13	0.6	A	615.5	615.5	615.5	2:25	3:29	1.4	10.1	6.16	-	5	-	-	-	-	-	-	-	-	Max Volume
		20-Dec-08	3	6.8	5.8	1	A	10.1	10.1	10.1	3:18	3:40	3.1	0.5	0.09	-	-	-	-	-	-	-	-	-	-	
		20-Dec-08	2	9.3	6.8	2.5	A	24.9	24.9	10.0	2:47	3:10	3.1	0.4	0.07	-	-	-	-	-	-	-	-	-	-	
		20-Dec-08	1	16.3	9.3	7	A	58.7	58.7	8.4	2:21	2:39	5.5	0.5	0.09	32.0	3	1.64	-	-	-	-	-	-	17	
60+341.75	Q	24-Feb-09	3	6.7	5.7	1	A	600.3	600.3	600.3	4:31	6:08	2.9	7.7	2.68	-	-	-	-	-	-	-	-	-	-	Max Volume
		24-Feb-09	2	11.2	6.7	4.5	A	8.3	8.3	1.8	4:15	4:28	2.8	0.2	0.02	32.6	3	1.64	-3	9	18	14	-	-	17	
60+342.5	T	08-Mar-09	4	5.19	4.59	0.6	MF	3.5	3.5	3.5	13:47	13:58	1.4	0.3	0.32	31.0	1	1.44	12	6	20	-	-	-	15	
		19-Jan-09	3	6.5	5.5	1	A	600.3	600.3	600.3	4:48	5:58	2.8	9.8	3.54	-	-	-	-	-	-	-	-	-	-	Max volume
		19-Jan-09	2	9	6.5	2.5	A	751.4	751.4	300.6	2:52	4:57	2.6	9.4	1.43	32.6	1	1.57	-	-	-	-	-	-	29	Max Volume
		29-Jan-09	1	16	9	7	A	6.4	6.4	0.9	14:28	14:42	5.5	0.1	0	-	-	-	-	-	-	-	-	-	-	
60+343.25	Q	24-Feb-09	3	6.2	5.2	1	A	87.4	87.4	87.4	2:10	4:04	2.9	0.2	0.05	-	-	-	-	-	-	-	-	-	-	
		24-Feb-09	2	10.7	6.2	4.5	A	325.2	325.2	72.3	0:48	2:05	3.1	1	0.07	33.1	2	1.63	-2	10	18	13	-	-	19	
60+344	P	18-Feb-09	4	5.65	5.05	0.6	A	117.9	117.9	117.9	3:41	4:20	2.6	0	0	32.0	-	1.63	-	-	-	-	-	-	22	
		11-Dec-08	3	6.7	5.7	1	A	5.5	5.5	5.5	9:20	9:41	3.3	0	0	32.0	-	-	-	-	-	-	-	-	19	
		11-Dec-08	2	9.2	6.7	2.5	A	20.5	20.5	8.2	8:54	9:12	3.2	0.1	0	33.2	5	1.64	12	10	13	11	-	-	21	
		05-Nov-08	1	16.2	9.2	7	A	87.1	87.1	12.4	09:40	10:53	4.8	0.1	0.01	31.0	5	1.63	20	7	14	15	-	-	18	
60+345.5	T	08-Mar-09	4	5.35	4.75	0.6	MF	441.7	-	-	15:03	16:03	0.5	10.3	45.75	-	-	-	-	-	-	-	-	-	-	
		08-Mar-09	4	5.35	4.75	0.6	A	250.5	692.2	692.2	16:03	17:00	1.4	0.4	0.51	33.0	6	1.63	15	8	20	15	-	-	19	
		19-Jan-09	3	6.8	5.8	1	A	5.4	5.4	5.4	1:59	2:16	3.2	0.2	0.06	-	-	-	-	-	-	-	-	-	-	
		19-Jan-09	2	9.3	6.8	2.5	A	9.5	9.5	3.8	1:35	1:50	3.1	0.2	0.03	-	-	-	-	-	-	-	-	-	-	
60+347	S	19-Feb-09	4	5.62	5.02	0.6	A	133.1	133.1	133.1	9:38	10:48	2.5	0.4	0.14	32.0	4	1.62	14	14	-	16	-	-	21	
		20-Dec-08	3	7.2	6.2	1	A	5.3	5.3	5.3	1:52	2:04	3.0	0.2	0.08	-	-	-	-	-	-	-	-	-	-	
		20-Dec-08	2	9.7	7.2	2.5	A	5.2	5.2	2.1	1:33	1:45	3.1	0.2	0.02	-	-	-	-	-	-	-	-	-	-	
		20-Dec-08	1	16.7	9.7	7	A	3.6	3.6	0.5	1:10	1:23	5.4	0.3	0.01	33.0	4	1.65	11	9	16	15	-	-	15	
60+348.5	T	08-Mar-09	4	6.49	5.89	0.6	MF	2.0	2.0	2.0	17:17	17:28	1.1	0.3	0.47	-	-	-	-	-	-	-	-	-	-	
		19-Jan-09	3	7.7	6.7	1	A	2.1	2.1	2.1	0:51	1:02	3.2	0	0	33.2	-	1.66	15	9	19	17	-	-	23	
		19-Jan-09	2	12.2	7.7	4.5	A	480.0	-	-	20:33	21:32	3.5	-	-	34.2	1	1.65	-3	8	17	16	-	-	17	
		19-Jan-09	2	12.2	7.7	4.5	B	394.0	874.0	194.2	22:48	22:48	3.5	0	0	36.2	2	1.69	23	-	-	-	-	-	19	Max Volume
60+350	P	19-Feb-09	4	6.62	6.02	0.6	A	600.6	600.6	600.6	11:01	12:15	2.6	10.3	3.33	32.0	4	1.63	14	11	-	16	-	-	17	Max Volume
		11-Dec-08	3	8	7	1	A	400.0	-	-	4:58	5:43	-	-	-	-	-	-	-	-	-	-	-	-	-	
		11-Dec-08	3	8	7	1	B	205.1	605.1	605.1	4:58	6:05	1.3	9.5	13.1	-	-	-	-	-	-	-	-	-	-	
		10-Dec-08	2	10.5	8	2.5	A	20.7	20.7	8.3	04:30	04:47	1.3	0.1	0	31.8	-	-	-	-	-	-	-	-	19	
		10-Dec-08	1	17.5	10.5	7	A	385.6	-	-	03:12	03:50	3.5	15.4	0.64	32.1	4	1.63	18	8	16	9	-	-	17	
		10-Dec-08	1	17.5	10.5	7	B	164.9	550.5	78.6	03:50	04:15	3.6	0	0	35.3	6	1.64	-	-	-	-	-	-	19	

Check: GRB

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

			Stage				Take				Duration		Termination			QA			Temperatures							
Hole	Order (P, S, T, Q)	Date	Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	Comments
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+351.5	T	08-Mar-09	4	7.05	6.45	0.6	MF	600.5	600.5	600.5	21:13	23:28	1.3	9.9	13.17	32.1	3	1.42	31	7	12	-	-	-	14	Max Volume
		18-Jan-09	3	8.2	7.2	1	A	29.3	29.3	29.3	8:04	8:49	3.1	0.3	0.08	-	-	-	-	-	-	-	-	-	-	
		18-Jan-09	2	12.7	8.2	4.5	A	5.1	5.1	1.1	7:38	7:54	3.3	0.3	0.02	-	-	-	-	-	-	-	-	-	-	
60+353	S	19-Feb-09	4	6.41	5.81	0.6	A	607.3	607.3	607.3	15:05	16:14	2.1	10.5	4.12	32.0	4	1.61	7	12	-	18	-	-	17	Max Volume
		20-Dec-08	3	8	7	1	A	3.8	3.8	3.8	8:42	8:57	3.3	0	0	32.3	5	1.64	11	12	15	15	-	-	17	
		20-Dec-08	2	10.5	8	2.5	A	374.9	374.9	150.0	unkn	7:05	3.1	0.8	0.09	-	-	-	-	-	-	-	-	-	-	
		20-Dec-08	1	17.5	10.5	7	A	1.6	1.6	0.2	17:03	17:16	5.5	0	0	-	-	-	-	-	-	-	-	-	-	
60+354.5	T	08-Mar-09	4	6.67	6.07	0.6	MF	36.4	36.4	36.4	1:20	1:45	1.7	0.4	0.41	31.9	2	1.43	14	8	13	-	-	-	12	
		18-Jan-09	3	7.8	6.8	1	A	3.4	3.4	3.4	9:30	9:42	2.9	0.2	0.06	-	-	-	-	-	-	-	-	-	-	
		18-Jan-09	2	10.3	7.8	2.5	A	3.3	3.3	1.3	9:09	9:22	3.3	0.2	0.03	32.8	-	-	11	18	20	-	-	-	30	
60+356	P	19-Feb-09	4	6.54	5.94	0.6	A	68.7	68.7	68.7	16:28	16:51	2.5	0	0	-	-	-	-	-	-	-	-	-	-	
		03-Dec-08	3	9.06	8.06	1	A	1.7	1.7	1.7	04:34	04:48	4.5	0.3	0.009	-	-	-	-	-	-	-	-	-	-	
		03-Dec-08	2	14.56	9.06	5.5	A	16.5	16.5	3.0	03:41	04:19	4.7	0.02	0.001	32.0	5	1.58	28	8	11	14	-	-	18	
		05-Nov-08	1	17.56	10.56	7	A	173.0	173.0	24.7	11:15	11:55	4.6	0.1	0.01	29.0	-	-	17	10	10	14	-	-	17	
60+357.5	T	08-Mar-09	4	6.72	6.12	0.6	MF	105.7	105.7	105.7	19:56	20:58	1.3	0.8	1	31.1	2	1.43	34	5	13	-	-	-	13	
		09-Jan-09	3	8.1	7.1	1	A	387.7	387.7	387.7	8:48	9:27	0.7	15	22.7	31.2	4	1.64	10	9	19	14	-	-	20	Communicate to 60+342.5
		09-Jan-09	2	10.6	8.1	2.5	A	8.5	8.5	3.4	8:19	8:34	2.8	0.3	0.05	-	-	-	-	-	-	-	-	-	-	
		09-Jan-09	1	17.6	10.6	7	A	388.1	388.1	55.4	6:59	8:08	5.2	1.2	0.03	31.0	8	1.64	18	12	17	12	-	-	19	
60+359	S	19-Feb-09	4	6.49	5.89	0.6	A	600.1	600.1	600.1	17:00	18:06	2.1	9.9	4.07	31.6	8	1.61	-4	15	27	21	-	-	23	Max Volume
		20-Dec-08	3	8	7	1	A	400.0	-	-	15:59	16:00	-	-	-	32.0	-	1.64	16	15	-	21	-	-	19	
		20-Dec-08	3	8	7	1	B	200.2	600.2	600.2	16:00	16:54	1.3	10.3	8.24	38.0	-	1.67	18	17	-	20	-	-	18	Max Volume
		20-Dec-08	2	10.5	8	2.5	A	20.7	20.7	8.3	15:29	15:53	2.8	0.5	0.07	-	-	-	-	-	-	-	-	-	-	
		20-Dec-08	1	17.5	10.5	7	A	59.4	59.4	8.5	14:52	15:21	5.2	0.8	0.02	-	-	-	-	-	-	-	-	-	-	
60+360.5	T	08-Mar-09	4	6.56	5.96	0.6	MF	9.6	9.6	9.6	1:59	2:14	1.4	0.2	0.28	-	-	-	-	-	-	-	-	-	-	
		09-Jan-09	3	7.8	6.8	1	A	8.4	8.4	8.4	10:27	10:43	2.8	0	0	-	-	-	-	-	-	-	-	-	-	
		09-Jan-09	2	12.3	7.8	4.5	A	17.6	17.6	3.9	9:56	10:16	2.9	0.2	0.02	-	-	-	-	-	-	-	-	-	-	
60+362	P	19-Feb-09	4	6.56	5.96	0.6	A	600.5	600.5	600.5	18:27	19:33	2.1	10.3	4.09	-	-	-	-	-	-	-	-	-	-	Max Volume
		10-Dec-08	3	8	7	1	A	155.0	155.0	155.0	09:47	10:55	3.0	0	0	33.1	-	-	-	-	-	-	-	-	19	
		10-Dec-08	2	10.5	8	2.5	A	649.0	649.0	259.6	07:25	09:30	1.2	0.9	0.3	33.0	-	1.63	11	9	9	8	-	-	18	
		10-Dec-08	1	17.5	10.5	7	A	87.3	87.3	12.5	06:45	07:15	3.7	0	0	31.4	5	1.62	-	-	-	-	-	-	18	
60+362.75	Q	24-Feb-09	3	9.3	8.3	1	A	267.1	267.1	267.1	19:59	21:56	3.5	0.1	0.02	32.9	2	1.64	-4	8	19	12	-	-	17	
		24-Feb-09	2	13.8	9.3	4.5	A	15.6	15.6	3.5	19:35	19:52	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
60+363.5	T	08-Mar-09	4	6.59	5.99	0.6	MF	30.3	30.3	30.3	2:27	2:49	1.7	0.8	0.76	-	-	-	-	-	-	-	-	-	-	
		19-Jan-09	3	8	7	1	A	600.0	600.0	600.0	16:54	-	3.1	8.5	2.7	32.5	-	1.61	-22	20	16	22	-	-	15	
		19-Jan-09	2	10.5	8	2.5	A	800.0	-	-	11:12	12:35	-	-	-	33.1	-	1.66	17	12	23	-	-	-	19	
		19-Jan-09	2	10.5	8	2.5	B	550.0	1350.0	540.0	12:35	13:28	2.3	10	1.72	37.3	-	1.65	-19	12	24	-	-	-	19	
		29-Jan-09	1	17.5	10.5	7	A	23.3	23.3	3.3	13:30	13:46	6.2	1	0	-	-	-	-	-	-	-	-	-	-	
60+364.25	Q	24-Feb-09	3	8.7	7.7	1	A	600.3	600.3	600.3	18:01	19:16	2.9	7.6	2.65	-	-	-	-	-	-	-	-	-	-	Max Volume
		24-Feb-09	2	13.2	8.7	4.5	A	40.2	40.2	8.9	17:35	17:56	3.2	0	0	33.0	3	1.63	-7	10	16	15	-	-	14	
60+365	S	19-Feb-09	4	7.25	6.65	0.6	A	600.6	600.6	600.6	19:46	20:55	2.1	10.4	4.16	32.5	-	1.65	4	11	12	14	-	-	18	Max Volume
		20-Dec-08	3	8.5	7.5	1	A	32.7	32.7	32.7	13:51	14:34	3.3	0.2	0.05	-	-	-	-	-	-	-	-	-	-	
		20-Dec-08	2	11	8.5	2.5	A	32.3	32.3	12.9	13:06	13:44	3.1	0.7	0.09	32.0	-	1.56	20	11	-	20	-	-	18	
		20-Dec-08	1	18	11	7	A	5.5	5.5	0.8	11:04	11:25	5.1	0	0	33.0	-	1.63	24	13	-	25	-	-	18	
60+366.5	T	09-Mar-09	4	7.02	6.42	0.6	MF	102.0	102.0	102.0	15:15	15:54	1.6	0.8	0.85	30.0	1	1.41	14	10	15	-	-	-	19	
		19-Jan-09	3	8.5	7.5	1	A	2.5	2.5	2.5	10:45	10:58	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		19-Jan-09	2	11	8.5	2.5	A	2.9	2.9	1.2	10:25	10:40	2.7	0	0	32.8	5	1.60	-11	25	22	20	-	-	23	
		01-Feb-09	1	18	11	7	A	19.9	19.9	2.8	22:11	22:25	5.1	0.7	0.02	-	-	-	-	-	-	-	-	-	-	
60+368	P	19-Feb-09	4	6.79	6.19	0.6	A	600.9	600.9	600.9	22:45	23:47	2.2	10.4	3.94	32.8	2	1.63	21	5	15	13	-	-	19	Max Volume
		03-Dec-08	3	8.76	7.76	1	A	2.9	2.9	2.9	05:39	05:50	3.9	0.01	0.001	-	-	-	-	-	-	-	-	-	-	
		03-Dec-08	2	13.26	8.76	4.5	A	7.0	7.0	1.6	05:14	05:38	4.3	0	0	-	-	-	-	-	-	-	-	-	-	
		05-Nov-08	1	18.26	11.26	7	A	410.0	-	-	15:58	-	0.0	0	0	32.0	-	1.65	10	6	12	9	-	-	16	
		05-Nov-08	1	18.26	11.26	7	B	440.0	-	-	-	-	0.0	0	0	34.5	2	1.65	7	7	10	-	-	-	19	
		05-Nov-08	1	18.26	11.26	7	C	500.0	-	-	-	-	0.0	0	0	47.0	2	1.70	7	7	11	-	-	22	18	
		05-Nov-08	1	18.26	11.26	7	D	736.0	2086.0	298.0	-	19:15	2.2	1.75	0.1	60.0	2	1.69	2	7	20	-	-	21	18	

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
	(P, S, T, Q)		Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+369.5	T	09-Mar-09	4	7.07	6.47	0.6	MF	369.7	369.7	369.7	16:29	17:46	1.4	0.7	0.51	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	3	8.4	7.4	1	A	594.3	594.3	594.3	3:30	4:53	3.2	5.1	1.61	-	-	-	-	-	-	-	-	-	-	Max Volume
		17-Jan-09	2	12.9	8.4	4.5	A	3.3	3.3	0.7	3:10	3:21	3.5	0.2	0.01	-	-	-	-	-	-	-	-	-	-	
		01-Feb-09	1	17.9	12.9	5	A	12.3	12.3	2.5	21:40	21:54	5.2	0.3	0.01	-	-	-	-	-	-	-	-	-	-	
60+371	S	19-Feb-09	4	6.59	5.99	0.6	A	600.4	600.4	600.4	0:05	1:08	2.1	10.1	3.98	33.0	4	1.62	-4	7	16	14	-	-	18	Max Volume
		20-Dec-08	3	8.4	7.4	1	A	211.8	211.8	211.8	8:49	9:40	3.6	1.6	0.44	-	-	-	-	-	-	-	-	-	-	
		20-Dec-08	2	10.9	8.4	2.5	A	3.7	3.7	1.5	8:30	8:43	3.1	0.1	0.02	-	-	-	-	-	-	-	-	-	-	
		20-Dec-08	1	17.9	10.9	7	A	18.2	18.2	2.6	8:04	8:20	5.4	0	0	33.5	-	1.67	19	15	-	16	-	-	20	
60+372.5	T	08-Mar-09	4	7.02	6.42	0.6	MF	43.0	43.0	43.0	4:44	5:12	1.2	0.6	0.76	32.8	2	1.43	11	8	12	-	-	-	10	
		10-Jan-09	3	8.5	7.5	1	A	400.0	-	-	6:35	7:10	-	-	-	-	-	-	-	-	-	-	-	-	-	
		10-Jan-09	3	8.5	7.5	1	B	201.6	601.6	601.6	7:10	7:36	1.0	13.8	25.75	34.4	7	1.63	12	16	18	-	-	-	19	Max Volume
		09-Jan-09	2	13	8.5	4.5	A	27.1	27.1	6.0	5:57	6:15	3.6	0.6	0.04	32.9	5	1.65	-	-	-	-	-	-	14	
60+374	P	19-Feb-09	4	7.33	6.73	0.6	A	600.8	600.8	600.8	3:38	4:40	2.3	11.2	4.2	31.4	4	1.63	5	5	19	27	-	-	19	Max Volume
		10-Dec-08	3	9.6	8.6	1	A	450.0	-	-	16:44	17:35	-	-	-	32.3	-	1.62	15	10	16	15	-	-	18	
		10-Dec-08	3	9.6	8.6	1	B	200.2	650.2	650.2	17:35	17:55	0.9	10	8.6	34.5	-	1.62	15	10	16	15	-	-	17	
		10-Dec-08	2	12.1	9.6	2.5	A	430.0	-	-	15:03	16:02	-	-	-	-	-	-	-	-	-	-	-	-	-	
		10-Dec-08	2	12.1	9.6	2.5	B	321.5	751.5	300.6	16:02	16:25	2.1	10.5	2	-	-	-	-	-	16	-	-	-	15	
		10-Dec-08	1	19.1	12.1	7	A	41.5	41.5	5.9	14:27	14:52	5.4	1.1	0.03	31.7	4	1.68	20	15	6	16	-	-	20	
60+375.5	T	09-Mar-09	4	7.5	6.9	0.6	MF	9.9	9.9	9.9	19:20	19:37	1.2	0.5	0.72	32.1	2	1.42	15	9	17	-	-	-	14	
		09-Jan-09	3	8.8	7.8	1	A	400.0	-	-	3:49	4:29	-	-	-	-	-	-	-	-	-	-	-	-	-	
		09-Jan-09	3	8.8	7.8	1	B	205.7	605.7	605.7	4:29	4:49	1.0	10.7	20.81	32.3	4	1.66	15	9	-	14	-	-	19	Max volume
		09-Jan-09	2	13.3	8.8	4.5	A	620.0	-	-	1:44	2:56	-	-	-	31.1	8	1.64	4	12	-	27	-	-	21	
		09-Jan-09	2	13.3	8.8	4.5	B	48.7	668.7	148.6	2:56	3:14	3.7	0.6	0.04	34.2	5	1.64	-	-	-	-	-	-	20	
60+377	S	19-Feb-09	4	7.35	6.75	0.6	A	0.4	0.4	0.4	4:57	5:17	4.8	0	0	30.8	7	1.62	30	7	14	24	-	-	18	
		20-Dec-08	3	8.9	7.9	1	A	3.7	3.7	3.7	7:26	7:40	3.0	0	0	32.0	-	1.64	20	9	-	21	-	-	16	
		19-Dec-08	2	11.4	8.9	2.5	A	400.0	-	-	4:46	5:40	2.7	6.5	0.8	-	-	-	-	-	-	-	-	-	-	
		19-Dec-08	2	11.4	8.9	2.5	B	81.0	481.0	192.4	5:40	6:15	3.1	0	0	37.7	-	1.66	-	-	-	-	-	-	15	
		19-Dec-08	1	18.4	11.4	7	A	30.3	30.3	4.3	4:19	4:37	5.4	0.2	0	32.8	-	1.65	14	8	13	15	-	-	15	
60+378.5	T	09-Mar-09	4	7.63	7.03	0.6	MF	94.7	94.7	94.7	10:32	11:10	1.5	0.4	0.46	29.5	1	1.39	13	9	13	-	-	-	17	
		17-Jan-09	3	8.9	7.9	1	A	3.4	3.4	3.4	2:35	2:50	2.8	0	0	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	2	13.4	8.9	4.5	A	242.9	242.9	54.0	1:15	2:25	3.0	0	0	32.3	7	1.65	-5	10	16	19	-	-	23	
60+380	P	20-Feb-09	4	8.29	7.69	0.6	A	600.4	600.4	600.4	5:28	6:31	1.7	9.5	4.59	-	-	-	-	-	-	-	-	-	-	
		04-Dec-08	3	9.72	8.72	1	A	257.5	257.5	257.5	15:23	16:23	3.0	0.011	0.001	-	-	-	-	-	-	-	-	-	-	
		04-Dec-08	2	12.22	9.72	2.5	A	19.0	19.0	7.6	13:59	15:08	2.1	0.011	0.001	-	-	-	-	-	-	-	-	-	-	
		05-Nov-08	1	19.22	12.22	7	A	75.0	75.0	10.7	09:23	10:12	5.1	0.1	0	30.0	2	1.62	14	6	13	12	-	-	-	
60+381.5	T	18-Mar-09	4	8.62	8.02	0.6	MF	62.6	62.6	62.6	8:12	8:35	1.4	0.8	0.38	32.0	1	1.42	18	10	20	-	-	-	20	
		09-Jan-09	3	9.7	8.7	1	A	400.0	-	-	21:31	22:06	-	-	-	-	-	-	-	-	-	-	-	-	-	
		09-Jan-09	3	9.7	8.7	1	B	201.5	601.5	601.5	22:06	22:26	0.4	11.2	61.69	-	-	-	-	-	-	-	-	-	-	Max volume
		09-Jan-09	2	14.2	9.7	4.5	A	46.1	46.1	10.2	20:58	21:21	3.5	0.2	0.01	32.4	11	1.65	-	-	-	-	-	-	23	
60+383	S	20-Feb-09	4	8.39	7.79	0.6	A	602.3	602.3	602.3	8:27	9:43	1.9	10.2	4.47	32.0	3	1.61	16	8	17	15	-	-	15	Max Volume
		19-Dec-08	3	10	9	1	A	399.9	-	-	3:07	3:40	1.0	15.6	16.61	32.4	5	1.66	-	-	-	-	-	-	17	
		19-Dec-08	3	10	9	1	B	200.5	600.4	600.4	3:40	3:59	1.6	10.3	6.38	37.6	-	1.66	15	10	13	-	-	-	16	Max Volume
		19-Dec-08	2	12.5	10	2.5	A	400.0	-	-	1:28	2:18	2.9	9.7	1.39	-	-	-	-	-	-	-	-	-	-	
		19-Dec-08	2	12.5	10	2.5	B	350.1	750.1	300.0	2:18	2:56	3.2	5.3	0.67	33.0	3	1.65	-	-	-	-	-	-	13	Max Volume
		19-Dec-08	1	19.5	12.5	7	A	8.1	8.1	1.2	1:00	1:14	5.4	0.4	0.01	32.3	5	1.65	16	10	16	16	-	-	14	
60+384.5	T	09-Mar-09	4	9.13	8.53	0.6	MF	41.3	41.3	41.3	21:31	22:01	1.9	0.8	0.72	-	-	-	-	-	-	-	-	-	-	
		09-Jan-09	3	10.4	9.4	1	A	2.2	2.2	2.2	20:06	20:21	3.0	0	0.01	-	-	-	-	-	-	-	-	-	-	
		09-Jan-09	2	12.9	10.4	2.5	A	307.8	307.8	123.1	18:10	19:52	3.0	0.1	0.01	31.5	6	1.65	5	7	-	-	-	-	20	
		09-Jan-09	1	19.9	12.9	7	A	2.5	2.5	0.4	17:51	17:53	5.3	0	0.01	-	-	-	-	-	-	-	-	-	-	
60+386	P	20-Feb-09	4	8.98	8.38	0.6	A	600.2	600.2	600.2	10:14	11:26	2.4	7.3	2.58	32.0	3	1.62	1	10	22	15	-	-	18	Max Volume
		10-Dec-08	3	10.5	9.5	1	A	450.0	-	-	7:11	7:45	-	-	-	30.5	-	1.63	20	9	10	10	-	-	18	
		10-Dec-08	3	10.5	9.5	1	B	151.4	601.4	601.4	7:45	8:17	1.3	10	16	34.5	-	1.65	-	-	8	-	-	-	14	
		10-Dec-08	2	13	10.5	2.5	A	750.1	750.1	300.0	4:10	6:42	1.8	9.5	2	-	3	-	-	-	-	-	-	-	-	
		09-Dec-08	1	20	13	7	A	40.0	40.0	5.7	4:45	5:09	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
60+387.5	T	09-Mar-09	4	8.55	7.95	0.6	MF	10.4	10.4	10.4	22:19	22:33	1.9	0.4	0.37	-	-	-	-	-	-	-	-	-	-	
		10-Jan-09	3	10.8	9.8	1	A	3.6	3.6	3.6	9:55	10:07	2.9	0.2	0.05	30.4	7	1.65	14	17	17	-	-	-	20	
		10-Jan-09	2	15.3	10.8	4.5	A	4.4	4.4	1.0	9:33	9:46	3.4	0.3	0.02	-	-	-	-	-	-	-	-	-	-	

Check: GRB

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
	(P, S, T, Q)		Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+389	S	20-Feb-09	4	9.26	8.66	0.6	A	600.7	600.7	600.7	13:46	14:56	1.7	9.2	4.57	32.0	3	1.60	4	11	24	16	-	-	18	Max Volume
		19-Dec-08	3	10.7	9.7	1	A	399.9	-	-	8:26	9:00	0.6	15.6	25.08	-	-	-	-	-	-	-	-	-	-	
		19-Dec-08	3	10.7	9.7	1	B	185.4	585.3	585.3	9:00	9:11	1.4	15.8	11.67	37.4	4	1.66	-	-	-	-	-	-	13	Max Volume
		19-Dec-08	2	13.2	10.7	2.5	A	16.1	16.1	6.4	7:57	8:15	3.0	0.6	0.08	-	-	-	-	-	-	-	-	-	-	
		19-Dec-08	1	20.2	13.2	7	A	51.0	51.0	7.3	7:27	7:43	5.6	0.3	0.01	32.7	2	1.66	-	-	-	-	-	-	-	
60+390.5	T	09-Mar-09	4	8.85	8.25	0.6	MF	3.8	3.8	3.8	22:43	22:55	1.5	0.4	0.37	-	-	-	-	-	-	-	-	-	-	
		10-Jan-09	3	10.3	9.3	1	A	601.0	601.0	601.0	11:04	12:06	1.2	11.2	9.18	30.4	-	1.63	-	-	18	-	-	-	25	Max Volume
		10-Jan-09	2	14.8	10.3	4.5	A	9.1	9.1	2.0	10:36	10:54	3.5	0.2	0.01	-	-	-	-	-	-	-	-	-	-	
60+392	P	20-Feb-09	4	8.75	8.15	0.6	A	10.0	10.0	10.0	15:17	15:32	2.4	0	0	32.0	3	1.63	4	12	24	16	-	-	18	
		04-Dec-08	3	10	9	1	A	1.2	1.2	1.2	18:07	18:20	2.9	0.006	0.002	-	-	-	-	-	-	-	-	-	-	
		04-Dec-08	2	12.5	10	2.5	A	13.7	13.7	5.5	17:25	17:38	2.6	0.011	0.002	-	-	-	-	-	-	-	-	-	-	
		05-Nov-08	1	19.5	12.5	7	A	400.0	-	-	02:15	03:10	3.0	10	0.5	29.0	-	-	-	-	-	-	-	-	15	
		05-Nov-08	1	19.5	12.5	7	B	500.0	-	-	03:11	03:55	4.4	4.5	0.14	35.0	3	1.65	-	-	-	-	-	-	15	
		05-Nov-08	1	19.5	12.5	7	C	152.0	1052.0	150.3	03:56	04:40	5.1	0	0	46.0	2	1.68	-	-	13	-	-	12	15	
60+393.5	T	09-Mar-09	4	8.75	8.15	0.6	MF	5.0	5.0	5.0	23:06	23:21	1.5	0.3	0.36	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	3	9.9	8.9	1	A	400.0	-	-	20:07	20:56	1.4	9.5	7.1	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	3	9.9	8.9	1	B	234.9	634.9	634.9	20:56	21:20	1.8	9.1	5.09	-	-	-	-	-	-	-	-	-	-	Max Volume
		17-Jan-09	2	14.4	9.9	4.5	A	4.6	4.6	1.0	19:49	20:03	3.3	0.2	0.01	33.4	6	1.66	-5	9	13	14	-	-	-	
60+395	S	20-Feb-09	4	8.34	7.74	0.6	A	601.7	601.7	601.7	15:39	16:48	1.8	9.7	4.45	-	-	-	-	-	-	-	-	-	-	Max Volume
		19-Dec-08	3	9.4	8.4	1	A	400.0	-	-	17:47	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	
		19-Dec-08	3	9.4	8.4	1	B	200.7	600.7	600.7	18:00	19:01	0.7	10.6	15.2	36.7	-	1.66	-	-	-	-	-	-	-	Max Volume
		19-Dec-08	2	11.9	9.4	2.5	A	16.1	16.1	6.4	17:20	17:43	3.1	0.5	0.06	-	-	-	-	-	-	-	-	-	-	
		19-Dec-08	1	18.9	11.9	7	A	521.7	521.7	74.5	16:24	17:12	6.3	6.3	0.14	32.3	-	1.66	23	20	16	25	-	-	18	Communicate to 60+393.5
60+395.75	Q	04-Mar-09	3	9.4	8.4	1	A	9.1	9.1	9.1	8:34	9:13	3.4	0	0	-	-	-	-	-	-	-	-	-	-	
		04-Mar-09	2	11.9	9.4	2.5	A	9.4	9.4	3.8	8:14	8:30	2.9	0.3	0.5	-	-	-	-	-	-	-	-	-	-	
		04-Mar-09	1	18.9	11.9	7	A	26.9	26.9	3.8	7:47	8:10	5.0	0	0	32.6	4	1.64	13	6	9	10	-	-	18	
60+396.5	T	09-Mar-09	4	8.34	7.74	0.6	MF	316.0	316.0	316.0	23:33	0:46	1.4	0.8	0.89	32.8	1	1.43	18	10	16	-	-	-	14	
		10-Jan-09	3	9.5	8.5	1	A	405.0	-	-	18:32	19:40	-	-	-	32.4	-	1.64	22	7	-	20	-	-	17	
		10-Jan-09	3	9.5	8.5	1	B	185.7	590.7	590.7	19:40	19:57	1.6	5	3.2	34.6	5	1.63	22	7	18	20	-	-	22	Max Volume
		10-Jan-09	2	14	9.5	4.5	A	800.0	-	-	14:24	16:00	-	-	-	30.0	7	1.63	29	24	22	30	-	-	25	
		10-Jan-09	2	14	9.5	4.5	B	389.0	1189.0	264.2	16:00	17:57	3.5	0.7	0.05	35.7	3	1.63	29	19	19	-	-	-	22	
		29-Jan-09	1	12	19	7	A	3.9	3.9	0.6	11:00	11:17	5.2	0	0	-	-	-	-	-	-	-	-	-	-	
60+397.25	Q	04-Mar-09	3	9.9	8.9	1	A	7.3	7.3	7.3	14:03	14:27	3.3	0	0	32.3	-	1.63	12	6	11	15	-	-	18	
		04-Mar-09	2	12.4	9.9	2.5	A	627.0	-	-	9:46	10:42	-	-	-	-	-	-	-	-	-	-	-	-	-	
		04-Mar-09	2	12.4	9.9	2.5	B	368.0	995.0	398.0	10:42	11:28	3.2	0	0	37.0	4	1.66	12	6	10	-	-	-	19	
		04-Mar-09	1	19.4	12.4	7	A	2.5	2.5	0.4	9:29	9:42	5.3	0	0	-	-	-	-	-	-	-	-	-	-	
60+398	P	20-Feb-09	4	9.05	8.45	0.6	A	600.9	600.9	600.9	19:36	20:38	1.5	10.6	5.96	33.0	4	1.62	2	8	20	18	-	-	19	Max Volume
		09-Dec-08	3	10.5	9.5	1	A	441.7	-	-	3:20	4:10	0.7	9.7	27.31	31.0	6	1.65	7	7	16	2	-	-	14	
		09-Dec-08	3	10.5	9.5	1	B	159.3	601.0	601.0	4:10	4:25	1.6	10	11.43	35.0	4	1.62	-	-	-	-	-	-	19	
		09-Dec-08	2	13	10.5	2.5	A	2.8	2.8	1.1	3:03	3:14	1.2	0	0.01	-	-	-	-	-	-	-	-	-	-	
		09-Dec-08	1	20	13	7	A	2.6	2.6	0.4	2:25	2:53	3.3	0	0	33.0	-	1.64	-	-	-	-	-	-	19	
60+399.5	T	09-Mar-09	4	9.21	8.61	0.6	MF	54.5	54.5	54.5	3:17	4:09	1.4	0.7	0.8	33.1	1	1.42	17	6	16	-	-	-	13	
		17-Jan-09	3	10.4	9.4	1	A	390.0	-	-	18:03	19:00	-	-	-	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	3	10.4	9.4	1	B	192.0	582.0	582.0	19:00	19:12	2.8	12	8	36.3	2	1.66	-5	9	14	-	-	-	14	Max Volume
		17-Jan-09	2	14.9	10.4	4.5	A	3.4	3.4	0.8	17:40	17:51	3.5	0.2	0.01	-	-	-	-	-	-	-	-	-	-	
60+401	S	20-Feb-09	4	9.54	8.94	0.6	A	546.0	546.0	546.0	20:55	21:54	1.8	10.5	5.01	32.4	5	1.64	3	8	10	17	-	-	19	Communicate to 60+398
		19-Dec-08	3	11.2	10.2	1	A	4.7	4.7	4.7	15:54	16:06	3.5	0.1	0.04	-	-	-	-	-	-	-	-	-	-	
		19-Dec-08	2	13.7	11.2	2.5	A	2.6	2.6	1.0	15:34	15:47	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		19-Dec-08	1	20.7	13.7	7	A	36.5	36.5	5.2	14:21	14:44	5.4	0	0	33.1	3	1.63	20	14	15	21	-	-	17	
60+402.5	T	09-Mar-09	4	9.74	9.14	0.6	MF	7.0	7.0	7.0	4:35	4:47	1.5	0.4	0.39	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	3	11	10	1	A	601.9	601.9	601.9	16:15	17:21	2.9	10.4	3.55	32.8	-	1.68	-	23	12	-	-	-	20	Max Volume
		17-Jan-09	2	13.5	11	2.5	A	3.2	3.2	1.3	15:58	16:11	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
60+404	P	20-Feb-09	4	9.18	8.58	0.6	A	600.4	600.4	600.4	22:13	23:15	1.2	9.9	6.87	33.0	-	1.64	-7	11	7	17	-	-	18	Max Volume
		04-Dec-08	2, 3	15.09	9.8	5.29	A	17.3	17.3	3.3	22:08	22:30	2.8	0	0	-	-	-	-	-	-	-	-	-	-	
		05-Nov-08	1	20.4	13.4	7	A	44.9	44.9	6.4	05:50	06:02	5.0	0	0	31.0	-	-	-	-	12	-	-	-	12	

Check: GRB

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+405.5	T	09-Mar-09	4	9.28	8.68	0.6	MF	12.9	12.9	12.9	5:02	5:18	1.4	0.3	0.34	-	-	-	-	-	-	-	-	-	-	
		10-Jan-09	3	10.5	9.5	1	A	396.0	-	-	3:25	4:12	-	-	-	-	-	-	-	-	-	-	-	-	-	
		10-Jan-09	3	10.5	9.5	1	B	189.9	585.9	585.9	4:12	4:34	2.0	10	9	36.6	4	1.64	-	-	-	-	-	-	19	Max Volume
		10-Jan-09	2	15	10.5	4.5	A	8.2	8.2	1.8	3:06	3:18	3.4	0.4	0.02	32.3	7	1.66	24	6	19	21	-	-	21	
60+407	S	16-Dec-08	3	10.7	9.7	1	A	600.4	600.4	600.4	15:41	16:47	1.7	10.6	6.13	31.6	-	1.60	9	10	12	14	-	-	15	Max Volume
		16-Dec-08	2	13.2	10.7	2.5	A	8.3	8.3	3.3	15:22	15:36	3.4	0.2	0.02	-	-	-	-	-	-	-	-	-	-	
		16-Dec-08	1	20.2	13.2	7	A	22.0	22.0	3.1	14:57	15:11	5.9	1.2	0.03	32.4	4	1.63	9	7	12	10	-	-	14	
60+408.5	T	10-Mar-09	4	9.16	8.56	0.6	MF	278.5	278.5	278.5	5:45	6:50	1.1	0.4	0.62	30.0	1	1.45	12	9	15	-	-	-	18	
		10-Jan-09	3	10.6	9.6	1	A	601.3	601.3	601.3	5:06	6:41	2.5	10.8	4.38	-	-	-	-	-	-	-	-	-	-	Max Volume
		10-Jan-09	2	15.1	10.6	4.5	A	6.3	6.3	1.4	5:06	5:20	3.7	0	0	33.8	-	1.66	-	-	-	-	-	-	14	
60+410	P	20-Feb-09	4	9.31	8.71	0.6	A	600.6	600.6	600.6	2:04	3:07	1.1	10	7.42	33.1	2	1.62	-3	3	10	10	-	-	17	
		09-Dec-08	3	10.8	9.8	1	A	600.4	600.4	600.4	8:05	9:07	1.2	10	13.14	32.0	-	-	-	-	-	-	-	-	18	
		09-Dec-08	2	13.3	10.8	2.5	A	2.8	2.8	1.1	7:15	7:54	1.4	0	0	30.4	5	1.62	-	-	-	-	-	-	17	
		09-Dec-08	1	20.3	13.3	7	A	40.1	40.1	5.7	17:45	18:03	5.4	0.06	0.01	31.5	-	1.63	17	7	10	8		-	11	
60+411.5	T	10-Mar-09	4	9.16	8.56	0.6	MF	601.4	601.4	601.4	8:38	9:47	1.2	9.2	7.63	-	-	-	-	-	-	-	-	-	-	Max Volume
		11-Jan-09	3	10.7	9.7	1	A	600.9	600.9	600.9	8:24	10:12	2.9	4.5	1.55	-	-	-	-	-	-	-	-	-	-	Max Volume
		11-Jan-09	2	13.2	10.7	2.5	A	33.2	33.2	13.3	7:31	7:58	2.9	0.4	0.06	-	-	-	-	-	-	-	-	-	-	
		11-Jan-09	1	20.2	13.2	7	A	7.3	7.3	1.0	7:06	7:22	5.4	0.3	0.01	30.8	7	1.66	11	8	15	16	-	-	17	
60+413	S	20-Feb-09	4	9.64	9.04	0.6	A	600.9	600.9	600.9	3:25	4:26	1.4	10.3	6.27	32.6	2	1.62	5	6	10	11	-	-	17	
		16-Dec-08	3	11.4	10.4	1	A	400.0	-	-	19:08	19:57	0.9	10.1	23.71	-	-	-	-	-	-	-	-	-	-	
		16-Dec-08	3	11.4	10.4	1	B	200.2	600.2	600.2	19:57	20:15	2.9	7.8	5.03	36.0	5	1.65	19	9	16	14	-	-	16	Max Volume
		16-Dec-08	2	13.9	11.4	2.5	A	113.8	113.8	45.5	18:40	19:03	2.9	1	0.14	-	-	-	-	-	-	-	-	-	-	
		16-Dec-08	1	20.9	13.9	7	A	235.7	235.7	33.7	17:04	17:55	5.4	3.5	0.09	32.5	-	1.62	18	10	12	13	-	-	13	
60+414.5	T	10-Mar-09	4	10.12	9.52	0.6	MF	600.0	600.0	600.0	13:00	14:23	1.4	5.7	4.15	-	-	-	-	-	-	-	-	-	-	Max Volume
		11-Jan-09	3	11.4	10.4	1	A	603.2	603.2	603.2	13:34	14:40	1.4	10.1	7.25	33.7	5	1.64	-10	16	17	14	-	-	17	Max Volume
		11-Jan-09	2	15.9	11.4	4.5	A	4.2	4.2	0.9	13:12	13:26	3.5	0.2	0.02	-	-	-	-	-	-	-	-	-	-	
60+416	P	20-Feb-09	4	10.02	9.42	0.6	A	109.3	109.3	109.3	4:39	4:55	0.9	14.9	13.26	-	-	-	-	-	-	-	-	-	-	Communicate to 60+419
		04-Dec-08	3	11.4	10.6	0.8	A	2.0	2.0	2.5	23:42	23:55	2.5	0.012	0.005	-	-	-	-	-	-	-	-	-	-	
		04-Dec-08	2	14.95	11.4	3.55	A	3.8	3.8	1.1	22:52	23:06	2.1	0.012	0.002	32.0	5	1.58	20	17	22	13	-	-	22	
		06-Nov-08	1	20.9	13.9	7	A	44.8	44.8	6.4	14:22	15:03	5.8	0	0	32.6	5	1.64	-	-	-	-	-	-	-	
60+417.5	T	10-Mar-09	4	9.82	9.22	0.6	MF	37.6	37.6	37.6	14:45	14:59	1.1	0.2	0.2	30.0	1	1.42	12	13	19	-	-	-	19	
		17-Jan-09	3	11.2	10.2	1	A	2.5	2.5	2.5	15:03	15:15	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	2	13.7	11.2	2.5	A	2.3	2.3	0.9	14:45	14:55	3.0	0.1	0.01	30.6	10	1.63	-4	21	20	-	-	-	25	
60+419	S	20-Feb-09	4	9.36	8.76	0.6	A	601.0	601.0	601.0	5:09	6:12	1.1	10.4	7.39	32.9	2	1.63	-3	6	11	14	-	-	17	Max Volume
		16-Dec-08	3	11	10	1	A	3.6	3.6	3.6	22:02	22:20	3.6	0	0	-	-	-	-	-	-	-	-	-	-	
		16-Dec-08	2	13.5	11	2.5	A	3.0	3.0	1.2	9:04	21:30	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		16-Dec-08	1	20.5	13.5	7	A	7.0	7.0	1.0	20:36	8:48	5.4	0.2	0	33.2	6	1.66	19	9	12	14	-	-	16	
60+420.5	T	10-Mar-09	4	9.16	8.56	0.6	MF	373.3	373.3	373.3	15:15	16:03	1.6	0.16	0.1	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	3	10.5	9.5	1	A	600.2	600.2	600.2	11:36	13:02	3.0	5.6	1.91	-	-	-	-	-	-	-	-	-	-	Max Volume
		17-Jan-09	2	15	10.5	4.5	A	13.5	13.5	3.0	11:16	11:30	3.6	0.2	0.01	31.3	9	1.65	4	21	10	20	-	-	21	
60+422	P	21-Feb-09	4	9.33	8.73	0.6	A	526.8	526.8	526.8	6:30	7:32	1.0	10.5	9.5	33.5	4	1.62	-2	9	14	11	-	-	19	Communicate to 60+437
		09-Dec-08	3	10.7	9.7	1	A	400.0	-	-	16:06	00:00	-	-	-	33.0	-	1.61	10	7	10	8	-	-	12	
		09-Dec-08	3	10.7	9.7	1	B	200.0	600.0	600.0	00:00	17:12	3.0	10	36.5	36.5	-	1.66	-	-	10	-	-	-	11	
		09-Dec-08	2	13.2	10.7	2.5	A	411.4	411.4	164.6	14:54	15:55	3.0	0	0.01	-	-	-	16	5	10	6	-	-	14	
		09-Dec-08	1	20.2	13.2	7	A	2.8	2.8	0.4	14:36	14:46	5.4	0	0	31.5	5	1.63	16	5	12	6	-	-	12	
60+422.75	Q	25-Feb-09	3	11.1	10.1	1	A	601.9	601.9	601.9	15:38	16:40	1.1	9.3	8.15	34.0	3	1.54	23	13	16	14	-	-	18	Max Volume
		25-Feb-09	2	13.6	11.1	2.5	A	10.8	10.8	4.3	15:25	15:35	3.4	0	0	-	-	-	-	-	-	-	-	-	-	
		25-Feb-09	1	20.6	13.6	7	A	186.9	186.9	26.7	14:25	15:20	5.2	3.3	0.09	33.5	3	1.64	-7	10	16	14	-	-	17	
60+423.5	T	17-Mar-09	4	9.31	8.71	0.6	MF	508.7	508.7	508.7	15:13	16:59	1.3	0.4	0.33	-	-	-	-	-	-	-	-	-	-	
		11-Jan-09	3	10.4	9.4	1	A	643.9	643.9	643.9	17:21	18:32	0.9	10	10.6	-	-	-	-	-	-	-	-	-	-	Max Volume
		11-Jan-09	2	14.9	10.4	4.5	A	800.0	-	-	14:57	16:29	-	-	-	32.3	2	1.63	-9	9	15	-	-	-	14	
		11-Jan-09	2	14.9	10.4	4.5	B	553.0	1353.0	300.7	16:29	17:13	2.1	12.4	1.33	38.0	-	1.65	-8	18	17	-	-	-	18	Max Volume
		29-Jan-09	1	19.9	12.9	7	A	10.3	10.3	1.5	15:13	15:25	5.2	0.3	0.01	-	-	-	-	-	-	-	-	-	-	

Golder Associates

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	Comments
			Stage				Take				Duration		Termination			QA			Temperatures							
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+424.25	Q	25-Feb-09	3	11.1	10.1	1	A	90.4	90.4	90.4	18:20	19:46	3.2	0.3	0.1	-	-	-	-	-	-	-	-	-	-	
		25-Feb-09	2	13.6	11.1	2.5	A	13.1	13.1	5.2	18:02	18:16	3.3	0.2	0.03	-	-	-	-	-	-	-	-	-	-	
		25-Feb-09	1	20.6	13.6	7	A	22.1	22.1	3.2	16:57	17:17	5.6	0.2	0.01	-	-	-	-	-	-	-	-	-	-	
60+425	S	21-Feb-09	4	9.18	8.58	0.6	A	600.2	600.2	600.2	10:18	12:02	1.1	9.4	6.92	34.0	5	1.57	-21	6	11	12	-	-	14	Max Volume
		16-Dec-08	3	10.5	9.5	1	A	399.9	-	-	2:40	3:26	3.2	5.8	4.41	-	-	-	-	-	-	-	-	-	-	
		16-Dec-08	3	10.5	9.5	1	B	21.4	421.3	421.3	3:26	3:49	3.0	0	0	37.0	6	1.64	-	-	-	-	-	-	16	Max Volume
		16-Dec-08	2	13	10.5	2.5	A	3.3	3.3	1.3	2:24	2:37	3.2	0	0	-	-	-	-	-	-	-	-	-	-	
		16-Dec-08	1	20	13	7	A	13.4	13.4	1.9	2:00	2:16	5.4	0	0	32.8	4	1.65	19	11	11	15	-	-	17	
60+426.5	T	10-Mar-09	4	9.46	8.86	0.6	MF	603.0	603.0	603.0	16:40	17:55	1.0	10.6	10.91	-	-	-	-	-	-	-	-	-	-	Max Volume
		11-Jan-09	3	10.9	9.9	1	A	199.3	199.3	199.3	20:02	20:51	3.1	0	0								-	-	-	
		11-Jan-09	2	15.4	10.9	4.5	A	44.8	44.8	10.0	19:17	19:54	3.4	0	0	33.4	-	1.65	-9	6	15	14	-	-	14	
60+428	P	21-Feb-09	4	10.5	9.9	0.6	A	606.0	606.0	606.0	14:29	15:38	0.9	10.4	9.99	33.0	4	1.59	-5	7	26	10	-	-	16	
		06-Dec-08	3	11.82	10.82	1	A	0.6	0.6	0.6	08:50	09:04	3.0	0	0.01	-	-	-	-	-	-	-	-	-	-	
		06-Dec-08	2	14.32	11.82	2.5	A	5.3	5.3	2.1	08:10	08:35	3.0	0	0.01	32.0	6	1.65	24	10	9	18	-	-	20	
		06-Nov-08	1	21.32	14.32	7	A	97.9	97.9	14.0	15:28	15:55	5.5	1.8	0.05	28.6	-	-	-	-	-	-	-	-	-	
60+429.5	T	10-Mar-09	4	11.32	10.72	0.6	MF	70.0	70.0	70.0	19:15	20:39	1.4	0.5	0.37	31.0	2	1.43	17	8	16	-	-	-	15	
		17-Jan-09	3	12.8	11.8	1	A	24.3	24.3	24.3	8:57	9:27	2.7	0	0	31.6	-	1.63	0	16	10	-	-	-	22	
		17-Jan-09	2	15.3	12.8	2.5	A	37.9	37.9	15.2	8:11	8:36	3.4	0.2	0.02	31.3	-	1.60	-	-	14	-	-	-	31	
60+431	S	21-Feb-09	4	12.03	11.43	0.6	A	1.0	1.0	1.0	16:07	16:17	2.6	0	0	-	-	-	-	-	-	-	-	-	-	
		16-Dec-08	3	13.9	12.9	1	A	22.3	22.3	22.3	5:07	6:00	3.2	0.4	0.12	-	-	-	-	-	-	-	-	-	-	
		16-Dec-08	2	16.4	13.9	2.5	A	18.5	18.5	7.4	4:42	4:58	3.0	0.5	0.06	-	-	-	-	-	-	-	-	-	-	
		16-Dec-08	1	23.4	16.4	7	A	12.9	12.9	1.8	4:18	4:32	5.4	0	0	32.9	-	1.65	-	-	-	-	-	-	15	
60+432.5	T	10-Mar-09	4	11.62	11.02	0.6	MF	235.9	235.9	235.9	20:50	22:44	1.3	0.5	0.41	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	3	13	12	1	A	26.0	26.0	26.0	7:19	7:53	3.0	0.2	0.07	31.0	9	1.62	19	16	13	-	-	-	24	
		17-Jan-09	2	15.5	13	2.5	A	49.0	49.0	19.6	6:35	7:07	3.0	0.3	0.04	-	-	-	-	-	-	-	-	-	-	
60+434	P	21-Feb-09	4	10.63	10.03	0.6	A	392.1	392.1	392.1	16:28	17:16	0.6	10.3	14.26	-	-	-	-	-	-	-	-	-	-	Communicate to 60+437
		12-Dec-08	3	11.9	10.9	1	A	191.1	191.1	191.1	3:08	3:35	3.1	0.2	0.14	-	-	-	-	-	-	-	-	-	-	
		12-Dec-08	2	14.4	11.9	2.5	A	35.0	35.0	14.0	2:43	3:00	3.2	1	0.12	32.0	-	-	-	-	-	-	-	-	-	
		12-Dec-08	1	21.4	14.4	7	A	122.0	122.0	17.4	2:05	2:35	5.6	2.4	0.06	33.0	6	1.63	19	9	10	12	-	-	18	
60+435.5	T	10-Mar-09	4	10.76	10.16	0.6	MF	412.4	412.4	412.4	0:44	2:04	1.9	0.3	0.18	30.3	2	1.43	16	7	16	-	-	-	13	
		16-Jan-09	3	12.1	11.1	1	A	600.0	600.0	600.0	4:52	6:00	2.5	10.5	4.13	-	-	-	-	-	-	-	-	-	-	Max volume
		16-Jan-09	2	16.6	12.1	4.5	A	14.8	14.8	3.3	4:32	4:43	3.5	0.7	0.04	-	-	-	-	-	-	-	-	-	-	
60+437	S	17-Dec-08	3	12.2	11.2	1	A	15.3	15.3	15.3	8:00	8:18	3.5	0.1	0.04	-	-	-	-	-	-	-	-	-	-	
		17-Dec-08	2	14.7	12.2	2.5	A	14.3	14.3	5.7	7:38	7:55	3.5	0.4	0.05	-	-	-	-	-	-	-	-	-	-	
		17-Dec-08	1	21.7	14.7	7	A	110.8	110.8	15.8	7:02	7:30	5.6	0.7	0.02	33.5	-	1.66	12	6	8	10	-	-	15	
60+438.5	T	10-Mar-09	4	11.09	10.49	0.6	MF	86.3	86.3	86.3	2:30	3:15	1.2	0.5	0.39	-	-	-	-	-	-	-	-	-	-	
		16-Jan-09	3	12.6	11.6	1	A	297.5	297.5	297.5	3:03	4:00	3.0	0	0	33.1	4	1.66	2	9	18	15	-	-	20	
		16-Jan-09	2	15.1	12.6	2.5	A	24.0	24.0	9.6	2:33	2:56	2.9	0.3	0.04	-	-	-	-	-	-	-	-	-	-	
		16-Jan-09	1	22.1	15.1	7	A	219.3	219.3	31.3	1:43	2:25	5.2	1.8	0.05	31.6	10	1.65	10	10	16	18	-	-	21	
60+440	P	21-Feb-09	4	11.87	11.27	0.6	A	0.6	0.6	0.6	19:23	19:35	2.8	0	0	33.1	2	1.62	-7	7	16	11	-	-	17	
		06-Dec-08	3	11.29	10.29	1	A	7.0	7.0	7.0	10:03	10:25	3.0	0	0.1	-	-	-	-	-	-	-	-	-	-	
		06-Dec-08	2	13.79	11.29	2.5	A	16.3	16.3	6.5	09:31	09:55	3.0	0.2	0.1	32.0	-	-	22	10	9	14	-	-	20	
		06-Nov-08	1	21.59	14.59	7	A	473.8	-	-	18:09	19:20	4.5	13.8	0	32.0	-	1.64	9	17	19	-	-	-	14	
		06-Nov-08	1	21.59	14.59	7	B	161.9	635.7	90.8	19:20	20:08	5.5	0.5	0.01	35.0	-	-	-	-	-	-	-	-	-	
60+441.5	T	10-Mar-09	4	10.2	9.6	0.6	MF	28.1	28.1	28.1	3:39	3:59	1.3	0.5	0.37	29.6	3	1.44	18	9	14	-	-	-	16	
		13-Jan-09	3	11.6	10.6	1	A	15.5	15.5	15.5	5:47	6:17	2.8	0.3	0.1	-	-	-	-	-	-	-	-	-	-	
		13-Jan-09	2	16.1	11.6	4.5	A	49.0	49.0	10.9	5:03	5:38	4.1	0.4	0.02	33.4	-	1.65	24	2	21	3	-	-	21	
60+443	S	21-Feb-09	4	10.1	9.5	0.6	A	600.5	600.5	600.5	19:44	20:47	0.4	10.6	19.16	-	-	-	-	-	-	-	-	-	-	Max Volume
		17-Dec-08	3	11.6	10.6	1	A	400.0	-	-	14:31	15:10	-	-	-	-	-	-	-	-	-	-	-	-	-	
		17-Dec-08	3	11.6	10.6	1	B	192.6	592.6	592.6	15:10	17:10	3.0	14.7	15.9	38.6	1	1.64	5	10	8	-	-	-	14	
		17-Dec-08	2	14.1	11.6	2.5	A	32.6	32.6	13.0	13:55	14:23	3.5	0.6	0.06	31.6	-	1.66	17	9	10	13	-	-	18	
		17-Dec-08	1	21.1	14.1	7	A	56.9	56.9	8.1	13:01	13:47	5.0	0.3	0.01	32.3	-	1.65	15	8	9	12	-	-	18	

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+443.75	Q	27-Feb-09	3	11.7	10.7	1	A	601.3	601.3	601.3	13:52	14:48	2.2	9.5	4.93	32.0	4	1.62	13	10	16	16	-	-	19	Max Volume
		27-Feb-09	2	14.2	11.7	2.5	A	450.0	-	-	10:04	10:48	0.9	11.2	3.8	31.0	4	1.63	18	11	20	16	-	-	25	Max Volume
		27-Feb-09	2	14.2	11.7	2.5	B	275.0	725.0	290.0	10:48	11:16	1.7	9.9	1.8	35.0	2	1.64	12	9	22	-	-	-	20	Max Volume
		27-Feb-09	1	21.2	14.2	7	A	115.1	115.1	16.4	9:32	9:59	5.4	0.4	0.01	31.0	4	1.63	18	11	20	16	-	-	25	
60+444.5	T	10-Mar-09	4	10.07	9.47	0.6	MF	9.1	9.1	9.1	4:41	4:45	1.2	0.2	0.15	-	-	-	-	-	-	-	-	-	-	
		14-Jan-09	3	11.3	10.3	1	A	8.6	8.6	8.6	9:20	9:46	3.0	0	0	31.5	8	1.65	12	7	14	-	-	-	17	
		14-Jan-09	2	15.8	11.3	4.5	A	700.0	-	-	7:00	8:10	-	-	-	30.2	5	1.64	11	21	20	11	-	-	22	
		14-Jan-09	2	15.8	11.3	4.5	B	651.0	1351.0	300.2	8:10	9:03	2.3	12.4	1.21	38.0	1	1.65	11	9	15	-	-	-	15	
		29-Jan-09	1	20.8	13.8	7	A	339.8	339.8	48.5	8:36	8:54	5.3	0.5	0.01	34.4	-	1.65	-10	7	14	-	-	-	17	
60+445.25	Q	27-Feb-09	3	11.1	10.1	1	A	13.4	13.4	13.4	16:12	16:38	3.1	0.2	0.07	-	-	-	-	-	-	-	-	-	-	
		27-Feb-09	2	13.6	11.1	2.5	A	58.0	58.0	23.2	15:42	16:09	3.3	0.6	0.08	-	-	-	-	-	-	-	-	-	-	
		27-Feb-09	1	20.6	13.6	7	A	71.8	71.8	10.3	15:10	15:33	5.1	0.9	0.03	33.0	1	1.64	10	9	15	14	-	-	17	
60+446	P	20-Feb-09	4	9.84	9.24	0.6	A	600.5	600.5	600.5	15:20	16:25	0.6	10	-	33.4	-	1.61	20	16	16	22	-	-	22	Max Volume. RST broken, Manual reading
		13-Dec-08	3	11.3	10.3	1	A	400.0	-	-	7:49	8:35	0.5	10	0	-	-	-	-	-	-	-	-	-	-	
		13-Dec-08	3	11.3	10.3	1	B	101.2	501.2	501.2	8:35	8:55	1.0	10	15	35.0	-	1.62	-	-	11	-	-	-	-	
		13-Dec-08	2	13.8	11.3	2.5	A	7.5	7.5	3.0	7:28	7:40	3.0	0.4	0.05	31.6	5	1.64	-	-	13	-	-	-	-	
		12-Dec-08	1	20.8	13.8	7	A	793.4	-	-	4:17	5:15	3.3	14.7	0.63	33.0	-	1.62	16	10	10	-	-	-	16	
		12-Dec-08	1	20.8	13.8	7	B	560.6	-	-	5:15	5:55	5.5	9.8	0.25	37.2	-	1.64	16	10	10	-	-	-	17	
		13-Dec-08	1	20.8	13.8	7	C	1520.0	2874.0	410.6	5:55	6:32	5.4	0	0	46.1	-	1.66	21	10	9	-	-	17	17	
60+447.5	T	10-Mar-09	4	9.97	9.37	0.6	MF	322.5	322.5	322.5	5:09	6:08	1.5	0.3	0.19	-	-	-	-	-	-	-	-	-	-	
		14-Jan-09	3	11.1	10.1	1	A	600.7	600.7	600.7	10:28	11:38	1.3	10.5	8.28	30.4	7	1.65	14	24	2	20	-	-	20	Max volume
		14-Jan-09	2	15.6	11.1	4.5	A	8.0	8.0	1.8	10:05	10:21	3.5	0	0	-	-	-	-	-	-	-	-	-	-	
		01-Feb-09	1	20.6	16.1	4.5	A	9.2	9.2	2.0	20:25	20:43	4.8	0.3	0.01	32.4	6	1.67	-11	18	21	22	-	-	20	
60+449	S	20-Feb-09	4	9.49	8.89	0.6	A	600.5	600.5	600.5	16:32	17:36	1.6	10.5	-	31.0	-	1.62	16	16	16	20	-	-	23	Max Volume. RST broken, manual reading
		17-Dec-08	3	11.1	10.1	1	A	600.6	600.6	600.6	17:17	18:15	0.5	16	33.62	34.1	6	1.65	15	10	11	15	-	-	19	
		17-Dec-08	2	13.6	11.1	2.5	A	7.0	7.0	2.8	16:55	17:09	3.8	0.3	0.04	-	-	-	-	-	-	-	-	-	-	
		17-Dec-08	1	20.6	13.6	7	A	88.4	88.4	12.6	16:11	16:41	5.9	0.6	0.01	30.7	-	1.57	7	7	4	13	-	-	10	
60+450.5	T	11-Mar-09	4	10.07	9.47	0.6	MF	46.1	46.1	46.1	8:45	9:03	1.4	0.3	0.21	31.0	4	1.43	16	13	15	-	-	-	14	
		14-Jan-09	3	11.6	10.6	1	A	5.2	5.2	5.2	14:33	14:45	3.0	0.1	0.02	-	-	-	-	-	-	-	-	-	-	
		14-Jan-09	2	16.1	11.6	4.5	A	22.7	22.7	5.0	14:03	14:25	3.5	0.2	0.01	-	-	-	-	-	-	-	-	-	-	
60+452	P	21-Feb-09	4	9.56	8.96	0.6	A	600.9	600.9	600.9	7:34	8:41	-	10.1	-	31.0	-	1.64	15	13	10	11	-	-	18	Max Volume. RST broken, manual reading
		06-Dec-08	3	11.2	10.2	1	A	7.2	7.2	7.2	02:23	02:40	3.0	0.1	0.1	-	-	-	-	-	-	-	-	-	-	
		06-Dec-08	2	13.7	11.2	2.5	A	1.6	1.6	0.6	01:58	02:10	3.0	0	0.01	33.5	5	1.66	14	8	17	10	-	-	17	
		06-Nov-08	1	20.7	13.7	7	A	470.0	-	-	08:55	10:40	0.0	11.6	inf	30.0	4	1.62	-	-	-	-	-	-	13	
		06-Nov-08	1	20.7	13.7	7	B	80.8	550.8	78.7	10:41	10:58	5.6	0.7	0.02	35.0	2	1.65	-	-	-	-	-	-	-	
60+453.5	T	11-Mar-09	4	10.1	9.5	0.6	MF	424.5	-	-	8:21	9:10	1.0	9.1	9.13	-	-	-	-	-	-	-	-	-	-	
		11-Mar-09	4	10.1	9.5	0.6	A	3.3	427.8	427.8	10:07	10:16	1.6	0.3	0.18	30.0	0	1.50	-	9	16	-	-	-	18	
		14-Jan-09	3	11.7	10.7	1	A	2.4	2.4	2.4	5:40	5:55	3.3	0	0	-	-	-	-	-	-	-	-	-	-	
		14-Jan-09	2	14.2	11.7	2.5	A	11.7	11.7	4.7	5:20	5:35	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
60+455	S	21-Feb-09	4	10.17	9.57	0.6	A	605.5	605.5	605.5	9:20	10:30	-	10.3	-	-	-	-	-	-	-	-	-	-	-	Max Volume. RST broken, manual reading
		17-Dec-08	3	11.7	10.7	1	A	5.5	5.5	5.5	20:36	20:54	3.2	0.1	0.09	32.2	-	1.65	14	11	12	13	-	-	15	
		17-Dec-08	2	14.2	11.7	2.5	A	6.6	6.6	2.6	8:15	8:30	3.3	0.3	0.03	-	-	-	-	-	-	-	-	-	-	
		17-Dec-08	1	21.2	14.2	7	A	12.3	12.3	1.8	7:46	7:58	5.4	0	0	33.0	5	1.65	8	9	7	14	-	-	14	
60+456.5	T	11-Mar-09	4	10.15	9.55	0.6	MF	601.7	601.7	601.7	12:25	15:22	1.7	2.7	1.58	-	-	-	-	-	-	-	-	-	-	Max Volume
		14-Jan-09	3	11.5	10.5	1	A	0.8	0.8	0.8	4:42	4:52	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		14-Jan-09	2	16	11.5	4.5	A	36.1	36.1	8.0	4:15	4:35	3.1	0.3	0.02	-	-	-	-	-	-	-	-	-	-	
60+458	P	21-Feb-09	4	10.17	9.57	0.6	A	0.7	0.7	0.7	10:44	10:57	2.5	0	0.01	-	-	-	-	-	-	-	-	-	-	
		13-Dec-08	3	12.5	11.5	1	A	1.3	1.3	1.3	18:04	18:15	3.2	0	0.004	32.0	5	1.62	-	-	9	-	-	-	15	
		13-Dec-08	2	15	12.5	2.5	A	420.0	-	-	14:24	16:35	3.0	2.5	0.3	32.6	-	1.61	-	-	-	-	-	-	15	RST broken. Final volume of
		13-Dec-08	2	15	12.5	2.5	B	140.0	560.0	224.0	16:35	17:46	3.0	0.8	0.1	35.8	3	1.63	-	-	9	-	-	-	14	Mix B calculated manually.
		13-Dec-08	1	22	15	7	A	3.2	3.2	0.5	14:04	14:15	5.5	0.1	0	31.4	-	1.61	16	17	4	17	-	-	12	
60+459.5	T	11-Mar-09	4	10.38	9.78	0.6	MF	45.4	45.4	45.4	19:01	19:19	1.5	0	0	31.3	1	1.43	15	9	14	-	-	-	14	
		16-Jan-09	3	11.6	10.6	1	A	11.1	11.1	11.1	18:29	18:53	3.1	0.2	0.02	-	-	-	-	-	-	-	-	-	-	
		16-Jan-09	2	16.1	11.6	4.5	A	29.3	29.3	6.5	17:31	17:51	3.6	0.2	0.01	30.2	-	1.64	0	22	15	21	-	-	23	

Golder Associates

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+461	S	21-Feb-09	4	10.07	9.47	0.6	A	602.2	602.2	602.2	22:28	23:30	1.0	10.6	9.18	33.1	3	1.63	-22	6	19	8	-	-	17	Max Volume
		17-Dec-08	3	11.5	10.5	1	A	160.2	160.2	160.2	0:37	1:06	0.3	15.6	136.02	33.2	-	1.64	-	-	-	-	-	-	14	Communication. Stop.
		17-Dec-08	2	14	11.5	2.5	A	395.0	-	-	23:30	0:02	0.6	9.8	7.15	-	-	-	-	-	-	-	-	-	-	
		17-Dec-08	2	14	11.5	2.5	B	355.9	750.9	300.4	0:02	0:31	0.4	15.2	15.51	37.0	5	1.66	16	10	15	15	-	-	14	
		17-Dec-08	1	21	14	7	A	40.7	40.7	5.8	22:47	23:14	5.5	0.8	0.02	32.2	4	1.65	14	11	14	13	-	-	15	
60+462.5	T	11-Mar-09	4	9.28	8.68	0.6	MF	601.1	601.1	601.1	20:15	21:25	1.5	9.7	6.7	33.5	4	1.44	15	10	15	-	-	-	15	Max Volume
		14-Jan-09	3	11.5	10.5	1	A	404.0	-	-	2:22	3:11	-	-	-	-	-	-	-	-	-	-	-	-	-	
		14-Jan-09	3	11.5	10.5	1	B	226.8	630.8	630.8	3:11	3:32	1.0	9.5	9.33	36.5	3	1.65	17	7	14	17	-	-	7	Max volume
		14-Jan-09	2	14	11.5	2.5	A	72.0	72.0	28.8	1:36	2:20	2.8	0.5	0.08	-	-	-	-	-	-	-	-	-	-	
		14-Jan-09	1	21	14	7	A	10.5	10.5	1.5	1:09	1:22	5.0	0.8	0.02	32.0	4	1.65	18	7	16	17	-	-	19	
60+464	P	21-Feb-09	4	9.82	9.22	0.6	A	600.3	600.3	600.3	23:49	0:53	0.9	10.3	10.11	32.5	1	1.65	-14	7	17	14	-	-	18	Max Volume
		07-Dec-08	3	11.2	10.2	1	A	600.4	600.4	600.4	17:52	19:13	0.0	9.3	inf	32.5	-	1.61	12	11	20	14	-	-	20	
		06-Dec-08	2	13.7	11.2	2.5	A	410.0	-	-	15:00	16:25	-	-	-	32.5	-	-	15	8	14	12	-	-	18	
		06-Dec-08	2	13.7	11.2	2.5	B	340.0	750.0	300.0	16:25	17:28	0.0	5	inf	37.0	3	1.66	11	8	15	-	-	-	17	
		06-Nov-08	1	20.7	13.7	7	A	341.9	341.9	48.8	02:19	03:20	5.3	2.7	0.07	31.0	3	1.63	1	-	18	-	-	-	14	
60+465.5	T	11-Mar-09	4	9.56	8.96	0.6	MF	7.8	7.8	7.8	19:38	19:53	1.6	0	0	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	3	11.1	10.1	1	A	400.0	-	-	7:19	8:43	-	-	-	30.7	5	1.61	17	14	16	23	-	-	20	
		15-Jan-09	3	11.1	10.1	1	B	203.0	603.0	603.0	8:43	9:03	0.9	10.1	10.9	36.1	-	1.65	-15	14	13	-	-	-	17	Max volume
		15-Jan-09	2	15.6	11.1	4.5	A	15.3	15.3	3.4	6:54	7:10	3.0	0.1	0.01	-	-	-	-	-	-	-	-	-	-	
60+467	S	21-Feb-09	4	9.71	9.11	0.6	A	196.4	196.4	196.4	3:19	3:41	0.9	9.8	8.78	33.0	4	1.62	-8	9	18	28	-	-	21	Communicate to 60+464
		17-Dec-08	3	11.2	10.2	1	A	10.4	10.4	10.4	4:39	5:01	3.2	0	0.06	-	-	-	-	-	-	-	-	-	-	
		17-Dec-08	2	13.7	11.2	2.5	A	25.0	25.0	10.0	4:08	4:20	3.1	0.5	0.07	-	-	-	-	-	-	-	-	-	-	
		17-Dec-08	1	20.7	13.7	7	A	18.3	18.3	2.6	3:30	4:02	5.4	0.6	0.01	33.1	6	1.65	16	9	15	16		-	15	
60+468.5	T	17-Mar-09	4	10.35	9.75	0.6	MF	434.0	-	-	9:53	10:11	0.9	0.5	-	-	-	-	-	-	-	-	-	-	-	
		17-Mar-09	4	10.35	9.75	0.6	A	96.9	530.9	530.9	10:11	11:23	1.4	0.3	0.18	31.0	4	1.64	12	8	17	-	-	-	19	
		16-Jan-09	3	11.5	10.5	1	A	603.9	603.9	603.9	5:48	7:01	0.0	15.3	inf	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	2	16	11.5	4.5	A	2.3	2.3	0.5	5:33	5:40	3.5	0	0.01	31.5	-	1.66	15	9	15	-	-	-	21	
60+470	P	21-Feb-09	4	10.35	9.75	0.6	A	194.3	194.3	194.3	3:50	4:15	0.5	8	8.13	32.3	1	1.65	-16	9	17	8	-	-	19	Communicate to 60+464
		13-Dec-08	3	12.5	11.5	1	A	528.4	528.4	528.4	2:22	3:21	2.3	9.4	4.57	-	-	-	-	-	-	-	-	-	-	Communicate to 60+468.5
		13-Dec-08	2	15	12.5	2.5	A	94.0	94.0	37.6	1:45	2:13	3.0	0.8	0.1	32.2	6	1.64	18	10	14	14	-	-	17	
		13-Dec-08	1	22	15	7	A	367.4	-	-	9:11	9:45	5.6	10.4	0.27	32.6	5	1.66	18	8	14	12	-	-	16	
		13-Dec-08	1	22	15	7	B	346.8	714.2	102.0	9:45	10:41	5.4	1.8	0.04	37.0	4	1.66	19	8	14	-	-	-	16	
60+471.5	T	11-Mar-09	4	10.27	9.67	0.6	MF	5.8	5.8	5.8	21:54	22:09	1.3	0	0.01	-	-	-	-	-	-	-	-	-	-	
		16-Jan-09	3	11.9	10.9	1	A	8.5	8.5	8.5	7:41	8:05	2.7	0.1	0.05	-	-	-	-	-	-	-	-	-	-	
		16-Jan-09	2	16.4	11.9	4.5	A	6.2	6.2	1.4	7:22	7:35	3.5	0.3	0.02	32.3	5	1.66	-4	12	16	20	-	-	-	
60+473	S	21-Feb-09	4	10.38	9.78	0.6	A	601.3	601.3	601.3	4:30	5:34	0.9	10.1	8.1	-	-	-	-	-	-	-	-	-	-	Max Volume
		17-Dec-08	3	11.5	10.5	1	A	72.7	72.7	72.7	6:14	7:18	3.0	0.1	0.05	-	-	-	-	-	-	-	-	-	-	
		17-Dec-08	2	14	11.5	2.5	A	25.6	25.6	10.2	5:39	6:03	3.2	0.04	0.04	-	-	-	-	-	-	-	-	-	-	
		17-Dec-08	1	21	14	7	A	12.1	12.1	1.7	5:18	5:30	5.7	0.4	0.01	-	-	-	-	-	-	-	-	-	-	
60+473.75	Q	05-Feb-09	3	13.3	12.3	1	A	660.2	660.2	660.2	4:54	5:57	0.5	13.5	27.12	33.8	4	1.66	8	8	-	13	-	-	16	Max Volume
		05-Feb-09	2	17.8	13.3	4.5	A	509.0	-	-	2:44	3:30	0.9	15	5.9	31.4	3	1.52	18	1	-	5	-	-	14	
		05-Feb-09	2	17.8	13.3	4.5	B	766.0	-	-	3:30	4:30	1.5	1.4	1.2	36.7	2	1.64	18	3	-	-	-	-	11	
		05-Feb-09	2	17.8	13.3	4.5	C	122.0	1397.0	310.4	2:44	4:44	1.0	9.2	2	47.2	-	1.65	20	6	-	-	-	13	14	Max Volume
		06-Feb-09	1	22.8	17.8	5	A	17.9	17.9	3.6	0:34	1:09	5.3	0	0	32.0	4	1.68	4	11	-	27	-	-	20	
60+474.5	T	11-Mar-09	4	12	11.4	0.6	MF	8.2	8.2	8.2	0:36	0:57	1.3	0.3	0.27	32.2	1	1.45	18	8	8	-	-	-	14	
		16-Jan-09	3	12	11	1	A	2.9	2.9	2.9	9:39	9:52	2.9	0	0.01	-	-	-	-	-	-	-	-	-	-	Collapse; No stage 1, 2
60+475.25	Q	06-Feb-09	3	13.1	12.1	1	A	6.9	6.9	6.9	8:12	8:30	3.3	0.2	0.05	-	-	-	-	-	-	-	-	-	-	
		06-Feb-09	2	17.6	13.1	4.5	A	26.6	26.6	5.9	7:47	8:04	3.9	1.2	0.06	31.0	5	1.62	-9	7	13	12	-	-	14	
		06-Feb-09	1	22.6	17.6	5	A	2.6	2.6	0.5	2:03	2:18	5.4	0	0	-	-	-	-	-	-	-	-	-	-	
60+476	P	22-Feb-09	4	10.38	9.78	0.6	A	600.0	600.0	600.0	7:46	8:52	1.0	9.3	7.9	32.0	2	1.59	-8	11	15	12	-	-	18	Max Volume
		06-Nov-08	1	21.38	14.38	7	A	162.8	162.8	23.3	03:32	04:23	5.5	2.2	0.06	30.0	-	-	-	-	-	-	-	-	-	Grout in hole; No stage 2, 3
60+476.75	Q	06-Feb-09	3	12.8	11.8	1	A	523.8	523.8	523.8	9:34	10:29	0.8	10	12.49	-	-	-	-	-	-	-	-	-	-	Max Volume
		06-Feb-09	2	17.3	12.8	4.5	A	15.2	15.2	3.4	8:45	9:00	3.8	0.1	0.03	-	-	-	-	-	-	-	-	-	-	
		06-Feb-09	1	22.3	17.3	5	A	26.9	26.9	5.4	2:43	3:02	6.0	0.1	0	-	-	-	-	-	-	-	-	-	-	

Golder Associates

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
		Date	Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+477.5	T	11-Mar-09	4	10.12	9.52	0.6	MF	601.9	601.9	601.9	2:12	3:20	1.3	11.8	15.31	-	-	-	-	-	-	-	-	-	-	Max Volume
		16-Jan-09	3	11.7	10.7	1	A	4.3	4.3	4.3	8:56	9:10	2.9	0.1	0.05	-	-	-	-	-	-	-	-	-	-	
		16-Jan-09	2	14.2	11.7	2.5	A	12.1	12.1	4.8	8:34	8:51	2.9	0.2	0.02	33.3	-	1.55	-	-	19	-	-	-	25	Agi Mix
		29-Jan-09	1	21.2	14.2	7	A	46.8	46.8	6.7	8:35	8:53	5.4	0.7	0.02	-	-	-	-	-	-	-	-	-	-	By-Pass
60+479	S	22-Feb-09	4	10.5	9.9	0.6	A	599.7	599.7	599.7	9:06	10:14	1.2	9.8	6.98	33.0	4	1.60	-12	6	11	14	-	-	15	Max Volume
		18-Dec-08	3	11.9	10.9	1	A	133.0	133.0	133.0	10:39	11:36	3.2	0.3	0.1	32.4	-	1.66	25	16	16	18	-	-	19	
		18-Dec-08	2	14.4	11.9	2.5	A	37.0	37.0	14.8	9:57	10:32	2.9	0.7	0.1	-	-	-	-	-	-	-	-	-	-	
		18-Dec-08	1	21.4	14.4	7	A	34.5	34.5	4.9	9:26	9:46	5.5	0.3	0.01	32.0	-	1.66	22	9	12	14	-	-	15	
60+480.5	T	11-Mar-09	4	10.73	10.13	0.6	MF	16.8	16.8	16.8	3:02	3:27	1.7	0	0.05	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	3	12	11	1	A	269.6	269.6	269.6	16:44	17:34	3.1	0.2	0.05	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	2	14.5	12	2.5	A	87.9	87.9	35.2	15:49	16:35	3.1	0	0	31.0	8	1.60	-1	13	20	-	-	-	21	
60+482	P	22-Feb-09	4	11.06	10.46	0.6	A	1.7	1.7	1.7	10:29	10:40	2.3	0	0.01	-	-	-	-	-	-	-	-	-	-	
		13-Dec-08	3	13	12	1	A	20.1	20.1	20.1	4:50	5:14	3.2	0.4	0.3	-	-	-	-	-	-	-	-	-	17	
		13-Dec-08	2	15.5	13	2.5	A	47.9	47.9	19.2	4:15	4:37	3.2	1	0.13	-	-	-	-	-	-	-	-	-	17	
		13-Dec-08	1	22.5	15.5	7	A	15.3	15.3	2.2	3:53	4:06	5.5	0.7	0.02	33.0	-	1.64	-	-	-	-	-	-	17	
60+483.5	T	12-Mar-09	4	12.97	12.37	0.6	MF	417.4	417.4	417.4	4:22	6:00	1.6	0.2	0.19	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	3	14.4	13.4	1	A	8.7	8.7	8.7	21:03	21:26	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	2	18.9	14.4	4.5	A	68.0	68.0	15.1	20:30	21:02	3.0	0.4	0.03	32.9	9	1.64	-17	9	22	-	-	-	17	
60+485	S	22-Feb-09	4	12.38	11.78	0.6	A	62.8	62.8	62.8	10:48	11:12	2.4	0	0.01	-	-	-	-	-	-	-	-	-	-	
		18-Dec-08	3	13.8	12.8	1	A	198.0	-	-	15:50	16:40	2.0	10	0	-	-	-	-	-	-	-	-	-	-	By-Pass
		18-Dec-08	3	13.8	12.8	1	A	372.0	570.0	570.0	16:40	17:22	3.1	7	2.2	33.0	-	1.65	-	-	-	-	-	-	-	Max Volume
		18-Dec-08	2	16.3	13.8	2.5	A	412.0	412.0	164.8	15:01	15:40	1.7	15	4	-	-	-	-	-	-	-	-	-	-	By-Pass
		18-Dec-08	1	23.3	16.3	7	A	401.2	401.2	57.3	13:43	14:50	5.5	1.9	0.05	30.0	-	1.63	20	9	10	18	-	-	15	
60+486.5	T	12-Mar-09	4	13.04	12.44	0.6	MF	1.2	1.2	1.2	6:23	6:36	1.7	0	0.01	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	3	14.5	13.5	1	A	3.0	3.0	3.0	18:46	19:07	3.0	0.1	0.02	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	2	17	14.5	2.5	A	6.0	6.0	2.4	18:28	18:42	2.9	0.2	0.02	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	1	24	17	7	A	2.6	2.6	0.4	17:58	18:12	5.3	0.1	0	-	-	-	-	-	-	-	-	-	-	
60+488	P	21-Feb-09	4	11.09	10.49	0.6	A	600.7	600.7	600.7	14:06	15:10	1.1	10.2	8	31.0	6	1.63	13	11	14	16	-	-	19	Max Volume
		06-Dec-08	3	12.19	11.19	1	A	2.0	2.0	2.0	23:00	23:14	3.2	0	0.01	31.0	-	-	-	-	-	-	-	-	17	
		06-Dec-08	2	14.69	12.19	2.5	A	180.5	180.5	72.2	21:59	22:52	2.2	0.2	0.03	32.0	4	1.61	5	10	12	7	-	-	15	
		08-Nov-08	1	22.25	15.25	7	A	65.7	-	-	01:06	01:33	0.0	6.1	inf	32.0	-	1.63	16	12	13	16	-	-	19	By-Pass
		09-Nov-08	1	22.25	14.25	8	A	43.7	109.4	13.7	08:25	09:03	5.7	0.7	0.02	32.8	1	1.65	-	-	-	-	-	-	-	
60+489.5	T	12-Mar-09	4	11.6	11	0.6	MF	559.9	559.9	559.9	9:29	10:50	1.5	0.1	0.16	32.0	1	1.43	15	7	17	-	-	-	17	
		15-Jan-09	3	13.4	12.4	1	A	590.3	590.3	590.3	22:32	23:52	3.0	7.8	0.03	31.6	6	1.66	-9	-	-	-	-	-	18	Max volume
		15-Jan-09	2	17.9	13.4	4.5	A	67.9	67.9	15.1	21:54	22:23	3.0	0.6	0.05	-	-	-	-	-	-	-	-	-	-	
60+491	S	21-Feb-09	4	12.1	11.5	0.6	A	26.9	26.9	26.9	15:26	16:03	2.5	0.2	0.06	-	-	-	-	-	-	-	-	-	-	
		08-Jan-09	3	13.7	12.7	1	A	258.3	258.3	258.3	6:26	7:21	3.1	0	0.01	-	-	-	-	-	-	-	-	-	-	
		08-Jan-09	2	16.2	13.7	2.5	A	54.8	54.8	21.9	5:45	6:18	3.1	0.5	0.06	-	-	-	-	-	-	-	-	-	-	
		07-Jan-09	1	23.2	16.2	7	A	102.1	102.1	14.6	5:05	5:34	5.5	1.2	0.08	31.1	-	1.65	18	6	-	18	-	-	16	
60+492.5	T	12-Mar-09	4	11.34	10.74	0.6	MF	1.3	1.3	1.3	10:15	10:27	1.3	0	0.02	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	3	12.8	11.8	1	A	21.0	21.0	21.0	1:08	1:55	2.6	0.2	0.07	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	2	17.3	12.8	4.5	A	60.0	60.0	13.3	0:41	1:04	3.6	0.8	0.05	33.3	6	1.65	0	10	17	-	-	-	15	
60+494	P	21-Feb-09	4	10.07	9.47	0.6	A	598.6	598.6	598.6	16:17	17:26	1.0	10	9.4	32.0	-	1.61	-22	8	13	8	-	-	15	Max Volume
		18-Dec-08	3	11.7	10.7	1	A	400.0	-	-	21:00	21:36	0.3	15.4	85.5	-	-	-	-	-	-	-	-	-	-	
		18-Dec-08	3	11.7	10.7	1	B	200.7	600.7	600.7	21:36	21:49	0.9	15.9	32.9	37.4	5	1.65	-	-	-	-	-	-	14	Max Volume
		18-Dec-08	2	14.2	11.7	2.5	A	52.5	52.5	21.0	20:20	20:54	3.2	0.3	0.04	-	-	-	-	-	-	-	-	-	-	
		18-Dec-08	1	21.2	14.2	7	A	128.9	128.9	18.4	19:29	20:00	5.4	0	0	32.8	6	1.65	12	10	15	16	-	-	16	
60+495.5	T	12-Mar-09	4	10.58	9.98	0.6	MF	3.0	3.0	3.0	13:00	13:13	1.4	0	0.02	31.0	-	1.44	16	7	20	-	-	-	18	
		19-Jan-09	3	12.6	11.6	1	A	35.4	35.4	35.4	8:03	8:38	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		18-Jan-09	2	16.6	12.1	4.5	A	100.0	-	-	5:12	5:55	1.0	0	0	33.2	-	1.68	-	-	-	-	-	-	19	By-pass
		19-Jan-09	2	16.6	12.6	4	A	13.0	113.0	28.3	7:43	7:55	3.8	0.7	0.04	32.9	4	1.61	-9	15	11	-	-	-	15	
60+497	S	22-Feb-09	4	10.25	9.65	0.6	A	39.5	39.5	39.5	14:02	14:24	2.5	0.3	0.04	32.0	1	1.60	-10	8	15	14	-	-	17	
		08-Jan-09	3	11.8	10.8	1	A	633.9	633.9	633.9	8:55	10:11	2.9	6.8	2.37	-	-	-	-	-	-	-	-	-	-	Max Volume
		08-Jan-09	2	14.3	11.8	2.5	A	8.6	8.6	3.4	8:33	8:46	3.1	0.3	0.04	-	-	-	-	-	-	-	-	-	-	
		08-Jan-09	1	21.3	14.3	7	A	232.0	232.0	33.1	7:38	8:21	4.4	0.7	0.02	31.0	2	1.63	25	7	-	18	-	-	19	By-pass

Golder Associates

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

			Stage				Take				Duration		Termination			QA			Temperatures							
Hole	Order (P, S, T, Q)	Date (dd-mmm-yy)	Stage #	From (m)	To (m)	Length (m)	Mix	Volume (L)	V_{TOTAL} (L)	Take (L/m)	Start (hh:mm)	End (hh:mm)	P_{FINAL} (bar)	Q_{FINAL} (L/min/m)	Penetrab (L/min/m/bar)	Marsh (sec)	Bleed (%)	Specific Gravity	Cement (Celcius)	Water (Celcius)	Ambient (Celcius)	Glenium (Celcius)	Pozzutec (Celcius)	Bentonite (Celcius)	Mix (Celcius)	Comments
60+498.5	T	12-Mar-09	4	9.94	9.34	0.6	MF	430.3	430.3	430.3	13:28	14:47	1.6	0	0.02	-	-	-	-	-	-	-	-	-	-	
		18-Jan-09	3	11.4	10.4	1	A	606.9	606.9	606.9	3:32	4:41	1.6	9.1	5.88	-	-	-	-	-	-	-	-	-	-	Max Volume
		18-Jan-09	2	15.9	11.4	4.5	A	79.8	79.8	17.7	2:51	3:22	3.4	0.7	0.05	31.7	7	1.64	18	6	20	13	-	-	19	
60+500	P	22-Feb-09	4	9.87	9.27	0.6	A	15.8	15.8	15.8	14:35	14:51	2.7	0.2	0.07	-	-	-	-	-	-	-	-	-	-	
		06-Dec-08	3	11.37	10.37	1	A	394.3	394.3	394.3	02:56	05:05	3.0	0	0.07	31.0	-	-	-	-	-	-	-	-	15	
		06-Dec-08	2	13.87	11.37	2.5	A	34.5	34.5	13.8	02:22	02:47	2.0	0.3	0.06	32.0	7	1.64	17	8	12	15	-	-	12	
		09-Nov-08	1	21.1	14.1	7	A	122.6	122.6	17.5	10:03	11:00	5.5	0.6	0.01	31.6	1	1.65	-	-	-	-	-	-	-	
60+501.5	T	12-Mar-09	4	10.17	9.57	0.6	MF	2.0	2.0	2.0	16:20	16:32	1.8	0	0.02	-	-	-	-	-	-	-	-	-	-	
		18-Jan-09	3	11.3	10.3	1	A	600.9	600.9	600.9	14:40	15:40	1.1	11.2	10.41	31.5	10	1.65	-1	16	22	-	-	-	22	Max Volume
		18-Jan-09	2	15.8	11.3	4.5	A	66.2	66.2	14.7	14:07	14:34	3.6	0.7	0.04	31.1	7	1.63	16	12	20	28	-	-	22	
60+503	S	22-Feb-09	4	9.69	9.09	0.6	A	601.4	601.4	601.4	14:59	16:08	1.0	9.8	8.33	32.0	2	1.61	4	8	15	14	-	-	19	Max Volume
		18-Dec-08	3	11.1	10.1	1	A	17.1	17.1	17.1	0:03	0:30	3.1	0.1	0.08	32.6	5	1.65	11	11	15	14	-	-	16	
		18-Dec-08	2	13.6	11.1	2.5	A	39.8	39.8	15.9	23:25	23:52	3.2	0.4	0.05	-	-	-	-	-	-	-	-	-	-	
		18-Dec-08	1	20.6	13.6	7	A	98.2	98.2	14.0	22:13	22:37	5.5	1	0.03	33.2	-	1.64	-	-	-	-	-	-	15	
60+504.5	T	12-Mar-09	4	9.87	9.27	0.6	MF	600.6	600.6	600.6	19:43	21:02	1.7	5.3	5.26	33.2	1	1.42	10	5	14	-	-	-	18	Max Volume
		18-Jan-09	3	14.5	13.5	1	A	3.3	3.3	3.3	22:36	22:50	3.1	0.2	0.05	-	-	-	-	-	-	-	-	-	-	
		18-Jan-09	2	17	14.5	2.5	A	11.6	11.6	4.6	22:11	22:28	3.1	0.3	0.03	-	-	-	-	-	-	-	-	-	-	
60+506	P	22-Feb-09	4	9.46	8.86	0.6	A	602.3	602.3	602.3	16:23	17:33	1.1	9.4	7.12	33.5	3	1.62	0	9	12	14	-	-	19	Max Volume
		14-Dec-08	3	11	10	1	A	7.9	7.9	7.9	11:45	12:00	3.0	0.4	0.17	-	-	-	-	-	-	-	-	-	-	
		14-Dec-08	2	13.5	11	2.5	A	71.8	71.8	28.7	11:01	11:38	3.3	0.8	0.1	-	-	-	-	-	12	-	-	-	18	
		14-Dec-08	1	20.5	13.5	7	A	64.7	64.7	9.2	10:30	10:50	5.4	1.5	0.04	31.5	4	1.64	20	10	13	15	-	-	17	
60+507.5	T	13-Mar-09	4	9.46	8.86	0.6	MF	30.4	30.4	30.4	8:04	8:55	1.3	0.1	0	31.0	1	1.43	16	6	16	-	-	-	16	
		18-Jan-09	3	13.9	12.9	1	A	13.8	13.8	13.8	21:17	21:46	3.0	0.2	0.08	-	-	-	-	-	-	-	-	-	-	
		18-Jan-09	2	18.4	13.9	4.5	A	5.6	5.6	1.2	20:59	21:11	3.2	0.3	0.02	-	-	-	-	-	-	-	-	-	-	
60+509	S	22-Feb-09	4	8.85	8.25	0.6	A	600.3	600.3	600.3	17:52	19:01	1.2	10.2	7.2	-	-	-	-	-	-	-	-	-	-	Max Volume
		18-Dec-08	3	10.4	9.4	1	A	400.0	-	-	5:47	6:15	-	-	-	-	-	-	-	-	-	-	-	-	-	
		18-Dec-08	3	10.4	9.4	1	B	200.2	600.2	600.2	6:15	6:30	2.0	14.5	15.6	35.0	-	1.66	-	-	-	-	-	-	17	Max Volume
		18-Dec-08	2	12.9	10.4	2.5	A	66.7	66.7	26.7	4:48	5:35	3.2	0.7	0.09	-	-	-	-	-	-	-	-	-	-	
		18-Dec-08	1	19.9	12.9	7	A	53.2	53.2	7.6	4:15	4:36	5.5	0.6	0.01	33.0	-	1.66	17	8	17	15	-	-	15	
60+510.5	T	17-Mar-09	4	10.35	9.75	0.6	MF	20.0	20.0	20.0	9:20	9:38	1.5	0	0.01	30.0	3	1.37	17	7	16	-	-	-	18	
		18-Jan-09	3	11.5	10.5	1	A	20.0	20.0	20.0	5:29	6:28	3.3	0.167	0.05	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	2	16	11.5	4.5	A	23.1	23.1	5.1	5:09	5:26	3.5	0.1	0.05	32.6	-	1.65	5	10	-	14	-	-	17	
60+512	P	22-Feb-09	4	9.13	8.53	0.6	A	600.5	600.5	600.5	21:14	22:18	1.0	11.2	9.42	33.0	2	1.64	6	5	12	3	-	-	16	Max Volume
		07-Dec-08	3	10.64	9.64	1	A	0.0	-	-	00:00	00:00	-	-	-	33.0	-	1.64	15	9	15	12	-	-	20	
		07-Dec-08	3	10.64	9.64	1	A	0.0	-	-	00:00	00:00	-	-	-	33.0	-	1.66	16	9	15	11	-	-	-	
		07-Dec-08	3	10.64	9.64	1	A	600.5	600.5	240.2	05:35	08:05	2.7	5	4.2	33.0	-	-	16	11	15	14	-	-	20	
		06-Dec-08	2	13.14	10.64	2.5	A	13.3	13.3	5.3	05:35	05:50	2.0	0.3	0.06	32.0	-	-	-	-	-	-	-	-	16	
		08-Nov-08	1	20.3	13.3	7	A	84.1	84.1	12.0	07:39	08:07	5.4	0.6	0.02	32.1	-	1.68	-	-	-	-	-	-	-	
60+513.5	T	12-Mar-09	4	9.18	8.58	0.6	MF	450.0	-	-	21:40	-	-	-	-	32.9	1	1.42	16	7	14	-	-	-	17	
		12-Mar-09	4	9.18	8.58	0.6	A	182.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		12-Mar-09	4	9.18	8.58	0.6	B	250.0	882.2	882.2	-	0:15	1.1	6.6	9.81	-	-	-	-	-	-	-	-	-	-	Max Volume
		18-Jan-09	3	10.3	9.3	1	A	10.1	10.1	10.1	20:15	20:32	2.8	0.2	0.07	-	-	-	-	-	-	-	-	-	-	
		18-Jan-09	2	12.8	10.3	2.5	A	21.5	21.5	8.6	19:49	20:09	3.3	0.3	0.03	-	-	-	-	-	-	-	-	-	-	
		18-Jan-09	1	19.8	12.8	7	A	113.3	113.3	16.2	19:09	19:40	4.6	0.5	0.01	30.6	9	1.65	5	13	19	7	-	-	23	
60+515	S	22-Feb-09	4	9.16	8.56	0.6	A	600.3	600.3	600.3	22:37	0:23	2.5	3.6	1.13	32.3	3	1.63	17	6	14	14	-	-	17	Max Volume
		19-Dec-08	3	10.5	9.5	1	A	500.0	-	-	9:58	10:30	-	-	-	33.6	-	1.67	25	13	12	23	-	-	21	
		19-Dec-08	3	10.5	9.5	1	B	103.3	603.3	603.3	10:30	10:55	1.2	15	12.5	37.5	-	1.65	18	14	16	-	-	-	18	Max Volume
		19-Dec-08	2	13	10.5	2.5	A	54.5	54.5	21.8	9:04	9:50	2.6	0.1	0.02	-	-	-	-	-	-	-	-	-	-	
		19-Dec-08	1	20	13	7	A	465.7	465.7	66.5	7:35	8:55	5.8	3	0.07	31.0	4	1.61	11	19	11	16	-	-	14	
60+516.5	T	13-Mar-09	4	8.93	8.33	0.6	MF	1.1	1.1	1.1	9:00	9:25	1.3	0	0.01	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	3	10.4	9.4	1	A	21.9	21.9	21.9	1:27	1:49	3.1	0.1	0.04	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	2	14.9	10.4	4.5	A	26.0	26.0	5.8	1:01	1:12	4.6	1	0.05	32.6	-	1.65	3	10	4	11	-	-	16	

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+518	P	22-Feb-09	4	9.16	8.56	0.6	A	600.1	600.1	600.1	2:43	3:45	1.4	10.6	6.44	33.0	5	1.62	4	6	13	23	-	-	18	Max Volume
		14-Dec-08	3	10.5	9.5	1	A	380.0	-	-	17:38	18:10	0.6	10	23	33.5	-	1.61	-	-	11	-	-	-	17	
		14-Dec-08	3	10.5	9.5	1	B	412.0	792.0	792.0	18:10	18:40	1.5	0	0.03	33.5	-	-	-	-	-	-	-	-	-	
		14-Dec-08	2	13	10.5	2.5	A	11.5	11.5	4.6	17:17	17:30	3.0	0.5	0.07	-	-	-	-	-	-	-	-	-	-	
		14-Dec-08	1	20	13	7	A	229.2	229.2	32.7	16:15	17:05	5.4	2.7	0.07	33.0	-	1.64	18	10	9	15	-	-	15	
60+518.75	Q	28-Feb-09	3	11.7	10.7	1	A	600.3	600.3	600.3	9:53	10:58	2.9	9	3.07	-	-	-	-	-	-	-	-	-	-	Max Volume
		28-Feb-09	2	14.2	11.7	2.5	A	28.7	28.7	11.5	9:27	9:50	3.1	0.6	0.07	-	-	-	-	-	-	-	-	-	-	
		28-Feb-09	1	21.2	14.2	7	A	79.6	79.6	11.4	9:02	9:22	5.7	0.4	0.01	32.0	3	1.62	23	10	18	13	-	-	23	
60+519.5	T	13-Mar-09	4	8.75	8.15	0.6	MF	1.1	1.1	1.1	10:51	11:04	1.4	0.1	0.07	-	-	-	-	-	-	-	-	-	-	
		28-Jan-09	3	10.1	9.1	1	A	511.1	511.1	511.1	1:23	4:12	2.8	0	0.01	33.2	5	1.62	15	18	9	14	-	-	18	
		28-Jan-09	2	14.6	10.1	4.5	A	1350.0	1350.0	300.0	21:53	0:50	3.5	5.5	0.36	-	-	-	-	-	-	-	-	-	-	Max Volume
		31-Jan-09	1	19.6	14.6	5	A	27.9	27.9	5.6	21:20	21:35	5.5	1.2	0.04	-	-	-	-	-	-	-	-	-	-	
60+520.25	Q	28-Feb-09	3	11.7	10.7	1	A	12.8	12.8	12.8	14:34	14:55	2.9	0.4	0.14	-	-	-	-	-	-	-	-	-	-	
		28-Feb-09	2	14.2	11.7	2.5	A	65.4	65.4	26.2	13:42	14:28	3.1	1	0.12	-	-	-	-	-	-	-	-	-	-	
		28-Feb-09	1	21.2	14.2	7	A	26.0	26.0	3.7	13:25	13:38	5.3	1.1	0.03	33.5	4	1.62	2	10	18	14	-	-	17	
60+521	S	22-Feb-09	4	7.35	6.75	0.6	A	4.6	4.6	4.6	4:10	4:24	2.7	0	0	33.1	1	1.63	1	7	14	14	-	-	17	
		17-Jan-09	3	8.6	7.6	1	A	430.0	-	-	23:45	0:27	1.2	11.4	9.3	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	3	8.6	7.6	1	B	175.6	605.6	605.6	0:27	0:46	1.2	11.4	9.3	37.2	-	1.66	2	10	3	-	-	-	15	Max Volume
		17-Jan-09	2	11.1	8.6	2.5	A	101.1	101.1	40.4	23:09	23:40	3.1	0.3	0.04	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	1	18.1	11.1	7	A	120.5	120.5	17.2	22:35	23:04	5.5	1.7	0.05	33.1	2	1.65	-10	8	-	14	-	-	14	
60+521.75	Q	28-Feb-09	3	9.8	8.8	1	A	11.4	11.4	11.4	17:00	17:15	2.9	0	0.01	-	-	-	-	-	-	-	-	-	-	
		28-Feb-09	2	12.3	9.8	2.5	A	2.7	2.7	1.1	16:46	16:57	3.2	0.2	0.02	-	-	-	-	-	-	-	-	-	-	
		28-Feb-09	1	19.3	12.3	7	A	375.0	-	-	15:10	16:20	5.6	5.7	0.16	32.6	5	1.65	9	11	17	15	-	-	22	
		28-Feb-09	1	19.3	12.3	7	B	59.3	434.3	62.0	16:20	16:33	5.5	5.2	0.12	35.5	1	1.67	9	12	16	-	-	-	21	By-Pass
60+522.5	T	13-Mar-09	4	7.48	6.88	0.6	MF	5.6	5.6	5.6	13:30	13:45	1.6	0	0.1	30.0	0	1.40	15	7	19	-	-	-	16	
		28-Jan-09	3	8.7	7.7	1	A	405.0	-	-	20:10	21:01	-	-	-	33.4	4	1.63	18	8	12	15	-	-	21	
		28-Jan-09	3	8.7	7.7	1	B	195.5	600.5	600.5	21:01	21:17	1.1	8.9	8.4	37.6	1	1.64	20	9	22	15	-	-	22	Max Volume
		28-Jan-09	2	13.2	8.7	4.5	A	400.0	-	-	17:27	18:08	-	-	-	33.1	3	1.65	-10	9	21	-	-	-	18	
		28-Jan-09	2	13.2	8.7	4.5	B	950.0	1350.0	300.0	18:08	19:49	1.5	11.1	1.62	-	-	-	-	-	-	-	-	-	-	Max Volume
		31-Jan-09	1	18.2	13.2	5	A	252.6	252.6	50.5	21:53	22:44	5.3	0.4	0.01	31.9	6	1.62	2	8	12	17	-	-	19	
60+523.25	Q	01-Mar-09	3	9	8	1	A	600.5	600.5	600.5	16:39	17:45	1.6	10.4	6.74	-	-	-	-	-	-	-	-	-	-	Max Volume
		01-Mar-09	2	11.5	9	2.5	A	9.7	9.7	3.9	16:24	16:36	3.6	0.5	0.06	-	-	-	-	-	-	-	-	-	-	
		01-Mar-09	1	18.5	11.5	7	A	53.7	53.7	7.7	16:02	16:20	5.1	1.3	0.04	33.0	2	1.62	18	10	9	12	-	-	19	
60+524	P	22-Feb-09	4	7.3	6.7	0.6	A	483.9	483.9	483.9	4:33	5:46	1.3	9.42	6.16	-	-	-	-	-	-	-	-	-	-	
		07-Dec-08	3	8.76	7.76	1	A	0.0	-	-	00:00	00:00	-	-	-	32.0	-	1.66	-	-	-	-	-	-	18	By-pass / packer line broken.
		07-Dec-08	3	8.76	7.76	1	A	0.0	-	-	00:00	00:00	-	-	-	32.0	-	1.67	-	-	-	-	-	-	17	Volume from electronic record.
		07-Dec-08	3	8.76	7.76	1	A	0.0	-	-	00:00	00:00	-	-	-	33.0	-	-	14	10	16	11	-	-	-	
		07-Dec-08	3	8.76	7.76	1	A	473.2	473.2	473.2	11:06	13:15	3.0	0	0.01	32.0	-	1.61	13	9	17	10	-	-	17	
		07-Dec-08	2	11.26	8.76	2.5	A	4.0	4.0	1.6	10:45	10:58	2.5	0.2	0.03	31.5	7	1.57	13	10	18	10	-	-	-	
		08-Nov-08	1	18.73	11.73	7	A	55.0	55.0	7.9	17:20	18:20	5.1	0.4	0.01	33.0	2	1.65	-	-	-	-	-	-	-	
60+525.5	T	13-Mar-09	4	8.01	7.41	0.6	MF	0.8	0.8	0.8	13:50	14:05	1.4	0	0.01	-	-	-	-	-	-	-	-	-	-	
		29-Jan-09	3	9.3	8.3	1	A	14.9	14.9	14.9	7:37	7:56	2.9	0	0.01	31.8	-	1.64	-14	16	14	20	-	-	19	
		29-Jan-09	2	13.8	9.3	4.5	A	2.9	2.9	0.6	7:20	7:31	3.5	0	0	-	-	-	-	-	-	-	-	-	-	
60+527	S	23-Feb-09	4	8.85	8.25	0.6	A	8.7	8.7	8.7	7:52	8:07	2.6	0	0	33.0	2	1.61	16	12	12	12	-	-	18	
		17-Jan-09	3	9.8	8.8	1	A	406.0	-	-	21:25	21:59	-	-	-	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	3	9.8	8.8	1	B	260.0	666.0	666.0	21:59	22:25	1.2	9.5	8.55	37.8	2	1.66	-12	9	-	-	-	-	13	Max Volume
		17-Jan-09	2	12.3	9.8	2.5	A	6.8	6.8	2.7	21:07	21:18	2.6	0.3	0.05	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	1	19.3	12.3	7	A	53.5	53.5	7.6	20:38	20:57	5.4	0	0	32.8	3	1.65	-15	10	-	14	-	-	-	
60+527.75	Q	01-Mar-09	3	9.8	8.8	1	A	601.0	601.0	601.0	20:56	22:05	2.4	9	3.8	31.9	2	1.64	-2	9	16	14	-	-	19	Max Volume
		01-Mar-09	2	14.3	9.8	4.5	A	450.0	-	-	19:04	20:00	-	-	-	32.4	4	1.63	14	10	14	13	-	-	22	
		01-Mar-09	2	14.3	9.8	4.5	B	36.0	486.0	108.0	20:00	20:15	3.3	0	0	-	-	-	-	-	-	-	-	-	-	
60+528.5	T	13-Mar-09	4	7.96	7.36	0.6	MF	304.2	304.2	304.2	14:15	16:07	1.5	0.8	0.92	-	-	-	-	-	-	-	-	-	-	
		28-Jan-09	3	9.4	8.4	1	A	600.6	600.6	600.6	16:14	17:11	0.0	12.8	inf	-	-	-	-	-	-	-	-	-	-	Max Volume
		28-Jan-09	2	11.9	9.4	2.5	A	751.6	751.6	300.6	14:56	16:07	0.0	12.8	inf	-	-	-	-	-	-	-	-	-	-	Max Volume
		28-Jan-09	1	18.9	11.9	7	A	2.7	2.7	0.4	14:31	14:42	5.4	0.2	0.01	-	-	-	-	-	-	-	-	-	-	

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

Hole	Order (P, S, T, Q)	Date	Stage: Stage #	Stage: From	Stage: To	Stage: Length	Take: Mix	Take: Volume	Take: V_{TOTAL}	Take: Take	Duration: Start	Duration: End	Termination: P_{FINAL}	Termination: Q_{FINAL}	Termination: Penetrab	QA: Marsh	QA: Bleed	QA: Specific Gravity	Temperatures: Cement	Temperatures: Water	Temperatures: Ambient	Temperatures: Glenium	Temperatures: Pozzutec	Temperatures: Bentonite	Temperatures: Mix	Comments
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+529.25	Q	01-Mar-09	3	10.1	9.1	1	A	600.3	600.3	600.3	22:46	0:10	3.0	3.9	1.3	32.1	3	1.64	1	9	16	15	-	-	20	Max Volume
		01-Mar-09	2	14.6	10.1	4.5	A	25.5	25.5	5.7	22:24	22:42	3.5	0.7	0.05	-	-	-	-	-	-	-	-	-	-	
60+530	P	14-Dec-08	3	9.2	8.2	1	A	366.9	-	-	9:39	10:18	0.3	10.2	87.4	-	-	-	-	-	-	-	-	-	-	
		14-Dec-08	3	9.2	8.2	1	B	233.2	600.1	600.1	10:18	10:41	1.0	8.9	20.45	37.1	3	1.66	18	11	14	-	-	-	16	
		14-Dec-08	2	11.7	9.2	2.5	A	183.3	183.3	73.3	8:33	9:20	3.2	1.2	0.14	-	-	-	-	-	-	-	-	-	17	
		14-Dec-08	1	18.7	11.7	7	A	226.7	226.7	32.4	7:48	8:21	5.5	1	0.03	33.2	2	1.65	19	11	15	14	-	-	16	
60+531.5	T	13-Mar-09	4	7.81	7.21	0.6	MF	8.7	8.7	8.7	16:20	16:45	1.1	0	0.06	-	-	-	-	-	-	-	-	-	-	
		28-Jan-09	3	9.3	8.3	1	A	9.6	9.6	9.6	13:57	14:19	3.1	0.2	0.05	-	-	-	-	-	-	-	-	-	-	
		28-Jan-09	2	13.8	9.3	4.5	A	104.3	104.3	23.2	13:14	13:50	3.4	0.8	0.05	31.0	5	1.62	17	11	-	8	-	-	21	
60+533	S	23-Feb-09	4	7.35	6.75	0.6	A	77.9	77.9	77.9	8:14	8:44	2.6	0.1	0.03	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	3	9	8	1	A	12.4	12.4	12.4	17:22	17:45	3.0	0.3	0.1	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	2	11.5	9	2.5	A	37.6	37.6	15.0	16:16	17:14	2.9	0.2	0.03	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	1	18.5	11.5	7	A	51.0	51.0	7.3	15:54	16:12	4.4	0.5	0.01	-	-	-	-	-	-	-	-	-	-	
60+533.75	Q	01-Mar-09	3	10	9	1	A	5.1	5.1	5.1	3:07	3:21	2.9	0.2	0.08	-	-	-	-	-	-	-	-	-	-	
		01-Mar-09	2	12.5	10	2.5	A	5.2	5.2	2.1	2:48	3:01	2.9	0.2	0.03	-	-	-	-	-	-	-	-	-	-	
		01-Mar-09	1	19.5	12.5	7	A	30.5	30.5	4.4	2:25	2:46	5.2	0.9	0.03	31.3	3	1.63	4	10	17	15	-	-	19	
60+534.5	T	13-Mar-09	4	7.48	6.88	0.6	MF	51.6	51.6	51.6	19:17	19:58	1.4	0.6	0.75	31.4	1	1.41	15	5	17	-	-	-	16	
		30-Jan-09	3	8.6	7.6	1	A	601.3	601.3	601.3	8:10	9:15	1.3	10	7.6	33.0	-	1.66	-13	20	13	16	-	-	17	Max Volume
		30-Jan-09	2	11.1	8.6	2.5	A	750.9	-	-	6:38	7:50	1.2	10.1	3.41	33.0	3	1.65	-13	20	13	16	-	-	18	Max Volume
		22-Feb-09	2	11.1	8.6	2.5	A	514.7	1265.6	506.2	9:18	11:45	2.8	0.2	0.03	30.0	6	1.58	13	14	18	11	-	-	21	
		22-Feb-09	1	18.1	11.1	7	A	92.1	92.1	13.2	8:34	9:08	5.0	1.4	0.04	31.0	5	1.63	-7	16	15	12	-	-	22	
60+535.25	Q	01-Mar-09	3	9.7	8.7	1	A	7.0	7.0	7.0	4:11	4:28	2.9	0.2	0.08	-	-	-	-	-	-	-	-	-	-	
		01-Mar-09	2	12.2	9.7	2.5	A	8.0	8.0	3.2	3:52	4:05	3.1	0.3	0.04	-	-	-	-	-	-	-	-	-	-	
		01-Mar-09	1	19.2	12.2	7	A	11.0	11.0	1.6	3:34	3:46	5.2	0.5	0.01	-	-	-	-	-	-	-	-	-	-	
60+536	P	23-Feb-09	4	7.2	6.6	0.6	A	12.2	12.2	12.2	8:55	9:09	2.5	0.1	0.05	-	-	-	-	-	-	-	-	-	-	
		07-Dec-08	3	8.53	7.53	1	A	8.1	8.1	8.1	13:48	14:03	3.0	0.1	0.1	-	-	-	-	-	-	-	-	-	17	
		07-Dec-08	2	11.03	8.53	2.5	A	1.3	1.3	0.5	13:32	13:39	2.4	0	0	34.0	-	1.64	-	-	-	-	-	-	17	
		07-Nov-08	1	18.36	11.36	7	A	50.4	50.4	7.2	02:25	02:55	5.1	0.4	0.01	32.0	5	1.67	19	12	18	12	-	-	16	
60+537.5	T	13-Mar-09	4	6.82	6.22	0.6	MF	99.5	99.5	99.5	20:15	20:56	1.4	0.6	0.65	-	-	-	-	-	-	-	-	-	-	
		30-Jan-09	3	8.1	7.1	1	A	319.9	319.9	319.9	10:05	10:45	1.1	10	8.73	-	-	-	-	-	-	-	-	-	-	Communicate to 60+534.5
		30-Jan-09	2	12.6	8.1	4.5	A	19.6	19.6	4.4	9:45	10:00	3.5	0.4	0.02	33.0	-	1.66	-	-	-	-	-	-	-	
60+539	S	23-Feb-09	4	7.4	6.8	0.6	A	600.0	600.0	600.0	9:15	10:22	1.6	9.4	4.97	35.0	-	1.56	-20	11	15	11	-	-	14	Max Volume
		17-Jan-09	3	8.7	7.7	1	A	157.2	157.2	157.2	15:02	15:38	2.8	0	0	35.2	-	-	-	-	-	-	-	-	10	
		17-Jan-09	2	11.2	8.7	2.5	A	58.8	58.8	23.5	14:32	14:55	3.2	0.3	0.04	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	1	18.2	11.2	7	A	141.9	141.9	20.3	13:54	14:25	4.8	2.3	0.07	35.1	14	1.64	-19	13	-	21	-	-	16	
60+540.5	T	13-Mar-09	4	8.01	7.41	0.6	MF	1.0	1.0	1.0	21:16	21:28	1.5	0	0.01	-	-	-	-	-	-	-	-	-	-	
		29-Jan-09	3	9.5	8.5	1	A	11.1	11.1	11.1	5:07	5:29	2.9	0.17	0.01	-	-	-	-	-	-	-	-	-	-	
		29-Jan-09	2	14	9.5	4.5	A	50.0	50.0	11.1	4:37	5:02	3.3	0	0	-	-	-	-	-	-	-	-	-	-	
60+542	P	23-Feb-09	4	7.58	6.98	0.6	A	600.4	600.4	600.4	13:12	14:18	1.7	10.1	5.05	33.0	2	1.66	9	12	21	14	-	-	21	Max Volume
		14-Dec-08	3	9.2	8.2	1	A	395.0	-	-	3:52	4:28	0.7	10.7	31.7	-	-	-	-	-	-	-	-	-	18	
		14-Dec-08	3	9.2	8.2	1	B	205.9	600.9	600.9	4:28	4:48	2.0	10	9.87	37.4	4	1.67	18	11	15	-	-	-	20	
		14-Dec-08	2	11.7	9.2	2.5	A	89.8	89.8	35.9	3:21	3:45	3.2	0.4	0.05	-	-	-	-	-	-	-	-	-	17	
		14-Dec-08	1	18.7	11.7	7	A	24.4	24.4	3.5	2:18	2:32	5.5	0.8	0.02	33.2	3	1.66	14	10	15	14	-	-	17	
60+543.5	T	13-Mar-09	4	7.86	7.26	0.6	MF	0.6	0.6	0.6	21:43	21:55	1.7	0	0.01	31.3	2	1.42	4	7	12	-	-	-	15	
		29-Jan-09	3	9.4	8.4	1	A	600.8	600.8	600.8	23:34	0:43	1.6	10.1	6.24	-	-	-	-	-	-	-	-	-	-	Max Volume
		29-Jan-09	2	11.9	9.4	2.5	A	135.3	135.3	54.1	22:24	23:29	2.7	0.1	0.02	-	-	-	-	-	-	-	-	-	-	
		29-Jan-09	1	18.9	11.9	7	A	90.3	90.3	12.9	21:46	22:16	5.0	0.1	0	32.7	3	1.63	10	4	7	5	-	-	17	
60+545	S	23-Feb-09	4	7.35	6.75	0.6	A	607.0	607.0	607.0	14:41	15:49	2.1	9.6	3.85	33.0	3	1.64	9	12	20	15	-	-	20	Max Volume
		17-Jan-09	3	8.8	7.8	1	A	600.4	600.4	600.4	12:20	13:26	2.6	10.2	3.96	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	2	11.3	8.8	2.5	A	30.3	30.3	12.1	11:51	12:13	2.9	0.2	0.03	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	1	18.3	11.3	7	A	333.7	333.7	47.7	10:53	11:45	5.5	3.1	0.09	34.6	20	1.62	1	9	-	13	-	-	13	
60+546.5	T	13-Mar-09	4	6.69	6.09	0.6	MF	22.6	22.6	22.6	22:07	22:33	1.7	0	0.01	-	-	-	-	-	-	-	-	-	-	
		29-Jan-09	3	8.4	7.4	1	A	5.5	5.5	5.5	3:53	4:10	2.6	0.1	0.05	-	-	-	-	-	-	-	-	-	-	
		29-Jan-09	2	12.9	8.4	4.5	A	31.5	31.5	7.0	3:26	3:48	3.6	0.5	0.03	32.6	4	1.62	12	7	12	8	-	-	19	

Check: GRB

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+548	P	23-Feb-09	4	6.44	5.84	0.6	A	601.2	601.2	601.2	16:00	17:08	1.6	9.5	4.84	-	-	-	-	-	-	-	-	-	-	Max Volume
		07-Dec-08	3	7.82	6.82	1	A	4.6	4.6	4.6	17:20	17:32	3.0	0	0.01	-	-	-	13	10	15	11	-	-	20	
		07-Dec-08	2	10.32	7.82	2.5	A	5.7	5.7	2.3	17:00	17:14	2.6	0.1	0.03	31.5	-	1.62	16	11	15	14	-	-	21	
		07-Nov-08	1	17.32	10.32	7	A	150.1	150.1	21.4	03:15	03:55	5.1	2.1	0.06	-	-	-	-	-	-	-	-	-	-	
60+549.5	T	18-Mar-09	4	6.74	6.14	0.6	MF	8.5	8.5	8.5	17:23	17:42	1.6	0.2	0.14	-	-	-	-	-	-	-	-	-	-	
		30-Jan-09	3	8.2	7.2	1	A	600.5	600.5	600.5	13:50	14:55	1.7	10.3	5.98	-	-	-	-	-	-	-	-	-	-	Max Volume
		30-Jan-09	2	12.7	8.2	4.5	A	4.8	4.8	1.1	13:30	13:45	3.5	0.2	0.01	31.0	-	1.62	-15	9	13	16	-	-	17	
60+551	S	23-Feb-09	4	6.84	6.24	0.6	A	600.9	600.9	600.9	17:19	18:27	2.2	9.6	3.63	32.8	2	1.60	-1	8	15	14	-	-	18	Max Volume
		17-Jan-09	3	8.4	7.4	1	A	600.3	600.3	600.3	7:25	8:33	3.1	10.2	3.29	-	-	-	-	-	-	-	-	-	-	
		17-Jan-09	2	10.9	8.4	2.5	A	101.1	101.1	40.4	6:43	7:16	3.3	0.4	0.04	35.2	5	1.65	0	10	-	15	-	-	15	
		17-Jan-09	1	17.9	10.9	7	A	77.8	77.8	11.1	6:00	6:30	5.2	0.1	0	-	-	-	-	-	-	-	-	-	-	
60+552.5	T	14-Mar-09	4	6.74	6.14	0.6	MF	2.0	2.0	2.0	6:53	7:10	1.2	0.85	0.1	32.0	5	1.43	16	6	28	-	-	-	18	
		30-Jan-09	3	8.2	7.2	1	A	600.1	600.1	600.1	15:32	16:37	1.7	3.8	2.11	-	-	-	-	-	-	-	-	-	-	Max Volume
		30-Jan-09	2	12.7	8.2	4.5	A	22.0	22.0	4.9	15:10	15:25	3.6	0.8	0.05	33.0	-	1.62	-	-	-	-	-	-	-	
60+554	P	23-Feb-09	4	6.51	5.91	0.6	A	602.0	602.0	602.0	19:21	20:30	2.4	10.4	3.69	-	-	-	-	-	-	-	-	-	-	Max Volume
		14-Dec-08	3	7.8	6.8	1	A	6.7	6.7	6.7	5:55	6:12	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		14-Dec-08	2	10.3	7.8	2.5	A	7.2	7.2	2.9	5:37	5:48	3.1	0.3	0.03	-	-	-	-	-	-	-	-	-	-	
		14-Dec-08	1	17.3	10.3	7	A	32.3	32.3	4.6	5:16	5:34	5.4	1	0.03	32.4	-	1.64	-	-	-	-	-	-	18	
60+555.5	T	14-Mar-09	4	6.87	6.27	0.6	MF	144.7	144.7	144.7	8:30	9:27	1.7	0	0.02	-	-	-	-	-	-	-	-	-	-	
		30-Jan-09	3	8.5	7.5	1	A	110.6	110.6	110.6	17:18	17:56	2.9	0.1	0	32.0	-	1.65	-14	12	13	17	-	-	18	
		30-Jan-09	2	11	8.5	2.5	A	4.8	4.8	1.9	17:00	17:10	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
60+557	S	23-Feb-09	4	6.44	5.84	0.6	A	600.9	600.9	600.9	1:03	2:11	2.2	10.3	3.84	32.4	6	1.64	-2	6	19	4	-	-	17	Max Volume
		16-Jan-09	3	7.7	6.7	1	A	39.8	39.8	39.8	5:24	5:45	2.5	0	0.01	-	-	-	-	-	-	-	-	-	-	
		16-Jan-09	2	10.2	7.7	2.5	A	4.2	4.2	1.7	5:07	5:20	3.0	0	0	32.3	-	1.64	5	7	-	14	-	-	16	
		16-Jan-09	1	17.2	10.2	7	A	475.0	-	-	3:36	4:31	-	-	-	33.2	2	1.65	-20	7	-	14	-	-	14	
		16-Jan-09	1	17.2	10.2	7	B	119.0	594.0	84.9	4:31	4:58	5.0	0.1	0	36.7	-	1.64	8	8	-	-	-	-	16	
60+558.5	T	14-Mar-09	4	6.31	5.71	0.6	MF	1.0	1.0	1.0	9:29	9:43	1.5	0.1	0.04	-	-	-	-	-	-	-	-	-	-	
		30-Jan-09	3	7.7	6.7	1	A	385.0	-	-	18:42	19:32	-	-	-	-	-	-	-	-	-	-	-	-	-	
		30-Jan-09	3	7.7	6.7	1	B	195.3	580.3	580.3	19:32	19:53	1.9	8.5	4.42	38.7	1	1.63	-5	8	20	19	-	-	17	Max Volume
		30-Jan-09	2	10.2	7.7	2.5	A	17.0	17.0	6.8	18:11	18:31	3.1	0.3	0.04	-	-	-	-	-	-	-	-	-	-	
60+560	P	23-Feb-09	4	6.64	6.04	0.6	A	601.1	601.1	601.1	2:52	4:02	2.5	10.9	3.6	32.7	4	1.65	-2	8	12	6	-	-	20	Max Volume
		07-Dec-08	3	8.48	7.48	1	A	3.9	3.9	3.9	6:40	6:53	2.9	0	0.02	32.0	-	-	-	-	-	-	-	-	-	
		07-Dec-08	2	10.98	8.48	2.5	A	5.0	5.0	2.0	18:02	18:15	2.6	0	0.01	-	-	-	-	-	-	-	-	-	20	
		07-Nov-08	1	17.98	10.98	7	A	41.5	41.5	5.9	14:46	15:19	4.7	0	0	30.1	12	1.65	-	-	-	-	-	-	-	
60+561.5	T	14-Mar-09	4	6.72	6.12	0.6	MF	47.9	47.9	47.9	9:58	10:29	1.5	0.6	0.7	-	-	-	-	-	-	-	-	-	-	
		30-Jan-09	3	8	7	1	A	608.1	608.1	608.1	21:18	22:28	2.0	9.4	4.6	-	-	-	-	-	-	-	-	-	-	Max Volume
		30-Jan-09	2	12.5	8	4.5	A	20.0	20.0	4.4	20:56	21:11	3.4	1.2	0.08	32.2	3	1.64	-6	9	18	18	-	-	18	
60+563	S	23-Feb-09	4	6.84	6.24	0.6	A	600.5	600.5	600.5	5:10	6:20	2.1	9	3.57	33.1	-	1.64	-1	8	11	7	-	-	19	Max Volume
		16-Jan-09	3	8.3	7.3	1	A	430.0	-	-	2:28	3:07	-	-	-	32.3	-	1.64	5	7	-	14	-	-	16	
		16-Jan-09	3	8.3	7.3	1	B	157.7	587.7	587.7	3:07	3:23	1.8	10	9	37.7	6	1.65	-15	8	-	-	-	-	14	Max Volume
		16-Jan-09	2	10.8	8.3	2.5	A	6.0	6.0	2.4	2:12	2:25	2.6	0.3	0.05	-	-	-	-	-	-	-	-	-	-	
		16-Jan-09	1	17.8	10.8	7	A	23.2	23.2	3.3	1:52	2:07	5.1	0.6	0.02	33.0	3	1.65	-19	14	-	16	-	-	17	
60+564.5	T	14-Mar-09	4	7.02	6.42	0.6	MF	25.6	25.6	25.6	10:35	11:00	1.8	0	0	-	-	-	-	-	-	-	-	-	-	
		30-Jan-09	3	8.5	7.5	1	A	600.4	600.4	600.4	4:19	6:00	3.0	4	1.35	-	-	-	-	-	-	-	-	-	-	Max Volume
		30-Jan-09	2	13	8.5	4.5	A	24.3	24.3	5.4	3:47	4:14	3.6	0.3	0.02	-	-	-	-	-	-	-	-	-	-	
60+566	P	24-Feb-09	4	7.02	6.42	0.6	A	600.3	600.3	600.3	6:43	7:48	2.7	9.7	3.05	33.0	2	1.61	-3	8	13	12	-	-	14	Max Volume
		15-Dec-08	3	8.4	7.4	1	A	81.8	81.8	81.8	12:03	13:21	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		15-Dec-08	2	10.9	8.4	2.5	A	4.1	4.1	1.6	11:44	11:55	2.9	0.1	0.02	-	-	-	-	-	-	-	-	-	-	
		15-Dec-08	1	17.9	10.9	7	A	88.4	88.4	12.6	11:07	11:36	5.5	0.2	0	31.0	5	1.62	-	-	-	-	-	-	-	
60+567.5	T	14-Mar-09	4	7.5	6.9	0.6	MF	1.7	1.7	1.7	13:34	13:50	1.5	0	0	-	-	-	-	-	-	-	-	-	-	
		30-Jan-09	3	9	8	1	A	602.2	602.2	602.2	2:12	3:20	2.2	9.2	4.21	-	-	-	-	-	-	-	-	-	-	Max Volume
		30-Jan-09	2	13.5	9	4.5	A	8.8	8.8	2.0	1:55	2:08	3.4	0.2	0.01	32.1	3	1.63	-4	10	20	18	-	-	19	

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
	(P, S, T, Q)		Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+569	S	24-Feb-09	4	7.48	6.88	0.6	A	600.8	600.8	600.8	8:00	9:07	2.4	9.1	3.11	-	-	-	-	-	-	-	-	-	-	
		16-Jan-09	3	9	8	1	A	610.3	610.3	610.3	20:43	21:48	1.4	9.5	6.92	-	-	-	-	-	-	-	-	-	-	Max Volume
		16-Jan-09	2	11.5	9	2.5	A	12.6	12.6	5.0	20:21	20:38	2.4	0.1	0.01	-	-	-	-	-	-	-	-	-	-	
		16-Jan-09	1	18.5	11.5	7	A	96.4	96.4	13.8	19:50	20:16	5.0	0	0.05	32.9	3	1.66	2	8	-	14	-	-	17	
60+570.5	T	12-Mar-09	4	7.43	6.83	0.6	MF	95.0	95.0	95.0	14:35	15:31	1.7	0.5	0.3	-	-	-	-	-	-	-	-	-	-	
		31-Jan-09	3	9	8	1	A	600.0	600.0	600.0	7:00	8:15	2.1	10	4.74	-	-	-	-	-	-	-	-	-	-	Max volume
		31-Jan-09	2	13.5	9	4.5	A	11.1	11.1	2.5	6:45	7:00	3.5	0.7	0.05	33.0	10	1.62	-15	11	10	3	-	-	17	
60+572	P	24-Feb-09	4	7.35	6.75	0.6	A	57.2	57.2	57.2	10:45	11:07	2.4	0	0.01	34.0	4	1.63	-8	7	14	12	-	-	14	Max Volume
		07-Dec-08	3	8.86	7.86	1	A	600.5	600.5	600.5	9:58	11:15	0.3	10.5	56.05	32.0	6	1.64	-	-	-	-	-	-	17	
		07-Dec-08	2	11.36	8.86	2.5	A	2.0	2.0	0.8	9:42	9:54	1.7	0	0	33.1	5	1.62	13	17	7	16	-	-	18	
		07-Nov-08	1	18.36	11.36	7	A	44.6	44.6	6.4	16:09	16:31	4.8	0	0	30.1	-	-	-	-	-	-	-	-	-	
60+573.5	T	12-Mar-09	4	7.53	6.93	0.6	MF	53.8	53.8	53.8	13:35	14:25	1.5	0.5	0.3	-	-	-	-	-	-	-	-	-	-	
		29-Jan-09	3	10.1	9.1	1	A	1.4	1.4	1.4	16:37	16:55	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		29-Jan-09	2	12.6	10.1	2.5	A	10.6	10.6	4.2	16:12	16:28	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		29-Jan-09	1	19.6	12.6	7	A	8.0	8.0	1.1	15:47	16:04	5.4	0.1	0	32.0	9	1.63	13	8	-	19	-	-	17	
60+575	S	24-Feb-09	4	8.17	7.57	0.6	A	600.8	600.8	600.8	11:14	12:21	2.7	10.3	3.14	-	-	-	-	-	-	-	-	-	-	Max Volume
		16-Jan-09	3	9.9	8.9	1	A	400.0	-	-	18:13	19:08	-	-	-	-	-	-	-	-	-	-	-	-	-	
		16-Jan-09	3	9.9	8.9	1	B	236.1	636.1	636.1	19:08	19:32	1.5	9.9	6.63	37.8	8	1.66	-	-	-	-	-	-	17	Max Volume
		16-Jan-09	2	12.4	9.9	2.5	A	57.2	57.2	22.9	17:32	17:32	3.2	0.4	0.05	-	-	-	-	-	-	-	-	-	-	
		16-Jan-09	1	19.4	12.4	7	A	31.0	31.0	4.4	17:06	17:20	5.4	1.6	0.04	-	-	-	-	-	-	-	-	-	-	
60+575.75	Q	03-Mar-09	3	10.4	9.4	1	A	4.6	4.6	4.6	22:32	22:50	3.1	0.2	0.07	-	-	-	-	-	-	-	-	-	-	
		03-Mar-09	2	12.9	10.4	2.5	A	32.1	32.1	12.8	22:02	22:24	2.9	0.4	0.05	-	-	-	-	-	-	-	-	-	-	
		03-Mar-09	1	19.9	12.9	7	A	21.2	21.2	3.0	21:40	21:55	5.4	0.5	0.01	-	-	-	-	-	-	-	-	-	-	
		03-Mar-09	0	24.9	19.9	5	A	61.3	61.3	12.3	21:10	21:29	8.3	0.3	0.01	32.0	3	1.64	-5	9	13	14	-	-	19	
60+576.5	T	12-Mar-09	4	8.57	7.97	0.6	MF	236.7	236.7	236.7	9:51	11:23	1.0	1	0.89	30.0	1	1.44	15	7	18	-	-	-	19	
		31-Jan-09	3	10.1	9.1	1	A	1.9	1.9	1.9	13:46	13:58	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		31-Jan-09	2	12.6	10.1	2.5	A	1.1	1.1	0.4	13:31	13:43	2.8	0	0	33.0	-	1.62	-	-	-	-	-	-	-	
		31-Jan-09	1	19.6	12.6	7	A	487.0	-	-	8:45	9:40	2.9	15	0.7	33.0	-	1.62	-	-	-	-	-	-	-	
		31-Jan-09	1	19.6	12.6	7	B	446.0	-	-	9:40	10:15	4.2	15	0.6	36.0	-	1.60	-12	14	7	-	-	-	19	
		31-Jan-09	1	19.6	12.6	7	C	365.0	-	-	10:15	10:40	5.2	14	0.32	45.0	-	1.66	-9	11	4	-	-	17	20	
		31-Jan-09	1	19.6	12.6	7	D	231.0	1529.0	218.4	10:40	11:24	5.4	0	0	77.0	-	1.66	-6	10	4	-	-	-	19	
60+577.25	Q	03-Mar-09	3	10.6	9.6	1	A	14.8	14.8	14.8	1:44	2:13	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
		03-Mar-09	2	13.1	10.6	2.5	A	6.2	6.2	2.5	1:26	1:38	2.9	0.1	0.01	-	-	-	-	-	-	-	-	-	-	
		03-Mar-09	1	20.1	13.1	7	A	21.5	21.5	3.1	1:07	1:19	5.4	1.4	0.04	-	-	-	-	-	-	-	-	-	-	
		03-Mar-09	0	25.1	20.1	5	A	6.1	6.1	1.2	0:46	0:59	8.6	0.3	0.01	31.9	4	1.64	1	10	16	15	-	-	19	
60+578	P	24-Feb-09	4	8.17	7.57	0.6	A	600.0	600.0	600.0	14:39	15:55	2.5	5.7	1.92	32.0	2	1.61	-9	12	20	15	-	-	17	Max Volume
		08-Jan-09	3	9.5	8.5	1	A	630.5	630.5	630.5	17:06	18:15	0.4	11.1	26.75	-	-	-	-	-	-	-	-	-	-	By-Pass. Re-try. Max volume
		08-Jan-09	2	12	9.5	2.5	A	7.5	7.5	3.0	16:48	17:01	2.9	0.6	0.09	-	-	-	-	-	-	-	-	-	-	
		08-Jan-09	1	19	12	7	A	177.8	177.8	25.4	16:05	16:43	5.8	0.9	0.02	32.0	-	1.62	24	6	-	13	-	-	18	
60+579.5	T	12-Mar-09	4	7.5	6.9	0.6	MF	36.2	36.2	36.2	9:00	9:33	1.4	0	0.01	-	-	-	-	-	-	-	-	-	-	
		31-Jan-09	3	9	8	1	A	600.6	600.6	600.6	14:48	15:56	3.0	8	2.7	34.0	0	1.66	-11	17	10	11	-	-	17	Max volume
		31-Jan-09	2	13.5	9	4.5	A	3.4	3.4	0.8	14:30	14:42	3.6	0	0	-	-	-	-	-	-	-	-	-	-	
60+581	S	25-Feb-09	4	7.1	6.5	0.6	A	291.1	291.1	291.1	7:01	7:58	2.5	0	0	31.3	7	1.61	21	16	17	18	-	-	23	
		16-Jan-09	3	9.6	8.6	1	A	0.0	-	-	0:00	0:00	-	-	-	36.0	3	1.66	1	15	-	15	-	-	15	Max volume
		16-Jan-09	3	9.6	8.6	1	A	600.4	600.4	600.4	15:37	16:52	2.2	0.1	4.33	32.0	-	1.64	1	2	-	16	-	-	20	
		16-Jan-09	2	12.1	9.6	2.5	A	16.8	16.8	6.7	15:12	15:31	3.0	0.1	0.02	-	-	-	-	-	-	-	-	-	-	
		16-Jan-09	1	19.1	12.1	7	A	20.8	20.8	3.0	14:52	15:05	5.4	0.6	0.02	34.3	-	1.65	7	12	-	17	-	-	20	
60+582.5	T	12-Mar-09	4	7.4	6.8	0.6	MF	52.0	52.0	52.0	15:50	16:16	1.3	0.2	0.22	-	-	-	-	-	-	-	-	-	-	
		31-Jan-09	3	8.5	7.5	1	A	96.7	96.7	96.7	16:30	17:22	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		31-Jan-09	2	13	8.5	4.5	A	5.2	5.2	1.2	16:10	16:22	3.3	0.2	0.01	-	-	-	-	-	-	-	-	-	-	
60+584	P	25-Feb-09	4	7.02	6.42	0.6	A	32.0	32.0	32.0	8:09	8:34	2.2	0	0	29.5	8	1.58	15	15	10	8	-	-	19	
		07-Dec-08	3	8.5	7.5	1	A	600.3	600.3	600.3	2:10	3:15	0.0	10.2	500.23	32.0	-	-	-	-	-	-	-	-	18	
		07-Dec-08	2	11	8.5	2.5	A	1.1	1.1	0.4	1:47	2:02	1.4	0	0	33.0	5	1.64	18	10	8	13	-	-	17	
		07-Nov-08	1	18	11	7	A	52.7	52.7	7.5	08:12	08:45	4.4	0	0	32.0	6	1.66	13	16	16	13	-	-	22	

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date (dd-mmm-yy)	Stage: Stage #	Stage: From (m)	Stage: To (m)	Stage: Length (m)	Take: Mix	Take: Volume (L)	Take: V_{TOTAL} (L)	Take: Take (L/m)	Duration: Start (hh:mm)	Duration: End (hh:mm)	Termination: P_{FINAL} (bar)	Termination: Q_{FINAL} (L/min/m)	Termination: Penetrab (L/min/m/bar)	QA: Marsh (sec)	QA: Bleed (%)	QA: Specific Gravity	Temperatures: Cement (Celcius)	Temperatures: Water (Celcius)	Temperatures: Ambient (Celcius)	Temperatures: Glenium (Celcius)	Temperatures: Pozzutec (Celcius)	Temperatures: Bentonite (Celcius)	Temperatures: Mix (Celcius)	Comments
60+585.5	T	13-Mar-09	4	7.48	6.88	0.6	MF	41.3	41.3	41.3	7:50	8:20	2.0	0.3	0.15	-	-	-	-	-	-	-	-	-	-	
		29-Jan-09	3	8.6	7.6	1	A	360.5	360.5	360.5	23:04	0:40	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		29-Jan-09	2	13.1	8.6	4.5	A	2.2	2.2	0.5	22:51	23:02	3.3	0	0	-	-	-	-	-	-	-	-	-	-	
60+587	S	14-Feb-09	4, 5	7.8	6.8	1	A	600.3	600.3	600.3	9:10	8:16	1.7	9.97	5.58	30.0	4	1.64	11	11	17	19	-	-	19	Port Injection. Max Volume
		16-Jan-09	3	8.8	7.8	1	A	18.7	18.7	18.7	10:13	10:40	3.1	0.1	0.05	-	-	-	-	-	-	-	-	-	-	
		16-Jan-09	2	11.3	8.8	2.5	A	61.5	61.5	24.6	9:25	10:07	3.2	0.7	0.09	32.0	-	1.70	16	16	-	11	-	-	22	
		16-Jan-09	1	18.3	11.3	7	A	15.9	15.9	2.3	9:00	9:17	5.6	0.1	0	-	-	-	-	-	-	-	-	-	-	
60+588.5	T	13-Mar-09	4	7.61	7.01	0.6	MF	82.3	82.3	82.3	8:30	9:07	1.8	0.4	0.23	32.0	1	1.50	14	9	16	-	-	-	14	
		29-Jan-09	2, 3	13.2	7.7	5.5	A	1351.0	1351.0	245.6	19:22	22:07	2.9	7	0.53	31.9	10	1.64	-13	11	20	13	-	-	19	Max Volume
60+590	P	25-Feb-09	4	6.64	6.04	0.6	A	352.1	352.1	352.1	8:51	10:24	2.5	0	0.03	-	-	-	-	-	-	-	-	-	-	
		15-Dec-08	3	8.2	7.2	1	A	400.0	-	-	16:34	17:00	-	-	-	-	-	-	-	-	-	-	-	-	-	
		15-Dec-08	3	8.2	7.2	1	B	200.0	600.0	600.0	17:00	17:40	0.1	9.7	96.3	35.0	4	1.65	-	-	-	-	-	-	-	Max Volume
		15-Dec-08	2	10.7	8.2	2.5	A	64.7	64.7	25.9	15:45	16:25	3.0	0.5	0.08	33.5	-	1.61	-	-	-	-	-	-	-	
		15-Dec-08	1	17.7	10.7	7	A	7.3	7.3	1.0	15:23	15:36	5.6	0	0	33.0	5	1.62	-	-	-	-	-	-	-	
60+591.5	T	13-Mar-09	4	7.2	6.6	0.6	MF	51.0	51.0	51.0	9:23	9:53	1.5	0.4	0.25	-	-	-	-	-	-	-	-	-	-	
		29-Jan-09	3	8.5	7.5	1	A	4.0	4.0	4.0	17:49	18:02	3.0	0.24	0.08	-	-	-	-	-	-	-	-	-	-	
		29-Jan-09	2	11	8.5	2.5	A	7.7	7.7	3.1	17:34	17:45	3.4	0.2	0.02	-	-	-	-	-	-	-	-	-	-	
		29-Jan-09	1	18	11	7	A	6.2	6.2	0.9	17:13	17:26	5.4	0.1	0	-	-	-	-	-	-	-	-	-	-	
60+593	S	25-Feb-09	4	7.05	6.45	0.6	A	208.7	208.7	208.7	10:36	12:02	2.4	0	0	29.0	11	1.59	-15	15	9	10	-	-	19	
		16-Jan-09	3	8.4	7.4	1	A	600.9	600.9	600.9	7:18	8:46	1.8	2.9	1.64	31.9	9	1.64	3	10	-	12	-	-	14	Max volume
		16-Jan-09	2	10.9	8.4	2.5	A	751.3	751.3	300.5	5:42	7:04	2.7	11.6	1.73	-	-	-	-	-	-	-	-	-	-	Max volume
		15-Jan-09	1	17.9	10.9	7	A	34.4	34.4	4.9	5:21	5:37	5.5	1.3	0.03	-	-	-	-	-	-	-	-	-	-	
60+594.5	T	13-Mar-09	4	7.35	6.75	0.6	MF	43.1	43.1	43.1	10:16	10:44	1.3	1	0.76	-	-	-	-	-	-	-	-	-	-	
		29-Jan-09	3	8.7	7.7	1	A	2.4	2.4	2.4	18:49	19:01	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		29-Jan-09	2	13.2	8.7	4.5	A	10.9	10.9	2.4	18:25	18:41	3.3	0.6	0.05	-	-	-	-	-	-	-	-	-	-	
60+596	P	03-Mar-09	4	7.05	6.45	0.6	A	396.6	396.6	396.6	13:26	14:28	2.7	0	0	32.9	4	1.63	7	13	-	15	-	-	18	
		08-Dec-08	3	8.35	7.35	1	A	22.6	22.6	22.6	-	06:40	3.0	0	0	-	-	-	-	-	-	-	-	-	20	
		07-Dec-08	2	10.85	8.35	2.5	A	1.1	1.1	0.4	1:47	2:02	1.4	0	0	33.0	5	1.64	18	10	8	13	-	-	17	
		07-Nov-08	1	17.85	10.85	7	A	200.0	200.0	28.6	09:30	10:15	5.0	3.3	0.08	32.0	6	1.63	20	10	12	-	-	-	21	
60+597.5	T	13-Mar-09	4	7.63	7.03	0.6	MF	118.1	118.1	118.1	12:43	14:30	1.6	0.4	0.24	-	-	-	-	-	-	-	-	-	-	
		29-Jan-09	3	8.9	7.9	1	A	8.9	8.9	8.9	10:38	11:05	2.8	0.2	0.06	-	-	-	-	-	-	-	-	-	-	
		29-Jan-09	2	13.4	8.9	4.5	A	8.3	8.3	1.8	10:20	10:35	3.1	0.3	0.03	31.0	5	1.62	5	7	-	16	-	-	19	
60+599	S	03-Mar-09	4	7.25	6.65	0.6	A	189.9	189.9	189.9	14:50	15:25	2.6	0.02	0.01	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	3	8.5	7.5	1	A	206.0	206.0	206.0	4:43	5:10	0.3	10	22	-	-	-	-	-	-	-	-	-	-	Communicate to 60+597.5
		15-Jan-09	2	11	8.5	2.5	A	6.6	6.6	2.6	4:28	4:41	2.9	0.2	0.03	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	1	18	11	7	A	51.3	51.3	7.3	4:00	4:22	5.7	0.1	0	32.9	3	1.64	7	8	-	8	-	-	16	
60+600.5	T	13-Mar-09	4	7.76	7.16	0.6	MF	59.3	59.3	59.3	14:39	15:11	1.6	0.5	0.34	31.5	2	1.42	17	8	13	-	-	-	15	
		31-Jan-09	3	8.9	7.9	1	A	22.2	22.2	22.2	19:11	19:50	3.3	0.2	0.05	-	-	-	-	-	-	-	-	-	-	
		31-Jan-09	2	13.4	8.9	4.5	A	20.7	20.7	4.6	18:49	19:06	3.0	1	0.07	36.4	5	1.62	-1	9	19	16	-	-	21	
60+602	P	03-Mar-09	4	7.05	6.45	0.6	A	8.2	8.2	8.2	15:49	16:05	2.9	0	0.01	-	-	-	-	-	-	-	-	-	-	
		08-Jan-09	3	8.9	7.9	1	A	400.0	-	-	22:39	23:23	-	-	-	31.4	-	1.63	-	-	-	-	-	-	16	
		08-Jan-09	3	8.9	7.9	1	B	200.6	600.6	600.6	23:23	23:43	1.9	9.9	5.07	35.8	5	1.61	-	-	-	-	-	-	14	
		08-Jan-09	2	10.9	8.9	2	A	3.1	3.1	1.5	22:25	22:35	2.4	0.1	0.01	-	-	-	-	-	-	-	-	-	-	
		08-Jan-09	1	18.4	10.9	7.5	A	352.6	352.6	47.0	21:30	0:00	5.0	1	0.08	33.4	-	1.65	15	8	-	11	-	-	15	By-pass
60+603.5	T	14-Mar-09	4	7.35	6.75	0.6	MF	78.0	78.0	78.0	6:02	7:37	1.6	0.4	0.24	32.0	1	1.42	16	9	27	-	-	-	17	
		28-Jan-09	3	8.9	7.9	1	A	100.6	100.6	100.6	5:03	5:48	3.2	0.2	0.06	33.7	2	-	16	12	21	13	-	-	19	
		28-Jan-09	2	13.4	8.9	4.5	A	23.0	23.0	5.1	4:41	4:55	3.2	0.5	0.03	-	-	-	-	-	-	-	-	-	-	
60+605	S	03-Mar-09	4	7.66	7.06	0.6	A	600.6	600.6	600.6	16:20	17:26	1.4	9.6	6.93	-	-	-	-	-	-	-	-	-	-	Max Volume
		15-Jan-09	3	9.4	8.4	1	A	394.1	394.1	394.1	23:55	0:56	3.1	0.2	0.06	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	2	13.9	9.4	4.5	A	28.8	28.8	6.4	23:27	23:47	3.2	0.6	0.05	-	-	-	-	-	-	-	-	-	-	
60+606.5	T	14-Mar-09	4	7.05	6.45	0.6	MF	31.5	31.5	31.5	7:48	8:05	1.5	0.9	0.6	-	-	-	-	-	-	-	-	-	-	
		28-Jan-09	3	8.6	7.6	1	A	5.0	5.0	5.0	4:16	4:37	3.2	0.2	0.06	-	-	-	-	-	-	-	-	-	-	
		28-Jan-09	2	13.1	8.6	4.5	A	16.1	16.1	3.6	3:27	4:15	3.3	0.4	0.03	-	-	-	-	-	-	-	-	-	-	

Check: GRB

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+608	P	09-Nov-08	4	7.5	6.5	1	A	0.0	0.0	0.0	20:10	20:30	11.0	0	0	31.0	5	1.65	-	-	-	-	-	-	-	Unable to break port
		25-Feb-09	4	7	6.4	0.6	A	600.4	600.4	600.4	23:54	1:11	2.5	7.4	2.44	31.4	6	1.64	3	8	22	10	-	-	25	Max Volume
		09-Nov-08	3	8.5	7.5	1	A	300.2	300.2	300.2	17:11	18:19	0.7	5.1	8	33.1	1	1.67	-	-	-	-	-	-	-	
		09-Nov-08	2	11.15	8.5	2.65	A	34.9	34.9	13.2	16:04	16:30	3.6	0.4	0.04	33.8	1	1.67	-	-	-	-	-	-	-	
		23-Oct-08	1	18.15	11.15	7	A	70.3	70.3	10.0	21:35	22:10	4.8	0.5	0.015	30.0	2	1.61	25	12	12	11	-	-	23	
60+609.5	T	18-Mar-09	4	7.23	6.63	0.6	MF	67.0	67.0	67.0	15:36	16:13	1.5	0.3	0.2	-	-	-	-	-	-	-	-	-	-	
		28-Jan-09	3	8.5	7.5	1	A	129.1	129.1	129.1	2:30	3:10	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		28-Jan-09	2	13	8.5	4.5	A	19.7	19.7	4.4	1:58	2:21	2.9	0.5	0.04	32.8	2	8.00	15	14	22	5	-	-	19	
60+611	S	25-Feb-09	4	6.82	6.22	0.6	A	177.3	177.3	177.3	1:27	2:01	2.1	14.3	5.95	32.2	3	1.64	4	8	20	9	-	-	20	Communicate to 60+608
		15-Jan-09	3	8.1	7.1	1	A	9.5	9.5	9.5	22:44	23:03	3.0	0	0.1	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	2	12.6	8.1	4.5	A	3.0	3.0	0.7	22:24	22:37	2.9	0	0	34.3	2	1.64	5	17	-	14	-	-	-	
60+612.5	T	14-Mar-09	4	7	6.4	0.6	MF	36.2	36.2	36.2	8:38	9:06	1.4	0.9	0.32	-	-	-	-	-	-	-	-	-	-	
		28-Jan-09	3	8.4	7.4	1	A	601.7	601.7	601.7	21:57	23:06	1.7	10.4	6.3	32.2	2	5.00	8	10	13	-14	-	-	13	Max Volume
		28-Jan-09	2	10.9	8.4	2.5	A	4.8	4.8	1.9	21:36	21:49	3.2	0	0	-	-	-	-	-	-	-	-	-	-	
60+614	P	21-Nov-08	5	7.38	6.38	1	A	0.6	-	-	11:11	11:16	21.0	0	0	32.6	-	-	-	-	-	-	-	-	-	Unable to break port
		21-Nov-08	5	7.38	6.38	1	A	794.8	795.4	795.4	15:22	17:06	2.4	10.4	4.3	32.6	-	1.62	-	-	-	-	-	-	-	Re-attempt, successful
		21-Nov-08	4	7.38	6.38	1	A	5.1	-	-	10:44	10:51	21.0	0	0	38.0	-	-	18	9	-	19	-	-	-	Unable to break port
		21-Nov-08	4	7.38	6.38	1	A	0.7	-	-	15:13	15:16	19.0	0	0	32.7	3	-	-	-	-	-	-	-	24	Re-attempt, unsuccessful
		21-Nov-08	4	7.38	6.38	1	A	2.0	7.8	7.8	17:20	17:23	20.0	0	0	-	-	-	-	-	-	-	-	-	-	Re-attempt, unsuccessful
		21-Nov-08	3	8.38	7.38	1	A	0.5	0.5	0.5	09:40	09:50	9.9	0	0	32.9	-	-	-	-	13	-	-	-	21	
		21-Nov-08	2	10.82	8.38	2.44	A	42.3	42.3	17.3	17:58	18:08	3.5	0	0	34.1	-	-	-	-	-	-	-	-	21	
		30-Oct-08	1	17.82	10.82	7	A	45.9	45.9	6.6	07:25	08:25	5.0	0	0	31.0	3	1.62	-	-	-	-	-	-	17	
60+615.5	T	14-Mar-09	4	6.89	6.29	0.6	MF	31.0	31.0	31.0	9:12	9:38	1.5	0.4	0.35	-	-	-	-	-	-	-	-	-	-	
		28-Jan-09	3	8.3	7.3	1	A	601.8	601.8	601.8	20:10	21:10	1.1	0	0.01	-	-	-	-	-	-	-	-	-	-	Max Volume
		28-Jan-09	2	12.8	8.3	4.5	A	13.3	13.3	3.0	19:49	20:02	3.1	0.7	0.05	-	-	-	-	-	-	-	-	-	-	
60+617	S	25-Feb-09	4	6.89	6.29	0.6	A	357.2	357.2	357.2	2:25	3:47	2.5	0.2	0.07	31.9	3	1.63	4	9	19	10	-	-	22	
		15-Jan-09	3	8.2	7.2	1	A	600.4	600.4	600.4	20:41	21:44	1.6	10.1	8	37.8	4	1.64	-	-	-	-	-	-	19	Max volume
		15-Jan-09	2	12.7	8.2	4.5	A	2.6	2.6	0.6	20:25	20:36	2.9	0	0	33.6	-	1.64	15	8	-	11	-	-	15	
60+618.5	T	14-Mar-09	4	7.05	6.45	0.6	MF	74.7	74.7	74.7	9:50	10:09	1.8	0.9	0.51	31.5	2	1.42	17	9	26	-	-	-	17	
		28-Jan-09	3	8.2	7.2	1	A	470.0	-	-	11:09	11:50	0.0	15	inf	-	-	-	-	-	-	-	-	-	-	
		28-Jan-09	3	8.2	7.2	1	B	190.7	660.7	660.7	11:50	12:03	0.0	9.7	inf	38.0	4	1.65	2	6	-	12	-	-	15	Max Volume
		28-Jan-09	2	10.7	8.2	2.5	A	15.0	15.0	6.0	10:44	11:01	2.7	0.3	0.04	-	-	-	-	-	-	-	-	-	-	
		28-Jan-09	1	17.7	10.7	7	A	2.3	2.3	0.3	10:21	10:34	5.0	0	0	33.0	4	1.63	2	6	-	13	-	-	17	
60+620	P	09-Nov-08	5	7.94	6.94	1	A	0.3	-	-	3:45	4:00	11.5	0	0	-	-	-	-	-	-	-	-	-	-	Unable to break port
		22-Nov-08	5	7.94	6.94	1	A	0.4	0.7	0.7	15:24	15:26	14.0	0	0	31.1	4	1.56	-	-	-	-	-	-	21	Unable to break port
		09-Nov-08	4	7.94	6.94	1	A	0.3	-	-	3:25	3:30	11.3	0	0	30.0	-	1.66	-	-	-	-	-	-	-	Unable to break port
		22-Nov-08	4	7.94	6.94	1	A	0.5	0.8	0.8	15:05	15:12	13.3	0	0	32.0	2	1.67	23	12	12	15	-	-	22	Unable to break port
		25-Feb-09	4	7.45	6.85	0.6	A	55.2	55.2	55.2	4:02	4:44	2.5	0.1	0.02	-	-	-	-	-	-	-	-	-	-	
		09-Nov-08	3	8.94	7.94	1	A	9.9	9.9	9.9	23:10	23:30	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		09-Nov-08	2	12.38	8.94	3.44	A	65.7	65.7	19.1	22:00	22:30	3.5	0.7	0.01	31.0	3	1.65	-	-	-	-	-	-	-	
		24-Oct-08	1	19.38	12.38	7	A	3.4	3.4	0.5	21:15	21:33	5.0	0.1	0.001	31.0	-	1.67	25	13	12	9	-	-	24	
60+620.75	Q	22-Feb-09	3	8.9	7.9	1	A	601.1	601.1	601.1	15:07	16:06	1.6	10.2	6.28	-	-	-	-	-	-	-	-	-	-	Max Volume
		22-Feb-09	2	13.4	8.9	4.5	A	16.3	16.3	3.6	14:37	14:53	3.9	0.3	0.02	31.0	4	1.62	17	14	14	16	-	-	20	
60+621.5	T	14-Mar-09	4	7.48	6.88	0.6	MF	58.1	58.1	58.1	10:36	11:11	1.6	0.6	0.37	-	-	-	-	-	-	-	-	-	-	
		28-Jan-09	3	8.4	7.4	1	A	615.9	615.9	615.9	18:11	19:25	1.8	10	5.48	33.5	2	4.00	9	16	17	13	-	-	14	Max Volume
		28-Jan-09	2	10.9	8.4	2.5	A	540.0	-	-	16:26	17:27	2.5	10.5	1.43	-	-	-	-	-	-	-	-	-	-	
		28-Jan-09	2	10.9	8.4	2.5	B	260.0	800.0	320.0	17:27	18:00	2.2	10.4	1.59	9.0	6	1.54	-1	9	-	-	-	-	18	Max Volume
		01-Feb-09	1	17.9	10.9	7	A	30.7	30.7	4.4	10:21	10:41	5.3	0	0	-	-	-	-	-	-	-	-	-	-	
60+622.25	Q	22-Feb-09	3	8.5	7.5	1	A	601.7	601.7	601.7	16:56	17:59	2.5	10.3	4.22	-	-	-	-	-	-	-	-	-	-	Max Volume
		22-Feb-09	2	13	8.5	4.5	A	2.6	2.6	0.6	16:24	16:39	4.4	0	0	32.0	2	1.64	4	13	20	15	-	-	18	
60+623	S	25-Feb-09	4	8.09	7.49	0.6	A	47.3	47.3	47.3	5:57	6:28	2.4	0	0.01	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	3	9.4	8.4	1	A	69.3	69.3	69.3	10:49	11:34	3.2	0.2	0.05	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	2	13.9	9.4	4.5	A	5.4	5.4	1.2	9:49	10:38	2.9	0	0	32.5	-	1.65	15	9	8	13	-	-	16	

Check: GRB

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

Hole	Order (P, S, T, Q)	Date	Stage #	Stage From	Stage To	Stage Length	Take Mix	Take Volume	Take V_{TOTAL}	Take	Duration Start	Duration End	Termination P_{FINAL}	Termination Q_{FINAL}	Termination Penetrab	QA Marsh	QA Bleed	QA Specific Gravity	Temp. Cement	Temp. Water	Temp. Ambient	Temp. Glenium	Temp. Pozzutec	Temp. Bentonite	Temp. Mix	Comments
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+624.5	T	14-Mar-09	4	8.06	7.46	0.6	MF	1.9	1.9	1.9	14:59	15:06	2.0	0	0	-	-	-	-	-	-	-	-	-	-	
		28-Jan-09	3	9.4	8.4	1	A	90.6	-	-	14:38	14:55	1.8	9.1	5.23	-	-	-	-	-	-	-	-	-	-	By-Pass
		28-Jan-09	3	9.4	8.4	1	A	604.1	694.7	694.7	14:58	16:08	3.7	9.82	13.25	-	-	-	-	-	-	-	-	-	-	Max Volume
		28-Jan-09	2	13.9	9.4	4.5	A	10.0	10.0	2.2	14:12	14:27	3.0	0	0	37.6	6	1.60	2	8	-	18	-	-	17	
60+626	P	20-Nov-08	5	8	7	1	A	109.7	109.7	109.7	08:39	09:17	9.0	0.01	0.001	32.2	5	-	15	15	12	15	-	-	24	Injection via port
		20-Nov-08	4	8	7	1	A	0.0	0.0	0.0	08:10	08:13	16.0	0	0	32.8	-	1.63	10	15	12	15	-	-	19	Unable to break port
		26-Feb-09	4	7.5	6.9	0.6	A	494.8	494.8	494.8	13:32	14:59	2.5	0	0	32.0	5	1.63	2	17	14	18	-	-	21	
		20-Nov-08	3	9	8	1	A	2.0	2.0	2.0	05:34	05:55	9.9	0	0	35.4	-	-	22	11	11	19	-	-	-	
		20-Nov-08	2	11.3	9	2.3	A	7.8	7.8	3.4	09:43	09:51	3.7	0	0	32.2	-	-	-	-	11	-	-	-	20	
		30-Oct-08	1	18.3	11.3	7	A	47.6	47.6	6.8	08:28	09:10	5.0	0	0	31.0	-	-	-	-	-	-	-	-	-	
60+627.5	T	14-Mar-09	4	7.25	6.65	0.6	MF	136.9	136.9	136.9	15:17	16:11	1.5	0.9	0.99	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	3	8.7	7.7	1	A	601.4	601.4	601.4	4:05	5:10	1.6	10.7	6.61	-	-	-	-	-	-	-	-	-	-	Max Volume
		27-Jan-09	2	13.2	8.7	4.5	A	3.9	3.9	0.9	3:45	3:57	3.2	0	0	-	-	-	-	-	-	-	-	-	-	
60+629	S	15-Feb-09	4, 5	7.7	6.7	1	A	164.7	164.7	164.7	11:01	11:26	2.4	0	0.01	-	-	-	-	-	-	-	-	-	-	Port injection
		26-Feb-09	4	7.3	6.7	0.6	A	1.0	1.0	1.0	15:13	15:24	2.3	0.1	0.03	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	3	8.7	7.7	1	A	479.6	-	-	8:15	9:10	1.1	10.6	10.56	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	3	8.7	7.7	1	B	150.1	629.7	629.7	9:10	9:27	1.3	9.2	6.88	36.4	-	1.64	18	10	3	-	-	-	19	Max volume
		15-Jan-09	2	13.2	8.7	4.5	A	365.1	365.1	81.1	6:58	8:05	3.3	0	0	35.0	-	1.64	21	8	8	17	-	-	29	
60+630.5	T	14-Mar-09	4	7.43	6.83	0.6	MF	153.8	153.8	153.8	16:24	17:25	1.5	0.5	0.59	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	3	8.6	7.6	1	A	11.0	11.0	11.0	8:27	9:07	3.1	0	0.01	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	2	13.1	8.6	4.5	A	13.3	13.3	3.0	8:03	8:20	3.2	0	0	-	-	-	-	-	-	-	-	-	-	
60+632	P	10-Nov-08	5	7.86	6.86	1	A	0.0	0.0	0.0	10:47	12:00	12.0	0	0	-	-	-	-	-	-	-	-	-	-	Unable to break port
		10-Nov-08	4	7.86	6.86	1	A	0.0	0.0	0.0	10:47	12:00	12.0	0	0	-	-	-	-	-	-	-	-	-	-	Unable to break port
		26-Feb-09	4	7.86	6.86	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Hole was not perforated due to
		10-Nov-08	3	8.86	7.86	1	A	366.0	366.0	366.0	08:51	10:08	0.4	0	0	31.0	2	1.66	-	-	-	-	-	-	-	crooked casing.
		10-Nov-08	2	11.25	8.86	2.39	A	121.0	121.0	50.6	07:40	08:31	3.5	0	0	30.9	2	1.66	-	-	-	-	-	-	-	
		24-Oct-08	1	18.25	11.25	7	A	11.7	11.7	1.7	02:25	02:40	5.5	0.3	0.007	32.0	-	-	20	13	11	14	-	-	22	
60+633.5	T	15-Mar-09	4	7.94	7.34	0.6	MF	83.6	83.6	83.6	7:13	8:00	1.6	0.6	0.36	32.0	1	1.42	16	7	23	-	-	-	18	
		27-Jan-09	3	9.5	8.5	1	A	16.5	16.5	16.5	7:21	7:53	2.4	0	0	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	2	14	9.5	4.5	A	5.0	5.0	1.1	6:58	7:13	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
60+635	S	15-Feb-09	4, 5	8.3	7.3	1	A	601.3	601.3	601.3	13:10	14:11	1.9	9.7	4.98	32.0	5	1.65	19	12	17	16	-	-	19	Port injection. Max Volume
		15-Jan-09	3	9.3	8.3	1	A	8.2	8.2	8.2	6:10	6:27	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		15-Jan-09	2	13.8	9.3	4.5	A	2.3	2.3	0.5	5:51	6:03	3.3	0.018	0.001	32.9	-	1.65	10	6	-	12	-	-	14	
60+636.5	T	27-Jan-09	3	9.5	8.5	1	A	67.8	67.8	67.8	2:48	3:24	3.3	0	0	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	2	14	9.5	4.5	A	7.4	7.4	1.6	2:20	2:33	2.9	0	0	32.4	6	1.65	4	14	16	17	-	-	19	
60+638	P	19-Nov-08	5	8.16	7.16	1	A	801.0	801.0	801.0	03:56	06:45	3.1	3.2	1.04	32.3	-	-	-	-	14	-	-	-	21	Port Injection
		19-Nov-08	4	8.16	7.16	1	A	6.8	6.8	6.8	03:27	03:46	9.4	0	0	32.8	4	1.62	12	7	17	12	-	-	19	Unable to break port
		20-Nov-08	3	9.16	8.16	1	A	602.9	602.9	602.9	07:54	09:36	7.2	7.3	0.9	33.3	4	1.66	20	10	12	15	-	-	23	
		20-Nov-08	2	11.59	9.16	2.43	A	61.8	61.8	25.4	07:11	07:39	3.2	0	0	32.4	2	1.64	14	11	-	10	-	-	24	
		30-Oct-08	1	18.59	11.59	7	A	64.6	64.6	9.2	11:20	00:12	5.0	0	0	30.0	-	-	-	-	-	-	-	-	-	
60+639.5	T	15-Mar-09	4	7.5	6.9	0.6	MF	40.2	40.2	40.2	8:56	9:32	1.5	0.5	0.59	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	3	8.9	7.9	1	A	4.6	4.6	4.6	23:25	23:47	2.8	0	0.01	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	2	13.4	8.9	4.5	A	25.4	25.4	5.6	22:54	23:14	2.7	0	0	-	-	-	-	-	-	-	-	-	-	
60+641	S	15-Feb-09	4, 5	7.9	6.9	1	A	602.2	602.2	602.2	9:10	8:16	1.8	9.22	5.1	-	-	-	-	-	-	-	-	-	-	Port injection. Max Volume
		14-Jan-09	3	8.9	7.9	1	A	390.0	-	-	12:55	1:39	-	-	-	-	-	-	-	-	-	-	-	-	-	
		14-Jan-09	3	8.9	7.9	1	B	440.0	830.0	830.0	1:39	2:02	1.3	9.7	0	37.2	-	1.65	6	5	-	-	-	-	15	Max volume
		14-Jan-09	2	13.4	8.9	4.5	A	4.8	4.8	1.1	12:35	12:49	2.9	0.2	0	-	-	-	-	-	-	-	-	-	-	
60+642.5	T	18-Mar-09	4	7.71	7.11	0.6	MF	95.8	95.8	95.8	13:13	13:36	1.5	0.2	0.14	30.0	2	1.40	16	10	18	-	-	-	20	
		27-Jan-09	3	9	8	1	A	601.0	601.0	601.0	14:52	16:05	0.8	0.8	0.9	-	-	-	-	-	-	-	-	-	-	Max Volume
		27-Jan-09	2	11.5	9	2.5	A	32.6	32.6	13.0	14:20	14:45	2.6	0	0	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	1	18.5	11.5	7	A	3.6	3.6	0.5	13:49	14:12	4.5	0	0	33.0	5	1.63	4	7	-	12	-	-	20	

Check: GRB

Golder Associates

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+644	P	21-Nov-08	5	8.26	7.26	1	A	526.8	526.8	526.8	02:04	04:01	5.5	0	0	32.3	8	-	17	10	9	15	-	-	20	Port Injection
		10-Nov-08	4	8.26	7.26	1	A	0.0	-	-	17:24	17:51	12.0	0	0	-	-	-	-	-	-	-	-	-	-	Unable to break port
		21-Nov-08	4	8.26	7.26	1	A	0.3	0.3	0.3	01:45	01:50	20.4	0	0	31.7	9	1.65	19	14	14	15	-	-	22	Unable to break port
		10-Nov-08	3	9.26	8.26	1	A	301.0	301.0	301.0	15:27	16:35	0.6	5.1	10	31.5	-	1.67	-	-	-	-	-	-	-	
		10-Nov-08	2	10.95	9.26	1.69	A	31.3	31.3	18.5	14:29	14:50	3.5	0	0	31.5	-	1.67	-	-	-	-	-	-	-	
		25-Oct-08	1	17.95	10.95	7	A	14.7	14.7	2.1	01:04	01:27	5.3	0.2	0.005	31.0	2	1.62	16	8	11	3	-	-	18	
60+645.5	T	15-Mar-09	4	7.94	7.34	0.6	MF	2.0	2.0	2.0	9:42	9:58	2.0	0.2	0.02	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	3	9.1	8.1	1	A	65.3	65.3	65.3	21:26	22:23	2.7	0.1	0.04	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	2	13.6	9.1	4.5	A	25.5	25.5	5.7	20:54	21:15	3.2	0.3	0.02	-	-	-	-	-	-	-	-	-	-	
60+647	S	26-Feb-09	4	7.99	7.39	0.6	A	201.9	201.9	201.9	16:57	17:37	2.5	0	0	31.9	4	1.61	6	14	15	15	-	-	16	
		14-Jan-09	3	9.3	8.3	1	A	602.1	602.1	602.1	23:14	0:17	2.1	0.2	0	-	-	-	-	-	-	-	-	-	-	Max volume
		14-Jan-09	2	13.8	9.3	4.5	A	5.3	5.3	1.2	22:56	23:10	3.2	0	0	32.8	-	1.66	-	-	-	-	-	-	16	
60+647.75	Q	23-Feb-09	3	9.3	8.3	1	A	600.5	600.5	600.5	10:17	11:21	3.0	10.8	7.05	33.6	6	1.66	-	18	23	27	-	-	23	Max Volume
		23-Feb-09	2	11.8	9.3	2.5	A	7.4	7.4	3.0	9:57	10:10	2.6	0	0	-	-	-	-	-	-	-	-	-	-	
		23-Feb-09	1	18.8	11.8	7	A	5.2	5.2	0.7	9:36	9:47	5.0	0	0	32.0	5	1.63	15	15	-	20	-	-	20	
60+648.5	T	15-Mar-09	4	8.37	7.77	0.6	MF	0.6	0.6	0.6	10:10	10:30	1.6	0	0.03	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	3	9.7	8.7	1	A	603.4	603.4	603.4	19:25	20:33	2.8	10.9	3.9	32.6	2	1.64	-12	15	19	11	-	-	14	Max Volume
		27-Jan-09	2	14.2	9.7	4.5	A	684.0	-	-	16:27	17:53	-	-	-	32.2	5	1.63	16	12	16	12	-	-	20	
		27-Jan-09	2	14.2	9.7	4.5	B	666.0	1350.0	300.0	17:54	19:05	2.2	9	1.03	-	-	-	-	-	-	-	-	-	-	Max Volume
		01-Feb-09	1	19.2	14.2	5	A	22.6	22.6	4.5	9:04	9:24	1.7	0	0	32.2	-	1.60	0	9	-	13	-	-	16	
60+649.25	Q	23-Feb-09	3	8.7	7.7	1	A	2.7	2.7	2.7	15:24	15:37	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		23-Feb-09	2	11.2	8.7	2.5	A	750.9	750.9	300.4	13:49	15:17	2.6	10.3	1.67	-	-	-	-	-	-	-	-	-	-	Max Volume
		23-Feb-09	1	18.2	11.2	7	A	5.8	5.8	0.8	13:30	13:42	5.0	0	0	30.0	7	1.62	-5	14	17	11	-	-	19	
60+650	P	20-Nov-08	5	8.45	7.45	1	A	802.0	802.0	802.0	11:35	13:44	4.2	8.9	2.2	33.2	0	1.63	11	10	-	13	-	-	-	Port Injection
		20-Nov-08	4	8.45	7.45	1	A	0.0	0.0	0.0	10:53	11:10	17.0	0	0	-	-	-	-	-	-	-	-	-	-	Unable to break port
		20-Nov-08	3	9.45	8.45	1	A	58.8	58.8	58.8	14:54	15:32	7.0	0	0.17	-	-	-	-	-	-	-	-	-	-	By-Pass
		20-Nov-08	2	11.84	9.45	2.39	A	55.7	55.7	23.3	14:06	14:33	3.6	0	0	32.9	-	-	-	-	-	-	-	-	-	
		30-Oct-08	1	18.84	11.84	7	A	49.6	49.6	7.1	10:15	11:00	5.0	0	0	31.0	4	1.62	-	-	-	-	-	-	16	
60+651.5	T	15-Mar-09	4	7.96	7.36	0.6	MF	0.9	0.9	0.9	10:40	10:52	1.9	0	0.01	-	-	-	-	-	-	-	-	-	-	
		27-Jan-09	3	9.5	8.5	1	A	600.4	600.4	600.4	5:00	6:22	2.6	7.2	2.99	-	-	-	-	-	-	-	-	-	-	Max Volume
		26-Jan-09	2	14	9.5	4.5	A	4.1	4.1	0.9	4:35	4:47	4.2	0.9	0.05	32.6	-	1.64	-4	12	14	13	-	-	13	
60+653	S	26-Feb-09	4	7.81	7.21	0.6	A	305.0	305.0	305.0	17:52	18:48	2.5	0	0	33.7	5	1.56	10	13	15	18	-	-	17	
		14-Jan-09	3	9.3	8.3	1	A	450.0	-	-	21:18	22:07	-	-	-	-	-	-	-	-	-	-	-	-	-	
		14-Jan-09	3	9.3	8.3	1	B	152.4	602.4	602.4	22:07	22:25	1.3	10.4	8.2	37.8	-	1.65	-	-	-	-	-	-	15	Max volume
		14-Jan-09	2	13.8	9.3	4.5	A	8.6	8.6	1.9	21:01	21:13	3.1	0	0	33.0	-	1.65	9	6	-	14	-	-	13	
60+654.5	T	15-Mar-09	4	7.81	7.21	0.6	MF	112.0	112.0	112.0	13:35	14:37	1.4	0	0.01	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	3	9.2	8.2	1	A	625.7	625.7	625.7	17:35	18:57	1.3	5.9	4.59	-	-	-	-	-	-	-	-	-	-	Max Volume
		26-Jan-09	2	13.7	9.2	4.5	A	23.8	23.8	5.3	17:07	17:28	2.8	0	0	-	-	-	-	-	-	-	-	-	-	
60+656	P	10-Nov-08	5	8.13	7.13	1	A	9.8	-	-	23:25	23:32	12.5	0.1	0.04	31.0	0	1.62	-	-	-	-	-	-	-	Unable to break port
		11-Nov-08	5	8.13	7.13	1	A	1.3	-	-	21:03	21:24	15.1	0	0	-	-	-	-	-	-	-	-	-	-	Unable to break port
		22-Nov-08	5	8.13	7.13	1	A	0.4	11.5	11.5	10:06	10:07	15.0	0	0	30.9	2	1.56	-	-	12	-	-	-	24	Unable to break port
		10-Nov-08	4	8.13	7.13	1	A	2.3	-	-	23:09	23:20	12.4	-	-	-	-	-	-	-	-	-	-	-	-	Unable to break port
		11-Nov-08	4	8.13	7.13	1	A	8.7	-	-	20:34	20:48	11.8	0.2	0	40.0	-	-	-	-	-	-	-	-	-	Unable to break port
		22-Nov-08	4	8.13	7.13	1	A	1.9	12.9	12.9	09:37	09:41	14.3	0	0	32.3	2	1.63	15	10	13	15	-	-	24	Unable to break port
		26-Feb-09	4	7.61	7.01	0.6	A	145.8	145.8	145.8	19:26	20:12	2.2	0	0.01	32.1	3	1.62	8	12	18	17	-	-	19	
		10-Nov-08	3	9.13	8.13	1	A	314.0	314.0	314.0	21:25	22:34	0.7	2.3	2.36	33.0	1	1.60	-	-	-	-	-	-	-	
		10-Nov-08	2	11.59	9.13	2.46	A	28.9	28.9	11.7	20:50	21:00	3.5	0.2	0	-	-	-	-	-	-	-	-	-	-	
		25-Oct-08	1	18.59	11.59	7	A	32.8	32.8	4.7	01:42	02:10	5.8	0.4	0.01	-	-	-	-	-	-	-	-	-	-	
60+657.5	T	15-Mar-09	4	7.83	7.23	0.6	MF	35.0	35.0	35.0	14:55	15:07	1.6	0	0.01	32.0	1	1.40	17	7	26	-	-	-	19	
		26-Jan-09	3	9.2	8.2	1	A	22.8	22.8	22.8	16:20	16:44	2.9	0.7	0.23	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	2	13.7	9.2	4.5	A	86.5	86.5	19.2	15:30	16:14	0.8	0.8	0.05	-	-	-	-	-	-	-	-	-	-	
60+659	S	26-Feb-09	4	7.91	7.31	0.6	A	347.2	347.2	347.2	20:27	22:40	2.5	0	0	32.4	3	1.63	10	11	19	18	-	-	21	
		14-Jan-09	3	9.3	8.3	1	A	6.0	6.0	6.0	12:33	13:09	3.1	0.009	0.003	-	-	-	-	-	-	-	-	-	-	
		14-Jan-09	2	13.8	9.3	4.5	A	422.2	422.2	93.8	10:57	12:32	3.4	1.1	0.08	-	-	-	-	-	-	-	-	-	-	

Check: GRB

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
	(P, S, T, Q)		Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+660.5	T	15-Mar-09	4	7.35	6.75	0.6	MF	62.6	62.6	62.6	15:20	16:03	1.7	0.4	0.49	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	3	8.6	7.6	1	A	23.6	23.6	23.6	13:18	13:43	3.1	0.1	0.04	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	2	13.1	8.6	4.5	A	375.8	375.8	83.5	11:24	13:08	1.9	6	0.09	33.7	4	1.60	7	14	15	19	-	-	14	
60+662	P	19-Nov-08	5	8.1	7.1	1	A	789.2	789.2	789.2	08:31	11:21	2.7	10.9	4.04	32.0	2	1.63	6	10	16	12	-	-	20	Port Injection
		19-Nov-08	4	8.1	7.1	1	A	39.5	39.5	39.5	09:00	09:24	7.7	0	0	32.2	1	1.62	10	6	16	13	-	-	20	Port Injection
		19-Nov-08	3	9.1	8.1	1	A	631.2	631.2	631.2	17:32	19:32	1.1	5.3	4.2	32.3	6	1.65	19	15	13	14	-	-	22	
		19-Nov-08	2	11.48	9.1	2.38	A	53.9	53.9	22.6	16:47	17:22	3.5	0	0	30.6	4	1.63	17	-	13	14	-	-	22	
		31-Oct-08	1	18.48	11.48	7	A	84.6	84.6	12.1	07:55	08:35	4.9	0.2	0	31.0	4	1.62	-	-	-	-	-	-	14	
60+663.5	T	15-Mar-09	4	7.45	6.85	0.6	MF	122.4	122.4	122.4	16:14	17:01	1.4	0.7	0.9	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	3	8.6	7.6	1	A	610.2	610.2	610.2	13:56	15:10	2.2	30.9	14.29	35.5	7	1.65	3	15	-	17	-	-	17	Max Volume
		26-Jan-09	2	11.1	8.6	2.5	A	3.9	3.9	1.6	9:58	10:10	2.6	0.2	0.03	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	1	18.1	11.1	7	A	60.6	60.6	8.7	9:32	9:48	4.7	0.2	0.01	-	-	-	-	-	-	-	-	-	-	
60+665	S	15-Feb-09	4, 5	7.8	6.8	1	A	410.0	-	-	21:36	22:22	1.7	10.2	6.88	32.0	3	1.68	3	19	18	18	-	-	21	
		15-Feb-09	4, 5	7.8	6.8	1	B	191.8	601.8	601.8	22:22	22:46	2.1	10.6	4.62	36.0	4	1.63	4	20	19	-	-	-	22	Port Injection. Max Volume
		14-Jan-09	3	8.8	7.8	1	A	11.9	11.9	11.9	10:09	10:25	3.0	0.2	0.06	37.0	3	1.64	4	5	-	12	-	-	10	
		14-Jan-09	2	13.3	8.8	4.5	A	750.0	-	-	5:27	6:40	-	-	-	33.0	3	1.66	-7	3	-	11	-	-	10	
		14-Jan-09	2	13.3	8.8	4.5	B	600.0	1350.0	300.0	6:40	9:42	2.9	3.3	0.25	37.0	5	1.59	4	5	-	10	-	-	13	Max volume
60+666.5	T	16-Mar-09	4	7.96	7.36	0.6	MF	0.7	0.7	0.7	7:08	7:32	1.2	0	0	32.0	3	1.39	17	8	20	-	-	-	19	
		26-Jan-09	3	9.3	8.3	1	A	3.8	3.8	3.8	0:48	1:06	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	2	11.8	9.3	2.5	A	3.1	3.1	1.2	0:24	0:39	3.0	0	0	33.1	5	1.63	18	14	9	14	-	-	18	
		26-Jan-09	1	18.8	11.8	7	A	40.7	40.7	5.8	22:43	23:02	4.8	0	0	32.8	3	1.65	13	14	17	14	-	-	15	
60+668	P	10-Nov-08	5	8.6	7.6	1	A	215.2	215.2	215.2	05:35	06:30	2.5	0	0	31.0	3	1.61	-	-	-	-	-	-	-	Port Injection
		10-Nov-08	4	8.6	7.6	1	A	138.5	138.5	138.5	04:38	05:27	2.4	0	0	31.0	3	-	-	-	-	-	-	-	17	Port Injection
		10-Nov-08	3	9.6	8.6	1	A	310.6	310.6	310.6	03:15	04:16	0.8	5.1	0	30.0	2	1.61	-	-	-	-	-	-	18	
		10-Nov-08	2	12	9.6	2.4	A	9.8	9.8	4.1	02:45	03:55	3.4	0	0	30.0	6	1.62	24	15	13	24	-	-	-	
		25-Oct-08	1	19	12	7	A	74.7	74.7	10.7	03:58	04:47	5.1	0.2	0.006	31.0	-	1.62	15	3	11	4	-	-	13	
60+669.5	T	14-Mar-09	4	7.91	7.31	0.6	MF	115.4	-	-	16:05	17:05	1.3	0.8	0.6	-	-	-	-	-	-	-	-	-	-	
		16-Mar-09	4	7.91	7.31	0.6	MF	2.3	117.7	117.7	9:00	9:32	1.4	0.1	0.1	-	-	-	-	-	-	-	-	-	-	
		25-Jan-09	3	9.3	8.3	1	A	19.9	19.9	19.9	5:00	5:20	3.8	0.2	0.05	-	-	-	-	-	-	-	-	-	-	
		25-Jan-09	2	11.8	9.3	2.5	A	24.2	24.2	9.7	2:36	2:57	3.1	0.1	0.01	-	-	-	-	-	-	-	-	-	-	
		25-Jan-09	1	18.8	11.8	7	A	21.4	21.4	3.1	2:00	2:15	5.0	0.4	0.01	33.2	7	1.64	-13	13	15	15	-	-	15	
60+671	S	15-Feb-09	4, 5	8.1	7.1	1	A	480.0	-	-	0:56	2:10	2.5	10.9	3.63	32.6	3	-	13	9	18	18	-	-	17	
		15-Feb-09	4, 5	8.1	7.1	1	B	120.1	600.1	600.1	2:10	2:23	2.5	7.6	2.73	35.6	2	1.65	11	7	20	-	-	-	19	Port Injection. Max Volume
		14-Jan-09	3	9.1	8.1	1	A	400.5	-	-	16:54	17:40	1.1	10.32	8.49	-	-	-	-	-	-	-	-	-	-	
		14-Jan-09	3	9.1	8.1	1	B	199.9	600.4	600.4	17:40	18:03	1.9	9.5	5.02	39.0	4	1.67	8	6	-	-	-	-	14	Max volume
		14-Jan-09	2	13.6	9.1	4.5	A	424.0	-	-	13:37	14:28	3.1	10.7	0.79	-	-	-	-	-	-	-	-	-	-	
		14-Jan-09	2	13.6	9.1	4.5	B	521.0	945.0	210.0	14:28	16:43	3.3	0.9	0.06	33.0	4	1.64	8	5	-	16	-	-	13	Max Volume
60+672.5	T	14-Mar-09	4	7.73	7.13	0.6	MF	23.6	-	-	15:30	15:53	1.3	0.3	0.2	-	-	-	-	-	-	-	-	-	-	
		16-Mar-09	4	7.73	7.13	0.6	MF	1.3	24.9	24.9	9:48	10:03	1.3	0	0.02	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	3	9.1	8.1	1	A	600.9	600.9	600.9	6:21	7:37	1.7	9.7	5.75	-	-	-	-	-	-	-	-	-	-	Max Volume
		26-Jan-09	2	11.6	9.1	2.5	A	5.0	5.0	2.0	6:01	6:13	3.3	0	0.01	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	1	18.6	11.6	7	A	9.5	9.5	1.4	5:37	5:51	5.1	0	0	-	-	-	-	-	-	-	-	-	-	
60+674	P	18-Nov-08	5	7.75	6.75	1	A	0.0	0.0	0.0	01:35	01:43	17.9	0	0	32.4	7	1.61	20	5	12	13	-	-	19	Unable to break port
		18-Nov-08	4	7.75	6.75	1	A	34.7	34.7	34.7	08:17	08:41	8.9	0	0	32.1	9	1.62	20	6	13	10	-	-	20	Port Injection
		18-Nov-08	1, 2, 3	18.17	7.75	10.42	A	830.0	830.0	79.7	02:07	04:49	0.4	5.4	1.26	33.0	-	-	-	-	12	-	-	-	-	2 rods in hole; grouted in
60+675.5	T	14-Mar-09	4	7.61	7.01	0.6	MF	44.7	-	-	14:39	15:07	1.8	0.2	0.16	-	-	-	-	-	-	-	-	-	-	
		16-Mar-09	4	7.61	7.01	0.6	MF	0.3	45.0	45.0	10:26	10:44	1.5	0	0.03	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	3	9	8	1	A	40.3	40.3	40.3	8:18	9:04	2.6	0	0.01	-	-	-	-	-	-	-	-	-	-	
		26-Jan-09	2	13.5	9	4.5	A	3.7	3.7	0.8	7:58	8:11	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
60+677	S	15-Feb-09	4, 5	8.1	7.1	1	A	430.0	-	-	3:24	4:20	2.0	10.9	4.67	31.0	5	1.62	12	9	19	19	-	-	20	
		15-Feb-09	4, 5	8.1	7.1	1	B	201.0	631.0	631.0	4:20	4:35	2.2	11.1	4.55	36.2	-	1.66	12	9	21	-	-	-	22	Port Injection. Max Volume
		11-Jan-09	3	9.1	8.1	1	A	329.7	329.7	329.7	18:22	19:40	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Jan-09	2	13.6	9.1	4.5	A	13.7	13.7	3.0	17:35	18:10	3.1	0.9	0.06	-	-	-	-	-	-	-	-	-	-	

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date (dd-mmm-yy)	Stage: Stage #	Stage: From (m)	Stage: To (m)	Stage: Length (m)	Take: Mix	Take: Volume (L)	Take: V_{TOTAL} (L)	Take: Take (L/m)	Duration: Start (hh:mm)	Duration: End (hh:mm)	Termination: P_{FINAL} (bar)	Termination: Q_{FINAL} (L/min/m)	Termination: Penetrab (L/min/m/bar)	QA: Marsh (sec)	QA: Bleed (%)	QA: Specific Gravity	Temperatures: Cement (Celcius)	Temperatures: Water (Celcius)	Temperatures: Ambient (Celcius)	Temperatures: Glenium (Celcius)	Temperatures: Pozzutec (Celcius)	Temperatures: Bentonite (Celcius)	Temperatures: Mix (Celcius)	Comments
60+678.5	T	14-Mar-09	4	7.81	7.21	0.6	MF	4.0	-	-	14:16	14:28	1.7	0.2	0.13	-	-	-	-	-	-	-	-	-	-	
		16-Mar-09	4	7.81	7.21	0.6	MF	0.3	4.3	4.3	10:53	11:11	1.3	0	0.02	-	-	-	-	-	-	-	-	-	-	
		25-Jan-09	3	9.1	8.1	1	A	3.0	3.0	3.0	19:30	19:44	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
		25-Jan-09	2	13.6	9.1	4.5	A	680.0	-	-	16:27	18:05	-	-	-	-	-	-	-	-	-	-	-	-	-	
		25-Jan-09	2	13.6	9.1	4.5	B	203.0	883.0	196.2	18:05	19:04	3.1	0	0	37.2	6	1.66	-18	13	12	10	-	-	20	
60+680	P	11-Nov-08	5	8.47	7.47	1	A	7.9	-	-	03:22	03:23	11.2	0	0	-	-	-	-	-	-	-	-	-	-	Unable to break port
		22-Nov-08	5	8.47	7.47	1	A	0.5	8.4	8.4	09:04	09:10	11.3	0	0	-	-	-	-	-	-	-	-	-	-	Unable to break port
		11-Nov-08	4	8.47	7.47	1	A	1.2	-	-	03:06	03:07	11.7	0	0	-	-	-	-	-	-	-	-	-	-	Unable to break port
		22-Nov-08	4	8.47	7.47	1	A	0.7	1.9	1.9	08:45	08:55	13.3	0	0	31.4	2	-	18	16	9	12	-	-	22	Unable to break port
		26-Feb-09	4	7.63	7.03	0.6	A	331.7	331.7	331.7	2:06	3:20	2.1	0	0	31.9	5	1.63	8	10	18	19	-	-	22	
		11-Nov-08	3	9.47	8.47	1	A	319.8	319.8	319.8	01:40	02:40	0.4	4.9	10	30.0	9	-	-	-	-	-	-	-	21	
		11-Nov-08	2	12.25	9.47	2.78	A	10.7	10.7	3.8	01:05	1:!7	3.5	0	0	30.0	7	1.61	8	20	15	16	-	-	24	
		25-Oct-08	1	19.25	12.25	7	A	117.6	-	-	05:03	06:15	5.0	0.4	0.011	31.0	-	-	10	4	9	4	-	-	15	
		26-Oct-08	1	19.25	12.25	7	A	45.9	163.5	23.4	09:26	10:01	5.2	0.015	0.001	32.0	-	1.66	14	9	10	8	-	-	10	
60+681.5	T	14-Mar-09	4	7.81	7.21	0.6	MF	3.0	-	-	13:54	14:06	1.3	0.2	0.19	32.0	1	1.43	17	9	26	-	-	-	17	
		16-Mar-09	4	7.81	7.21	0.6	MF	5.4	8.4	8.4	13:26	13:46	1.2	0	0.03	31.0	5	1.42	18	8	19	-	-	-	19	
		25-Jan-09	3	9.3	8.3	1	A	22.6	22.6	22.6	15:33	16:10	2.7	0	0.01	32.0	8	1.65	17	16	17	15	-	-	23	
		25-Jan-09	2	13.8	9.3	4.5	A	126.3	126.3	28.1	14:45	15:24	2.6	0.8	0.06	-	-	-	-	-	-	-	-	-	-	
60+683	S	26-Feb-09	4	7.58	6.98	0.6	A	451.9	451.9	451.9	3:36	4:30	2.1	8.2	3.92	32.4	4	1.63	12	9	18	15	-	-	14	Communicate to 60+680
		11-Jan-09	3	8.9	7.9	1	A	400.0	-	-	16:19	16:03	-	-	-	-	-	-	-	-	-	-	-	-	-	
		11-Jan-09	3	8.9	7.9	1	B	230.5	630.5	630.5	16:19	17:32	1.2	9.2	7.82	38.0	-	1.67	4	9	-	-	-	-	15	Max Volume
		11-Jan-09	2	13.4	8.9	4.5	A	143.4	143.4	31.9	15:32	16:11	3.2	0.1	0.01	-	-	-	-	-	-	-	-	-	-	
60+684.5	T	18-Mar-09	4	7.2	6.6	0.6	MF	57.8	57.8	57.8	9:45	10:23	1.5	0.4	0.28	-	-	-	-	-	-	-	-	-	-	
		25-Jan-09	3	8.5	7.5	1	A	602.1	602.1	602.1	10:24	11:36	1.0	9.7	9.6	-	-	-	-	-	-	-	-	-	-	
		25-Jan-09	2	13	8.5	4.5	A	25.4	25.4	5.6	9:54	10:14	2.6	0.3	0.03	-	-	-	-	-	-	-	-	-	-	
60+686	P	17-Nov-08	5	7.84	6.84	1	A	212.0	212.0	212.0	18:17	19:22	6.8	0	0	31.7	4	-	-	-	-	-	-	-	20	Port Injection
		17-Nov-08	4	7.84	6.84	1	A	466.1	466.1	466.1	16:53	17:58	3.2	8.3	2.9	29.5	5	1.62	12	8	14	8	-	-	18	Port Injection
		17-Nov-08	3	8.84	7.84	1	A	610.3	610.3	610.3	10:32	12:31	1.5	6.3	4.3	30.8	4	1.60	5	7	13	13	-	-	20	
		17-Nov-08	2	15.84	8.84	7	A	47.3	47.3	6.8	09:55	10:12	6.9	0.3	0.01	31.5	3	1.61	7	8	32	13	-	-	19	
		01-Nov-08	1	17.58	10.58	7	A	46.5	46.5	6.6	09:55	10:38	4.7	0.02	0.001	31.5	-	1.62	15	10	14	11	-	-	19	
60+686.75	Q	03-Mar-09	3	10.2	9.2	1	A	2.7	2.7	2.7	3:30	3:43	2.9	0.1	0.03	-	-	-	-	-	-	-	-	-	-	
		03-Mar-09	2	14.7	10.2	4.5	A	10.9	10.9	2.4	3:10	3:23	4.1	0.4	0.02	-	-	-	-	-	-	-	-	-	-	
60+687.5	T	16-Mar-09	4	7.3	6.7	0.6	MF	220.5	220.5	220.5	14:34	15:45	1.5	0.8	0.85	-	-	-	-	-	-	-	-	-	-	
		24-Jan-09	3	8.9	7.9	1	A	11.1	11.1	11.1	4:22	4:39	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		24-Jan-09	2	11.4	8.9	2.5	A	359.8	359.8	143.9	1:50	4:14	2.7	1.2	0.08	-	-	-	-	-	-	-	-	-	-	
		24-Jan-09	1	18.4	11.4	7	A	1147.0	1147.0	163.9	22:35	1:40	5.0	3.3	0.09	35.0	5	1.67	8	9	14	-	-	-	12	
60+688.25	Q	03-Mar-09	3	9.7	8.7	1	A	3.1	3.1	3.1	4:34	4:47	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
		03-Mar-09	2	14.2	9.7	4.5	A	6.2	6.2	1.4	4:17	4:30	4.5	0.3	0.02	32.1	2	1.63	2	9	13	14	-	-	20	
60+689	S	26-Feb-09	4	7.78	7.18	0.6	A	604.0	604.0	604.0	5:13	6:21	2.2	8.6	3.97	-	-	-	-	-	-	-	-	-	-	
		11-Jan-09	3	9.4	8.4	1	A	600.5	600.5	600.5	14:13	15:20	0.5	10.9	21.42	-	-	-	-	-	-	-	-	-	-	Max Volume
		11-Jan-09	2	13.9	9.4	4.5	A	44.8	44.8	10.0	13:14	13:37	3.3	0	0	32.7	2	1.64	11	9	-	14	-	-	15	
60+690.5	T	16-Mar-09	4	7.86	7.26	0.6	MF	25.4	25.4	25.4	15:57	16:17	1.1	0.3	0.29	-	-	-	-	-	-	-	-	-	-	
		24-Jan-09	3	9.3	8.3	1	A	4.7	4.7	4.7	5:46	5:55	3.4	0	0	-	-	-	-	-	-	-	-	-	-	
		24-Jan-09	2	13.8	9.3	4.5	A	101.3	101.3	22.5	5:03	5:41	3.2	0.6	0.04	33.4	-	1.62	34	10	12	11	-	-	16	
60+692	P	11-Nov-08	5	7.91	6.91	1	A	9.8	-	-	06:05	06:10	20.0	0	0	-	-	-	-	-	-	-	-	-	-	Unable to break port
		22-Nov-08	5	7.91	6.91	1	A	1.8	11.6	11.6	10:09	10:15	11.6	0	0	-	-	-	-	-	-	-	-	-	-	Unable to break port
		11-Nov-08	4	7.91	6.91	1	A	3.0	-	-	05:52	05:55	13.1	0	0	-	-	-	-	-	-	-	-	-	-	Unable to break port
		22-Nov-08	4	7.91	6.91	1	A	0.3	3.3	3.3	09:55	10:01	11.4	0	0	32.0	-	1.68	14	16	13	12	-	-	21	Unable to break port
		27-Feb-09	4	7.33	6.73	0.6	A	602.9	602.9	602.9	7:31	8:56	2.8	8.9	3.13	-	-	-	-	-	-	-	-	-	-	Max Volume
		11-Nov-08	3	8.91	7.91	1	A	333.1	333.1	333.1	04:19	05:27	0.6	4.9	8.9	30.0	-	1.60	-	-	-	-	-	-	16	
		11-Nov-08	2	11.5	8.91	2.59	A	19.8	19.8	7.6	03:55	04:05	3.5	0	0	31.0	-	-	-	-	-	-	-	-	19	
		26-Oct-08	1	18.5	11.5	7	A	243.6	243.6	34.8	10:10	11:14	4.8	2	0.06	31.0	5	-	14	10	8	8	-	-	9	
60+693.5	T	16-Mar-09	4	7.33	6.73	0.6	MF	135.8	135.8	135.8	16:31	17:21	1.6	1	0.66	-	-	-	-	-	-	-	-	-	-	
		25-Jan-09	3	9.1	8.1	1	A	352.4	352.4	352.4	6:48	7:51	2.8	0	0.01	34.7	2	1.69	27	10	-	9	-	-	19	
		25-Jan-09	2	13.6	9.1	4.5	A	27.6	27.6	6.1	6:15	6:36	3.1	0.1	0	-	-	-	-	-	-	-	-	-	-	

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+695	S	16-Feb-09	4, 5	8	7	1	A	630.0	630.0	630.0	9:38	11:04	2.2	5.8	3.88	31.0	3	1.58	17	11	25	14	-	-	20	Port Injection. Max Volume
		11-Jan-09	3	9	8	1	A	80.8	80.8	80.8	8:12	9:01	3.2	0.1	0.01	33.0	-	1.62	-3	6	-	12	-	-	16	
		11-Jan-09	2	13.5	9	4.5	A	32.1	32.1	7.1	7:40	8:08	3.2	0.5	0.04	-	-	-	-	-	-	-	-	-	-	
60+696.5	T	16-Mar-09	4	7.86	7.26	0.6	MF	10.3	10.3	10.3	17:36	17:50	1.4	0.2	0.17	-	-	-	-	-	-	-	-	-	-	
		25-Jan-09	3	9.1	8.1	1	A	5.3	5.3	5.3	9:24	9:40	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		25-Jan-09	2	13.6	9.1	4.5	A	144.8	144.8	32.2	8:24	9:09	3.1	0.7	0.04	-	-	-	-	-	-	-	-	-	-	
60+698	P	16-Nov-08	5	7.56	6.56	1	A	9.3	9.3	9.3	12:41	12:46	21.0	0	0	-	-	-	-	-	-	-	-	-	-	Unable to break port
		16-Nov-08	4	7.56	6.56	1	A	395.6	395.6	395.6	11:43	12:35	5.0	9.3	1.9	31.3	3	1.65	13	9	12	9	-	-	19	Port Injection
		16-Nov-08	3	8.82	7.56	1.26	A	608.3	608.3	482.8	15:55	17:19	3.7	10	2.2	30.5	6	1.65	5	11	12	13	-	-	21	
		16-Nov-08	1, 2	18.67	8.82	9.85	A	247.2	247.2	25.1	13:11	14:15	4.6	0.4	0.01	32.5	5	1.65	4	9	-	9	-	-	-	
		01-Nov-08	1	17.1	10.1	7	A	65.2	65.2	9.3	10:50	11:20	4.5	0.3	0.009	31.0	-	-	-	-	-	-	-	-	-	
60+699.5	T	16-Mar-09	4	7.86	7.26	0.6	MF	66.7	66.7	66.7	18:00	18:35	1.4	0.8	0.54	-	-	-	-	-	-	-	-	-	-	
		23-Jan-09	3	9.2	8.2	1	A	28.4	28.4	28.4	1:30	2:23	3.2	0.3	0.09	33.2	6	1.64	-	-	-	-	-	-	-	
		23-Jan-09	2	13.7	9.2	4.5	A	857.0	857.0	190.4	22:00	1:20	3.1	1.3	0.09	-	-	-	-	-	-	-	-	-	-	
60+701	S	27-Feb-09	4	7.35	6.75	0.6	A	600.4	600.4	600.4	10:22	11:28	2.7	10.3	3.8	32.0	5	1.62	-12	7	11	4	-	-	13	Max Volume
		11-Jan-09	3	9.3	8.3	1	A	55.3	55.3	55.3	6:31	7:25	3.3	0	0	-	-	-	-	-	-	-	-	-	-	
		10-Jan-09	2	13.8	9.3	4.5	A	450.0	-	-	3:54	4:48	-	-	-	-	-	-	-	-	-	-	-	-	-	
		10-Jan-09	2	13.8	9.3	4.5	B	432.0	882.0	196.0	4:48	6:10	3.2	0.6	0.04	37.0	-	1.65	-	-	-	-	-	-	14	
60+702.5	T	16-Mar-09	4	7.86	7.26	0.6	MF	14.3	14.3	14.3	20:51	21:08	1.4	0.3	0.42	32.3	0	1.46	18	13	17	-	-	-	17	
		23-Jan-09	2, 3	13.6	8.1	5.5	A	55.3	55.3	10.1	20:50	21:34	2.9	0.2	0.02	-	-	-	-	-	-	-	-	-	-	By-Pass
60+704	P	12-Nov-08	5	7.58	6.58	1	A	190.1	190.1	190.1	00:00	10:34	8.0	0	0.001	33.0	3	1.65	-	-	-	-	-	-	16	Port Injection
		12-Nov-08	4	7.58	6.58	1	A	82.3	-	-	16:27	16:40	-	-	-	38.0	-	-	-	-	-	-	-	-	18	
		12-Nov-08	4	7.58	6.58	1	A	36.0	118.3	118.3	20:36	21:05	2.6	0	0.04	31.0	1	1.59	6	10	10	14	-	-	16	Port Injection
		12-Nov-08	3	8.58	7.58	1	A	304.0	304.0	304.0	14:50	15:56	2.2	5.1	2.2	32.0	-	-	-	-	-	-	-	-	19	
		12-Nov-08	2	11.43	8.58	2.85	A	92.2	92.2	32.4	13:56	14:35	3.5	0.4	0.03	31.6	5	1.63	-	-	-	-	-	-	-	
		26-Oct-08	1	18.43	11.43	7	A	40.3	40.3	5.8	14:41	15:00	4.8	0.3	0.009	31.0	-	1.62	12	13	17	10	-	-	14	
60+705.5	T	16-Mar-09	4	7.4	6.8	0.6	MF	3.0	3.0	3.0	21:18	21:30	1.7	0	0.01	-	-	-	-	-	-	-	-	-	-	
		23-Jan-09	3	8.9	6.4	2.5	A	600.3	600.3	240.1	18:51	20:10	2.6	10.2	3.67	32.8	11	1.69	-	-	-	-	-	-	-	Max Volume
		23-Jan-09	2	13.4	8.9	4.5	A	56.6	56.6	12.6	18:06	18:45	2.8	0.4	0.04	-	-	-	-	-	-	-	-	-	-	
60+707	S	27-Feb-09	4	7.61	7.01	0.6	A	7.4	7.4	7.4	13:50	14:06	3.0	7.4	0.04	33.0	2	1.62	-10	12	10	20	-	-	20	
		10-Jan-09	3	9.1	8.1	1	A	13.0	13.0	13.0	3:13	3:41	3.0	0.2	0	32.3	-	1.64	-	-	-	-	-	-	15	
		10-Jan-09	2	11.6	9.1	2.5	A	400.0	-	-	1:13	2:02	-	-	-	-	-	-	-	-	-	-	-	-	-	
		10-Jan-09	2	11.6	9.1	2.5	B	220.4	620.4	248.2	2:02	2:59	2.9	0.3	0.04	37.2	3	1.66	-	-	-	-	-	-	14	
		10-Jan-09	1	18.6	11.6	7	A	88.8	88.8	12.7	0:45	1:08	4.3	1.1	0.04	32.6	5	1.65	15	9	-	12	-	-	15	
60+708.5	T	16-Mar-09	4	7.94	7.34	0.6	MF	171.6	171.6	171.6	21:41	22:29	1.5	0.4	0.38	-	-	-	-	-	-	-	-	-	-	
		23-Jan-09	3	9.1	8.1	1	A	9.2	9.2	9.2	17:34	17:54	2.9	0.3	0.08	-	-	-	-	-	-	-	-	-	-	
		23-Jan-09	2	11.6	9.1	2.5	A	139.0	139.0	55.6	16:54	17:27	2.9	0.6	0.08	-	-	-	-	-	-	-	-	-	-	
		23-Jan-09	1	18.6	11.6	7	A	93.0	93.0	13.3	16:20	16:47	5.0	1.1	0.03	32.8	-	1.67	31	11	-	11	-	-	22	
60+710	P	17-Nov-08	5	7.99	6.99	1	A	864.0	864.0	864.0	08:36	10:40	4.4	9.6	2.2	33.3	1	1.66	4	6	11	7	-	-	19	Port Injection
		16-Nov-08	4	7.99	6.99	1	A	0.0	-	-	10:20	-	-	-	-	33.1	1	1.60	3	7	13	10	-	-	20	Unable to break port
		16-Nov-08	4	7.99	6.99	1	A	0.0	-	-	-	-	-	-	-	33.1	1	1.60	3	7	13	10	-	-	20	Unable to break port
		16-Nov-08	4	7.99	6.99	1	A	12.2	12.2	12.2	-	10:43	20.8	0	0	33.1	1	1.60	3	7	13	10	-	-	20	Unable to break port
		16-Nov-08	3	8.99	7.99	1	A	16.9	16.9	16.9	11:00	11:26	11.9	-	-	-	-	-	-	-	-	-	-	-	-	
		16-Nov-08	1, 2	19.62	8.99	10.63	A	495.8	-	-	2:40	-	-	-	-	31.7	7	1.60	9	4	12	10	-	-	19	
		16-Nov-08	1, 2	19.62	8.99	10.63	B	248.5	744.3	70.0	-	05:07	4.1	4	0.1	36.4	2	1.61	3	5	13	0	-	-	20	By-pass
60+711.5	T	16-Mar-09	4	7.94	7.34	0.6	MF	7.9	7.9	7.9	1:27	1:42	1.6	0.1	0.07	32.6	0	1.46	14	15	22	-	-	-	19	
		23-Jan-09	3	8.8	7.8	1	A	151.6	151.6	151.6	3:31	5:01	3.3	0	0	-	-	-	-	-	-	-	-	-	-	
		23-Jan-09	2	13.3	8.8	4.5	A	13.7	13.7	3.0	3:06	3:19	3.4	0.4	0.03	-	-	-	-	-	-	-	-	-	-	
60+713	S	16-Feb-09	4, 5	8.1	7.1	1	A	450.0	-	-	19:54	21:15	2.5	8.7	4.82	32.0	3	1.65	28	10	12	23	-	-	20	
		16-Feb-09	4, 5	8.1	7.1	1	B	150.0	600.0	600.0	21:15	21:31	2.3	9.6	4.87	37.5	4	1.65	21	10	11	-	-	-	21	Port Injection
		10-Jan-09	3	9.1	8.1	1	A	28.0	28.0	28.0	20:39	21:39	3.1	0.2	0.15	-	-	-	-	-	-	-	-	-	-	
		10-Jan-09	2	11.6	9.1	2.5	A	5.9	5.9	2.4	20:22	20:34	3.0	0.3	0.04	-	-	-	-	-	-	-	-	-	-	
		10-Jan-09	1	18.6	11.6	7	A	28.2	28.2	4.0	19:57	20:15	5.3	0.5	0.01	32.9	6	1.65	11	9	-	12	-	-	15	
60+714.5	T	16-Mar-09	4	7.53	6.93	0.6	MF	6.5	6.5	6.5	1:50	2:04	1.3	0.2	0.22	-	-	-	-	-	-	-	-	-	-	
		23-Jan-09	3	8.6	7.6	1	A	605.5	605.5	605.5	5:54	7:04	2.3	9.7	4.16	33.1	-	1.62	-	-	-	-	-	-	-	Max Volume
		23-Jan-09	2	13.1	8.6	4.5	A	5.0	5.0	1.1	5:33	5:47	3.5	0.1	0	-	-	-	-	-	-	-	-	-	-	

Check: GRB

Golder Associates

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+716	P	13-Nov-08	5	7.43	6.43	1	A	0.4	-	-	08:02	08:04	21.0	0	0	32.3	-	1.65	-	-	-	-	-	-	-	Unable to break port
		23-Nov-08	5	7.28	6.28	1	A	1.4	1.8	1.8	11:18	11:30	11.9	0.1	0	31.1	-	-	12	8	17	6	-	-	18	Unable to break port
		13-Nov-08	4	7.58	6.58	1	A	0.4	-	-	07:52	07:54	21.0	0	0	32.3	-	1.65	12	11	9	24	-	-	24	Unable to break port
		23-Nov-08	4	7.58	6.58	1	A	1.5	1.9	1.9	11:08	11:14	12.4	0	0	36.4	-	-	24	5	16	20	-	-	22	Unable to break port
		27-Feb-09	4	7.23	6.63	0.6	A	11.2	11.2	11.2	15:04	15:18	2.7	0	0	-	-	-	-	-	-	-	-	-	-	
		12-Nov-08	3	8.58	7.58	1	A	642.0	642.0	642.0	02:52	05:08	3.0	4.5	1.58	30.0	-	-	-	-	-	-	-	-	-	
		12-Nov-08	2	11.47	8.76	2.71	A	19.9	19.9	7.3	02:25	02:42	3.7	0	0.01	30.0	1	1.62	8	11	12	7	-	-	19	
		26-Oct-08	1	18.47	11.47	7	A	400.0	-	-	15:10	00:00	-	-	-	31.0	5	1.67	13	12	9	9	-	-	19	
		26-Oct-08	1	18.47	11.47	7	B	276.0	676.0	96.6	00:00	17:05	4.7	0.1	0.003	35.0	-	-	-	-	-	-	-	-	-	
60+717.5	T	16-Mar-09	4	7.53	6.93	0.6	MF	2.2	2.2	2.2	2:13	2:25	0.7	0	0.02	-	-	-	-	-	-	-	-	-	-	
		24-Jan-09	3	8.6	7.6	1	A	600.1	600.1	600.1	9:01	10:19	2.0	9	2.37	-	-	-	-	-	-	-	-	-	-	Max Volume
		24-Jan-09	2	13.1	8.6	4.5	A	40.6	40.6	9.0	8:29	8:50	3.0	0.2	0.02	-	-	-	-	-	-	-	-	-	-	
60+719	S	27-Feb-09	4	7.12	6.52	0.6	A	10.1	10.1	10.1	17:26	17:40	2.7	0.2	0.06	-	-	-	-	-	-	-	-	-	-	
		10-Jan-09	3	8.6	7.6	1	A	380.0	-	-	18:09	19:13	-	-	-	-	-	-	-	-	-	-	-	-	-	
		10-Jan-09	3	8.6	7.6	1	B	243.1	623.1	623.1	19:13	19:38	1.9	9.9	5.16	37.4	3	1.64	-	-	-	-	-	-	15	Max Volume
		10-Jan-09	2	11.1	8.6	2.5	A	31.9	31.9	12.8	17:41	18:03	2.3	0.5	0.08	-	-	-	-	-	-	-	-	-	-	
		10-Jan-09	1	18.1	11.1	7	A	89.5	89.5	12.8	17:06	17:33	4.7	1.4	0.04	-	-	-	-	-	-	-	-	-	-	
60+720.5	T	16-Mar-09	4	7.45	6.85	0.6	MF	134.4	134.4	134.4	16:35	17:16	1.3	1	0.79	-	-	-	-	-	-	-	-	-	-	
		24-Jan-09	3	8.6	7.6	1	A	3.2	3.2	3.2	17:40	17:50	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		24-Jan-09	2	13.1	8.6	4.5	A	2.9	2.9	0.6	17:18	17:31	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
60+722	P	16-Nov-08	4	8.56	7.56	1	A	0.0	0.0	0.0	00:30	02:56	-	-	-	-	-	-	-	-	-	-	-	-	-	Unable to break port
		27-Feb-09	4	7.45	6.85	0.6	A	12.1	12.1	12.1	15:43	15:58	2.4	0.1	0.06	34.0	3	1.63	-10	6	13	16	-	-	16	
		15-Nov-08	3	9.56	8.56	1	A	584.7	584.7	584.7	00:30	02:56	3.1	0.2	0.07	30.4	-	-	-	-	13	-	-	-	23	
		15-Nov-08	1, 2	19.31	9.56	9.75	A	145.3	145.3	14.9	23:40	00:15	4.9	0.6	0.01	33.0	2	1.61	12	8	12	7	-	-	21	
60+723.5	T	16-Mar-09	4	7.66	7.06	0.6	MF	5.6	5.6	5.6	16:13	16:23	1.5	0.2	0.4	-	-	-	-	-	-	-	-	-	-	
		24-Jan-09	3	8.6	7.6	1	A	87.7	87.7	87.7	16:07	16:55	2.9	0.2	0.08	-	-	-	-	-	-	-	-	-	-	
		24-Jan-09	2	13.1	8.6	4.5	A	177.2	177.2	39.4	15:00	16:00	2.5	0.4	0.04	-	-	-	-	-	-	-	-	-	-	
60+725	S	27-Feb-09	4	7.25	6.65	0.6	A	11.3	11.3	11.3	16:12	16:35	2.3	0	0	-	-	-	-	-	-	-	-	-	-	
		10-Jan-09	3	8.6	7.6	1	A	600.2	600.2	600.2	15:45	16:52	1.0	9	8.78	-	-	-	-	-	-	-	-	-	-	Max Volume
		10-Jan-09	2	11.1	8.6	2.5	A	30.9	30.9	12.4	15:07	15:38	3.1	0.7	0.09	-	-	-	-	-	-	-	-	-	-	
		10-Jan-09	1	18.1	11.1	7	A	317.8	317.8	45.4	13:21	14:55	4.8	1.5	0.05	32.0	6	1.66	21	10	-	14	-	-	22	
60+725.75	Q	04-Mar-09	3	9.4	8.4	1	A	416.7	416.7	416.7	6:20	7:34	2.9	0.1	0.03	31.3	4	1.62	-12	10	-	14	-	-	17	
		03-Mar-09	2	11.9	9.4	2.5	A	26.5	26.5	10.6	5:44	6:15	2.4	0.3	0.05	-	-	-	-	-	-	-	-	-	-	
		03-Mar-09	1	18.9	11.9	7	A	4.3	4.3	0.6	5:27	5:39	4.6	0.1	0	-	-	-	-	-	-	-	-	-	-	
60+726.5	T	16-Mar-09	4	7.68	7.08	0.6	MF	4.7	4.7	4.7	15:47	16:05	1.9	0.2	0.11	-	-	-	-	-	-	-	-	-	-	
		22-Jan-09	3	8.6	7.6	1	A	279.5	279.5	279.5	6:36	7:36	2.4	0	0.01	-	-	-	-	-	-	-	-	-	-	
		22-Jan-09	2	13.1	8.6	4.5	A	1350.0	1350.0	300.0	3:01	6:31	3.5	0	0.01	-	-	-	-	-	-	-	-	-	-	
		01-Feb-09	1	18.1	13.1	5	A	917.0	917.0	183.4	4:39	6:35	5.0	0	0	-	-	-	-	-	-	-	-	-	-	
60+727.25	Q	04-Mar-09	3	9.8	8.8	1	A	6.7	6.7	6.7	8:46	9:00	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		04-Mar-09	2	12.3	9.8	2.5	A	9.9	9.9	4.0	8:24	8:37	2.7	0	0	-	-	-	-	-	-	-	-	-	-	
		04-Mar-09	1	19.3	12.3	7	A	6.1	6.1	0.9	8:08	8:21	5.0	0	0	31.3	8	1.61	-11	-	-	14	-	-	17	
60+728	P	13-Nov-08	5	8.97	7.97	1	A	0.0	0.0	0.0	13:43	13:44	19.0	0	0	-	-	-	-	-	-	-	-	-	-	Unable to break port
		13-Nov-08	4	8.97	7.97	1	A	0.0	-	-	13:35	13:37	19.0	0	0	33.4	-	-	-	-	-	-	-	-	-	Unable to break port
		23-Nov-08	4	8.97	7.97	1	A	0.6	0.6	0.6	12:31	12:37	12.3	0.1	0	32.8	-	-	-	-	-	-	-	-	22	Unable to break port
		27-Feb-09	4	8.01	7.41	0.6	A	23.3	23.3	23.3	16:47	17:04	2.4	0	0	-	-	-	-	-	-	-	-	-	-	
		13-Nov-08	3	9.97	8.97	1	A	11.2	11.2	11.2	11:34	11:49	9.0	0	0	31.8	-	1.65	-	-	-	-	-	-	-	
		13-Nov-08	2	12.34	9.97	2.37	A	21.8	21.8	9.2	11:03	11:24	3.5	0	0	32.8	-	1.66	13	9	8	9	-	-	-	
		30-Oct-08	1	19.34	12.34	7	A	73.8	-	-	09:00	09:50	5.0	0.3	0.01	31.0	-	1.61	11	10	14	8	-	-	17	
		26-Oct-08	1	14.96	7.96	7	A	400.0	-	-	20:19	21:15	-	-	-	30.0	4	1.63	8	8	14	4	-	-	17	Ice in hole
		26-Oct-08	1	14.96	7.96	7	B	400.0	-	-	21:15	21:57	-	-	-	35.0	-	1.64	8	7	13	-	-	-	16	
		26-Oct-08	1	14.96	7.96	7	C	700.0	-	-	21:57	22:50	-	-	-	45.0	-	1.66	9	14	5	-	-	10	16	
		26-Oct-08	1	14.96	7.96	7	D	556.0	2129.8	304.3	22:50	00:17	2.5	1.2	0.15	58.0	-	-	-	-	-	-	-	-	14	
60+729.5	T	16-Mar-09	4	7.56	6.96	0.6	MF	131.6	131.6	131.6	14:52	15:42	1.6	0.5	0.32	-	-	-	-	-	-	-	-	-	-	
		21-Jan-09	3	8.6	7.6	1	A	600.3	600.3	600.3	1:30	2:40	3.0	11	3.71	32.6	9	1.67	10	12	-	16	-	-	-	Max Volume
		21-Jan-09	2	11.1	8.6	2.5	A	32.9	32.9	13.2	1:05	1:30	2.6	0.3	0.05	-	-	-	-	-	-	-	-	-	-	
		21-Jan-09	1	18.1	11.1	7	A	54.5	54.5	7.8	12:31	12:55	6.5	1	0.02	33.0	7	1.64	12	9	-	16	-	-	9	

Check: GRB

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage: Stage #	Stage: From	Stage: To	Stage: Length	Take: Mix	Take: Volume	Take: V_{TOTAL}	Take: Take	Duration: Start	Duration: End	Termination: P_{FINAL}	Termination: Q_{FINAL}	Termination: Penetrab	QA: Marsh	QA: Bleed	QA: Specific Gravity	Temperatures: Cement	Temperatures: Water	Temperatures: Ambient	Temperatures: Glenium	Temperatures: Pozzutec	Temperatures: Bentonite	Temperatures: Mix	Comments
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+731	S	27-Feb-09	4	7.28	6.68	0.6	A	600.9	600.9	600.9	19:13	20:24	2.1	10.1	4.91	32.1	4	1.63	2	8	14	16	-	-	18	Max Volume
		10-Jan-09	3	8.6	7.6	1	A	630.5	630.5	630.5	7:35	8:46	1.8	10.7	5.79	-	-	-	-	-	-	-	-	-	-	Max Volume
		10-Jan-09	2	11.1	8.6	2.5	A	21.6	21.6	8.6	7:03	7:29	2.7	0.5	0.08	-	-	-	-	-	-	-	-	-	-	
		10-Jan-09	1	18.1	11.1	7	A	29.0	29.0	4.1	6:32	6:48	4.9	0.5	0.01	-	-	-	-	-	-	-	-	-	-	
60+732.5	T	17-Mar-09	4	7.17	6.57	0.6	MF	5.4	5.4	5.4	5:22	5:33	1.5	0.5	0.56	32.7	1	1.42	5	7	17	-	-	-	12	
		23-Jan-09	3	8.6	7.6	1	A	644.0	644.0	644.0	9:39	11:01	3.3	0.1	0.04	31.9	7	1.67	12	10	20	17	-	-	22	Max Volume
		23-Jan-09	2	13.1	8.6	4.5	A	14.7	14.7	3.3	9:16	9:29	2.7	0.3	0.02	-	-	-	-	-	-	-	-	-	-	
60+734	P	24-Nov-08	5	7.67	6.67	1	A	3.1	3.1	3.1	07:32	07:35	12.3	0	0	-	-	-	-	-	-	-	-	-	-	Unable to break port
		15-Nov-08	4	7.67	6.67	1	A	4.6	-	-	19:50	20:40	16.0	0	0	32.9	1	1.62	13	7	12	7	-	-	21	Unable to break port
		24-Nov-08	4	7.67	6.67	1	A	1.1	5.7	5.7	07:20	07:22	12.4	0.1	0	31.9	-	-	-	-	-	-	-	-	-	Unable to break port
		27-Feb-09	4	7.3	6.7	0.6	A	39.0	39.0	39.0	20:37	20:52	2.2	0.2	0.16	32.5	4	1.64	-4	9	16	17	-	-	21	
		15-Nov-08	3	8.93	7.67	1.26	A	608.2	608.2	482.7	16:23	17:33	1.9	10.3	4.3	32.1	2	-	10	5	-	10	-	-	20	
		15-Nov-08	1, 2	18.45	8.93	9.52	A	75.7	75.7	8.0	15:41	16:07	4.5	0.1	0.002	33.2	2	1.66	9	4	-	5	-	-	20	
60+735.5	T	18-Mar-09	4	7.33	6.73	0.6	MF	46.9	46.9	46.9	5:43	6:25	1.1	0.7	1.09	-	-	-	-	-	-	-	-	-	-	
		23-Jan-09	3	8.6	7.6	1	A	5.4	5.4	5.4	8:50	9:03	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
		23-Jan-09	2	13.1	8.6	4.5	A	4.9	4.9	1.1	8:32	8:42	3.2	0	0	33.0	-	-	17	6	-	19	-	-	14	
60+737	S	27-Feb-09	4	7.28	6.68	0.6	A	601.1	601.1	601.1	21:10	22:27	2.4	4.2	1.75	32.2	3	1.63	-1	9	17	16	-	-	22	Communicate to 60+734
		09-Jan-09	3	8.6	7.6	1	A	400.0	-	-	4:53	5:39	-	-	-	-	-	-	-	-	-	-	-	-	-	
		09-Jan-09	3	8.6	7.6	1	B	259.6	659.6	659.6	5:39	6:03	2.2	8.4	7.55	36.8	-	1.66	-	-	-	-	-	-	18	Max Volume
		09-Jan-09	2	11.1	8.6	2.5	A	470.0	-	-	3:30	4:16	-	-	-	32.0	4	1.65	-	-	-	-	-	-	-	
		09-Jan-09	2	11.1	8.6	2.5	B	309.2	779.2	311.7	4:16	4:46	2.2	11.1	3	37.8	-	1.67	15	8	-	16	-	-	14	Max Volume
		09-Jan-09	1	18.1	11.1	7	A	12.4	12.4	1.8	3:10	3:26	5.5	0.4	0.01	-	-	-	-	-	-	-	-	-	-	
60+737.75	Q	15-Mar-09	3	9.2	8.2	1	A	14.0	14.0	14.0	13:58	14:20	2.5	0	0.02	-	-	-	-	-	-	-	-	-	-	
		15-Mar-09	2	11.7	9.2	2.5	A	21.3	21.3	8.5	13:39	13:52	3.9	0.2	0.01	-	-	-	-	-	-	-	-	-	-	
		14-Mar-09	1	18.7	11.7	7	A	42.0	-	-	21:50	22:10	4.9	1	0.03	32.6	3	1.63	1	9	20	15	-	-	18	
		15-Mar-09	1	18.7	11.7	7	A	53.8	95.8	13.7	13:06	13:34	4.9	0.4	0.01	32.0	1	1.62	14	10	18	11	-	-	18	
60+738.5	T	18-Mar-09	4	7.35	6.75	0.6	MF	8.0	8.0	8.0	6:45	7:04	1.5	0.2	0.1	-	-	-	-	-	-	-	-	-	-	
		20-Jan-09	3	8.6	7.6	1	A	361.7	361.7	361.7	0:02	1:25	2.9	0	0	32.2	2	1.67	-	-	-	-	-	-	-	
		20-Jan-09	2	13.1	8.6	4.5	A	888.0	-	-	20:47	23:05	-	-	-	-	-	-	-	-	-	-	-	-	-	
		20-Jan-09	2	13.1	8.6	4.5	B	80.0	968.0	215.1	23:05	23:40	3.4	0.7	0.05	38.1	3	1.66	16	9	-	19	-	-	15	
		31-Jan-09	1	18.1	13.1	5	A	12.1	12.1	2.4	4:05	4:18	5.2	0.2	0.01	-	-	-	-	-	-	-	-	-	-	
60+739.25	Q	15-Mar-09	3	9.2	8.2	1	A	115.4	115.4	115.4	10:26	11:09	2.5	0.1	0.04	-	-	-	-	-	-	-	-	-	-	
		15-Mar-09	2	11.7	9.2	2.5	A	140.2	140.2	56.1	9:19	10:21	2.4	0	0.01	-	-	-	-	-	-	-	-	-	-	
		15-Mar-09	1	18.7	11.7	7	A	52.4	52.4	7.5	8:49	9:10	4.8	0	0	32.0	7	1.63	13	9	16	13	-	-	18	
60+740	P	13-Nov-08	5	7.8	6.8	1	A	2.2	-	-	18:04	18:12	18.2	0	0	32.0	-	-	6	3	11	9	-	-	19	Unable to break port
		23-Nov-08	5	7.8	6.8	1	A	2.3	4.5	4.5	05:03	05:11	-	-	-	-	-	-	-	-	-	-	-	-	-	Unable to break port
		13-Nov-08	4	7.8	6.8	1	A	2.0	-	-	17:55	17:57	22.0	0	0	32.0	-	-	6	3	11	9	-	-	19	Unable to break port
		23-Nov-08	4	7.8	6.8	1	A	1.6	3.6	3.6	04:45	04:52	12.4	0.1	0	32.2	-	1.62	21	7	11	11	-	-	17	Unable to break port
		27-Feb-09	4	7.12	6.52	0.6	A	600.3	600.3	600.3	22:50	0:18	2.2	5.9	2.63	-	-	-	-	-	-	-	-	-	-	Max Volume
		13-Nov-08	3	8.8	7.8	1	A	14.7	14.7	14.7	17:00	17:26	3.5	0	0	32.1	-	-	6	3	7	11	-	-	13	
		13-Nov-08	2	11.17	8.8	2.37	A	22.1	22.1	9.3	16:36	16:54	3.5	0	0	32.1	1	1.62	6	3	7	11	-	-	13	
		26-Oct-08	1	15.05	8.05	7	A	254.4	-	-	05:42	06:28	4.8	0.2	0.007	32.0	-	1.62	5	3	4	3	-	-	11	
		30-Oct-08	1	18.17	11.17	7	A	48.6	303.0	29.9	10:15	11:00	4.8	0	0.001	32.0	-	-	14	10	17	9	-	-	16	Ice in hole
60+741.5	T	18-Mar-09	4	7.12	6.52	0.6	MF	7.0	7.0	7.0	7:10	7:27	1.5	0.2	0.01	32.0	1	1.44	12	8	14	-	-	-	17	
		20-Jan-09	3	8.4	7.4	1	A	597.0	597.0	597.0	19:12	20:21	3.0	10	2.5	34.5	6	1.71	16	9	30	14	-	-	19	Max Volume
		20-Jan-09	2	12.9	8.4	4.5	A	18.9	18.9	4.2	17:56	18:12	3.1	0.4	0.03	34.0	-	1.61	14	10	-	13	-	-	13	
60+743	S	01-Mar-09	4	6.87	6.27	0.6	A	600.3	600.3	600.3	17:03	18:14	2.5	7.7	5.25	31.0	3	1.62	-3	12	12	10	-	-	17	Max Volume
		09-Jan-09	3	8.3	7.3	1	A	400.0	-	-	23:44	0:28	-	-	-	32.5	-	1.66	-	-	-	-	-	-	14	
		09-Jan-09	3	8.3	7.3	1	B	245.4	645.4	645.4	0:28	0:53	2.0	10.1	5.11	37.4	2	1.66	-	-	-	-	-	-	14	Max Volume
		09-Jan-09	2	10.8	8.3	2.5	A	410.0	-	-	22:14	22:58	-	-	-	-	-	-	-	-	-	-	-	-	-	
		09-Jan-09	2	10.8	8.3	2.5	B	340.7	750.7	300.3	22:58	23:31	1.5	9.9	2.59	37.7	2	1.64	-	-	-	-	-	-	17	Max Volume
		09-Jan-09	1	17.8	10.8	7	A	13.2	13.2	1.9	21:56	22:09	5.6	0.8	0.02	31.8	5	1.65	22	8	-	14	-	-	16	
60+744.5	T	18-Mar-09	4	7.1	6.5	0.6	MF	3.4	3.4	3.4	7:35	7:48	1.4	0.3	0.19	-	-	-	-	-	-	-	-	-	-	
		20-Jan-09	3	8.5	7.5	1	A	400.0	-	-	16:09	17:00	-	-	-	34.7	-	1.67	16	11	-	4	-	-	13	
		20-Jan-09	3	8.5	7.5	1	B	212.0	612.0	612.0	17:00	17:36	3.0	3.7	1.24	37.5	-	1.61	14	9	-	-	-	-	15	Max volume
		19-Jan-09	2	13	8.5	4.5	A	17.5	17.5	3.9	5:45	6:31	2.9	0.4	0.03	-	-	-	-	-	-	-	-	-	-	

Check: GRB

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+746	P	15-Nov-08	5	8.06	7.06	1	A	678.8	678.8	678.8	10:52	12:20	2.3	10.7	4.6	33.6	3	1.66	9	8	9	11	-	-	19	Port Injection
		15-Nov-08	4	8.06	7.06	1	A	7.3	7.3	7.3	10:10	10:20	21.0	0	0	32.9	1	1.65	7	7	7	11	-	-	7	Unable to break port
		14-Nov-08	3	9.06	8.06	1	A	625.2	625.2	625.2	05:53	07:55	1.1	10.3	9.2	30.4	3	1.62	12	7	9	12	-	-	22	
		14-Nov-08	1, 2	18.9	9.06	9.84	A	480.7	-	-	03:11	00:00	2.7	5	0.2	32.6	4	1.66	5	15	11	12	-	-	22	
		14-Nov-08	1, 2	18.9	9.06	9.84	B	65.3	546.0	55.5	04:50	05:11	4.4	0	0.01	36.7	2	1.65	13	7	11	-	-	-	24	
60+747.5	T	16-Mar-09	4	7.45	6.85	0.6	MF	5.6	5.6	5.6	14:23	14:37	1.5	0.5	0.13	-	-	-	-	-	-	-	-	-	-	
		19-Jan-09	3	8.6	7.6	1	A	601.5	601.5	601.5	4:36	5:40	2.6	9.6	3.73	32.9	-	1.64	-16	13	14	20	-	-	19	Max Volume
		19-Jan-09	2	13.1	8.6	4.5	A	50.1	50.1	11.1	3:58	4:26	3.3	0	0	-	-	-	-	-	-	-	-	-	-	
60+749	S	27-Feb-09	4	7.07	6.47	0.6	A	350.2	350.2	350.2	3:32	4:26	2.6	4.6	1.74	31.7	3	1.63	3	9	17	18	-	-	-	Communicate to 60+740
		09-Jan-09	3	8.6	7.6	1	A	400.0	-	-	10:13	11:06	-	-	-	32.0	-	1.66	25	6	-	16	-	-	20	
		09-Jan-09	3	8.6	7.6	1	B	230.7	630.7	630.7	11:06	11:27	0.9	9.3	10.55	36.0	-	1.72	26	6	-		-	-	19	
		09-Jan-09	2	11.1	8.6	2.5	A	4.0	4.0	1.6	9:51	10:06	2.4	0.1	0.01	-	-	-	-	-	-	-	-	-	-	
		09-Jan-09	1	18.1	11.1	7	A	1.9	1.9	0.3	9:29	9:41	4.8	0	0	-	-	-	-	-	-	-	-	-	-	
60+750.5	T	16-Mar-09	4	7.53	6.93	0.6	MF	5.6	5.6	5.6	13:43	13:56	1.4	0.2	0.21	-	-	-	-	-	-	-	-	-	-	
		19-Jan-09	3	8.6	7.6	1	A	540.0	-	-	2:35	3:21	-	-	-	-	-	-	-	-	-	-	-	-	-	
		19-Jan-09	3	8.6	7.6	1	B	107.6	647.6	647.6	3:21	3:31	0.5	-	23.56	37.9	4	1.66	20	19	29	-	-	-	21	Max Volume
		19-Jan-09	2	13.1	8.6	4.5	A	4.2	4.2	0.9	2:11	2:30	3.2	0.2	0	32.5	2	1.65	-	-	-	-	-	-	19	
60+752	P	27-Feb-09	4	7.81	7.21	0.6	A	36.6	36.6	36.6	4:45	5:06	2.2	0	0	-	-	-	-	-	-	-	-	-	-	
		27-Oct-08	1, 2, 3	11.93	4.93	7	A	420.0	-	-	20:04	20:49	-	-	-	31.0	4	1.63	9	7	8	14	-	-	14	
		27-Oct-08	1, 2, 3	11.93	4.93	7	B	415.0	-	-	20:49	21:21	-	-	-	35.0	-	-	8	7	6	-	-	-	12	Ice in hole
		27-Oct-08	1, 2, 3	11.93	4.93	7	C	85.0	920.0	131.4	21:21	21:52	3.3	0.02	0.001	44.0	-	1.66	8	7	9	-	-	12	-	
		28-Oct-08	1	17.1	10.1	7	A	47.3	47.3	6.8	21:49	22:12	4.3	0.04	0.001	31.0	3	1.62	20	10	14	11	-	-	14	
60+753.5	T	16-Mar-09	4	7.63	7.03	0.6	MF	5.5	5.5	5.5	13:05	13:22	1.4	0.3	0.21	30.0	1	1.44	16	9	28	-	-	-	19	
		19-Jan-09	3	8.6	7.6	1	A	645.7	645.7	645.7	22:45	23:54	2.8	10.6	3.81	33.1	4	1.67	-16	17	20	18	-	-	23	Max Volume
		19-Jan-09	2	11.1	8.6	2.5	A	16.9	16.9	6.8	22:15	22:38	3.2	0.4	0.05	-	-	-	-	-	-	-	-	-	-	
		19-Jan-09	1	17	11.1	5.9	A	4.4	4.4	0.7	21:55	22:09	5.0	0.2	0.01	-	-	-	-	-	-	-	-	-	-	
60+755	S	27-Feb-09	4	7.23	6.63	0.6	A	29.0	29.0	29.0	5:18	5:38	2.6	0	0.01	-	-	-	-	-	-	-	-	-	-	
		09-Jan-09	3	8.6	7.6	1	A	603.7	603.7	603.7	8:03	9:13	0.8	10.2	12.69	-	-	-	-	-	-	-	-	-	-	
		09-Jan-09	2	11.1	8.6	2.5	A	4.8	4.8	1.9	7:42	7:55	3.0	0.2	0.02	-	-	-	-	-	-	-	-	-	-	
		09-Jan-09	1	18.1	11.1	7	A	2.2	2.2	0.3	7:25	7:37	5.3	0	0	31.5	6	1.63	25	7		15	-	-	24	
60+756.5	T	16-Mar-09	4	7.53	6.93	0.6	MF	7.2	7.2	7.2	10:20	10:35	1.4	0.3	0.21	-	-	-	-	-	-	-	-	-	-	
		19-Jan-09	3	8.6	7.6	1	A	600.3	600.3	600.3	20:28	21:35	2.8	10.1	3.66	-	-	-	-	-	-	-	-	-	-	Max Volume
		19-Jan-09	2	13.1	8.6	4.5	A	19.3	19.3	4.3	20:04	20:22	3.3	0.3	0.02	32.8	7	1.64	13	24	-	21	-	-	27	
60+758	P	14-Nov-08	5	7.69	6.69	1	A	420.8	420.8	420.8	20:27	21:54	2.7	4.9	1.8	34.6	-	-	6	13	12	12	-	-	-	Port Injection
		14-Nov-08	4	7.69	6.69	1	A	431.7	431.7	431.7	18:30	20:02	7.0	0	0.05	30.9	-	-	-	-	-	-	-	-	23	Port Injection
		14-Nov-08	3	8.96	7.69	1.27	A	709.0	709.0	558.3	13:54	15:26	0.2	5	0	29.1	9	1.62	17	11	12	20	-	-	22	
		14-Nov-08	1, 2	18.5	8.96	9.54	A	57.5	57.5	6.0	10:53	11:16	4.6	0	0	30.5	9	1.61	15	8	10	13	-	-	20	
60+759.5	T	16-Mar-09	4	7.12	6.52	0.6	MF	59.9	59.9	59.9	9:42	10:15	1.3	0.6	0.48	-	-	-	-	-	-	-	-	-	-	
		18-Jan-09	3	8.4	7.4	1	A	430.0	-	-	4:49	5:37	-	-	-	-	-	-	-	-	-	-	-	-	-	
		18-Jan-09	3	8.4	7.4	1	B	165.7	595.7	595.7	5:37	5:53	2.5	9.1	3.85	37.3	-	1.66	1	9	19	-	-	-	16	Max Volume
		18-Jan-09	2	12.9	8.4	4.5	A	16.4	16.4	3.6	4:30	4:45	2.7	0.6	0.05	32.8	-	1.65	18	9	19	13	-	-	15	
60+761	S	28-Feb-09	4	7.17	6.57	0.6	A	127.2	127.2	127.2	6:06	6:46	2.4	0	0.01	31.2	5	1.62	-15	13	13	12	-	-	15	
		09-Jan-09	3	8.6	7.6	1	A	600.7	600.7	600.7	16:31	17:38	1.7	9.9	5.97	-	-	-	-	-	-	-	-	-	-	
		09-Jan-09	2	11.1	8.6	2.5	A	116.2	116.2	46.5	14:58	16:24	2.4	0.4	0.07	-	-	-	-	-	-	-	-	-	-	
		09-Jan-09	1	18.1	11.1	7	A	2.2	2.2	0.3	14:39	14:52	5.4	0.1	0	32.2	-	1.66	20	10	-	19	-	-	23	
60+762.5	T	16-Mar-09	4	7.4	6.8	0.6	MF	3.4	3.4	3.4	9:22	9:36	1.2	0.2	0.2	-	-	-	-	-	-	-	-	-	-	
		31-Jan-09	3	8.6	7.6	1	A	600.7	600.7	600.7	1:22	2:29	3.0	11.4	3.77	32.9	6	1.64	5	12	18	15	-	-	21	Max Volume
		31-Jan-09	2	13.1	8.6	4.5	A	6.0	6.0	1.3	11:02	11:16	3.0	0.2	0.01	-	-	-	-	-	-	-	-	-	-	
60+764	P	28-Feb-09	4	6.87	6.27	0.6	A	9.3	9.3	9.3	8:02	8:17	2.6	0	0	-	-	-	-	-	-	-	-	-	-	
		27-Oct-08	1, 2, 3	10.17	3.17	7	A	400.0	-	-	22:44	23:22	-	-	-	32.0	-	-	-	-	-	-	-	-	13	Ice in hole
		27-Oct-08	1, 2, 3	10.17	3.17	7	B	400.0	-	-	23:22	23:56	-	-	-	35.0	-	1.67	-	-	-	-	-	-	14	
		27-Oct-08	1, 2, 3	10.17	3.17	7	C	550.0	-	-	23:56	00:55	-	-	-	45.0	-	1.67	-	-	-	-	-	-	13	
		27-Oct-08	1, 2, 3	10.17	3.17	7	D	762.0	2112.0	301.7	00:55	01:56	2.5	7	0.6	60.0	-	-	-	-	-	-	-	-	13	
		28-Oct-08	1	17.15	10.15	7	A	48.9	-	-	02:57	03:18	4.7	0.03	0.001	-	-	-	-	-	-	-	-	-	-	
		28-Oct-08	1	17.15	10.15	7	A	31.3	80.2	11.5	22:25	22:47	4.3	0.2	0.006	-	-	-	-	-	-	-	-	-	-	

Golder Associates

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage: Stage #	Stage: From	Stage: To	Stage: Length	Take: Mix	Take: Volume	Take: V_{TOTAL}	Take: Take	Duration: Start	Duration: End	Termination: P_{FINAL}	Termination: Q_{FINAL}	Termination: Penetrab	QA: Marsh	QA: Bleed	QA: Specific Gravity	Temperatures: Cement	Temperatures: Water	Temperatures: Ambient	Temperatures: Glenium	Temperatures: Pozzutec	Temperatures: Bentonite	Temperatures: Mix	Comments
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+765.5	T	16-Mar-09	4	7.3	6.7	0.6	MF	3.5	3.5	3.5	9:00	9:15	1.5	0.1	0.1	-	-	-	-	-	-	-	-	-	-	
		31-Jan-09	3	8.6	7.6	1	A	432.8	432.8	432.8	8:20	10:44	3.0	0	0	28.9	11	1.58	5	7	-	3	-	-	15	
		31-Jan-09	2	13.1	8.6	4.5	A	10.1	10.1	2.2	8:00	8:14	2.9	0.3	0.03	30.9	12	1.51	0	7	-	10	-	-	18	
60+767	S	28-Feb-09	4	7.28	6.68	0.6	A	6.5	6.5	6.5	8:28	8:42	2.8	0.1	0.04	-	-	-	-	-	-	-	-	-	-	
		18-Jan-09	3	8.6	7.6	1	A	380.0	-	-	19:34	20:22	-	-	-	32.8	4	1.65	10	12	18	18	-	-	19	
		18-Jan-09	3	8.6	7.6	1	B	235.6	615.6	615.6	20:22	21:35	2.9	2.6	0.89	36.8	4	1.66	8	10	18	-	-	-	18	Max Volume
		18-Jan-09	2	13.1	8.6	4.5	A	210.0	210.0	46.7	17:51	19:23	3.0	0	0	34.4	8	1.67	16	14	-	21	-	-	20	
60+768.5	T	16-Mar-09	4	7.23	6.63	0.6	MF	55.9	55.9	55.9	8:24	8:54	1.4	0.6	0.44	-	-	-	-	-	-	-	-	-	-	
		31-Jan-09	3	8.6	7.6	1	A	14.6	14.6	14.6	7:15	7:43	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
		31-Jan-09	2	13.1	8.6	4.5	A	155.0	155.0	34.4	6:14	7:07	2.9	0.7	0.05	-	-	-	-	-	-	-	-	-	-	
60+770	P	28-Feb-09	4	7.48	6.88	0.6	A	601.2	601.2	601.2	9:05	10:00	2.2	8.3	3.78	34.0	2	1.65	-15	7	12	15	-	-	13	Max Volume
		09-Jan-09	3	9.1	8.1	1	A	400.0	-	-	18:34	19:16	-	-	-	-	-	-	-	-	-	-	-	-	-	
		09-Jan-09	3	9.1	8.1	1	B	200.3	600.3	600.3	19:16	19:36	1.3	10.4	15.41	36.1	2	1.65	-	-	-	-	-	-	17	Max Volume
		09-Jan-09	2	11.6	9.1	2.5	A	1.7	1.7	0.7	18:10	18:25	3.0	0.1	0.01	-	-	-	-	-	-	-	-	-	-	
		09-Jan-09	1	18.6	11.6	7	A	23.4	23.4	3.3	17:55	18:07	5.2	0	0	-	-	-	-	-	-	-	-	-	-	
60+771.5	T	16-Mar-09	4	8.27	7.67	0.6	MF	6.2	6.2	6.2	7:23	7:45	1.7	0.1	0.04	-	-	-	-	-	-	-	-	-	-	
		30-Jan-09	3	9.6	8.6	1	A	600.4	600.4	600.4	4:30	5:46	1.8	10.3	5.6	32.3	6	1.63	4	15	19	10	-	-	14	Max Volume
		30-Jan-09	2	14.1	9.6	4.5	A	2.4	2.4	0.5	4:07	4:23	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
60+773	S	28-Feb-09	4	7.35	6.75	0.6	A	571.1	571.1	571.1	10:18	11:37	3.0	0.1	0.03	-	-	-	-	-	-	-	-	-	-	
		18-Jan-09	3	8.9	7.9	1	A	403.8	-	-	16:20	17:00	1.4	10.2	13.12	-	-	-	-	-	-	-	-	-	-	
		18-Jan-09	3	8.9	7.9	1	B	290.5	694.3	694.3	17:00	17:25	1.7	9.3	10.11	37.0	-	1.64	19	16	-	-	-	-	20	Max volume
		18-Jan-09	2	13.4	8.9	4.5	A	3.0	3.0	0.7	16:00	16:12	5.3	0	0	-	-	-	-	-	-	-	-	-	-	
60+774.5	T	16-Mar-09	4	7.91	7.31	0.6	MF	7.8	7.8	7.8	6:55	7:15	1.5	0.1	0.11	31.0	2	1.44	14	9	26	-	-	-	19	
		30-Jan-09	3	9.3	8.3	1	A	600.4	600.4	600.4	2:45	3:53	2.6	10.1	3.41	-	-	-	-	-	-	-	-	-	-	Max Volume
		30-Jan-09	2	13.8	9.3	4.5	A	3.0	3.0	0.7	2:22	2:39	2.9	0	0	32.6	7	1.66	11	10	19	19	-	-	17	
60+776	P	13-Nov-08	5	8.62	7.62	1	A	0.0	-	-	03:08	03:43	19.0	0	0	-	-	-	-	-	-	-	-	-	-	Unable to break port
		24-Nov-08	5	8.62	7.62	1	A	24.9	24.9	24.9	15:25	15:38	9.9	0	0	31.6	-	-	-	-	-	-	-	-	24	Port Injection
		13-Nov-08	4	8.62	7.62	1	A	0.0	0.0	0.0	02:38	02:51	19.0	0	0	-	-	-	-	-	-	-	-	-	-	Unable to break port
		28-Feb-09	4	8.06	7.46	0.6	A	363.1	363.1	363.1	13:51	15:12	2.6	0	0.02	-	-	-	-	-	-	-	-	-	-	
		13-Nov-08	3	9.62	8.62	1	A	12.7	12.7	12.7	23:08	23:39	5.0	0	0	-	-	-	-	-	-	-	-	-	-	
		13-Nov-08	2	11.99	9.62	2.37	A	16.4	16.4	6.9	10:35	10:55	3.5	0	0	30.7	2	1.63	12	6	12	13	-	-	22	
		29-Oct-08	1	18.99	11.99	7	A	400.0	-	-	07:55	09:30	3.0	2.5	3	30.0	4	1.62	13	6	22	8	-	-	-	
		29-Oct-08	1	18.99	11.99	7	B	28.0	428.0	61.1	09:30	09:50	5.0	0	0	35.0	3	1.64	-	-	-	-	-	-	-	
60+777.5	T	15-Mar-09	4	7.91	7.31	0.6	MF	5.1	5.1	5.1	22:39	22:55	1.3	0.05	0.07	-	-	-	-	-	-	-	-	-	-	
		30-Jan-09	3	9.3	8.3	1	A	12.4	12.4	12.4	22:12	22:24	2.3	0	0	-	-	-	-	-	-	-	-	-	-	
		30-Jan-09	2	11.8	9.3	2.5	A	12.1	12.1	4.8	21:52	22:07	3.3	0	0	-	-	-	-	-	-	-	-	-	-	
		30-Jan-09	1	18.8	11.8	7	A	124.7	124.7	17.8	20:40	21:28	5.3	0	0	-	-	-	-	-	-	-	-	-	-	
60+779	S	28-Feb-09	4	7.33	6.73	0.6	A	73.2	73.2	73.2	19:17	19:30	1.5	0	0	-	-	-	-	-	-	-	-	-	-	Communicate to 60+776
		18-Jan-09	3	8.6	7.6	1	A	601.3	601.3	601.3	14:34	15:41	1.2	8.8	7.26	32.2	9	1.60	-7	19	-	25	-	-	23	Max volume
		18-Jan-09	2	13.1	8.6	4.5	A	400.0	-	-	10:34	12:31	-	-	-	-	-	-	-	-	-	-	-	-	-	
		18-Jan-09	2	13.1	8.6	4.5	B	951.0	1351.0	300.2	10:34	12:31	1.2	12.5	2.25	37.3	5	1.63	9	12	-	-	-	-	18	Max volume
60+780.5	T	17-Mar-09	4	8.01	7.41	0.6	MF	3.9	3.9	3.9	3:47	4:00	1.7	0.3	0.02	31.3	1	1.42	13	8	12	-	-	-	12	
		30-Jan-09	3	9.4	8.4	1	A	600.9	600.9	600.9	18:42	19:52	2.6	11.1	4.34	32.9	10	1.64	-13	8	14	7	-	-	12	Max Volume
		30-Jan-09	2	11.9	9.4	2.5	A	50.8	50.8	20.3	17:50	18:31	2.5	0.4	0.06	-	-	-	-	-	-	-	-	-	-	
		30-Jan-09	1	18.9	11.9	7	A	33.3	33.3	4.8	17:17	17:37	5.2	0.8	0.02	-	-	-	-	-	-	-	-	-	-	
60+782	P	28-Feb-09	4	7.56	6.96	0.6	A	485.0	485.0	485.0	19:43	21:55	2.6	0.2	0.07	32.1	4	1.63	4	9	14	16	-	-	19	
		08-Jan-09	3	9.3	8.3	1	A	2.6	2.6	2.6	3:53	4:05	2.7	0	0.02	-	-	-	-	-	-	-	-	-	-	
		08-Jan-09	2	11.8	9.3	2.5	A	22.0	22.0	8.8	3:34	3:47	2.2	0	0	-	-	-	-	-	-	-	-	-	-	
		08-Jan-09	1	18.8	11.8	7	A	43.7	43.7	6.2	2:45	3:05	4.8	0.6	0.02	33.3	-	1.65	-	-	-	-	-	-	19	
60+783.5	T	15-Mar-09	4	7.2	6.6	0.6	MF	36.4	36.4	36.4	21:54	22:21	1.4	0.4	0.43	31.2	2	1.41	14	9	17	-	-	-	17	
		30-Jan-09	3	8.4	7.4	1	A	601.1	601.1	601.1	15:35	16:45	1.9	10.1	5.28	31.8	-	1.62	-4	7	-	5	-	-	15	Max Volume
		30-Jan-09	2	12.9	8.4	4.5	A	12.7	12.7	2.8	15:11	15:28	1.9	0	0	-	-	-	-	-	-	-	-	-	-	
60+785	S	28-Feb-09	4	6.72	6.12	0.6	A	600.9	600.9	600.9	22:46	1:23	2.7	4.2	2.59	31.8	2	1.64	5	10	15	16	-	-	21	Max Volume
		18-Jan-09	3	8.6	7.6	1	A	4.9	4.9	4.9	10:04	10:18	3.0	0.2	0.08	-	-	-	-	-	-	-	-	-	-	
		18-Jan-09	2	13.1	8.6	4.5	A	4.5	4.5	1.0	9:49	9:59	2.5	0	0	32.0	18	1.62	21	10	-	17	-	-	18	

Golder Associates

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date (dd-mmm-yy)	Stage: Stage #	Stage: From (m)	Stage: To (m)	Stage: Length (m)	Take: Mix	Take: Volume (L)	Take: V_{TOTAL} (L)	Take: Take (L/m)	Duration: Start (hh:mm)	Duration: End (hh:mm)	Termination: P_{FINAL} (bar)	Termination: Q_{FINAL} (L/min/m)	Termination: Penetrab (L/min/m/bar)	QA: Marsh (sec)	QA: Bleed (%)	QA: Specific Gravity	Temperatures: Cement (Celcius)	Temperatures: Water (Celcius)	Temperatures: Ambient (Celcius)	Temperatures: Glenium (Celcius)	Temperatures: Pozzutec (Celcius)	Temperatures: Bentonite (Celcius)	Temperatures: Mix (Celcius)	Comments
60+786.5	T	15-Mar-09	4	6.84	6.24	0.6	MF	19.7	19.7	19.7	20:02	20:25	1.3	0.9	1.18	-	-	-	-	-	-	-	-	-	-	
		02-Feb-09	3	8.4	7.4	1	A	621.9	621.9	621.9	22:20	0:12	3.6	10.8	3.02	-	-	-	-	-	-	-	-	-	-	Max Volume
		02-Feb-09	2	12.9	8.4	4.5	A	4.4	4.4	1.0	21:49	22:07	2.8	0	0	-	-	-	-	-	-	-	-	-	-	
60+788	P	24-Nov-08	5	7.73	6.73	1	A	145.9	145.9	145.9	11:51	12:37	8.9	0	0	30.6	-	1.62	-	-	-	-	-	-	20	Port Injection
		24-Nov-08	4	7.73	6.73	1	A	439.6	439.6	439.6	10:37	11:42	5.7	4.8	0.95	31.9	3	1.63	20	10	18	13	-	-	23	Port Injection
		24-Nov-08	3	8.73	7.73	1	A	10.0	10.0	10.0	13:53	14:07	9.2	0	0	-	-	-	-	-	-	-	-	-	-	
		24-Nov-08	2	11.9	8.37	3.53	A	18.3	18.3	5.2	13:21	13:35	3.3	0	0	32.4	3	1.61	-	-	18	-	-	-	24	
		29-Oct-08	1	18.23	11.23	7	A	52.0	52.0	7.4	10:15	10:55	5.0	0	0	31.0	4	1.62	-	-	-	-	-	-	-	
60+789.5	T	15-Mar-09	4	7.15	6.55	0.6	MF	3.0	3.0	3.0	19:39	19:52	1.4	0.2	0.25	-	-	-	-	-	-	-	-	-	-	
		02-Feb-09	3	8.6	7.6	1	A	600.7	600.7	600.7	19:08	20:20	2.7	10.6	3.92	-	-	-	-	-	-	-	-	-	-	Max Volume
		02-Feb-09	2	13.1	8.6	4.5	A	7.7	7.7	1.7	18:17	18:35	2.9	0	0	32.4	3	1.69	-12	19	19	20	-	-	19	
60+791	S	28-Feb-09	4	6.97	6.37	0.6	A	22.6	22.6	22.6	3:33	3:53	2.5	0	0	32.1	4	1.63	4	9	15	17	-	-	20	
		01-Feb-09	3	8.3	7.3	1	A	601.0	601.0	601.0	15:10	16:15	1.9	9.9	5.1	33.0	-	1.65	2	9	-	17	-	-	19	Max Volume
		01-Feb-09	2	12.8	8.3	4.5	A	1.3	1.3	0.3	14:43	15:01	2.8	0	0	-	-	-	-	-	-	-	-	-	-	
60+792.5	T	15-Mar-09	4	7	6.4	0.6	MF	15.3	15.3	15.3	19:09	19:26	1.0	0.2	0.31	-	-	-	-	-	-	-	-	-	-	
		02-Feb-09	3	8.4	7.4	1	A	601.5	601.5	601.5	16:27	17:37	2.0	10	5.05	31.0	-	1.65	-	-	13	-	-	-	22	Max Volume
		02-Feb-09	2	12.9	8.4	4.5	A	4.4	4.4	1.0	16:10	16:21	3.2	0	0	-	-	-	-	-	-	-	-	-	-	
60+794	P	28-Feb-09	4	6.92	6.32	0.6	A	51.0	51.0	51.0	4:31	5:18	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		30-Jan-09	3	8.5	7.5	1	A	600.1	600.1	600.1	13:40	14:51	1.5	9.1	6.03	-	-	-	-	-	-	-	-	-	-	Max Volume
		30-Jan-09	2	13	8.5	4.5	A	0.7	0.7	0.2	13:18	13:32	2.9	0	0	32.0	4	1.63	-3	7	-	8	-	-	14	
60+795.5	T	15-Mar-09	4	7.43	6.83	0.6	MF	601.4	601.4	601.4	16:26	18:29	1.5	4.9	3.29	-	-	-	-	-	-	-	-	-	-	
		02-Feb-09	3	8.6	7.6	1	A	262.0	262.0	262.0	14:35	16:00	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		02-Feb-09	2	13.1	8.6	4.5	A	31.0	31.0	6.9	14:10	14:20	3.0	0	0	32.0	2	1.66	23	16	19	24	-	-	27	
60+797	S	28-Feb-09	4	7.02	6.42	0.6	A	123.6	123.6	123.6	5:36	6:32	2.8	0	0	-	-	-	-	-	-	-	-	-	-	
		01-Feb-09	3	8.6	7.6	1	A	12.7	12.7	12.7	14:11	14:32	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		01-Feb-09	2	13.1	8.6	4.5	A	11.8	11.8	2.6	13:48	14:04	2.9	0	0	33.7	3	1.63	19	11	-	24	-	-	21	
60+798.5	T	15-Mar-09	4	7.35	6.75	0.6	MF	5.4	5.4	5.4	16:04	16:18	1.7	0	0	31.2	3	1.42	18	10	16	-	-	-	14	
		13-Feb-09	3	8.6	7.6	1	A*	434.7	434.7	434.7	8:21	9:56	1.8	0	0.02	-	-	-	-	-	-	-	-	-	-	
		13-Feb-09	2	11.1	8.6	2.5	A*	6.1	6.1	2.4	8:00	8:16	2.2	0.3	0.07	32.0	3	1.64	15	9	15	15	12	-	20	
60+800	P	01-Mar-09	4	7.12	6.52	0.6	A*	14.7	14.7	14.7	7:00	7:15	2.4	0	0	32.0	4	1.61	-5	12	12	9	5	-	12	
		30-Jan-09	3	8.8	7.8	1	A	600.8	600.8	600.8	11:02	12:11	1.4	10.6	7.52	-	-	-	-	-	-	-	-	-	-	Max Volume
		30-Jan-09	2	11.3	8.8	2.5	A	1.5	1.5	0.6	10:43	10:55	2.2	0	0	-	-	-	-	-	-	-	-	-	-	
		30-Jan-09	1	18.3	11.3	7	A	2.4	2.4	0.3	10:23	10:36	5.4	0	0	31.1	5	1.55	13	8	-	11	-	-	17	
60+801.5	T	12-Feb-09	3	7.9	6.9	1	A*	649.0	649.0	649.0	4:31	5:49	2.3	8.9	4	-	-	-	-	-	-	-	-	-	-	Max Volume
		12-Feb-09	2	10.4	7.9	2.5	A*	15.3	15.3	6.1	3:59	4:25	2.4	0	0	-	-	-	-	-	-	-	-	-	-	
60+803	S	01-Mar-09	4	6.21	5.61	0.6	A*	365.4	365.4	365.4	7:23	8:33	2.8	0	0	33.0	5	1.62	-4	12	9	12	9	-	14	
		10-Feb-09	3	7.7	6.7	1	A*	17.4	17.4	17.4	23:25	23:51	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	2	12.2	7.7	4.5	A*	5.4	5.4	1.2	23:03	23:18	2.6	0	0	32.0	3	1.66	24	12	18	17	14	-	22	
60+804.5	T	12-Feb-09	3	7.7	6.7	1	A*	3.4	3.4	3.4	3:30	3:45	2.3	0	0	-	-	-	-	-	-	-	-	-	-	
		12-Feb-09	2	10.2	7.7	2.5	A*	18.0	18.0	7.2	2:56	3:24	2.0	0	0	31.0	4	1.66	11	5	13	9	10	-	22	
60+806	P	02-Mar-09	4	6.89	6.29	0.6	A*	601.4	601.4	601.4	6:55	7:59	0.4	10.1	23.4	30.0	6	1.60	6	12	-	12	9	-	20	Max Volume
		08-Feb-09	3	8.5	7.5	1	A*	604.6	604.6	604.6	15:05	16:21	1.9	9.5	5.06	-	-	-	-	-	-	-	-	-	-	Max Volume
		08-Feb-09	2	13	8.5	4.5	A*	1.3	1.3	0.3	14:46	15:01	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
60+807.5	T	12-Feb-09	3	7.8	6.8	1	A*	2.5	2.5	2.5	1:32	1:46	2.5	0	0	-	-	-	-	-	-	-	-	-	-	
		12-Feb-09	2	10.3	7.8	2.5	A*	22.8	22.8	9.1	0:48	1:19	2.0	0	0	-	-	-	-	-	-	-	-	-	-	
60+809	S	02-Mar-09	4	6.82	6.22	0.6	A*	600.1	600.1	600.1	8:28	9:43	2.5	1.9	0.77	30.6	4	1.65	-15	6	13	-	-	-	18	Max Volume
		10-Feb-09	3	8.3	7.3	1	A*	600.1	600.1	600.1	20:25	22:03	2.4	11.4	2.83	-	-	-	-	-	-	-	-	-	-	Max Volume
		10-Feb-09	2	12.8	8.3	4.5	A*	5.0	5.0	1.1	20:07	20:18	2.1	0	0	31.0	3	1.65	29	11	19	18	18	-	19	
60+810.5	T	17-Mar-09	3	7.8	6.8	1	A	11.9	11.9	11.9	1:08	1:24	1.9	0.3	0.27	-	-	-	-	-	-	-	-	-	-	
		17-Mar-09	2	10.3	7.8	2.5	A	21.2	21.2	8.5	0:49	1:06	1.7	0.4	0.08	30.7	4	1.66	10	14	17	17	-	-	21	

Golder Associates

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

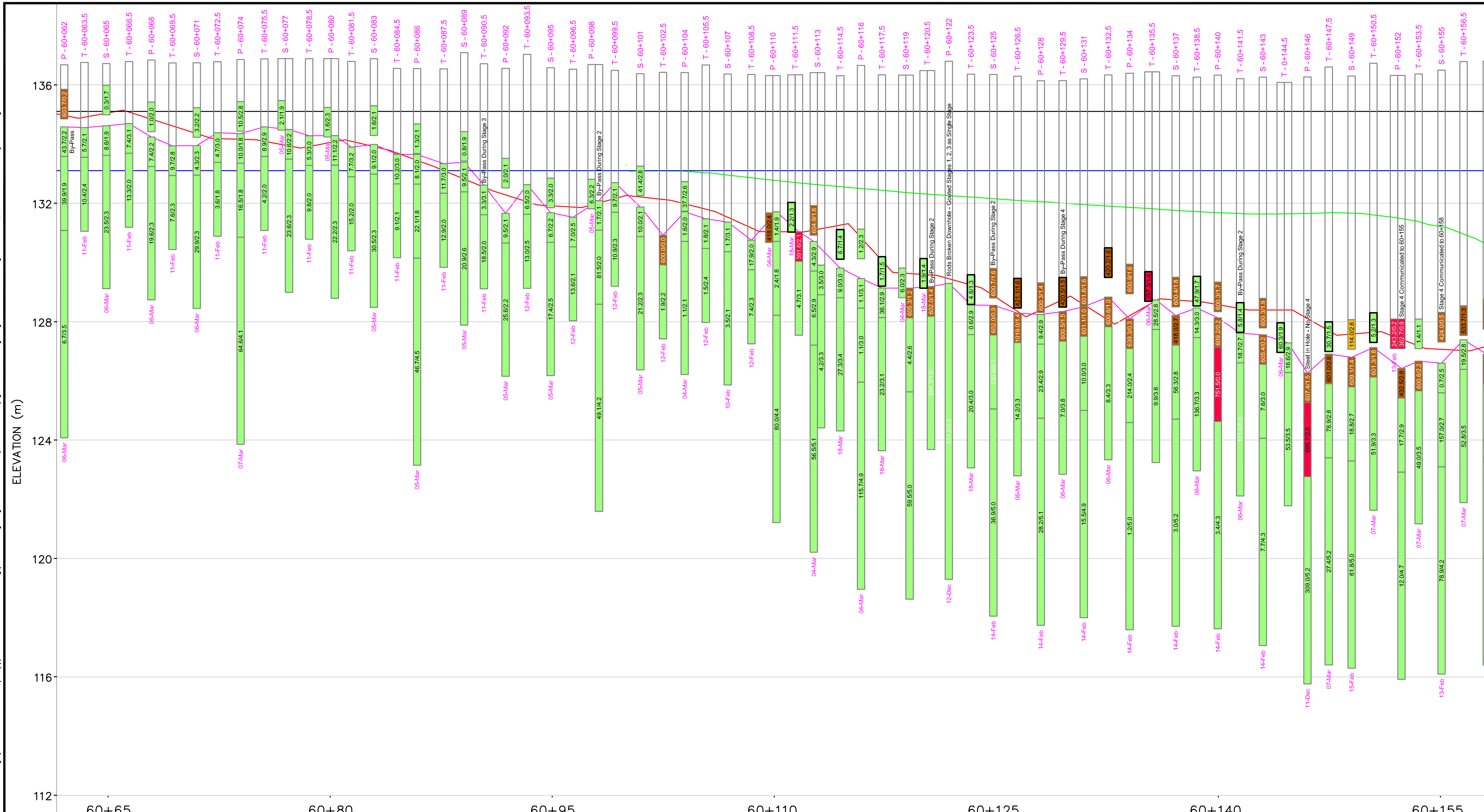
Hole	Order (P, S, T, Q)	Date	Stage: Stage #	Stage: From	Stage: To	Stage: Length	Take: Mix	Take: Volume	Take: V_{TOTAL}	Take: Take	Duration: Start	Duration: End	Termination: P_{FINAL}	Termination: Q_{FINAL}	Termination: Penetrab	QA: Marsh	QA: Bleed	QA: Specific Gravity	Temperatures: Cement	Temperatures: Water	Temperatures: Ambient	Temperatures: Glenium	Temperatures: Pozzutec	Temperatures: Bentonite	Temperatures: Mix	Comments
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+812	P	02-Mar-09	4	5.83	5.23	0.6	A*	230.7	230.7	230.7	10:13	10:54	2.5	0	0.01	32.0	7	1.62	8	10	-	16	11	-	17	
		08-Feb-09	3	7.4	6.4	1	A*	2.3	2.3	2.3	14:08	14:10	3.0	0	0	-	-	-	-	-	-	-	-	-	-	
		08-Feb-09	2	9.9	7.4	2.5	A*	2.4	2.4	1.0	13:40	14:01	1.9	0	0	-	-	-	-	-	-	-	-	-	-	
		08-Feb-09	1	16.9	9.9	7	A*	2.0	2.0	0.3	13:31	13:42	4.3	0	0	30.0	5	1.65	20	13	16	20	21	-	22	
60+813.5	T	12-Feb-09	3	7.8	6.8	1	A*	2.3	2.3	2.3	0:00	0:17	1.9	0	0	32.0	2	1.65	9	7	14	13	9	-	21	
		12-Feb-09	2	10.3	7.8	2.5	A*	215.0	215.0	86.0	22:35	23:53	2.3	0	0	-	-	-	-	-	-	-	-	-	-	
60+815	S	02-Mar-09	4	6.13	5.53	0.6	A*	173.5	173.5	173.5	13:33	14:12	2.7	0	0.01	30.8	5	1.63	-10	11	-	24	12	-	20	
		10-Feb-09	3	7.8	6.8	1	A*	70.4	70.4	70.4	16:06	17:36	2.0	0	0	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	2	12.3	7.8	4.5	A*	2.0	2.0	0.4	15:49	16:01	2.3	0.3	0.04	-	-	-	-	-	-	-	-	-	-	
60+816.5	T	12-Feb-09	3	7.8	6.8	1	A**	2.1	2.1	2.1	18:02	18:13	1.9	0.1	0.02	-	-	-	-	-	-	-	-	-	-	
		12-Feb-09	2	10.3	7.8	2.5	A*	14.0	14.0	5.6	17:17	17:58	1.9	0.1	0.02	29.0	3	1.60	26	14	13	16	16	-	19	
60+818	P	02-Mar-09	4	6.56	5.96	0.6	A*	302.9	302.9	302.9	14:35	15:24	2.5	0.1	0.03	33.0	4	1.62	-5	13	-	10	9	-	16	
		08-Feb-09	3	8.5	7.5	1	A*	33.7	33.7	33.7	11:00	11:15	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
		08-Feb-09	2	13	8.5	4.5	A*	2.8	2.8	0.6	10:41	10:52	2.1	0	0	-	-	-	-	-	-	-	-	-	-	
60+819.5	T	12-Feb-09	3	7.8	6.8	1	A*	103.7	103.7	103.7	18:49	20:06	2.1	0	0	-	-	-	-	-	-	-	-	-	-	
		12-Feb-09	2	10.3	7.8	2.5	A*	2.4	2.4	1.0	18:28	18:41	1.4	0	0	32.0	3	1.66	7	10	13	12	13	-	19	
60+821	S	02-Mar-09	4	6.23	5.63	0.6	A*	355.9	355.9	355.9	17:03	17:58	2.7	0.1	0.03	32.0	-	1.63	4	10	-	11	11	-	14	
		10-Feb-09	3	7.7	6.7	1	A*	259.8	259.8	259.8	13:50	15:33	2.0	0.1	0.04	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	2	12.2	7.7	4.5	A*	4.5	4.5	1.0	13:02	13:42	2.1	0	0	30.0	2	1.65	23	14	20	17	18	-	23	
60+822.5	T	12-Feb-09	3	7.8	6.8	1	A*	22.5	22.5	22.5	15:55	16:45	2.0	0	0.01	-	-	-	-	-	-	-	-	-	-	
		12-Feb-09	2	10.3	7.8	2.5	A*	42.5	42.5	17.0	13:30	15:38	1.7	0	0.01	31.0	8	1.65	20	11	15	20	20	-	24	
60+824	P	02-Mar-09	4	6.23	5.63	0.6	A*	83.7	83.7	83.7	18:10	18:40	2.5	0	0.01	-	-	-	-	-	-	-	-	-	-	
		08-Feb-09	3	7.9	6.9	1	A*	1.2	1.2	1.2	10:00	10:12	3.3	0	0	-	-	-	-	-	-	-	-	-	-	
		08-Feb-09	2	10.4	7.9	2.5	A*	19.4	19.4	7.8	9:23	9:56	1.9	0	0	30.0	3	1.63	19	15	13	16	14	-	20	
		08-Feb-09	1	17.4	10.4	7	A*	39.1	39.1	5.6	8:49	9:12	4.4	0	0	33.5	4	1.64	19	10	13	17	13	-	16	
60+825.5	T	12-Feb-09	3	7	6	1	A*	36.6	36.6	36.6	10:00	10:53	2.0	0	0.01	-	-	-	-	-	-	-	-	-	-	
		12-Feb-09	2	9.5	7	2.5	A*	162.0	162.0	64.8	8:42	9:56	1.8	0.2	0.03	-	-	-	-	-	-	-	-	-	-	
60+827	S	02-Mar-09	4	5.01	4.41	0.6	A*	22.8	22.8	22.8	19:30	19:51	2.5	0	0	30.2	3	1.63	4	12	14	12	10	-	21	
		10-Feb-09	3	6.6	5.6	1	A*	3.9	3.9	3.9	9:27	9:44	2.1	0	0	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	2	11.1	6.6	4.5	A*	29.6	29.6	6.6	9:11	9:23	2.2	0	0	-	-	-	-	-	-	-	-	-	-	
60+828.5	T	12-Feb-09	3	6.7	5.7	1	A*	600.4	600.4	600.4	6:30	8:25	2.1	4.5	2.12	31.0	4	1.62	28	11	16	14	13	-	22	
		12-Feb-09	2	9.2	6.7	2.5	A*	2.9	2.9	1.2	6:04	6:18	2.4	0	0	-	-	-	-	-	-	-	-	-	-	
60+830	P	02-Mar-09	4	4.61	4.01	0.6	A*	28.6	28.6	28.6	20:17	20:38	2.5	0	0	-	-	-	-	-	-	-	-	-	-	
		08-Feb-09	3	6.1	5.1	1	A*	607.5	607.5	607.5	5:20	6:29	2.4	10.4	4.35	-	-	-	-	-	-	-	-	-	-	Max Volume
		07-Feb-09	2	10.6	6.1	4.5	A*	27.5	27.5	6.1	4:49	5:10	2.4	0	0	32.0	2	1.70	9	13	-	18	19	-	16	
60+831.5	T	11-Feb-09	3	6.2	5.2	1	A*	18.7	18.7	18.7	3:36	3:56	2.8	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	8.7	6.2	2.5	A*	15.9	15.9	6.4	3:13	3:30	2.2	0	0	31.0	-	1.65	24	8	15	16	14	-	22	
60+833	S	02-Mar-09	4	4.25	3.65	0.6	A*	24.5	24.5	24.5	21:19	21:39	2.1	0.1	0.04	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	3	5.7	4.7	1	A*	71.7	71.7	71.7	7:50	8:47	2.1	0	0	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	2	10.2	5.7	4.5	A*	8.2	8.2	1.8	7:20	7:35	2.0	0.1	0.01	-	-	-	-	-	-	-	-	-	-	
60+834.5	T	11-Feb-09	3	6	5	1	A*	62.2	62.2	62.2	2:29	2:56	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	8.5	6	2.5	A*	8.2	8.2	3.3	2:09	2:24	1.9	0	0	-	-	-	-	-	-	-	-	-	-	
60+836	P	02-Mar-09	4	4.07	3.47	0.6	A*	23.8	23.8	23.8	1:08	1:33	2.9	0	0	31.1	-	1.63	4	10	16	14	9	-	19	
		07-Feb-09	3	5.7	4.7	1	A*	108.6	108.6	108.6	3:28	4:19	2.9	0.7	0.25	-	-	-	-	-	-	-	-	-	-	
		07-Feb-09	2	10.2	5.7	4.5	A*	27.6	27.6	6.1	3:00	3:18	2.7	0.1	0.01	-	-	-	-	-	-	-	-	-	-	
60+837.5	T	11-Feb-09	3	5.2	4.2	1	A*	76.1	76.1	76.1	22:20	22:49	2.9	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	7.7	5.2	2.5	A*	11.0	11.0	4.4	21:57	22:13	2.2	0	0	-	-	-	-	-	-	-	-	-	-	
60+839	S	02-Mar-09	4	3.57	2.97	0.6	A*	21.4	21.4	21.4	1:47	2:05	2.7	0.9	0.32	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	3	5.4	4.4	1	A*	7.2	7.2	7.2	6:24	6:46	2.1	0.08	0.07	-	-	-	-	-	-	-	-	-	-	
		10-Feb-09	2	9.9	5.4	4.5	A*	49.0	49.0	10.9	5:45	6:15	2.1	0.06	0	32.9	4	1.66	-	-	-	-	-	-	-	

Check: GRB

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

AEM

Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(L)	(L)	(L/m)	(hh:mm)	(hh:mm)	(bar)	(L/min/m)	(L/min/m/bar)	(sec)	(%)		(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	(Celcius)	
60+840.5	T	11-Feb-09	3	5.4	4.4	1	A*	10.9	10.9	10.9	21:11	21:28	3.1	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	7.9	5.4	2.5	A*	14.9	14.9	6.0	20:45	21:02	2.3	0	0	31.0	4	1.65	35	6	16	14	16	-	17	
60+842	P	02-Mar-09	4	3.54	2.94	0.6	A*	17.9	17.9	17.9	2:35	2:52	2.5	0.1	0.05	-	-	-	-	-	-	-	-	-	-	
		07-Feb-09	3	5.2	4.2	1	A*	219.5	219.5	219.5	1:49	2:37	3.1	0	0.02	-	-	-	-	-	-	-	-	-	-	
		07-Feb-09	2	9.7	5.2	4.5	A*	12.0	12.0	2.7	1:25	1:41	2.5	0	0	32.4	6	1.65	9	13	-	18	19	-	17	
60+843.5	T	11-Feb-09	3	5.1	4.1	1	A*	600.7	600.7	600.7	0:09	1:34	0.9	14.9	15.07	-	-	-	-	-	-	-	-	-	-	Max volume
		11-Feb-09	2	7.6	5.1	2.5	A*	26.7	26.7	10.7	23:40	0:02	1.8	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	1	14.6	7.6	7	A*	39.5	39.5	5.6	23:11	23:33	4.5	0	0	32.0	2	1.66	26	7	17	15	14	-	19	
60+845	S	02-Mar-09	4	3.08	2.48	0.6	A*	600.9	600.9	600.9	3:13	4:23	0.1	9.6	123.7	-	-	-	-	-	-	-	-	-	-	Max Volume
		09-Feb-09	3	5	4	1	A*	7.1	7.1	7.1	2:52	3:06	3.2	0	0	-	-	-	-	-	-	-	-	-	24	
		09-Feb-09	2	9.5	5	4.5	A*	400.0	-	-	1:15	2:00	0.6	0	0	32.0	-	1.65	19	17	15	17	16	-	22	
		09-Feb-09	2	9.5	5	4.5	B*	432.0	832.0	184.9	2:00	2:44	2.0	0	0	35.0	-	1.66	-	-	-	-	-	-	23	
60+846.5	T	11-Feb-09	3	4.6	3.6	1	A*	9.8	9.8	9.8	16:30	16:47	2.1	0	0.01	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	7.1	4.6	2.5	A*	14.0	14.0	5.6	16:07	16:25	1.9	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	1	14.1	7.1	7	A*	60.8	60.8	8.7	15:33	15:59	4.3	0	0	-	-	-	-	-	-	-	-	-	-	
60+848	P	02-Mar-09	4	2.75	2.15	0.6	A*	24.7	24.7	24.7	4:52	5:19	2.6	0	0	30.2	4	1.62	5	9	14	15	10	-	21	
		07-Feb-09	3	4.1	3.1	1	A*	615.7	615.7	615.7	21:01	22:07	0.1	13.3	109.5	31.3	-	1.58	26	11	-	13	11	-	15	Max Volume
		07-Feb-09	2	8.6	4.1	4.5	A*	15.6	15.6	3.5	20:30	20:48	2.3	0.2	0.02	-	-	-	-	-	-	-	-	-	-	
60+849.5	T	11-Feb-09	3	4.1	3.1	1	A*	14.0	14.0	14.0	18:00	18:21	1.8	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	6.6	4.1	2.5	A*	13.9	13.9	5.6	17:36	17:50	2.0	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	1	13.6	6.6	7	A*	48.7	48.7	7.0	16:58	17:25	4.1	0	0	-	-	-	-	-	-	-	-	-	-	
60+851	S	03-Mar-09	4	2.75	2.15	0.6	A*	8.4	8.4	8.4	7:28	7:43	2.6	0	0	31.5	5	1.62	10	11	-	15	15	-	17	
		09-Feb-09	3	4	3	1	A*	600.1	600.1	600.1	23:00	0:57	0.0	15.9	inf	-	-	-	-	-	-	-	-	-	-	Max Volume
		09-Feb-09	2	8.5	4	4.5	A*	544.5	544.5	121.0	22:10	23:53	2.2	0	0	32.0	3	1.66	21	18	14	16	17	-	20	
60+852.5	T	11-Feb-09	3	4.6	3.6	1	A*	1.5	1.5	1.5	14:59	15:11	2.0	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	7.1	4.6	2.5	A*	1.5	1.5	0.6	14:43	14:55	1.8	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	1	14.1	7.1	7	A*	40.2	40.2	5.7	14:13	14:33	4.2	0	0	31.0	9	1.63	15	17	20	21	21	-	25	
60+854	P	03-Mar-09	4	3.06	2.46	0.6	A*	7.5	7.5	7.5	7:55	8:09	2.9	0	0	30.4	4	1.62	9	10	-	15	15	-	16	
		07-Feb-09	3	4.6	3.6	1	A*	601.2	601.2	601.2	18:50	20:15	0.0	11	inf	-	-	-	-	-	-	-	-	-	-	Max Volume
		07-Feb-09	2	9.1	4.6	4.5	A*	15.1	15.1	3.3	18:20	18:40	2.6	0	0	-	-	-	-	-	-	-	-	-	-	
60+855.5	T	11-Feb-09	3	4.1	3.1	1	A*	6.7	6.7	6.7	10:56	11:14	1.8	0	0.01	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	8.6	4.1	4.5	A*	36.5	36.5	8.1	10:30	10:55	1.6	0	0	-	-	-	-	-	-	-	-	-	-	
60+857	S	03-Mar-09	4	3.01	2.41	0.6	A*	601.3	601.3	601.3	8:22	9:33	0.2	12.5	67	31.9	-	1.62	13	10	-	15	13	-	15	Max Volume
		09-Feb-09	3	4.5	3.5	1	A*	9.3	9.3	9.3	21:00	21:15	2.0	0	0	-	-	-	-	-	-	-	-	-	-	
		09-Feb-09	2	9	4.5	4.5	A*	21.8	21.8	4.8	20:30	20:50	2.1	0	0	32.0	3	1.64	22	19	13	17	18	-	20	
60+858.5	T	11-Feb-09	3	3.9	2.9	1	A*	8.6	8.6	8.6	10:06	10:21	2.1	0	0	-	-	-	-	-	-	-	-	-	-	
		11-Feb-09	2	6.4	3.9	2.5	A*	15.3	15.3	6.1	9:39	10:00	1.8	0.2	0.06	31.0	2	1.65	16	16	15	15	15	-	20	
60+860	P	03-Mar-09	4	1.97	1.37	0.6	A*	1.9	1.9	1.9	9:48	10:00	2.6	0	0.01	-	-	-	-	-	-	-	-	-	-	
		07-Feb-09	3	3.3	2.3	1	A*	0.7	0.7	0.7	17:53	18:09	2.7	0	0	-	-	-	-	-	-	-	-	-	-	
		07-Feb-09	2	7.8	3.3	4.5	A*	28.9	28.9	6.4	17:29	17:48	2.6	0	0	30.0	5	1.61	-9	8	16	17	6	-	17	



LEGEND:

BOREHOLE NAME
P-PRIMARY
S-SECONDARY
T-TERTIARY
Q-QUATERNARY

P - 60+104 — PRESSURE OBTAINED (BARS)

3.3/2.0 — VOLUME INJECTED (L)

DD-MMM — START OF FINAL GROUTING FOR GIVEN GROUT HOLE

		TAKE: L/m
VOL / P	LOW	< 100
VOL / P	M.HIGH	100< >200
VOL / P	HIGH	200< >400
VOL / P	V.HIGH	>400

*White Numbers indicate > 80% of Pmax not achieved
*Black Numbers indicate > 80% Pmax achieved

3.3/2.0 — BLACK OUTLINE: GROUTED WITH MICROFINE

DIKE CREST: ~135.1m
LAKE LEVEL: ~133.1m
LAKEBED
BASE OF SB CUT-OFF WALL (SOUNDING)
INFERRED BEDROCK BASED ON CASING INSTALLATION RECORDS

0 1 2 3 4 5
VERTICAL SCALE IN METRES

0 2 4 6 8 10
HORIZONTAL SCALE IN METRES

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (MASL), UNLESS OTHERWISE NOTED
3) LAKEBED SURFACE BASED INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
4) CASING COLLAR REFERENCE ELEVATIONS PROVIDED BY AEM

PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

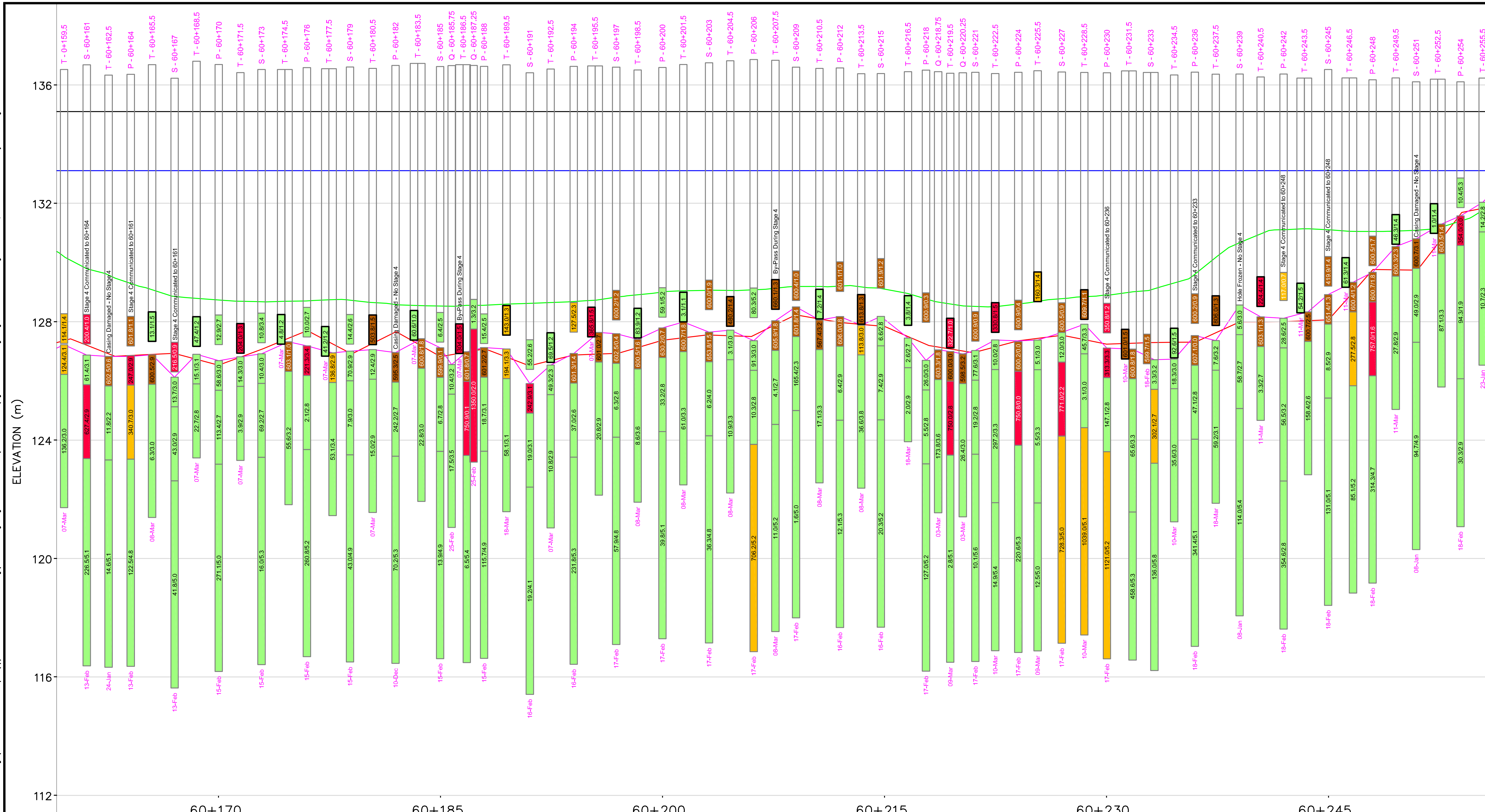
TITLE
EAST DIKE
GROUTING PROGRESS CROSS SECTION

Golder Associates

PROJECT No.	07-1413-0074		FILE No.		
DESIGN	VTR	APR09	SCALE	AS SHOWN	REV. 0
CADD	VTR	APR09			
CHECK	GRB	APR09			
REVIEW	-	-			

FIGURE E3 - 1

Drawing File: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Appendix E - East Dike Grouting\E3 - Grouting Progress Cross Section\DRAFT REMOVED\Figure E3 - Grouting Progress Cross Section.dwg October 23, 2009 11:01:35 AM By: VRombough



LEGEND:

BOREHOLE NAME
P-PRIMARY
S-SECONDARY
T-TERTIARY
Q-QUATERNARY

P - 60+104

PRESSURE OBTAINED (BARS)

3.3/2.0

START OF FINAL GROUTING FOR GIVEN GROUT HOLE

DD-MMM

VOLUME INJECTED (L)

		TAKE: L/m
VOL / P	LOW	< 100
VOL / P	M.HIGH	100< >200
VOL / P	HIGH	200< >400
VOL / P	V.HIGH	>400

*White Numbers indicate > 80% of Pmax not achieved
*Black Numbers indicate > 80% Pmax achieved

3.3/2.0 — BLACK OUTLINE: GROUTED WITH MICROFINE

DIKE CREST: ~135.1m
LAKE LEVEL: ~133.1m
LAKEBED
BASE OF SB CUT-OFF WALL (SOUNDING)
INFERRED BEDROCK BASED ON CASING INSTALLATION RECORDS

0 1 2 3 4 5
VERTICAL SCALE IN METRES

0 2 4 6 8 10
HORIZONTAL SCALE IN METRES

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (MASL), UNLESS OTHERWISE NOTED
3) LAKEBED SURFACE BASED INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
4) CASING COLLAR REFERENCE ELEVATIONS PROVIDED BY AEM

PROJECT
AEM
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

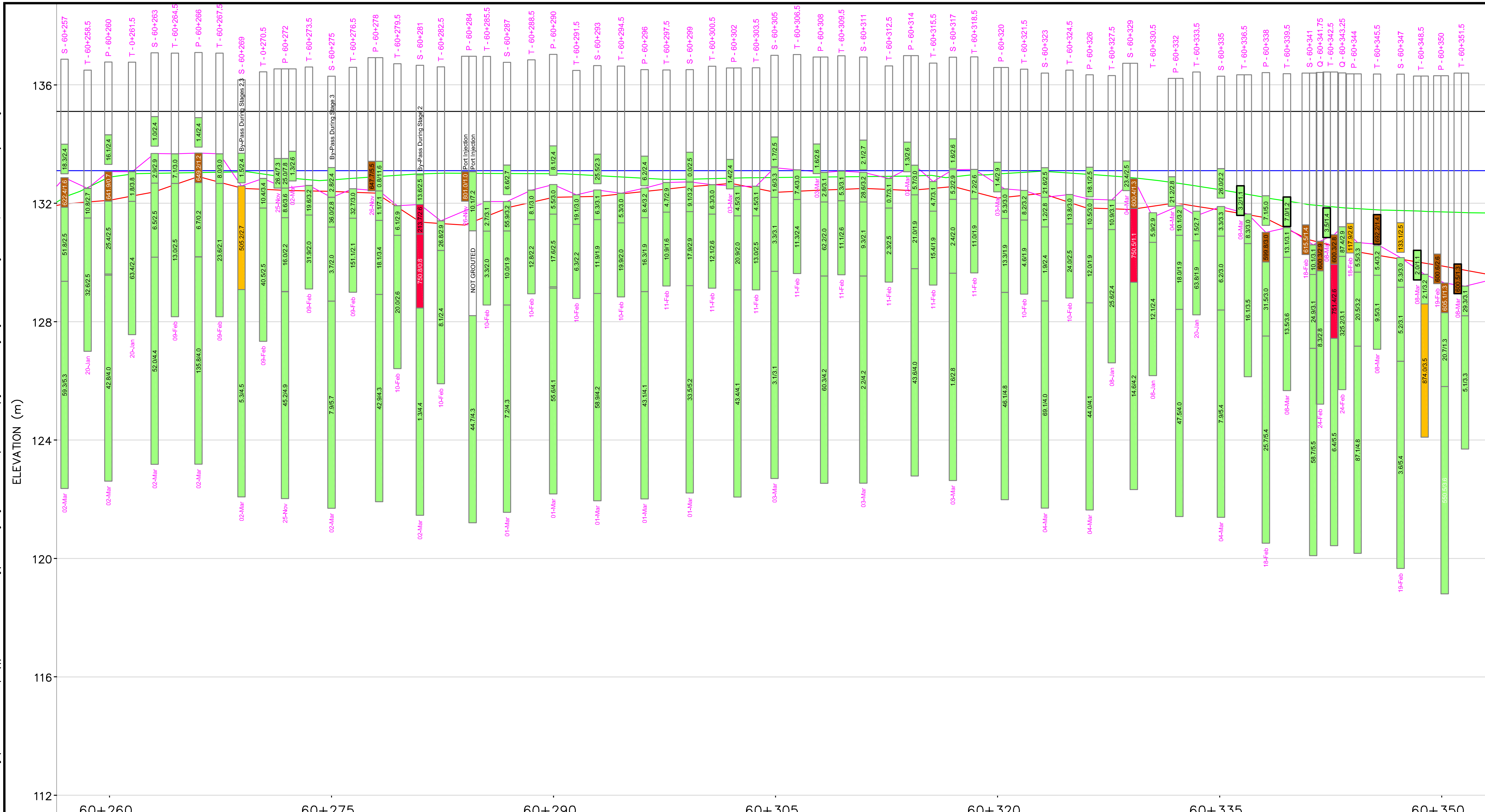
TITLE
EAST DIKE
GROUTING PROGRESS CROSS SECTION

Golder Associates

PROJECT No.	07-1413-0074		FILE No.			
DESIGN	VTR	APR09	SCALE	AS SHOWN	REV.	0
CADD	VTR	APR09				
CHECK	GRB	APR09				
REVIEW	-	-				

FIGURE E3 - 2

Drawing File: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Appendix E - East Dike Grouting\E3 - Grouting Progress Cross Section\DRAFT REMOVED\Figure E3 - Grouting Progress Cross Section.dwg October 23, 2009 10:54:59 AM By: VRombough



LEGEND:

BOREHOLE NAME
P-PRIMARY
S-SECONDARY
T-TERTIARY
Q-QUATERNARY

P - 60+104

PRESSURE OBTAINED (BARS)

3.3/2.0

START OF FINAL GROUTING FOR GIVEN GROUT HOLE

DD-MMM

VOLUME INJECTED (L)

		TAKE: L/m
VOL / P	LOW	< 100
VOL / P	M.HIGH	100< >200
VOL / P	HIGH	200< >400
VOL / P	V.HIGH	>400

*White Numbers indicate > 80% of Pmax not achieved
*Black Numbers indicate > 80% Pmax achieved

3.3/2.0 — BLACK OUTLINE: GROUTED WITH MICROFINE

DIKE CREST: ~135.1m
LAKE LEVEL: ~133.1m
LAKEBED
BASE OF SB CUT-OFF WALL (SOUNDING)
INFERRED BEDROCK BASED ON CASING INSTALLATION RECORDS

0 1 2 3 4 5
VERTICAL SCALE IN METRES

0 2 4 6 8 10
HORIZONTAL SCALE IN METRES

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (MASL), UNLESS OTHERWISE NOTED
3) LAKEBED SURFACE BASED INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
4) CASING COLLAR REFERENCE ELEVATIONS PROVIDED BY AEM

PROJECT
AEM
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

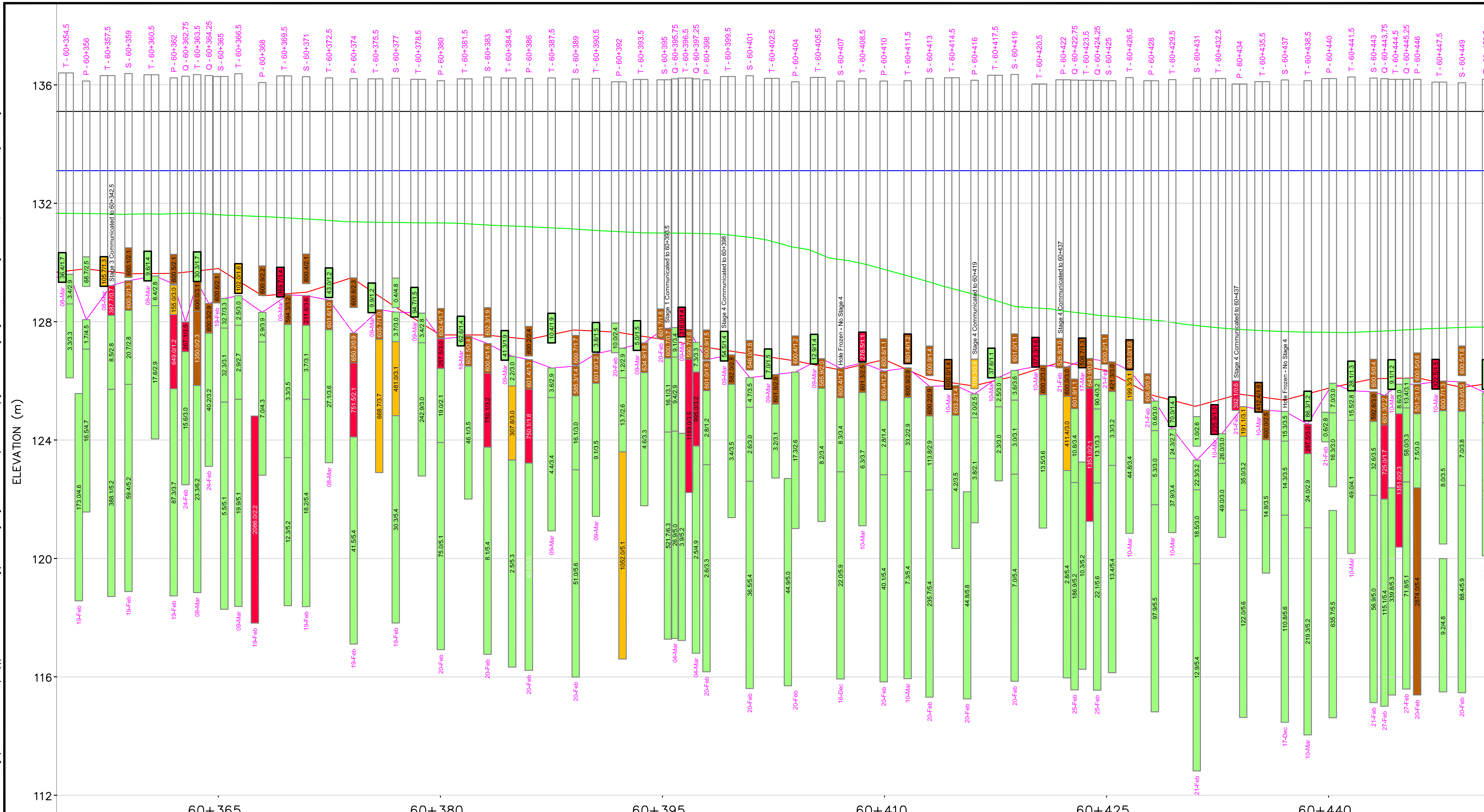
TITLE
EAST DIKE
GROUTING PROGRESS CROSS SECTION

Golder Associates

PROJECT No.		07-1413-0074	FILE No.			
DESIGN	VTR	APR09	SCALE	AS SHOWN	REV.	0
CADD	VTR	APR09				
CHECK	GRB	APR09				
REVIEW	-	-				

FIGURE E3 - 3

Drawing File: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Appendix E - East Dike Grouting\E3 - Grouting Progress Cross Section\DRAFT REMOVED\Figure E3 - Grouting Progress Cross Section.dwg October 23, 2009 10:54:59 AM By: VRombough



LEGEND:

BOREHOLE NAME
P-PRIMARY
S-SECONDARY
T-TERTIARY
Q-QUATERNARY

P - 60+104 — PRESSURE OBTAINED (BARS)

3.3/2.0 — VOLUME INJECTED (L)

START OF FINAL GROUTING FOR GIVEN GROUT HOLE — DD-MMM

		TAKE: L/m
VOL / P	LOW	< 100
VOL / P	M.HIGH	100< >200
VOL / P	HIGH	200< >400
VOL / P	V.HIGH	>400

*White Numbers indicate > 80% of Pmax not achieved
*Black Numbers indicate > 80% Pmax achieved

3.3/2.0 — BLACK OUTLINE: GROUTED WITH MICROFINE

DIKE CREST: ~135.1m
LAKE LEVEL: ~133.1m
LAKEBED
BASE OF SB CUT-OFF WALL (SOUNDING)
INFERRED BEDROCK BASED ON CASING INSTALLATION RECORDS

0 1 2 3 4 5
VERTICAL SCALE IN METRES

0 2 4 6 8 10
HORIZONTAL SCALE IN METRES

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (MASL), UNLESS OTHERWISE NOTED
3) LAKEBED SURFACE BASED INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
4) CASING COLLAR REFERENCE ELEVATIONS PROVIDED BY AEM

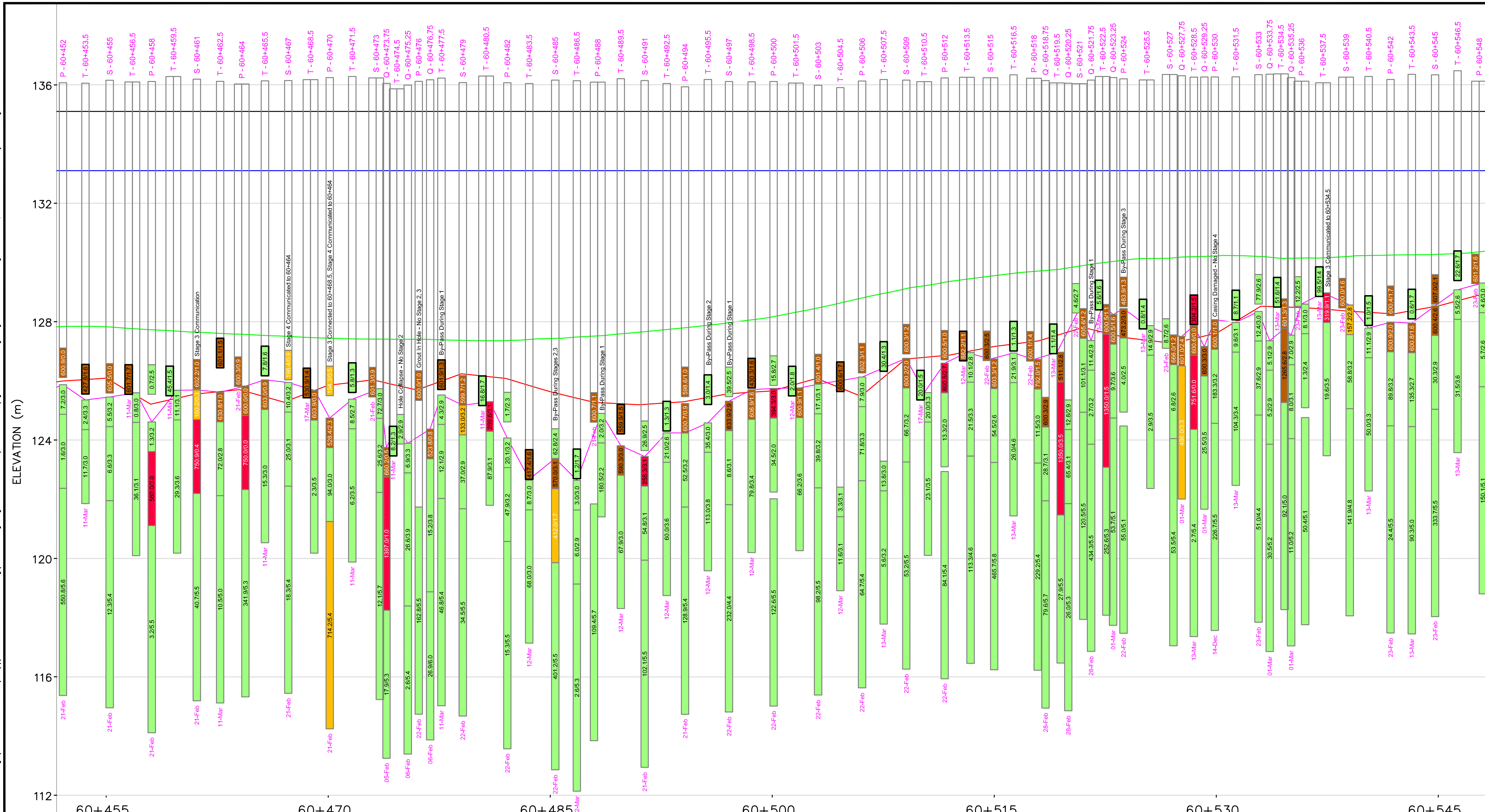
PROJECT
AEM
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE
GROUTING PROGRESS CROSS SECTION

Golder Associates

PROJECT No.	07-1413-0074		FILE No.
DESIGN	VTR	APR09	SCALE AS SHOWN REV. 0
CADD	VTR	APR09	
CHECK	GRB	APR09	FIGURE E3 - 4
REVIEW	-	-	

Drawing File: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Appendix E - East Dike Grouting\E3 - Grouting Progress Cross Section\DRAFT REMOVED\Figure E3 - Grouting Progress Cross Section.dwg October 23, 2009 10:54:59 AM By: VRombough



LEGEND:

BOREHOLE NAME
P-PRIMARY
S-SECONDARY
T-TERTIARY
Q-QUATERNARY

P - 60+104

PRESSURE OBTAINED (BARS)

3.3/2.0

VOLUME INJECTED (L)

START OF FINAL GROUTING FOR GIVEN GROUT HOLE

DD-MMM

		TAKE: L/m
VOL / P	LOW	< 100
VOL / P	M.HIGH	100< >200
VOL / P	HIGH	200< >400
VOL / P	V.HIGH	>400

*White Numbers indicate > 80% of Pmax not achieved
*Black Numbers indicate > 80% Pmax achieved

3.3/2.0 — BLACK OUTLINE: GROUTED WITH MICROFINE

DIKE CREST: ~135.1m

LAKE LEVEL: ~133.1m

LAKEBED

BASE OF SB CUT-OFF WALL (SOUNDING)

INFERRED BEDROCK BASED ON CASING INSTALLATION RECORDS

0 1 2 3 4 5
VERTICAL SCALE IN METRES

0 2 4 6 8 10
HORIZONTAL SCALE IN METRES

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
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3) LAKEBED SURFACE BASED INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
4) CASING COLLAR REFERENCE ELEVATIONS PROVIDED BY AEM

PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

EAST DIKE
GROUTING PROGRESS CROSS SECTION

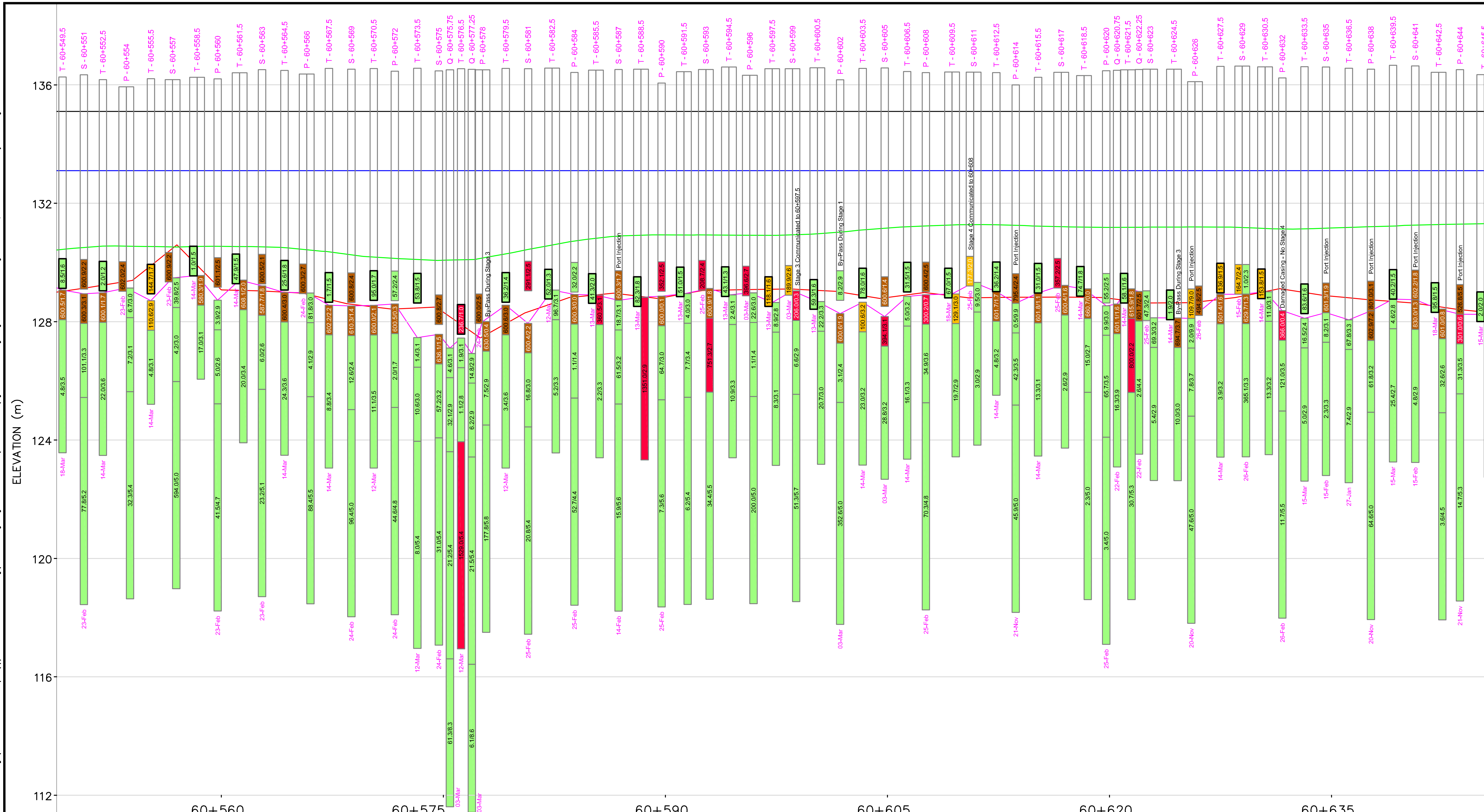
PROJECT No.		07-1413-0074	FILE No.	
DESIGN	VTR	APR09	SCALE AS SHOWN	REV. 0
CADD	VTR	APR09		
CHECK	GRB	APR09		
REVIEW	-	-		

Golder Associates

FIGURE E3 - 5

Drawing File: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Appendix E - East Dike Grouting\E3 - Grouting Progress Cross Section\DRAFT REMOVED\Figure E3 - Grouting Progress Cross Section.dwg October 23, 2009 10:54:59 AM By: VRombough

Drawing File: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Appendix E – East Dike Grouting\E3 – Grouting Progress Cross Section\DRAFT REMOVED\Figure E3 – Grouting Progress Cross Section.dwg October 23, 2009 10:54:59 AM By: VRombough



LEGEND:

BOREHOLE NAME
P-PRIMARY
S-SECONDARY
T-TERTIARY
Q-QUATERNARY

P - 60+104

PRESSURE OBTAINED (BARS)

3.3/2.0

START OF FINAL GROUTING FOR GIVEN GROUT HOLE

DD-MMM

VOLUME INJECTED (L)

		TAKE: L/m
VOL / P	LOW	< 100
VOL / P	M.HIGH	100< >200
VOL / P	HIGH	200< >400
VOL / P	V.HIGH	>400

*White Numbers indicate > 80% of Pmax not achieved
*Black Numbers indicate > 80% Pmax achieved

3.3/2.0 — BLACK OUTLINE: GROUTED WITH MICROFINE

DIKE CREST: ~135.1m
LAKE LEVEL: ~133.1m
LAKEBED
BASE OF SB CUT-OFF WALL (SOUNDING)
INFERRED BEDROCK BASED ON CASING INSTALLATION RECORDS

0 1 2 3 4 5
VERTICAL SCALE IN METRES

0 2 4 6 8 10
HORIZONTAL SCALE IN METRES

NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2) ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (MASL), UNLESS OTHERWISE NOTED.
3) LAKEBED SURFACE BASED INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
4) CASING COLLAR REFERENCE ELEVATIONS PROVIDED BY AEM

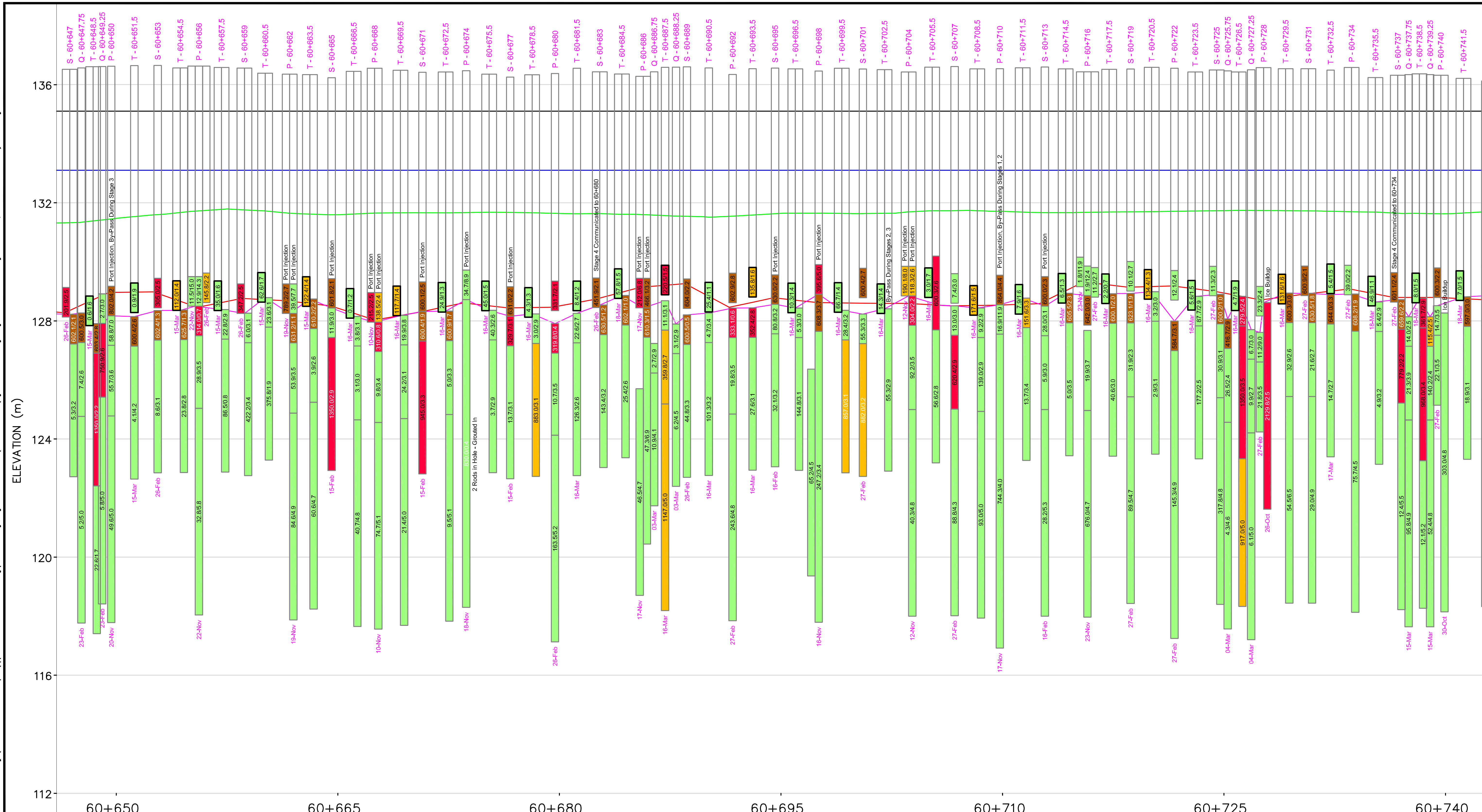
PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE
GROUTING PROGRESS CROSS SECTION

Golder Associates

PROJECT No.		07-1413-0074	FILE No.		
DESIGN	VTR	APR09	SCALE	AS SHOWN	REV. 0
CADD	VTR	APR09			
CHECK	GRB	APR09			
REVIEW	-	-			

FIGURE E3 - 6



LEGEND:

BOREHOLE NAME
P-PRIMARY
S-SECONDARY
T-TERTIARY
Q-QUATERNARY

P - 60+104

PRESSURE OBTAINED (BARS)

3.3/2.0

START OF FINAL GROUTING FOR GIVEN GROUT HOLE

DD-MMM

VOLUME INJECTED (L)

		TAKE: L/m
VOL / P	LOW	< 100
VOL / P	M.HIGH	100< >200
VOL / P	HIGH	200< >400
VOL / P	V.HIGH	>400

*White Numbers indicate > 80% of Pmax not achieved
*Black Numbers indicate > 80% Pmax achieved

3.3/2.0 — BLACK OUTLINE: GROUTED WITH MICROFINE

DIKE CREST: ~135.1m
LAKE LEVEL: ~133.1m
LAKEBED
BASE OF SB CUT-OFF WALL (SOUNDING)
INFERRED BEDROCK BASED ON CASING INSTALLATION RECORDS

0 1 2 3 4 5
VERTICAL SCALE IN METRES

0 2 4 6 8 10
HORIZONTAL SCALE IN METRES

NOTES:

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4) CASING COLLAR REFERENCE ELEVATIONS PROVIDED BY AEM

PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE
GROUTING PROGRESS CROSS SECTION

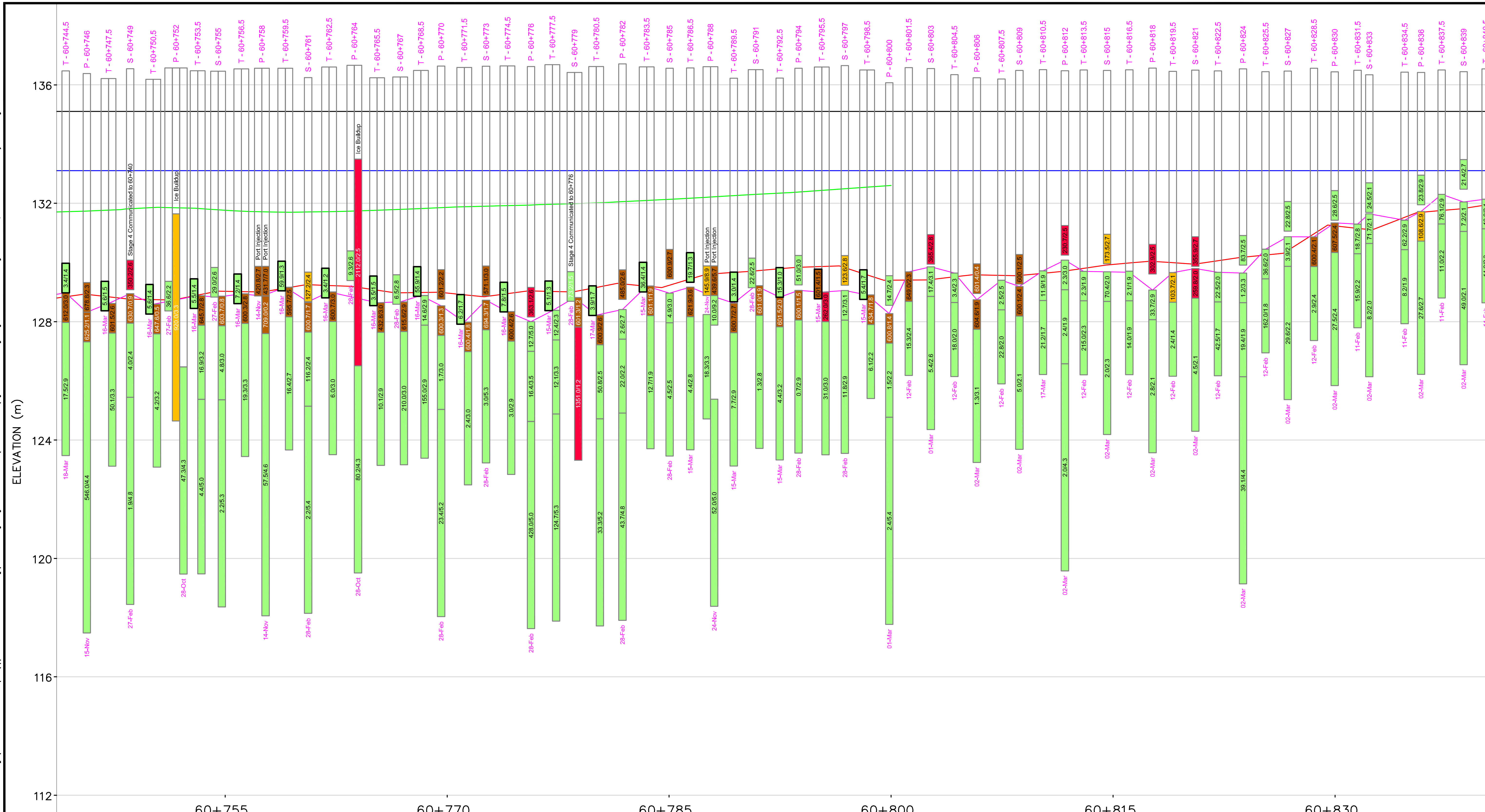
PROJECT No.		07-1413-0074	FILE No.		
DESIGN	VTR	APR09	SCALE	AS SHOWN	REV. 0
CADD	VTR	APR09			
CHECK	GRB	APR09			
REVIEW	-	-			

Golder Associates

FIGURE E3 - 7

Drawing File: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Appendix E - East Dike Grouting\E3 - Grouting Progress Cross Section\DRAFT REMOVED\Figure E3 - Grouting Progress Cross Section.dwg October 23, 2009 10:54:59 AM By: VRombough

Drawing File: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Appendix E - East Dike Grouting\E3 - Grouting Progress Cross Section\DRAFT REMOVED\Figure E3 - Grouting Progress Cross Section.dwg October 23, 2009 10:54:59 AM By: VRombough



LEGEND:

BOREHOLE NAME
P-PRIMARY
S-SECONDARY
T-TERTIARY
Q-QUATERNARY

P - 60+104

PRESSURE OBTAINED (BARS)

3.3/2.0

VOLUME INJECTED (L)

START OF FINAL GROUTING FOR GIVEN GROUT HOLE

00-MMM

		TAKE: L/m
VOL / P	LOW	< 100
VOL / P	M.HIGH	100< >200
VOL / P	HIGH	200< >400
VOL / P	V.HIGH	>400

*White Numbers indicate > 80% of Pmax not achieved
*Black Numbers indicate > 80% Pmax achieved

3.3/2.0 BLACK OUTLINE: GROUTED WITH MICROFINE

DIKE CREST: ~135.1m
LAKE LEVEL: ~133.1m
LAKEBED
BASE OF SB CUT-OFF WALL (SOUNDING)
INFERRED BEDROCK BASED ON CASING INSTALLATION RECORDS

0 1 2 3 4 5
VERTICAL SCALE IN METRES

0 2 4 6 8 10
HORIZONTAL SCALE IN METRES

NOTES:

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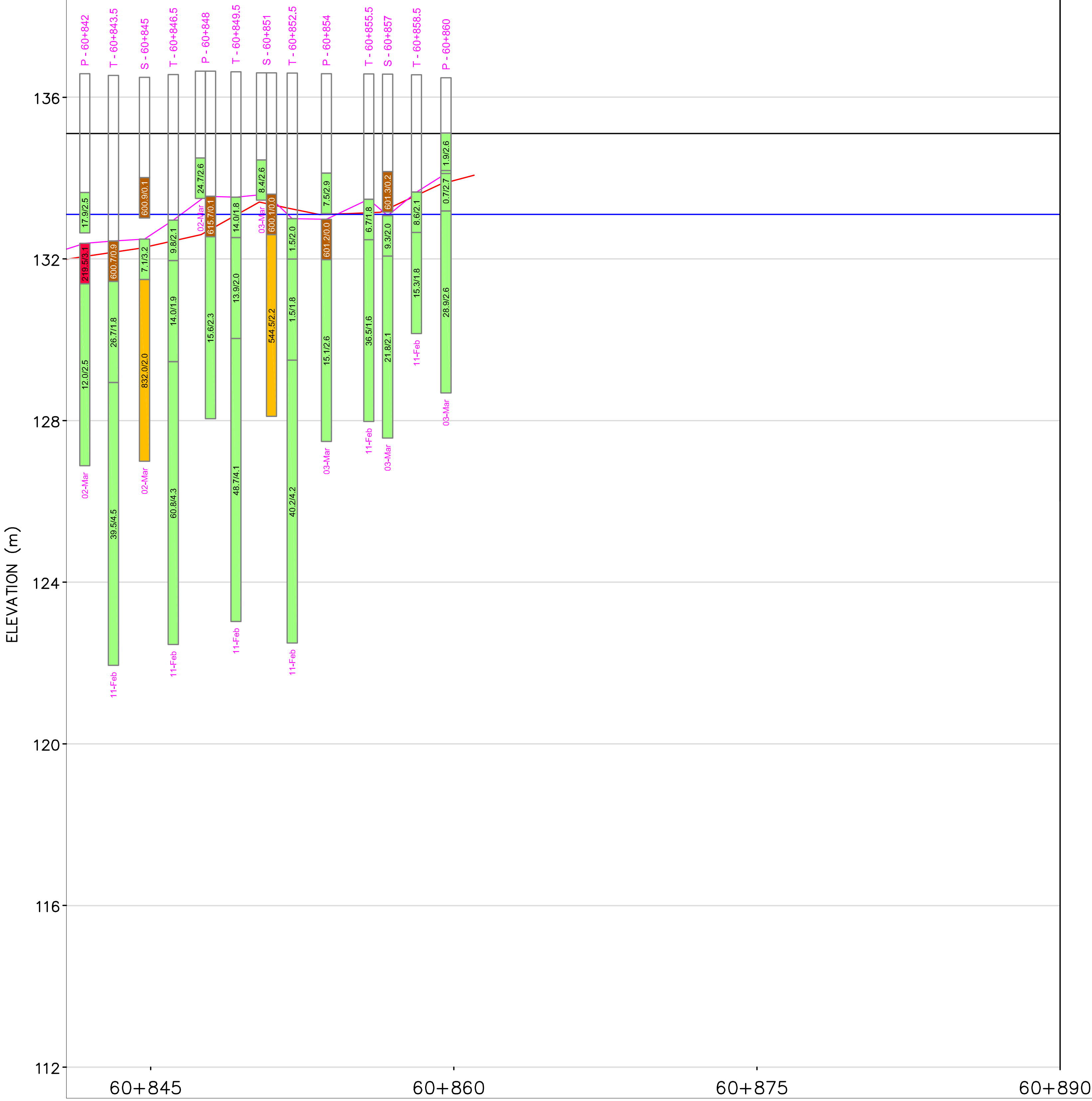
4) CASING COLLAR REFERENCE ELEVATIONS PROVIDED BY AEM

PROJECT
AEM
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE
GROUTING PROGRESS CROSS SECTION

Golder Associates

PROJECT No.	07-1413-0074		FILE No.			
DESIGN	VTR	APR09	SCALE	AS SHOWN	REV.	0
CADD	VTR	APR09	FIGURE E3 - 8			
CHECK	GRB	APR09				
REVIEW	-	-				



LEGEND:

BOREHOLE NAME
P-PRIMARY
S-SECONDARY
T-TERTIARY
Q-QUATERNARY

P - 60+104
PRESSURE OBTAINED (BARS)
3.3/2.0
VOLUME INJECTED (L)
DD-MMM
START OF FINAL GROUTING FOR GIVEN GROUT HOLE

		TAKE: L/m
VOL / P	LOW	< 100
VOL / P	M.HIGH	100< >200
VOL / P	HIGH	200< >400
VOL / P	V.HIGH	>400

*White Numbers indicate > 80% of Pmax not achieved
*Black Numbers indicate > 80% Pmax achieved

3.3/2.0 — BLACK OUTLINE: GROUTED WITH MICROFINE

DIKE CREST: ~135.1m
LAKE LEVEL: ~133.1m
LAKEBED
BASE OF SB CUT-OFF WALL (SOUNDING)
INFERRED BEDROCK BASED ON CASING INSTALLATION RECORDS

0 1 2 3 4 5
VERTICAL SCALE IN METRES

0 2 4 6 8 10
HORIZONTAL SCALE IN METRES

NOTES:

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4) CASING COLLAR REFERENCE ELEVATIONS PROVIDED BY AEM

PROJECT
AEM
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

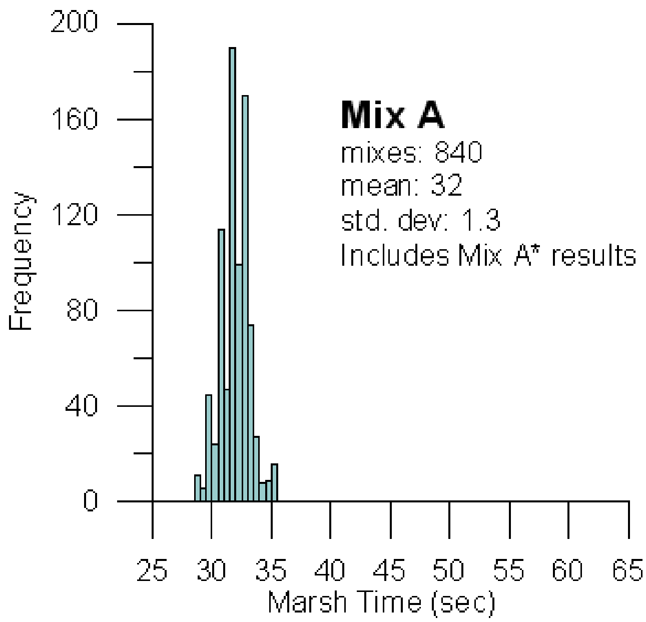
TITLE
EAST DIKE
GROUTING PROGRESS CROSS SECTION

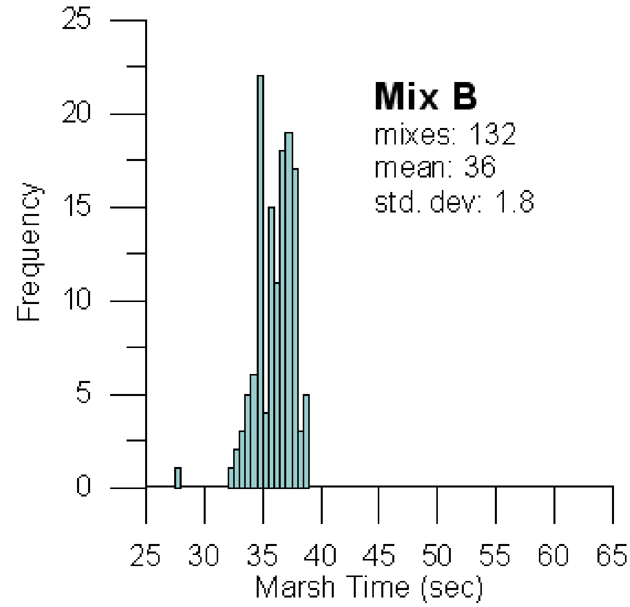
Golder Associates

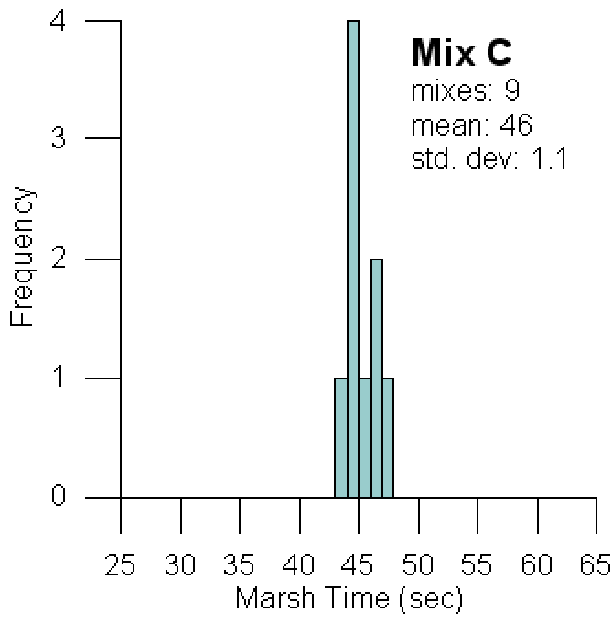
PROJECT No.	07-1413-0074		FILE No.			
DESIGN	VTR	APR09	SCALE	AS SHOWN	REV.	0
CADD	VTR	APR09				
CHECK	GRB	APR09				
REVIEW	-	-				

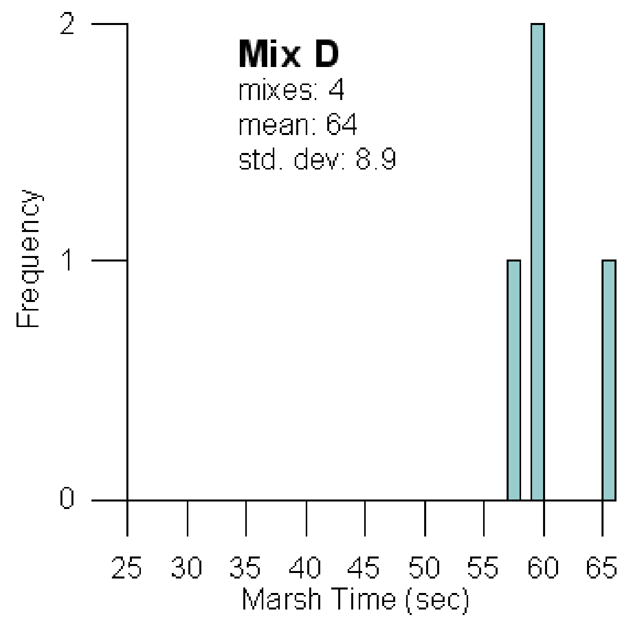
FIGURE E3 - 9

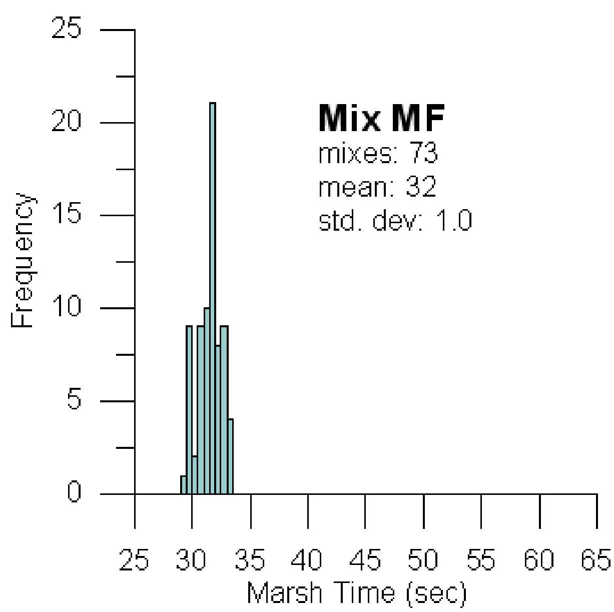
Drawing File: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Appendix E - East Dike Grouting\E3 - Grouting Progress Cross Section\DRAFT REMOVED\Figure E3 - Grouting Progress Cross Section.dwg October 23, 2009 10:54:59 AM By: VRombough











PROJECT

AEM

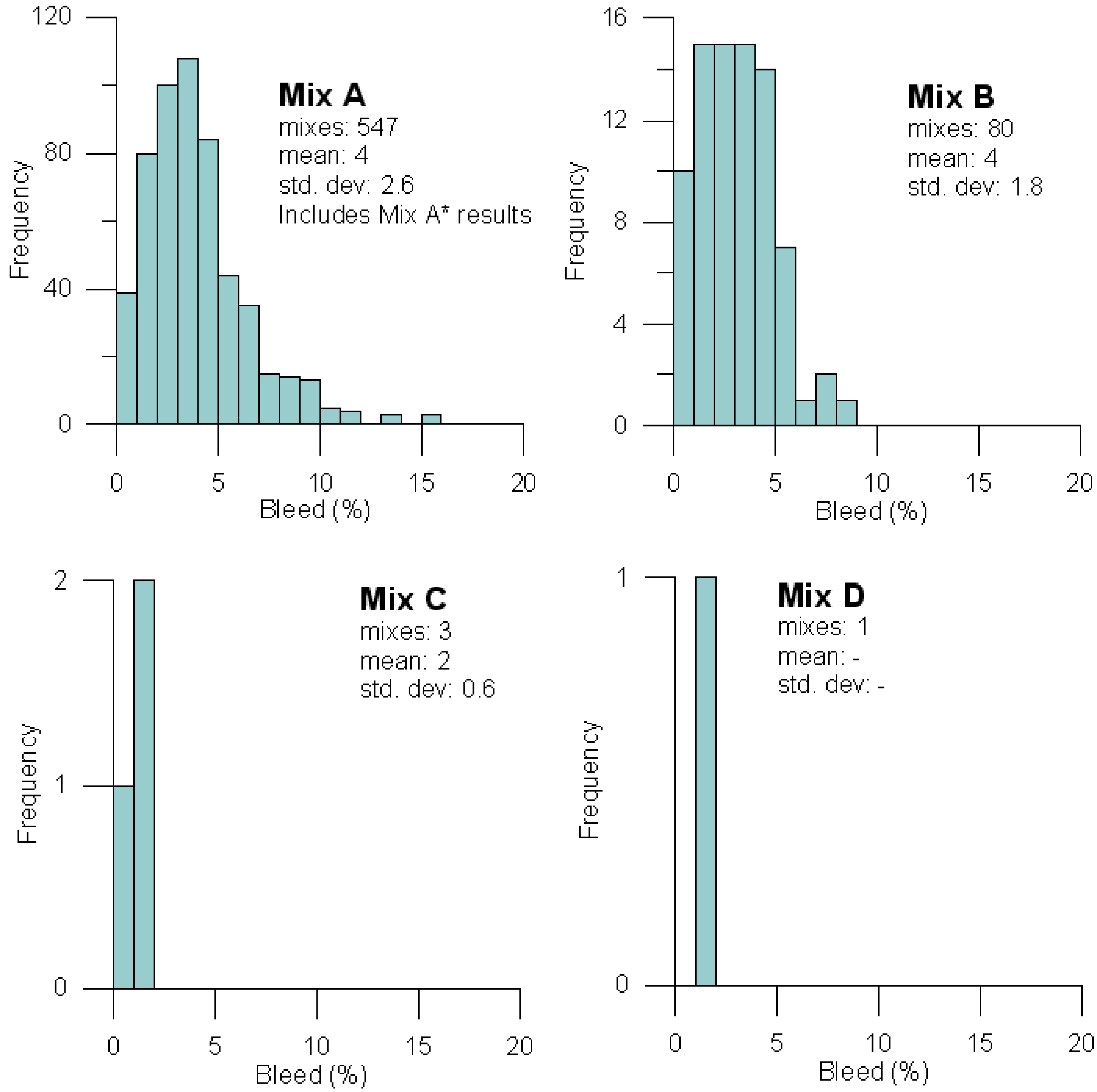
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

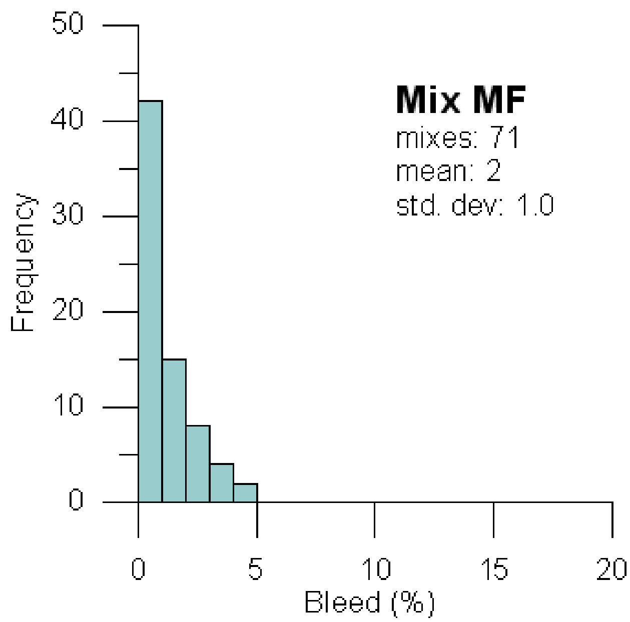
TITLE

MARSH TIME RESULTS

Golder Associates

PROJECT No.	07-1413-0074		PHASE / TASK No. 2800	
DESIGN	VTR	22MAY09	SCALE NTS	REV. 0
CADD	VTR	22MAY09	**FIGURE E4-1**	
CHECK	GRB	22MAY09		
REVIEW				





PROJECT

AEM

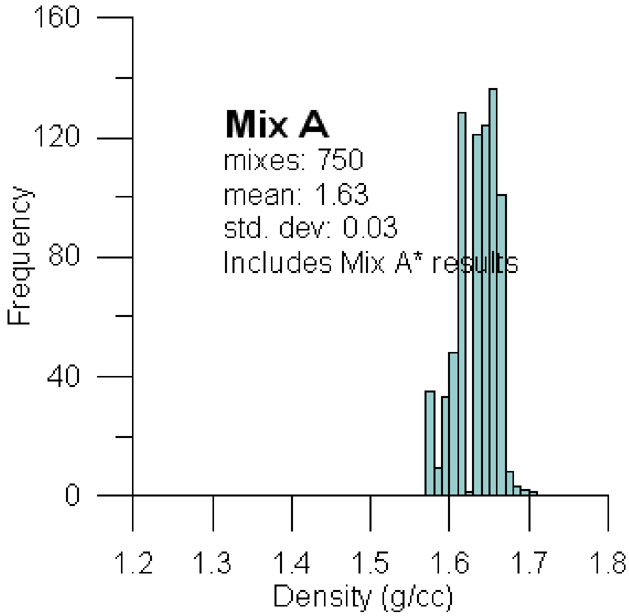
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

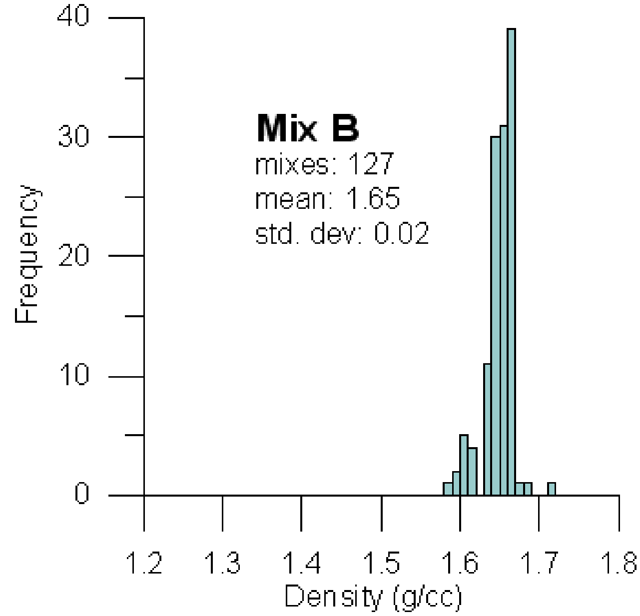
TITLE

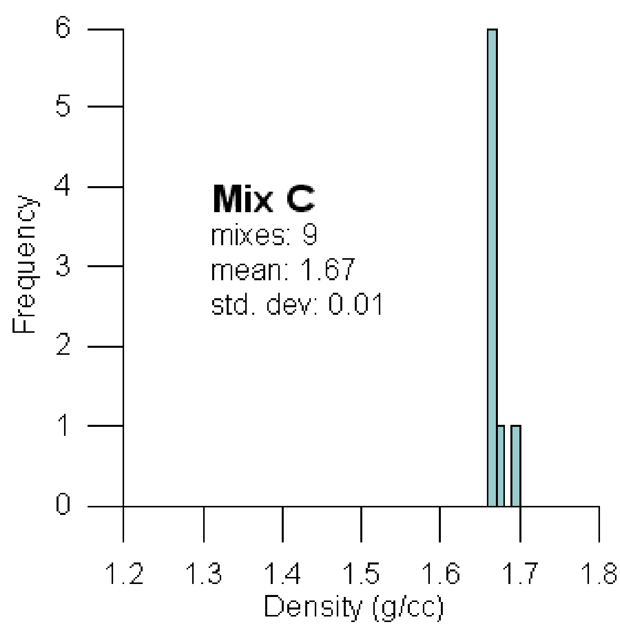
BLEED RESULTS

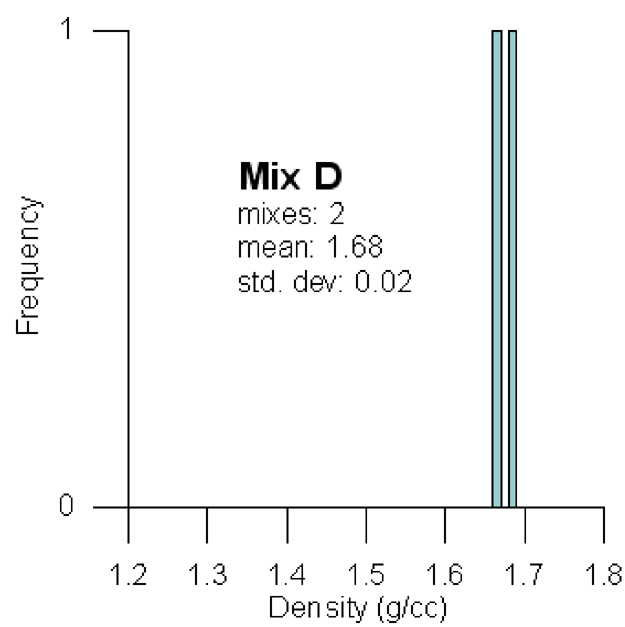
Golder Associates

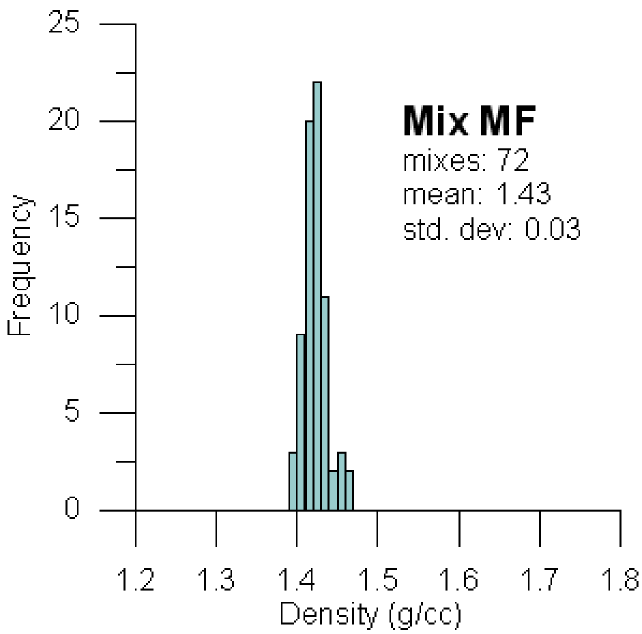
PROJECT No. 07-1413-0074			PHASE / TASK No. 2800	
DESIGN	VTR	22MAY09	SCALE NTS	REV. 0
CADD	VTR	22MAY09	**FIGURE E4-2**	
CHECK	GRB	22MAY09		
REVIEW				











PROJECT

AEM

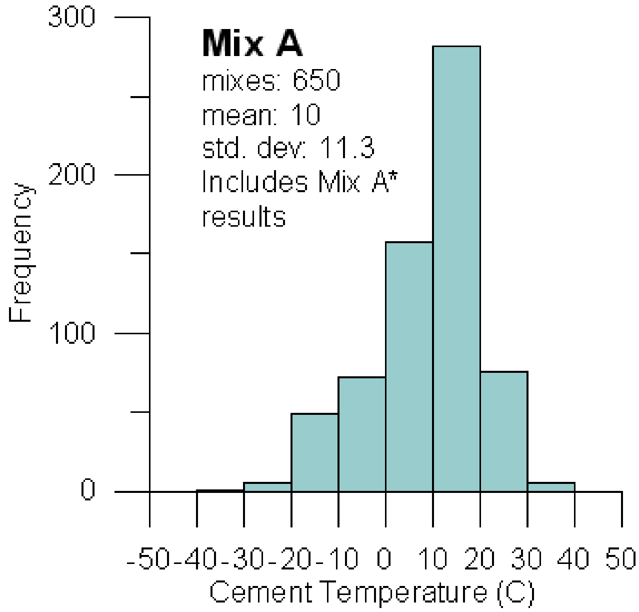
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

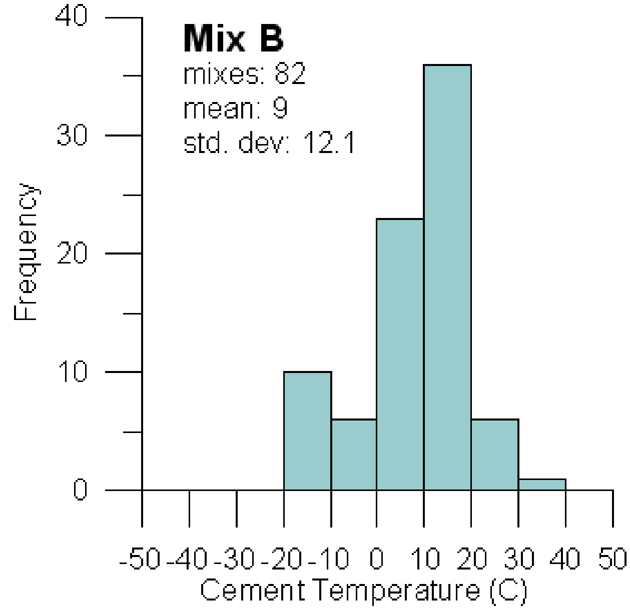
TITLE

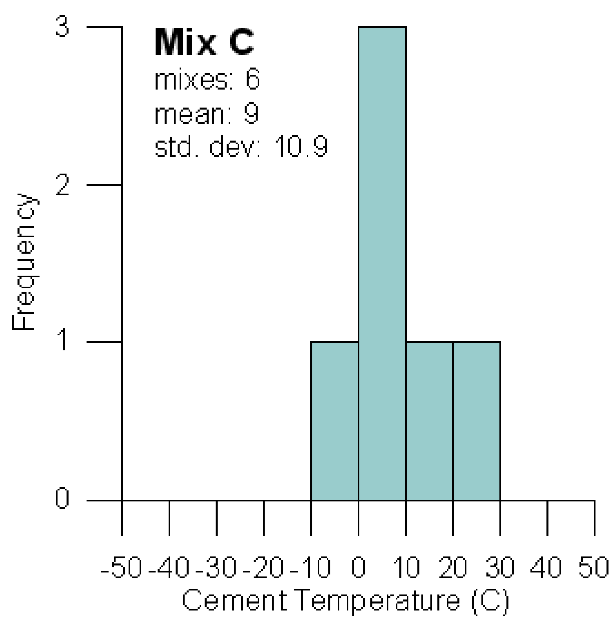
SPECIFIC GRAVITY RESULTS

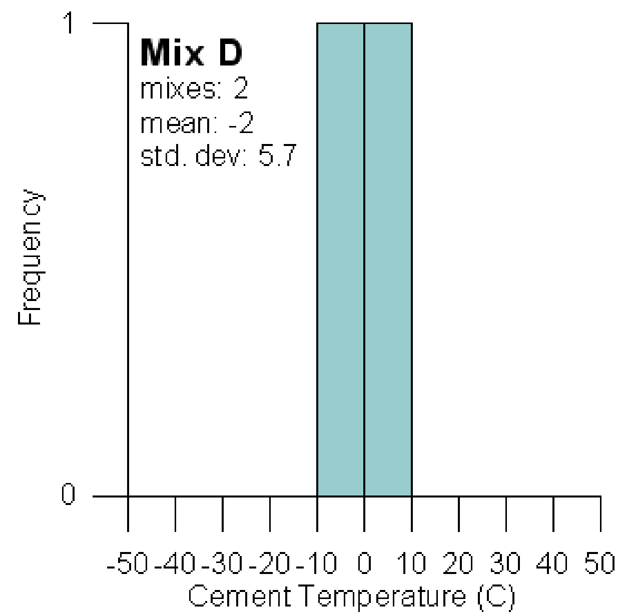
Golder Associates

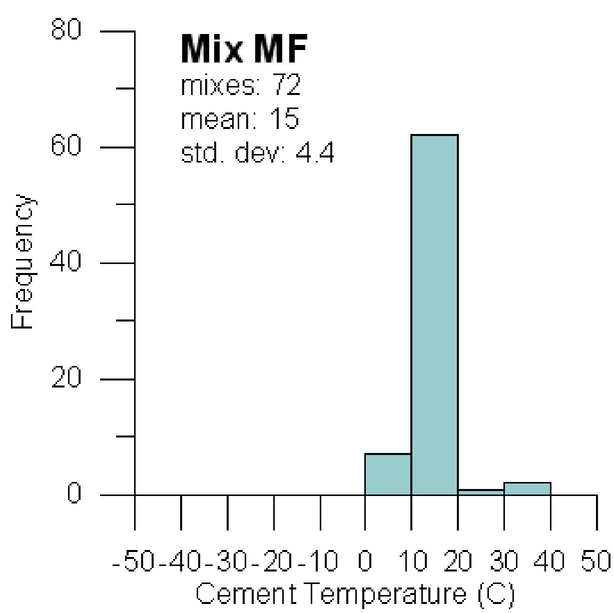
PROJECT No.	07-1413-0074		PHASE / TASK No.	2800
DESIGN	VTR	22MAY09	SCALE NTS	REV. 0
CADD	VTR	22MAY09		
CHECK	GRB	22MAY09	**FIGURE E4-3**	
REVIEW				











PROJECT

AEM

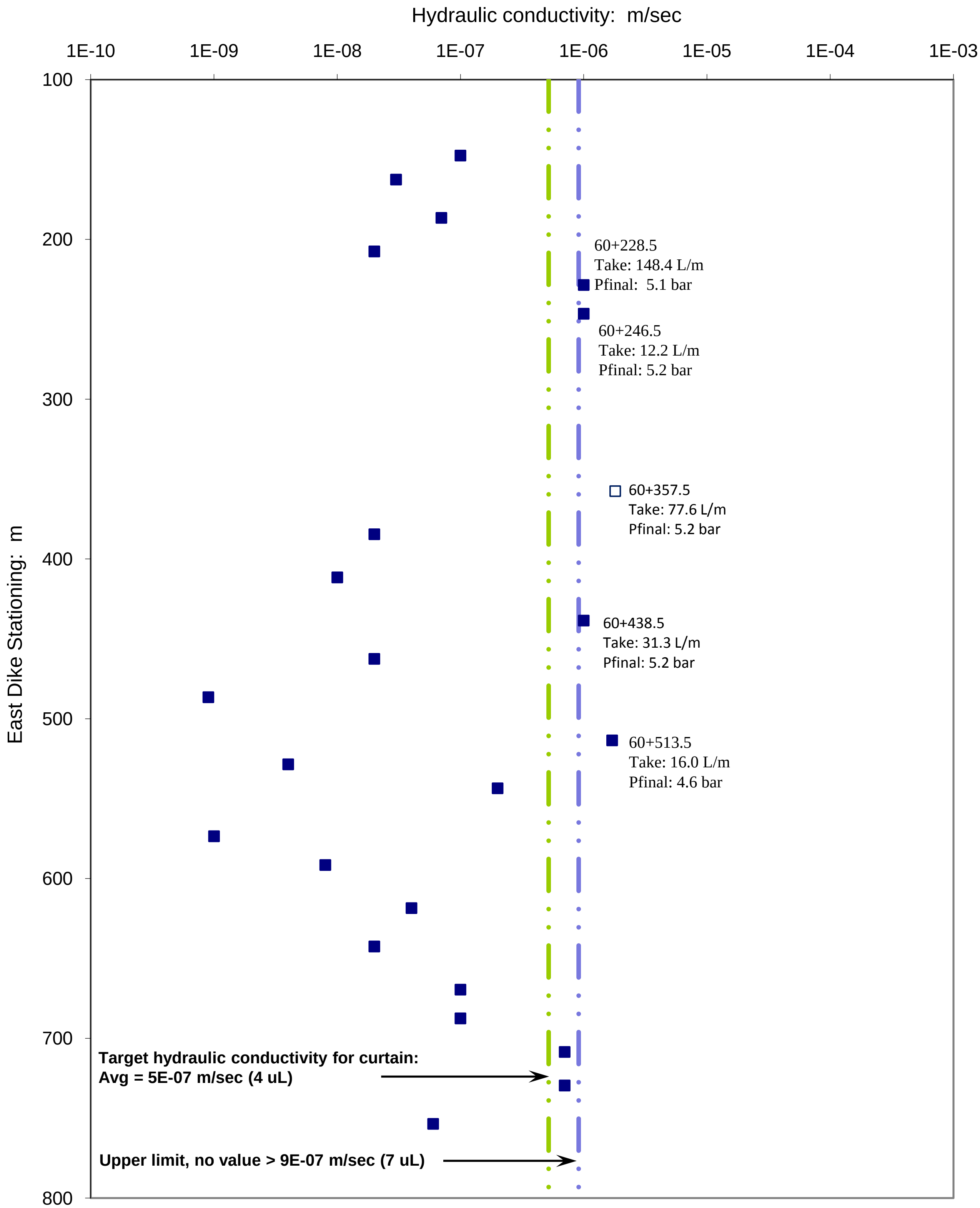
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

CEMENT TEMPERATURE RESULTS

Golder Associates

PROJECT No. 07-1413-0074			PHASE / TASK No. 2800	
DESIGN	VTR	22MAY09	SCALE NTS	REV. 0
CADD	VTR	22MAY09	**FIGURE E4-4**	
CHECK	GRB	22MAY09		
REVIEW				



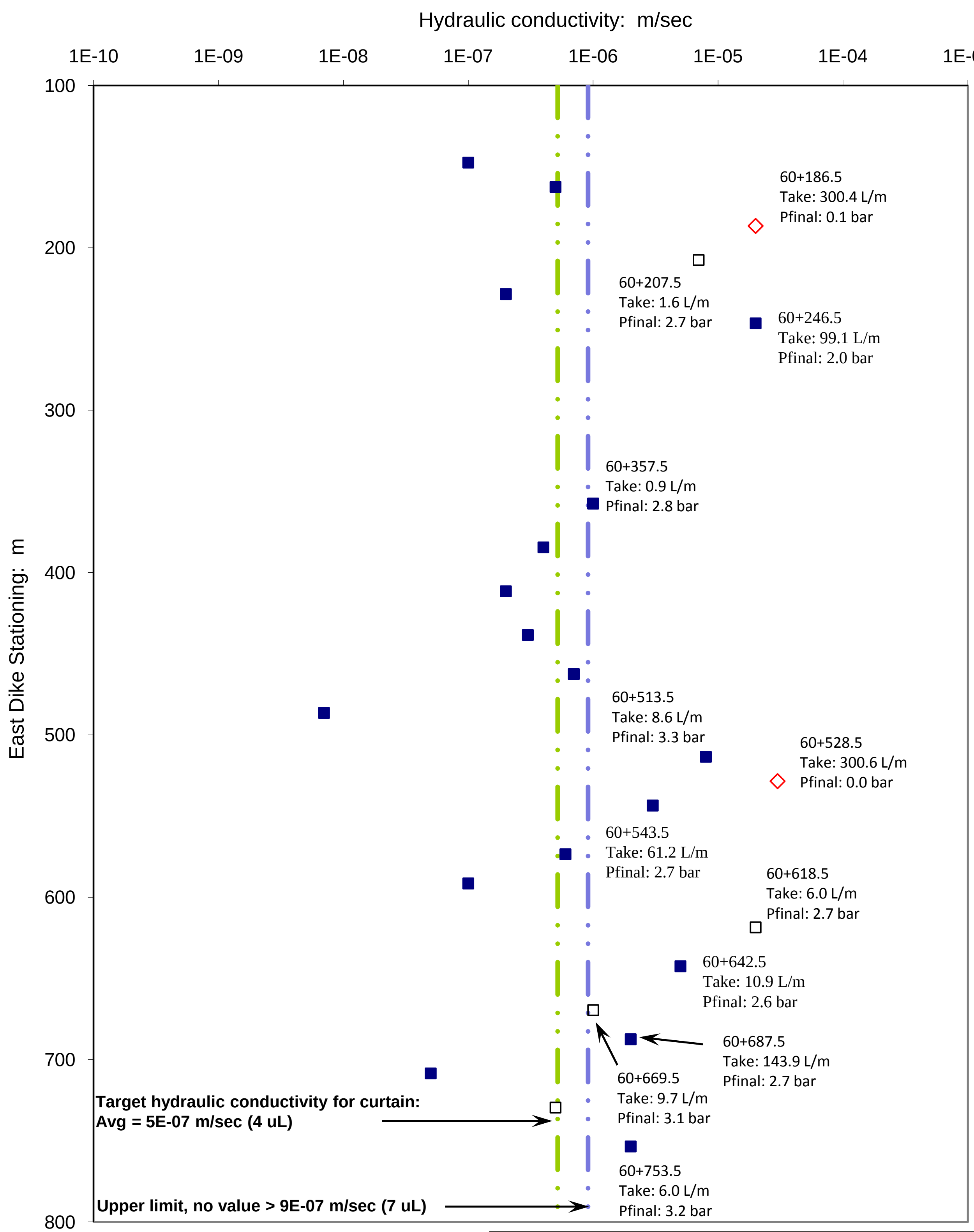
■ Complete, 5-stage water pressure test; closure achieved while grouting this stage.

□ Washout water pressure test; closure achieved while grouting this stage.

PROJECT	AGNICO-EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT		
TITLE	WATER PRESSURE TEST RESULTS STAGE 1		
PROJECT No.	07-1413-0074		PHASE / TASK No.
DESIGN	GRB	01JUN09	SCALE NTS, REV.
CADD	VTR	01JUN09	FIGURE E5-1
CHECK	GRB	01JUN09	
REVIEW			

Golder Associates

REVISION DATE: 22 / 05 / 09 BY: VTR FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Appendix E - East Dike Grouting\E5 – Water Pressure Testing Results\Figure E5-1-2.ppt



■ Complete, 5-stage water pressure test; closure achieved while grouting this stage.

□ Washout water pressure test; closure achieved while grouting this stage.

◇ Washout water pressure test; but closure not achieved while grouting this stage.

PROJECT	AGNICO-EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT			
TITLE	**WATER PRESSURE TEST RESULTS STAGE 2**			
Golder Associates	PROJECT No.	07-1413-0074		PHASE / TASK No.
	DESIGN	GRB	01JUN09	SCALE NTS · REV.
	CADD	VTR	01JUN09	**FIGURE E5-2**
	CHECK	GRB	01JUN09	
	REVIEW			

TABLE E5-1: East Dike - Summary of Water Pressure Test Results: Bedrock

Sequence	Chainage	Type	WATER PRESSURE TEST										GROUTING FOLLOWING WPT					Comments
			Date	Depth b.g.s From (m)	Depth b.g.s To (m)	Approx. Depth b.c. From (m)	Approx. Depth b.c. To (m)	Water Table Depth (m)	Analysis	Stage	Lugeons (uL)	Hydraulic Conductivity (m/sec)	Final Mix (type)	Final Volume (L)	Final Pressure (bar)	Final Penetrability (L/min/m/bar)	Final Flow Rate (L/min)	
Tertiary	60+147.5	Bedrock	23-Jan-09	13.2	20.2	3	10	3.05	Laminar	1	0.8	1.0E-07	A	27.4	5.2	0.02	0.6	
				10.7	13.2	0.5	3	3.05	Laminar	2	1	1.0E-07	A	78.9	2.8	0.04	0.3	
	60+162.5	Bedrock	24-Jan-09	13	26	3	10	3.5	Low Flow	1	0.2	3.0E-08	A	14.6	5.1	0.02	0.8	
				10.5	13	0.5	3	3.5	Dilation	2	5	5.0E-07	A	11.8	2.3	0.08	0.5	
	60+186.5	Bedrock	25-Jan-09	13.2	20.2	3	10	3.3	Laminar	1	0.5	7.0E-08	A	6.5	5.4	0.01	0.5	
				10.7	13.2	0.5	3	3.3	Washout	2	238	2.0E-05	B	750.9	0.1	92.8	15.7	
	60+207.5	Bedrock	26-Jan-09	12.3	19.3	3	10	3.5	Low Flow	1	0.2	2.0E-08	A	11	5.2	0.01	0.4	
				9.8	12.3	0.5	3	3.5	Washout	2	71	7.0E-06	A	4.1	2.7	0.02	0.2	
	60+228.5	Bedrock	26-Jan-09	12	19	3	10	10.7	Laminar	1	8	1.0E-06	B	1039	5.1	0.03	0	
				9.5	12	0.5	3	10.7	Dilation	2	1	2.0E-07	A	3.1	3	0.06	0.4	
	60+246.5	Bedrock	21-Jan-09	10.4	17.4	3	10	2.6	Turbulent	1	9	1.0E-06	A	85.1	5.2	0.03	1.2	
				7.9	10.7	0.5	3	2.6	Turbulent	2	157	2.0E-05	A	277.5	2.8	0.05	0.3	
	60+357.5	Bedrock	9-Jan-09	12.6	17.6	3	10	2.73	Washout	1	15	1.8E-06	A	388.1	5.2	0.03	1.2	
				8.1	17.6	0.5	3	2.73	Turbulent	2	7	1.0E-06	A	8.5	2.8	0.05	0.3	
	60+384.5	Bedrock	9-Jan-09	12.56	19.9	3	10	2.8	Low Flow	1	0.1	2.0E-08	A	2.5	5.3	0.01	0	
				10.4	13.2	0.5	3	2.8	Laminar	2	4	4.0E-07	A	307.8	3.0	0.01	0.1	
	60+411.5	Bedrock	10-Jan-09	13.2	20.2	3	10	2.6	Low Flow	1	0.1	1.0E-08	A	7.3	5.4	0.01	0.3	
				10.7	13.5	0.5	3	2.6	Laminar	2	2	2.0E-07	A	33.2	2.9	0.06	0.4	
	60+438.5	Bedrock	16-Jan-09	15.1	22.1	3	10	2.78	Turbulent	1	8	1.0E-06	A	219.3	5.2	0.05	1.8	
				12.6	15.4	0.5	3	2.78	Turbulent	2	3	3.0E-07	A	24	2.9	0.04	0.3	
	60+462.5	Bedrock	14-Jan-09	14	20	3	10	2.6	Low Flow	1	0.1	2.0E-08	A	10.5	5.0	0.02	0.8	
				11.5	14.3	0.5	3	2.6	Laminar	2	7	7.0E-07	A	72	2.8	0.08	0.5	
	60+486.5	Bedrock	15-Jan-09	17	24	3	10	2.56	Low Flow	1	0	9.0E-10	A	2.6	5.3	0	0.1	
				14.5	17	0.5	3	2.56	Low Flow	2	0.1	7.0E-09	A	6	2.9	0.02	0.2	
	60+513.5	Bedrock	18-Jan-09	12.7	19.8	3	10	2.9	Turbulent	1	13	1.7E-06	A	113.3	4.6	0.01	0.5	
				10.3	12.8	0.5	3	2.9	Turbulent	2	72	8.0E-06	A	21.5	3.31	0.03	0.3	
	60+528.5	Bedrock	28-Jan-09	11.9	18.9	3	10	2.6	Low Flow/No Flow	1	0	4.0E-09	A	2.7	5.4	0.01	0.2	
				9.4	11.9	0.5	3	2.6	Washout	2	243	3.0E-05	A	751.6	0	Infinity	12.8	
	60+543.5	Bedrock	29-Jan-09	11.9	18.9	3	10	3.2	Laminar	1	1	2.0E-07	A	90.3	5.0	0	0.1	
				9.4	11.9	0.5	3	3.2	Turbulent	2	29	3.0E-06	A	153	2.7	0.02	0.1	
	60+573.5	Bedrock	29-Jan-09	12.6	19.6	3	10	3.1	Low Flow	1	0.0	1.0E-09	A	8	5.4	0	0.1	
				9.6	12.6	0.5	3	3.1	Washout	2	6	6.0E-07	A	10.6	3	0	0	
	60+591.5	Bedrock	29-Jan-09	11	18	3	10	2.14	Low Flow	1	0.1	8.0E-09	A	6.2	5.4	0	0.1	
				8	11	0.5	3	2.14	Dilation	2	0.9	1.0E-07	A	7.7	3.4	0.02	0.2	
	60+618.5	Bedrock	28-Jan-09	10.7	17.7	3	10	2.82	Laminar	1	0.3	4.0E-08	A	2.3	5.0	0	0	
				8.2	10.7	0.5	3	2.82	Washout	2	205	2.0E-05	A	15	2.7	0.04	0.3	
	60+642.5	Bedrock	27-Jan-09	11.5	18.5	3	10	2.3	Dialation	1	0.1	2.0E-08	A	3.6	4.5	0	0	
				8.5	11.5	0.5	3	2.3	Void Filling	2	47	5.0E-06	A	32.6	2.6	0	0	

TABLE E5-1: East Dike - Summary of Water Pressure Test Results: Bedrock

Sequence	Chainage	Type	WATER PRESSURE TEST										GROUTING FOLLOWING WPT					Comments
			Date	Depth b.g.s From (m)	Depth b.g.s To (m)	Approx. Depth b.c. From (m)	Approx. Depth b.c. To (m)	Water Table Depth (m)	Analysis	Stage	Lugeons (uL)	Hydraulic Conductivity (m/sec)	Final Mix (type)	Final Volume (L)	Final Pressure (bar)	Final Penetrability (L/min/m/bar)	Final Flow Rate (L/min)	
	60+669.5	Bedrock	25-Jan-09	11.8	18.8	3	10	2.1	Laminar	1	0.7	1.0E-07	A	21.4	5.0	0.01	0.4	
				9.3	11.8	0.5	3	2.1	Washout	2	11	1.0E-06	A	24.2	3.1	0.01	0.1	
	60+687.5	Bedrock	24-Jan-09	11.4	18.4	3	10	3.39	Laminar	1	1	1.0E-07	A	1147	5	0.09	3.3	
				8.9	11.4	0.5	3	3.39	Turbulent	2	18	2.0E-06	A	359.8	2.7	0.08	1.2	
	60+708.5	Bedrock	23-Jan-09	11.6	18.6	3	10	2.62	Turbulent	1	6	7.0E-07	A	93	5	0.03	1.1	
				9.1	11.6	0.5	3	2.62	Low Flow	2	0.5	5.0E-08	A	139	2.9	0.08	0.6	
	60+729.5	Bedrock	21-Jan-09	11.1	18.1	3	10	3.2	Laminar	1	5	7.0E-07	A	54.5	6.5	0.02	1	
				8.6	11.4	0.5	3	3.2	Washout	2	4	5.0E-07	A	32.9	2.6	0.05	0.3	
	60+753.5	Bedrock	18-Jan-09	8.6	16.9	3	10	3.1	Low Flow	1	0.4	6.0E-08	A	4.4	5.0	0.01	0.2	
				6.1	8.9	0.5	3	3.1	Dilation	2	15	2.0E-06	A	16.9	3.2	0.05	0.4	

NOTE: 1) b.g.s: below ground surface
2) b.c: below casing

CHECK: GRB

TABLE E5-2: East Dike - Summary of Water Pressure Test Results: Contact

Sequence	Chainage	Type	WATER PRESSURE TEST						GROUTING FOLLOWING WPT					Comments
			Date	Depth b.g.s From (m)	Depth b.g.s To (m)	Water Table Depth (m)	Stage	Hydraulic Conductivity (m/sec)	Final Mix (type)	Final Volume (L)	Final Pressure (bar)	Final Penetrability (L/min/m/bar)	Final Flow Rate (L/min)	
Tertiary	60+126.5	Contact	5-Mar-09	6.4	7.4	2	4	3.7E-05	MF	421.1	1.6	10.2	9.5	
	60+138.5	Contact	5-Mar-09	6.3	7.3	2	4	3.9E-05	MF	47.9	1.7	0	0	
	60+150.5	Contact	6-Mar-09	8	9	2	4	1.7E-07	MF	5.2	1.3	0.01	0	
	60+168.5	Contact	7-Mar-09	8.2	9.2	2	4	8.7E-07	MF	47.4	1.2	0.26	0.3	
	60+180.5	Contact	7-Mar-09	8	9	2	4	7.5E-05	MF	503.8	1.2	0.42	0.5	
	60+195.5	Contact	7-Mar-09	7.7	8.7	2	4	1.1E-05	MF	365.8	1.5	0.47	0.4	
	60+207.5	Contact	7-Mar-09	7	8	2	4	3.9E-05	MF	660.1	1.3	0.06	0.1	
	60+342.5	Contact	8-Mar-09	4.2	5.2	2	4	6.2E-07	MF	3.5	1.4	0.32	0.3	
	60+357.5	Contact	8-Mar-09	5.7	6.7	2	4	1.4E-05	MF	105.7	1.3	1	0.8	
	60+372.5	Contact	8-Mar-09	6	7	2	4	9.3E-06	MF	43	1.2	0.76	0.6	
	60+189.5	Contact	17-Mar-09	8	9	-	4	3.6E-05	MF	143	1.1	0.02	0	Confirmation
	60+216.5	Contact	17-Mar-09	7.5	8.5	-	4	2.5E-06	MF	3.8	1.4	0.03	0.1	Confirmation
	60+237.5	Contact	17-Mar-09	7.4	8.4	-	4	9.2E-05	A	806	1.3	7.77	10.1	Confirmation
	60+381.5	Contact	17-Mar-09	7.6	8.6	-	4	2.6E-06	MF	62.6	1.4	0.38	0.8	Confirmation
	60+423.5	Contact	17-Mar-09	8.3	9.3	-	4	3.6E-05	MF	508.7	1.3	0.33	0.4	Confirmation
	60+468.5	Contact	17-Mar-09	9.4	10.4	-	4	1.1E-04	A	530.9	1.4	0.18	0.3	Confirmation
	60+510.5	Contact	17-Mar-09	9.4	10.4	-	4	5.5E-06	MF	20	1.5	0.01	0	Confirmation
	60+549.5	Contact	18-Mar-09	5.7	6.7	-	4	7.2E-06	MF	8.5	1.6	0.14	0.2	Confirmation
	60+609.5	Contact	18-Mar-09	6.2	7.2	-	4	9.3E-06	MF	67	1.5	0.2	0.3	Confirmation
	60+642.5	Contact	18-Mar-09	6.2	7.2	-	4	1.2E-05	MF	95.8	1.5	0.14	0.2	Confirmation
	60+684.5	Contact	18-Mar-09	6.2	7.2	-	4	6.2E-06	MF	57.8	1.5	0.28	0.4	Confirmation
	60+780.5	Contact	17-Mar-09	7.01	8.01	-	4	6.0E-07	MF	3.9	1.7	0.02	0.3	Confirmation

NOTE: 1) b.g.s: below ground surface
2) b.c: below casing

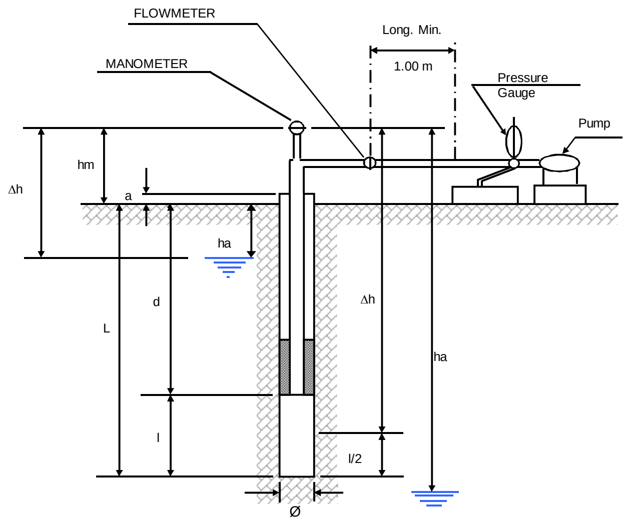
CHECK: GRB

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

HOLE Nº	60+147.5	TEST Nº	1	North. COORD:	
TEST DEPTH :	13.20 TO 20.20 m.			East. COORD:	
DATE:	23/01/2009	START: 22:30	FINISH: 23:08	INCLINATION:	90
		Minutes:	38	GROUND LEVEL: (m.s.n.m.)	
INTERVAL LITHOLOGY :					

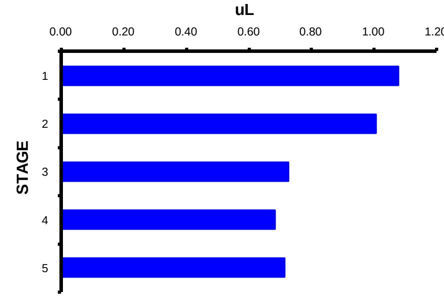
PROJECT : East Dike Grouting
LOCATION: Meadowbank
PROJECT Nº : 07-1413-0074 / 2200 / ****



hm	=	HEIGHT OF MANOMETER	1.01	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	3.05	m
Δh	=	HYDRAULIC PRESSURE HEAD	4.06	m
d	=	TOP OF TEST INTERVAL	13.20	m
L	=	BOTTOM OF TEST INTERVAL	20.20	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	4.06	m
l	=	LENGTH OF TEST INTERVAL	7.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	Bars		Bars		Bars		Bars		Bars	
	$1/3P_M$ =	0.66	$2/3P_M$ =	1.39	P_M =	2.12	$2/3P_M$ =	1.40	$1/3P_M$ =	0.68
TIMES MINUTES	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	4.7		11.4		20.0		28.4		34.9	
1	5.5	0.80	12.6	1.20	21.3	1.30	29.3	0.90	35.4	0.50
2	6.3	0.80	13.9	1.30	22.8	1.50	30.1	0.80	36.0	0.60
3	7.2	0.90	15.2	1.30	23.9	1.10	30.9	0.80	36.5	0.50
4	8.0	0.80	16.4	1.20	25.2	1.30	31.8	0.90	37.0	0.50
5	8.7	0.70	17.7	1.30	26.4	1.20	32.7	0.90	37.6	0.60
6										
7										
8										
9										
10										
Qt (l)		4.00		6.30		6.40		4.30		2.70
q (l/min)		0.80		1.26		1.28		0.86		0.54
Pent(l/min/m)		0.11		0.18		0.18		0.12		0.08
Δp (bars)										
P_{EF} (bars)		1.06		1.79		2.52		1.80		1.08
K (m/sec)		1.4E-07		1.3E-07		9.6E-08		9.0E-08		9.4E-08
uL		1.08		1.01		0.73		0.68		0.72

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS
uL



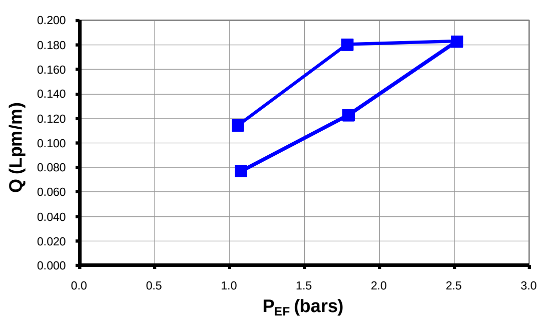
SELECTED LUGEON UNIT : 0.8 uL

K (PERMEABILITY) : 1E-07 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(\, l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Laminar

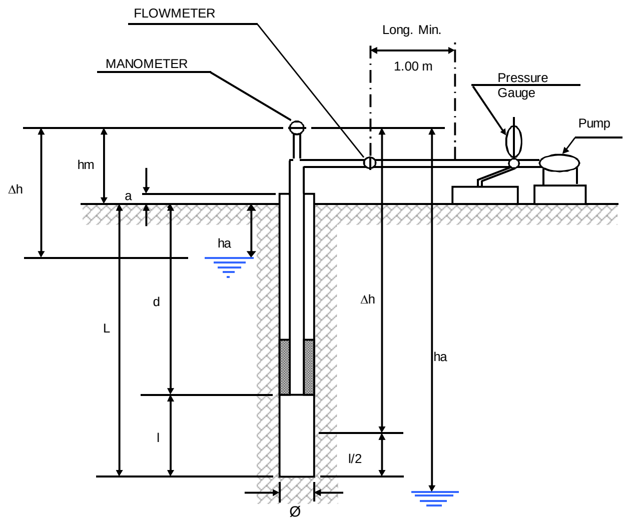
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

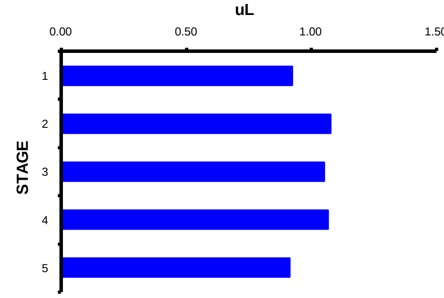
HOLE Nº 60+147.5	**TEST Nº** 2	**North. COORD:**	
PROJECT : East Dike Grouting	**TEST DEPTH :** 10.70 **TO** 13.20 **m.**	**East. COORD:**	
LOCATION: Meadowbank	**DATE:** 23/01/2009 **START:** 23:38 **FINISH:** 0:19	**INCLINATION:**	90
PROJECT Nº : 07-1413-0074 / 2200 / ****	**Minutes:** 41	**GROUND LEVEL:** (m.s.n.m.)	
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.01	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	3.05	m
Δh	=	HYDRAULIC PRESSURE HEAD	4.06	m
d	=	TOP OF TEST INTERVAL	10.70	m
L	=	BOTTOM OF TEST INTERVAL	13.20	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	4.06	m
l	=	LENGTH OF TEST INTERVAL	2.50	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

TIMES MINUTES	$1/3P_M$ = 0.38 Bars Q (L)	q (L/min)	$2/3P_M$ = 0.79 Bars Q (L)	q (L/min)	P_M = 1.20 Bars Q (L)	q (L/min)	$2/3P_M$ = 0.80 Bars Q (L)	q (L/min)	$1/3P_M$ = 0.39 Bars Q (L)	q (L/min)
0	0.3		2.5		5.9		9.0		11.0	
1	0.4	0.10	2.8	0.30	6.3	0.40	9.3	0.30	11.2	0.20
2	0.6	0.20	3.2	0.40	6.7	0.40	9.6	0.30	11.3	0.10
3	0.9	0.30	3.5	0.30	7.1	0.40	9.9	0.30	11.5	0.20
4	1.1	0.20	3.8	0.30	7.5	0.40	10.3	0.40	11.7	0.20
5	1.2	0.10	4.1	0.30	8.0	0.50	10.6	0.30	11.9	0.20
6										
7										
8										
9										
10										
Qt (l)		0.90		1.60		2.10		1.60		0.90
q (l/min)		0.18		0.32		0.42		0.32		0.18
Pent(l/min/m)		0.07		0.13		0.17		0.13		0.07
Δp (bars)										
P_{EF} (bars)		0.78		1.19		1.60		1.20		0.79
K (m/sec)		9.7E-08		1.1E-07		1.1E-07		1.1E-07		9.6E-08
uL		0.93		1.08		1.05		1.07		0.91

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



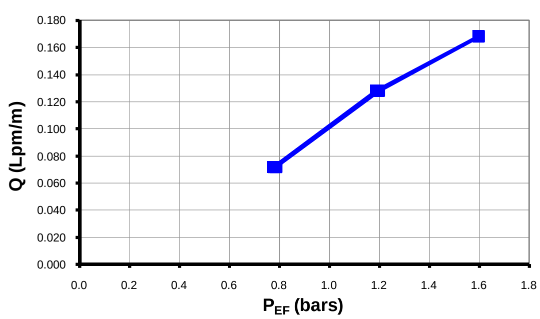
SELECTED LUGEON UNIT : 1.0 uL

K (PERMEABILITY) : 1E-07 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Laminar

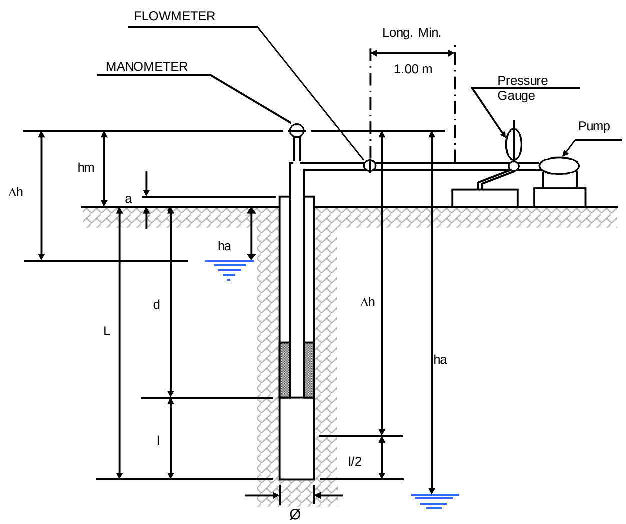
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

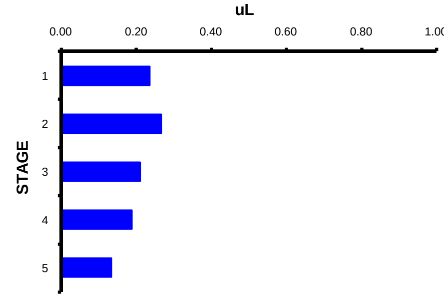
HOLE Nº 60+162.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH :** 13.0 **TO** 26.0 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 24/01/2009	**START:** 15:07 **FINISH:** 15:50	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 43	**GROUND LEVEL:**
	INTERVAL LITHOLOGY :		(m.s.n.m.)



hm	=	HEIGHT OF MANOMETER	0.95	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	3.50	m
Δh	=	HYDRAULIC PRESSURE HEAD	4.45	m
d	=	TOP OF TEST INTERVAL	13.00	m
L	=	BOTTOM OF TEST INTERVAL	26.00	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	4.45	m
l	=	LENGTH OF TEST INTERVAL	13.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	1/3P_M =	0.87 Bars	2/3P_M =	1.41 Bars	P_M =	2.12 Bars	2/3P_M =	1.45 Bars	1/3P_M =	0.72 Bars
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	6.2		11.0		16.2		20.4		23.6	
1	6.6	0.40	11.6	0.60	17.0	0.80	20.9	0.50	23.8	0.20
2	7.0	0.40	12.3	0.70	17.7	0.70	21.3	0.40	24.0	0.20
3	7.4	0.40	12.9	0.60	18.3	0.60	21.8	0.50	24.2	0.20
4	7.8	0.40	13.6	0.70	19.0	0.70	22.2	0.40	24.4	0.20
5	8.2	0.40	14.2	0.60	19.7	0.70	22.7	0.50	24.6	0.20
6										
7										
8										
9										
10										
Qt (l)		2.00		3.20		3.50		2.30		1.00
q (l/min)		0.40		0.64		0.70		0.46		0.20
Pent(l/min/m)		0.03		0.05		0.05		0.04		0.02
Δp (bars)										
P_{EF} (bars)		1.31		1.84		2.56		1.89		1.16
K (m/sec)		3.5E-08		3.9E-08		3.1E-08		2.8E-08		2.0E-08
uL		0.24		0.27		0.21		0.19		0.13

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



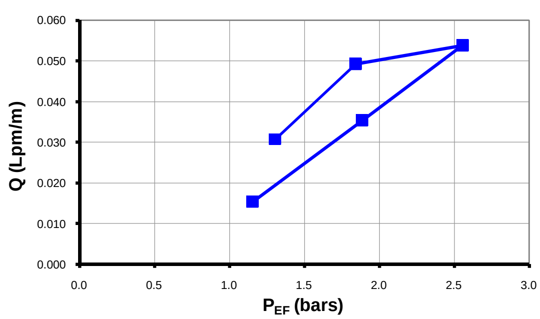
SELECTED LUGEON UNIT : 0.2 uL

K (PERMEABILITY) : 3E-08 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Low flow

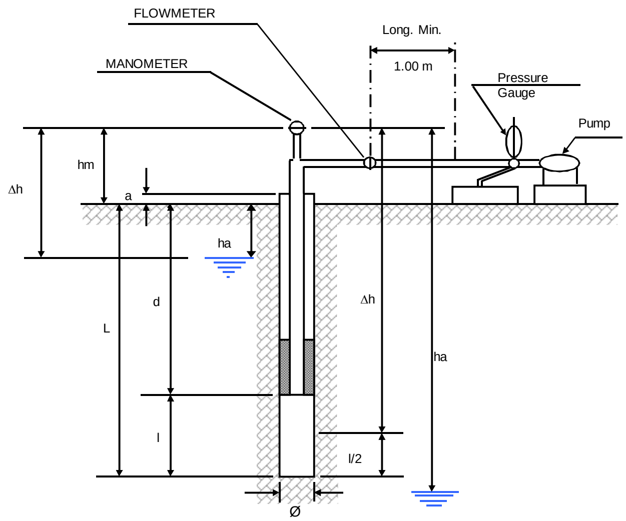
VTR
Analysis

GRB
Check

WATER PRESSURE TEST
LUGEON TYPE

Golder Associates Limited

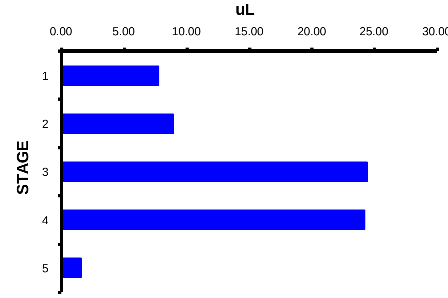
HOLE Nº 60+162.5	**TEST Nº** 2	**North. COORD:**	
PROJECT : East Dike Grouting	**TEST DEPTH** : 10.50 **TO** 13.00 **m.**	**East. COORD:**	
LOCATION: Meadowbank	**DATE:** 24/01/2009 **START:** 16:01 **FINISH:** 16:40	**INCLINATION:**	90
PROJECT Nº : 07-1413-0074 / 2200 / ****	**Minutes:** 39	**GROUND LEVEL:** (m.s.n.m.)	
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	0.95	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	3.50	m
Δh	=	HYDRAULIC PRESSURE HEAD	4.45	m
d	=	TOP OF TEST INTERVAL	10.50	m
L	=	BOTTOM OF TEST INTERVAL	13.00	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	4.45	m
l	=	LENGTH OF TEST INTERVAL	2.50	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.40 Bars	$2/3P_M$ =	0.84 Bars	P_M =	1.20 Bars	$2/3P_M$ =	0.80 Bars	$1/3P_M$ =	0.39 Bars
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	3.5		16.7		38.0		95.9		137.3	
1	5.1	1.60	19.5	2.80	46.6	8.60	103.1	7.20	137.3	0.00
2	6.8	1.70	22.4	2.90	55.8	9.20	111.0	7.90	137.3	0.00
3	8.4	1.60	25.1	2.70	66.3	10.50	118.2	7.20	137.5	0.20
4	10.1	1.70	27.9	2.80	76.7	10.40	125.9	7.70	138.0	0.50
5	11.6	1.50	30.9	3.00	88.0	11.30	133.3	7.40	138.9	0.90
6										
7										
8										
9										
10										
Qt (l)		8.10		14.20		50.00		37.40		1.60
q (l/min)		1.62		2.84		10.00		7.48		0.32
Pent(l/min/m)		0.65		1.14		4.00		2.99		0.13
Δp (bars)										
P_{EF} (bars)		0.84		1.28		1.64		1.24		0.83
K (m/sec)		8.1E-07		9.3E-07		2.6E-06		2.5E-06		1.6E-07
uL		7.71		8.90		24.44		24.20		1.55

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS
uL



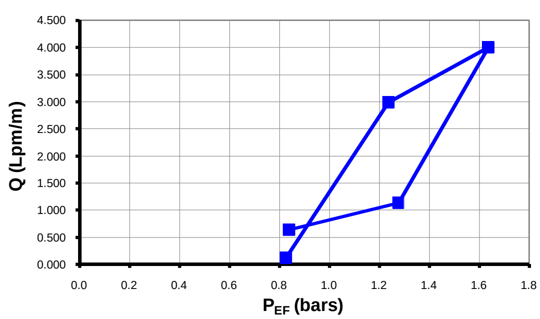
SELECTED LUGEON UNIT : 4.6 **uL**

K (PERMEABILITY) : 5E-07 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Dilation

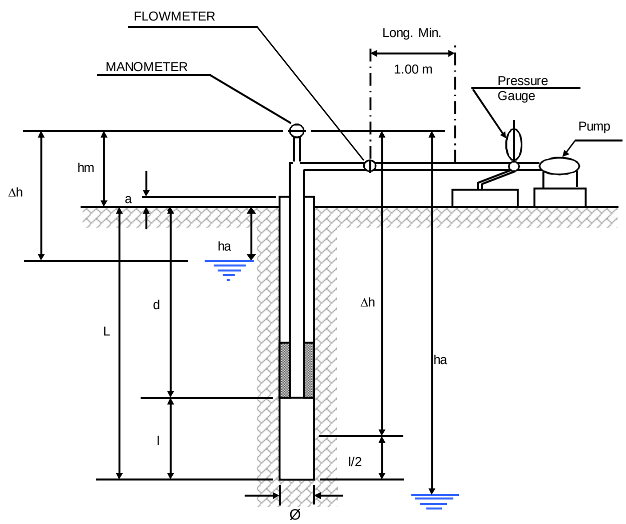
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

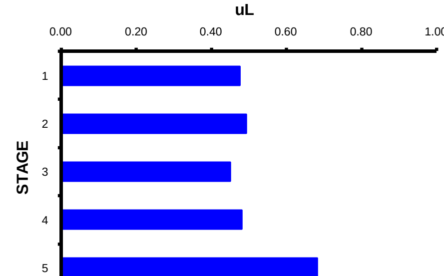
HOLE Nº 60+186.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH :** 13.20 **TO** 20.20 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 25/01/2009	**START:** 15:45 **FINISH:** 16:18	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 33	**GROUND LEVEL:**
	INTERVAL LITHOLOGY :		(m.s.n.m.)



hm	=	HEIGHT OF MANOMETER	1.20	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	3.30	m
Δh	=	HYDRAULIC PRESSURE HEAD	4.50	m
d	=	TOP OF TEST INTERVAL	13.20	m
L	=	BOTTOM OF TEST INTERVAL	20.20	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	4.50	m
l	=	LENGTH OF TEST INTERVAL	7.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

TIMES MINUTES	$1/3P_M$ = 0.70 Bars Q (L)	q (L/min)	$2/3P_M$ = 1.41 Bars Q (L)	q (L/min)	P_M = 2.10 Bars Q (L)	q (L/min)	$2/3P_M$ = 1.40 Bars Q (L)	q (L/min)	$1/3P_M$ = 0.73 Bars Q (L)	q (L/min)
0	1.6		4.5		9.0		14.1		19.4	
1	2.1	0.50	5.1	0.60	9.8	0.80	14.6	0.50	20.1	0.70
2	2.4	0.30	5.8	0.70	10.6	0.80	15.3	0.70	20.6	0.50
3	2.9	0.50	6.4	0.60	14.1	3.50	15.9	0.60	21.2	0.60
4	3.2	0.30	7.1	0.70	12.1	-2.00	16.6	0.70	21.7	0.50
5	3.5	0.30	7.7	0.60	13.0	0.90	17.2	0.60	22.2	0.50
6										
7										
8										
9										
10										
Qt (l)		1.90		3.20		4.00		3.10		2.80
q (l/min)		0.38		0.64		0.80		0.62		0.56
Pent(l/min/m)		0.05		0.09		0.11		0.09		0.08
Δp (bars)										
P_{EF} (bars)		1.14		1.85		2.54		1.84		1.17
K (m/sec)		6.3E-08		6.5E-08		5.9E-08		6.3E-08		9.0E-08
uL		0.48		0.49		0.45		0.48		0.68

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



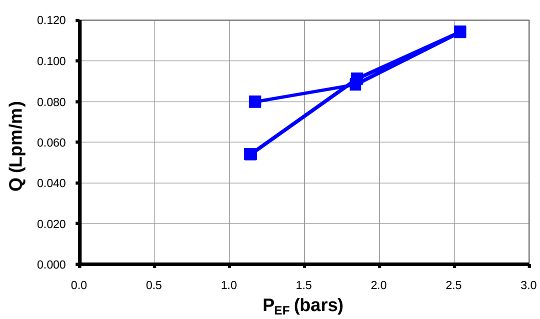
SELECTED LUGEON UNIT : 0.5 uL

K (PERMEABILITY) : 7E-08 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Laminar

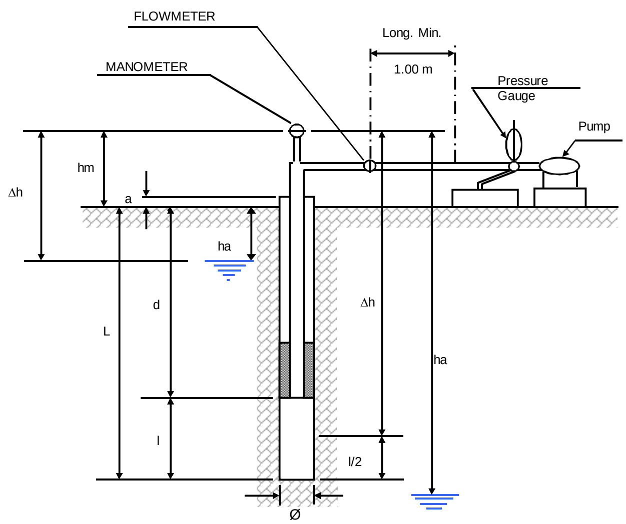
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

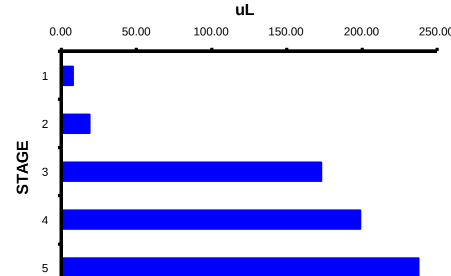
PROJECT : East Dike Grouting	**HOLE Nº** 60+186.5	**TEST Nº** 2	**North. COORD:**
LOCATION: Meadowbank	**TEST DEPTH** : 10.70 **TO** 13.20 **m.**		**East. COORD:**
PROJECT Nº : 07-1413-0074 / 2200 / ****	**DATE:** 25/01/2009	**START:** *16:36* **FINISH:** *17:16*	**INCLINATION:** 90
		Minutes: 40	**GROUND LEVEL:** (m.s.n.m.)
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.02	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	3.30	m
Δh	=	HYDRAULIC PRESSURE HEAD	4.32	m
d	=	TOP OF TEST INTERVAL	10.70	m
L	=	BOTTOM OF TEST INTERVAL	13.20	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	4.32	m
l	=	LENGTH OF TEST INTERVAL	2.50	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.40 Bars	$2/3P_M$ =	0.80 Bars	P_M =	1.18 Bars	$2/3P_M$ =	0.81 Bars	$1/3P_M$ =	0.41 Bars
TIMES MINUTES	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	2.7		21.3		239.3		641.1		1068.0	
1	4.8	2.10	26.0	4.70	308.8	69.50	700.9	59.80	1119.0	51.00
2	6.2	1.40	31.4	5.40	378.8	70.00	764.7	63.80	1167.0	48.00
3	7.6	1.40	37.4	6.00	448.7	69.90	824.0	59.30	1218.0	51.00
4	9.0	1.40	43.3	5.90	518.7	70.00	886.0	62.00	1268.0	50.00
5	10.4	1.40	49.8	6.50	586.5	67.80	948.0	62.00	1316.0	48.00
6										
7										
8										
9										
10										
Qt (l)		7.70		28.50		347.20		306.90		248.00
q (l/min)		1.54		5.70		69.44		61.38		49.60
Pent(l/min/m)		0.62		2.28		27.78		24.55		19.84
Δp (bars)										
P_{EF} (bars)		0.82		1.22		1.60		1.23		0.83
K (m/sec)		7.8E-07		2.0E-06		1.8E-05		2.1E-05		2.5E-05
uL		7.48		18.63		173.21		199.02		237.99

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



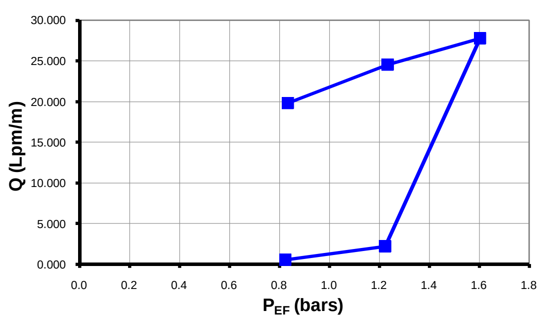
SELECTED LUGEON UNIT : 238 uL

K (PERMEABILITY) : 2E-05 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Washout

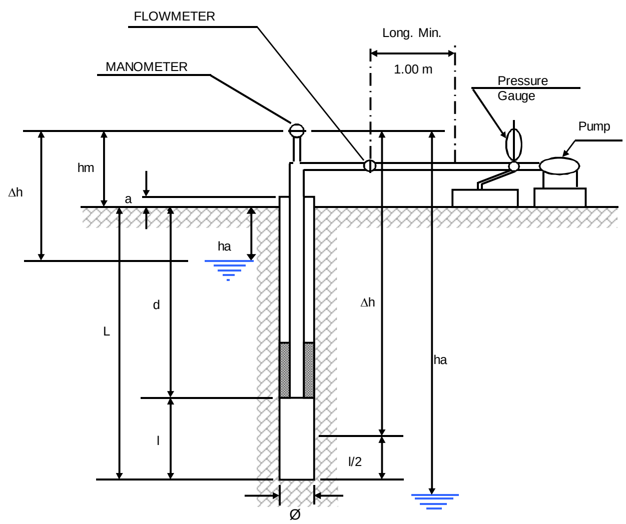
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

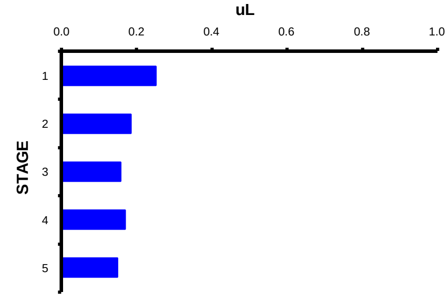
HOLE Nº	60+207.5	**TEST Nº**	1	**North. COORD:**	
PROJECT : East Dike Grouting	**TEST DEPTH** : 12.30 **TO** 19.30 **m.**			**East. COORD:**	
LOCATION: Meadowbank	**DATE:** 26/01/2009	**START:** 13:26	**FINISH:** 13:58	**INCLINATION:**	90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:**	32	**GROUND LEVEL:** (m.s.n.m.)	
	INTERVAL LITHOLOGY :				



hm	=	HEIGHT OF MANOMETER	1.10	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	3.50	m
Δh	=	HYDRAULIC PRESSURE HEAD	4.60	m
d	=	TOP OF TEST INTERVAL	12.30	m
L	=	BOTTOM OF TEST INTERVAL	19.30	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	4.60	m
l	=	LENGTH OF TEST INTERVAL	7.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.69 Bars	$2/3P_M$ =	1.41 Bars	P_M =	2.10 Bars	$2/3P_M$ =	1.41 Bars	$1/3P_M$ =	0.71 Bars
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	0.3		1.7		3.1		4.7		5.9	
1	0.6	0.30	2.0	0.30	3.4	0.30	5.0	0.30	6.0	0.10
2	0.9	0.30	2.2	0.20	3.7	0.30	5.2	0.20	6.1	0.10
3	1.0	0.10	2.4	0.20	4.0	0.30	5.4	0.20	6.3	0.20
4	1.2	0.20	2.6	0.20	4.2	0.20	5.6	0.20	6.4	0.10
5	1.3	0.10	2.9	0.30	4.5	0.30	5.8	0.20	6.5	0.10
6										
7										
8										
9										
10										
Qt (l)		1.00		1.20		1.40		1.10		0.60
q (l/min)		0.20		0.24		0.28		0.22		0.12
Pent(l/min/m)		0.03		0.03		0.04		0.03		0.02
Δp (bars)										
P_{EF} (bars)		1.14		1.86		2.55		1.86		1.16
K (m/sec)		3.3E-08		2.4E-08		2.1E-08		2.2E-08		1.9E-08
uL		0.25		0.18		0.16		0.17		0.15

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



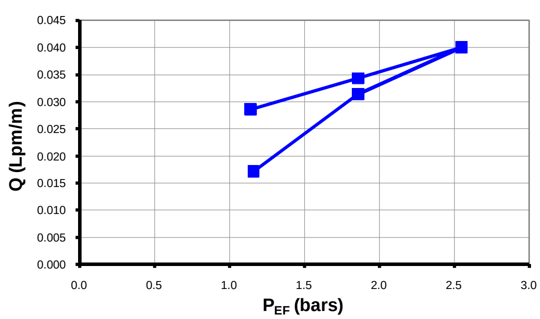
SELECTED LUGEON UNIT : 0.2 uL

K (PERMEABILITY) : 2E-08 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(\, l[m] / (\text{Ø}[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Low Flow

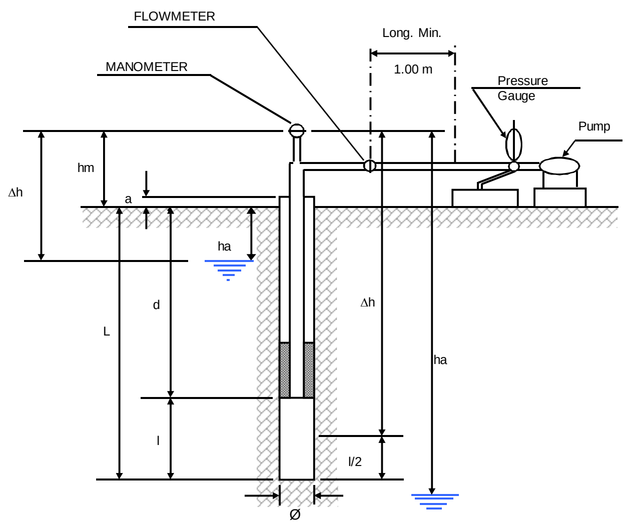
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

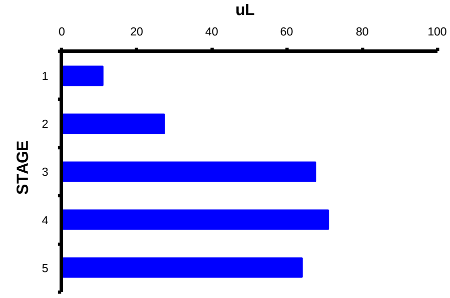
HOLE Nº 60+207.5	**TEST Nº** 2		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH :** 9.80 **TO** 12.30 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 26/01/2009	**START:** 14:21 **FINISH:** 14:52	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 31	**GROUND LEVEL:**
	INTERVAL LITHOLOGY :		(m.s.n.m.)



hm	=	HEIGHT OF MANOMETER	1.10	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	3.50	m
Δh	=	HYDRAULIC PRESSURE HEAD	4.60	m
d	=	TOP OF TEST INTERVAL	9.80	m
L	=	BOTTOM OF TEST INTERVAL	12.30	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	4.60	m
l	=	LENGTH OF TEST INTERVAL	2.50	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.39 Bars	$2/3P_M$ =	0.78 Bars	P_M =	1.18 Bars	$2/3P_M$ =	0.81 Bars	$1/3P_M$ =	0.41 Bars
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	2.2		17.3		73.3		241.4		399.1	
1	4.4	2.20	24.3	7.00	97.2	23.90	264.0	22.60	413.3	14.20
2	6.7	2.30	32.7	8.40	125.2	28.00	285.8	21.80	426.6	13.30
3	9.0	2.30	41.1	8.40	151.4	26.20	309.0	23.20	440.7	14.10
4	11.3	2.30	50.5	9.40	181.7	30.30	331.5	22.50	453.9	13.20
5	13.6	2.30	59.4	8.90	211.2	29.50	353.3	21.80	467.9	14.00
6										
7										
8										
9										
10										
Qt (l)		11.40		42.10		137.90		111.90		68.80
q (l/min)		2.28		8.42		27.58		22.38		13.76
Pent(l/min/m)		0.91		3.37		11.03		8.95		5.50
Δp (bars)										
P_{EF} (bars)		0.84		1.23		1.63		1.26		0.86
K (m/sec)		1.1E-06		2.9E-06		7.1E-06		7.4E-06		6.7E-06
uL		10.84		27.36		67.64		70.99		63.92

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



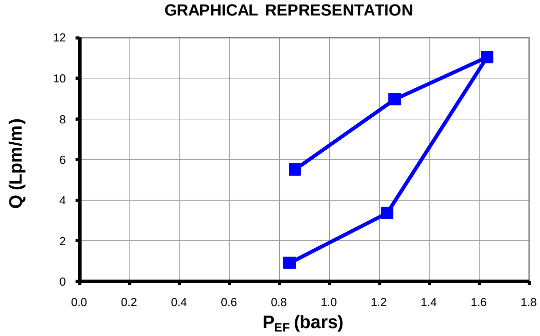
SELECTED LUGEON UNIT : 71 uL

K (PERMEABILITY) : 7E-06 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(\,l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Washout

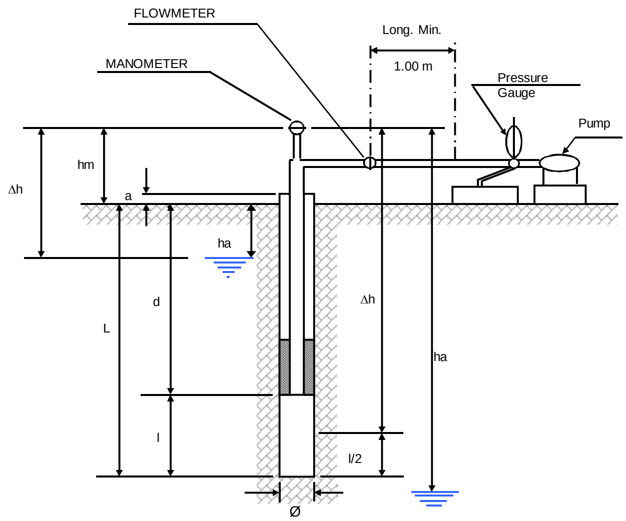
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

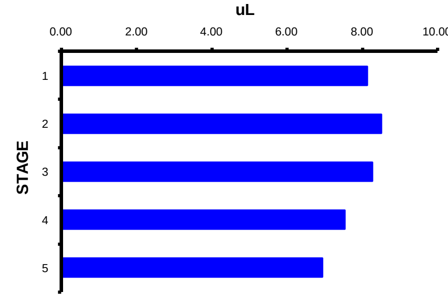
HOLE Nº 60+228.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH :** 12.00 **TO** 19.00 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 26/01/2009	**START:** 4:23 **FINISH:** 4:55	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 32	**GROUND LEVEL:**
	INTERVAL LITHOLOGY :		(m.s.n.m.)



hm	=	HEIGHT OF MANOMETER	1.02	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	10.70	m
Δh	=	HYDRAULIC PRESSURE HEAD	11.72	m
d	=	TOP OF TEST INTERVAL	12.00	m
L	=	BOTTOM OF TEST INTERVAL	19.00	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	11.72	m
l	=	LENGTH OF TEST INTERVAL	7.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.73 Bars	$2/3P_M$ =	1.41 Bars	P_M =	2.12 Bars	$2/3P_M$ =	1.41 Bars	$1/3P_M$ =	0.70 Bars
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	8.6		89.4		178.0		289.3		370.0	
1	19.6	11.00	105.8	16.40	198.1	20.10	303.4	14.10	379.0	9.00
2	30.9	11.30	120.7	14.90	216.9	18.80	316.6	13.20	388.3	9.30
3	41.6	10.70	136.2	15.50	235.5	18.60	330.5	13.90	397.1	8.80
4	52.1	10.50	150.5	14.30	253.8	18.30	344.0	13.50	406.0	8.90
5	62.1	10.00	165.7	15.20	272.7	18.90	356.9	12.90	415.0	9.00
6										
7										
8										
9										
10										
Qt (l)		53.50		76.30		94.70		67.60		45.00
q (l/min)		10.70		15.26		18.94		13.52		9.00
Pent(l/min/m)		1.53		2.18		2.71		1.93		1.29
Δp (bars)										
P_{EF} (bars)		1.88		2.56		3.27		2.56		1.85
K (m/sec)		1.1E-06		1.1E-06		1.1E-06		9.9E-07		9.1E-07
uL		8.13		8.52		8.28		7.55		6.95

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



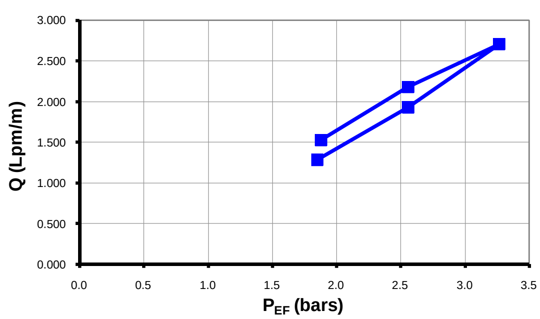
SELECTED LUGEON UNIT : 7.9 **uL**

K (PERMEABILITY) : 1E-06 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(\,l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Laminar

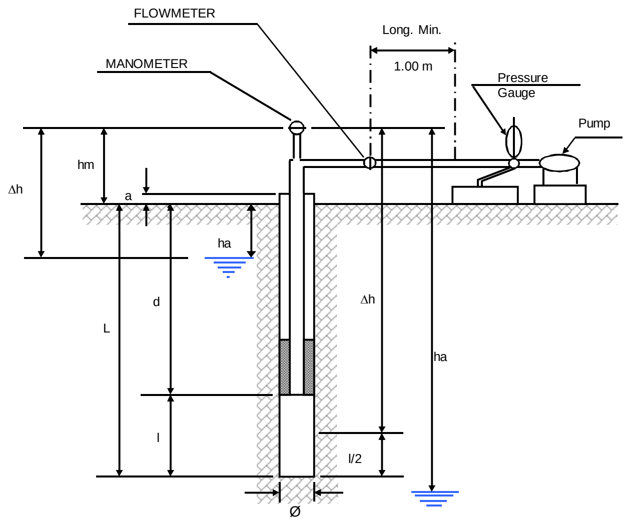
VTR
Analysis

GRB
Check

WATER PRESSURE TEST
LUGEON TYPE

Golder Associates Limited

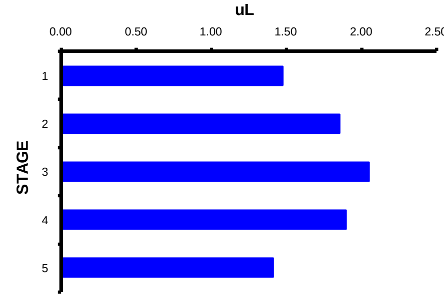
HOLE Nº 60+228.5	**TEST Nº** 2	**North. COORD:**	
PROJECT : East Dike Grouting	**TEST DEPTH :** 9.50 **TO** 12.00 **m.**	**East. COORD:**	
LOCATION: Meadowbank	**DATE:** 26/01/2009 **START:** 5:14 **FINISH:** 5:48	**INCLINATION:**	90
PROJECT Nº : 07-1413-0074 / 2200 / ****	**Minutes:** 34	**GROUND LEVEL:** (m.s.n.m.)	
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.02	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	10.70	m
Δh	=	HYDRAULIC PRESSURE HEAD	11.72	m
d	=	TOP OF TEST INTERVAL	9.50	m
L	=	BOTTOM OF TEST INTERVAL	12.00	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	11.72	m
l	=	LENGTH OF TEST INTERVAL	2.50	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.37 Bars	$2/3P_M$ =	0.79 Bars	P_M =	1.19 Bars	$2/3P_M$ =	0.79 Bars	$1/3P_M$ =	0.38 Bars
TIMES MINUTES	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	1.8		5.4		12.2		20.3		25.8	
1	2.4	0.60	6.4	1.00	13.4	1.20	21.2	0.90	26.4	0.60
2	2.9	0.50	7.2	0.80	14.6	1.20	22.1	0.90	26.9	0.50
3	3.5	0.60	8.1	0.90	15.8	1.20	23.0	0.90	27.5	0.60
4	4.0	0.50	9.0	0.90	16.9	1.10	24.0	1.00	28.0	0.50
5	4.6	0.60	9.9	0.90	18.2	1.30	24.9	0.90	28.5	0.50
6										
7										
8										
9										
10										
Qt (l)		2.80		4.50		6.00		4.60		2.70
q (l/min)		0.56		0.90		1.20		0.92		0.54
Pent(l/min/m)		0.22		0.36		0.48		0.37		0.22
Δp (bars)										
P_{EF} (bars)		1.52		1.94		2.34		1.94		1.53
K (m/sec)		1.5E-07		1.9E-07		2.2E-07		2.0E-07		1.5E-07
uL		1.47		1.86		2.05		1.90		1.41

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



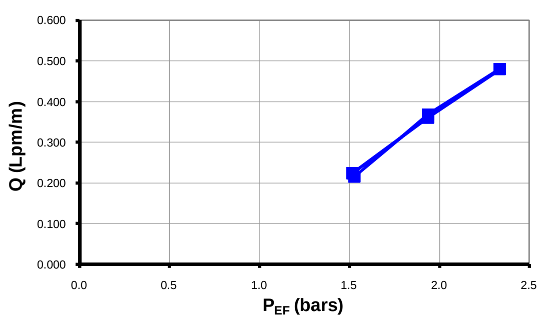
SELECTED LUGEON UNIT : 1.4 uL

K (PERMEABILITY) : 2E-07 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Dilation

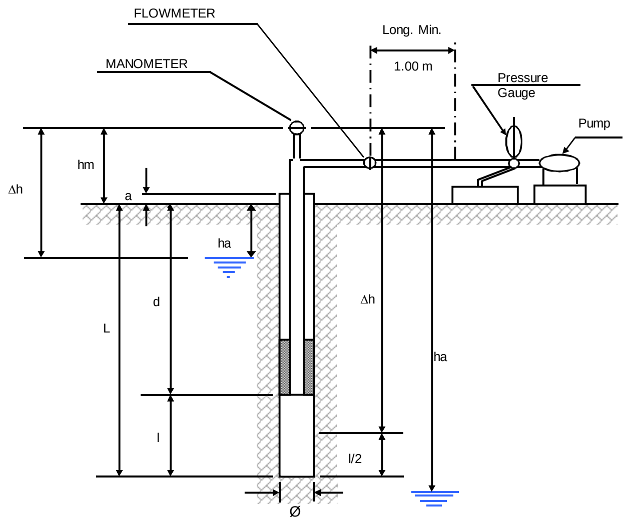
VTR
Analysis

GRB
Check

WATER PRESSURE TEST
LUGEON TYPE

Golder Associates Limited

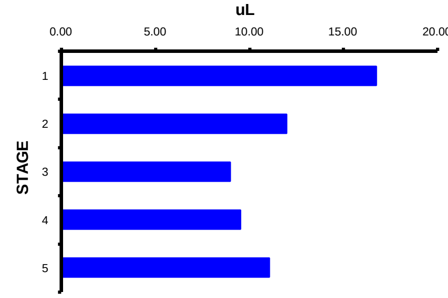
HOLE Nº	60+246.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH** :	10.40 **TO** 17.40 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:** 21/01/2009	**START:** 20:45 **FINISH:** 21:20	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 35	**GROUND LEVEL:** (m.s.n.m.)	
		INTERVAL LITHOLOGY :			



	=	HEIGHT OF MANOMETER	1.00	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.60	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.60	m
d	=	TOP OF TEST INTERVAL	10.40	m
L	=	BOTTOM OF TEST INTERVAL	17.40	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.60	m
l	=	LENGTH OF TEST INTERVAL	7.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.71 Bars	$2/3P_M$ =	1.41 Bars	P_M =	2.12 Bars	$2/3P_M$ =	1.40 Bars	$1/3P_M$ =	0.71 Bars
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	45.3		144.3		249.9		357.2		442.5	
1	58.4	13.10	159.6	15.30	266.7	16.80	369.3	12.10	450.5	8.00
2	70.5	12.10	174.7	15.10	282.5	15.80	380.9	11.60	458.9	8.40
3	83.3	12.80	189.4	14.70	297.5	15.00	392.5	11.60	467.2	8.30
4	95.9	12.60	205.8	16.40	312.6	15.10	403.6	11.10	475.1	7.90
5	107.6	11.70	218.3	12.50	327.6	15.00	415.7	12.10	483.7	8.60
6										
7										
8										
9										
10										
Qt (l)		62.30		74.00		77.70		58.50		41.20
q (l/min)		12.46		14.80		15.54		11.70		8.24
Pent(l/min/m)		1.78		2.11		2.22		1.67		1.18
Δp (bars)										
P_{EF} (bars)		1.06		1.76		2.47		1.75		1.06
K (m/sec)		2.2E-06		1.6E-06		1.2E-06		1.3E-06		1.5E-06
uL		16.74		11.99		8.98		9.53		11.07

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS
uL



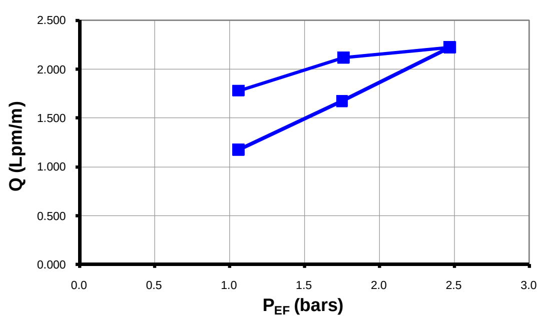
SELECTED LUGEON UNIT : 9.0 uL

K (PERMEABILITY) : 1E-06 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(\, l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Turbulent

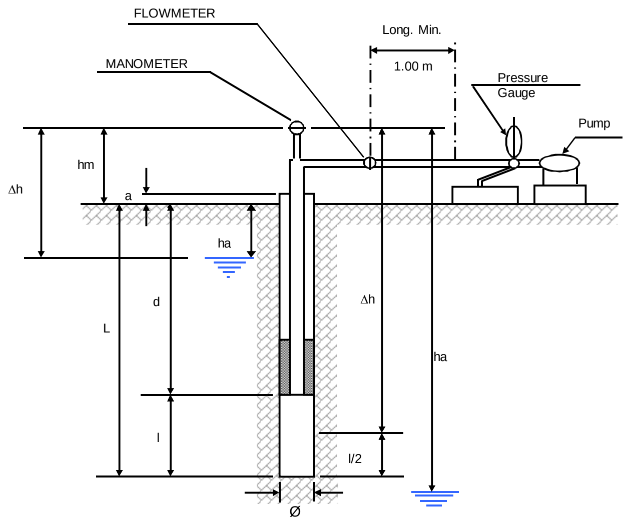
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

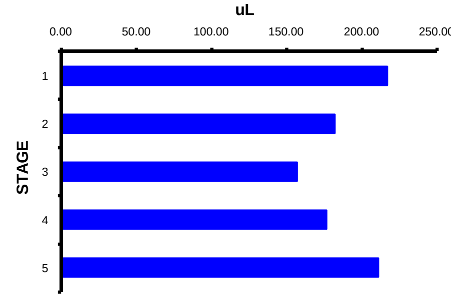
HOLE Nº	60+246.5	**TEST Nº**	2	**North. COORD:**	
PROJECT : East Dike Grouting		**TEST DEPTH :**	7.90 **TO** 10.70 **m.**	**East. COORD:**	
LOCATION: Meadowbank		**DATE:** 21/01/2009	**START:** 23:30 **FINISH:** 23:35	**INCLINATION:**	90
PROJECT Nº : 07-1413-0074 / 2200 / ****			**Minutes:** 5	**GROUND LEVEL:** (m.s.n.m.)	
		INTERVAL LITHOLOGY :			



hm	=	HEIGHT OF MANOMETER	1.00	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	3.00	m
Δh	=	HYDRAULIC PRESSURE HEAD	4.00	m
d	=	TOP OF TEST INTERVAL	7.90	m
L	=	BOTTOM OF TEST INTERVAL	10.70	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	4.00	m
l	=	LENGTH OF TEST INTERVAL	2.80	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

TIMES MINUTES	$1/3P_M$ = 0.39 Bars Q (L)	q (L/min)	$2/3P_M$ = 0.80 Bars Q (L)	q (L/min)	P_M = 1.20 Bars Q (L)	q (L/min)	$2/3P_M$ = 0.80 Bars Q (L)	q (L/min)	$1/3P_M$ = 0.40 Bars Q (L)	q (L/min)
0	94.6		469.0		855.5		1279.0		1688.0	
1	142.5	47.90	532.0	63.00	925.0	69.50	1338.0	59.00	1730.0	42.00
2	190.4	47.90	595.1	63.10	991.0	66.00	1396.0	58.00	1780.0	50.00
3	238.4	48.00	651.9	56.80	1063.0	72.00	1455.0	59.00	1825.0	45.00
4	287.8	49.40	72.7	-579.20	1136.0	73.00	1513.0	58.00	1870.0	45.00
5	332.5	44.70	773.3	700.60	1205.0	69.00	1574.0	61.00	1922.0	52.00
6										
7										
8										
9										
10										
Qt (l)		237.90		304.30		349.50		295.00		234.00
q (l/min)		47.58		60.86		69.90		59.00		46.80
Pent(l/min/m)		16.99		21.74		24.96		21.07		16.71
Δp (bars)										
P_{EF} (bars)		0.78		1.19		1.59		1.19		0.79
K (m/sec)		2.3E-05		2.0E-05		1.7E-05		1.9E-05		2.3E-05
uL		217.23		182.31		156.78		176.73		210.97

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS
uL



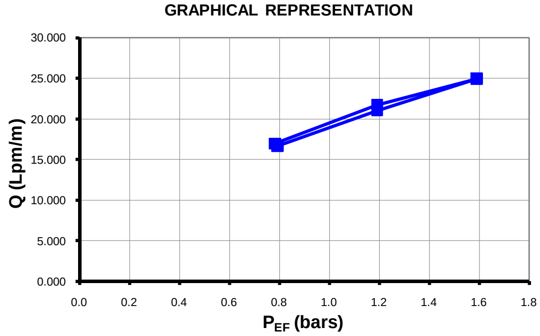
SELECTED LUGEON UNIT : 157 uL

K (PERMEABILITY) : 2E-05 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: turbulent

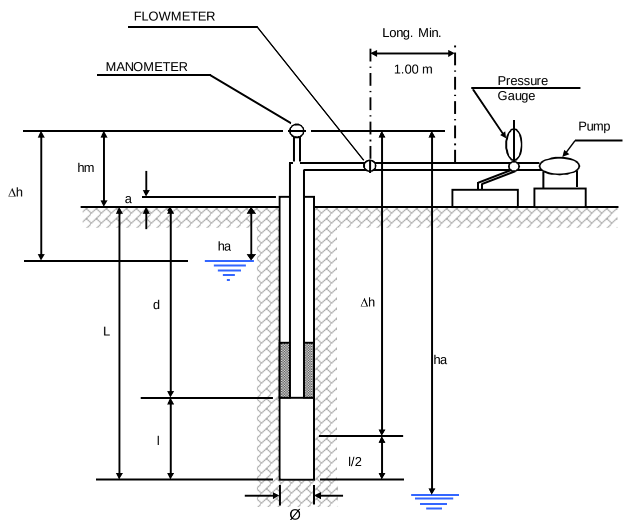
VTR
Analysis

GRB
Check

WATER PRESSURE TEST
LUGEON TYPE

Golder Associates Limited

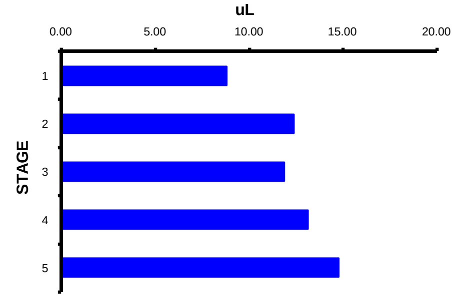
HOLE Nº	60+357.5	**TEST Nº**	1	**North. COORD:**	
PROJECT : East Dike Grouting	**TEST DEPTH :**	12.60	**TO** 17.60 **m.**	**East. COORD:**	
LOCATION: Meadowbank	**DATE:** 09/01/2009	**START:** 4:10	**FINISH:** 4:51	**INCLINATION:**	90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:**	41	**GROUND LEVEL:** (m.s.n.m.)	
	INTERVAL LITHOLOGY :				



hm	=	HEIGHT OF MANOMETER	0.95	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.73	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.68	m
d	=	TOP OF TEST INTERVAL	12.60	m
L	=	BOTTOM OF TEST INTERVAL	17.60	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.68	m
l	=	LENGTH OF TEST INTERVAL	5.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.90 Bars	$2/3P_M$ =	1.60 Bars	P_M =	2.40 Bars	$2/3P_M$ =	1.50 Bars	$1/3P_M$ =	0.80 Bars
TIMES MINUTES	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	0.0		0.0		0.0		0.0		0.0	
1	5.5	5.50	12.2	12.20	16.0	16.00	12.1	12.10	8.0	8.00
2	11.2	5.70	24.4	12.20	31.9	15.90	24.2	12.10	16.6	8.60
3	16.7	5.50	36.5	12.10	48.6	16.70	36.3	12.10	25.3	8.70
4	22.2	5.50	48.8	12.30	65.1	16.50	48.6	12.30	33.9	8.60
5	27.8	5.60	60.8	12.00	81.8	16.70	61.0	12.40	42.7	8.80
6					98.5	16.70	73.4	12.40	51.5	8.80
7										
8										
9										
10										
Qt (l)		27.80		60.80		98.50		73.40		51.50
q (l/min)		5.56		12.16		16.42		12.23		8.58
Pent(l/min/m)		1.11		2.43		3.28		2.45		1.72
Δp (bars)										
P_{EF} (bars)		1.26		1.96		2.76		1.86		1.16
K (m/sec)		1.1E-06		1.5E-06		1.5E-06		1.6E-06		1.8E-06
uL		8.82		12.40		11.89		13.15		14.79

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS



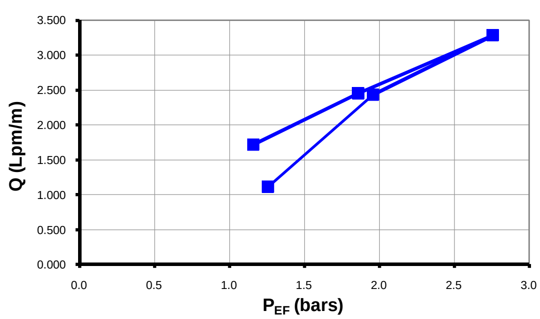
SELECTED LUGEON UNIT : 14.79 uL

K (PERMEABILITY) : 1.8E-06 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: washout

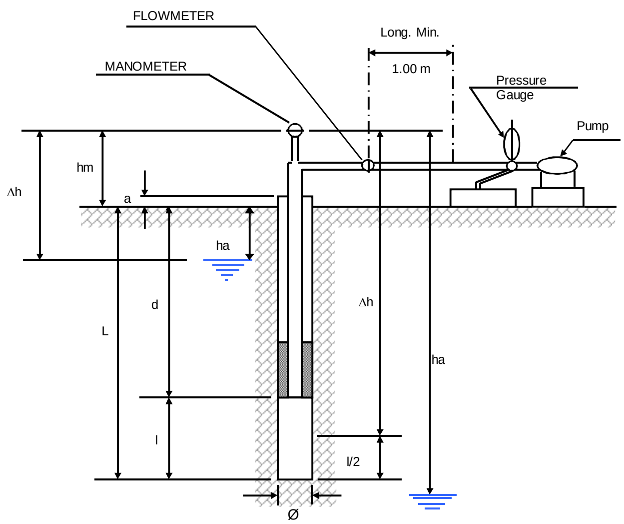
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

HOLE Nº 60+357.5	**TEST Nº** 2		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH :** 8.10 **TO** 17.60 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 09/01/2009	**START:** 5:07 **FINISH:** 5:41	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 34	**GROUND LEVEL:** (m.s.n.m.)
	INTERVAL LITHOLOGY :		

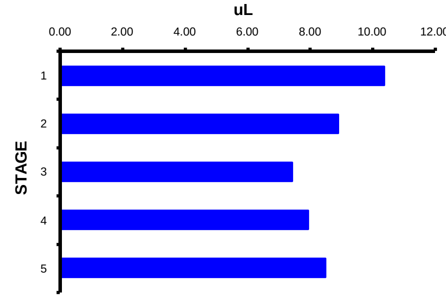


hm	=	HEIGHT OF MANOMETER	0.95	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.73	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.68	m
d	=	TOP OF TEST INTERVAL	8.10	m
L	=	BOTTOM OF TEST INTERVAL	17.60	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.68	m
l	=	LENGTH OF TEST INTERVAL	9.50	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.80 Bars	$2/3P_M$ =	1.20 Bars	P_M =	2.00 Bars	$2/3P_M$ =	1.30 Bars	$1/3P_M$ =	0.70 Bars
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	0.0		0.0		0.0		0.0		0.0	
1	11.6	11.60	13.4	13.40	16.8	16.80	12.4	12.40	8.6	8.60
2	23.0	11.40	26.5	13.10	33.5	16.70	25.0	12.60	17.4	8.80
3	34.4	11.40	39.7	13.20	50.1	16.60	37.6	12.60	25.9	8.50
4	45.8	11.40	52.9	13.20	66.7	16.60	50.1	12.50	34.4	8.50
5	57.2	11.40	66.1	13.20	83.3	16.60	62.7	12.60	42.9	8.50
6					99.9	16.60	75.3	12.60	51.4	8.50
7										
8										
9										
10										
Qt (l)		57.20		66.10		99.90		75.30		51.40
q (l/min)		11.44		13.22		16.65		12.55		8.57
Pent(l/min/m)		1.20		1.39		1.75		1.32		0.90
Δp (bars)										
P_{EF} (bars)		1.16		1.56		2.36		1.66		1.06
K (m/sec)		1.4E-06		1.2E-06		1.0E-06		1.1E-06		1.2E-06
uL		10.37		8.92		7.42		7.95		8.50

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS

uL



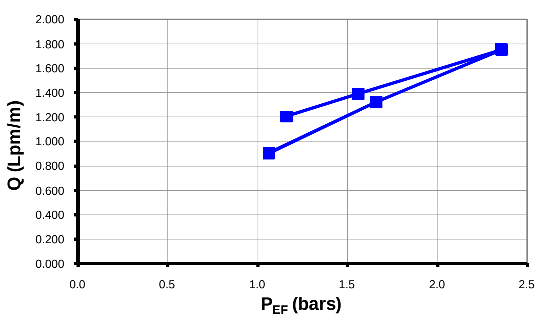
SELECTED LUGEON UNIT : 7.4 uL

K (PERMEABILITY) : 1E-06 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



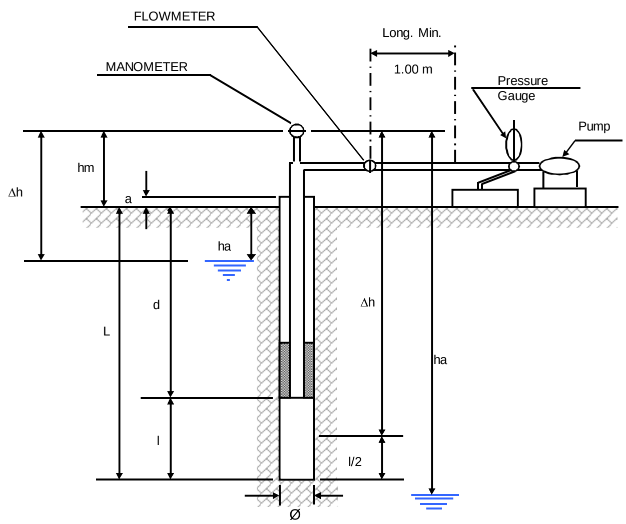
OBSERVATIONS: turbulent

VTR
Analysis

GRB
Check

Golder Associates Limited	**WATER PRESSURE TEST** **LUGEON TYPE**

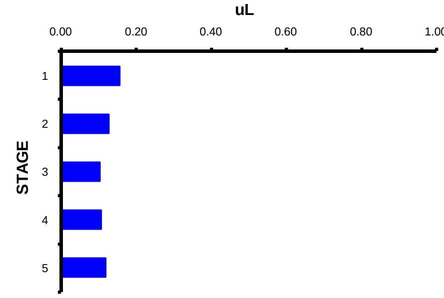
HOLE Nº	60+384.5	**TEST Nº**	1	**North. COORD:**	
PROJECT : East Dike Grouting	**TEST DEPTH** : 12.56 **TO** 19.90 **m.**			**East. COORD:**	
LOCATION: Meadowbank	**DATE:** 09/01/2009	**START:** 15:05	**FINISH:** 15:38	**INCLINATION:**	90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:**	33	**GROUND LEVEL:** (m.s.n.m.)	
	INTERVAL LITHOLOGY :				



hm	=	HEIGHT OF MANOMETER	0.95	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.73	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.68	m
d	=	TOP OF TEST INTERVAL	12.56	m
L	=	BOTTOM OF TEST INTERVAL	19.90	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.68	m
l	=	LENGTH OF TEST INTERVAL	7.34	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

		Bars		Bars		Bars		Bars		Bars
	$1/3P_M$ =	0.69	$2/3P_M$ =	1.59	P_M =	2.30	$2/3P_M$ =	1.70	$1/3P_M$ =	0.80
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	2.0		3.1		4.3		5.5		6.6	
1	2.1	0.10	3.2	0.10	4.5	0.20	5.6	0.10	6.7	0.10
2	2.2	0.10	3.4	0.20	4.7	0.20	5.8	0.20	6.8	0.10
3	2.4	0.20	3.6	0.20	4.9	0.20	6.0	0.20	6.9	0.10
4	2.5	0.10	3.8	0.20	5.1	0.20	6.2	0.20	7.0	0.10
5	2.6	0.10	4.0	0.20	5.3	0.20	6.3	0.10	7.1	0.10
6										
7										
8										
9										
10										
Qt (l)		0.60		0.90		1.00		0.80		0.50
q (l/min)		0.12		0.18		0.20		0.16		0.10
Pent(l/min/m)		0.02		0.02		0.03		0.02		0.01
Δp (bars)										
P_{EF} (bars)		1.05		1.95		2.66		2.06		1.16
K (m/sec)		2.1E-08		1.7E-08		1.4E-08		1.4E-08		1.6E-08
uL		0.16		0.13		0.10		0.11		0.12

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



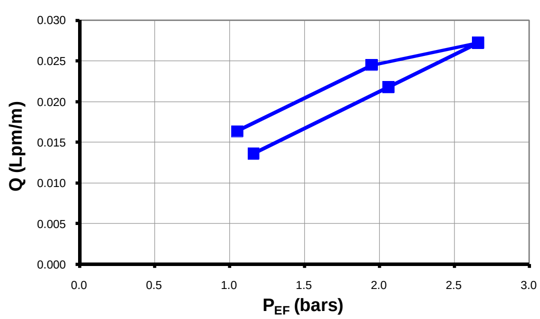
SELECTED LUGEON UNIT : 0.1 uL

K (PERMEABILITY) : 2E-08 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ **uL = Pent (L/min/m) x 10 / P_{EF} (bars)**

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



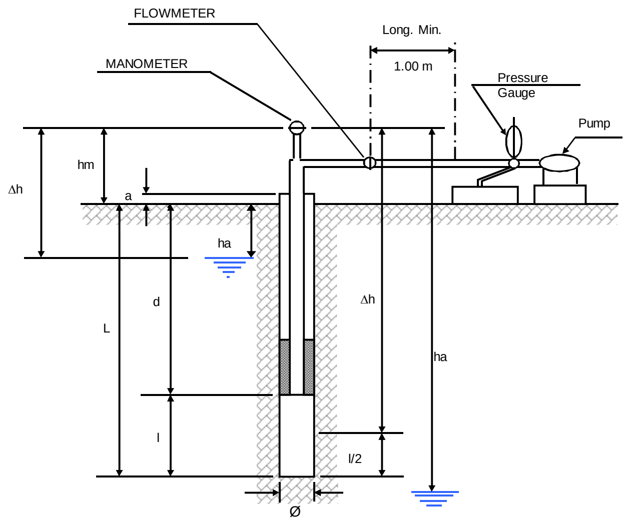
OBSERVATIONS: low flow

VTR
Analysis

GRB
Check

Golder Associates Limited		**WATER PRESSURE TEST LUGEON TYPE**

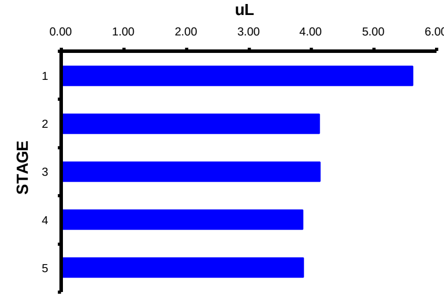
HOLE Nº	60+384.5	**TEST Nº**	2	**North. COORD:**	
PROJECT : East Dike Grouting	**TEST DEPTH :** 10.40	**TO** 13.20 **m.**		**East. COORD:**	
LOCATION: Meadowbank	**DATE:** 09/01/2009	**START:** 16:14	**FINISH:** 16:57	**INCLINATION:**	90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 43		**GROUND LEVEL:** (m.s.n.m.)	
	INTERVAL LITHOLOGY :				



hm	=	HEIGHT OF MANOMETER	1.10	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.80	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.90	m
d	=	TOP OF TEST INTERVAL	10.40	m
L	=	BOTTOM OF TEST INTERVAL	13.20	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.90	m
l	=	LENGTH OF TEST INTERVAL	2.80	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.57 Bars	$2/3P_M$ =	0.95 Bars	P_M =	1.38 Bars	$2/3P_M$ =	0.95 Bars	$1/3P_M$ =	0.54 Bars
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	16.0		33.7		44.0		56.5		65.2	
1	17.5	1.50	35.2	1.50	46.3	2.30	57.8	1.30	66.1	0.90
2	19.0	1.50	36.8	1.60	48.5	2.20	59.3	1.50	67.1	1.00
3	20.5	1.50	38.3	1.50	50.4	1.90	60.8	1.50	68.2	1.10
4	22.0	1.50	39.8	1.50	52.3	1.90	62.3	1.50	69.2	1.00
5	23.5	1.50	41.4	1.60	54.2	1.90	63.7	1.40	70.2	1.00
6										
7										
8										
9										
10										
Qt (l)		7.50		7.70		10.20		7.20		5.00
q (l/min)		1.50		1.54		2.04		1.44		1.00
Pent(l/min/m)		0.54		0.55		0.73		0.51		0.36
Δp (bars)										
P_{EF} (bars)		0.95		1.33		1.76		1.33		0.92
K (m/sec)		6.1E-07		4.4E-07		4.5E-07		4.2E-07		4.2E-07
uL		5.62		4.13		4.13		3.86		3.87

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS



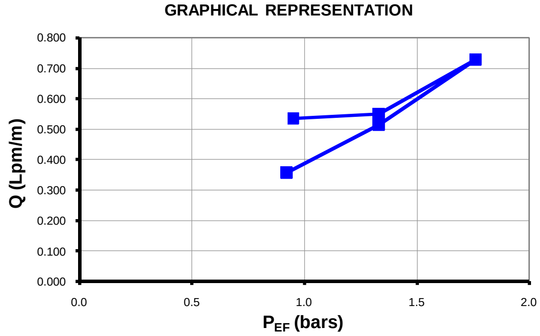
SELECTED LUGEON UNIT : 4.0 **uL**

K (PERMEABILITY) : 4E-07 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ **uL = Pent (L/min/m) x 10 / P_{EF} (bars)**

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: laminar

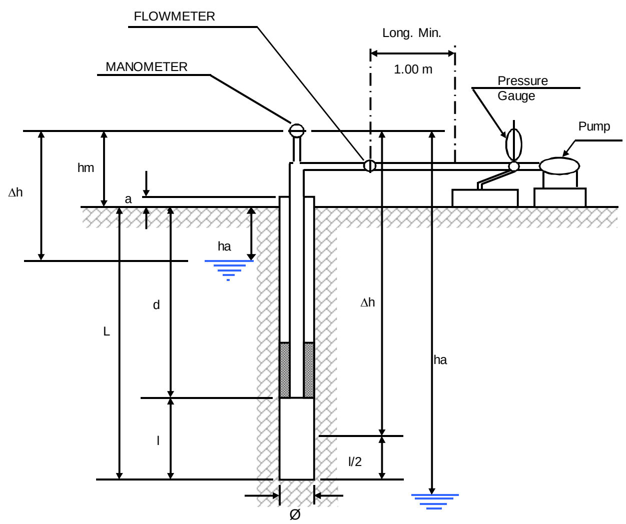
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

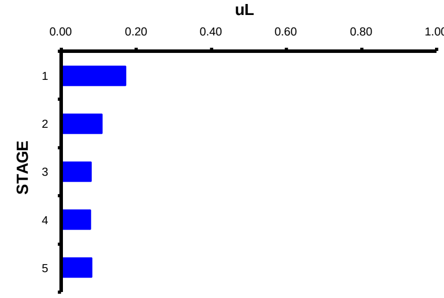
HOLE Nº	60+411.5	**TEST Nº**	1	**North. COORD:**	
PROJECT : East Dike Grouting	**TEST DEPTH :**	13.20 TO 20.20 m.		**East. COORD:**	
LOCATION: Meadowbank	**DATE:** 10/01/2009	**START:** 23:11	**FINISH:** 23:46	**INCLINATION:**	90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 35		**GROUND LEVEL:** (m.s.n.m.)	
	INTERVAL LITHOLOGY :				



hm	=	HEIGHT OF MANOMETER	1.05	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.60	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.65	m
d	=	TOP OF TEST INTERVAL	13.20	m
L	=	BOTTOM OF TEST INTERVAL	20.20	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.65	m
l	=	LENGTH OF TEST INTERVAL	7.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ = 0.65 Bars		$2/3P_M$ = 1.50 Bars		P_M = 2.20 Bars		$2/3P_M$ = 1.50 Bars		$1/3P_M$ = 0.70 Bars	
TIMES MINUTES	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	4.0		4.9		6.0		7.0		7.5	
1	4.2	0.20	5.1	0.20	6.1	0.10	7.1	0.10	7.6	0.10
2	4.3	0.10	5.2	0.10	6.3	0.20	7.2	0.10	7.6	0.00
3	4.4	0.10	5.3	0.10	6.4	0.10	7.3	0.10	7.7	0.10
4	4.5	0.10	5.5	0.20	6.6	0.20	7.4	0.10	7.7	0.00
5	4.6	0.10	5.6	0.10	6.7	0.10	7.5	0.10	7.8	0.10
6										
7										
8										
9										
10										
Qt (l)		0.60		0.70		0.70		0.50		0.30
q (l/min)		0.12		0.14		0.14		0.10		0.06
Pent(l/min/m)		0.02		0.02		0.02		0.01		0.01
Δp (bars)										
P_{EF} (bars)		1.01		1.86		2.56		1.86		1.06
K (m/sec)		2.2E-08		1.4E-08		1.0E-08		1.0E-08		1.1E-08
uL		0.17		0.11		0.08		0.08		0.08

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



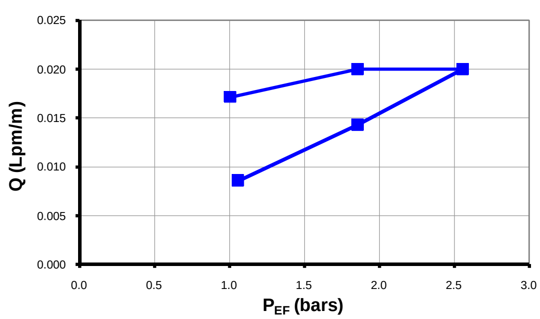
SELECTED LUGEON UNIT : 0.1 uL

K (PERMEABILITY) : 1E-08 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: low flow

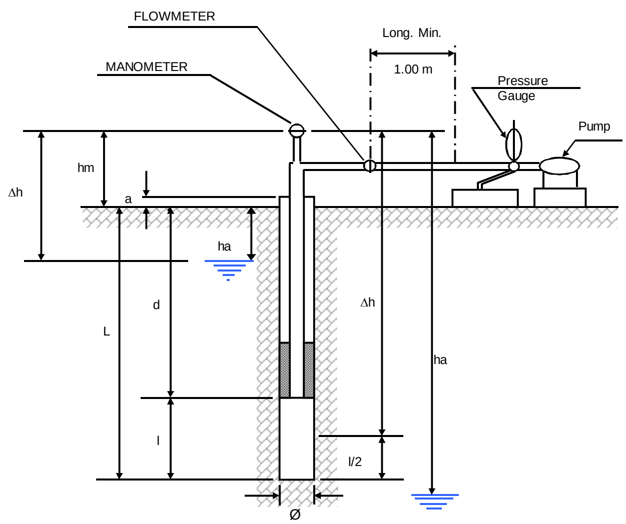
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

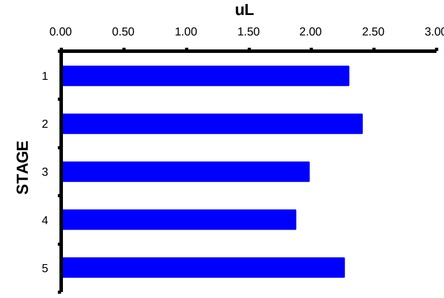
HOLE Nº 60+411.5	**TEST Nº** 2		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH :** 10.70 **TO** 13.50 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 10/01/2009	**START:** 0:22 **FINISH:** 0:55	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 33	**GROUND LEVEL:** (m.s.n.m.)
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.05	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.60	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.65	m
d	=	TOP OF TEST INTERVAL	10.70	m
L	=	BOTTOM OF TEST INTERVAL	13.50	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.65	m
l	=	LENGTH OF TEST INTERVAL	2.80	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

TIMES MINUTES	$1/3P_M$ =	0.45 Bars	$2/3P_M$ =	0.80 Bars	P_M =	1.30 Bars	$2/3P_M$ =	0.90 Bars	$1/3P_M$ =	0.40 Bars
	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	22.7		26.7		32.7		38.7		42.7	
1	23.2	0.50	27.5	0.80	33.8	1.10	39.3	0.60	43.2	0.50
2	23.7	0.50	28.2	0.70	34.8	1.00	40.1	0.80	43.7	0.50
3	24.4	0.70	29.0	0.80	35.6	0.80	40.7	0.60	44.1	0.40
4	24.7	0.30	29.8	0.80	36.6	1.00	41.3	0.60	44.6	0.50
5	25.3	0.60	30.6	0.80	37.3	0.70	42.0	0.70	45.1	0.50
6										
7										
8										
9										
10										
Qt (l)		2.60		3.90		4.60		3.30		2.40
q (l/min)		0.52		0.78		0.92		0.66		0.48
Pent(l/min/m)		0.19		0.28		0.33		0.24		0.17
Δp (bars)										
P_{EF} (bars)		0.81		1.16		1.66		1.26		0.76
K (m/sec)		2.5E-07		2.6E-07		2.1E-07		2.0E-07		2.4E-07
uL		2.30		2.41		1.98		1.87		2.26

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



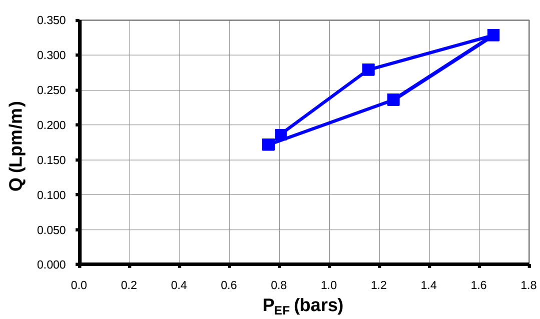
SELECTED LUGEON UNIT : 2.2 uL

K (PERMEABILITY) : 2E-07 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (\text{Ø}[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: laminar

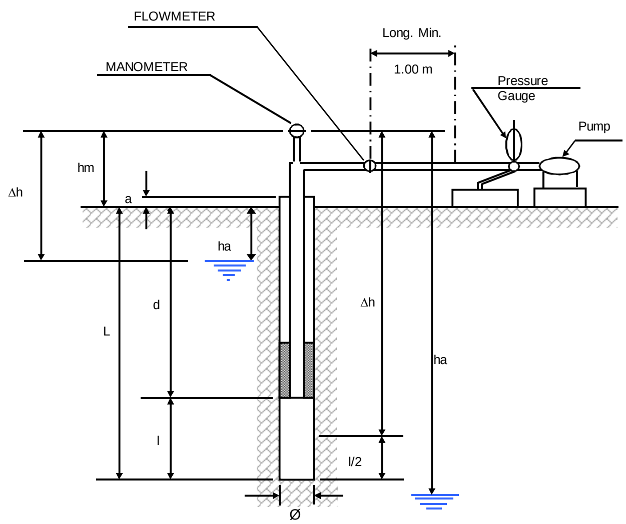
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

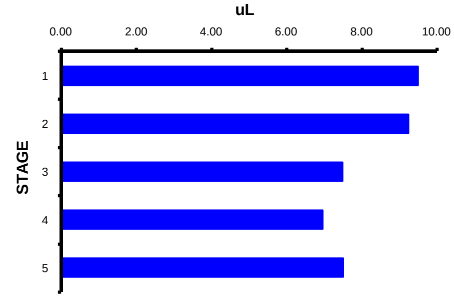
HOLE Nº 60+438.5	**TEST Nº** 1	**North. COORD:**	
PROJECT : East Dike Grouting	**TEST DEPTH** : 15.10 **TO** 22.10 **m.**	**East. COORD:**	
LOCATION: Meadowbank	**DATE:** 16/01/2009 **START:** 21:00 **FINISH:** 21:45	**INCLINATION:**	90
PROJECT Nº : 07-1413-0074 / 2200 / ****	**Minutes:** 45	**GROUND LEVEL:** (m.s.n.m.)	
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.10	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.78	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.88	m
d	=	TOP OF TEST INTERVAL	15.10	m
L	=	BOTTOM OF TEST INTERVAL	22.10	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.88	m
l	=	LENGTH OF TEST INTERVAL	7.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

TIMES MINUTES	$1/3P_M$ = 0.75 Bars Q (L)	q (L/min)	$2/3P_M$ = 1.50 Bars Q (L)	q (L/min)	P_M = 2.20 Bars Q (L)	q (L/min)	$2/3P_M$ = 1.50 Bars Q (L)	q (L/min)	$1/3P_M$ = 0.70 Bars Q (L)	q (L/min)
0	18.3		72.1		162.5		244.7		299.5	
1	25.9	7.60	85.1	13.00	177.5	15.00	253.2	8.50	305.8	6.30
2	33.4	7.50	97.5	12.40	190.2	12.70	262.9	9.70	311.1	5.30
3	40.9	7.50	109.6	12.10	203.1	12.90	272.1	9.20	316.8	5.70
4	49.2	8.30	121.5	11.90	216.9	13.80	281.3	9.20	322.4	5.60
5	55.9	6.70	133.0	11.50	230.1	13.20	290.5	9.20	327.9	5.50
6										
7										
8										
9										
10										
Qt (l)		37.60		60.90		67.60		45.80		28.40
q (l/min)		7.52		12.18		13.52		9.16		5.68
Pent(l/min/m)		1.07		1.74		1.93		1.31		0.81
Δp (bars)										
P_{EF} (bars)		1.13		1.88		2.58		1.88		1.08
K (m/sec)		1.3E-06		1.2E-06		9.9E-07		9.2E-07		9.9E-07
uL		9.50		9.25		7.48		6.96		7.51

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



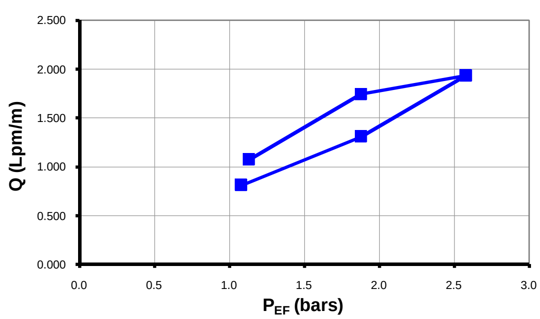
SELECTED LUGEON UNIT : 7.5 uL

K (PERMEABILITY) : 1E-06 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: turbulent

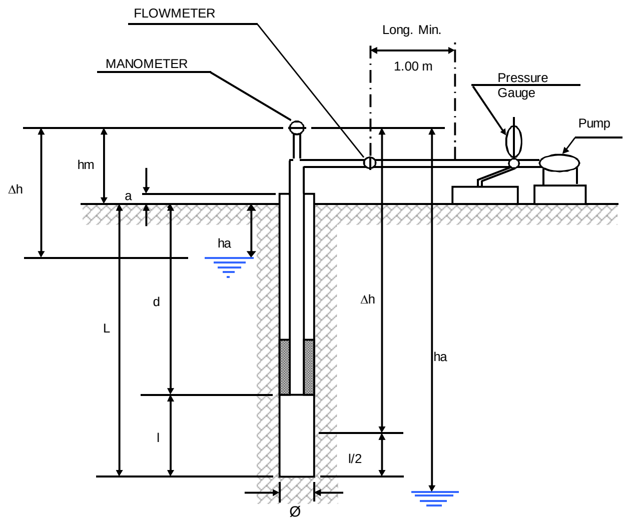
VTR
Analysis

GRB
Check

WATER PRESSURE TEST
LUGEON TYPE

Golder Associates Limited

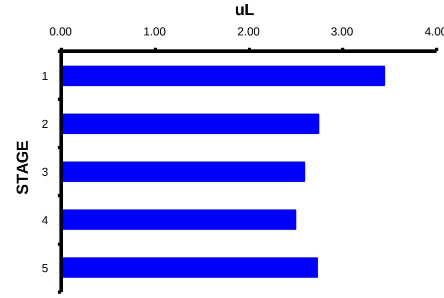
HOLE Nº	60+438.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH** :	12.60 **TO** 15.40 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:** 15/01/2009	**START:** 22:50 **FINISH:** 23:25	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 35	**GROUND LEVEL:** (m.s.n.m.)	
		INTERVAL LITHOLOGY :			



hm	=	HEIGHT OF MANOMETER	1.10	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.78	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.88	m
d	=	TOP OF TEST INTERVAL	12.60	m
L	=	BOTTOM OF TEST INTERVAL	15.40	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.88	m
l	=	LENGTH OF TEST INTERVAL	2.80	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ = 0.32 Bars		$2/3P_M$ = 0.97 Bars		P_M = 1.38 Bars		$2/3P_M$ = 1.02 Bars		$1/3P_M$ = 0.43 Bars	
TIMES MINUTES	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	13.2		19.6		28.4		37.0		42.9	
1	13.9	0.70	20.7	1.10	29.9	1.50	38.8	1.80	43.5	0.60
2	14.5	0.60	21.7	1.00	31.0	1.10	39.0	0.20	44.1	0.60
3	15.2	0.70	22.8	1.10	32.3	1.30	40.0	1.00	44.8	0.70
4	15.9	0.70	23.8	1.00	33.5	1.20	41.0	1.00	45.3	0.50
5	16.6	0.70	24.8	1.00	34.8	1.30	41.9	0.90	46.0	0.70
6										
7										
8										
9										
10										
Qt (l)		3.40		5.20		6.40		4.90		3.10
q (l/min)		0.68		1.04		1.28		0.98		0.62
Pent(l/min/m)		0.24		0.37		0.46		0.35		0.22
Δp (bars)										
P_{EF} (bars)		0.70		1.35		1.76		1.40		0.81
K (m/sec)		3.7E-07		3.0E-07		2.8E-07		2.7E-07		2.9E-07
uL		3.45		2.75		2.59		2.50		2.73

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



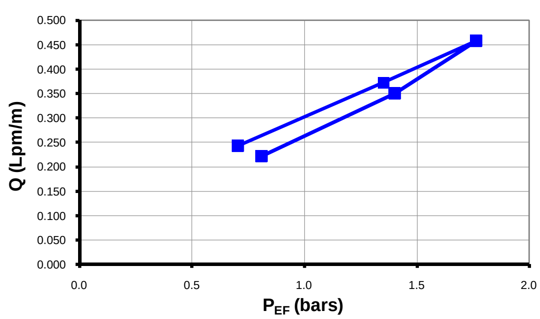
SELECTED LUGEON UNIT : 2.6 uL

K (PERMEABILITY) : 3E-07 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: turbulent

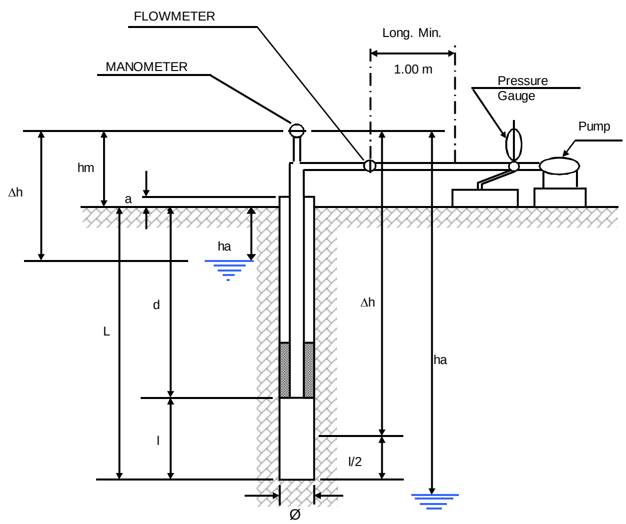
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

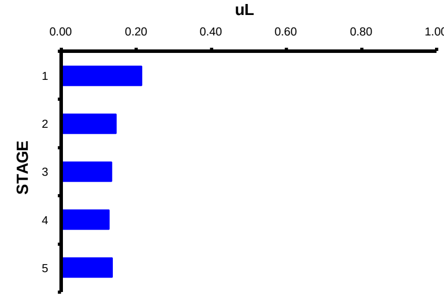
HOLE Nº	60+462.5	TEST Nº	1	North. COORD:	
PROJECT : East Dike Grouting		TEST DEPTH : 14.00 TO 20.00 m.		East. COORD:	
LOCATION: Meadowbank		DATE: 14/01/2009	START: 19:45 FINISH: 20:@0	INCLINATION:	90
PROJECT Nº : 07-1413-0074 / 2200 / ****			Minutes: 255	GROUND LEVEL: (m.s.n.m.)	
		INTERVAL LITHOLOGY :			



hm	=	HEIGHT OF MANOMETER	0.85	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.60	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.45	m
d	=	TOP OF TEST INTERVAL	14.00	m
L	=	BOTTOM OF TEST INTERVAL	20.00	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.45	m
l	=	LENGTH OF TEST INTERVAL	6.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.60 Bars	$2/3P_M$ =	1.50 Bars	P_M =	2.40 Bars	$2/3P_M$ =	1.50 Bars	$1/3P_M$ =	0.90 Bars
TIMES MINUTES	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	0.7		1.6		3.1		4.5		5.4	
1	0.8	0.10	1.8	0.20	3.3	0.20	4.6	0.10	5.5	0.10
2	0.9	0.10	2.0	0.20	3.6	0.30	4.7	0.10	5.6	0.10
3	1.1	0.20	2.2	0.20	3.8	0.20	4.9	0.20	5.7	0.10
4	1.2	0.10	2.3	0.10	4.0	0.20	5.0	0.10	5.8	0.10
5	1.3	0.10	2.4	0.10	4.2	0.20	5.2	0.20	5.9	0.10
6										
7										
8										
9										
10										
Qt (l)		0.60		0.80		1.10		0.70		0.50
q (l/min)		0.12		0.16		0.22		0.14		0.10
Pent(l/min/m)		0.02		0.03		0.04		0.02		0.02
Δp (bars)										
P_{EF} (bars)		0.94		1.84		2.74		1.84		1.24
K (m/sec)		2.7E-08		1.9E-08		1.7E-08		1.6E-08		1.7E-08
uL		0.21		0.15		0.13		0.13		0.13

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



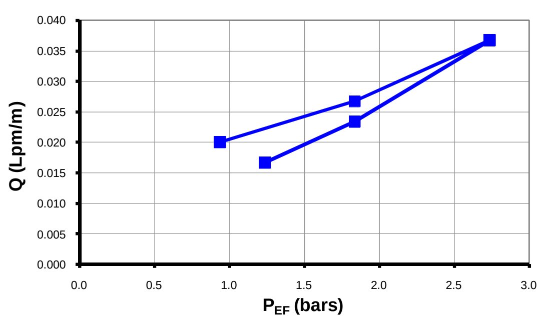
SELECTED LUGEON UNIT : 0.1 uL

K (PERMEABILITY) : 2E-08 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: low flow

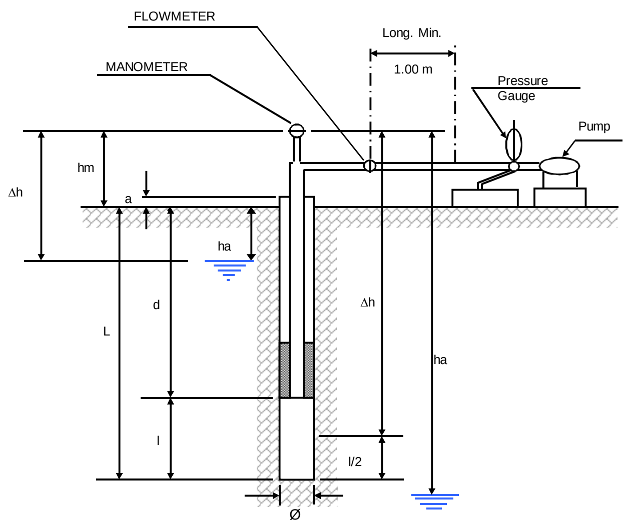
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

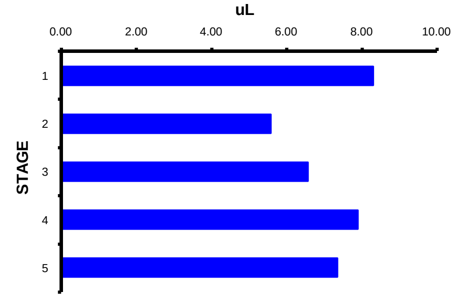
HOLE Nº 60+462.5	**TEST Nº** 2		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH :** 11.50 **TO** 14.30 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 14/01/2009	**START:** 21:05 **FINISH:** 21:43	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 38	**GROUND LEVEL:**
	INTERVAL LITHOLOGY :		(m.s.n.m.)



hm	=	HEIGHT OF MANOMETER	0.85	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.60	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.45	m
d	=	TOP OF TEST INTERVAL	11.50	m
L	=	BOTTOM OF TEST INTERVAL	14.30	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.45	m
l	=	LENGTH OF TEST INTERVAL	2.80	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ = 0.40 Bars		$2/3P_M$ = 1.30 Bars		P_M = 1.50 Bars		$2/3P_M$ = 0.80 Bars		$1/3P_M$ = 0.40 Bars	
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	6.5		27.3		48.9		69.6		88.8	
1	8.2	1.70	29.9	2.60	52.4	3.50	72.3	2.70	89.9	1.10
2	10.0	1.80	32.5	2.60	55.9	3.50	74.8	2.50	90.7	0.80
3	11.8	1.80	35.1	2.60	58.8	2.90	77.2	2.40	92.6	1.90
4	13.6	1.80	37.8	2.70	62.4	3.60	79.7	2.50	94.5	1.90
5	15.2	1.60	40.1	2.30	65.8	3.40	82.2	2.50	96.4	1.90
6	16.8	1.60								
7										
8										
9										
10										
Qt (l)		10.30		12.80		16.90		12.60		7.60
q (l/min)		1.72		2.56		3.38		2.52		1.52
Pent(l/min/m)		0.61		0.91		1.21		0.90		0.54
Δp (bars)										
P_{EF} (bars)		0.74		1.64		1.84		1.14		0.74
K (m/sec)		8.9E-07		6.0E-07		7.1E-07		8.5E-07		7.9E-07
uL		8.30		5.58		6.57		7.91		7.35

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS
uL



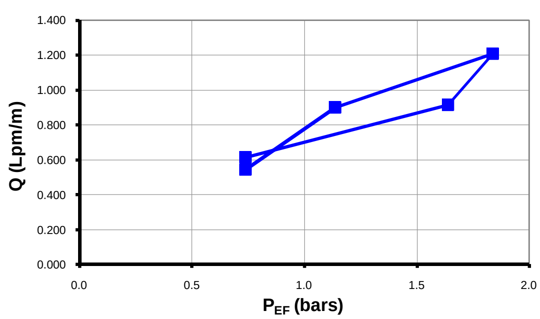
SELECTED LUGEON UNIT : 6.9 uL

K (PERMEABILITY) : 7E-07 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Laminar

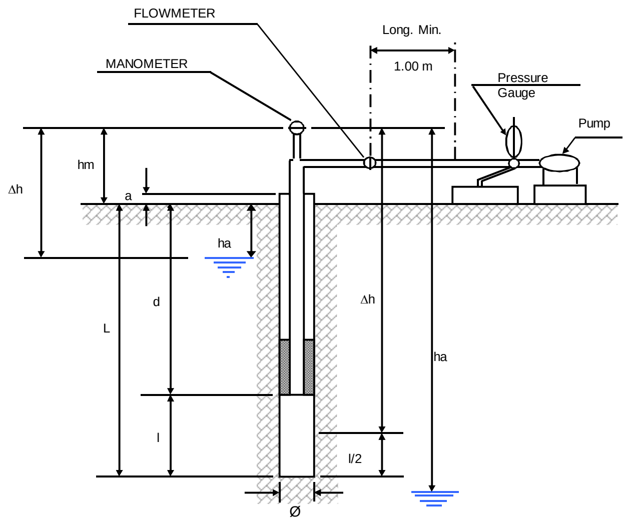
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

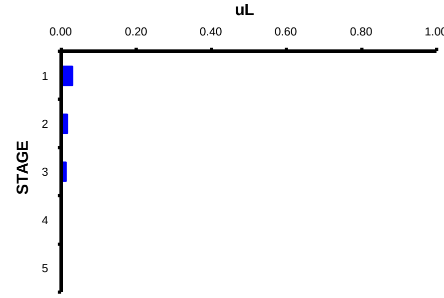
HOLE Nº 60+486.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH :** 17.00 **TO** 24.00 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 15/01/2009	**START:** 3:43:00 PM **FINISH:** 14:17:00 PM	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 0	**GROUND LEVEL:** (m.s.n.m.)
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.01	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.56	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.57	m
d	=	TOP OF TEST INTERVAL	17.00	m
L	=	BOTTOM OF TEST INTERVAL	24.00	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.57	m
l	=	LENGTH OF TEST INTERVAL	7.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

TIMES MINUTES	$1/3P_M$ = 0.64 Bars		$2/3P_M$ = 1.49 Bars		P_M = 2.20 Bars		$2/3P_M$ = 1.60 Bars		$1/3P_M$ = 0.81 Bars	
	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	0.9		1.0		1.1		1.2		1.3	
1	0.9	0.00	1.0	0.00	1.1	0.00	1.2	0.00	1.3	0.00
2	0.9	0.00	1.0	0.00	1.1	0.00	1.2	0.00	1.3	0.00
3	0.9	0.00	1.0	0.00	1.1	0.00	1.2	0.00	1.3	0.00
4	0.9	0.00	1.0	0.00	1.1	0.00	1.2	0.00	1.3	0.00
5	1.0	0.10	1.1	0.10	1.2	0.10	1.2	0.00	1.3	0.00
6										
7										
8										
9										
10										
Qt (l)		0.10		0.10		0.10		0.00		0.00
q (l/min)		0.02		0.02		0.02		0.00		0.00
Pent(l/min/m)		0.00		0.00		0.00		0.00		0.00
Δp (bars)										
P_{EF} (bars)		0.99		1.84		2.55		1.95		1.16
K (m/sec)		3.8E-09		2.0E-09		1.5E-09		0.0E+00		0.0E+00
uL		0.03		0.02		0.01		0.00		0.00

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS
uL



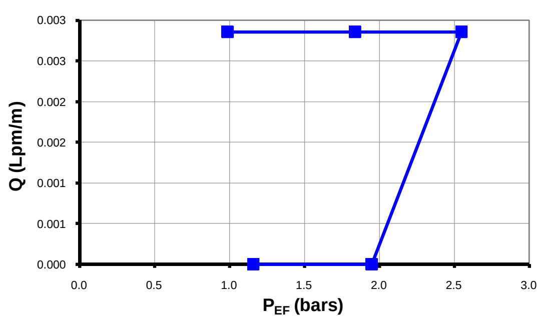
SELECTED LUGEON UNIT : 0.0 uL

K (PERMEABILITY) : 9E-10 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: low flow

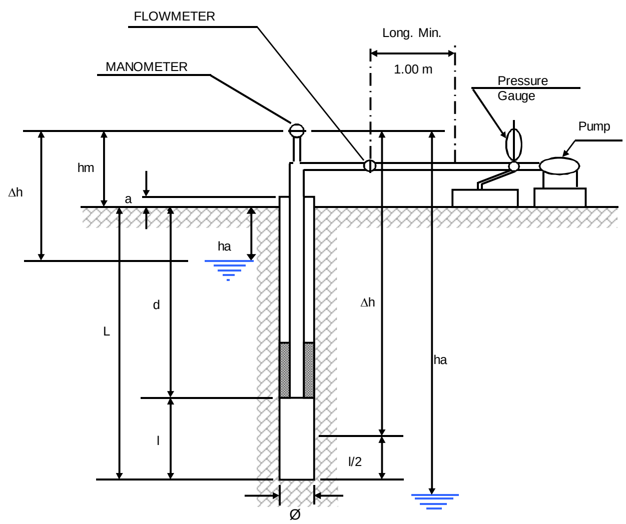
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

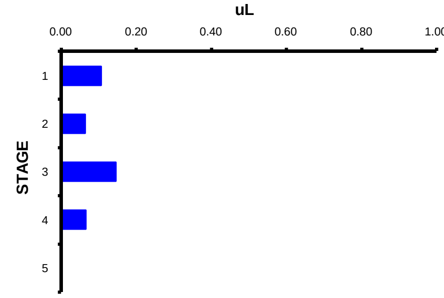
HOLE Nº 60+486.5	**TEST Nº** 2		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH** : 14.50 **TO** 17.00 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 15/01/2009	**START:** 4:44:00 PM **FINISH:** 15:15:00 PM	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 0	**GROUND LEVEL:** (m.s.n.m.)
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.01	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.56	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.57	m
d	=	TOP OF TEST INTERVAL	14.50	m
L	=	BOTTOM OF TEST INTERVAL	17.00	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.57	m
l	=	LENGTH OF TEST INTERVAL	2.50	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

TIMES MINUTES	$1/3P_M$ = 0.40 Bars Q (L)	q (L/min)	$2/3P_M$ = 0.92 Bars Q (L)	q (L/min)	P_M = 1.30 Bars Q (L)	q (L/min)	$2/3P_M$ = 0.87 Bars Q (L)	q (L/min)	$1/3P_M$ = 0.43 Bars Q (L)	q (L/min)
0	0.2		0.5		0.7		1.0		1.2	
1	0.2	0.00	0.5	0.00	0.8	0.10	1.0	0.00	1.2	0.00
2	0.3	0.10	0.5	0.00	0.8	0.00	1.1	0.10	1.2	0.00
3	0.3	0.00	0.6	0.10	0.9	0.10	1.1	0.00	1.2	0.00
4	0.3	0.00	0.6	0.00	0.9	0.00	1.1	0.00	1.2	0.00
5	0.3	0.00	0.6	0.00	1.0	0.10	1.1	0.00	1.2	0.00
6										
7										
8										
9										
10										
Qt (l)		0.10		0.10		0.30		0.10		0.00
q (l/min)		0.02		0.02		0.06		0.02		0.00
Pent(l/min/m)		0.01		0.01		0.02		0.01		0.00
Δp (bars)										
P_{EF} (bars)		0.75		1.27		1.65		1.22		0.78
K (m/sec)		1.1E-08		6.6E-09		1.5E-08		6.9E-09		0.0E+00
uL		0.11		0.06		0.15		0.07		0.00

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



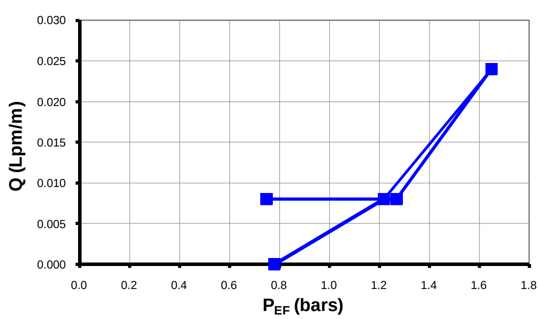
SELECTED LUGEON UNIT : 0.1 uL

K (PERMEABILITY) : 7E-09 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: low flow

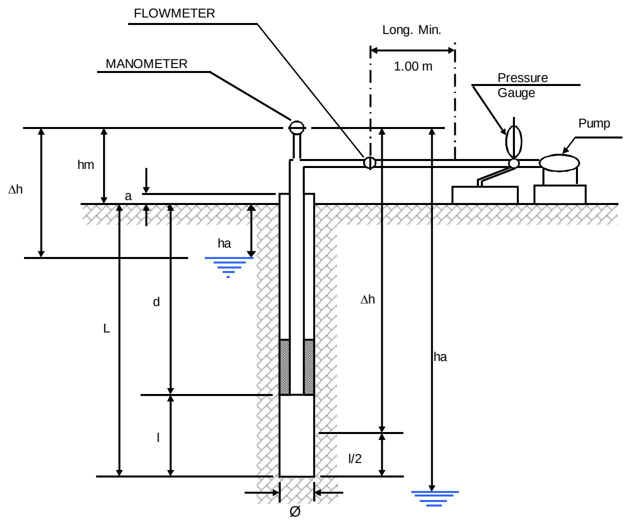
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

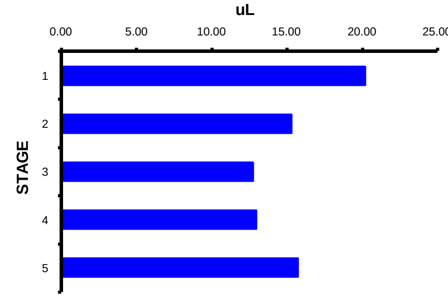
HOLE Nº 60+513.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH** : 12.70 **TO** 19.80 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 18/01/2009	**START:** 16:09 **FINISH:** 16:42	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 33	**GROUND LEVEL:**
	INTERVAL LITHOLOGY :		(m.s.n.m.)



hm	=	HEIGHT OF MANOMETER	1.01	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.90	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.91	m
d	=	TOP OF TEST INTERVAL	12.70	m
L	=	BOTTOM OF TEST INTERVAL	19.80	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.91	m
l	=	LENGTH OF TEST INTERVAL	7.10	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

TIMES MINUTES	$1/3P_M$ = 0.75 Bars		$2/3P_M$ = 1.55 Bars		P_M = 2.15 Bars		$2/3P_M$ = 1.56 Bars		$1/3P_M$ = 0.72 Bars	
	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	18.5		123.2		252.5		401.3		527.4	
1	35.2	16.70	144.8	21.60	276.2	23.70	419.5	18.20	539.9	12.50
2	51.7	16.50	165.9	21.10	299.4	23.20	437.5	18.00	552.3	12.40
3	67.8	16.10	186.7	20.80	322.2	22.80	455.3	17.80	564.6	12.30
4	83.8	16.00	207.3	20.60	344.8	22.60	473.1	17.80	576.8	12.20
5	99.8	16.00	228.2	20.90	367.2	22.40	490.7	17.60	589.0	12.20
6										
7										
8										
9										
10										
Qt (l)		81.30		105.00		114.70		89.40		61.60
q (l/min)		16.26		21.00		22.94		17.88		12.32
Pent(l/min/m)		2.29		2.96		3.23		2.52		1.74
Δp (bars)										
P_{EF} (bars)		1.13		1.93		2.53		1.94		1.10
K (m/sec)		2.7E-06		2.0E-06		1.7E-06		1.7E-06		2.1E-06
uL		20.21		15.30		12.75		12.96		15.73

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



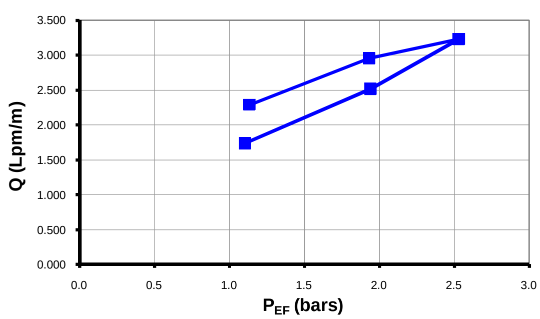
SELECTED LUGEON UNIT : 12.8 uL

K (PERMEABILITY) : 1.7E-06 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(\, l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Turbulent Flow

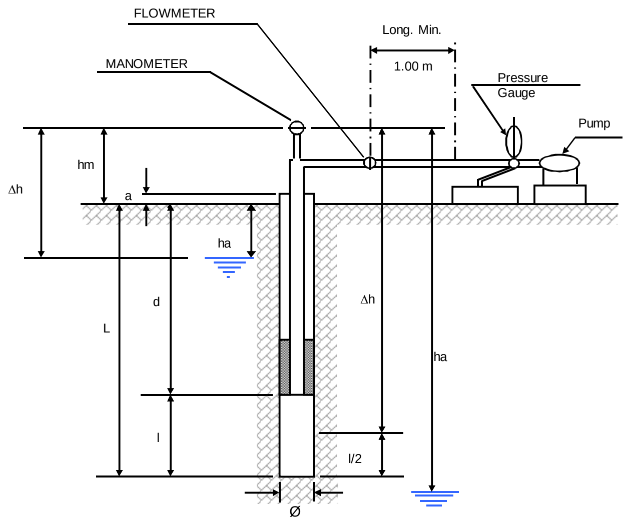
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

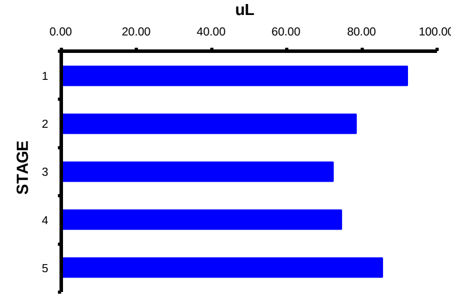
HOLE Nº 60+513.5	**TEST Nº** 2	**North. COORD:**	
PROJECT : East Dike Grouting	**TEST DEPTH :** 10.30 **TO** 12.80 **m.**	**East. COORD:**	
LOCATION: Meadowbank	**DATE:** 18/01/2009 **START:** 17:00 **FINISH:** 17:31	**INCLINATION:**	90
PROJECT Nº : 07-1413-0074 / 2200 / ****	**Minutes:** 31	**GROUND LEVEL:** (m.s.n.m.)	
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.01	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.90	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.91	m
d	=	TOP OF TEST INTERVAL	10.30	m
L	=	BOTTOM OF TEST INTERVAL	12.80	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.91	m
l	=	LENGTH OF TEST INTERVAL	2.50	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.48 Bars	$2/3P_M$ =	0.91 Bars	P_M =	1.35 Bars	$2/3P_M$ =	0.94 Bars	$1/3P_M$ =	0.40 Bars
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	19.3		147.5		294.2		475.2		629.2	
1	40.1	20.80	174.1	26.60	326.1	31.90	499.8	24.60	645.1	15.90
2	60.1	20.00	199.8	25.70	357.5	31.40	524.6	24.80	661.8	16.70
3	79.8	19.70	225.6	25.80	388.7	31.20	549.2	24.60	678.8	17.00
4	99.3	19.50	249.6	24.00	419.9	31.20	573.9	24.70	695.8	17.00
5	118.7	19.40	274.3	24.70	451.0	31.10	598.7	24.80	712.9	17.10
6										
7										
8										
9										
10										
Qt (l)		99.40		126.80		156.80		123.50		83.70
q (l/min)		19.88		25.36		31.36		24.70		16.74
Pent(l/min/m)		7.95		10.14		12.54		9.88		6.70
Δp (bars)										
P_{EF} (bars)		0.86		1.29		1.73		1.32		0.78
K (m/sec)		9.7E-06		8.2E-06		7.6E-06		7.8E-06		9.0E-06
uL		92.10		78.43		72.36		74.65		85.47

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS
uL



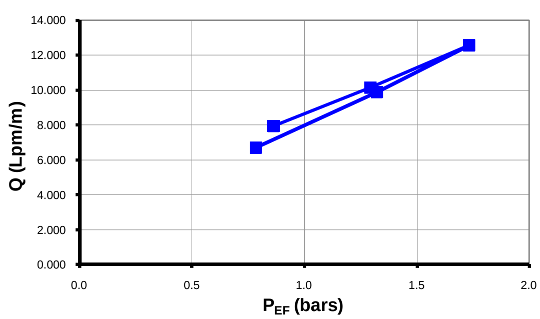
SELECTED LUGEON UNIT : 72.4 uL

K (PERMEABILITY) : 8E-06 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



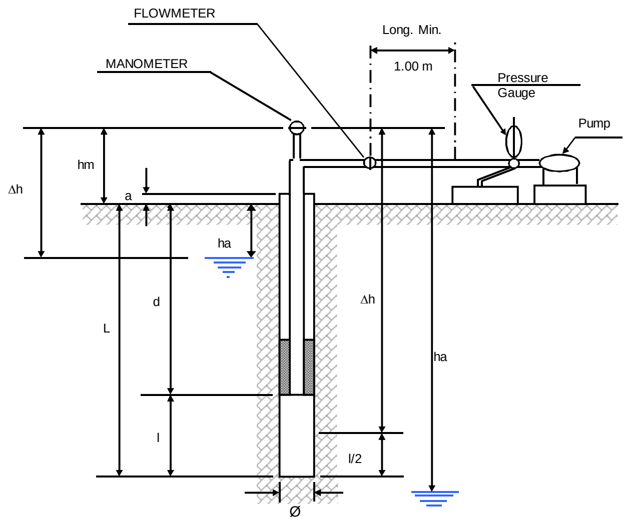
OBSERVATIONS: Turbulent Flow

VTR
Analysis

GRB
Check

Golder Associates Limited	**WATER PRESSURE TEST** **LUGEON TYPE**

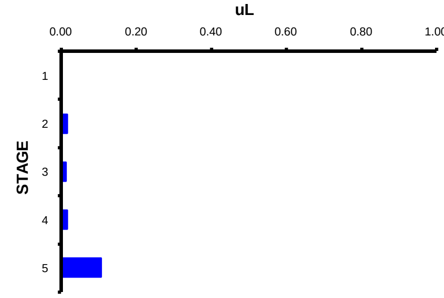
		HOLE Nº	60+528.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	11.90	**TO**	18.90 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	28/01/2009	**START:** 9:56	**FINISH:** 10:26	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****			**Minutes:**	30	**GROUND LEVEL:**	
		INTERVAL LITHOLOGY :				**(m.s.n.m.)**	



hm	=	HEIGHT OF MANOMETER	1.06	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.60	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.66	m
d	=	TOP OF TEST INTERVAL	11.90	m
L	=	BOTTOM OF TEST INTERVAL	18.90	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.66	m
l	=	LENGTH OF TEST INTERVAL	7.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

		Bars		Bars		Bars		Bars		Bars
	$1/3P_M$ =	0.74	$2/3P_M$ =	1.46	P_M =	2.21	$2/3P_M$ =	1.43	$1/3P_M$ =	0.73
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	0.1		0.2		0.4		0.5		0.7	
1	0.1	0.00	0.2	0.00	0.5	0.10	0.5	0.00	0.7	0.00
2	0.1	0.00	0.3	0.10	0.5	0.00	0.5	0.00	0.8	0.10
3	0.1	0.00	0.3	0.00	0.5	0.00	0.6	0.10	0.9	0.10
4	0.1	0.00	0.3	0.00	0.5	0.00	0.6	0.00	1.0	0.10
5	0.1	0.00	0.3	0.00	0.5	0.00	0.6	0.00	1.1	0.10
6										
7										
8										
9										
10										
Qt (l)		0.00		0.10		0.10		0.10		0.40
q (l/min)		0.00		0.02		0.02		0.02		0.08
Pent(l/min/m)		0.00		0.00		0.00		0.00		0.01
Δp (bars)										
P_{EF} (bars)		1.10		1.82		2.57		1.79		1.09
K (m/sec)		0.0E+00		2.1E-09		1.5E-09		2.1E-09		1.4E-08
uL		0.00		0.02		0.01		0.02		0.10

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS



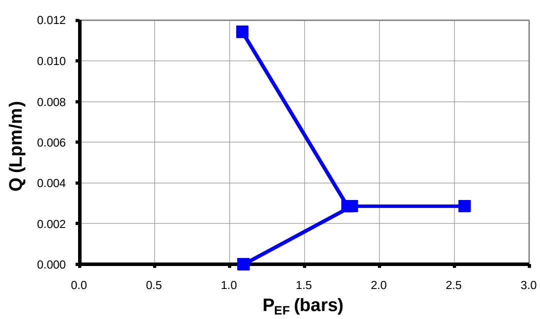
SELECTED LUGEON UNIT : 0.0 uL

K (PERMEABILITY) : 4E-09 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



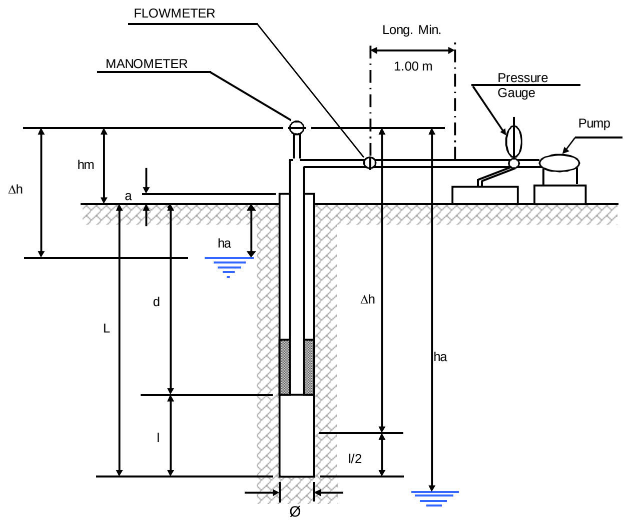
OBSERVATIONS: Low / No Flow

VTR	GRB
Analysis	Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

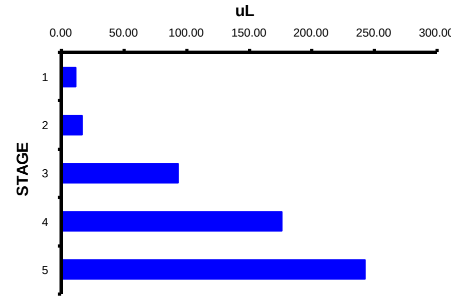
HOLE Nº 60+528.5	**TEST Nº** 2		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH :** 9.40 **TO** 11.90 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 28/01/2009	**START:** 10:49 **FINISH:** 11:19	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 30	**GROUND LEVEL:** (m.s.n.m.)
INTERVAL LITHOLOGY :			



hm	=	HEIGHT OF MANOMETER	1.06	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.60	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.66	m
d	=	TOP OF TEST INTERVAL	9.40	m
L	=	BOTTOM OF TEST INTERVAL	11.90	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.66	m
l	=	LENGTH OF TEST INTERVAL	2.50	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	1/3P_M = 0.44 Bars		2/3P_M = 0.84 Bars		P_M = 1.18 Bars		2/3P_M = 0.87 Bars		1/3P_M = 0.43 Bars	
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	0.3		15.9		76.6		306.3		646.5	
1	3.1	2.80	20.0	4.10	107.8	31.20	358.9	52.60	694.5	48.00
2	5.3	2.20	24.8	4.80	141.2	33.40	412.3	53.40	740.3	45.80
3	7.4	2.10	30.2	5.40	178.3	37.10	466.2	53.90	788.8	48.50
4	9.5	2.10	35.3	5.10	213.6	35.30	523.5	57.30	837.0	48.20
5	11.6	2.10	40.7	5.40	255.6	42.00	577.0	53.50	886.0	49.00
6										
7										
8										
9										
10										
Qt (l)		11.30		24.80		179.00		270.70		239.50
q (l/min)		2.26		4.96		35.80		54.14		47.90
Pent(l/min/m)		0.90		1.98		14.32		21.66		19.16
Δp (bars)										
P_{EF} (bars)		0.80		1.20		1.54		1.23		0.79
K (m/sec)		1.2E-06		1.7E-06		9.8E-06		1.8E-05		2.5E-05
uL		11.32		16.55		93.05		176.22		242.86

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS



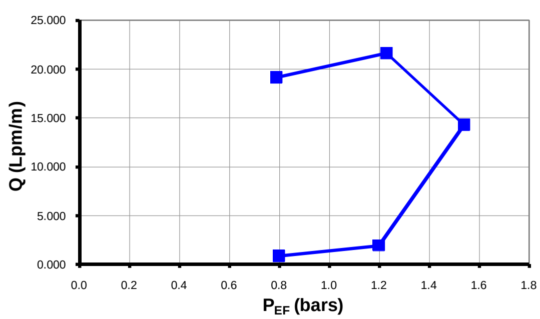
SELECTED LUGEON UNIT : 243 uL

K (PERMEABILITY) : 3E-05 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Washout

VTR
Analysis

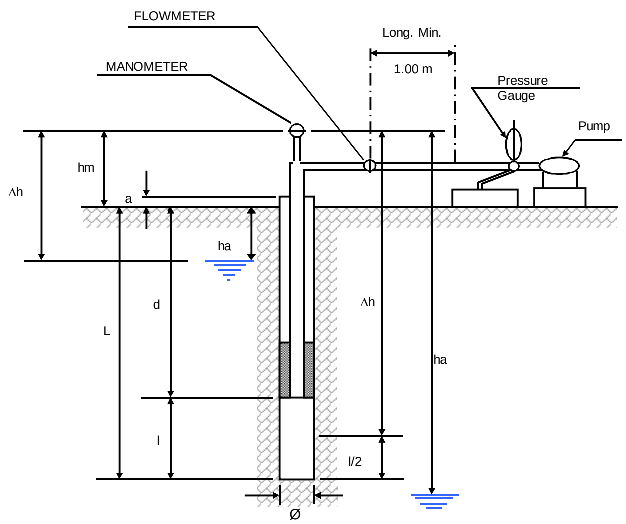
GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

HOLE Nº	60+543.5	TEST Nº	1
TEST DEPTH :	11.90 TO 18.90 m.	North. COORD:	
DATE: 29/01/2009	START: 19:07 FINISH: 19:44	East. COORD:	
	Minutes: 37	INCLINATION:	90
INTERVAL LITHOLOGY :		GROUND LEVEL: (m.s.n.m.)	

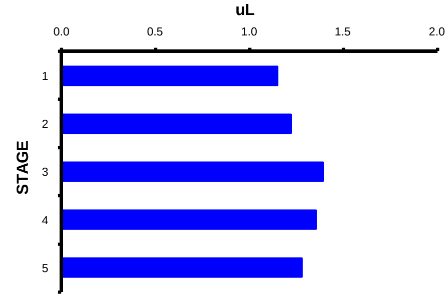
PROJECT : East Dike Grouting
LOCATION: Meadowbank
PROJECT Nº : 07-1413-0074 / 2200 / ****



hm	=	HEIGHT OF MANOMETER	0.98	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	3.20	m
Δh	=	HYDRAULIC PRESSURE HEAD	4.18	m
d	=	TOP OF TEST INTERVAL	11.90	m
L	=	BOTTOM OF TEST INTERVAL	18.90	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	4.18	m
l	=	LENGTH OF TEST INTERVAL	7.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

TIMES MINUTES	1/3P_M = 0.71 Bars Q (L)	q (L/min)	2/3P_M = 1.48 Bars Q (L)	q (L/min)	P_M = 2.20 Bars Q (L)	q (L/min)	2/3P_M = 1.47 Bars Q (L)	q (L/min)	1/3P_M = 0.73 Bars Q (L)	q (L/min)
0	3.2		11.6		26.5		43.7		54.3	
1	4.2	1.00	13.4	1.80	29.3	2.80	45.6	1.90	55.3	1.00
2	5.0	0.80	15.1	1.70	31.8	2.50	47.4	1.80	56.4	1.10
3	6.0	1.00	16.6	1.50	34.2	2.40	49.2	1.80	57.4	1.00
4	6.9	0.90	18.1	1.50	36.6	2.40	50.9	1.70	58.4	1.00
5	7.7	0.80	19.7	1.60	39.2	2.60	52.6	1.70	59.4	1.00
6										
7										
8										
9										
10										
Qt (l)		4.50		8.10		12.70		8.90		5.10
q (l/min)		0.90		1.62		2.54		1.78		1.02
Pent(l/min/m)		0.13		0.23		0.36		0.25		0.15
Δp (bars)										
P_{EF} (bars)		1.12		1.89		2.61		1.88		1.14
K (m/sec)		1.5E-07		1.6E-07		1.8E-07		1.8E-07		1.7E-07
uL		1.15		1.22		1.39		1.35		1.28

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS



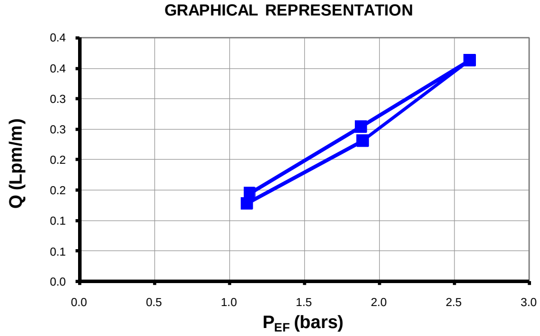
SELECTED LUGEON UNIT : 1.3 uL

K (PERMEABILITY) : 2E-07 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Laminar

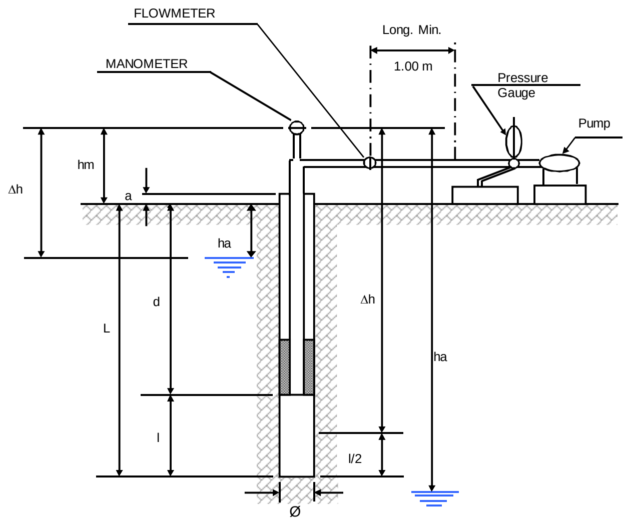
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

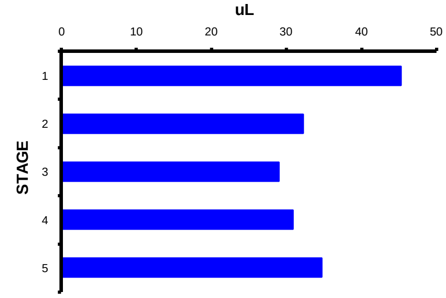
HOLE Nº 60+543.5	**TEST Nº** 2		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH** : 9.40 TO 11.90 m.		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 29/01/2009	**START:** 20:24 **FINISH:** 20:57	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 33	**GROUND LEVEL:** (m.s.n.m.)
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	0.98	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	3.20	m
Δh	=	HYDRAULIC PRESSURE HEAD	4.18	m
d	=	TOP OF TEST INTERVAL	9.40	m
L	=	BOTTOM OF TEST INTERVAL	11.90	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	4.18	m
l	=	LENGTH OF TEST INTERVAL	2.50	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

TIMES MINUTES	1/3P_M = 0.44 Bars		2/3P_M = 0.88 Bars		P_M = 1.31 Bars		2/3P_M = 0.87 Bars		1/3P_M = 0.44 Bars	
	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	18.8		92.0		153.1		221.8		289.0	
1	28.8	10.00	103.1	11.10	165.8	12.70	232.1	10.30	296.3	7.30
2	38.5	9.70	113.6	10.50	178.0	12.20	241.7	9.60	303.9	7.60
3	48.0	9.50	123.9	10.30	190.8	12.80	251.9	10.20	311.2	7.30
4	57.7	9.70	133.7	9.80	203.2	12.40	261.6	9.70	318.2	7.00
5	67.0	9.30	143.9	10.20	215.6	12.40	271.4	9.80	325.7	7.50
6										
7										
8										
9										
10										
Qt (l)		48.20		51.90		62.50		49.60		36.70
q (l/min)		9.64		10.38		12.50		9.92		7.34
Pent(l/min/m)		3.86		4.15		5.00		3.97		2.94
Δp (bars)										
P_{EF} (bars)		0.85		1.29		1.72		1.28		0.85
K (m/sec)		4.8E-06		3.4E-06		3.0E-06		3.2E-06		3.6E-06
uL		45.32		32.24		29.04		30.91		34.71

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



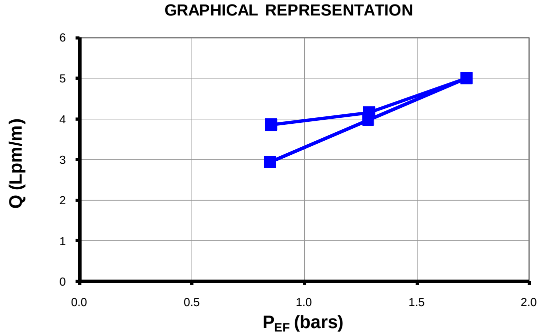
SELECTED LUGEON UNIT : 29.0 uL

K (PERMEABILITY) : 3E-06 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Turbulent

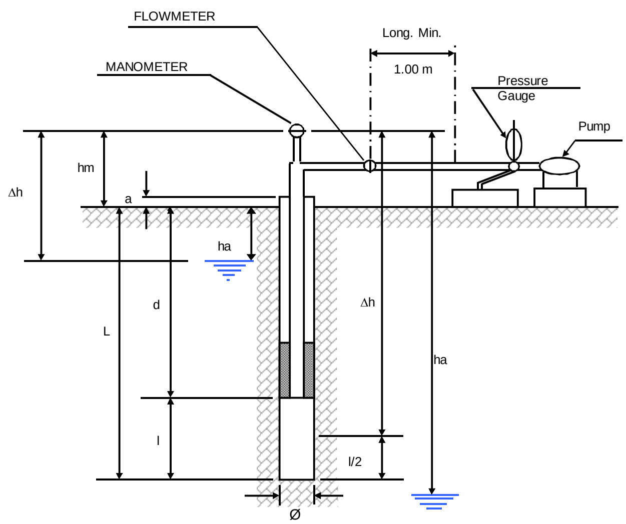
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

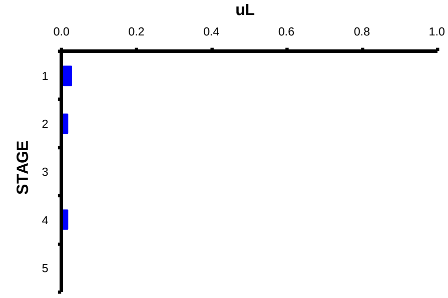
HOLE Nº 60+573.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH :** 12.60 **TO** 19.60 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 29/01/2009	**START:** 13:37 **FINISH:** 14:18	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 41	**GROUND LEVEL:** (m.s.n.m.)
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.08	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	3.10	m
Δh	=	HYDRAULIC PRESSURE HEAD	4.18	m
d	=	TOP OF TEST INTERVAL	12.60	m
L	=	BOTTOM OF TEST INTERVAL	19.60	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	4.18	m
l	=	LENGTH OF TEST INTERVAL	7.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ = 0.73 Bars		$2/3P_M$ = 1.46 Bars		P_M = 2.19 Bars		$2/3P_M$ = 1.47 Bars		$1/3P_M$ = 0.74 Bars	
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	0.6		0.7		0.9		1.0		1.2	
1	0.6	0.00	0.8	0.10	0.9	0.00	1.0	0.00	1.2	0.00
2	0.6	0.00	0.8	0.00	0.9	0.00	1.0	0.00	1.2	0.00
3	0.6	0.00	0.8	0.00	0.9	0.00	1.0	0.00	1.2	0.00
4	0.6	0.00	0.8	0.00	0.9	0.00	1.0	0.00	1.2	0.00
5	0.7	0.10	0.8	0.00	0.9	0.00	1.1	0.10	1.2	0.00
6										
7										
8										
9										
10										
Qt (l)		0.10		0.10		0.00		0.10		0.00
q (l/min)		0.02		0.02		0.00		0.02		0.00
Pent(l/min/m)		0.00		0.00		0.00		0.00		0.00
Δp (bars)										
P_{EF} (bars)		1.14		1.87		2.60		1.88		1.15
K (m/sec)		3.3E-09		2.0E-09		0.0E+00		2.0E-09		0.0E+00
uL		0.03		0.02		0.00		0.02		0.00

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



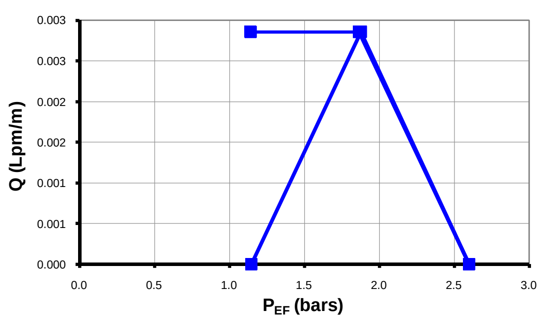
SELECTED LUGEON UNIT : 0.01 uL

K (PERMEABILITY) : 1E-09 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF} [mH2O]}$$

GRAPHICAL REPRESENTATION

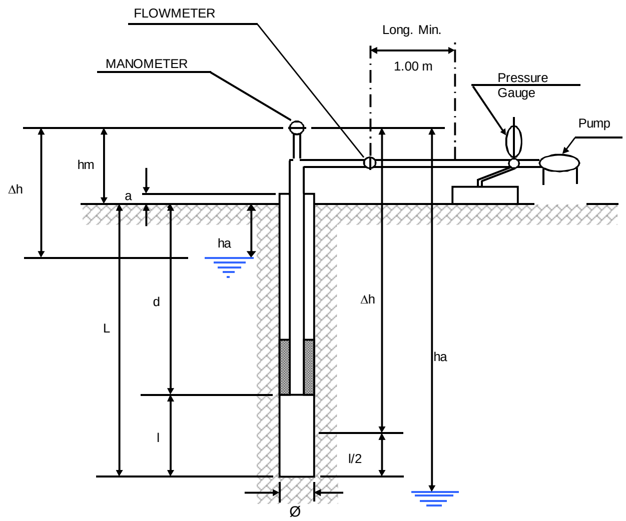


OBSERVATIONS: Low Flow

VTR
Analysis

GRB
Check

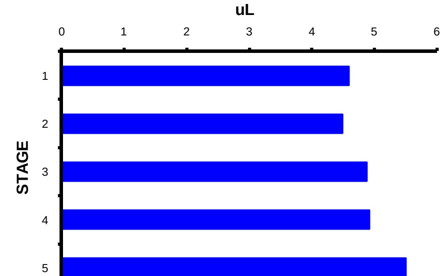
Golder Associates Limited	WATER PRESSURE TEST LUGEON TYPE		
	HOLE Nº 60+573.5	TEST Nº 2	North. COORD:
PROJECT : East Dike Grouting	TEST DEPTH : 9.60 TO 12.60 m.		East. COORD:
LOCATION: Meadowbank	DATE: 29/01/2009	START: 14:40 FINISH: 15:13	INCLINATION: 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		Minutes: 33	GROUND LEVEL:
	INTERVAL LITHOLOGY :		(m.s.n.m.)



hm	=	HEIGHT OF MANOMETER	1.08	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	3.10	m
Δh	=	HYDRAULIC PRESSURE HEAD	4.18	m
d	=	TOP OF TEST INTERVAL	9.60	m
L	=	BOTTOM OF TEST INTERVAL	12.60	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	4.18	m
l	=	LENGTH OF TEST INTERVAL	3.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.42 Bars	$2/3P_M$ =	0.87 Bars	P_M =	1.31 Bars	$2/3P_M$ =	0.86 Bars	$1/3P_M$ =	0.44 Bars
TIMES MINUTES	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	2.1		11.4		23.3		38.9		51.6	
1	3.3	1.20	13.1	1.70	25.9	2.60	40.9	2.00	53.0	1.40
2	4.5	1.20	14.8	1.70	28.7	2.80	42.6	1.70	54.4	1.40
3	5.7	1.20	16.6	1.80	31.0	2.30	44.5	1.90	55.8	1.40
4	6.8	1.10	18.2	1.60	33.5	2.50	46.4	1.90	57.2	1.40
5	7.8	1.00	20.0	1.80	35.9	2.40	48.3	1.90	58.6	1.40
6										
7										
8										
9										
10										
Qt (l)		5.70		8.60		12.60		9.40		7.00
q (l/min)		1.14		1.72		2.52		1.88		1.40
Pent(l/min/m)		0.38		0.57		0.84		0.63		0.47
Δp (bars)										
P_{EF} (bars)		0.83		1.28		1.72		1.27		0.85
K (m/sec)		5.0E-07		4.9E-07		5.4E-07		5.4E-07		6.0E-07
uL		4.60		4.49		4.88		4.93		5.50

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS
uL



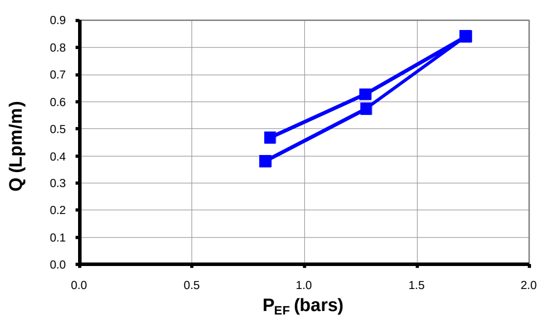
SELECTED LUGEON UNIT : 5.5 uL

K (PERMEABILITY) : 6E-07 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: wash out

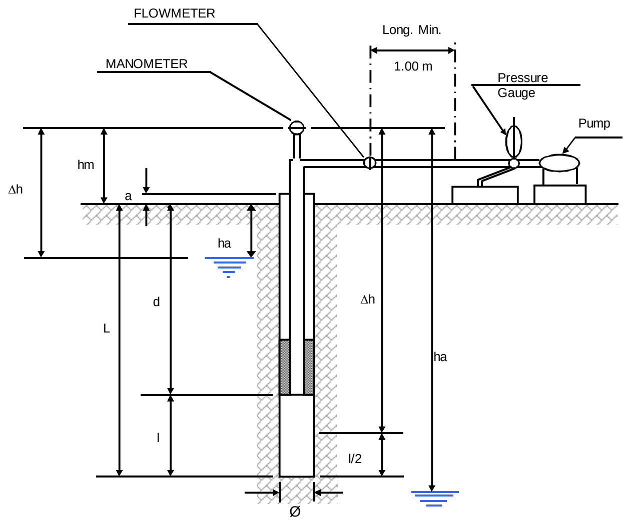
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

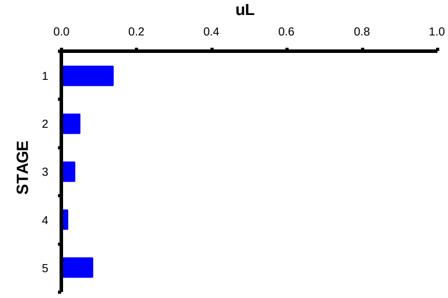
HOLE Nº 60+591.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH** : 11.00 **TO** 18.00 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 29/01/2009	**START:** 7:54 **FINISH:** 8:30	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 36	**GROUND LEVEL:** (m.s.n.m.)
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.06	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.14	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.20	m
d	=	TOP OF TEST INTERVAL	11.00	m
L	=	BOTTOM OF TEST INTERVAL	18.00	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.20	m
l	=	LENGTH OF TEST INTERVAL	7.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ = 0.74 Bars		$2/3P_M$ = 1.47 Bars		P_M = 2.19 Bars		$2/3P_M$ = 1.46 Bars		$1/3P_M$ = 0.73 Bars	
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	0.8		1.5		2.0		2.4		2.7	
1	1.0	0.20	1.5	0.00	2.1	0.10	2.4	0.00	2.8	0.10
2	1.1	0.10	1.6	0.10	2.1	0.00	2.5	0.10	2.8	0.00
3	1.2	0.10	1.7	0.10	2.2	0.10	2.5	0.00	2.9	0.10
4	1.3	0.10	1.7	0.00	2.3	0.10	2.5	0.00	3.0	0.10
5	1.3	0.00	1.8	0.10	2.3	0.00	2.5	0.00	3.0	0.00
6										
7										
8										
9										
10										
Qt (l)		0.50		0.30		0.30		0.10		0.30
q (l/min)		0.10		0.06		0.06		0.02		0.06
Pent(l/min/m)		0.01		0.01		0.01		0.00		0.01
Δp (bars)										
P_{EF} (bars)		1.05		1.79		2.51		1.77		1.05
K (m/sec)		1.8E-08		6.3E-09		4.5E-09		2.1E-09		1.1E-08
uL		0.14		0.05		0.03		0.02		0.08

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS



SELECTED LUGEON UNIT : 0.1 uL

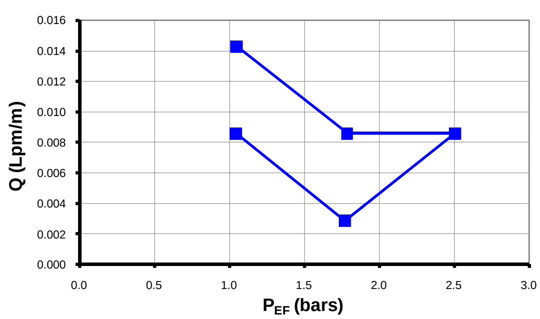
K (PERMEABILITY) : 8E-09 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$

uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



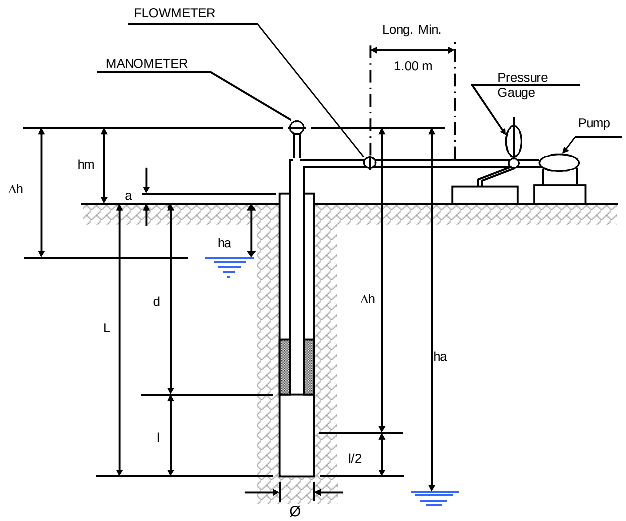
OBSERVATIONS: Low Flow

VTR
Analysis

GRB
Check

Golder Associates Limited	WATER PRESSURE TEST LUGEON TYPE

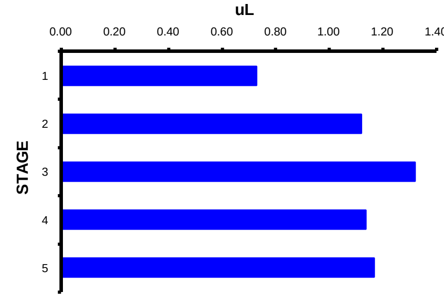
HOLE Nº	60+591.5	TEST Nº	2	North. COORD:	
PROJECT :	East Dike Grouting	TEST DEPTH :	8.00 TO 11.00 m.	East. COORD:	
LOCATION:	Meadowbank	DATE:	29/01/2009 START: 8:54 FINISH: 9:37	INCLINATION:	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		Minutes: 43	GROUND LEVEL: (m.s.n.m.)	
		INTERVAL LITHOLOGY :			



hm	=	HEIGHT OF MANOMETER	1.06	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.14	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.20	m
d	=	TOP OF TEST INTERVAL	8.00	m
L	=	BOTTOM OF TEST INTERVAL	11.00	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.20	m
l	=	LENGTH OF TEST INTERVAL	3.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.42 Bars	$2/3P_M$ =	0.88 Bars	P_M =	1.30 Bars	$2/3P_M$ =	0.86 Bars	$1/3P_M$ =	0.43 Bars
TIMES MINUTES	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	1.8		3.6		6.5		10.3		12.7	
1	1.9	0.10	4.0	0.40	7.1	0.60	10.7	0.40	13.0	0.30
2	2.1	0.20	4.3	0.30	7.7	0.60	11.1	0.40	13.3	0.30
3	2.2	0.10	4.8	0.50	8.4	0.70	11.5	0.40	13.5	0.20
4	2.4	0.20	5.2	0.40	9.1	0.70	11.9	0.40	13.8	0.30
5	2.6	0.20	5.6	0.40	9.7	0.60	12.3	0.40	14.0	0.20
6										
7										
8										
9										
10										
Qt (l)		0.80		2.00		3.20		2.00		1.30
q (l/min)		0.16		0.40		0.64		0.40		0.26
Pent(l/min/m)		0.05		0.13		0.21		0.13		0.09
Δp (bars)										
P_{EF} (bars)		0.73		1.19		1.61		1.17		0.74
K (m/sec)		8.0E-08		1.2E-07		1.4E-07		1.2E-07		1.3E-07
uL		0.73		1.12		1.32		1.14		1.17

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



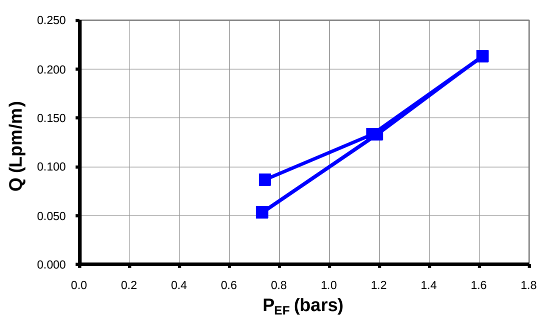
SELECTED LUGEON UNIT : 0.9 uL

K (PERMEABILITY) : 1E-07 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



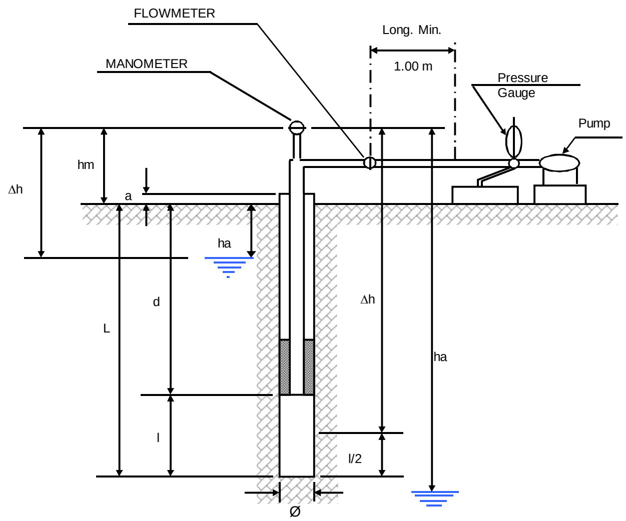
OBSERVATIONS: Dilation

VTR	GRB
Analysis	Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

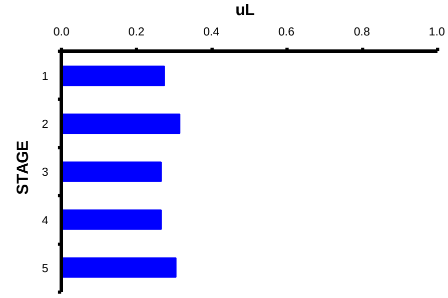
HOLE Nº	60+618.5	**TEST Nº**	1	**North. COORD:**	
PROJECT : East Dike Grouting	**TEST DEPTH :** 10.70 **TO** 17.70 **m.**			**East. COORD:**	
LOCATION: Meadowbank	**DATE:** 28/01/2009	**START:** 8:04	**FINISH:** 8:38	**INCLINATION:**	90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:**	34	**GROUND LEVEL:** (m.s.n.m.)	
INTERVAL LITHOLOGY :					



hm	=	HEIGHT OF MANOMETER	1.10	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.82	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.92	m
d	=	TOP OF TEST INTERVAL	10.70	m
L	=	BOTTOM OF TEST INTERVAL	17.70	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.92	m
l	=	LENGTH OF TEST INTERVAL	7.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

TIMES MINUTES	$1/3P_M$ =	0.66 Bars	$2/3P_M$ =	1.34 Bars	P_M =	1.99 Bars	$2/3P_M$ =	1.34 Bars	$1/3P_M$ =	0.65 Bars
	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	0.3		1.9		4.3		6.8		8.8	
1	0.5	0.20	2.3	0.40	4.8	0.50	7.2	0.40	8.9	0.10
2	0.7	0.20	2.7	0.40	5.2	0.40	7.5	0.30	9.1	0.20
3	0.9	0.20	3.1	0.40	5.7	0.50	7.8	0.30	9.3	0.20
4	1.1	0.20	3.4	0.30	6.1	0.40	8.1	0.30	9.4	0.10
5	1.3	0.20	3.8	0.40	6.5	0.40	8.4	0.30	9.9	0.50
6										
7										
8										
9										
10										
Qt (l)		1.00		1.90		2.20		1.60		1.10
q (l/min)		0.20		0.38		0.44		0.32		0.22
Pent(l/min/m)		0.03		0.05		0.06		0.05		0.03
Δp (bars)										
P_{EF} (bars)		1.05		1.72		2.37		1.72		1.03
K (m/sec)		3.6E-08		4.1E-08		3.5E-08		3.5E-08		4.0E-08
uL		0.27		0.31		0.26		0.27		0.30

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS
uL



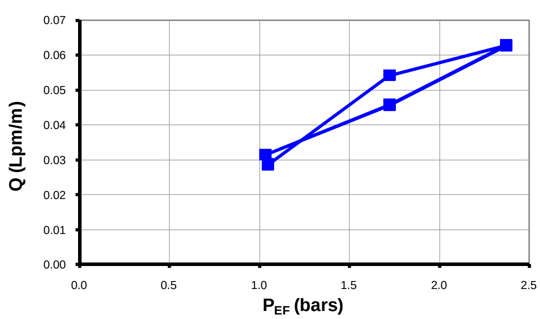
SELECTED LUGEON UNIT : 0.3 uL

K (PERMEABILITY) : 4E-08 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Laminar

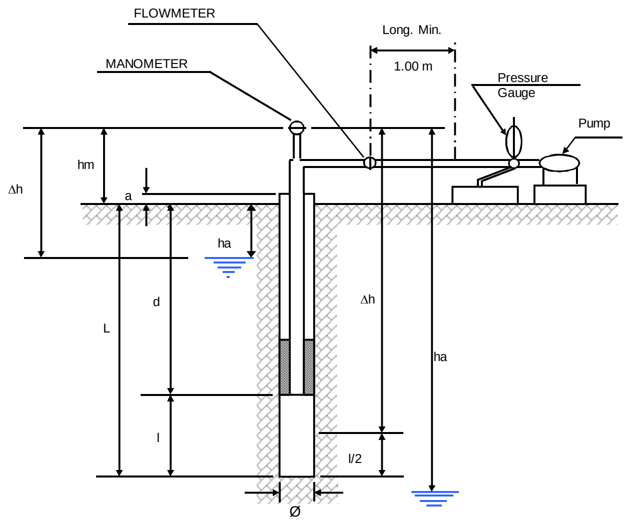
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

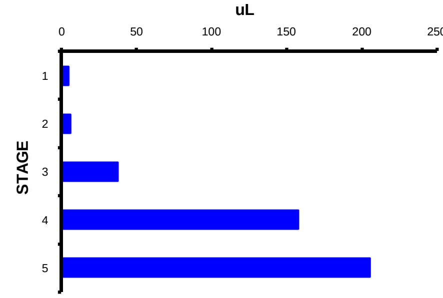
HOLE Nº 60+618.5	**TEST Nº** 2	**North. COORD:**	
PROJECT : East Dike Grouting	**TEST DEPTH :** 8.20 **TO** 10.70 **m.**	**East. COORD:**	
LOCATION: Meadowbank	**DATE:** 28/01/2009 **START:** 9:01 **FINISH:** 9:36	**INCLINATION:**	90
PROJECT Nº : 07-1413-0074 / 2200 / ****	**Minutes:** 35	**GROUND LEVEL:** (m.s.n.m.)	
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.10	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.82	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.92	m
d	=	TOP OF TEST INTERVAL	8.20	m
L	=	BOTTOM OF TEST INTERVAL	10.70	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.92	m
l	=	LENGTH OF TEST INTERVAL	2.50	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.34 Bars	$2/3P_M$ =	0.73 Bars	P_M =	1.10 Bars	$2/3P_M$ =	0.72 Bars	$1/3P_M$ =	0.35 Bars
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	2.4		9.3		27.2		174.4		444.4	
1	3.3	0.90	11.1	1.80	36.0	8.80	218.5	44.10	481.4	37.00
2	4.2	0.90	12.8	1.70	46.0	10.00	263.0	44.50	519.7	38.30
3	5.0	0.80	14.5	1.70	56.6	10.60	306.2	43.20	555.3	35.60
4	5.9	0.90	16.1	1.60	69.7	13.10	347.8	41.60	592.5	37.20
5	6.7	0.80	17.8	1.70	97.2	27.50	392.1	44.30	633.0	40.50
6										
7										
8										
9										
10										
Qt (l)		4.30		8.50		70.00		217.70		188.60
q (l/min)		0.86		1.70		14.00		43.54		37.72
Pent(l/min/m)		0.34		0.68		5.60		17.42		15.09
Δp (bars)										
P_{EF} (bars)		0.72		1.11		1.48		1.10		0.73
K (m/sec)		5.0E-07		6.4E-07		4.0E-06		1.7E-05		2.2E-05
uL		4.75		6.12		37.73		157.69		205.44

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



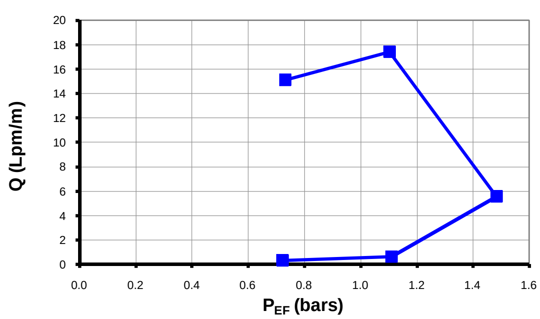
SELECTED LUGEON UNIT : 205 uL

K (PERMEABILITY) : 2E-05 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Washout

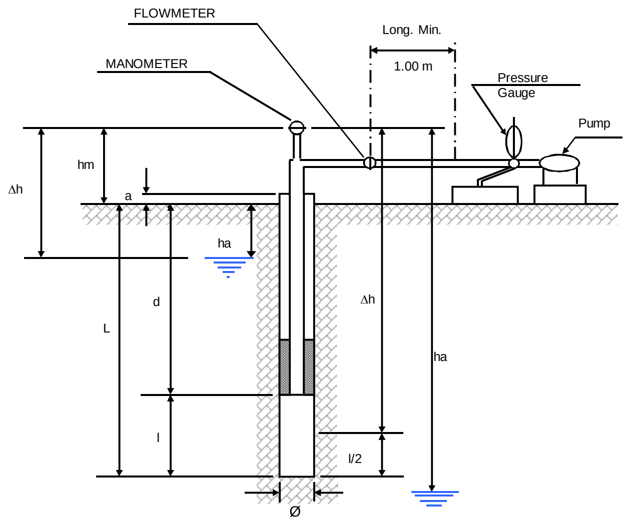
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

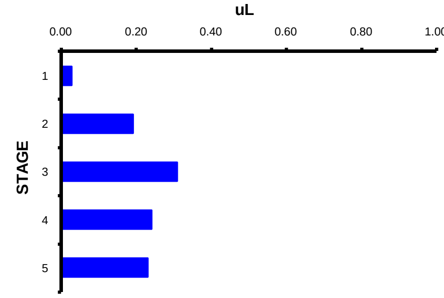
HOLE Nº 60+642.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH :** 11.50 **TO** 18.50 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 27/01/2009	**START:** 10:21 **FINISH:** 10:55	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 34	**GROUND LEVEL:**
	INTERVAL LITHOLOGY :		(m.s.n.m.)



hm	=	HEIGHT OF MANOMETER	1.03	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.30	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.33	m
d	=	TOP OF TEST INTERVAL	11.50	m
L	=	BOTTOM OF TEST INTERVAL	18.50	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.33	m
l	=	LENGTH OF TEST INTERVAL	7.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

TIMES MINUTES	$1/3P_M$ = 0.70 Bars Q (L)	q (L/min)	$2/3P_M$ = 1.32 Bars Q (L)	q (L/min)	P_M = 1.99 Bars Q (L)	q (L/min)	$2/3P_M$ = 1.33 Bars Q (L)	q (L/min)	$1/3P_M$ = 0.66 Bars Q (L)	q (L/min)
0	0.6		1.1		3.0		5.9		9.7	
1	0.7	0.10	1.3	0.20	3.5	0.50	6.2	0.30	9.9	0.20
2	0.7	0.00	1.5	0.20	4.1	0.60	6.5	0.30	10.1	0.20
3	0.7	0.00	1.7	0.20	4.6	0.50	6.8	0.30	10.3	0.20
4	0.7	0.00	1.9	0.20	5.1	0.50	7.1	0.30	10.4	0.10
5	0.7	0.00	2.2	0.30	5.5	0.40	7.3	0.20	10.5	0.10
6										
7										
8										
9										
10										
Qt (l)		0.10		1.10		2.50		1.40		0.80
q (l/min)		0.02		0.22		0.50		0.28		0.16
Pent(l/min/m)		0.00		0.03		0.07		0.04		0.02
Δp (bars)										
P_{EF} (bars)		1.02		1.65		2.31		1.66		0.99
K (m/sec)		3.7E-09		2.5E-08		4.1E-08		3.2E-08		3.0E-08
uL		0.03		0.19		0.31		0.24		0.23

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS
uL



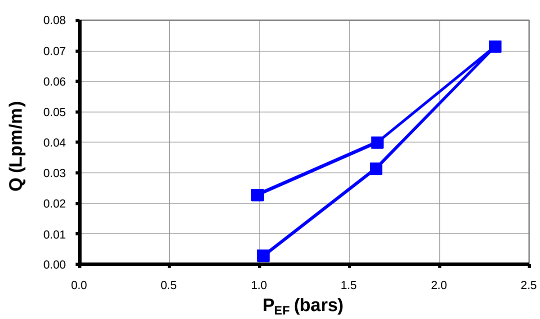
SELECTED LUGEON UNIT : 0.1 uL

K (PERMEABILITY) : 2E-08 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Dilation

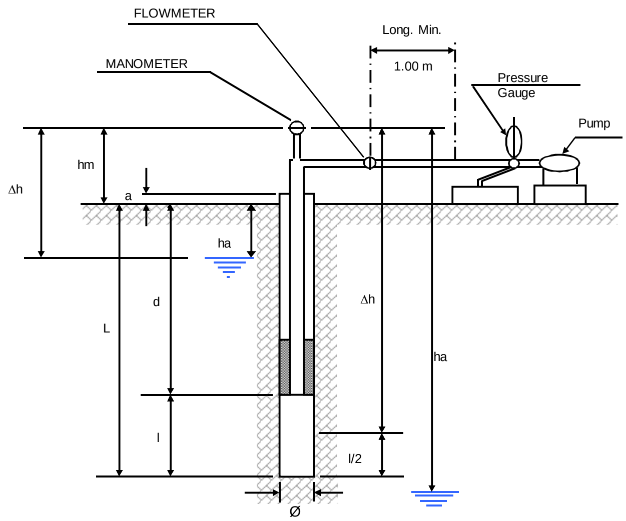
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

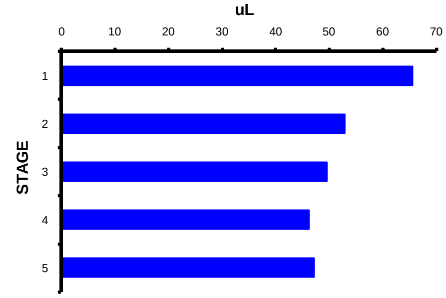
HOLE Nº 60+642.5	**TEST Nº** 2	**North. COORD:**	
PROJECT : East Dike Grouting	**TEST DEPTH** : 8.50 **TO** 11.50 **m.**	**East. COORD:**	
LOCATION: Meadowbank	**DATE:** 27/01/2009 **START:** 11:13 **FINISH:** 11:47	**INCLINATION:**	90
PROJECT Nº : 07-1413-0074 / 2200 / ****	**Minutes:** 34	**GROUND LEVEL:** (m.s.n.m.)	
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.03	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.30	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.33	m
d	=	TOP OF TEST INTERVAL	8.50	m
L	=	BOTTOM OF TEST INTERVAL	11.50	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.33	m
l	=	LENGTH OF TEST INTERVAL	3.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.35 Bars	$2/3P_M$ =	0.74 Bars	P_M =	1.11 Bars	$2/3P_M$ =	0.75 Bars	$1/3P_M$ =	0.33 Bars
TIMES MINUTES	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	15.9		123.2		235.5		384.5		470.7	
1	29.3	13.40	141.0	17.80	257.1	21.60	399.5	15.00	479.4	8.70
2	42.7	13.40	157.4	16.40	278.8	21.70	414.4	14.90	488.3	8.90
3	55.9	13.20	174.4	17.00	299.9	21.10	429.3	14.90	497.9	9.60
4	69.0	13.10	191.3	16.90	320.6	20.70	444.1	14.80	507.6	9.70
5	82.1	13.10	208.1	16.80	342.4	21.80	459.0	14.90	517.4	9.80
6										
7										
8										
9										
10										
Qt (l)		66.20		84.90		106.90		74.50		46.70
q (l/min)		13.24		16.98		21.38		14.90		9.34
Pent(l/min/m)		4.41		5.66		7.13		4.97		3.11
Δp (bars)										
P_{EF} (bars)		0.67		1.07		1.44		1.07		0.66
K (m/sec)		7.2E-06		5.8E-06		5.4E-06		5.1E-06		5.2E-06
uL		65.62		52.97		49.61		46.22		47.13

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS
uL



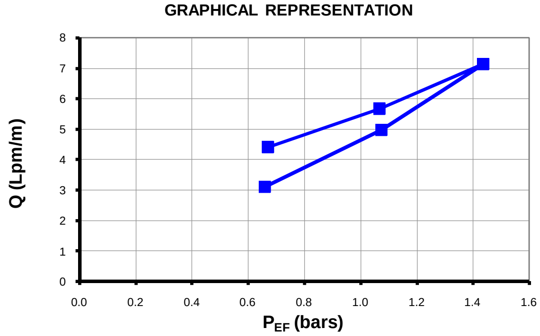
SELECTED LUGEON UNIT : 47 uL

K (PERMEABILITY) : 5E-06 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Void Filling

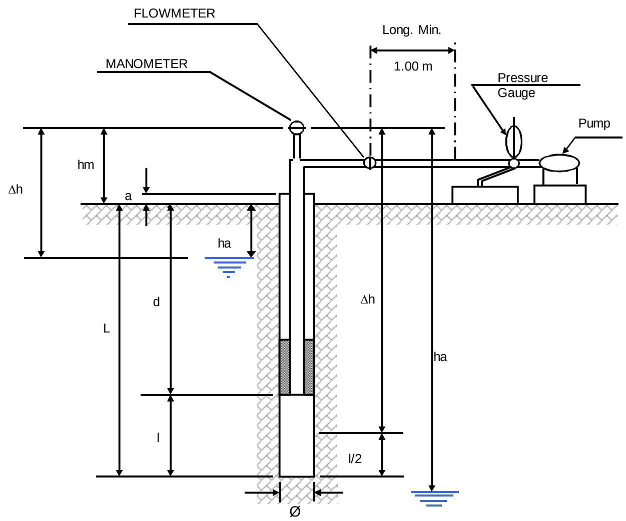
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

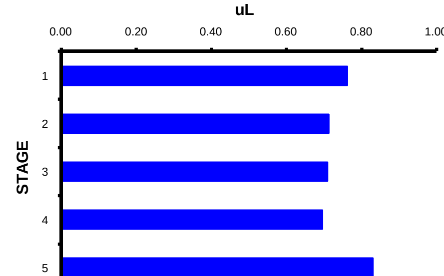
HOLE Nº 60+669.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH** : 11.80 **TO** 18.80 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 25/01/2009	**START:** 22:27 **FINISH:** 23:02	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 35	**GROUND LEVEL:** (m.s.n.m.)
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.09	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.10	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.19	m
d	=	TOP OF TEST INTERVAL	11.80	m
L	=	BOTTOM OF TEST INTERVAL	18.80	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.19	m
l	=	LENGTH OF TEST INTERVAL	7.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	1/3P_M = 0.66 Bars		2/3P_M = 1.33 Bars		P_M = 2.02 Bars		2/3P_M = 1.33 Bars		1/3P_M = 0.65 Bars	
TIMES MINUTES	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	1.5		5.3		11.9		18.4		24.5	
1	2.1	0.60	6.2	0.90	13.0	1.10	19.2	0.80	25.0	0.50
2	2.6	0.50	7.0	0.80	14.2	1.20	20.0	0.80	25.6	0.60
3	3.1	0.50	7.8	0.80	15.3	1.10	20.8	0.80	26.1	0.50
4	3.6	0.50	8.7	0.90	16.5	1.20	21.6	0.80	26.7	0.60
5	4.1	0.50	9.4	0.70	17.7	1.20	22.4	0.80	27.3	0.60
6										
7										
8										
9										
10										
Qt (l)		2.60		4.10		5.80		4.00		2.80
q (l/min)		0.52		0.82		1.16		0.80		0.56
Pent(l/min/m)		0.07		0.12		0.17		0.11		0.08
Δp (bars)										
P_{EF} (bars)		0.97		1.64		2.33		1.64		0.96
K (m/sec)		1.0E-07		9.4E-08		9.3E-08		9.2E-08		1.1E-07
uL		0.76		0.71		0.71		0.70		0.83

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



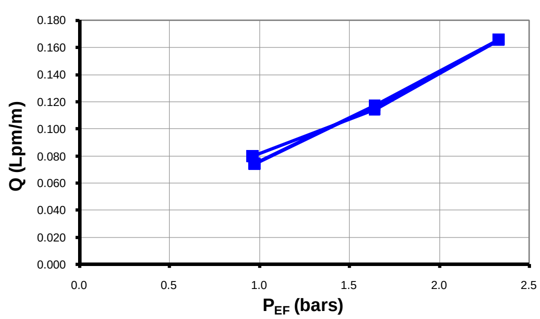
SELECTED LUGEON UNIT : 0.7 uL

K (PERMEABILITY) : 1E-07 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(\, l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Laminar

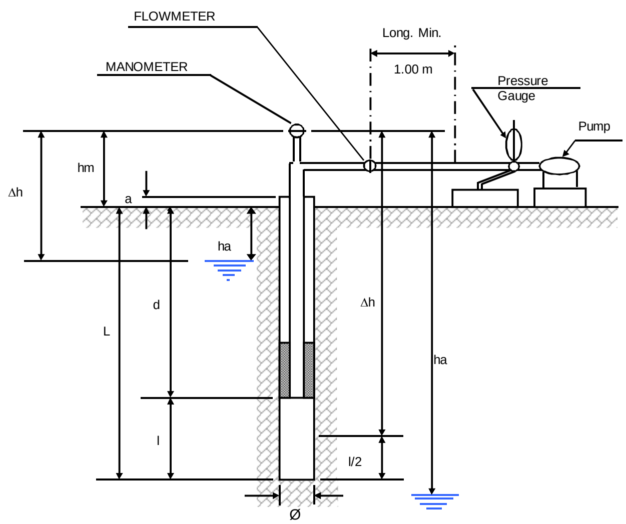
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

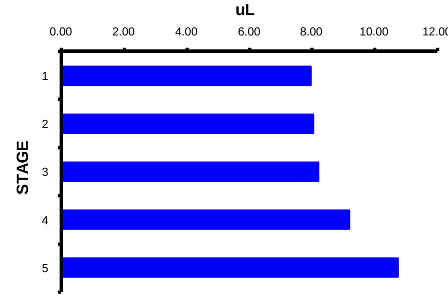
HOLE Nº 60+669.5	**TEST Nº** 2		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH :** 9.30 **TO** 11.80 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 25/01/2009	**START:** 23:19 **FINISH:** 0:03	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 44	**GROUND LEVEL:** (m.s.n.m.)
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.09	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.10	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.19	m
d	=	TOP OF TEST INTERVAL	9.30	m
L	=	BOTTOM OF TEST INTERVAL	11.80	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.19	m
l	=	LENGTH OF TEST INTERVAL	2.50	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

TIMES MINUTES	$1/3P_M$ = 0.41 Bars Q (L)	q (L/min)	$2/3P_M$ = 0.72 Bars Q (L)	q (L/min)	P_M = 1.11 Bars Q (L)	q (L/min)	$2/3P_M$ = 0.74 Bars Q (L)	q (L/min)	$1/3P_M$ = 0.35 Bars Q (L)	q (L/min)
0	3.0		12.1		25.6		42.0		56.7	
1	4.5	1.50	14.1	2.00	28.5	2.90	44.3	2.30	58.5	1.80
2	5.9	1.40	16.2	2.10	31.4	2.90	46.7	2.40	60.3	1.80
3	7.2	1.30	18.3	2.10	34.3	2.90	49.3	2.60	62.1	1.80
4	8.7	1.50	20.4	2.10	37.3	3.00	51.8	2.50	63.9	1.80
5	10.2	1.50	22.5	2.10	40.2	2.90	54.1	2.30	65.6	1.70
6										
7										
8										
9										
10										
Qt (l)		7.20		10.40		14.60		12.10		8.90
q (l/min)		1.44		2.08		2.92		2.42		1.78
Pent(l/min/m)		0.58		0.83		1.17		0.97		0.71
Δp (bars)										
P_{EF} (bars)		0.72		1.03		1.42		1.05		0.66
K (m/sec)		8.4E-07		8.4E-07		8.6E-07		9.6E-07		1.1E-06
uL		7.97		8.06		8.21		9.19		10.74

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS



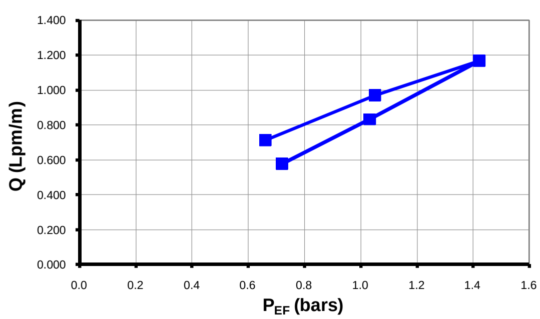
SELECTED LUGEON UNIT : 10.7 uL

K (PERMEABILITY) : 1E-06 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Washout

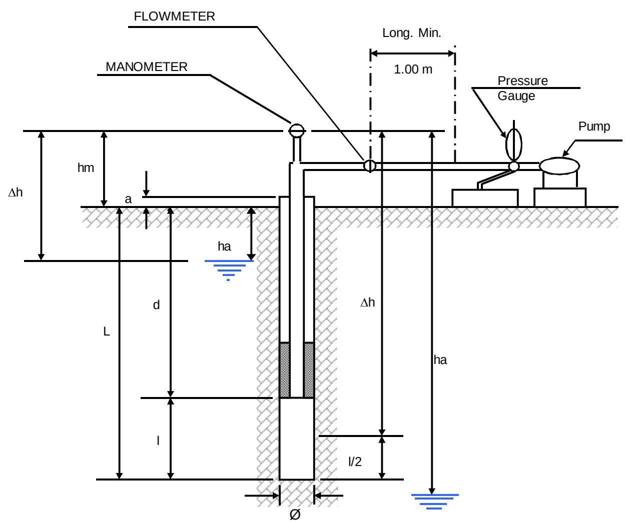
VTR
Analysis

GRB
Check

WATER PRESSURE TEST
LUGEON TYPE

Golder Associates Limited

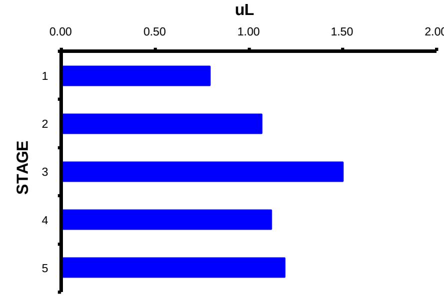
HOLE Nº 60+687.5	**TEST Nº** 1	**North. COORD:**	
PROJECT : East Dike Grouting	**TEST DEPTH :** 11.40 **TO** 18.40 **m.**	**East. COORD:**	
LOCATION: Meadowbank	**DATE:** 24/01/2009 **START:** 20:10 **FINISH:** 20:45	**INCLINATION:**	90
PROJECT Nº : 07-1413-0074 / 2200 / ****	**Minutes:** 35	**GROUND LEVEL:** (m.s.n.m.)	
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.03	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	3.39	m
Δh	=	HYDRAULIC PRESSURE HEAD	4.42	m
d	=	TOP OF TEST INTERVAL	11.40	m
L	=	BOTTOM OF TEST INTERVAL	18.40	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	4.42	m
l	=	LENGTH OF TEST INTERVAL	7.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.65 Bars	$2/3P_M$ =	1.33 Bars	P_M =	2.00 Bars	$2/3P_M$ =	1.33 Bars	$1/3P_M$ =	0.67 Bars
TIMES MINUTES	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	2.6		7.4		16.4		31.0		40.1	
1	3.2	0.60	8.7	1.30	19.1	2.70	32.4	1.40	41.1	1.00
2	3.8	0.60	10.0	1.30	21.5	2.40	33.8	1.40	42.0	0.90
3	4.4	0.60	11.3	1.30	24.1	2.60	35.2	1.40	42.9	0.90
4	5.0	0.60	12.6	1.30	26.7	2.60	36.5	1.30	43.8	0.90
5	5.6	0.60	14.0	1.40	29.2	2.50	37.9	1.40	44.7	0.90
6										
7										
8										
9										
10										
Qt (l)		3.00		6.60		12.80		6.90		4.60
q (l/min)		0.60		1.32		2.56		1.38		0.92
Pent(l/min/m)		0.09		0.19		0.37		0.20		0.13
Δp (bars)										
P_{EF} (bars)		1.08		1.76		2.43		1.76		1.10
K (m/sec)		1.0E-07		1.4E-07		2.0E-07		1.5E-07		1.6E-07
uL		0.79		1.07		1.50		1.12		1.19

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS



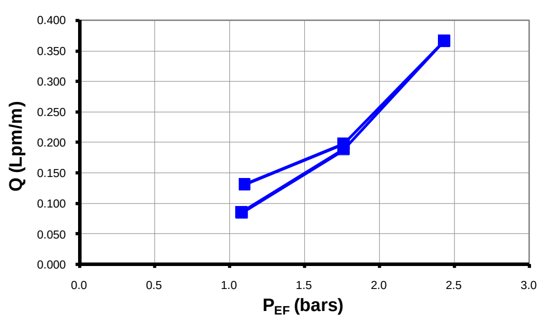
SELECTED LUGEON UNIT : 1.1 uL

K (PERMEABILITY) : 1E-07 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: laminar

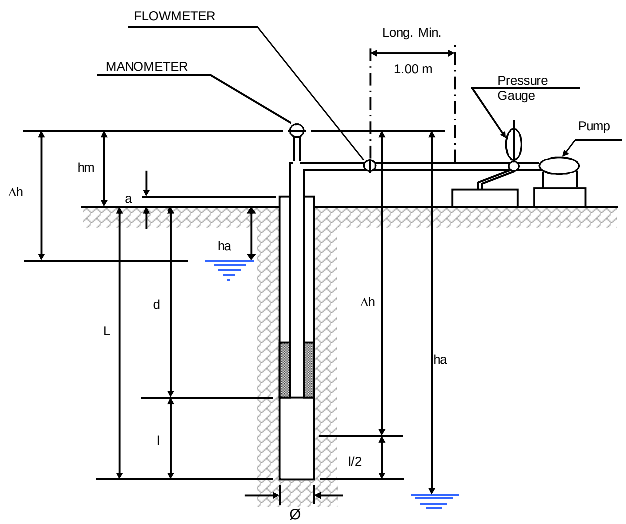
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

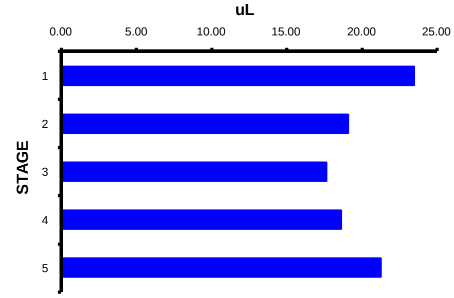
HOLE Nº	60+687.5	**TEST Nº**	2	**North. COORD:**	
PROJECT : East Dike Grouting		**TEST DEPTH** : 8.90 **TO** 11.40 **m.**		**East. COORD:**	
LOCATION: Meadowbank		**DATE:** 24/01/2009 **START:** 21:07 **FINISH:** 21:55		**INCLINATION:**	90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 48		**GROUND LEVEL:** (m.s.n.m.)	
		INTERVAL LITHOLOGY :			



hm	=	HEIGHT OF MANOMETER	1.03	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	3.39	m
Δh	=	HYDRAULIC PRESSURE HEAD	4.42	m
d	=	TOP OF TEST INTERVAL	8.90	m
L	=	BOTTOM OF TEST INTERVAL	11.40	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	4.42	m
l	=	LENGTH OF TEST INTERVAL	2.50	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ = 0.36 Bars		$2/3P_M$ = 0.75 Bars		P_M = 1.09 Bars		$2/3P_M$ = 0.73 Bars		$1/3P_M$ = 0.36 Bars	
TIMES MINUTES	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	7.5		35.9		77.5		123.0		154.6	
1	12.2	4.70	41.8	5.90	84.3	6.80	128.5	5.50	158.8	4.20
2	17.3	5.10	47.8	6.00	91.0	6.70	133.7	5.20	163.0	4.20
3	21.9	4.60	53.6	5.80	97.4	6.40	139.1	5.40	167.4	4.40
4	26.4	4.50	58.9	5.30	104.1	6.70	144.4	5.30	171.5	4.10
5	30.8	4.40	64.2	5.30	111.1	7.00	150.1	5.70	175.7	4.20
6										
7										
8										
9										
10										
Qt (l)		23.30		28.30		33.60		27.10		21.10
q (l/min)		4.66		5.66		6.72		5.42		4.22
Pent(l/min/m)		1.86		2.26		2.69		2.17		1.69
Δp (bars)										
P_{EF} (bars)		0.79		1.18		1.52		1.16		0.79
K (m/sec)		2.5E-06		2.0E-06		1.8E-06		2.0E-06		2.2E-06
uL		23.49		19.13		17.64		18.63		21.27

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS
uL



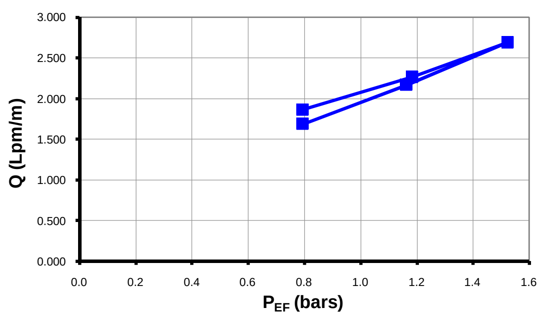
SELECTED LUGEON UNIT : 17.6 uL

K (PERMEABILITY) : 2E-06 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF} [mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Turbulent

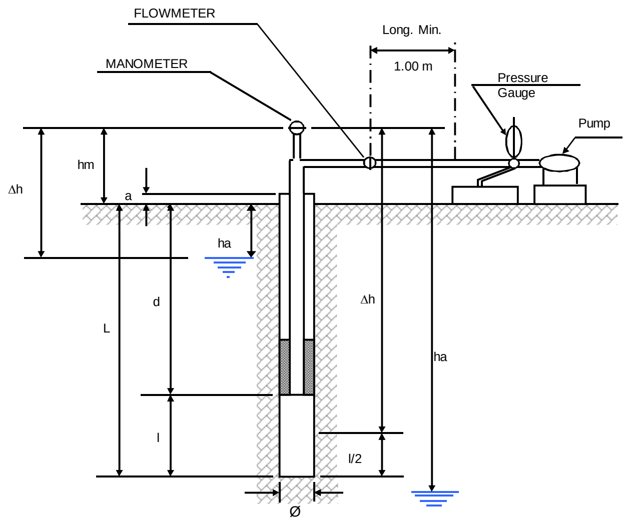
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

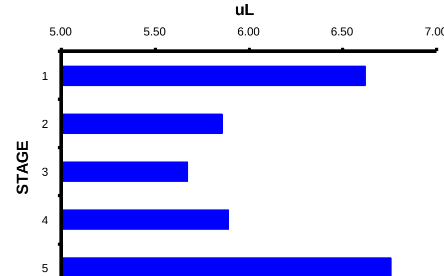
HOLE Nº 60+708.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH :** 11.60 **TO** 18.60 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 23/01/2009	**START:** 14:22 **FINISH:** 14:54	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 32	**GROUND LEVEL:**
	INTERVAL LITHOLOGY :		(m.s.n.m.)



hm	=	HEIGHT OF MANOMETER	1.08	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.62	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.70	m
d	=	TOP OF TEST INTERVAL	11.60	m
L	=	BOTTOM OF TEST INTERVAL	18.60	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.70	m
l	=	LENGTH OF TEST INTERVAL	7.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

TIMES MINUTES	$1/3P_M$ =	0.66 Bars	$2/3P_M$ =	1.34 Bars	P_M =	2.00 Bars	$2/3P_M$ =	1.31 Bars	$1/3P_M$ =	0.69 Bars
	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	5.8		39.9		87.6		141.3		184.4	
1	11.1	5.30	47.2	7.30	97.2	9.60	148.4	7.10	189.5	5.10
2	15.6	4.50	54.3	7.10	106.6	9.40	155.4	7.00	194.3	4.80
3	20.5	4.90	61.0	6.70	115.9	9.30	162.2	6.80	199.2	4.90
4	24.8	4.30	67.9	6.90	125.2	9.30	169.0	6.80	204.2	5.00
5	29.5	4.70	74.8	6.90	134.5	9.30	175.8	6.80	209.3	5.10
6										
7										
8										
9										
10										
Qt (l)		23.70		34.90		46.90		34.50		24.90
q (l/min)		4.74		6.98		9.38		6.90		4.98
Pent(l/min/m)		0.68		1.00		1.34		0.99		0.71
Δp (bars)										
P_{EF} (bars)		1.02		1.70		2.36		1.67		1.05
K (m/sec)		8.7E-07		7.7E-07		7.5E-07		7.8E-07		8.9E-07
uL		6.62		5.86		5.67		5.89		6.76

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS
uL



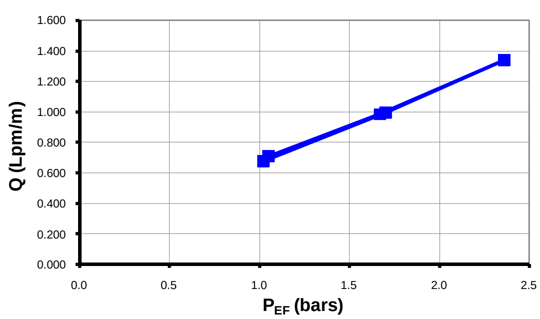
SELECTED LUGEON UNIT : 5.7 uL

K (PERMEABILITY) : 7E-07 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Turbulent

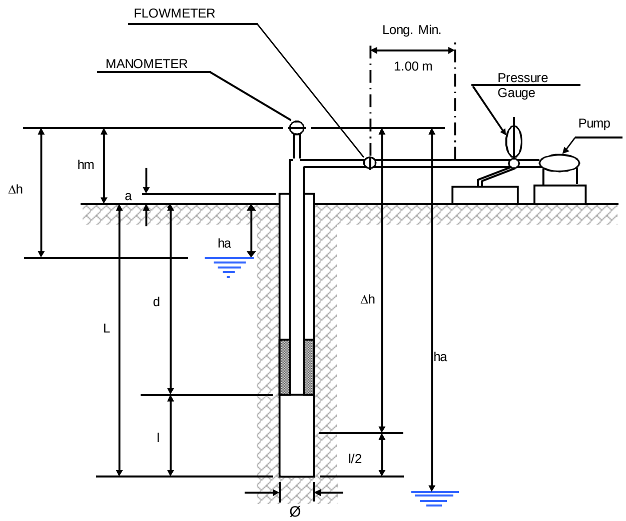
VTR
Analysis

GRB
Check

WATER PRESSURE TEST
LUGEON TYPE

Golder Associates Limited

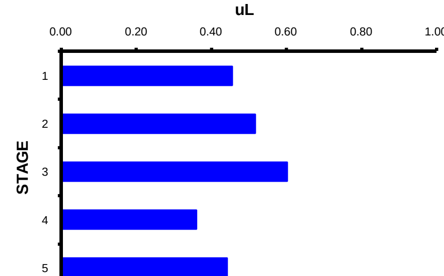
HOLE Nº 60+708.5	**TEST Nº** 2		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH :** 9.10 **TO** 11.60 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 23/01/2009	**START:** 15:13 **FINISH:** 15:48	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 35	**GROUND LEVEL:** (m.s.n.m.)
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.08	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.62	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.70	m
d	=	TOP OF TEST INTERVAL	9.10	m
L	=	BOTTOM OF TEST INTERVAL	11.60	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.70	m
l	=	LENGTH OF TEST INTERVAL	2.50	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.34 Bars	$2/3P_M$ =	0.72 Bars	P_M =	1.10 Bars	$2/3P_M$ =	0.75 Bars	$1/3P_M$ =	0.36 Bars
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	0.3		0.8		1.8		3.0		5.2	
1	0.4	0.10	1.0	0.20	2.1	0.30	3.2	0.20	5.4	0.20
2	0.5	0.10	1.1	0.10	2.3	0.20	3.3	0.10	5.5	0.10
3	0.6	0.10	1.3	0.20	2.5	0.20	3.3	0.00	5.6	0.10
4	0.6	0.00	1.4	0.10	2.7	0.20	3.4	0.10	5.6	0.00
5	0.7	0.10	1.5	0.10	2.9	0.20	3.5	0.10	5.6	0.00
6										
7										
8										
9										
10										
Qt (l)		0.40		0.70		1.10		0.50		0.40
q (l/min)		0.08		0.14		0.22		0.10		0.08
Pent(l/min/m)		0.03		0.06		0.09		0.04		0.03
Δp (bars)										
P_{EF} (bars)		0.70		1.08		1.46		1.11		0.72
K (m/sec)		4.8E-08		5.4E-08		6.3E-08		3.8E-08		4.6E-08
uL		0.46		0.52		0.60		0.36		0.44

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



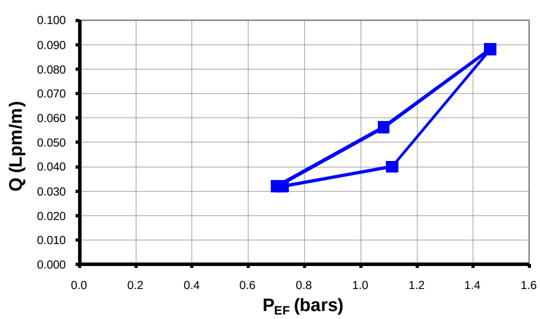
SELECTED LUGEON UNIT : 0.5 uL

K (PERMEABILITY) : 5E-08 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(\, l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Low Flow

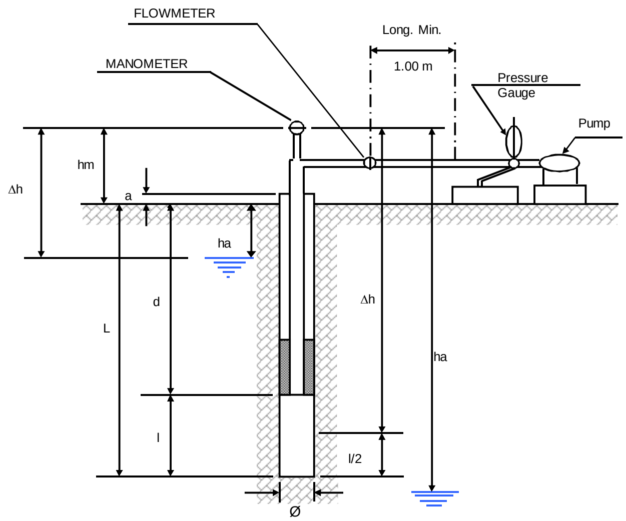
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

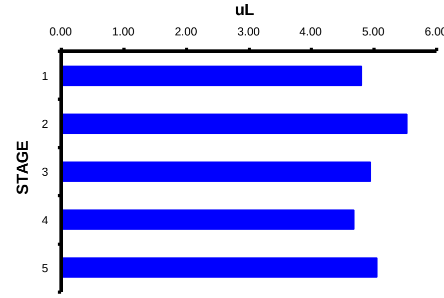
HOLE Nº 60+729.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH :** 11.10 **TO** 18.10 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 21/01/2009	**START:** 20:50 **FINISH:** 21:20	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 30	**GROUND LEVEL:**
	INTERVAL LITHOLOGY :		(m.s.n.m.)



hm	=	HEIGHT OF MANOMETER	1.00	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	3.20	m
Δh	=	HYDRAULIC PRESSURE HEAD	4.20	m
d	=	TOP OF TEST INTERVAL	11.10	m
L	=	BOTTOM OF TEST INTERVAL	18.10	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	4.20	m
l	=	LENGTH OF TEST INTERVAL	7.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

TIMES MINUTES	$1/3P_M$ = 0.89 Bars Q (L)	q (L/min)	$2/3P_M$ = 1.31 Bars Q (L)	q (L/min)	P_M = 2.02 Bars Q (L)	q (L/min)	$2/3P_M$ = 1.28 Bars Q (L)	q (L/min)	$1/3P_M$ = 0.68 Bars Q (L)	q (L/min)
0	5.7		41.3		82.0		131.9		170.1	
1	10.0	4.30	48.4	7.10	91.0	9.00	137.9	6.00	174.0	3.90
2	14.6	4.60	55.1	6.70	99.4	8.40	143.6	5.70	177.9	3.90
3	18.8	4.20	61.5	6.40	108.0	8.60	149.1	5.50	181.9	4.00
4	23.1	4.30	68.0	6.50	116.3	8.30	154.7	5.60	185.7	3.80
5	27.6	4.50	74.6	6.60	124.1	7.80	159.6	4.90	189.4	3.70
6										
7										
8										
9										
10										
Qt (l)		21.90		33.30		42.10		27.70		19.30
q (l/min)		4.38		6.66		8.42		5.54		3.86
Pent(l/min/m)		0.63		0.95		1.20		0.79		0.55
Δp (bars)										
P_{EF} (bars)		1.30		1.72		2.43		1.69		1.09
K (m/sec)		6.3E-07		7.3E-07		6.5E-07		6.2E-07		6.6E-07
uL		4.81		5.53		4.95		4.68		5.05

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



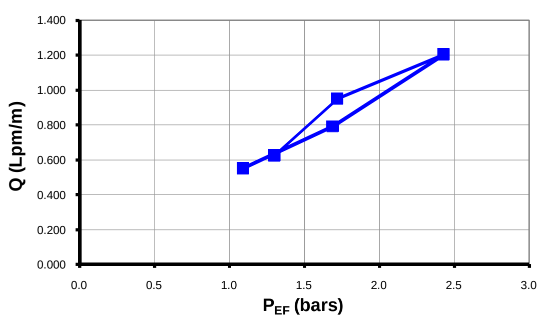
SELECTED LUGEON UNIT : 5.0 uL

K (PERMEABILITY) : 7E-07 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: laminar

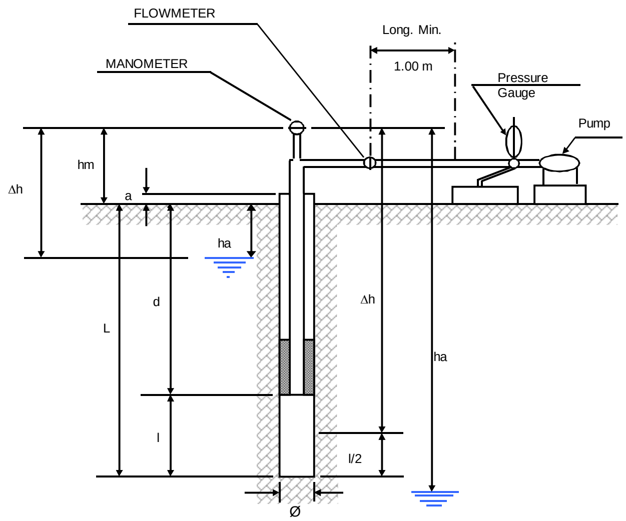
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

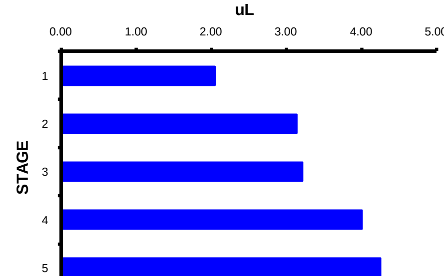
HOLE Nº	60+729.5	TEST Nº	2	North. COORD:	
PROJECT : East Dike Grouting	TEST DEPTH : 8.60 TO 11.40 m.			East. COORD:	
LOCATION: Meadowbank	DATE: 21/01/2009	START: 21:50	FINISH: 22:25	INCLINATION:	90
PROJECT Nº : 07-1413-0074 / 2200 / ****		Minutes:	35	GROUND LEVEL: (m.s.n.m.)	
	INTERVAL LITHOLOGY :				



hm	=	HEIGHT OF MANOMETER	1.00	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	3.20	m
Δh	=	HYDRAULIC PRESSURE HEAD	4.20	m
d	=	TOP OF TEST INTERVAL	8.60	m
L	=	BOTTOM OF TEST INTERVAL	11.40	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	4.20	m
l	=	LENGTH OF TEST INTERVAL	2.80	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

TIMES MINUTES	$1/3P_M$ = 0.32 Bars Q (L)	q (L/min)	$2/3P_M$ = 0.68 Bars Q (L)	q (L/min)	P_M = 1.12 Bars Q (L)	q (L/min)	$2/3P_M$ = 0.71 Bars Q (L)	q (L/min)	$1/3P_M$ = 0.36 Bars Q (L)	q (L/min)
0	1.2		4.4		12.4		23.0		30.6	
1	1.6	0.40	5.4	1.00	13.7	1.30	24.3	1.30	31.5	0.90
2	2.0	0.40	6.3	0.90	14.9	1.20	25.6	1.30	32.4	0.90
3	2.5	0.50	7.3	1.00	16.3	1.40	26.7	1.10	33.4	1.00
4	2.9	0.40	8.3	1.00	17.8	1.50	28.0	1.30	34.3	0.90
5	3.3	0.40	9.2	0.90	19.3	1.50	29.3	1.30	35.2	0.90
6										
7										
8										
9										
10										
Qt (l)		2.10		4.80		6.90		6.30		4.60
q (l/min)		0.42		0.96		1.38		1.26		0.92
Pent(l/min/m)		0.15		0.34		0.49		0.45		0.33
Δp (bars)										
P_{EF} (bars)		0.73		1.09		1.53		1.12		0.77
K (m/sec)		2.2E-07		3.4E-07		3.5E-07		4.3E-07		4.6E-07
uL		2.05		3.14		3.22		4.01		4.26

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



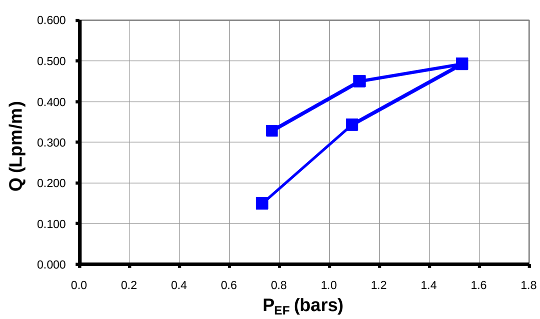
SELECTED LUGEON UNIT : 4.3 uL

K (PERMEABILITY) : 5E-07 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Washout

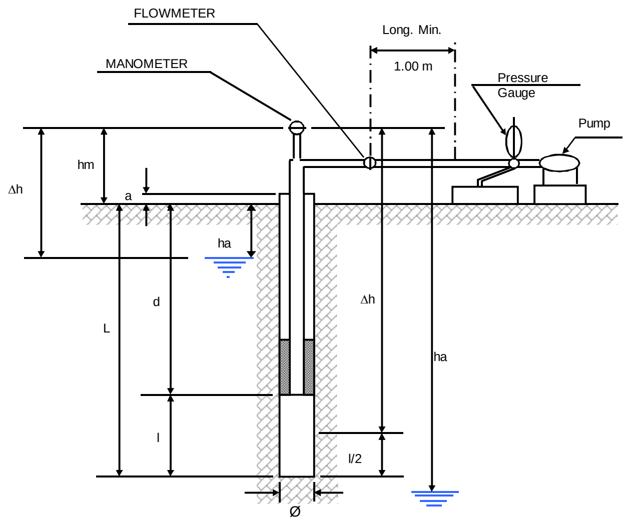
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

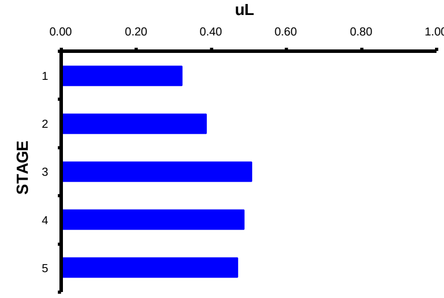
HOLE Nº 60+753.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH :** 8.60 **TO** 16.90 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 18/01/2009	**START:** 2:15 **FINISH:** 2:45	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 30	**GROUND LEVEL:**
	INTERVAL LITHOLOGY :		(m.s.n.m.)



hm	=	HEIGHT OF MANOMETER	1.05	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	3.10	m
Δh	=	HYDRAULIC PRESSURE HEAD	4.15	m
d	=	TOP OF TEST INTERVAL	8.60	m
L	=	BOTTOM OF TEST INTERVAL	16.90	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	4.15	m
l	=	LENGTH OF TEST INTERVAL	8.30	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

TIMES MINUTES	$1/3P_M$ =	0.72 Bars	$2/3P_M$ =	1.47 Bars	P_M =	2.21 Bars	$2/3P_M$ =	1.48 Bars	$1/3P_M$ =	0.72 Bars
	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	9.7		12.7		17.7		24.7		30.3	
1	10.0	0.30	13.3	0.60	18.8	1.10	25.5	0.80	30.8	0.50
2	10.2	0.20	13.9	0.60	19.9	1.10	26.4	0.90	31.2	0.40
3	10.4	0.20	14.5	0.60	21.0	1.10	27.0	0.60	31.5	0.30
4	10.8	0.40	15.1	0.60	22.3	1.30	27.7	0.70	32.0	0.50
5	11.2	0.40	15.7	0.60	23.2	0.90	28.5	0.80	32.5	0.50
6										
7										
8										
9										
10										
Qt (l)		1.50		3.00		5.50		3.80		2.20
q (l/min)		0.30		0.60		1.10		0.76		0.44
Pent(l/min/m)		0.04		0.07		0.13		0.09		0.05
Δp (bars)										
P_{EF} (bars)		1.13		1.88		2.62		1.88		1.13
K (m/sec)		4.4E-08		5.2E-08		6.9E-08		6.6E-08		6.4E-08
uL		0.32		0.39		0.51		0.49		0.47

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS uL



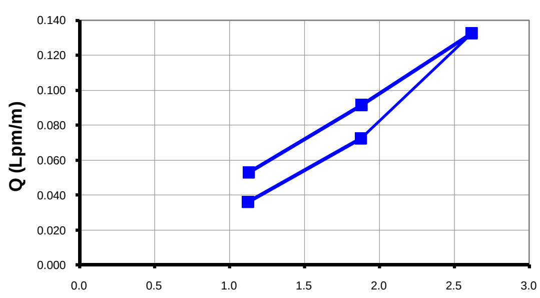
SELECTED LUGEON UNIT : 0.4 uL

K (PERMEABILITY) : 6E-08 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



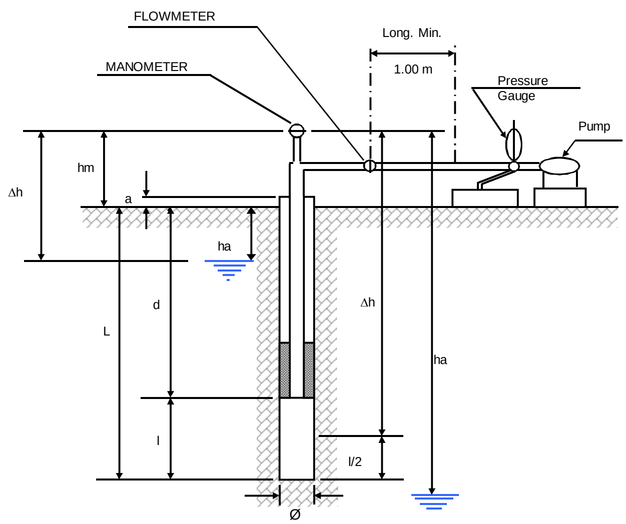
OBSERVATIONS: low flow

VTR
Analysis

GRB
Check

Golder Associates Limited	WATER PRESSURE TEST LUGEON TYPE			
	HOLE Nº 60+753.5	**TEST Nº** 2	**North. COORD:**	

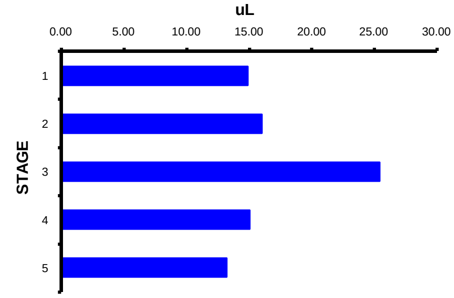
PROJECT :	East Dike Grouting	**TEST DEPTH** :	6.10	**TO**	8.90	**m.**	**East. COORD:**
LOCATION:	Meadowbank	**DATE:**	18/01/2009	**START:**	2:15	**FINISH:** 2:45	**INCLINATION:** 90
PROJECT Nº :	07-1413-0074 / 2200 / ****			**Minutes:**	30		**GROUND LEVEL:** (m.s.n.m.)
		INTERVAL LITHOLOGY :					



hm	=	HEIGHT OF MANOMETER	1.05	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	3.10	m
Δh	=	HYDRAULIC PRESSURE HEAD	4.15	m
d	=	TOP OF TEST INTERVAL	6.10	m
L	=	BOTTOM OF TEST INTERVAL	8.90	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	4.15	m
l	=	LENGTH OF TEST INTERVAL	2.80	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.44 Bars	$2/3P_M$ =	0.89 Bars	P_M =	1.31 Bars	$2/3P_M$ =	0.85 Bars	$1/3P_M$ =	0.41 Bars
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	69.2		99.0		140.6		209.7		247.6	
1	72.6	3.40	104.8	5.80	153.8	13.20	214.9	5.20	250.7	3.10
2	76.1	3.50	110.9	6.10	166.4	12.60	220.2	5.30	253.4	2.70
3	79.7	3.60	116.8	5.90	178.1	11.70	225.7	5.50	256.4	3.00
4	83.1	3.40	122.5	5.70	189.4	11.30	231.1	5.40	259.2	2.80
5	86.8	3.70	128.1	5.60	201.7	12.30	236.2	5.10	262.7	3.50
6										
7										
8										
9										
10										
Qt (l)		17.60		29.10		61.10		26.50		15.10
q (l/min)		3.52		5.82		12.22		5.30		3.02
Pent(l/min/m)		1.26		2.08		4.36		1.89		1.08
Δp (bars)										
P_{EF} (bars)		0.84		1.30		1.72		1.26		0.82
K (m/sec)		1.6E-06		1.7E-06		2.7E-06		1.6E-06		1.4E-06
uL		14.90		16.03		25.42		15.06		13.20

GRAPHICAL TEMPLATE OF RESULTS FOR THE SELECTION OF LUGEON UNITS



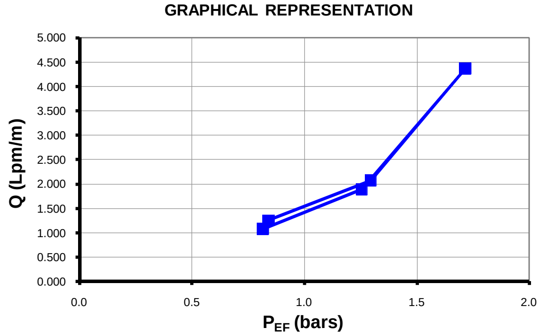
SELECTED LUGEON UNIT : 14.8 uL

K (PERMEABILITY) : 2E-06 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ uL = Pent (L/min/m) x 10 / P_{EF} (bars)

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



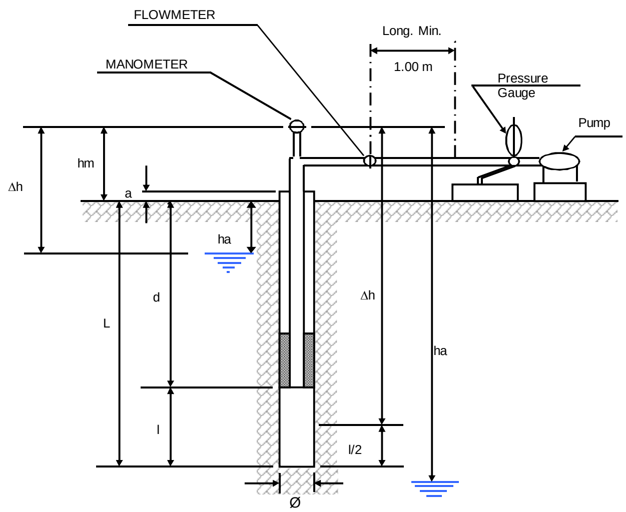
OBSERVATIONS: Dilation

VTR	GRB
Analysis	Check

WATER PRESSURE TEST CONFIRMATION

Golder Associates Limited

HOLE Nº 60+189.5		**TEST Nº** 1		**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH** : 8.00 **TO** 9.00 **m.**		**East. COORD:**	
LOCATION:	Meadowbank	**DATE:** 17/03/2009	**START:** 17:00 **FINISH:** 17:12	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 12	**GROUND LEVEL:**	
		INTERVAL LITHOLOGY :		**(m.s.n.m.)**	



hm	=	HEIGHT OF MANOMETER	1.06	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH		m
Δh	=	HYDRAULIC PRESSURE HEAD	9.56	m
d	=	TOP OF TEST INTERVAL	8.00	m
L	=	BOTTOM OF TEST INTERVAL	9.00	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	9.56	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ = 1.00 Bars		$2/3P_M$ = Bars		P_M = Bars		$2/3P_M$ = Bars		$1/3P_M$ = Bars	
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	23.0									
1	50.2	27.20								
2	73.4	23.20								
3	96.1	22.70								
4	118.1	22.00								
5	140.7	22.60								
6										
7										
8										
9										
10										
q t (l)		117.70		0.00		0.00		0.00		0.00
Qavg (l/min)		23.54		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.94		0.94		0.94		0.94		0.94
U L		121.5		0.0		0.0		0.0		0.0
K (m/sec)		3.6E-05		0.0E+00		0.0E+00		0.0E+00		0.0E+00

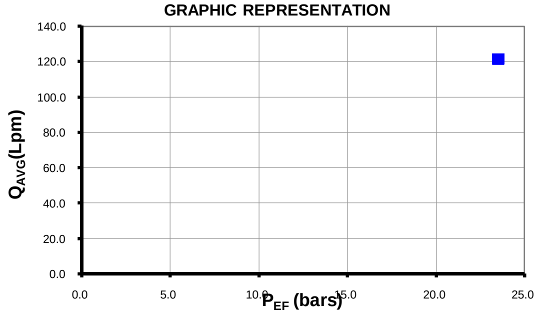
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 3.6E-05 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

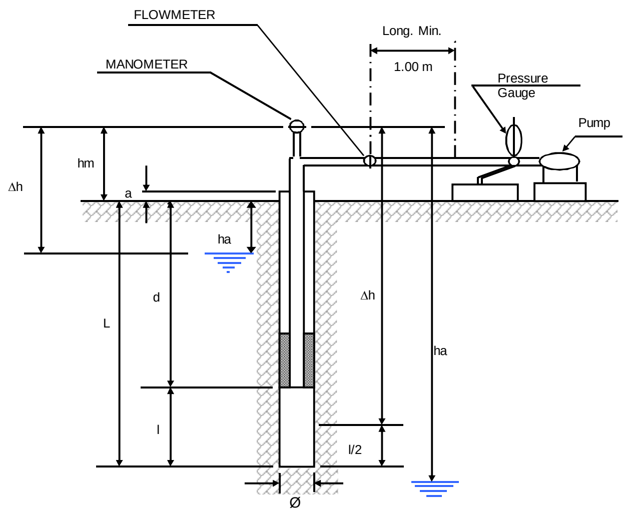
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST CONFIRMATION

HOLE Nº 60+216.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH** : 7.50 **TO** 8.50 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 17/03/2009	**START:** 10:24 **FINISH:** 10:35	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 10	**GROUND LEVEL:** (m.s.n.m.)
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.06	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH		m
Δh	=	HYDRAULIC PRESSURE HEAD	9.06	m
d	=	TOP OF TEST INTERVAL	7.50	m
L	=	BOTTOM OF TEST INTERVAL	8.50	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	9.06	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	1.00 Bars	$2/3P_M$ =	Bars	P_M =	Bars	$2/3P_M$ =	Bars	$1/3P_M$ =	Bars
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	2.3									
1	4.0	1.70								
2	5.7	1.70								
3	7.4	1.70								
4	9.1	1.70								
5	10.7	1.60								
6	12.3	1.60								
7	13.9	1.60								
8	15.5	1.60								
9	17.0	1.50								
10	18.6	1.60								
q t (l)		16.30		0.00		0.00		0.00		0.00
Qavg (l/min)		1.63		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.89		0.89		0.89		0.89		0.89
U L		8.6		0.0		0.0		0.0		0.0
K (m/sec)		2.5E-06		0.0E+00		0.0E+00		0.0E+00		0.0E+00

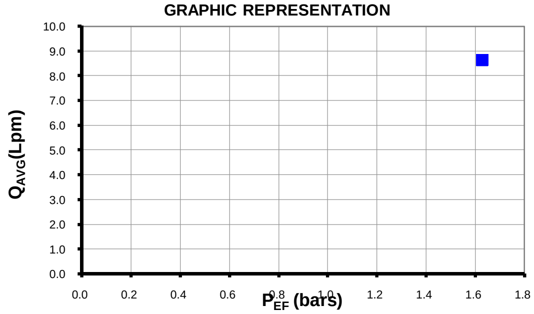
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 2.5E-06 **m/s**

$P_{EF} = P_M - Δp + Δh / 10.197$

GRAPHIC REPRESENTATION



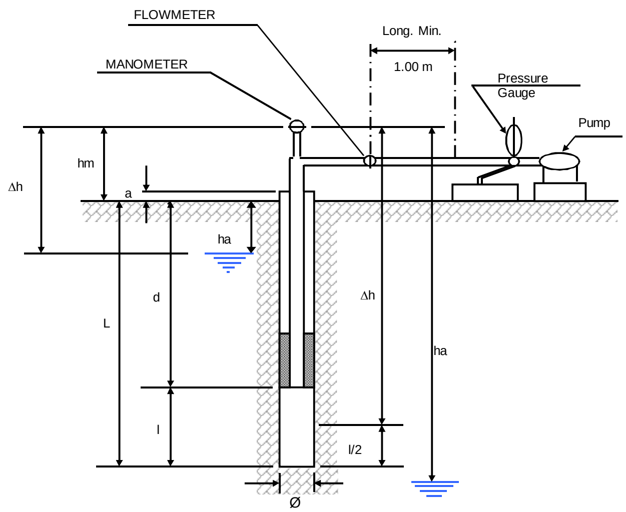
OBSERVATIONS:

VTR
Analysis

GRB
Check

Golder Associates Limited	**WATER PRESSURE TEST CONFIRMATION**

	HOLE Nº 60+237.5	**TEST Nº** 1	**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH** : 7.40 **TO** 8.40 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 17/03/2009 **START:** 13:13	**FINISH:** 13:21	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 8	**GROUND LEVEL:** (m.s.n.m.)
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.06	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH		m
Δh	=	HYDRAULIC PRESSURE HEAD	8.96	m
d	=	TOP OF TEST INTERVAL	7.40	m
L	=	BOTTOM OF TEST INTERVAL	8.40	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	8.96	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ = 1.00 Bars		$2/3P_M$ = Bars		P_M = Bars		$2/3P_M$ = Bars		$1/3P_M$ = Bars	
TIMES MINUTES	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	77.3									
1	134.3	57.00								
2	193.7	59.40								
3	253.0	59.30								
4	312.2	59.20								
5	373.5	61.30								
6										
7										
8										
9										
10										
q t (l)		296.20		0.00		0.00		0.00		0.00
Qavg (l/min)		59.24		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.88		0.88		0.88		0.88		0.88
U L		315.3		0.0		0.0		0.0		0.0
K (m/sec)		9.2E-05		0.0E+00		0.0E+00		0.0E+00		0.0E+00

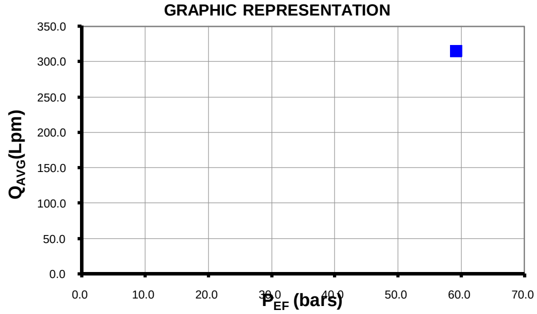
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 9.2E-05 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$

GRAPHIC REPRESENTATION



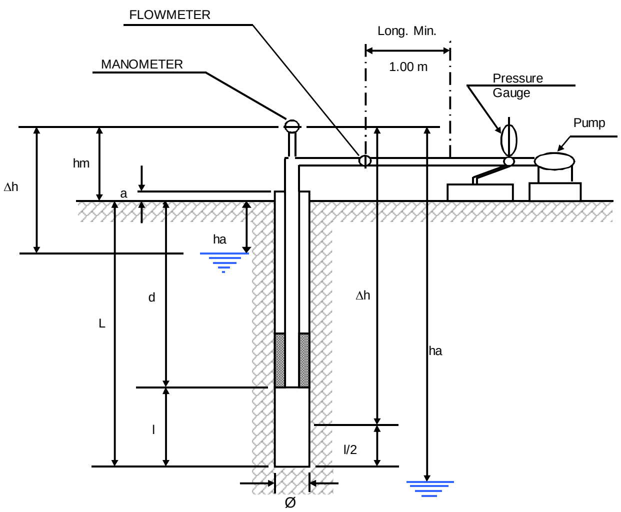
OBSERVATIONS:

VTR	GRB
Analysis	Check

Golder Associates Limited

WATER PRESSURE TEST CONFIRMATION

HOLE Nº 60+381.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH :** 7.60 **TO** 8.60 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 17/03/2009	**START:** 7:40 **FINISH:** 15:12	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 10	**GROUND LEVEL:**
	INTERVAL LITHOLOGY :		**(m.s.n.m.)**



hm	=	HEIGHT OF MANOMETER	1.06	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH		m
Δh	=	HYDRAULIC PRESSURE HEAD	9.16	m
d	=	TOP OF TEST INTERVAL	7.60	m
L	=	BOTTOM OF TEST INTERVAL	8.60	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	9.16	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ = 1.00 Bars		$2/3P_M$ = Bars		P_M = Bars		$2/3P_M$ = Bars		$1/3P_M$ = Bars	
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	4.5									
1	6.6	2.10								
2	8.6	2.00								
3	10.4	1.80								
4	12.4	2.00								
5	14.2	1.80								
6	15.8	1.60								
7	17.3	1.50								
8	18.9	1.60								
9	20.2	1.30								
10	21.5	1.30								
q t (l)		17.00		0.00		0.00		0.00		0.00
Qavg (l/min)		1.70		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.90		0.90		0.90		0.90		0.90
U L		9.0		0.0		0.0		0.0		0.0
K (m/sec)		2.6E-06		0.0E+00		0.0E+00		0.0E+00		0.0E+00

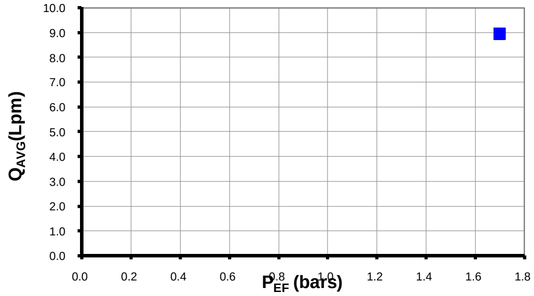
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 2.6E-06 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

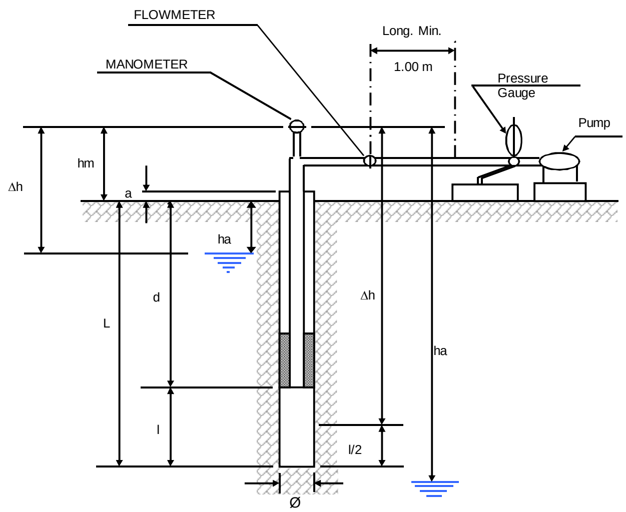
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST CONFIRMATION

HOLE Nº	60+423.5	**TEST Nº**	1	**North. COORD:**	
PROJECT : East Dike Grouting	**TEST DEPTH** : 8.30 TO 9.30 m.			**East. COORD:**	
LOCATION: Meadowbank	**DATE:** 17/03/2009	**START:** 15:00	**FINISH:** 15:12	**INCLINATION:**	90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:**	10	**GROUND LEVEL:** (m.s.n.m.)	
	INTERVAL LITHOLOGY :				



hm	=	HEIGHT OF MANOMETER	1.06	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.60	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.66	m
d	=	TOP OF TEST INTERVAL	8.30	m
L	=	BOTTOM OF TEST INTERVAL	9.30	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.66	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	1.00 Bars	$2/3P_M$ =	Bars	P_M =	Bars	$2/3P_M$ =	Bars	$1/3P_M$ =	Bars
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	43.7									
1	59.7	16.00								
2	76.6	16.90								
3	94.0	17.40								
4	109.1	15.10								
5	125.1	16.00								
6	141.1	16.00								
7	158.0	16.90								
8	174.0	16.00								
9	189.4	15.40								
10	209.4	20.00								
q t (l)		165.70		0.00		0.00		0.00		0.00
Qavg (l/min)		16.57		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.36		0.36		0.36		0.36		0.36
U L		121.9		0.0		0.0		0.0		0.0
K (m/sec)		3.6E-05		0.0E+00		0.0E+00		0.0E+00		0.0E+00

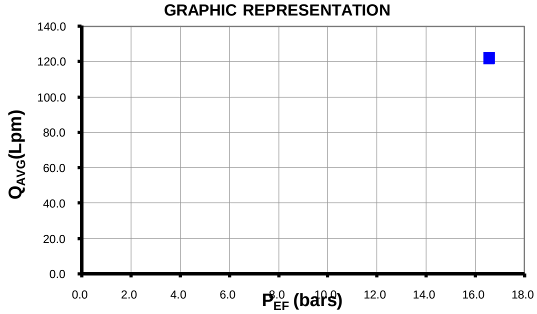
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 3.6E-05 **m/s**

$P_{EF} = P_M - Δp + Δh / 10.197$

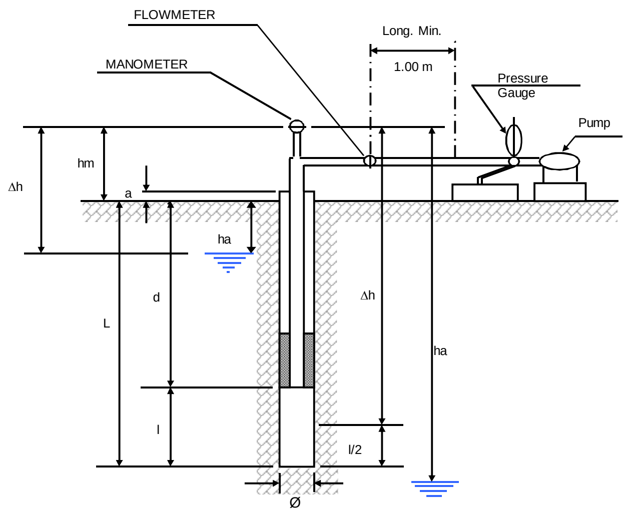
GRAPHIC REPRESENTATION



OBSERVATIONS:

VTR	GRB
Analysis	Check

Golder Associates Limited	WATER PRESSURE TEST CONFIRMATION		
	HOLE Nº 60+468.5	**TEST Nº** 1	**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH** : 9.40 TO 10.40 m.		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 17/03/2009 **START:** 10:30	**FINISH:** 10:40	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 10	**GROUND LEVEL:**
	INTERVAL LITHOLOGY :		(m.s.n.m.)



hm	=	HEIGHT OF MANOMETER	1.06	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.60	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.66	m
d	=	TOP OF TEST INTERVAL	9.40	m
L	=	BOTTOM OF TEST INTERVAL	10.40	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.66	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ = 1.00 Bars		$2/3P_M$ = Bars		P_M = Bars		$2/3P_M$ = Bars		$1/3P_M$ = Bars	
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	90.1									
1	135.7	45.60								
2	182.9	47.20								
3	236.0	53.10								
4	285.2	49.20								
5	336.3	51.10								
6	391.0	54.70								
7	431.0	40.00								
8	491.0	60.00								
9	549.0	58.00								
10	594.0	45.00								
q t (l)	503.90			0.00		0.00		0.00		0.00
Qavg (l/min)	50.39			0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)	1.36			0.36		0.36		0.36		0.36
U L	370.8			0.0		0.0		0.0		0.0
K (m/sec)	1.1E-04			0.0E+00		0.0E+00		0.0E+00		0.0E+00

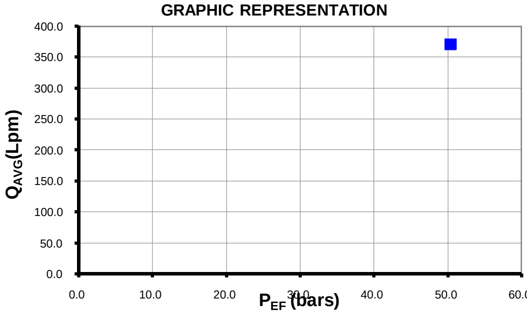
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 1.1E-04 **m/s**

$P_{EF} = P_M - Δp + Δh / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

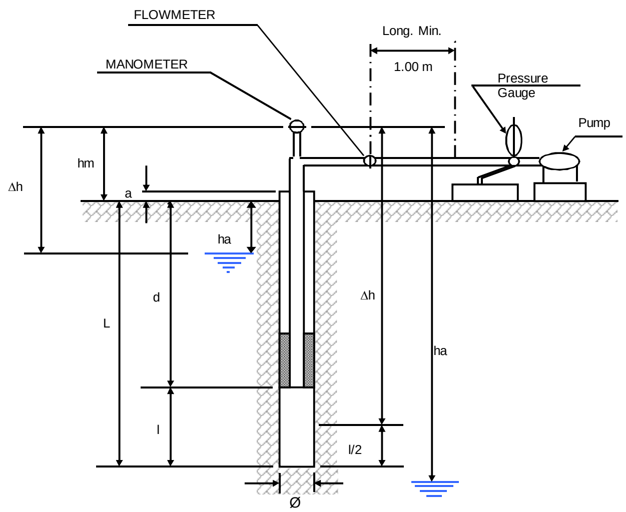
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST CONFIRMATION

HOLE Nº 60+510.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH** : 9.40 TO 10.40 m.		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 17/03/2009	**START:** 9:00 **FINISH:** 9:15	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 10	**GROUND LEVEL:** (m.s.n.m.)
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.06	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.60	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.66	m
d	=	TOP OF TEST INTERVAL	9.40	m
L	=	BOTTOM OF TEST INTERVAL	10.40	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.66	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ = 1.00 Bars		$2/3P_M$ = Bars		P_M = Bars		$2/3P_M$ = Bars		$1/3P_M$ = Bars	
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	6.3									
1	9.3	3.00								
2	12.1	2.80								
3	14.8	2.70								
4	17.0	2.20								
5	19.9	2.90								
6	22.4	2.50								
7	25.0	2.60								
8	27.2	2.20								
9	29.0	1.80								
10	31.8	2.80								
q t (l)		25.50		0.00		0.00		0.00		0.00
Qavg (l/min)		2.55		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.36		0.36		0.36		0.36		0.36
U L		18.8		0.0		0.0		0.0		0.0
K (m/sec)		5.5E-06		0.0E+00		0.0E+00		0.0E+00		0.0E+00

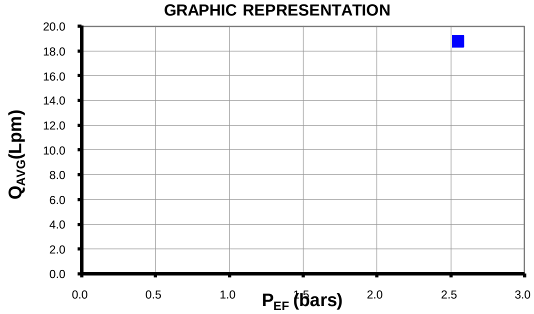
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 5.5E-06 **m/s**

$P_{EF} = P_M - Δp + Δh / 10.197$

GRAPHIC REPRESENTATION

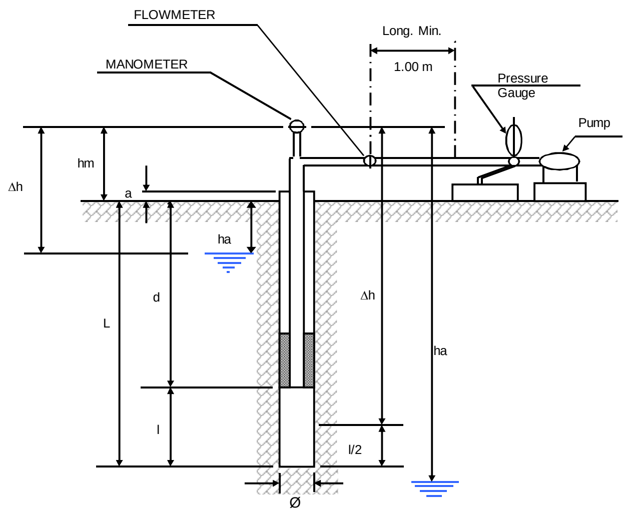


OBSERVATIONS:

VTR
Analysis

GRB
Check

Golder Associates Limited	# WATER PRESSURE TEST CONFIRMATION		
	HOLE Nº 60+549.5	**TEST Nº** 1	**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH** : 5.70 **TO** 6.70 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 18/03/2009 **START:** 17:00	**FINISH:** 17:13	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 13	**GROUND LEVEL:**
	INTERVAL LITHOLOGY :		(m.s.n.m.)



hm	=	HEIGHT OF MANOMETER	1.08	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH		m
Δh	=	HYDRAULIC PRESSURE HEAD	7.28	m
d	=	TOP OF TEST INTERVAL	5.70	m
L	=	BOTTOM OF TEST INTERVAL	6.70	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	7.28	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.34 Bars	$2/3P_M$ =	Bars	P_M =	Bars	$2/3P_M$ =	Bars	$1/3P_M$ =	Bars
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	7.1									
1	9.9	2.80								
2	12.2	2.30								
3	15.0	2.80								
4	17.7	2.70								
5	20.3	2.60								
6	22.9	2.60								
7	25.5	2.60								
8	27.6	2.10								
9	30.5	2.90								
10	33.0	2.50								
q t (l)		25.90		0.00		0.00		0.00		0.00
Qavg (l/min)		2.59		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.05		0.71		0.71		0.71		0.71
U L		24.6		0.0		0.0		0.0		0.0
K (m/sec)		7.2E-06		0.0E+00		0.0E+00		0.0E+00		0.0E+00

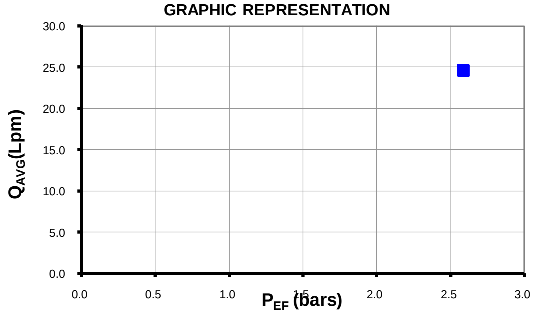
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 7.2E-06 **m/s**

$P_{EF} = P_M - Δp + Δh / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

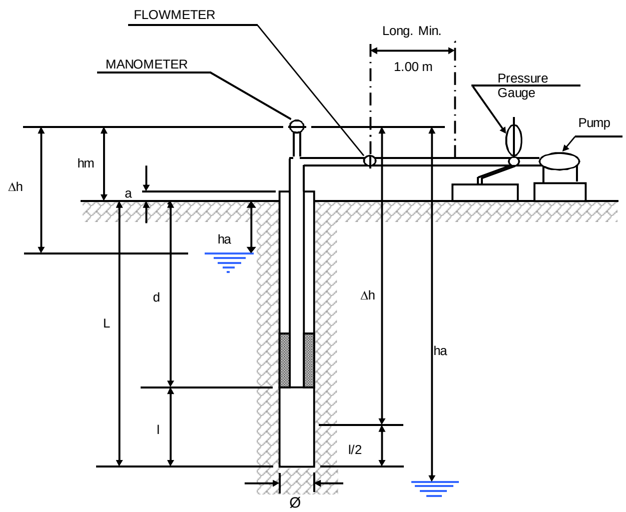
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST CONFIRMATION

HOLE Nº 60+609.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH :** 6.20 **TO** 7.20 **m.**		**East. COORD:**
LOCATION: Meadowbank	**DATE:** 18/03/2009	**START:** 15:16 **FINISH:** 15:27	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 11	**GROUND LEVEL:** (m.s.n.m.)
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.08	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH		m
Δh	=	HYDRAULIC PRESSURE HEAD	7.78	m
d	=	TOP OF TEST INTERVAL	6.20	m
L	=	BOTTOM OF TEST INTERVAL	7.20	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	7.78	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	1/3P_M = 0.34 Bars		2/3P_M = Bars		P_M = Bars		2/3P_M = Bars		1/3P_M = Bars	
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	30.7									
1	34.6	3.90								
2	39.8	5.20								
3	43.6	3.80								
4	47.3	3.70								
5	50.9	3.60								
6	54.5	3.60								
7	57.6	3.10								
8	60.5	2.90								
9	63.3	2.80								
10	65.9	2.60								
q t (l)		35.20		0.00		0.00		0.00		0.00
Qavg (l/min)		3.52		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.10		0.76		0.76		0.76		0.76
U L		31.9		0.0		0.0		0.0		0.0
K (m/sec)		9.3E-06		0.0E+00		0.0E+00		0.0E+00		0.0E+00

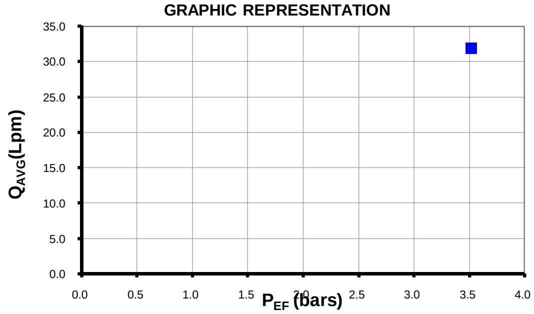
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 9.3E-06 **m/s**

$P_{EF} = P_M - Δp + Δh / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

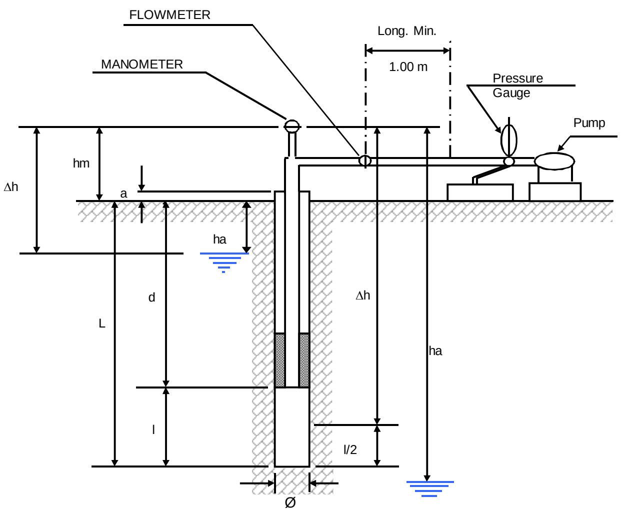
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST CONFIRMATION

HOLE Nº	60+642.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH** : 6.20 **TO** 7.20 **m.**		**East. COORD:**	
LOCATION:	Meadowbank	**DATE:** 18/03/2009 **START:** 11:15	**FINISH:** 11:31	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 16	**GROUND LEVEL:** (m.s.n.m.)	
		INTERVAL LITHOLOGY :			



hm	=	HEIGHT OF MANOMETER	1.08	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH		m
Δh	=	HYDRAULIC PRESSURE HEAD	7.78	m
d	=	TOP OF TEST INTERVAL	6.20	m
L	=	BOTTOM OF TEST INTERVAL	7.20	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	7.78	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ = 0.34 Bars		$2/3P_M$ = Bars		P_M = Bars		$2/3P_M$ = Bars		$1/3P_M$ = Bars	
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	31.6									
1	35.2	3.60								
2	39.0	3.80								
3	43.2	4.20								
4	47.4	4.20								
5	52.0	4.60								
6	56.9	4.90								
7	61.7	4.80								
8	66.6	4.90								
9	71.5	4.90								
10	76.2	4.70								
q t (l)		44.60		0.00		0.00		0.00		0.00
Qavg (l/min)		4.46		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.10		0.76		0.76		0.76		0.76
U L		40.4		0.0		0.0		0.0		0.0
K (m/sec)		1.2E-05		0.0E+00		0.0E+00		0.0E+00		0.0E+00

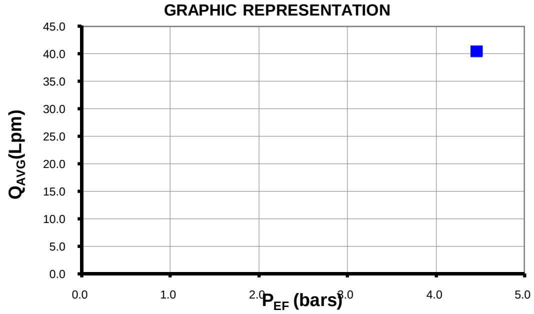
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 1.2E-05 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$

GRAPHIC REPRESENTATION



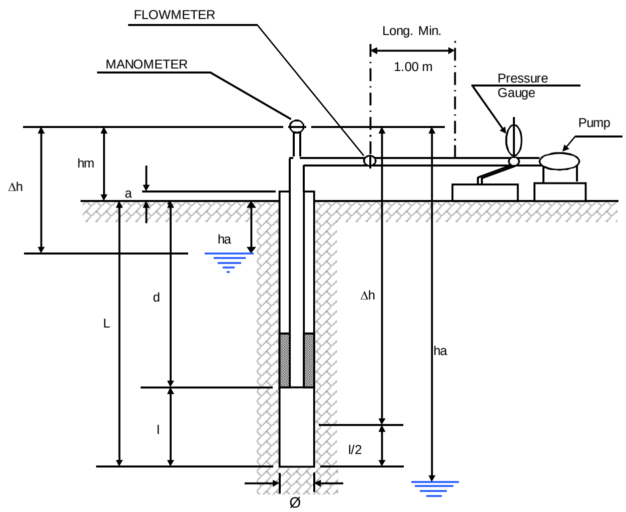
OBSERVATIONS:

VTR
Analysis

GRB
Check

Golder Associates Limited	**WATER PRESSURE TEST CONFIRMATION**

		HOLE Nº 60+684.5	**TEST Nº** 1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH** : 6.20 **TO** 7.20 **m.**		**East. COORD:**	
LOCATION:	Meadowbank	**DATE:** 18/03/2009 **START:** 9:25	**FINISH:** 9:40	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 15	**GROUND LEVEL:** (m.s.n.m.)	
		INTERVAL LITHOLOGY :			



hm	=	HEIGHT OF MANOMETER	1.08	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH		m
Δh	=	HYDRAULIC PRESSURE HEAD	7.78	m
d	=	TOP OF TEST INTERVAL	6.20	m
L	=	BOTTOM OF TEST INTERVAL	7.20	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	7.78	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ =	0.34 Bars	$2/3P_M$ =	Bars	P_M =	Bars	$2/3P_M$ =	Bars	$1/3P_M$ =	Bars
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	8.6									
1	11.2	2.60								
2	14.2	3.00								
3	16.6	2.40								
4	19.0	2.40								
5	21.4	2.40								
6	23.5	2.10								
7	25.7	2.20								
8	27.8	2.10								
9	29.8	2.00								
10	31.8	2.00								
q t (l)		23.20		0.00		0.00		0.00		0.00
Qavg (l/min)		2.32		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.10		0.76		0.76		0.76		0.76
U L		21.0		0.0		0.0		0.0		0.0
K (m/sec)		6.2E-06		0.0E+00		0.0E+00		0.0E+00		0.0E+00

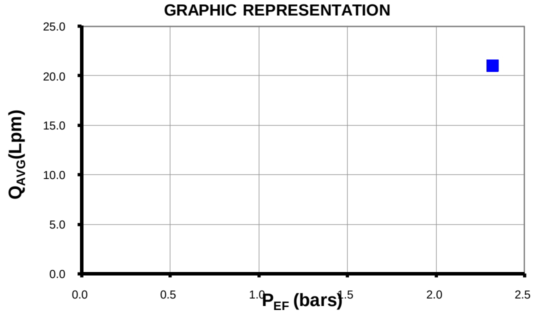
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 6.2E-06 **m/s**

$P_{EF} = P_M - Δp + Δh / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

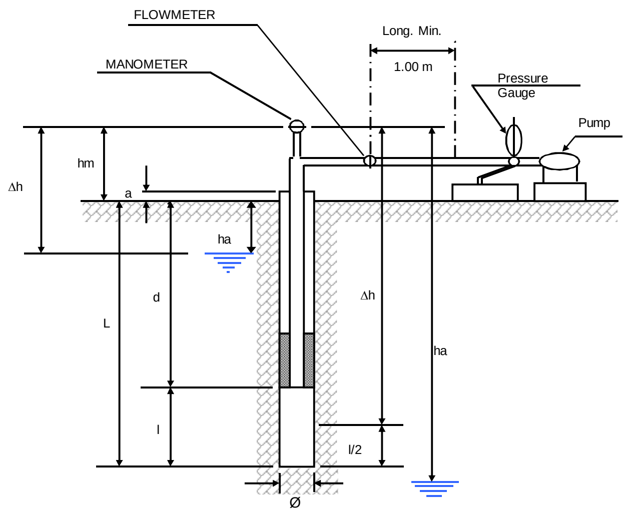
VTR
Analysis

GRB
Check

WATER PRESSURE TEST CONFIRMATION

Golder Associates Limited

HOLE Nº	60+780.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	7.01 **TO** 8.01 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	17/03/2009 **START:** 3:00 **FINISH:** 3:10	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 10	**GROUND LEVEL:** (m.s.n.m.)	
		INTERVAL LITHOLOGY :			



hm	=	HEIGHT OF MANOMETER	1.08	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH		m
Δh	=	HYDRAULIC PRESSURE HEAD	8.59	m
d	=	TOP OF TEST INTERVAL	7.01	m
L	=	BOTTOM OF TEST INTERVAL	8.01	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	8.59	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	$1/3P_M$ = 1.10 Bars		$2/3P_M$ = Bars		P_M = Bars		$2/3P_M$ = Bars		$1/3P_M$ = Bars	
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	5.3									
1	6.1	0.80								
2	6.4	0.30								
3	6.7	0.30								
4	6.9	0.20								
5										
6										
7										
8										
9										
10										
q t (l)		1.60		0.00		0.00		0.00		0.00
Qavg (l/min)		0.40		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.94		0.84		0.84		0.84		0.84
U L		2.1		0.0		0.0		0.0		0.0
K (m/sec)		6.0E-07		0.0E+00		0.0E+00		0.0E+00		0.0E+00

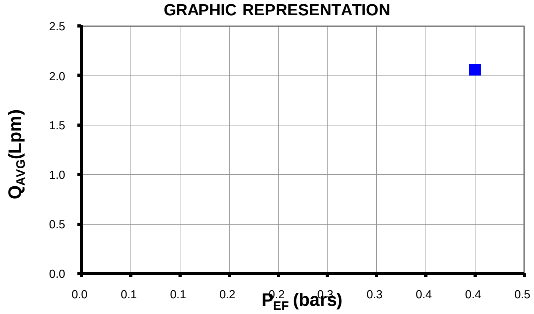
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 6.0E-07 **m/s**

$P_{EF} = P_M - Δp + Δh / 10.197$

GRAPHIC REPRESENTATION



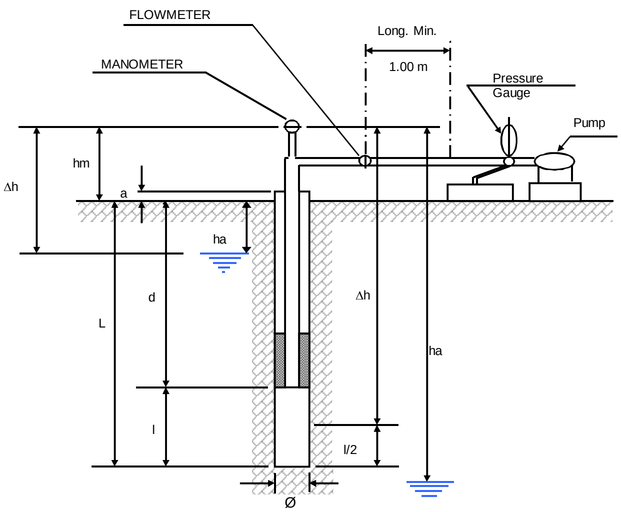
OBSERVATIONS:

VTR	GRB
Analysis	Check

Golder Associates Limited

WATER PRESSURE TEST
CONTACT - PRIOR TO INJECTION

HOLE Nº	60+126.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH** :	6.40 TO 7.40 m.	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:** 05/03/2009	**START:** 14:15 **FINISH:** 14:27	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 0:12	**GROUND LEVEL:**	
		INTERVAL LITHOLOGY :		(m.s.n.m.)	



hm	=	HEIGHT OF MANOMETER	1.15	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.00	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.15	m
d	=	TOP OF TEST INTERVAL	6.40	m
L	=	BOTTOM OF TEST INTERVAL	7.40	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.15	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	P_M = 1.15 Bars		2/3P_M = Bars		P_M = Bars		2/3P_M = Bars		1/3P_M = Bars	
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	33.0									
1	54.3	21.30								
2	76.3	22.00								
3	92.6	16.30								
4	113.8	21.20								
5	130.9	17.10								
6	147.9	17.00								
7	165.1	17.20								
8	182.2	17.10								
9	199.0	16.80								
10	215.7	16.70								
q t (l)		182.70		0.00		0.00		0.00		0.00
Qavg (l/min)		18.27		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.46		0.31		0.31		0.31		0.31
U L		124.8		0.0		0.0		0.0		0.0
K (m/sec)		3.7E-05		0.0E+00		0.0E+00		0.0E+00		0.0E+00

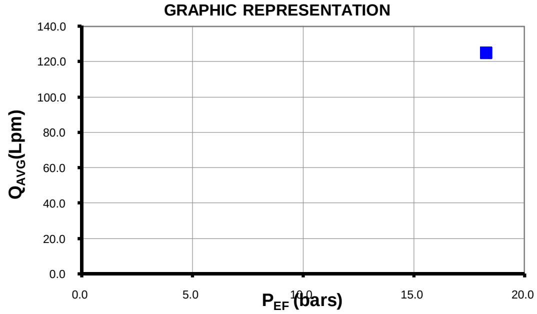
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 3.7E-05 **m/s**

$P_{EF} = P_M - Δp + Δh / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

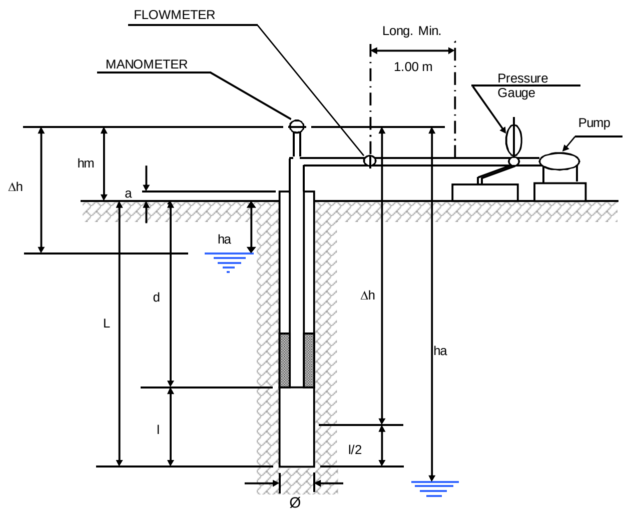
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
CONTACT - PRIOR TO INJECTION

HOLE Nº	60+138.5	**TEST Nº**	1	**North. COORD:**	
PROJECT : East Dike Grouting	**TEST DEPTH :**	6.30	7.30 m.	**East. COORD:**	
LOCATION: Meadowbank	**DATE:** 05/03/2009	**START:** 14:38	**FINISH:** 14:50	**INCLINATION:**	90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:**	0:12	**GROUND LEVEL:** (m.s.n.m.)	
INTERVAL LITHOLOGY :					



hm	=	HEIGHT OF MANOMETER	1.15	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.00	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.15	m
d	=	TOP OF TEST INTERVAL	6.30	m
L	=	BOTTOM OF TEST INTERVAL	7.30	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.15	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	P_M = 1.15 Bars		$2/3P_M$ = Bars		P_M = Bars		$2/3P_M$ = Bars		$1/3P_M$ = Bars	
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	24.4									
1	50.5	26.10								
2	75.0	24.50								
3	95.7	20.70								
4	115.1	19.40								
5	133.4	18.30								
6	151.0	17.60								
7	168.5	17.50								
8	185.7	17.20								
9	202.4	16.70								
10	219.3	16.90								
q t (l)		194.90		0.00		0.00		0.00		0.00
Qavg (l/min)		19.49		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.46		0.31		0.31		0.31		0.31
U L		133.4		0.0		0.0		0.0		0.0
K (m/sec)		3.9E-05		0.0E+00		0.0E+00		0.0E+00		0.0E+00

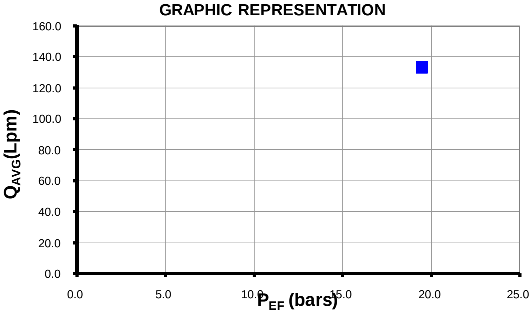
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 3.9E-05 **m/s**

$P_{EF} = P_M - Δp + Δh / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

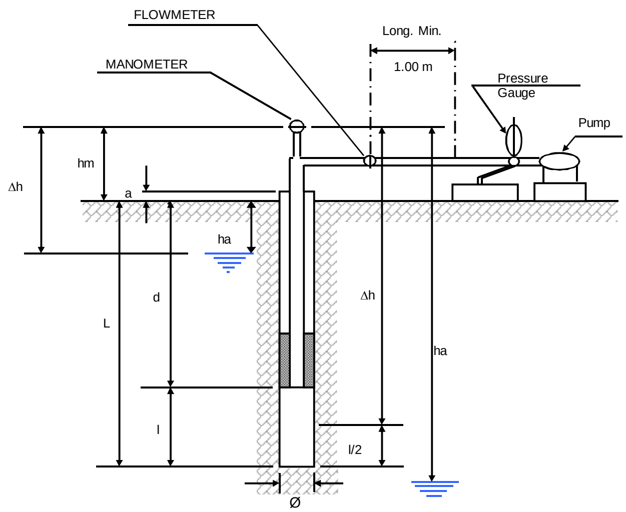
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
CONTACT - PRIOR TO INJECTION

HOLE Nº 60+150.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH** : 8.00	9.00 m.	**East. COORD:**
LOCATION: Meadowbank	**DATE:** 06/03/2009	**START:** 3:37 **FINISH:** 3:44	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 0:07	**GROUND LEVEL:**
	INTERVAL LITHOLOGY :		(m.s.n.m.)



hm	=	HEIGHT OF MANOMETER	1.15	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.00	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.15	m
d	=	TOP OF TEST INTERVAL	8.00	m
L	=	BOTTOM OF TEST INTERVAL	9.00	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.15	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	P_M = 1.04 Bars		2/3P_M = Bars		P_M = Bars		2/3P_M = Bars		1/3P_M = Bars	
TIMES MINUTES	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	1.5									
1	1.6	0.10								
2	1.7	0.10								
3	1.8	0.10								
4	1.9	0.10								
5	1.9	0.00								
6										
7										
8										
9										
10										
q t (l)		0.40		0.00		0.00		0.00		0.00
Qavg (l/min)		0.08		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.35		0.31		0.31		0.31		0.31
U L		0.6		0.0		0.0		0.0		0.0
K (m/sec)		1.7E-07		0.0E+00		0.0E+00		0.0E+00		0.0E+00

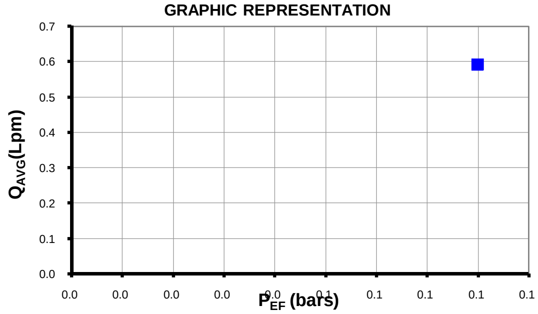
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 1.7E-07 **m/s**

$P_{EF} = P_M - Δp + Δh / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

VTR
Analysis

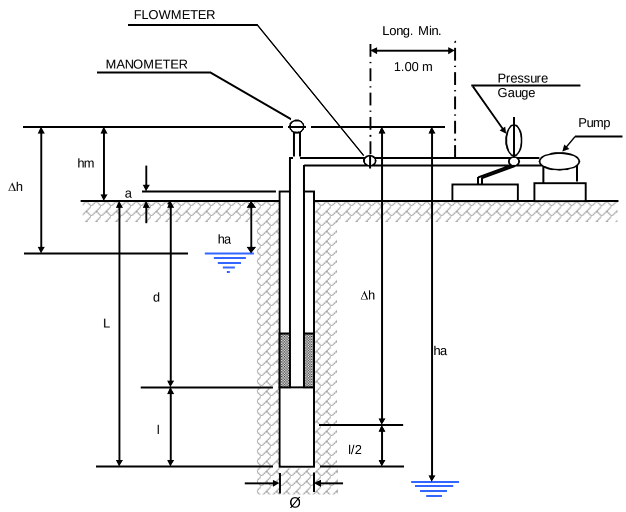
GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
CONTACT - PRIOR TO INJECTION

HOLE Nº	60+168.5	**TEST Nº**	1	**North. COORD:**	
TEST DEPTH :	8.20	9.20	m.	**East. COORD:**	
DATE:	07/03/2009	**START:** 8:40	**FINISH:** 8:53	**INCLINATION:**	90
		Minutes:	0:13	**GROUND LEVEL:** (m.s.n.m.)	
INTERVAL LITHOLOGY :					

PROJECT : East Dike Grouting
LOCATION: Meadowbank
PROJECT Nº : 07-1413-0074 / 2200 / ****



hm	=	HEIGHT OF MANOMETER	1.15	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.00	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.15	m
d	=	TOP OF TEST INTERVAL	8.20	m
L	=	BOTTOM OF TEST INTERVAL	9.20	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.15	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	P_M = 1.04 Bars		2/3P_M = Bars		P_M = Bars		2/3P_M = Bars		1/3P_M = Bars	
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	8.4									
1	8.7	0.30								
2	9.0	0.30								
3	9.3	0.30								
4	9.8	0.50								
5	10.2	0.40								
6	10.6	0.40								
7										
8										
9										
10										
q t (l)		2.20		0.00		0.00		0.00		0.00
Qavg (l/min)		0.37		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.35		0.31		0.31		0.31		0.31
U L		2.7		0.0		0.0		0.0		0.0
K (m/sec)		7.9E-07		0.0E+00		0.0E+00		0.0E+00		0.0E+00

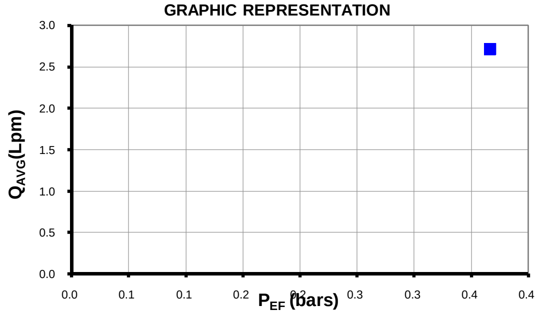
$$K\,(m/s) = \frac{1.634E^{-4} \times Q\,(Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\,(bar) \times l\,(m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 7.9E-07 **m/s**

$P_{EF} = P_M - Δp + Δh / 10.197$

GRAPHIC REPRESENTATION



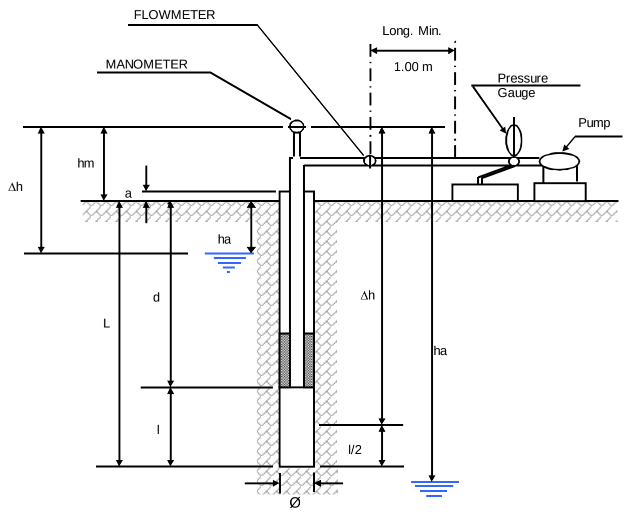
OBSERVATIONS:

VTR
Analysis

GRB
Check

Golder Associates Limited	WATER PRESSURE TEST CONTACT - PRIOR TO INJECTION

HOLE Nº	60+180.5	**TEST Nº**	1	**North. COORD:**	
PROJECT : East Dike Grouting	**TEST DEPTH** :	8.00	9.00 m.	**East. COORD:**	
LOCATION: Meadowbank	**DATE:** 07/03/2009	**START:** 3:37	**FINISH:** 3:44	**INCLINATION:**	90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:**	0:07	**GROUND LEVEL:**	
	INTERVAL LITHOLOGY :			**(m.s.n.m.)**	



hm	=	HEIGHT OF MANOMETER	1.15	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.00	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.15	m
d	=	TOP OF TEST INTERVAL	8.00	m
L	=	BOTTOM OF TEST INTERVAL	9.00	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.15	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	P_M = 1.04 Bars		$2/3P_M$ = Bars		P_M = Bars		$2/3P_M$ = Bars		$1/3P_M$ = Bars	
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	19.3									
1	46.8	27.50								
2	82.4	35.60								
3	115.2	32.80								
4										
5										
6										
7										
8										
9										
10										
q t (l)		95.90		0.00		0.00		0.00		0.00
Qavg (l/min)		31.97		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.35		0.31		0.31		0.31		0.31
U L		236.4		0.0		0.0		0.0		0.0
K (m/sec)		6.9E-05		0.0E+00		0.0E+00		0.0E+00		0.0E+00

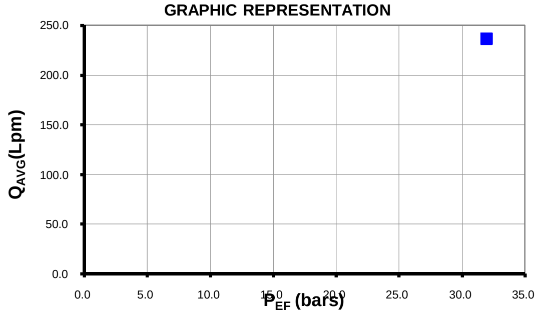
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 6.9E-05 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$

GRAPHIC REPRESENTATION



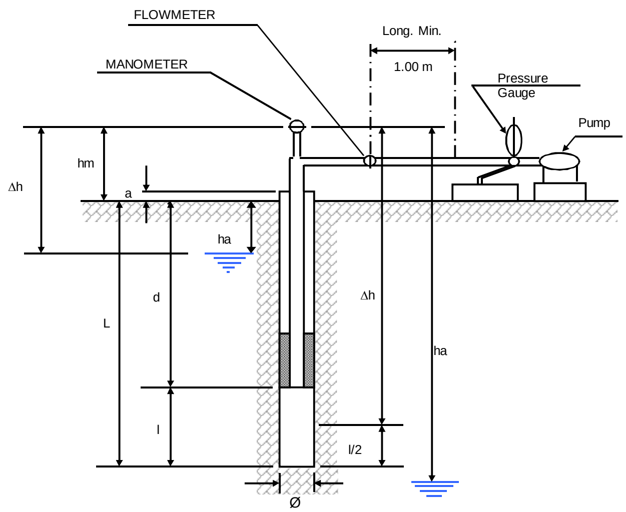
OBSERVATIONS:

VTR	GRB
Analysis	Check

Golder Associates Limited

WATER PRESSURE TEST
CONTACT - PRIOR TO INJECTION

HOLE Nº 60+195.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH** : 7.70	8.70 m.	**East. COORD:**
LOCATION: Meadowbank	**DATE:** 07/03/2009	**START:** 19:41 **FINISH:** 19:50	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 0:09	**GROUND LEVEL:**
	INTERVAL LITHOLOGY :		(m.s.n.m.)



hm	=	HEIGHT OF MANOMETER	1.15	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.00	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.15	m
d	=	TOP OF TEST INTERVAL	7.70	m
L	=	BOTTOM OF TEST INTERVAL	8.70	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.15	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	P_M =	1.02 Bars	$2/3P_M$ =	Bars	P_M =	Bars	$2/3P_M$ =	Bars	$1/3P_M$ =	Bars
TIMES MINUTES	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)	Q (L)	q (L/min)
0	7.9									
1	13.5	5.60								
2	18.5	5.00								
3	23.1	4.60								
4	27.9	4.80								
5	32.8	4.90								
6										
7										
8										
9										
10										
q t (l)		24.90		0.00		0.00		0.00		0.00
Qavg (l/min)		4.98		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.33		0.31		0.31		0.31		0.31
U L		37.5		0.0		0.0		0.0		0.0
K (m/sec)		1.1E-05		0.0E+00		0.0E+00		0.0E+00		0.0E+00

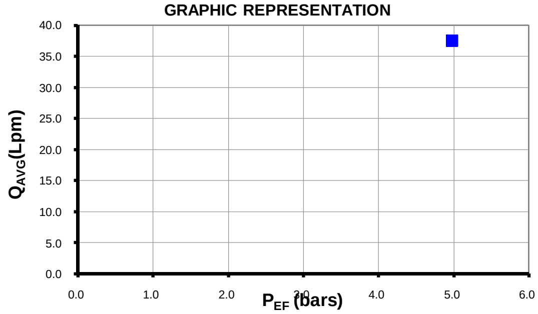
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 1.1E-05 **m/s**

$$P_{EF} = P_M - Δp + Δh / 10.197$$

GRAPHIC REPRESENTATION



OBSERVATIONS:

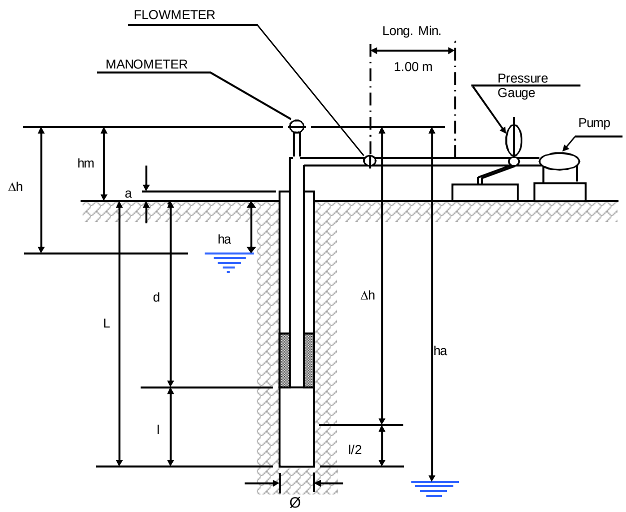
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
CONTACT - PRIOR TO INJECTION

HOLE Nº 60+207.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH** : 7.00	8.00 m.	**East. COORD:**
LOCATION: Meadowbank	**DATE:** 07/03/2009	**START:** 5:35 **FINISH:** 5:43	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 0:08	**GROUND LEVEL:** (m.s.n.m.)
	INTERVAL LITHOLOGY :		



hm	=	HEIGHT OF MANOMETER	1.15	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.00	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.15	m
d	=	TOP OF TEST INTERVAL	7.00	m
L	=	BOTTOM OF TEST INTERVAL	8.00	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.15	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	P_M = 1.02 Bars		2/3P_M = Bars		P_M = Bars		2/3P_M = Bars		1/3P_M = Bars	
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	27.3									
1	44.5	17.20								
2	62.5	18.00								
3	78.4	15.90								
4	96.9	18.50								
5	115.9	19.00								
6										
7										
8										
9										
10										
q t (l)		88.60		0.00		0.00		0.00		0.00
Qavg (l/min)		17.72		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.33		0.31		0.31		0.31		0.31
U L		133.3		0.0		0.0		0.0		0.0
K (m/sec)		3.9E-05		0.0E+00		0.0E+00		0.0E+00		0.0E+00

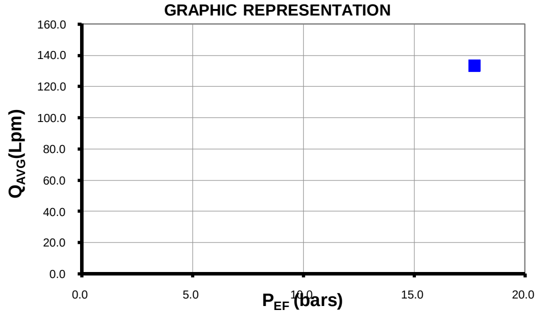
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 3.9E-05 **m/s**

$P_{EF} = P_M - Δp + Δh / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

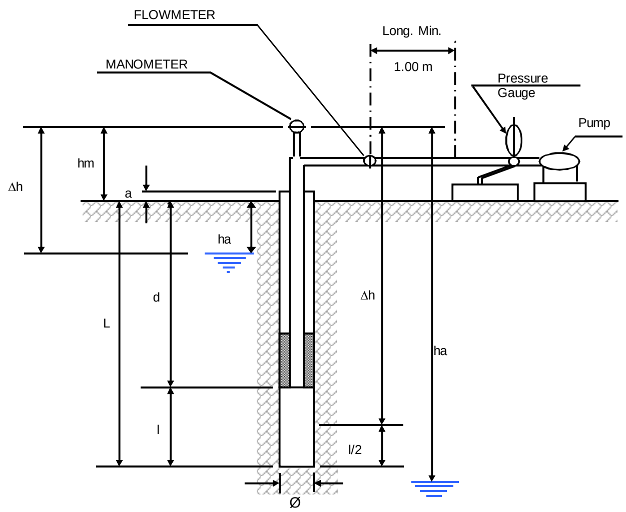
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
CONTACT - PRIOR TO INJECTION

HOLE Nº	60+342.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH** :	4.20 TO 5.20 m.	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:** 08/03/2009	**START:** 13:35 **FINISH:** 13:47	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 0:12	**GROUND LEVEL:** (m.s.n.m.)	
		INTERVAL LITHOLOGY :			



hm	=	HEIGHT OF MANOMETER	1.15	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.00	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.15	m
d	=	TOP OF TEST INTERVAL	4.20	m
L	=	BOTTOM OF TEST INTERVAL	5.20	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.15	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	P_M = 1.10 Bars		$2/3P_M$ = Bars		P_M = Bars		$2/3P_M$ = Bars		$1/3P_M$ = Bars	
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	7.5									
1	8.5	1.00								
2	8.6	0.10								
3	8.8	0.20								
4	8.9	0.10								
5	9.0	0.10								
6										
7										
8										
9										
10										
q t (l)		1.50		0.00		0.00		0.00		0.00
Qavg (l/min)		0.30		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.41		0.31		0.31		0.31		0.31
U L		2.1		0.0		0.0		0.0		0.0
K (m/sec)		6.2E-07		0.0E+00		0.0E+00		0.0E+00		0.0E+00

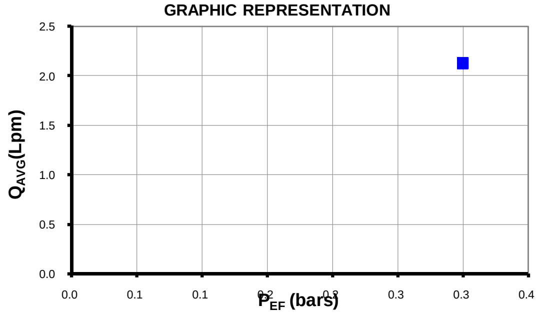
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 6.2E-07 **m/s**

$P_{EF} = P_M - Δp + Δh / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

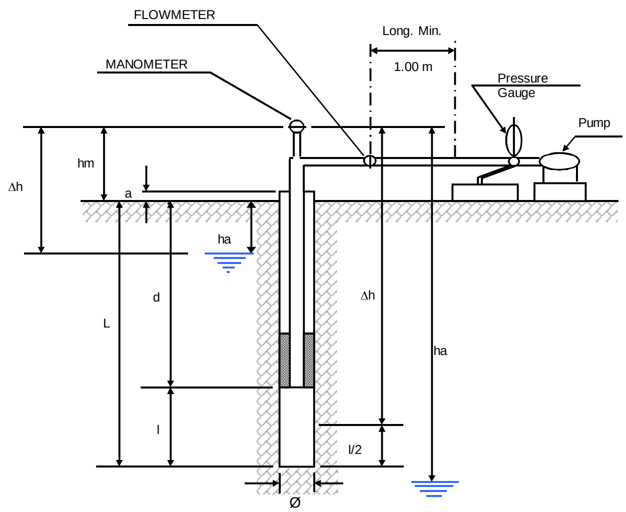
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
CONTACT - PRIOR TO INJECTION

HOLE Nº 60+357.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH** : 5.70	6.70 m.	**East. COORD:**
LOCATION: Meadowbank	**DATE:** 08/03/2009 **START:** 19:05	**FINISH:** 19:12	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 0:07	**GROUND LEVEL:**
	INTERVAL LITHOLOGY :		(m.s.n.m.)



hm	=	HEIGHT OF MANOMETER	1.15	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.00	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.15	m
d	=	TOP OF TEST INTERVAL	5.70	m
L	=	BOTTOM OF TEST INTERVAL	6.70	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.15	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	P_M = 1.04 Bars		$2/3P_M$ = Bars		P_M = Bars		$2/3P_M$ = Bars		$1/3P_M$ = Bars	
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	22.4									
1	29.8	7.40								
2	35.9	6.10								
3	42.3	6.40								
4	48.3	6.00								
5	54.2	5.90								
6										
7										
8										
9										
10										
q t (l)		31.80		0.00		0.00		0.00		0.00
Qavg (l/min)		6.36		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.35		0.31		0.31		0.31		0.31
U L		47.2		0.0		0.0		0.0		0.0
K (m/sec)		1.4E-05		0.0E+00		0.0E+00		0.0E+00		0.0E+00

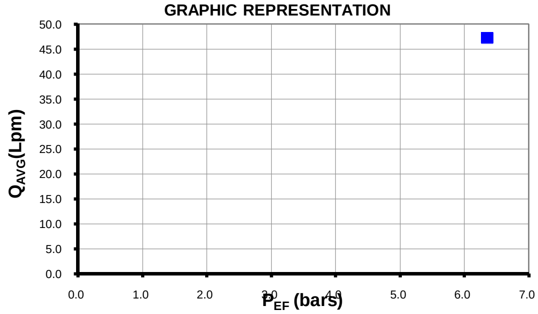
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 1.4E-05 **m/s**

$P_{EF} = P_M - Δp + Δh / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

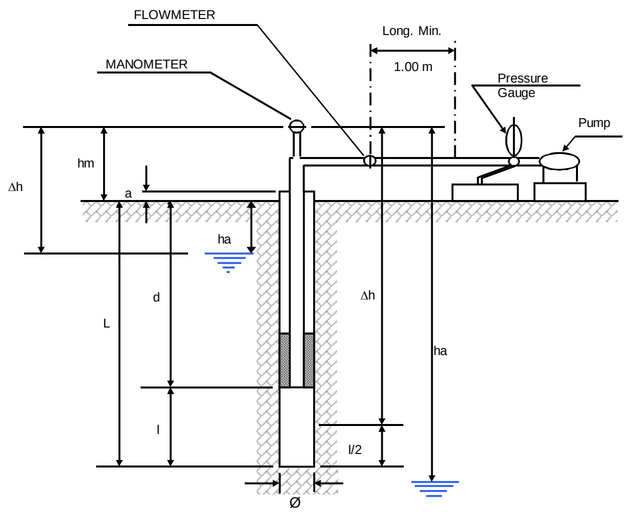
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
CONTACT - PRIOR TO INJECTION

HOLE Nº 60+372.5	**TEST Nº** 1		**North. COORD:**
PROJECT : East Dike Grouting	**TEST DEPTH** : 6.00	7.00 m.	**East. COORD:**
LOCATION: Meadowbank	**DATE:** 08/03/2009	**START:** 4:13 **FINISH:** 4:22	**INCLINATION:** 90
PROJECT Nº : 07-1413-0074 / 2200 / ****		**Minutes:** 0:09	**GROUND LEVEL:**
	INTERVAL LITHOLOGY :		(m.s.n.m.)



hm	=	HEIGHT OF MANOMETER	1.15	m
a	=	STICK-UP		m
ha	=	WATER TABLE DEPTH	2.00	m
Δh	=	HYDRAULIC PRESSURE HEAD	3.15	m
d	=	TOP OF TEST INTERVAL	6.00	m
L	=	BOTTOM OF TEST INTERVAL	7.00	m
α	=	INCLINATION wrt/ HORIZONTAL	90	°
Δh'	=	Δh CORRECTED = sin α x Δh	3.15	m
l	=	LENGTH OF TEST INTERVAL	1.00	m
Ø	=	HOLE DIAMETER	8.89	cm
P_M	=	MANOMETRIC PRESSURE		
P_{EF}	=	EFFECTIVE PRESSURE - MIDDLE OF THE TEST INTERVAL		
Δp	=	CALCULATED HEAD LOSS		
Q	=	CUMULATIVE VOLUME OF WATER - TAKEN EACH MINUTE DURING THE TEST		
Qt	=	TOTAL WATER VOLUME - CUMULATIVE AT THE END OF THE TEST		
q	=	AVERAGE FLOW - LITRES PER MINUTE		
Pent	=	PENETRABILITY - LITRES PER MINUTE PER METRE STAGE LENGTH		
uL	=	LUGEON UNIT (Q x 10 / P_{EF})		

	P_M =	1.03 Bars	$2/3P_M$ =	Bars	P_M =	Bars	$2/3P_M$ =	Bars	$1/3P_M$ =	Bars
TIMES MINUTES	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**	**Q (L)**	**q (L/min)**
0	16.4									
1	21.2	4.80								
2	30.7	9.50								
3	35.5	4.80								
4	36.3	0.80								
5	37.7	1.40								
6										
7										
8										
9										
10										
q t (l)		21.30		0.00		0.00		0.00		0.00
Qavg (l/min)		4.26		0.00		0.00		0.00		0.00
Δp (bar)										
P_{EF} (bar)		1.34		0.31		0.31		0.31		0.31
U L		31.9		0.0		0.0		0.0		0.0
K (m/sec)		9.3E-06		0.0E+00		0.0E+00		0.0E+00		0.0E+00

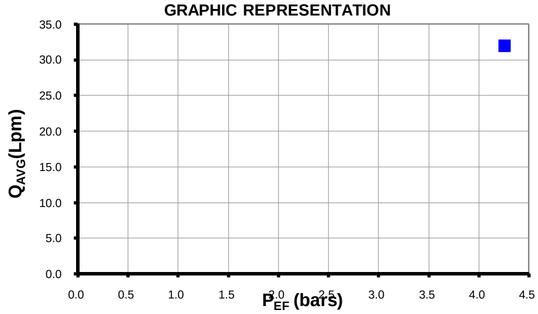
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 9.3E-06 **m/s**

$P_{EF} = P_M - Δp + Δh / 10.197$

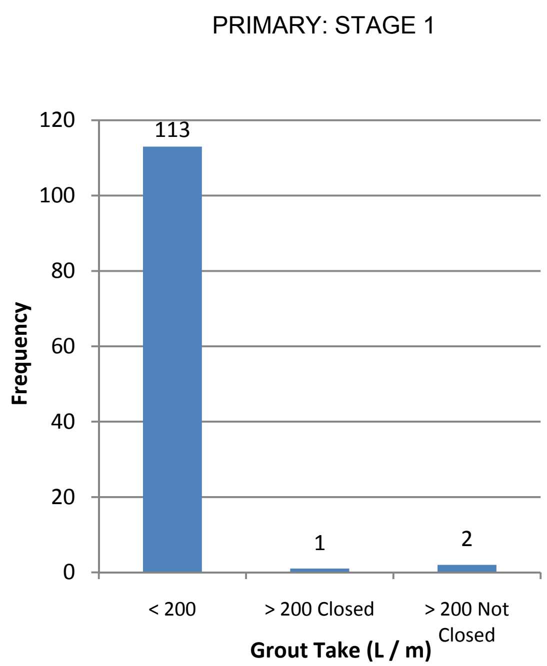
GRAPHIC REPRESENTATION

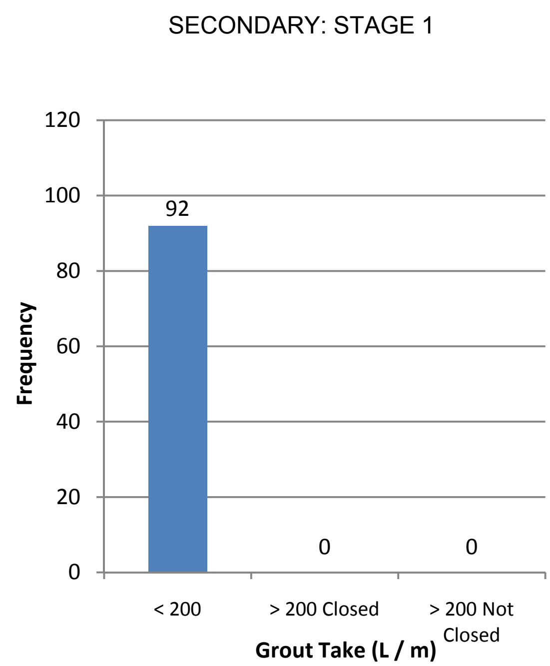


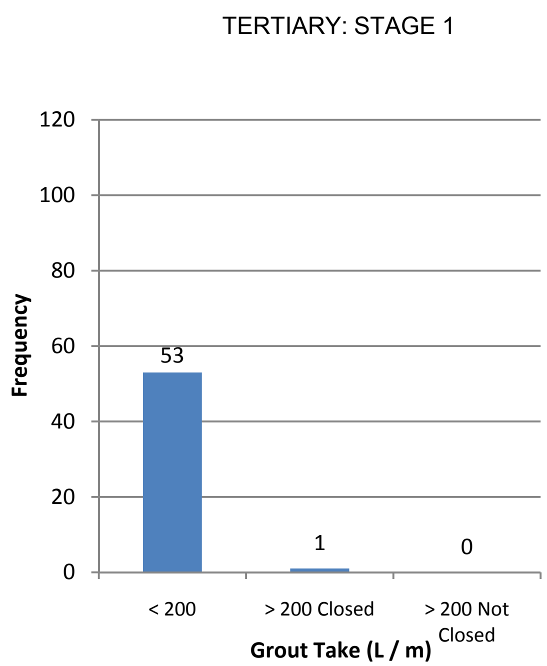
OBSERVATIONS:

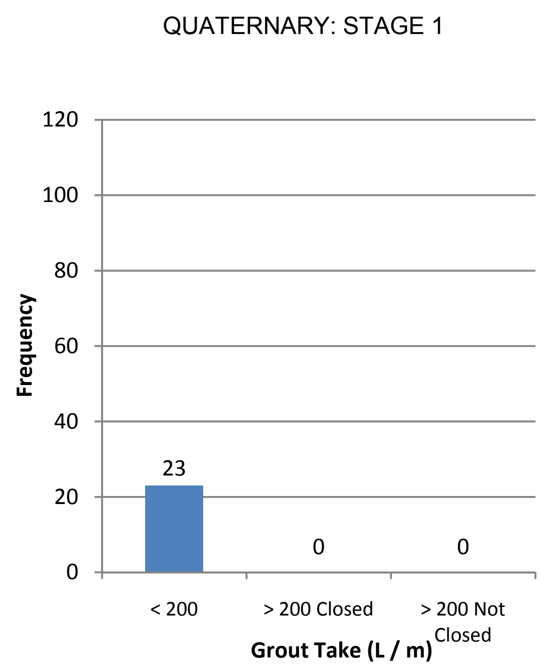
VTR
Analysis

GRB
Check









NOTES:

1) Closure criteria for Stages 1 and 2:
   Penetrability $\leq$ 0.1 L/min/m/bar @ P_{max}

2) Closure criteria for Stages 3, 4 and 5:
   $P_{Final} \geq 0.8\ P_{max}$

3) Two Stage 1's had takes of < 200 L/m but were injected in combination with Stages 2 and 3 due to rods lost down hole. For the purposes of this comparison, these stages were considered to be NOT CLOSED and have been included in the count of not closed > 200 L/m stages.

PROJECT: AEM — AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

GROUND IMPROVEMENT ACHIEVED
EAST DIKE - STAGE 1

Golder Associates

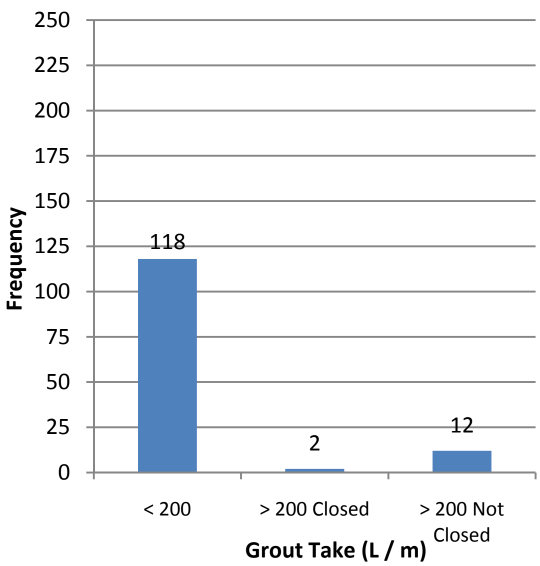
PROJECT No.	07-1413-0074	
DESIGN	GRB	21MAY09
CADD	RCHU	21MAY09
CHECK	GRB	21MAY09
REVIEW		

PHASE / TASK No.
SCALE NTS
REV.

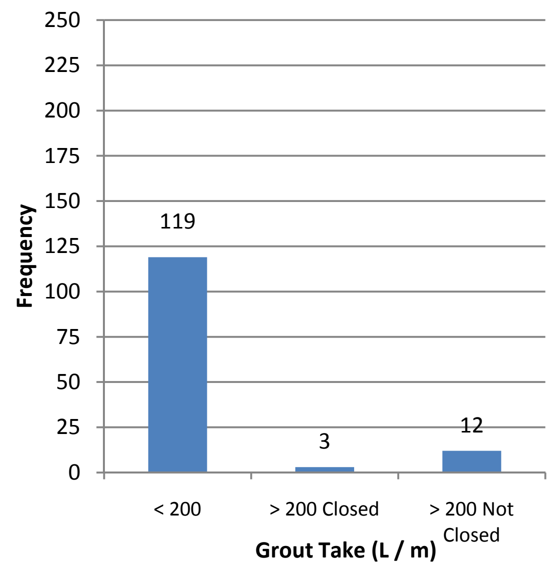
FIGURE E6-1

REVISION DATE: 21 / 05 / 09 BY: RCHU FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Appendix E - East Dike Grouting\E6 - Ground Improvement Achieved\Figure E6-1-4.ppt

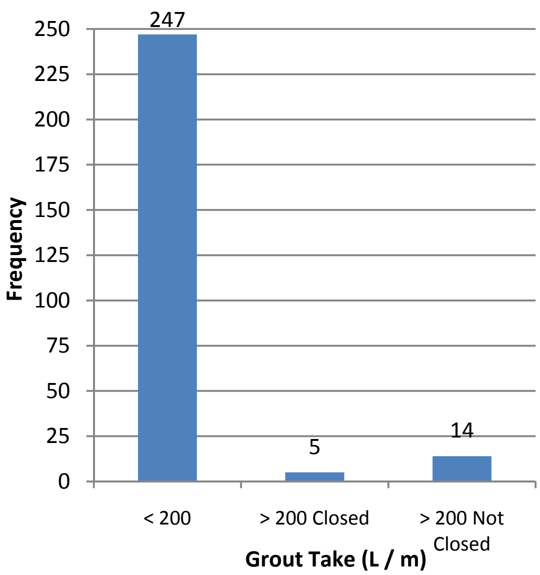
PRIMARY: STAGE 2



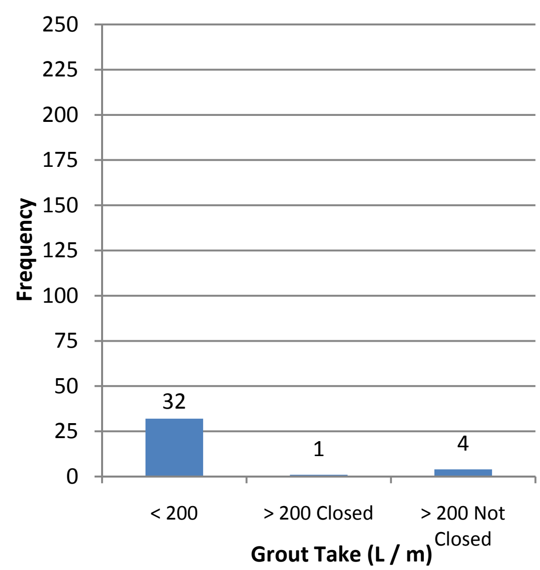
SECONDARY: STAGE 2



TERTIARY: STAGE 2



QUATERNARY: STAGE 2



NOTES:

1) Closure criteria for Stages 1 and 2:
   Penetrability $\leq$ 0.1 L/min/m/bar @ P_{max}

2) Closure criteria for Stages 3, 4 and 5:
   $P_{Final} \geq 0.8\ P_{max}$

3) Two secondary and two tertiary Stage 2's had takes of < 200 L/m but during injection, grout by-passed the upper packer. In addition, three primary Stage 2's had takes of < 200 L/m but were grouted in combination with Stages 1 and 2 due either to rods lost down hole or ice build up. For the purposes of this comparison, all of these stages were considered to be NOT CLOSED and have been included in the count of not closed > 200 L/m stages.

PROJECT	AEM	AGNICO-EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT

TITLE

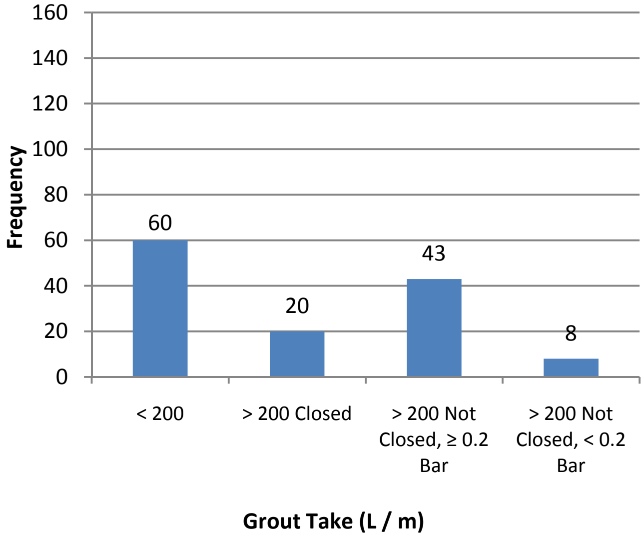
GROUND IMPROVEMENT ACHIEVED
EAST DIKE - STAGE 2

Golder Associates

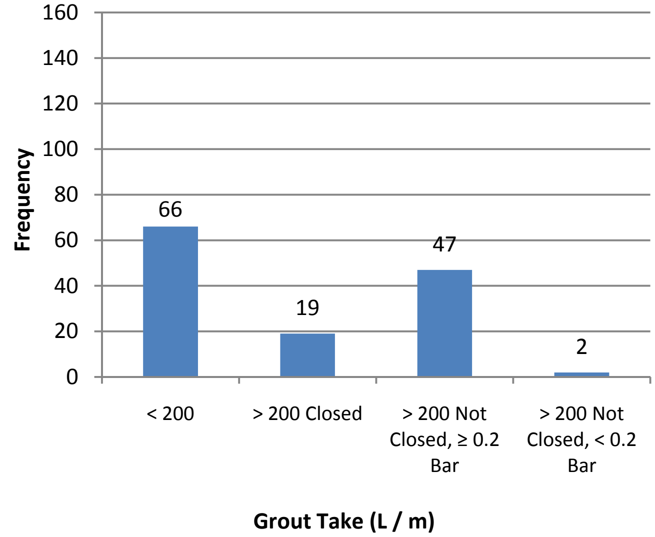
PROJECT No.	07-1413-0074		PHASE / TASK No.	
DESIGN	GRB	21MAY09	SCALE NTS	REV.
CADD	RCHU	21MAY09	FIGURE E6-2	
CHECK	GRB	21MAY09		
REVIEW				

REVISION DATE: 21 / 05 / 09 BY: RCHU FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Appendix E - East Dike Grouting\E6 - Ground Improvement Achieved\Figure E6-1-4.ppt

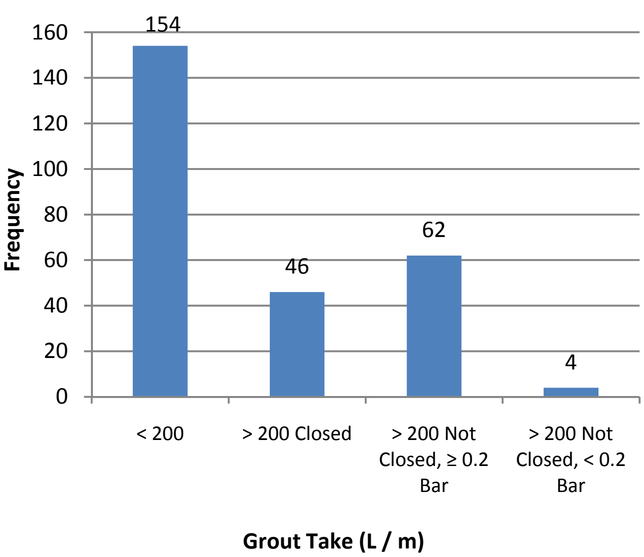
PRIMARY: STAGE 3



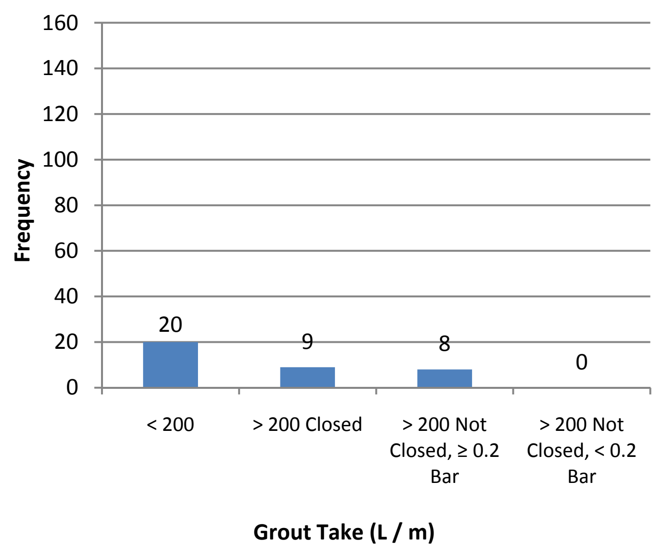
SECONDARY: STAGE 3



TERTIARY: STAGE 3



QUATERNARY: STAGE 3



NOTES:

1) Closure criteria for Stages 1 and 2:
Penetrability ≤ 0.1 L/min/m/bar @ P_{max}

2) Closure criteria for Stages 3, 4 and 5:
$P_{Final} \geq 0.8\ P_{max}$

3) One secondary Stage 3, which had a take of < 200 L/m, communicated with an adjacent grout hole during injection. In addition, three primary Stage 3's had takes of < 200 L/m but were grouted in combination with Stages 1 and 2 due either to lost rods down hole or ice build up. For the purposes of this comparison, all of these stages were considered to be NOT CLOSED and have been included in the count of not closed > 200 L/m stages with a pressure of > 0.2 bar.

PROJECT: AEM — AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

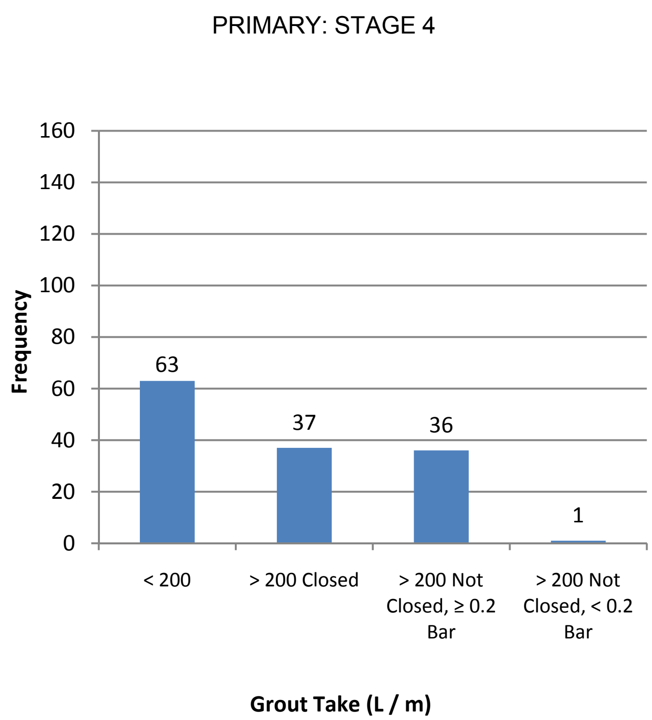
TITLE

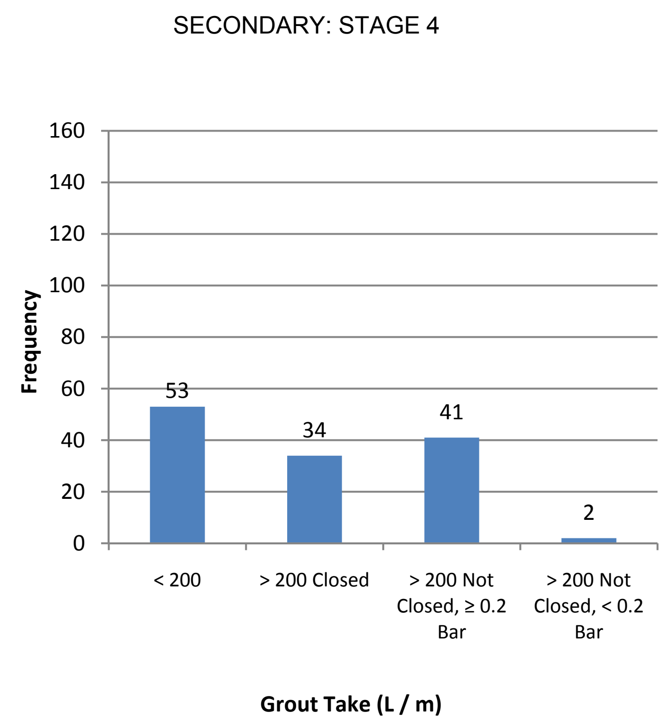
GROUND IMPROVEMENT ACHIEVED
EAST DIKE - STAGE 3

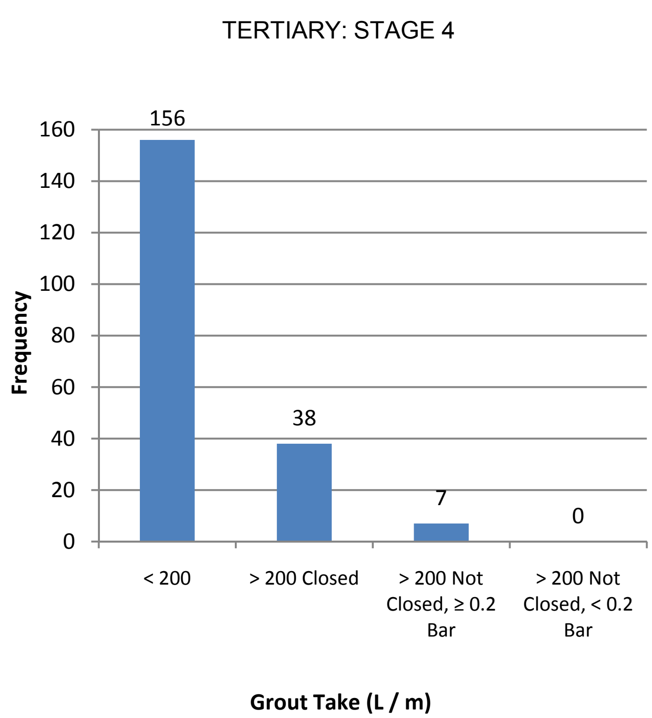
Golder Associates

PROJECT No.	07-1413-0074		PHASE / TASK No.	
DESIGN	GRB	21MAY09	SCALE NTS	REV.
CADD	RCHU	21MAY09		
CHECK	GRB	21MAY09	**FIGURE E6-3**	
REVIEW				

REVISION DATE: 21 / 05 / 09 BY: RCHU FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Appendix E - East Dike Grouting\E6 - Ground Improvement Achieved\Figure E6-1-4.ppt







NOTES:

1) Closure criteria for Stages 1 and 2:
Penetrability ≤ 0.1 L/min/m/bar @ P_{max}

2) Closure criteria for Stages 3, 4 and 5:
$P_{Final} \geq 0.8\ P_{max}$

3) Three primary and three secondary Stage 4's, which had takes of < 200 L/m, communicated with adjacent grout holes during injection. For the purposes of this comparison, all of these stages were considered to be NOT CLOSED and have been included in the count of not closed > 200 L/m stages with a pressure of > 0.2 bar.

PROJECT
AEM
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

GROUND IMPROVEMENT ACHIEVED
EAST DIKE - STAGE 4

Golder Associates

PROJECT No.	07-1413-0074	PHASE / TASK No.	
DESIGN	GRB	21MAY09	SCALE NTS	REV.
CADD	RCHU	21MAY09	
CHECK	GRB	21MAY09	
REVIEW			

FIGURE E6-4

REVISION DATE: 21 / 05 / 09 BY: RCHU FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Appendix E - East Dike Grouting\E6 - Ground Improvement Achieved\Figure E6-1-4.ppt

APPENDIX F

Instrumentation
-Vibrating Wire Pressure Transducer Calibration Record Sheets
-Vibrating Wire Pressure Transducer Plots - August 2009
-Thermistor Data Plots - April to August 2009
-Inclinometer Cumulative and Incremental Displacement Plots – June to July 2009

Calibration Record

200 - 2050 Hartley Ave., Coquitlam, British Columbia, Canada V3K 6W5
Tel: 604.540.1100 • Fax: 604.540.1005 • Toll Free: 1.800.665.5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**P-150**
Serial Number:		VW10722
Mfg Number:		09-1606
Range:		350.0 kPa
Date of Calibration:		30-Jan-09
Temperature:		23.3 °C
Barometric Pressure:		987 millibars
W.O. Number:		Q011656
Cable Length:		68 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8929	0.0	8930	0.0	8930	0.7	0.21	0.01
70.0	8297	70.0	8297	70.0	8297	69.9	-0.03	0.00
140.0	7663	140.0	7663	140.0	7663	139.2	-0.23	-0.07
210.0	7019	210.0	7019	210.0	7019	209.6	-0.10	0.05
280.0	6376	280.0	6376	280.0	6376	279.9	-0.02	0.03
350.0	5730	350.0	5730	350.0	5730	350.6	0.17	-0.02
						Max. Error (%):	0.23	0.07

Linear Calibration Factor:	C.F.=	**0.10935** kPa/B unit
Regression Zero:	At Calibration Bi =	**8936.1** B unit
Temperature Correction Factor:	Tk =	**0.0559** kPa/°C rise

Polynomial Gage Factors (kPa) A: -4.9323E-07 B: -0.10212 C: 951.26

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	3-Feb-09	8920	24.3	990.9
Shipped Zero Readings:	24-Feb-09	8921	19.8	1008.2

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 24-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 A.C. AL CULLEY AScT

Document Number.: ELL0130I

MIG0106A

INSTRUMENTS

Calibration Record

200 - 2050 Hartley Ave., Coquitlam, British Columbia, Canada V3K 6W5
Tel: 604.540.1100 • Fax: 604.540.1005 • Toll Free: 1.800.665.5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**P-240**
Serial Number:		VW10723
Mfg Number:		09-1607
Range:		350.0 kPa
Date of Calibration:		30-Jan-09
Temperature:		23.3 °C
Barometric Pressure:		987 millibars
W.O. Number:		Q011656
Cable Length:		77 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8723	0.0	8723	0.0	8723	0.6	0.17	0.02
70.0	8068	70.0	8068	70.0	8068	69.9	-0.04	-0.01
140.0	7411	140.0	7411	140.0	7411	139.4	-0.18	-0.06
210.0	6745	210.0	6746	210.0	6746	209.8	-0.07	0.05
280.0	6082	280.0	6082	280.0	6082	279.9	-0.01	0.02
350.0	5415	350.0	5416	350.0	5416	350.5	0.13	-0.02
						Max. Error (%):	0.18	0.06

Linear Calibration Factor:	**C.F.=**	**0.10578 kPa/B unit**
Regression Zero:	**At Calibration Bi =**	**8728.5** B unit
Temperature Correction Factor:	**Tk =**	**0.0333 kPa/°C rise**

Polynomial Gage Factors (kPa) A: -3.6019E-07 B: -0.10069 C: 905.76

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	3-Feb-09	8709	24.3	990.9
Shipped Zero Readings:	24-Feb-09	8722	19.9	1008.2

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 24-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia
22724
A.C.
AL CULLEY
AScT

Document Number.: ELL0130I

MIG0106A

Calibration Record

200 - 2050 Hartley Ave., Coquitlam, British Columbia, Canada V3K 6W5
Tel: 604.540.1100 • Fax: 604.540.1005 • Toll Free: 1.800.665.5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**P-400**
Serial Number:		VW10724
Mfg Number:		09-1608
Range:		350.0 kPa
Date of Calibration:		30-Jan-09
Temperature:		23.3 °C
Barometric Pressure:		987 millibars
W.O. Number:		Q011656
Cable Length:		123 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8705	0.0	8706	0.0	8706	0.7	0.20	0.01
70.0	8091	70.0	8091	70.0	8091	69.9	-0.04	-0.01
140.0	7474	140.0	7474	140.0	7474	139.3	-0.20	-0.05
210.0	6849	210.0	6849	210.0	6849	209.7	-0.10	0.05
280.0	6225	280.0	6225	280.0	6225	279.9	-0.03	0.01
350.0	5597	350.0	5597	350.0	5597	350.6	0.17	-0.02
						Max. Error (%):	0.20	0.05

Linear Calibration Factor:	C.F.=	0.11256 kPa/B unit
Regression Zero:	At Calibration Bi =	8711.6 B unit
Temperature Correction Factor:	Tk =	0.0131 kPa/°C rise

Polynomial Gage Factors (kPa) A: -4.9636E-07 B: -0.10546 C: 955.77

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	3-Feb-09	8695	24.5	990.9
Shipped Zero Readings:	24-Feb-09	8691	20.0	1008.2

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 24-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 A.C. AL CULLEY AScT

Document Number.: ELL0130I

MIG0106A

rst INSTRUMENTS

Calibration Record

200 - 2050 Hartley Ave., Coquitlam, British Columbia, Canada V3K 6W5
Tel: 604.540.1100 • Fax: 604.540.1005 • Toll Free: 1.800.665.5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**P-450**
Serial Number:		VW10725
Mfg Number:		09-1609
Range:		350.0 kPa
Date of Calibration:		30-Jan-09
Temperature:		23.3 °C
Barometric Pressure:		987 millibars
W.O. Number:		Q011656
Cable Length:		69 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8831	0.0	8832	0.0	8832	0.3	0.08	0.01
70.0	8155	70.0	8156	70.0	8156	69.8	-0.05	-0.04
140.0	7473	140.0	7474	140.0	7474	140.0	-0.01	0.04
210.0	6795	210.0	6795	210.0	6795	209.8	-0.07	-0.01
280.0	6113	280.0	6113	280.0	6113	279.9	-0.02	-0.01
350.0	5429	350.0	5430	350.0	5430	350.2	0.07	0.00
						Max. Error (%):	0.08	0.04

Linear Calibration Factor:	**C.F.=**	**0.10287 kPa/B unit**
Regression Zero:	**At Calibration Bi =**	**8834.1** B unit
Temperature Correction Factor:	**Tk =**	**-0.0691 kPa/°C rise**

Polynomial Gage Factors (kPa) A: -1.4870E-07 B: -0.10075 C: 901.42

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	3-Feb-09	8814	24.4	990.9
Shipped Zero Readings:	24-Feb-09	8819	19.9	1008.2

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 24-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 A.C. AL CULLEY AScT

Document Number.: ELL0130I

MIG0106A

Calibration Record

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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**P-550**
Serial Number:		VW10726
Mfg Number:		09-1610
Range:		350.0 kPa
Date of Calibration:		30-Jan-09
Temperature:		23.3 °C
Barometric Pressure:		987 millibars
W.O. Number:		Q011656
Cable Length:		87 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8900	0.0	8900	0.0	8900	0.4	0.10	-0.04
70.0	8271	70.0	8271	70.0	8271	70.1	0.04	0.07
140.0	7645	140.0	7645	140.0	7645	139.6	-0.12	0.00
210.0	7015	210.0	7015	210.0	7015	209.5	-0.14	-0.03
280.0	6381	280.0	6381	280.0	6381	279.8	-0.05	-0.02
350.0	5743	350.0	5744	350.0	5744	350.6	0.16	0.02
						Max. Error (%):	0.16	0.07

Linear Calibration Factor:	C.F.=	0.11095 kPa/B unit
Regression Zero:	At Calibration Bi =	8903.2 B unit
Temperature Correction Factor:	Tk =	0.0786 kPa/°C rise

Polynomial Gage Factors (kPa) A: -3.7058E-07 B: -0.10552 C: 968.35

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	3-Feb-09	8886	24.3	990.9
Shipped Zero Readings:	24-Feb-09	8890	19.8	1008.2

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 24-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

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Document Number.: ELL0130I

MIG0106A

Calibration Record

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Tel: 604.540.1100 • Fax: 604.540.1005 • Toll Free: 1.800.665.5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**P-600**
Serial Number:		VW10727
Mfg Number:		09-1611
Range:		350.0 kPa
Date of Calibration:		30-Jan-09
Temperature:		23.3 °C
Barometric Pressure:		987 millibars
W.O. Number:		Q011656
Cable Length:		132 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8921	0.0	8921	0.0	8921	0.5	0.15	0.00
70.0	8316	70.0	8316	70.0	8316	69.8	-0.05	-0.02
140.0	7706	140.0	7706	140.0	7706	139.7	-0.08	0.04
210.0	7097	210.0	7097	210.0	7097	209.5	-0.15	-0.02
280.0	6483	280.0	6483	280.0	6483	279.8	-0.05	-0.02
350.0	5866	350.0	5865	350.0	5866	350.6	0.16	0.01
						Max. Error (%):	0.16	0.04

Linear Calibration Factor:	**C.F.=**	**0.11456 kPa/B unit**
Regression Zero:	**At Calibration Bi =**	**8925.6** B unit
Temperature Correction Factor:	**Tk =**	**0.0359 kPa/°C rise**

Polynomial Gage Factors (kPa) A: -4.3014E-07 B: -0.10820 C: 999.50

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	3-Feb-09	8907	24.5	990.9
Shipped Zero Readings:	24-Feb-09	8910	19.9	1008.2

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 24-Feb-09

Applied Science Technologists and Technicians of British Columbia
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This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

RST INSTRUMENTS

Calibration Record

200 - 2050 Hartley Ave., Coquitlam, British Columbia, Canada V3K 6W5
Tel: 604.540.1100 • Fax: 604.540.1005 • Toll Free: 1.800.665.5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**P-650**
Serial Number:		VW10728
Mfg Number:		09-1612
Range:		350.0 kPa
Date of Calibration:		30-Jan-09
Temperature:		23.3 °C
Barometric Pressure:		987 millibars
W.O. Number:		Q011656
Cable Length:		77 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8794	0.0	8794	0.0	8794	0.6	0.16	-0.01
70.0	8180	70.0	8180	70.0	8180	70.0	-0.01	0.02
140.0	7565	140.0	7565	140.0	7565	139.5	-0.16	-0.02
210.0	6945	210.0	6945	210.0	6945	209.5	-0.14	0.00
280.0	6322	280.0	6322	280.0	6322	279.9	-0.02	0.02
350.0	5697	350.0	5697	350.0	5697	350.6	0.16	-0.01
						Max. Error (%):	0.16	0.02

Linear Calibration Factor:	C.F.=	**0.11301** kPa/B unit
Regression Zero:	At Calibration Bi =	**8799.0** B unit
Temperature Correction Factor:	Tk =	**-0.0092** kPa/°C rise

Polynomial Gage Factors (kPa) A: -4.5761E-07 B: -0.10638 C: 970.88

Pressure is calculated with the following equations:

Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]

Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	3-Feb-09	8780	24.1	990.9
Shipped Zero Readings:	24-Feb-09	8775	19.8	1008.2

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 24-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 A.C. AL CULLEY AScT

Document Number.: ELL0130I

MIG0106A

Calibration Record

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Tel: 604.540.1100 • Fax: 604.540.1005 • Toll Free: 1.800.665.5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**P-750**
Serial Number:		VW10729
Mfg Number:		09-1613
Range:		350.0 kPa
Date of Calibration:		30-Jan-09
Temperature:		23.3 °C
Barometric Pressure:		987 millibars
W.O. Number:		Q011656
Cable Length:		77 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8784	0.0	8784	0.0	8784	0.8	0.24	0.03
70.0	8201	70.0	8202	70.0	8202	69.7	-0.10	-0.06
140.0	7611	140.0	7612	140.0	7612	139.4	-0.18	-0.01
210.0	7018	210.0	7018	210.0	7018	209.5	-0.14	0.03
280.0	6422	280.0	6422	280.0	6422	280.0	-0.01	0.03
350.0	5824	350.0	5824	350.0	5824	350.6	0.18	-0.03
						Max. Error (%):	0.24	0.06

Linear Calibration Factor:	C.F.=	**0.11817** kPa/B unit
Regression Zero:	At Calibration Bi =	**8791.0** B unit
Temperature Correction Factor:	Tk =	**0.0603** kPa/°C rise

Polynomial Gage Factors (kPa) A: -6.1032E-07 B: -0.10926 C: 1006.9

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	3-Feb-09	8769	24.3	990.9
Shipped Zero Readings:	24-Feb-09	8772	19.9	1008.2

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 24-Feb-09

Applied Science Technologists and Technicians of British Columbia 22724 A.C. AL CULLEY AScT

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Calibration Record

200 - 2050 Hartley Ave., Coquitlam, British Columbia, Canada V3K 6W5
Tel: 604.540.1100 • Fax: 604.540.1005 • Toll Free: 1.800.665.5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**SP-1**
Serial Number:		VW10730
Mfg Number:		09-1640
Range:		350.0 kPa
Date of Calibration:		2-Feb-09
Temperature:		22.7 °C
Barometric Pressure:		991.6 millibars
W.O. Number:		Q011656
Cable Length:		50 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8576	0.0	8577	0.0	8577	0.8	0.24	0.02
70.0	7953	70.0	7953	70.0	7953	69.8	-0.06	-0.02
140.0	7325	140.0	7325	140.0	7325	139.2	-0.23	-0.05
210.0	6688	210.0	6689	210.0	6689	209.6	-0.13	0.05
280.0	6052	280.0	6052	280.0	6052	279.9	-0.02	0.03
350.0	5412	350.0	5412	350.0	5412	350.7	0.19	-0.03
						Max. Error (%):	0.24	0.05

Linear Calibration Factor:	**C.F.=**	**0.11055** **kPa/B unit**
Regression Zero:	**At Calibration Bi =**	**8584.2** B unit
Temperature Correction Factor:	**Tk =**	**-0.0396** **kPa/°C rise**

Polynomial Gage Factors (kPa) A: -5.7358E-07 B: -0.10252 C: 921.57

Pressure is calculated with the following equations:
Linear, $P(kPa) = C.F. \times (Li - Lc) - [Tk(Ti - Tc)] + [0.10(Bi - Bc)]$
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	3-Feb-09	8569	24.8	990.9
Shipped Zero Readings:	24-Feb-09	8567	19.7	1008.2

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = $Hz^2 / 1000$ ie: 1700Hz = 2890 B units

Technician: C. Byerley *CB* Date: 24-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 *A.C.* AL CULLEY AScT

Document Number.: ELL0130I

rst INSTRUMENTS

Calibration Record

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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**SP-2**
Serial Number:		VW10731
Mfg Number:		09-1641
Range:		350.0 kPa
Date of Calibration:		2-Feb-09
Temperature:		22.7 °C
Barometric Pressure:		991.6 millibars
W.O. Number:		Q011656
Cable Length:		50 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8584	0.0	8584	0.0	8584	0.7	0.19	0.01
70.0	7950	70.0	7950	70.0	7950	69.8	-0.07	-0.03
140.0	7309	140.0	7310	140.0	7310	139.6	-0.11	0.03
210.0	6668	210.0	6669	210.0	6669	209.5	-0.15	0.00
280.0	6023	280.0	6023	280.0	6023	279.9	-0.04	0.00
350.0	5374	350.0	5374	350.0	5374	350.6	0.18	0.00
						Max. Error (%):	0.19	0.03

Linear Calibration Factor:	**C.F.=**	**0.10902 kPa/B unit**
Regression Zero:	**At Calibration Bi =**	**8590.0** B unit
Temperature Correction Factor:	**Tk =**	**0.0039 kPa/°C rise**

Polynomial Gage Factors (kPa) A: -4.4860E-07 B: -0.10276 C: 915.19

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	3-Feb-09	8574	24.6	990.9
Shipped Zero Readings:	24-Feb-09	8571	19.8	1008.2

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 24-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia
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INSTRUMENTS

Calibration Record

200 - 2050 Hartley Ave., Coquitlam, British Columbia, Canada V3K 6W5
Tel: 604.540.1100 • Fax: 604.540.1005 • Toll Free: 1.800.665.5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**SP-3**
Serial Number:		VW10732
Mfg Number:		09-1642
Range:		350.0 kPa
Date of Calibration:		2-Feb-09
Temperature:		22.7 °C
Barometric Pressure:		991.6 millibars
W.O. Number:		Q011656
Cable Length:		50 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8757	0.0	8757	0.0	8757	0.3	0.08	-0.01
70.0	8094	70.0	8095	70.0	8095	70.1	0.03	0.05
140.0	7436	140.0	7436	140.0	7436	139.5	-0.14	-0.07
210.0	6769	210.0	6769	210.0	6769	209.8	-0.06	0.02
280.0	6103	280.0	6103	280.0	6103	280.0	0.00	0.02
350.0	5436	350.0	5436	350.0	5436	350.3	0.08	-0.01
						Max. Error (%):	0.14	0.07

Linear Calibration Factor:	**C.F.=**	**0.10539 kPa/B unit**
Regression Zero:	**At Calibration Bi =**	**8759.7** B unit
Temperature Correction Factor:	**Tk =**	**-0.1103 kPa/°C rise**

Polynomial Gage Factors (kPa) A: -2.2386E-07 B: -0.10221 C: 912.22

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	3-Feb-09	8746	24.9	990.9
Shipped Zero Readings:	24-Feb-09	8751	20.0	1008.2

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley *CB* Date: 24-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 *A.C.* AL CULLEY ASCT

Document Number.: ELL0130I

MIG0106A

Calibration Record

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Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**1-P-1-1**
Serial Number:		VW10698
Mfg Number:		08-27670
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23.1 °C
Barometric Pressure:		1003.7 millibars
W.O. Number:		Q011656
Cable Length:		49 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8786	0.0	8786	0.0	8786	0.6	0.17	0.01
70.0	8190	70.0	8190	70.0	8190	69.8	-0.04	-0.01
140.0	7590	140.0	7590	140.0	7590	139.6	-0.12	0.01
210.0	6988	210.0	6988	210.0	6988	209.5	-0.13	0.00
280.0	6382	280.0	6383	280.0	6383	279.9	-0.03	0.01
350.0	5774	350.0	5775	350.0	5775	350.6	0.16	0.00
						Max. Error (%):	0.17	0.01

Linear Calibration Factor:	C.F.=	**0.11621** kPa/B unit
Regression Zero:	At Calibration Bi =	**8791.0** B unit
Temperature Correction Factor:	Tk =	**0.0186** kPa/°C rise

Polynomial Gage Factors (kPa) A: -4.6900E-07 B: -0.10938 C: 997.26

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8794	24.9	985.5
Shipped Zero Readings:	23-Feb-09	8771	19.2	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 AC AL CULLEY AScT

Document Number.: ELL0130I

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Calibration Record

200 - 2050 Hartley Ave., Coquitlam, British Columbia, Canada V3K 6W5
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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**1-P-1-2**
Serial Number:		VW10699
Mfg Number:		08-27814
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23.1 °C
Barometric Pressure:		1003.7 millibars
W.O. Number:		Q011656
Cable Length:		44 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8730	0.0	8731	0.0	8731	0.7	0.21	-0.01
70.0	8128	70.0	8129	70.0	8129	70.0	-0.01	0.03
140.0	7526	140.0	7526	140.0	7526	139.2	-0.22	-0.05
210.0	6915	210.0	6916	210.0	6916	209.4	-0.17	0.01
280.0	6302	280.0	6303	280.0	6303	279.9	-0.03	0.02
350.0	5686	350.0	5687	350.0	5687	350.7	0.21	-0.01
						Max. Error (%):	0.22	0.05

Linear Calibration Factor:	**C.F.=**	**0.11497 kPa/B unit**
Regression Zero:	**At Calibration Bi =**	**8737.0** B unit
Temperature Correction Factor:	**Tk =**	**0.0758 kPa/°C rise**

Polynomial Gage Factors (kPa) A: -6.2034E-07 B: -0.10603 C: 972.97

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8740	24.8	985.5
Shipped Zero Readings:	23-Feb-09	8741	19.3	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

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Calibration Record

200 - 2050 Hartley Ave., Coquitlam, British Columbia, Canada V3K 6W5
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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**1-P-1-3**
Serial Number:		VW10700
Mfg Number:		08-27815
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23.1 °C
Barometric Pressure:		1003.7 millibars
W.O. Number:		Q011656
Cable Length:		38 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8713	0.0	8713	0.0	8713	0.2	0.05	0.00
70.0	8080	70.0	8081	70.0	8081	69.9	-0.03	-0.02
140.0	7445	140.0	7445	140.0	7445	140.0	-0.01	0.03
210.0	6811	210.0	6811	210.0	6811	209.9	-0.04	0.00
280.0	6175	280.0	6176	280.0	6176	279.9	-0.02	-0.02
350.0	5538	350.0	5538	350.0	5538	350.2	0.05	0.01
						Max. Error (%):	0.05	0.03

Linear Calibration Factor:	**C.F.=**	**0.11024 kPa/B unit**
Regression Zero:	**At Calibration Bi =**	**8714.6 B unit**
Temperature Correction Factor:	**Tk =**	**0.0612 kPa/°C rise**

Polynomial Gage Factors (kPa) A: -1.2206E-07 B: -0.10850 C: 954.65

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8719	24.9	985.5
Shipped Zero Readings:	23-Feb-09	8712	19.1	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 A.C. AL CULLEY AScT

Document Number.: ELL0130I

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RST INSTRUMENTS

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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Calibration Record

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**1-P-2-1**
Serial Number:		VW10701
Mfg Number:		08-27816
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23.1 °C
Barometric Pressure:		1003.7 millibars
W.O. Number:		Q011656
Cable Length:		35 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8301	0.0	8301	0.0	8301	0.6	0.18	0.02
70.0	7670	70.0	7671	70.0	7671	69.8	-0.06	-0.03
140.0	7035	140.0	7035	140.0	7035	139.5	-0.14	-0.02
210.0	6395	210.0	6396	210.0	6396	209.6	-0.10	0.03
280.0	5754	280.0	5755	280.0	5755	280.0	-0.01	0.02
350.0	5111	350.0	5112	350.0	5112	350.5	0.14	-0.02
						Max. Error (%):	0.18	0.03

Linear Calibration Factor:	**C.F.=**	**0.10969 kPa/B unit**
Regression Zero:	**At Calibration Bi =**	**8306.7** B unit
Temperature Correction Factor:	**Tk =**	**-0.0507 kPa/°C rise**

Polynomial Gage Factors (kPa) A: -4.0642E-07 B: -0.10424 C: 893.38

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8306	24.8	985.5
Shipped Zero Readings:	23-Feb-09	8306	19.3	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 A.C. AL CULLEY AScT

Document Number.: ELL0130I

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RST INSTRUMENTS

Calibration Record

200 - 2050 Hartley Ave., Coquitlam, British Columbia, Canada V3K 6W5
Tel: 604.540.1100 • Fax: 604.540.1005 • Toll Free: 1.800.665.5599 (North America only)
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Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**1-P-2-2**
Serial Number:		VW10702
Mfg Number:		08-27817
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23.1 °C
Barometric Pressure:		1003.7 millibars
W.O. Number:		Q011656
Cable Length:		30 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8723	0.0	8723	0.0	8723	0.4	0.12	-0.04
70.0	8071	70.0	8072	70.0	8072	70.1	0.04	0.07
140.0	7423	140.0	7423	140.0	7423	139.5	-0.13	-0.01
210.0	6770	210.0	6771	210.0	6771	209.3	-0.19	-0.06
280.0	6110	280.0	6111	280.0	6111	280.0	-0.01	0.02
350.0	5450	350.0	5451	350.0	5451	350.6	0.16	0.00
						Max. Error (%):	0.19	0.07

Linear Calibration Factor:	C.F.=	**0.10699 kPa/B unit**
Regression Zero:	At Calibration Bi =	**8727.1** B unit
Temperature Correction Factor:	Tk =	**-0.0279 kPa/°C rise**

Polynomial Gage Factors (kPa) A: -3.9486E-07 B: -0.10140 C: 914.42

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8725	24.9	985.5
Shipped Zero Readings:	23-Feb-09	8717	19.5	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 A.C. AL CULLEY AScT

Document Number.: ELL0130I

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rst INSTRUMENTS

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Calibration Record

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**1-P-2-3**
Serial Number:		VW10703
Mfg Number:		08-27818
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23.1 °C
Barometric Pressure:		1003.7 millibars
W.O. Number:		Q011656
Cable Length:		24 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8908	0.0	8909	0.0	8909	0.5	0.15	0.01
70.0	8328	70.0	8328	70.0	8328	69.8	-0.05	-0.02
140.0	7743	140.0	7744	140.0	7744	139.6	-0.11	0.00
210.0	7157	210.0	7157	210.0	7157	209.7	-0.09	0.01
280.0	6569	280.0	6569	280.0	6569	279.9	-0.03	0.00
350.0	5978	350.0	5978	350.0	5978	350.5	0.13	0.00
						Max. Error (%):	0.15	0.02

Linear Calibration Factor:	C.F.=	**0.11942** kPa/B unit
Regression Zero:	At Calibration Bi =	**8912.8** B unit
Temperature Correction Factor:	Tk =	**0.0182** kPa/°C rise

Polynomial Gage Factors (kPa) A: **-4.1269E-07** B: **-0.11327** C: **1041.9**

Pressure is calculated with the following equations:
Linear, $P(kPa) = C.F. \times (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]$
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8920	25.5	985.5
Shipped Zero Readings:	23-Feb-09	8920	19.6	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = $Hz^2 / 1000$ ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia
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Document Number.: ELL0130I

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Calibration Record

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Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**1-P-3-1**
Serial Number:		VW10704
Mfg Number:		08-27819
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23.1 °C
Barometric Pressure:		1003.7 millibars
W.O. Number:		Q011656
Cable Length:		31 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8333	0.0	8333	0.0	8333	0.7	0.20	0.03
70.0	7694	70.0	7695	70.0	7695	69.7	-0.09	-0.06
140.0	7048	140.0	7048	140.0	7048	139.6	-0.13	0.01
210.0	6399	210.0	6400	210.0	6400	209.6	-0.10	0.03
280.0	5749	280.0	5750	280.0	5750	279.9	-0.04	0.00
350.0	5095	350.0	5096	350.0	5096	350.6	0.16	-0.01
						Max. Error (%):	0.20	0.06

Linear Calibration Factor:	**C.F.=**	**0.10807 kPa/B unit**
Regression Zero:	**At Calibration Bi =**	**8339.4** B unit
Temperature Correction Factor:	**Tk =**	**0.0049 kPa/°C rise**

Polynomial Gage Factors (kPa) A: -4.2070E-07 B: -0.10242 C: 882.75

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8339	24.9	985.5
Shipped Zero Readings:	23-Feb-09	8332	19.4	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 A.C. AL CULLEY AScT

Document Number.: ELL0130I

MIG0106A

Calibration Record

200 - 2050 Hartley Ave., Coquitlam, British Columbia, Canada V3K 6W5
Tel: 604.540.1100 • Fax: 604.540.1005 • Toll Free: 1.800.665.5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**1-P-3-2**
Serial Number:		VW10705
Mfg Number:		08-27820
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23.1 °C
Barometric Pressure:		1003.7 millibars
W.O. Number:		Q011656
Cable Length:		26 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8712	0.0	8713	0.0	8713	0.5	0.13	-0.01
70.0	8084	70.0	8084	70.0	8084	70.0	-0.01	0.02
140.0	7453	140.0	7454	140.0	7454	139.7	-0.09	0.02
210.0	6821	210.0	6823	210.0	6822	209.5	-0.14	-0.02
280.0	6186	280.0	6186	280.0	6186	279.8	-0.05	-0.02
350.0	5546	350.0	5547	350.0	5547	350.6	0.16	0.01
						Max. Error (%):	0.16	0.02

Linear Calibration Factor:	**C.F.=**	**0.11058 kPa/B unit**
Regression Zero:	**At Calibration Bi =**	**8716.6** B unit
Temperature Correction Factor:	**Tk =**	**-0.0174 kPa/°C rise**

Polynomial Gage Factors (kPa) A: -3.7945E-07 B: -0.10517 C: 945.05

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8718	24.9	985.5
Shipped Zero Readings:	23-Feb-09	8717	19.5	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 A.C. AL CULLEY AScT

RST INSTRUMENTS

Calibration Record

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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**2-P-1-1**
Serial Number:		VW10706
Mfg Number:		08-27946
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23 °C
Barometric Pressure:		1002.3 millibars
W.O. Number:		Q011656
Cable Length:		53 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8625	0.0	8626	0.0	8626	0.5	0.15	-0.05
70.0	8073	70.0	8073	70.0	8073	70.1	0.03	0.07
140.0	7522	140.0	7521	140.0	7522	139.6	-0.13	0.03
210.0	6969	210.0	6968	210.0	6969	209.2	-0.23	-0.07
280.0	6408	280.0	6408	280.0	6408	279.8	-0.06	-0.02
350.0	5844	350.0	5844	350.0	5844	350.8	0.23	0.03
						Max. Error (%):	0.23	0.07

Linear Calibration Factor:	C.F.=	**0.12593 kPa/B unit**
Regression Zero:	At Calibration Bi =	**8629.8** B unit
Temperature Correction Factor:	Tk =	**-0.0064 kPa/°C rise**

Polynomial Gage Factors (kPa) A: -6.8017E-07 B: -0.11608 C: 1051.7

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8626	25.0	985.5
Shipped Zero Readings:	23-Feb-09	8628	19.5	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 A.C. AL CULLEY ASCT

Document Number.: ELL0130I

MIG0106A

Calibration Record

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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**2-P-1-2**
Serial Number:		VW10707
Mfg Number:		08-27947
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23 °C
Barometric Pressure:		1002.3 millibars
W.O. Number:		Q011656
Cable Length:		48 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8781	0.0	8778	0.0	8780	0.6	0.18	0.00
70.0	8212	70.0	8212	70.0	8212	69.9	-0.02	0.01
140.0	7643	140.0	7643	140.0	7643	139.4	-0.17	-0.03
210.0	7069	210.0	7069	210.0	7069	209.5	-0.14	0.00
280.0	6492	280.0	6492	280.0	6492	279.9	-0.01	0.02
350.0	5914	350.0	5913	350.0	5914	350.6	0.17	-0.01
						Max. Error (%):	0.18	0.03

Linear Calibration Factor:	**C.F.=**	**0.12211**	**kPa/B unit**
Regression Zero:	**At Calibration Bi =**	**8784.6**	B unit
Temperature Correction Factor:	**Tk =**	**-0.0191**	**kPa/°C rise**

Polynomial Gage Factors (kPa) A: -5.7727E-07 B: -0.11363 C: 1042.1

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8783	25.1	985.5
Shipped Zero Readings:	23-Feb-09	8781	19.5	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia
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Document Number.: ELL0130I

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rst INSTRUMENTS

Calibration Record

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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**2-P-1-3**
Serial Number:		VW10708
Mfg Number:		08-27948
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23 °C
Barometric Pressure:		1002.3 millibars
W.O. Number:		Q011656
Cable Length:		42 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8537	0.0	8537	0.0	8537	0.4	0.11	0.00
70.0	7957	70.0	7957	70.0	7957	70.0	0.00	0.02
140.0	7378	140.0	7378	140.0	7378	139.5	-0.14	-0.06
210.0	6792	210.0	6792	210.0	6792	209.8	-0.05	0.04
280.0	6208	280.0	6208	280.0	6208	279.9	-0.02	0.00
350.0	5621	350.0	5621	350.0	5621	350.4	0.11	-0.01
						Max. Error (%):	0.14	0.06

Linear Calibration Factor:	C.F.=	**0.12002**	kPa/B unit
Regression Zero:	At Calibration Bi =	**8540.2**	B unit
Temperature Correction Factor:	Tk =	**-0.0187**	kPa/°C rise

Polynomial Gage Factors (kPa) A: -3.4650E-07 B: -0.11511 C: 1008.0

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8540	24.9	985.5
Shipped Zero Readings:	23-Feb-09	8542	19.6	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia
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Document Number.: ELL0130I

MIG0106A

Calibration Record

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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**2-P-2-1**
Serial Number:		VW10709
Mfg Number:		08-27949
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23 °C
Barometric Pressure:		1002.3 millibars
W.O. Number:		Q011656
Cable Length:		39 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8288	0.0	8288	0.0	8288	0.6	0.17	0.02
70.0	7711	70.0	7711	70.0	7711	69.7	-0.08	-0.05
140.0	7127	140.0	7127	140.0	7127	139.7	-0.08	0.03
210.0	6544	210.0	6544	210.0	6544	209.6	-0.12	0.00
280.0	5957	280.0	5957	280.0	5957	279.9	-0.03	0.01
350.0	5367	350.0	5369	350.0	5368	350.5	0.14	-0.01
						Max. Error (%):	0.17	0.05

Linear Calibration Factor:	**C.F.=**	**0.11983** kPa/B unit
Regression Zero:	**At Calibration Bi =**	**8292.9** B unit
Temperature Correction Factor:	**Tk =**	**0.0057** kPa/°C rise

Polynomial Gage Factors (kPa) A: -4.5138E-07 B: -0.11367 C: 973.16

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8293	24.8	985.5
Shipped Zero Readings:	23-Feb-09	8286	19.5	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 A.C AL CULLEY AScT

Document Number.: ELL0130I

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RST INSTRUMENTS

Calibration Record

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Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**2-P-2-2**
Serial Number:		VW10710
Mfg Number:		08-27950
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23 °C
Barometric Pressure:		1002.3 millibars
W.O. Number:		Q011656
Cable Length:		34 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8535	0.0	8535	0.0	8535	0.3	0.08	-0.02
70.0	7890	70.0	7890	70.0	7890	70.1	0.02	0.04
140.0	7245	140.0	7247	140.0	7246	139.7	-0.08	0.01
210.0	6601	210.0	6600	210.0	6601	209.6	-0.13	-0.04
280.0	5950	280.0	5950	280.0	5950	279.9	-0.02	0.00
350.0	5299	350.0	5298	350.0	5299	350.4	0.12	0.01
						Max. Error (%):	0.13	0.04

Linear Calibration Factor:	C.F.=	0.10818	kPa/B unit
Regression Zero:	At Calibration Bi =	8537.7	B unit
Temperature Correction Factor:	Tk =	-0.0614	kPa/°C rise

Polynomial Gage Factors (kPa) A: -2.6982E-07 B: -0.10444 C: 911.00

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8536	25.0	985.5
Shipped Zero Readings:	23-Feb-09	8540	19.5	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 A.C. AL CULLEY AScT

Document Number.: ELL0130I

MIG0106A

Calibration Record

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Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**2-P-2-3**
Serial Number:		VW10711
Mfg Number:		08-27951
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23 °C
Barometric Pressure:		1002.3 millibars
W.O. Number:		Q011656
Cable Length:		28 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8710	0.0	8712	0.0	8711	0.6	0.17	0.00
70.0	8094	70.0	8095	70.0	8095	69.8	-0.04	-0.01
140.0	7473	140.0	7474	140.0	7474	139.6	-0.11	0.02
210.0	6852	210.0	6852	210.0	6852	209.4	-0.16	-0.03
280.0	6224	280.0	6224	280.0	6224	280.0	-0.01	0.03
350.0	5596	350.0	5596	350.0	5596	350.5	0.15	-0.01
						Max. Error (%):	0.17	0.03

Linear Calibration Factor:	C.F.=	**0.11234** kPa/B unit
Regression Zero:	At Calibration Bi =	**8716.2** B unit
Temperature Correction Factor:	Tk =	**0.0049** kPa/°C rise

Polynomial Gage Factors (kPa) A: -4.4184E-07 B: -0.10602 C: 957.09

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8717	24.8	985.5
Shipped Zero Readings:	23-Feb-09	8718	19.7	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

Applied Science Technologists and Technicians of British Columbia 22724 A.C AL CULLEY AScT

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Document Number.: ELL0130I

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rst INSTRUMENTS

Calibration Record

200 - 2050 Hartley Ave., Coquitlam, British Columbia, Canada V3K 6W5
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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		3-P-3-1
Serial Number:		VW10712
Mfg Number:		08-27952
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23 °C
Barometric Pressure:		1002.3 millibars
W.O. Number:		Q011656
Cable Length:		35 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8297	0.0	8297	0.0	8297	0.8	0.21	0.01
70.0	7702	70.0	7702	70.0	7702	69.8	-0.07	-0.03
140.0	7101	140.0	7101	140.0	7101	139.5	-0.15	0.02
210.0	6498	210.0	6498	210.0	6498	209.4	-0.16	0.00
280.0	5891	280.0	5891	280.0	5891	279.8	-0.05	0.00
350.0	5280	350.0	5280	350.0	5280	350.7	0.20	0.00
						Max. Error (%):	0.21	0.03

Linear Calibration Factor:	C.F.=	0.11600 kPa/B unit
Regression Zero:	At Calibration Bi =	8303.5 B unit
Temperature Correction Factor:	Tk =	0.0053 kPa/°C rise

Polynomial Gage Factors (kPa) A: -5.9151E-07 B: -0.10796 C: 936.54

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8304	24.6	985.5
Shipped Zero Readings:	23-Feb-09	8288	19.2	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia
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Calibration Record

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Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**2-P-3-2**
Serial Number:		VW10713
Mfg Number:		08-27953
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23 °C
Barometric Pressure:		1002.3 millibars
W.O. Number:		Q011656
Cable Length:		30 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8725	0.0	8725	0.0	8725	0.6	0.17	0.01
70.0	8120	70.0	8120	70.0	8120	69.8	-0.06	-0.03
140.0	7511	140.0	7509	140.0	7510	139.6	-0.12	0.01
210.0	6899	210.0	6897	210.0	6898	209.6	-0.11	0.01
280.0	6284	280.0	6284	280.0	6284	279.8	-0.04	-0.01
350.0	5666	350.0	5666	350.0	5666	350.6	0.16	0.00
						Max. Error (%):	0.17	0.03

Linear Calibration Factor:	C.F.=	0.11440	kPa/B unit
Regression Zero:	At Calibration Bi =	8730.1	B unit
Temperature Correction Factor:	Tk =	-0.0529	kPa/°C rise

Polynomial Gage Factors (kPa) A: -4.4199E-07 B: -0.10804 C: 976.37

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8729	24.7	985.5
Shipped Zero Readings:	23-Feb-09	8723	19.6	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

Applied Science Technologists and Technicians of British Columbia
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This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Document Number.: ELL0130I

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Calibration Record

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Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**3-P-1-1**
Serial Number:		VW10714
Mfg Number:		08-27954
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23 °C
Barometric Pressure:		1002.3 millibars
W.O. Number:		Q011656
Cable Length:		49 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8527	0.0	8527	0.0	8527	0.6	0.17	0.01
70.0	7914	70.0	7914	70.0	7914	69.9	-0.03	0.00
140.0	7299	140.0	7299	140.0	7299	139.4	-0.16	-0.03
210.0	6678	210.0	6679	210.0	6679	209.6	-0.12	0.01
280.0	6056	280.0	6056	280.0	6056	280.0	-0.01	0.02
350.0	5432	350.0	5432	350.0	5432	350.5	0.15	-0.02
						Max. Error (%):	0.17	0.03

Linear Calibration Factor:	C.F.=	0.11306	kPa/B unit
Regression Zero:	At Calibration Bi =	8532.2	B unit
Temperature Correction Factor:	Tk =	-0.0296	kPa/°C rise

Polynomial Gage Factors (kPa) A: -4.4771E-07 B: -0.10681 C: 943.35

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8534	24.7	985.5
Shipped Zero Readings:	23-Feb-09	8531	19.5	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 A.C. AL CULLEY AScT

Calibration Record

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Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**3-P-1-2**
Serial Number:		VW10715
Mfg Number:		08-27955
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23 °C
Barometric Pressure:		1002.3 millibars
W.O. Number:		Q011656
Cable Length:		44 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8414	0.0	8414	0.0	8414	0.7	0.19	0.00
70.0	7817	70.0	7817	70.0	7817	69.9	-0.02	0.02
140.0	7219	140.0	7219	140.0	7219	139.3	-0.20	-0.04
210.0	6614	210.0	6613	210.0	6614	209.5	-0.13	0.03
280.0	6007	280.0	6007	280.0	6007	279.9	-0.03	0.01
350.0	5397	350.0	5397	350.0	5397	350.6	0.19	-0.01
						Max. Error (%):	0.20	0.04

Linear Calibration Factor:	C.F.=	0.11600 kPa/B unit
Regression Zero:	At Calibration Bi =	8419.9 B unit
Temperature Correction Factor:	Tk =	-0.0302 kPa/°C rise

Polynomial Gage Factors (kPa) A: -5.6313E-07 B: -0.10822 C: 950.44

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8419	25.0	985.5
Shipped Zero Readings:	23-Feb-09	8419	19.6	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 A.C. AL CULLEY ASCT

Document Number.: ELL0130I

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Calibration Record

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Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**3-P-1-3**
Serial Number:		VW10716
Mfg Number:		08-27956
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23 °C
Barometric Pressure:		1002.3 millibars
W.O. Number:		Q011656
Cable Length:		38 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8960	0.0	8961	0.0	8961	0.7	0.20	0.01
70.0	8389	70.0	8390	70.0	8390	69.8	-0.07	-0.03
140.0	7812	140.0	7813	140.0	7813	139.5	-0.13	0.03
210.0	7234	210.0	7234	210.0	7234	209.5	-0.15	0.01
280.0	6653	280.0	6653	280.0	6653	279.7	-0.07	-0.03
350.0	6066	350.0	6066	350.0	6066	350.7	0.21	0.01
						Max. Error (%):	0.21	0.03

Linear Calibration Factor:	**C.F.=**	**0.12092 kPa/B unit**
Regression Zero:	**At Calibration Bi =**	**8966.4** B unit
Temperature Correction Factor:	**Tk =**	**0.0057 kPa/°C rise**

Polynomial Gage Factors (kPa) A: -6.1861E-07 B: -0.11163 C: 1049.9

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8968	24.9	985.5
Shipped Zero Readings:	23-Feb-09	8953	19.4	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 A.C. AL CULLEY ASCT

Document Number.: ELL0130I

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INSTRUMENTS

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Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**3-P-2-1**
Serial Number:		VW10717
Mfg Number:		08-27957
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23 °C
Barometric Pressure:		1002.3 millibars
W.O. Number:		Q011656
Cable Length:		35 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8201	0.0	8202	0.0	8202	0.5	0.15	-0.02
70.0	7602	70.0	7602	70.0	7602	70.0	-0.01	0.03
140.0	7001	140.0	7001	140.0	7001	139.6	-0.12	0.02
210.0	6398	210.0	6398	210.0	6398	209.5	-0.16	-0.02
280.0	5791	280.0	5791	280.0	5791	279.8	-0.07	-0.03
350.0	5179	350.0	5179	350.0	5179	350.7	0.19	0.02
						Max. Error (%):	0.19	0.03

Linear Calibration Factor:	**C.F.=**	**0.11585 kPa/B unit**
Regression Zero:	**At Calibration Bi =**	**8206.0** B unit
Temperature Correction Factor:	**Tk =**	**0.0052 kPa/°C rise**

Polynomial Gage Factors (kPa) A: -4.9010E-07 B: -0.10929 C: 929.22

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8203	24.7	985.5
Shipped Zero Readings:	23-Feb-09	8197	19.4	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

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Calibration Record

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Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**3-P-2-2**
Serial Number:		VW10718
Mfg Number:		08-27958
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23 °C
Barometric Pressure:		1002.3 millibars
W.O. Number:		Q011656
Cable Length:		30 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8614	0.0	8615	0.0	8615	0.1	0.04	0.01
70.0	8005	70.0	8005	70.0	8005	70.0	-0.01	-0.01
140.0	7395	140.0	7395	140.0	7395	139.8	-0.05	-0.03
210.0	6782	210.0	6783	210.0	6783	210.0	0.00	0.02
280.0	6171	280.0	6171	280.0	6171	280.0	0.01	0.02
350.0	5560	350.0	5560	350.0	5560	350.0	0.01	-0.01
						Max. Error (%):	0.05	0.03

Linear Calibration Factor:	**C.F.=**	**0.11456 kPa/B unit**
Regression Zero:	**At Calibration Bi =**	**8615.6** B unit
Temperature Correction Factor:	**Tk =**	**-0.0298 kPa/°C rise**

Polynomial Gage Factors (kPa) A: -7.3972E-08 B: -0.11351 C: 983.33

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8621	24.9	985.5
Shipped Zero Readings:	23-Feb-09	8617	19.4	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 A.C. AL CULLEY AScT

Document Number.: ELL0130I

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Calibration Record

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Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**3-P-2-3**
Serial Number:		VW10719
Mfg Number:		08-27959
Range:		350.0 kPa
Date of Calibration:		19-Dec-08
Temperature:		23 °C
Barometric Pressure:		1002.3 millibars
W.O. Number:		Q011656
Cable Length:		24 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	7992	0.0	7992	0.0	7992	0.6	0.18	0.01
70.0	7366	70.0	7366	70.0	7366	69.8	-0.05	-0.02
140.0	6735	140.0	6735	140.0	6735	139.5	-0.13	0.01
210.0	6102	210.0	6102	210.0	6102	209.5	-0.14	0.00
280.0	5465	280.0	5465	280.0	5465	279.9	-0.03	0.01
350.0	4825	350.0	4826	350.0	4826	350.6	0.17	-0.01
						Max. Error (%):	0.18	0.02

Linear Calibration Factor:	**C.F.=**	**0.11052 kPa/B unit**
Regression Zero:	**At Calibration Bi =**	**7997.7** B unit
Temperature Correction Factor:	**Tk =**	**-0.0064 kPa/°C rise**

Polynomial Gage Factors (kPa) A: -4.5009E-07 B: -0.10475 C: 865.91

Pressure is calculated with the following equations:
Linear, $P(kPa) = C.F. \times (L_i - L_c) - [T_k(T_i - T_c)] + [0.10(B_i - B_c)]$
Polynomial: $P(kPa) = A(L_c)^2 + BL_c + C + T_k(T_c - T_i) - [0.10(B_c - B_i)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	22-Jan-09	8002	24.7	985.5
Shipped Zero Readings:	23-Feb-09	7993	19.4	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = $Hz^2 / 1000$ ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 A.C. AL CULLEY AScT

Document Number.: ELL0130I

MIG0106A

Calibration Record

200 - 2050 Hartley Ave., Coquitlam, British Columbia, Canada V3K 6W5
Tel: 604.540.1100 • Fax: 604.540.1005 • Toll Free: 1.800.665.5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**3-P-3-1**
Serial Number:		VW10720
Mfg Number:		09-1603
Range:		350.0 kPa
Date of Calibration:		30-Jan-09
Temperature:		23.3 °C
Barometric Pressure:		987 millibars
W.O. Number:		Q011656
Cable Length:		31 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8978	0.0	8978	0.0	8978	0.3	0.08	-0.02
70.0	8338	70.0	8338	70.0	8338	70.1	0.02	0.04
140.0	7700	140.0	7701	140.0	7701	139.6	-0.11	-0.04
210.0	7057	210.0	7057	210.0	7057	209.8	-0.06	0.01
280.0	6414	280.0	6414	280.0	6414	279.9	-0.03	-0.01
350.0	5768	350.0	5768	350.0	5768	350.4	0.10	0.00
						Max. Error (%):	0.11	0.04

Linear Calibration Factor:	**C.F.=**	**0.10906 kPa/B unit**
Regression Zero:	**At Calibration Bi =**	**8980.6** B unit
Temperature Correction Factor:	**Tk =**	**-0.0088 kPa/°C rise**

Polynomial Gage Factors (kPa) **A:** -2.4571E-07 **B:** -0.10543 **C:** 966.32

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	3-Feb-09	8965	24.9	990.9
Shipped Zero Readings:	23-Feb-09	8971	19.3	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: C. Byerley CB Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 A.C. AL CULLEY AScT

Document Number.: ELL0130I

MIG0106A

Calibration Record

200 - 2050 Hartley Ave., Coquitlam, British Columbia, Canada V3K 6W5
Tel: 604.540.1100 • Fax: 604.540.1005 • Toll Free: 1.800.665.5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Pressure Transducer

Customer:		DYNAMITAGE T.C.G. (1993) INC.
Model:		VW2100-0.35
Client ID:		**3-P-3-2**
Serial Number:		VW10721
Mfg Number:		09-1605
Range:		350.0 kPa
Date of Calibration:		30-Jan-09
Temperature:		23.3 °C
Barometric Pressure:		987 millibars
W.O. Number:		Q011656
Cable Length:		26 meters
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 Kohms

Applied Pressure (kPa)	First Reading (B units)	Applied Pressure (kPa)	Second Reading (B units)	Average Pressure (kPa)	Average Readings (B units)	Calculated Linear (kPa)	Linearity F.S. Error (%)	Polynomial Fit (% FS)
0.0	8818	0.0	8819	0.0	8819	0.7	0.21	0.03
70.0	8199	70.0	8199	70.0	8199	69.7	-0.10	-0.06
140.0	7570	140.0	7571	140.0	7571	139.6	-0.12	0.02
210.0	6942	210.0	6942	210.0	6942	209.5	-0.15	0.00
280.0	6308	280.0	6308	280.0	6308	280.0	0.00	0.04
350.0	5674	350.0	5674	350.0	5674	350.5	0.15	-0.02
						Max. Error (%):	0.21	0.06

Linear Calibration Factor:	**C.F.=**	**0.11124 kPa/B unit**
Regression Zero:	**At Calibration Bi =**	**8825.1** B unit
Temperature Correction Factor:	**Tk =**	**-0.0529 kPa/°C rise**

Polynomial Gage Factors (kPa) A: -4.7395E-07 B: -0.10437 C: 957.37

Pressure is calculated with the following equations:
Linear, P(kPa) = C.F. X (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]
Polynomial: $P(kPa)=A(Lc)^2+BLc+C+Tk(Tc-Ti)-[0.10(Bc-Bi)]$

	Date (dd/mm/yr)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Factory Zero Readings:	3-Feb-09	8811	24.8	990.9
Shipped Zero Readings:	23-Feb-09	8815	19.5	1009.6

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

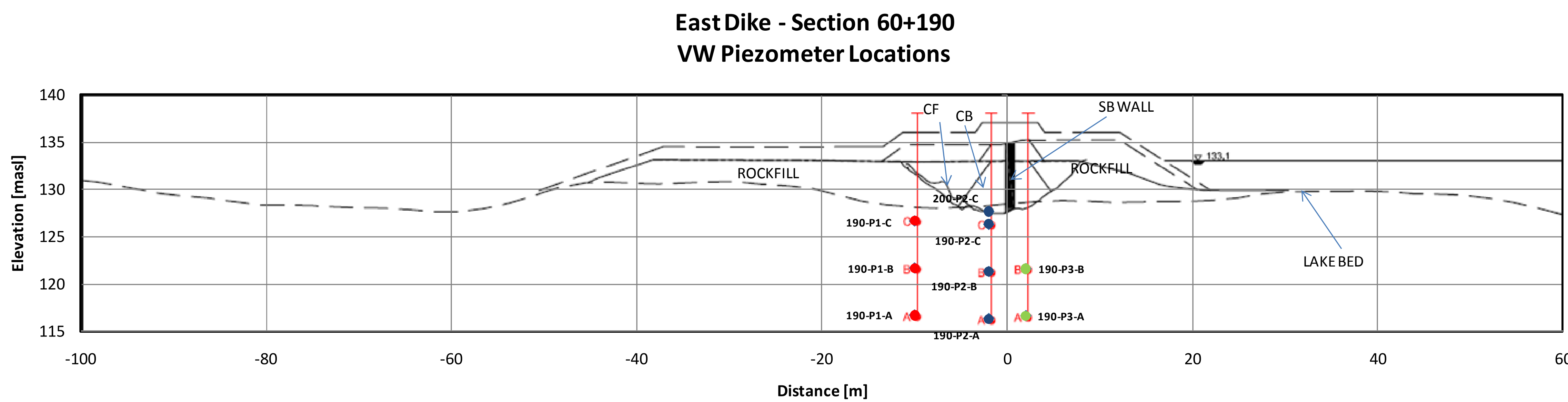
Technician: C. Byerley CB Date: 23-Feb-09

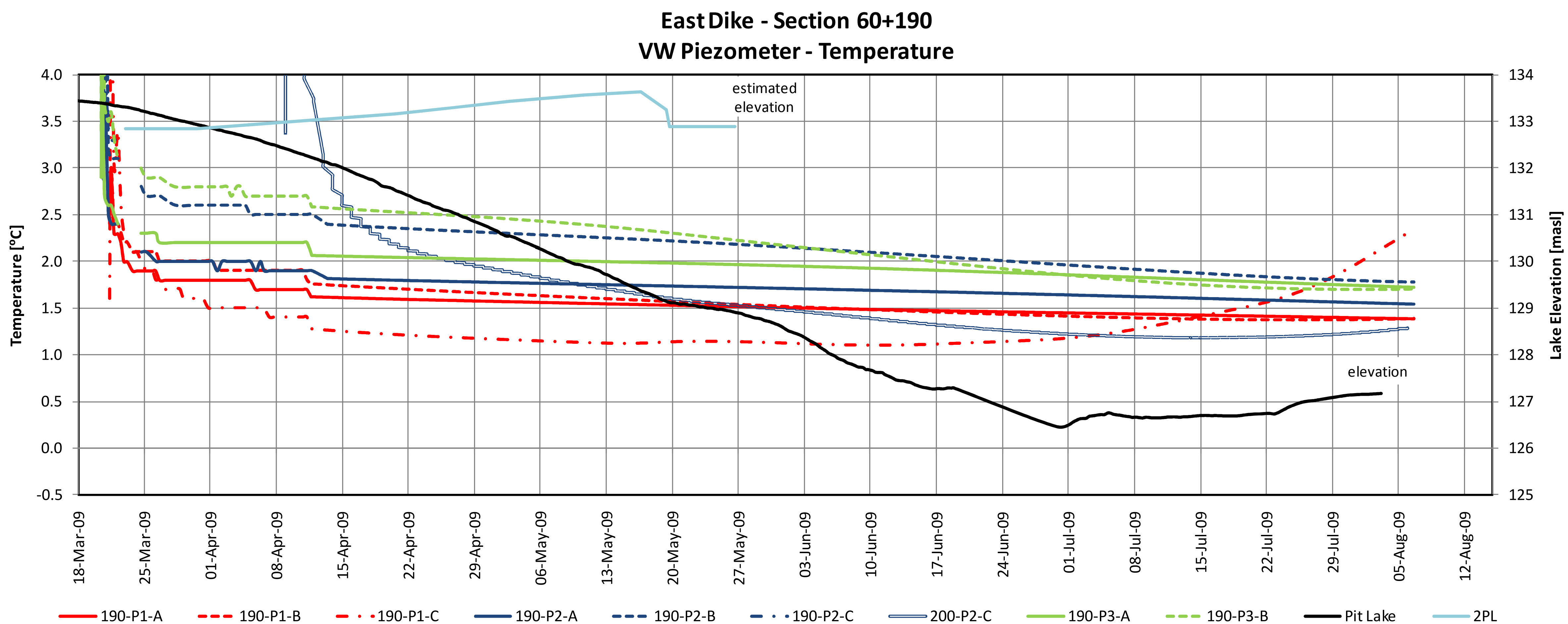
This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia
22724
A.C.
AL CULLEY
AScT

Document Number.: ELL0130I

MIG0106A



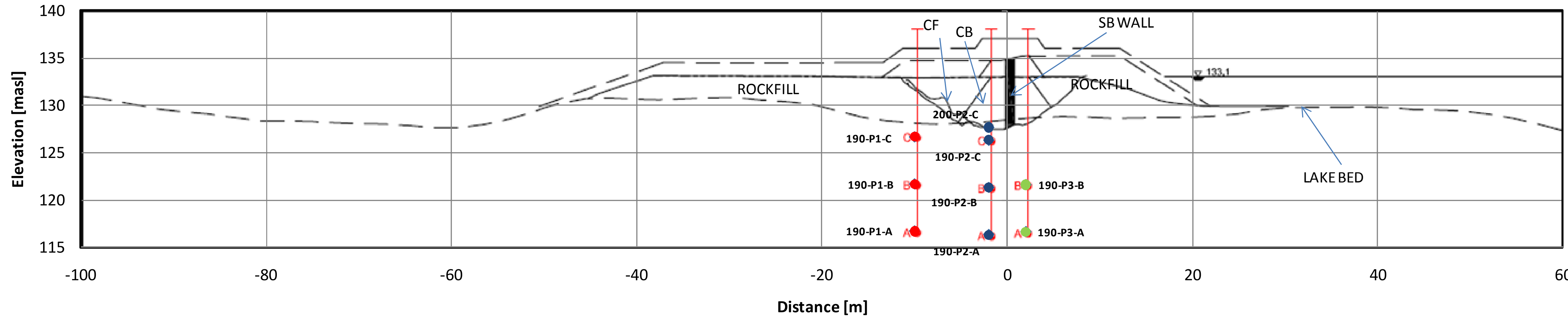


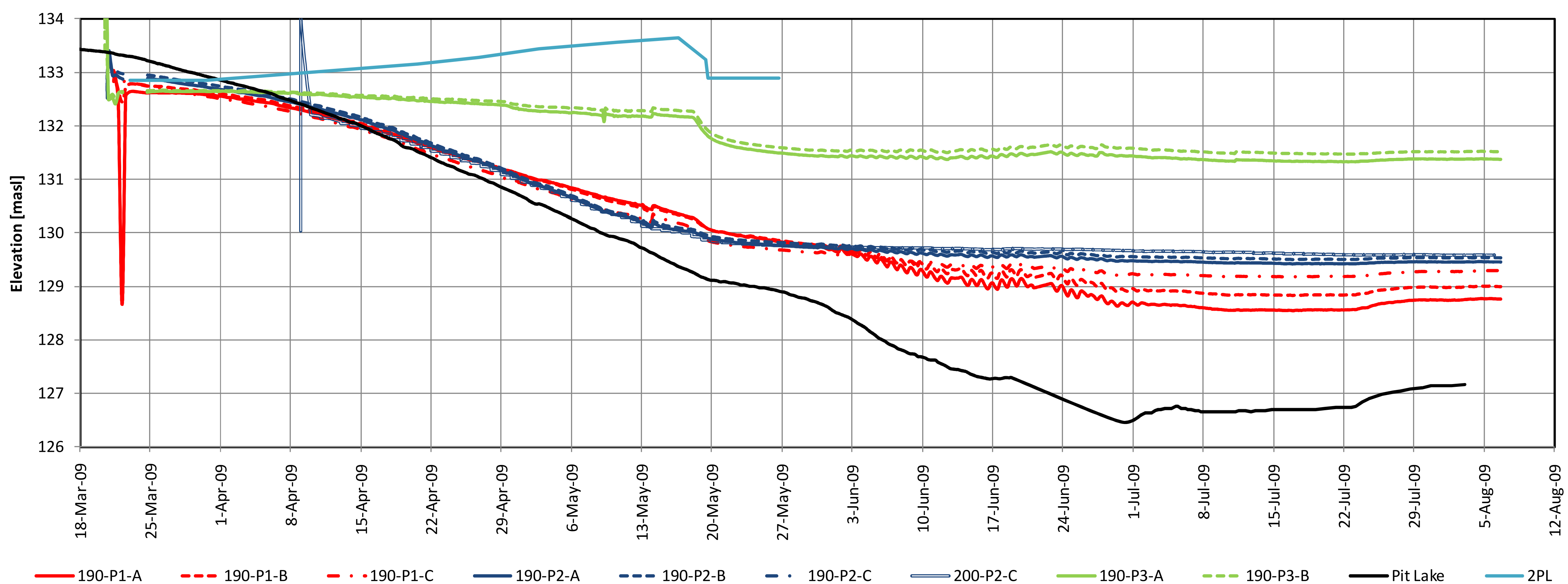
Note: Data provided by Agnico-Eagle Mines Limited.

PROJECT	AGNICO-EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT
TITLE	EAST DIKE-SECION 60+190 VW PIEZOMETER-TEMPERATURE

PROJECT No. 07-1413-0074			FILE No. ----	
DESIGN	BEW	10AUG09	SCALE NTS	REV.
CADD	JFC	10AUG09	FIGURE F-1	
CHECK	--			
REVIEW				

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA





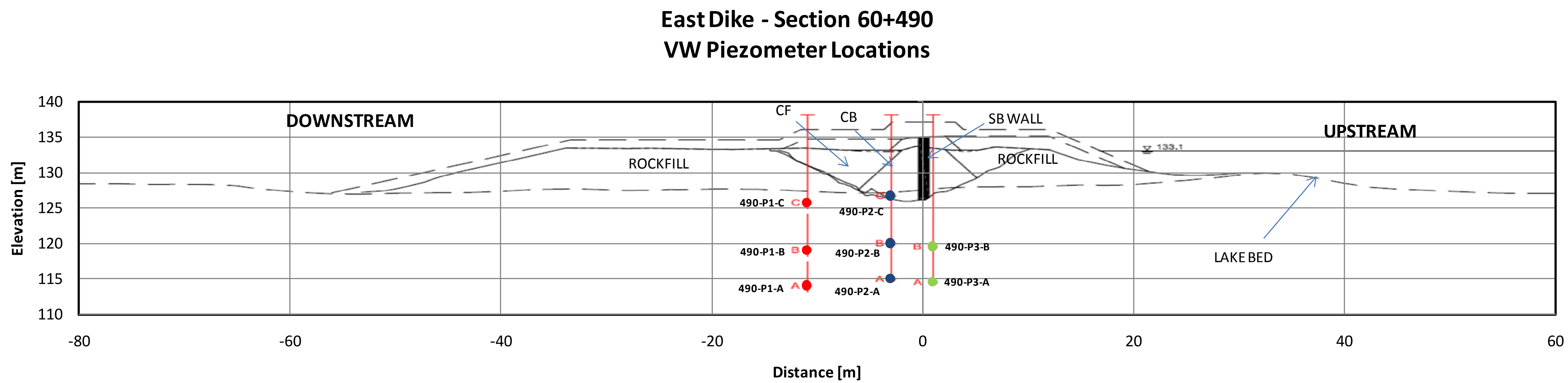
Note: Data provided by Agnico-Eagle Mines Limited.

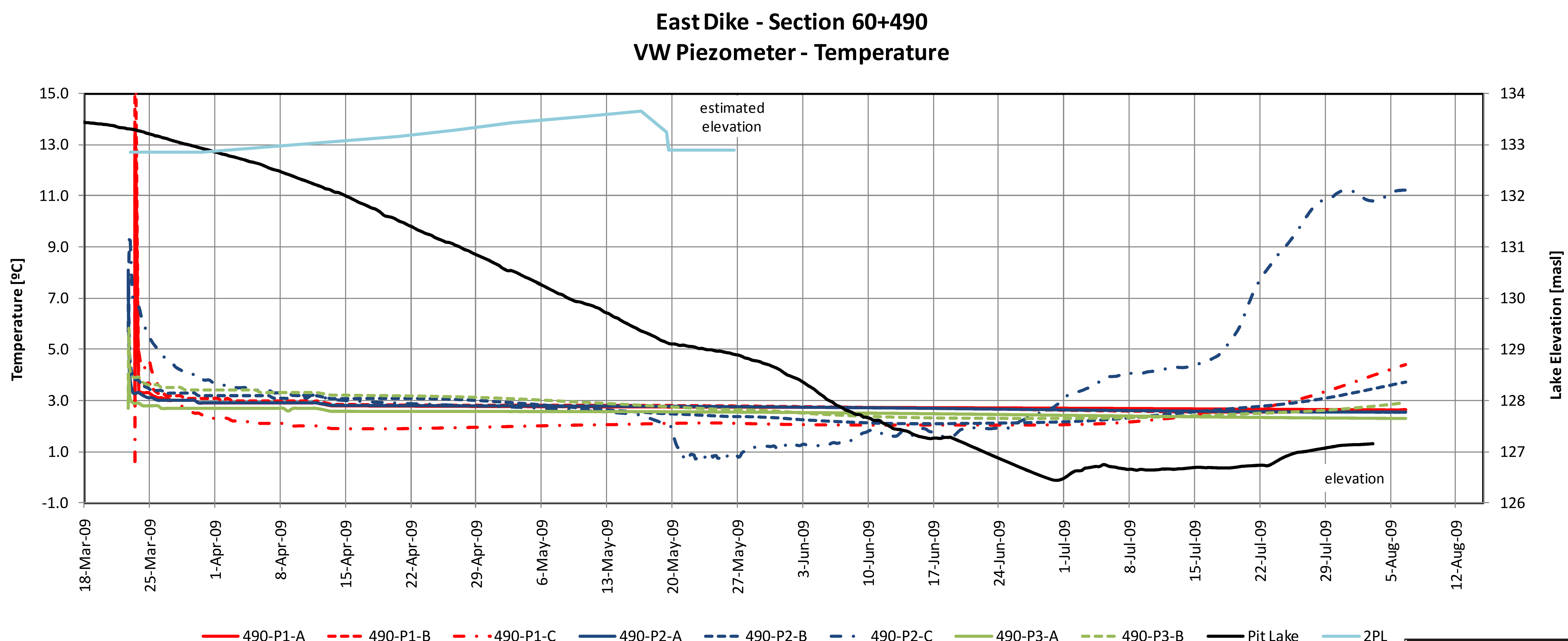
PROJECT	AGNICO-EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT
TITLE	EAST DIKE-SECION 60+190 VW PIEZOMETER-TOTAL HEAD

PROJECT No. 07-1413-0074			FILE No. ----
DESIGN	BEW	10AUG09	SCALE NTS REV.
CADD	JFC	10AUG09	
CHECK	--		FIGURE F-2
REVIEW			

Golder Associates

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA





Note: Data provided by Agnico-Eagle Mines Limited.

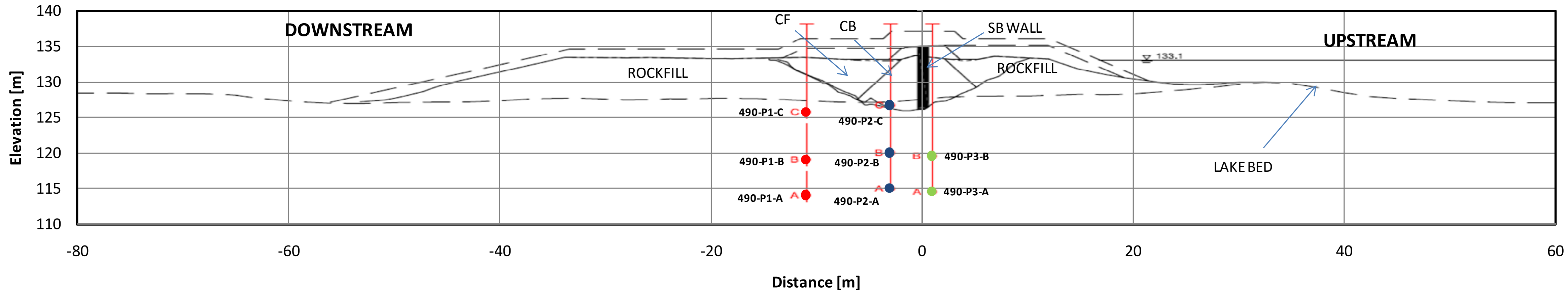
PROJECT	AGNICO-EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT
TITLE	EAST DIKE-SECION 60+490 VW PIEZOMETER-TEMPERATURE

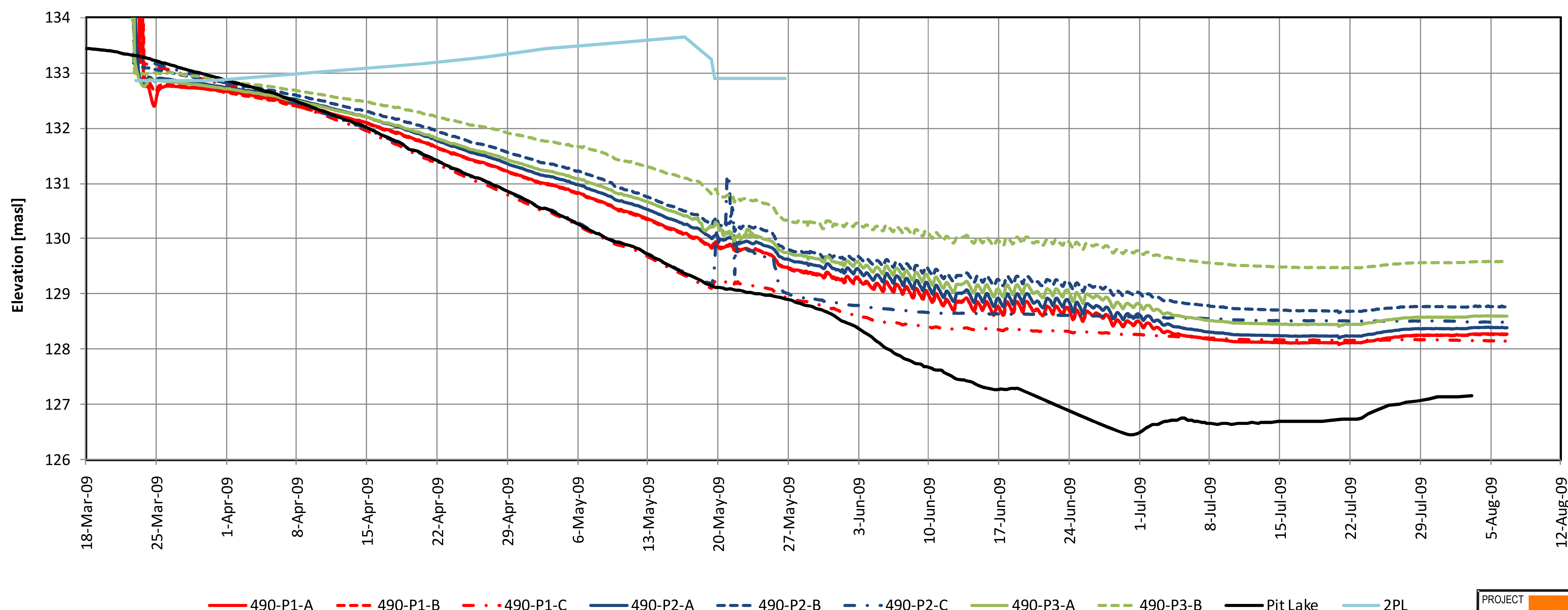
PROJECT No. 07-1413-0074			FILE No. ----	
DESIGN	BEW	10AUG09	SCALE NTS	REV.
CADD	JFC	10AUG09		
CHECK	--			
REVIEW				

FIGURE F-3

Golder Associates

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA





Note: Data provided by Agnico-Eagle Mines Limited.

PROJECT AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

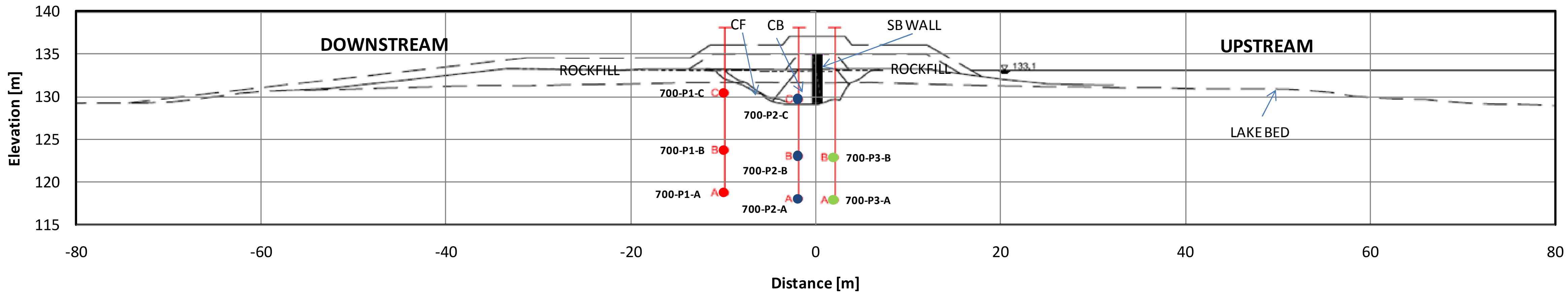
TITLE
EAST DIKE-SECION 60+490
VW PIEZOMETER-TOTAL HEAD

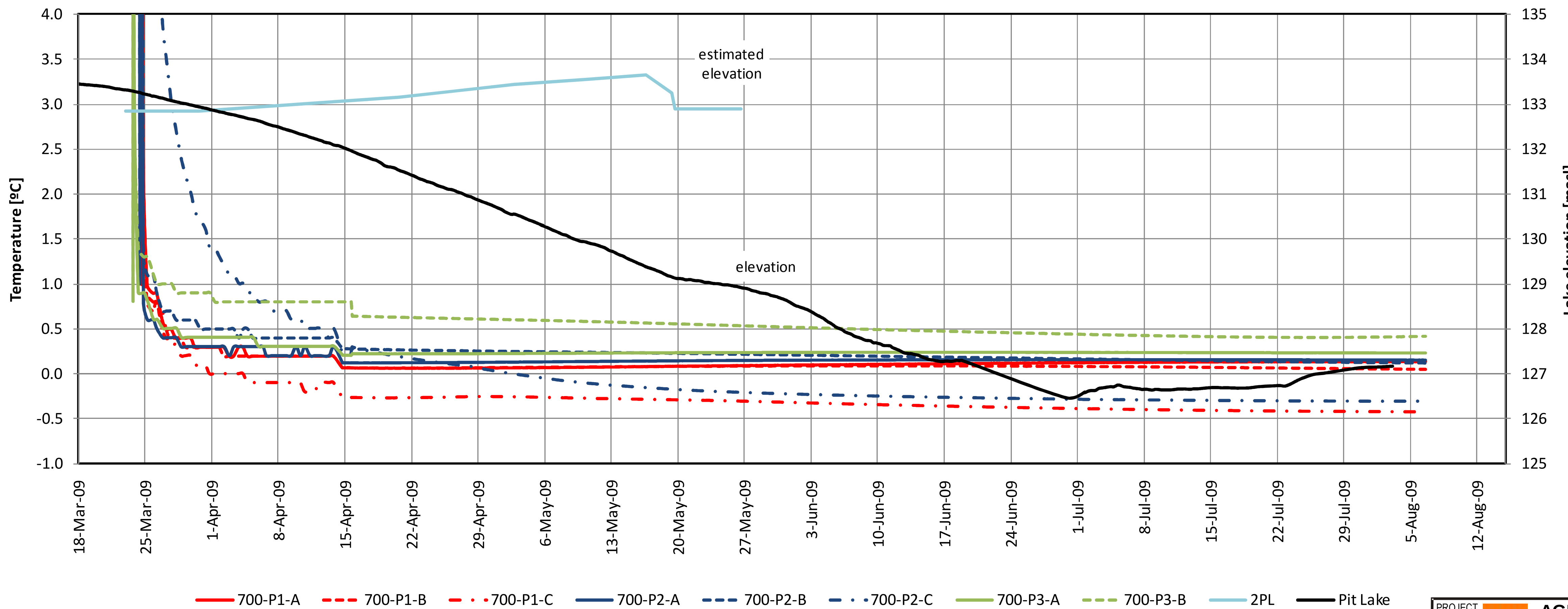
Golder Associates

PROJECT No. 07-1413-0074			FILE No. ----	
DESIGN	BEW	10AUG09	SCALE NTS	REV.
CADD	JFC	10AUG09		
CHECK	--			
REVIEW				

FIGURE F-4

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA





Note: Data provided by Agnico-Eagle Mines Limited.

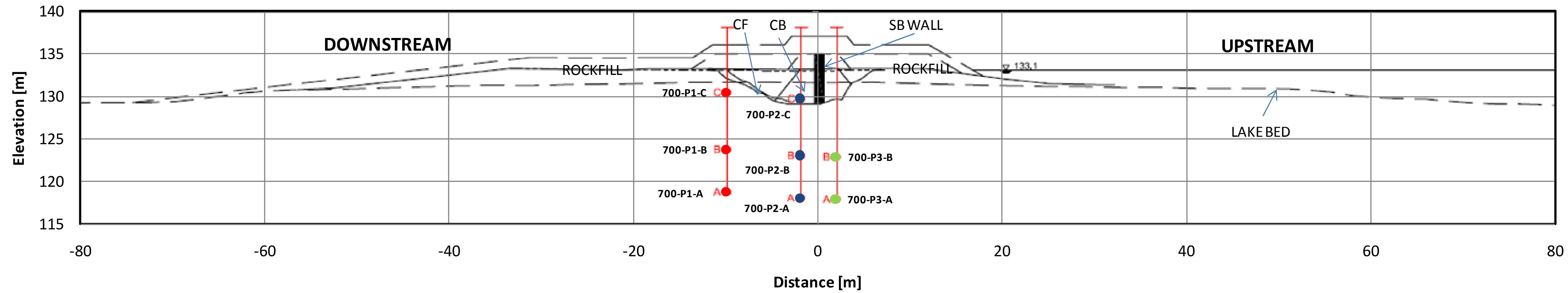
PROJECT AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

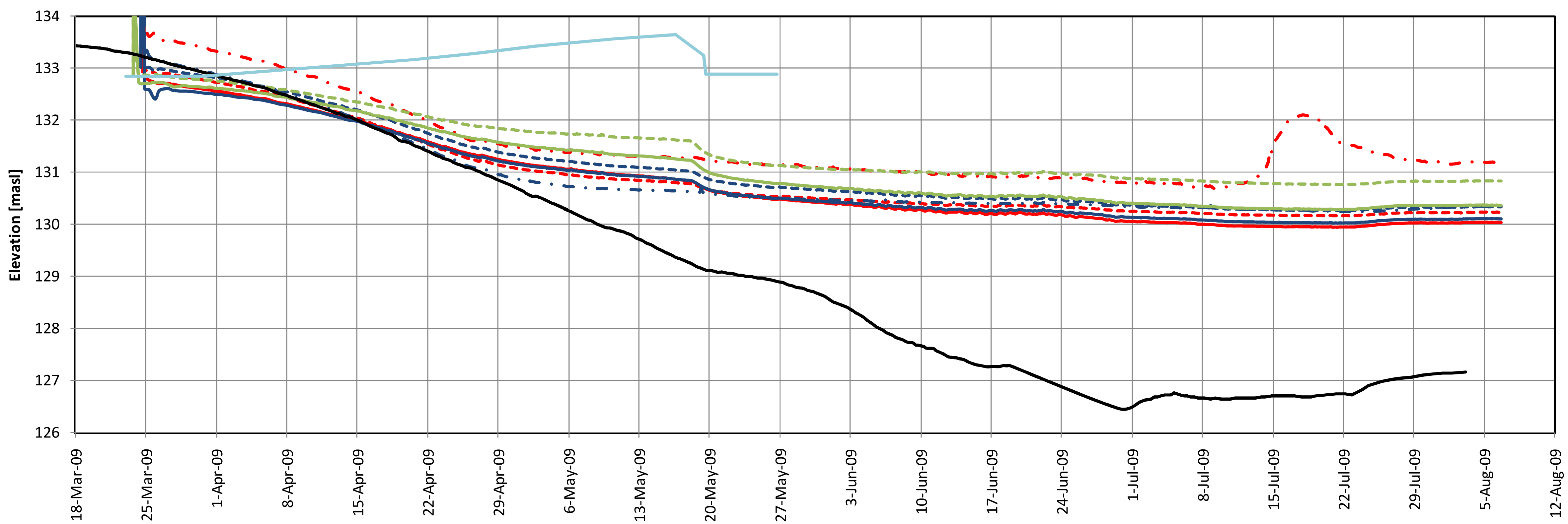
TITLE
EAST DIKE-SECION 60+700
VW PIEZOMETER-TEMPERATURE

PROJECT No. 07-1413-0074			FILE No. ----
DESIGN	BEW	10AUG09	SCALE NTS REV.
CADD	JFC	10AUG09	
CHECK	--		
REVIEW			

FIGURE F-5

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA





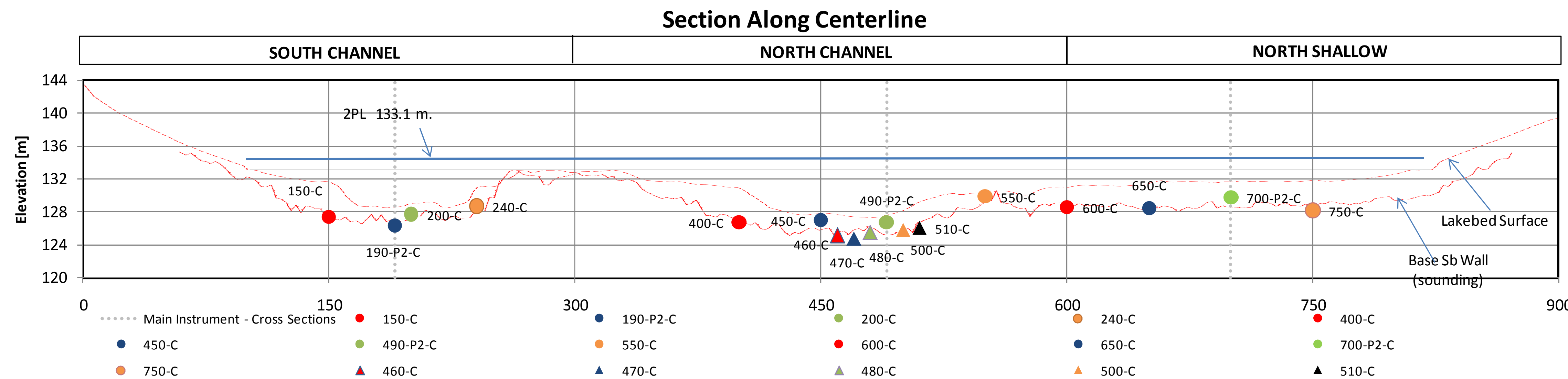
Note: Data provided by Agnico-Eagle Mines Limited.

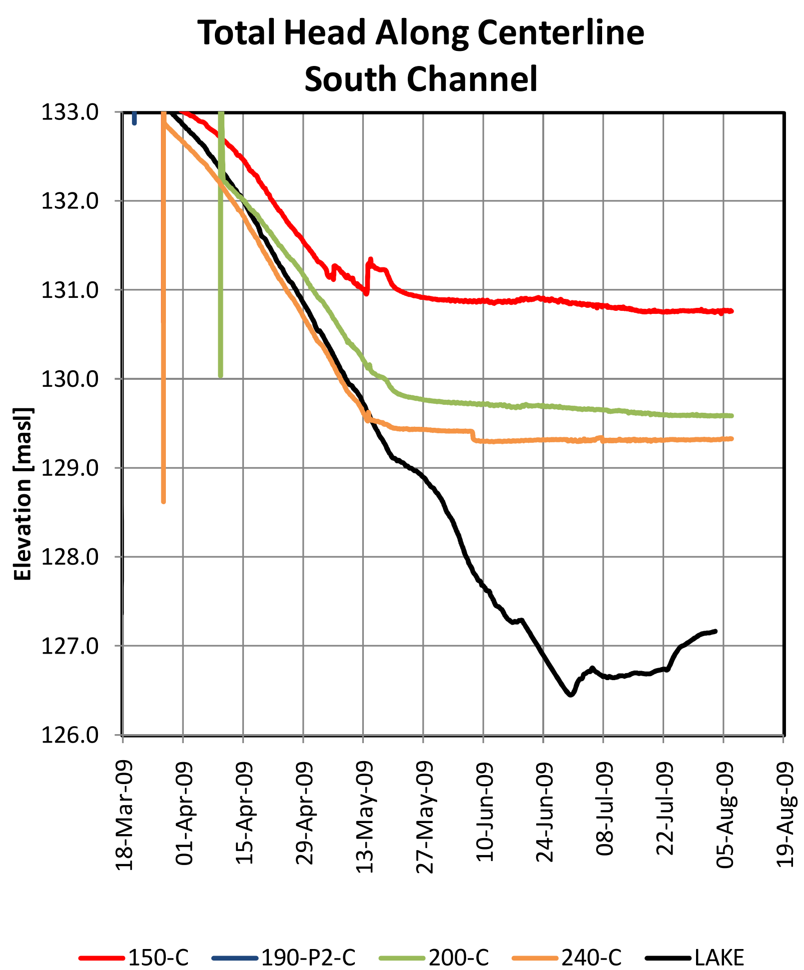
PROJECT	AGNICO-EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT
TITLE	EAST DIKE-SECION 60+700 VW PIEZOMETER-TOTAL HEAD

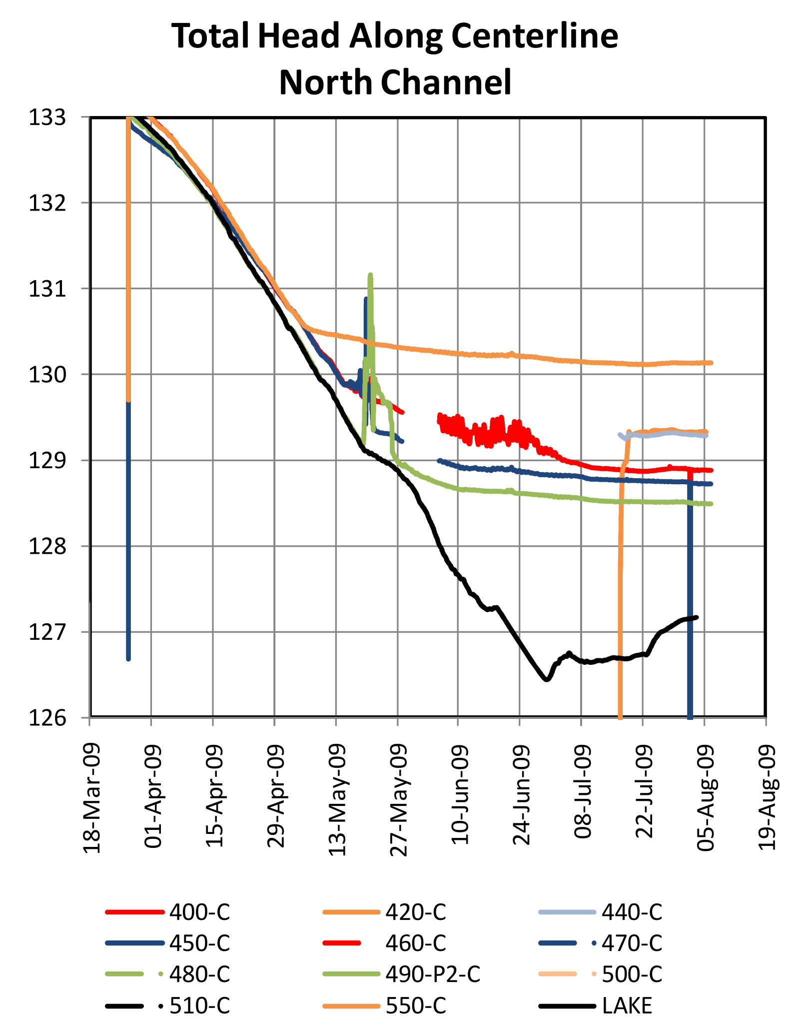
PROJECT No. 07-1413-0074			FILE No. ----	
DESIGN	BEW	10AUG09	SCALE NTS	REV.
CADD	JFC	10AUG09	FIGURE F-6	
CHECK	--			
REVIEW				

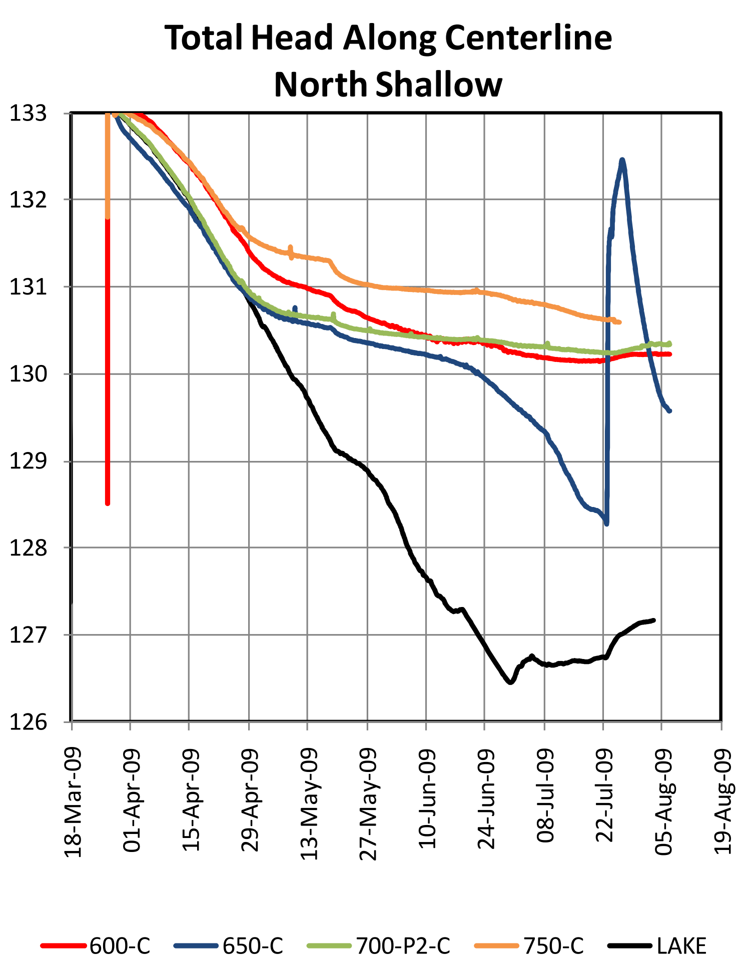
Golder Associates

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA







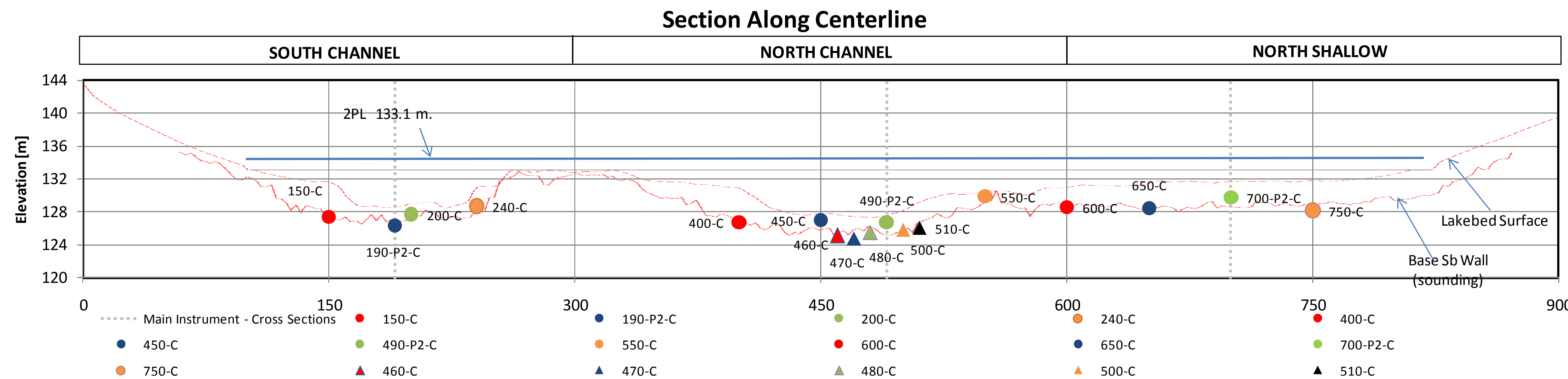


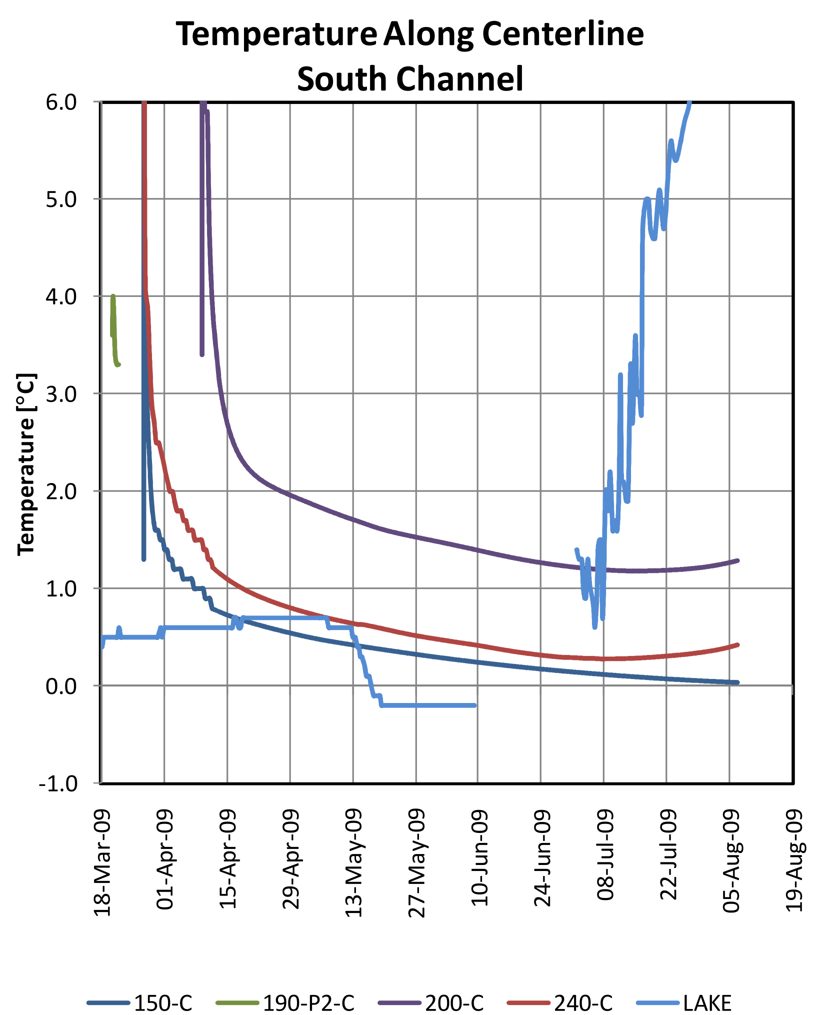
Note: Data provided by Agnico-Eagle Mines Limited.

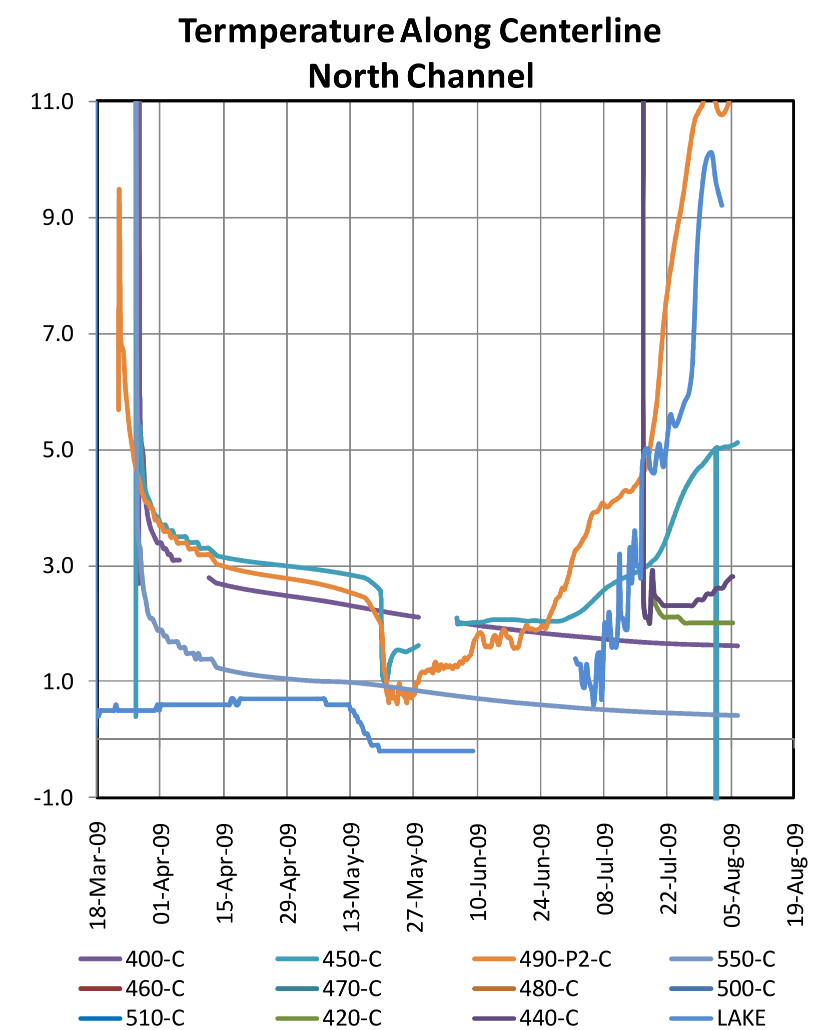
PROJECT	AGNICO-EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT			
TITLE	EAST DIKE TOTAL HEAD ALONG CENTERLINE			
PROJECT No. 07-1413-0074			FILE No. ----	
DESIGN	BEW	10AUG09	SCALE NTS	REV.
CADD	JFC	10AUG09	FIGURE F-7	
CHECK	--			
REVIEW				

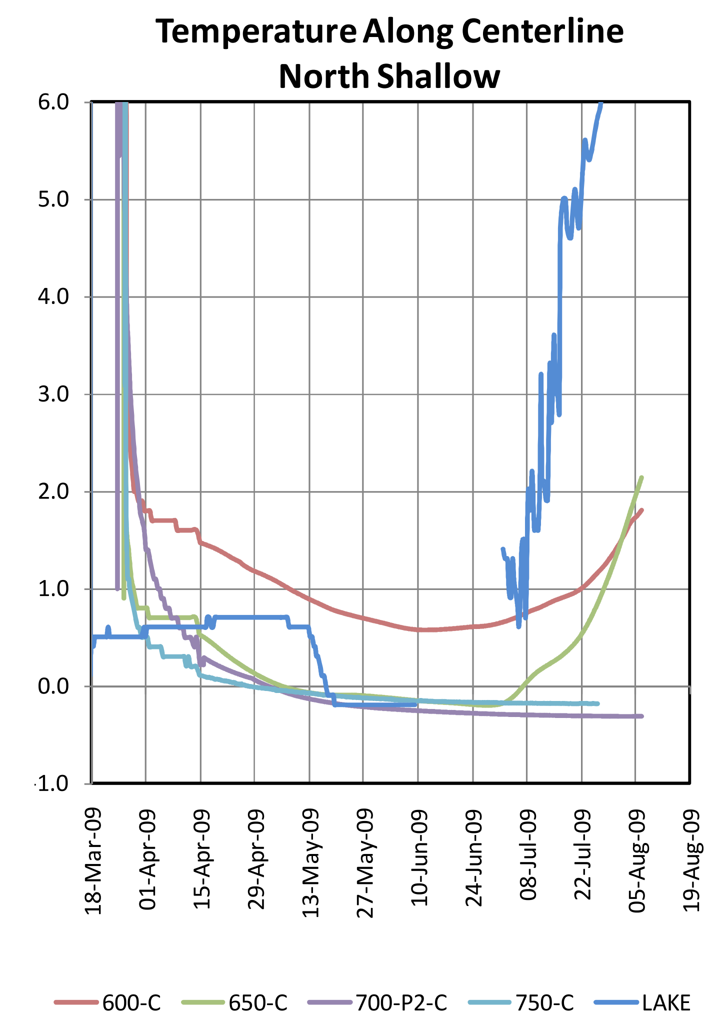
Golder Associates

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA









Note: Data provided by Agnico-Eagle Mines Limited.

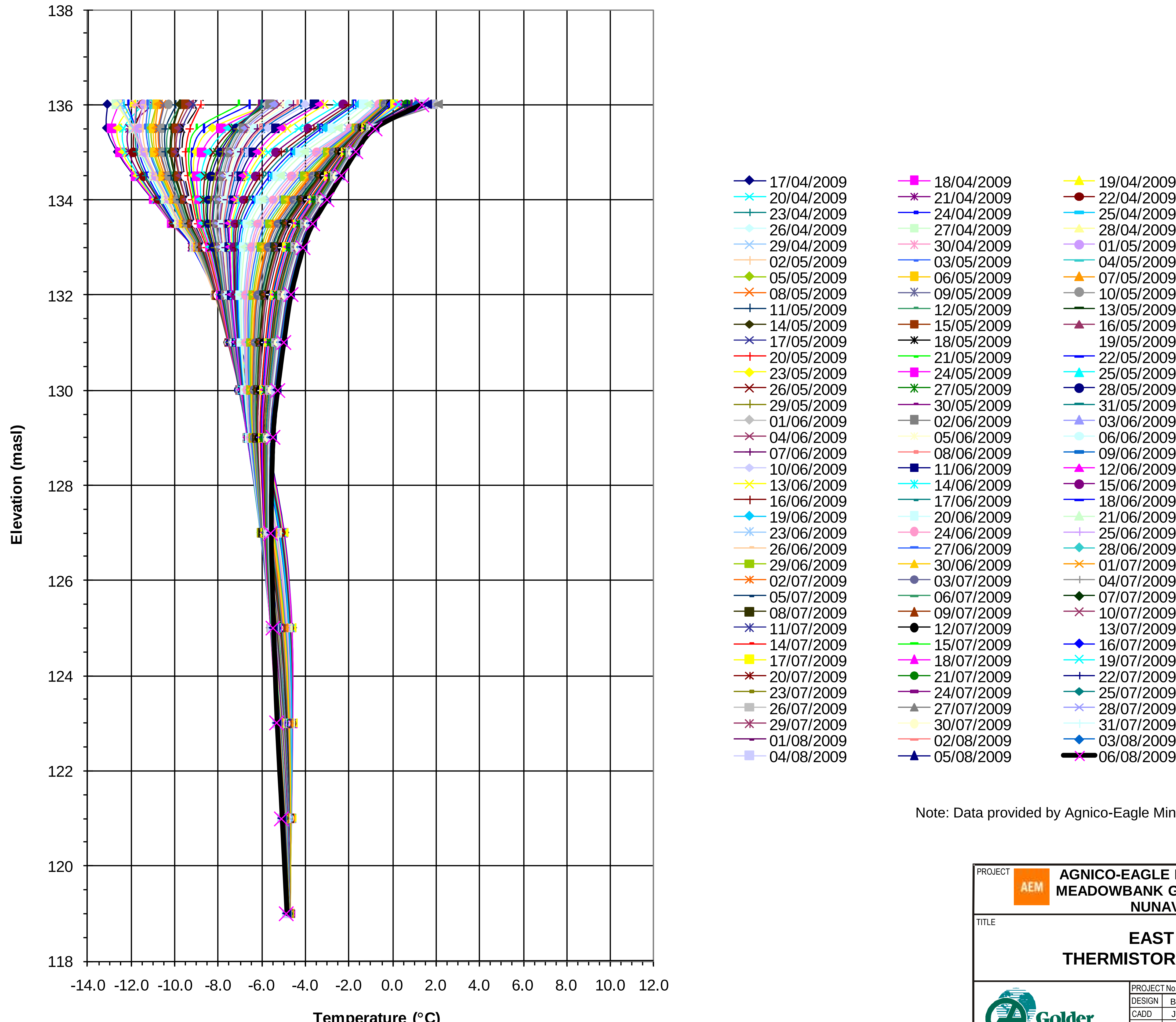
PROJECT AEM AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE
TEMPERATURE ALONG CENTERLINE

PROJECT No. 07-1413-0074		FILE No. ----	
DESIGN	BEW	10AUG09	SCALE NTS REV.
CADD	JFC	10AUG09	
CHECK	--		FIGURE F-8
REVIEW			

Golder Associates

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA



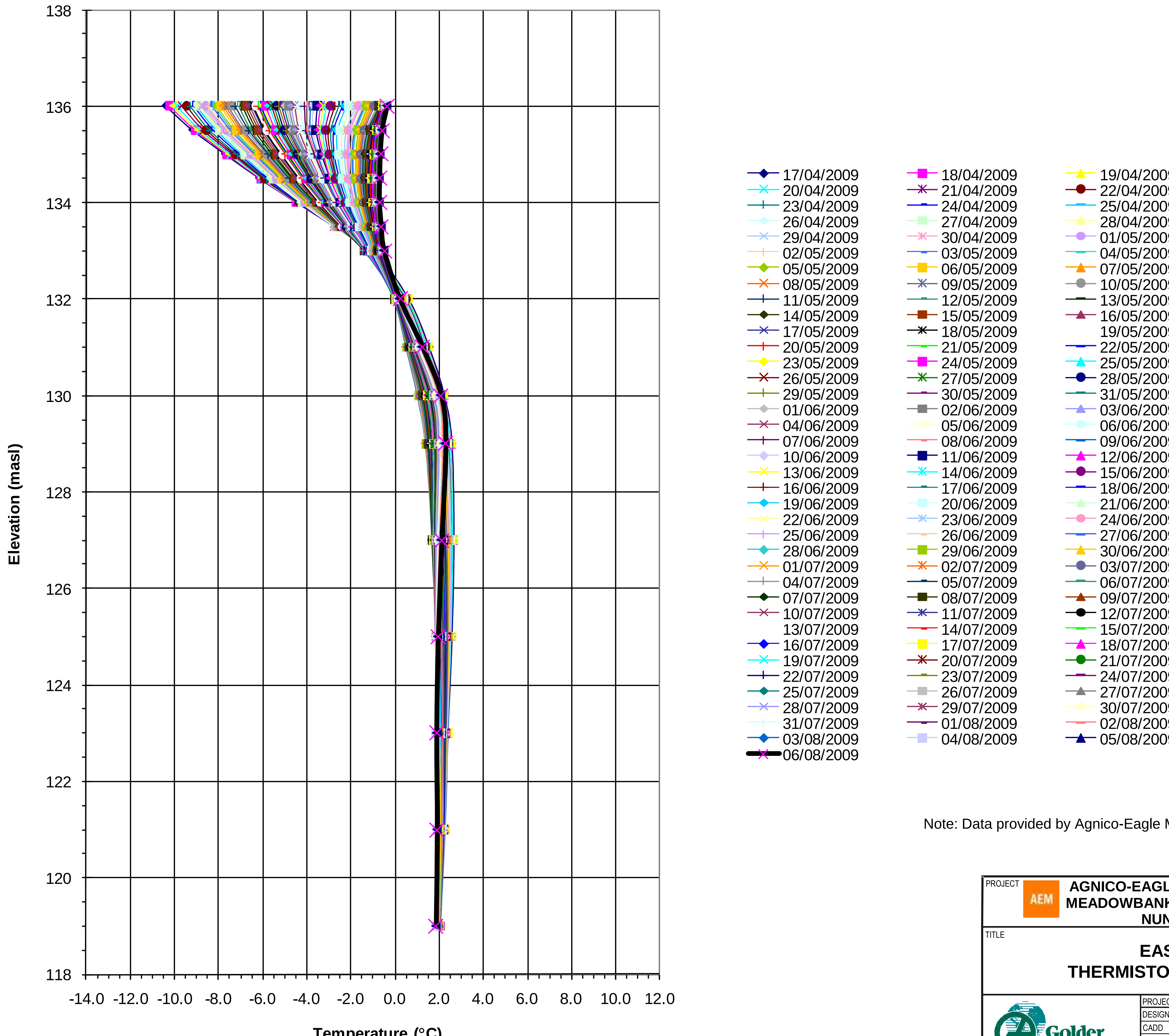
Note: Data provided by Agnico-Eagle Mines Limited.

PROJECT	AGNICO-EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT
TITLE	EAST DIKE THERMISTOR DATA – TH92

PROJECT No. 07-1413-0074			FILE No. ----
DESIGN	BEW	10AUG09	SCALE NTS REV.
CADD	JFC	10AUG09	
CHECK	--		FIGURE F-9
REVIEW			

Golder Associates

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA



Note: Data provided by Agnico-Eagle Mines Limited.

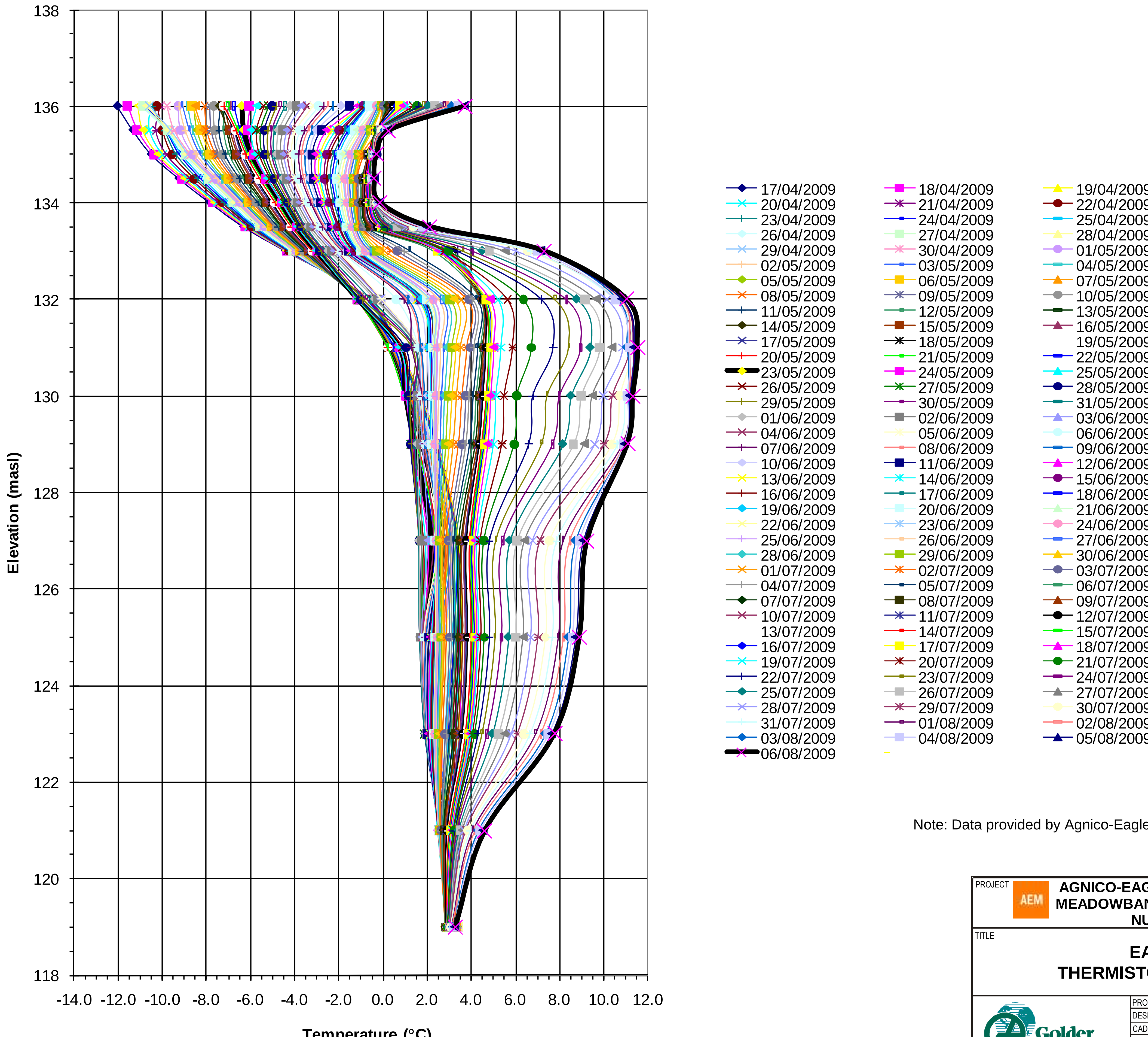
PROJECT AEM **AGNICO-EAGLE MINES LIMITED**
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE
THERMISTOR DATA – TH185

Golder Associates

PROJECT No.	07-1413-0074		FILE No. ----	
DESIGN	BEW	10AUG09	SCALE NTS	REV.
CADD	JFC	10AUG09	**FIGURE F-10**	
CHECK	--			
REVIEW				

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA



Note: Data provided by Agnico-Eagle Mines Limited.

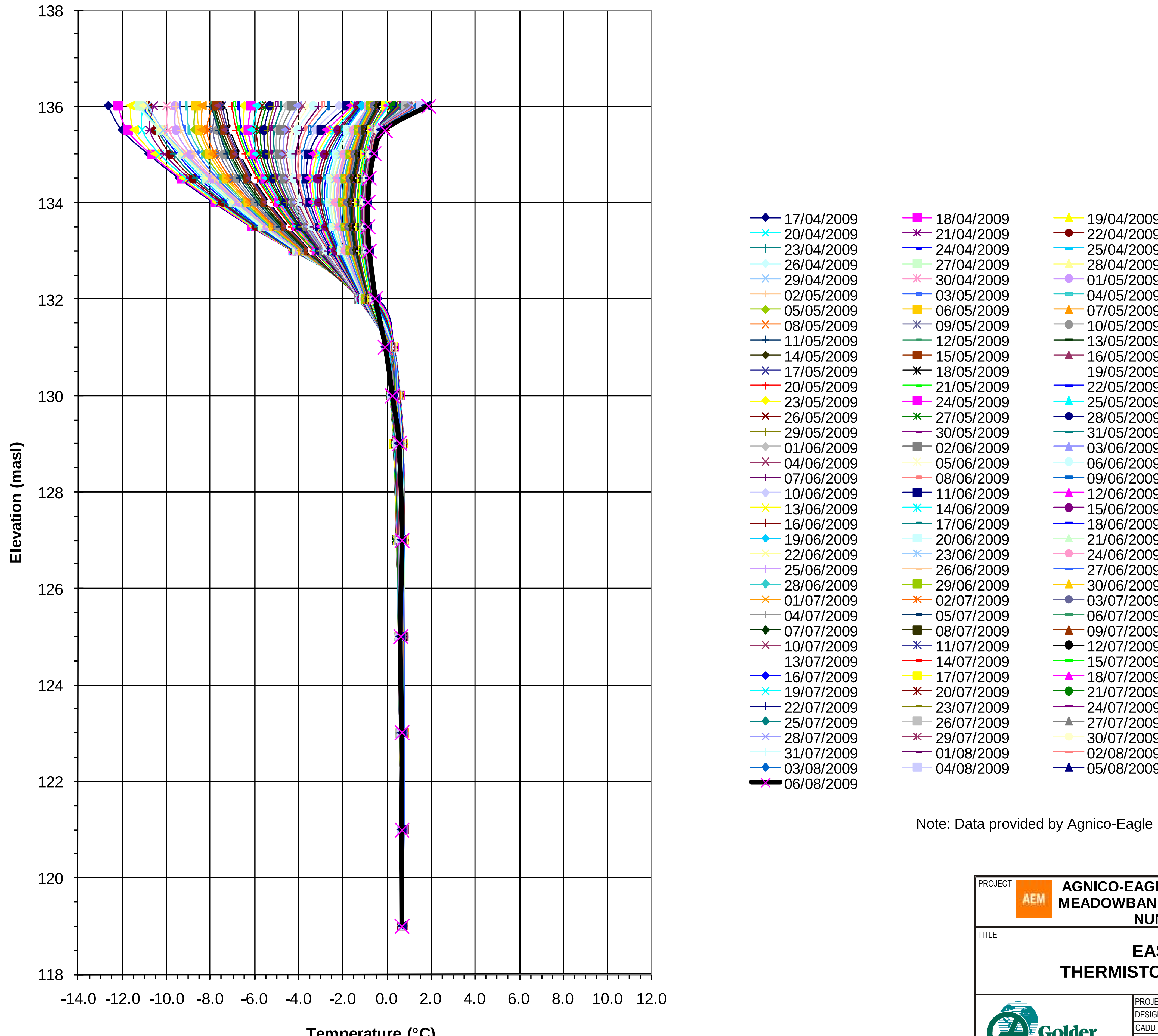
PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE
THERMISTOR DATA – TH485

PROJECT No. 07-1413-0074			FILE No. ----	
DESIGN	BEW	10AUG09	SCALE NTS	REV.
CADD	JFC	10AUG09		
CHECK	--		**FIGURE F-11**	
REVIEW				

Golder Associates

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA

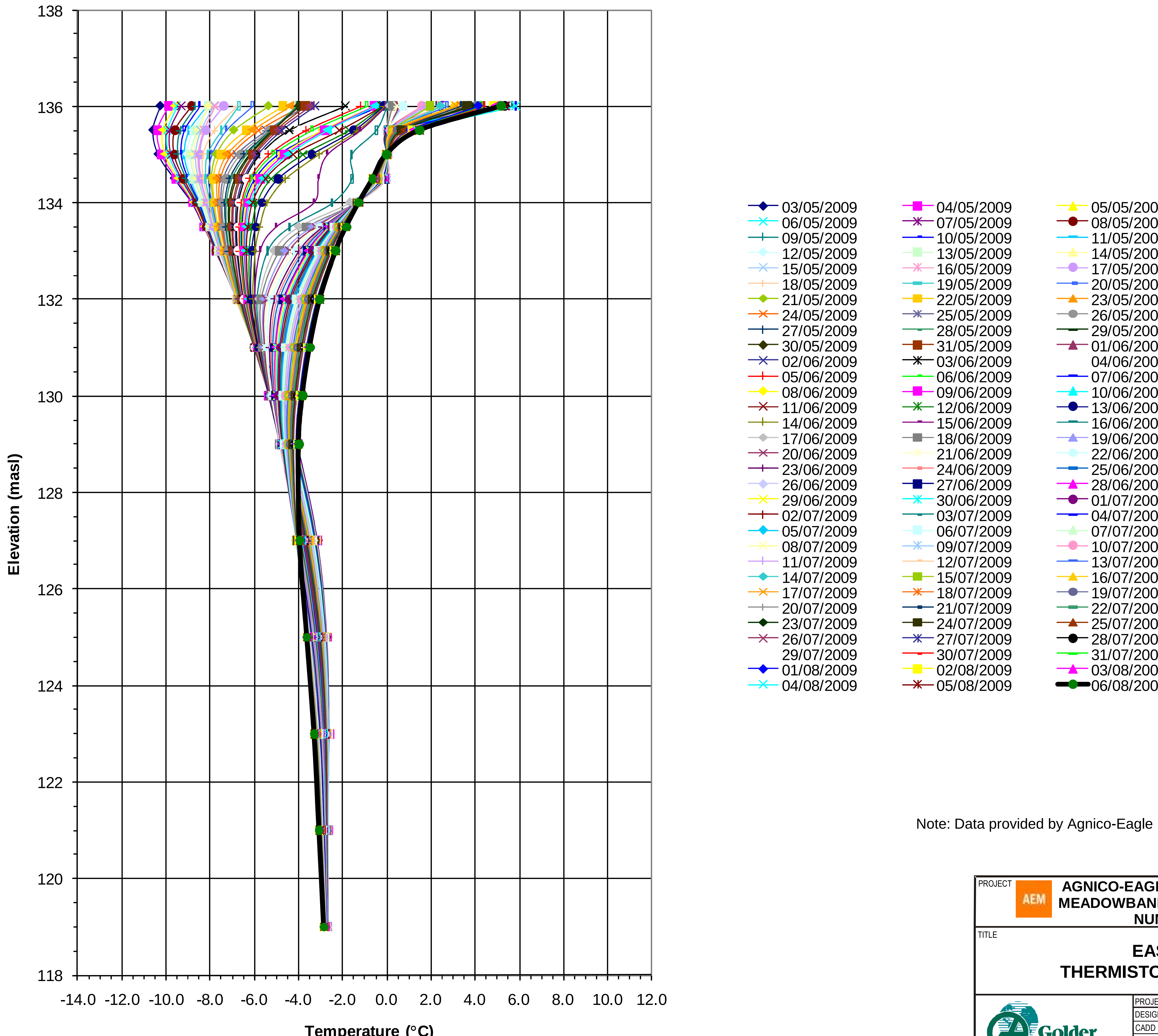


Note: Data provided by Agnico-Eagle Mines Limited.

PROJECT	AGNICO-EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT
TITLE	EAST DIKE THERMISTOR DATA – TH695

Golder Associates				
PROJECT No. 07-1413-0074			FILE No. ----	
DESIGN	BEW	10AUG09	SCALE NTS	REV.
CADD	JFC	10AUG09	FIGURE F-12	
CHECK	--			
REVIEW				

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA



Note: Data provided by Agnico-Eagle Mines Limited.

PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE
THERMISTOR DATA – TH842

PROJECT No. 07-1413-0074			FILE No. ----	
DESIGN	BEW	10AUG09	SCALE NTS	REV.
CADD	JFC	10AUG09		
CHECK	--			
REVIEW				

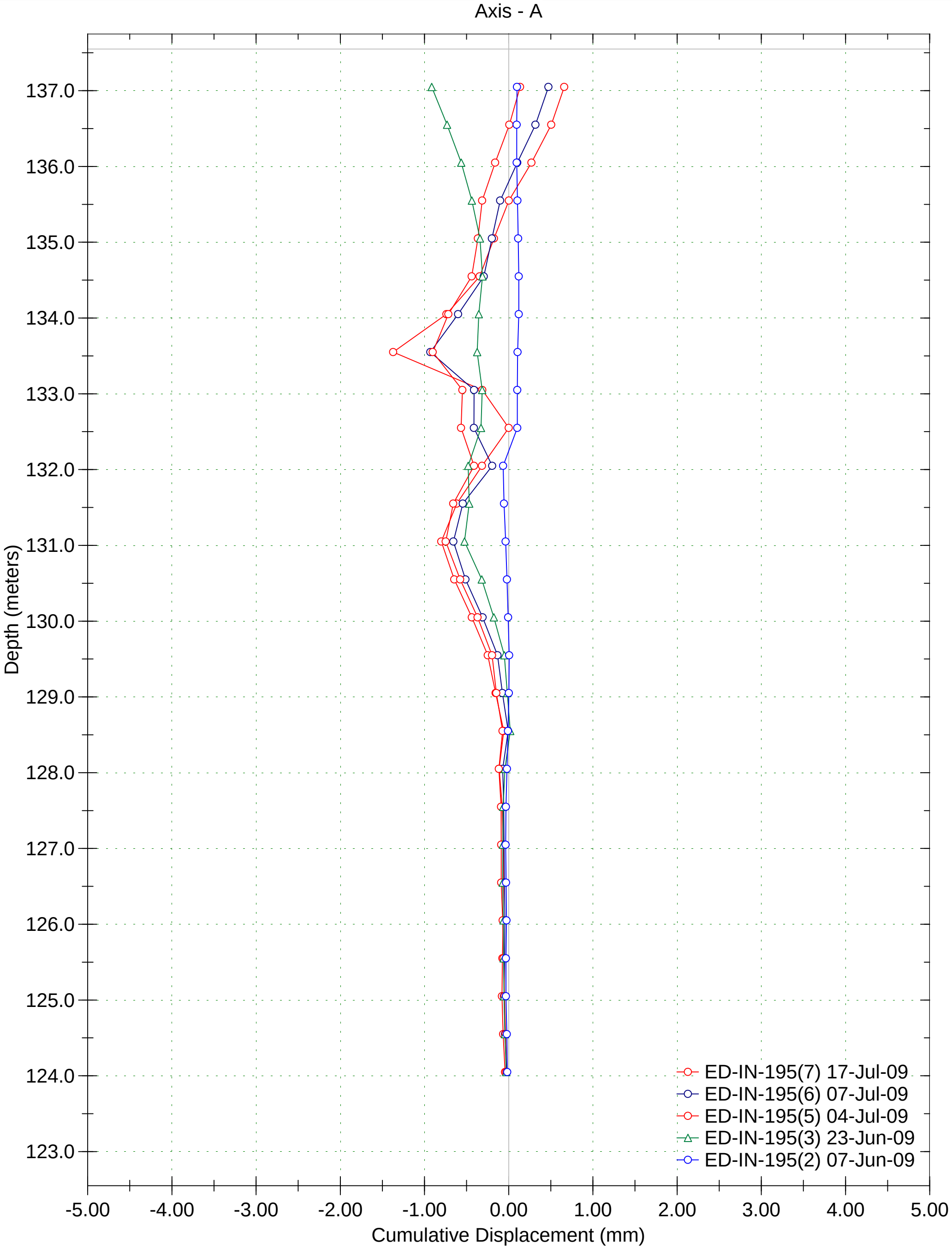
FIGURE F-13

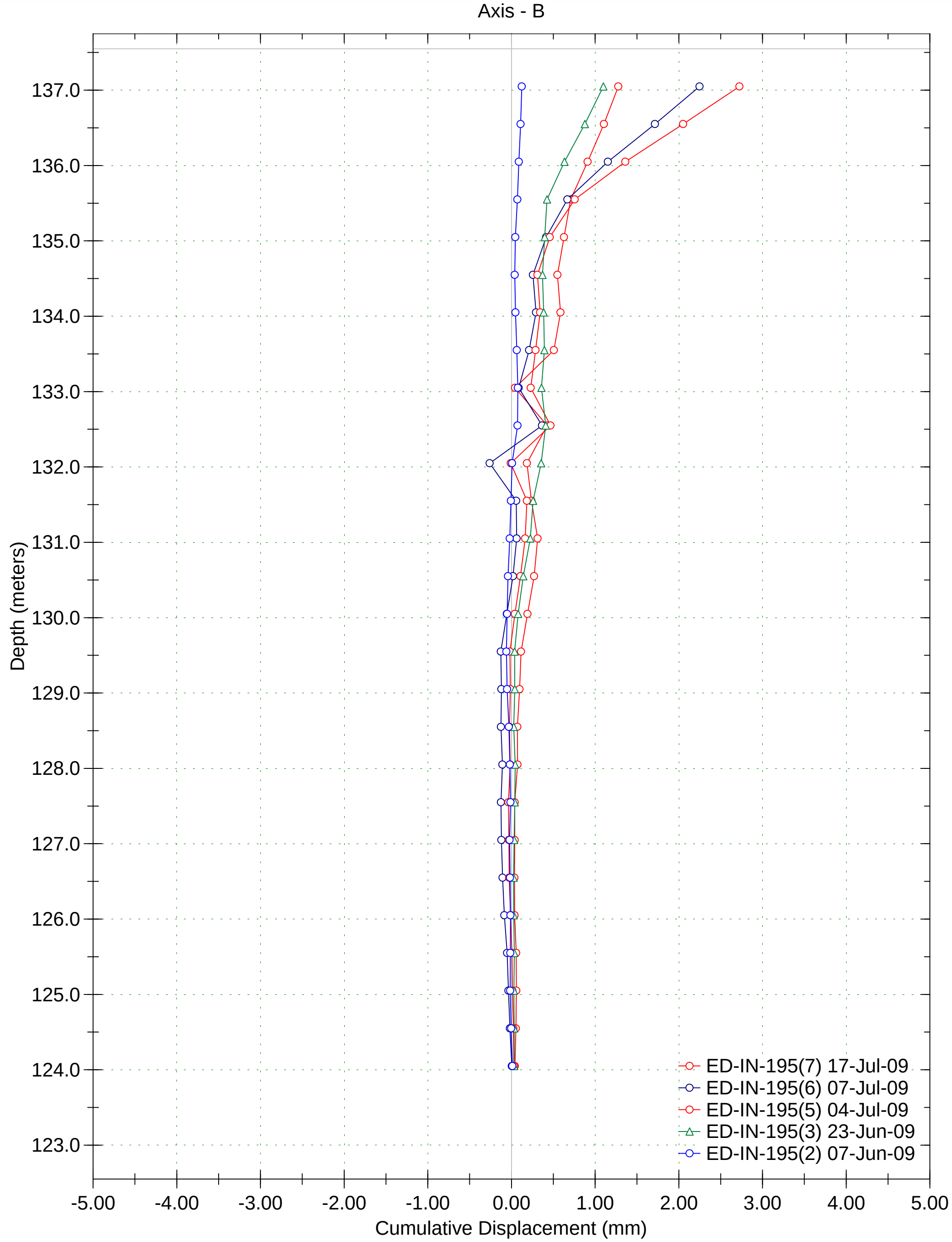
REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA

RST Instruments Ltd. | CUMULATIVE DISPLACEMENT | Inclinalysis v.2.30

Borehole : ED-IN-195
Project : Meadowbank, Nunavut
Location : East Dike, ST. 60+194.69m O/S 0.05m
Northing : 7213857.341 mN
Easting : 639366.570 mE
Collar : 0.7m

Spiral Correction : N/A
Collar Elevation : 137.6 meters
Borehole Total Depth : 13.5 meters
North Groove Azimuth :
Base Reading : 2009 Jun 07 12:11
Axis A Azimuth : 0.0 degrees

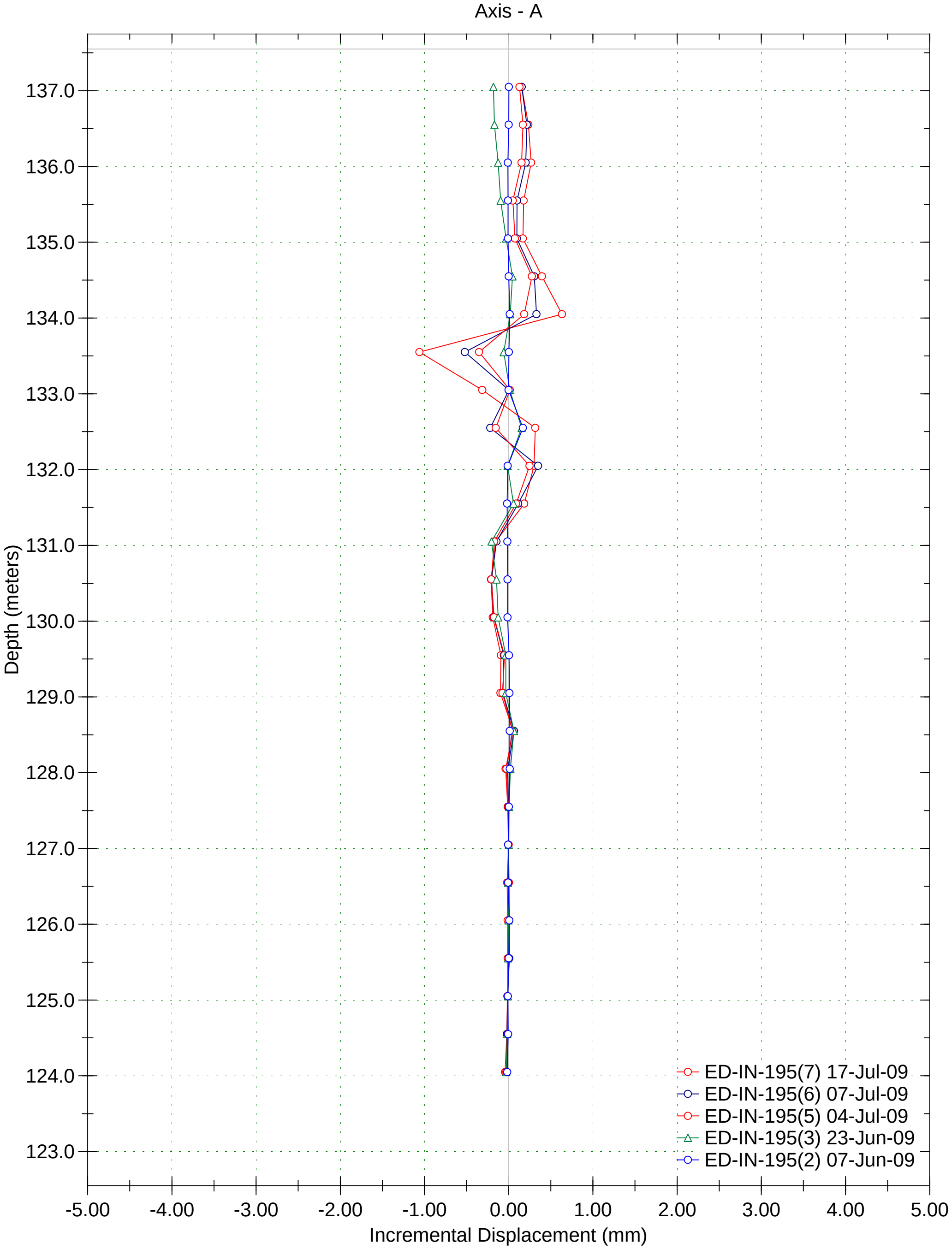


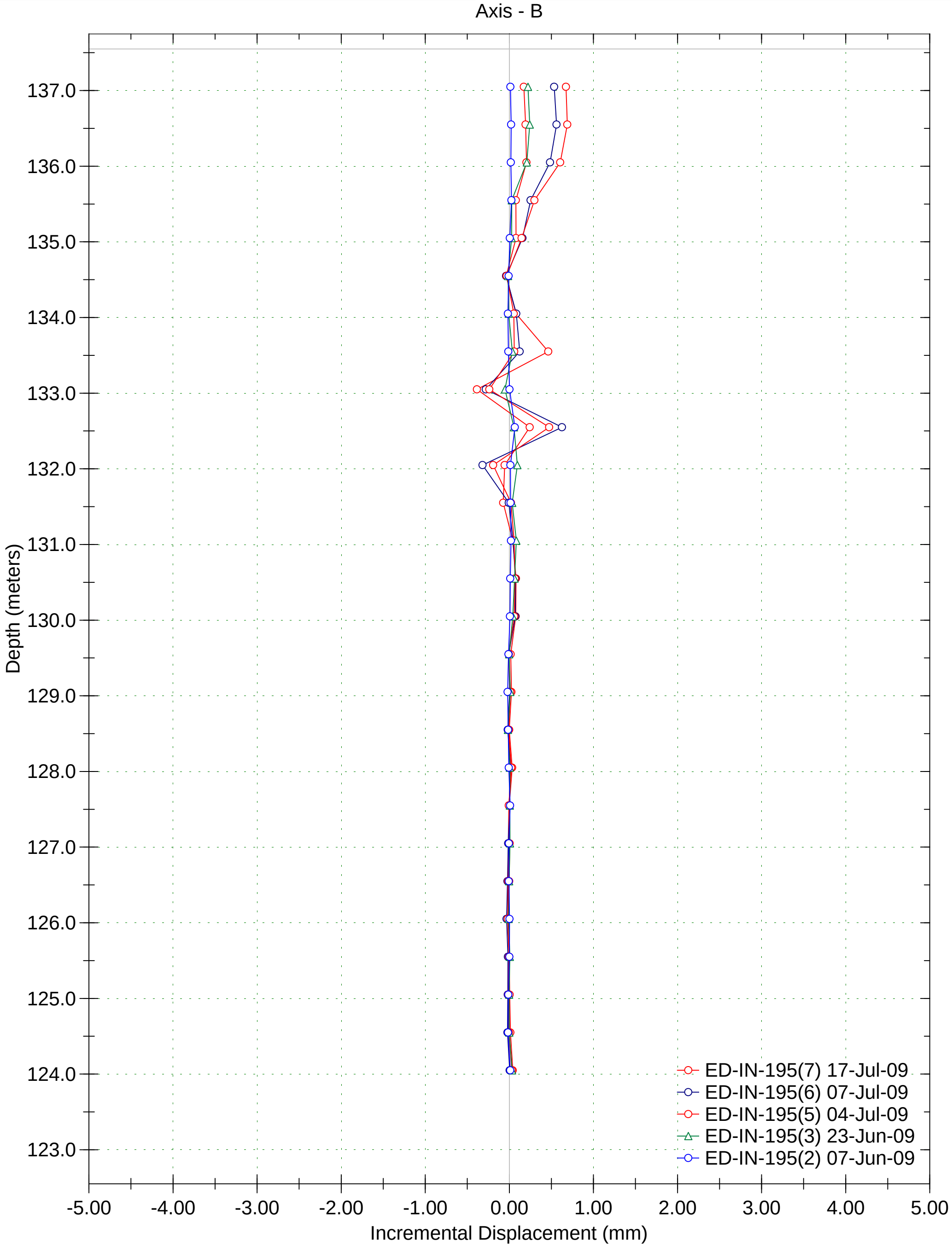


RST Instruments Ltd. INCREMENTAL DISPLACEMENT Inclinalysis v.2.30

Borehole : ED-IN-195
Project : Meadowbank, Nunavut
Location : East Dike, ST. 60+194.69m O/S 0.05m
Northing : 7213857.341 mN
Easting : 639366.570 mE
Collar : 0.7m

Spiral Correction : N/A
Collar Elevation : 137.6 meters
Borehole Total Depth : 13.5 meters
North Groove Azimuth :
Base Reading : 2009 Jun 07 12:11
Axis A Azimuth : 0.0 degrees





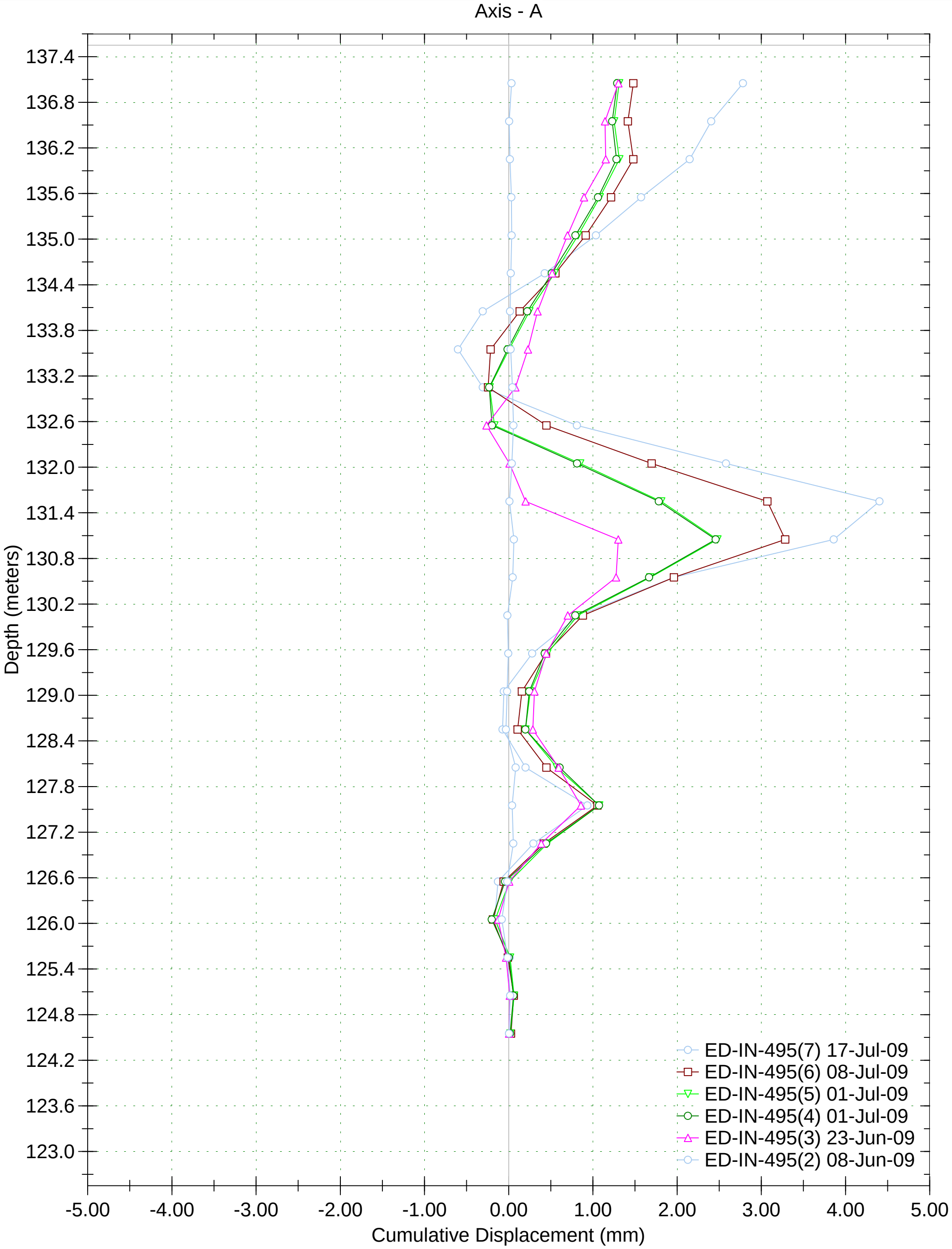
RST Instruments Ltd.

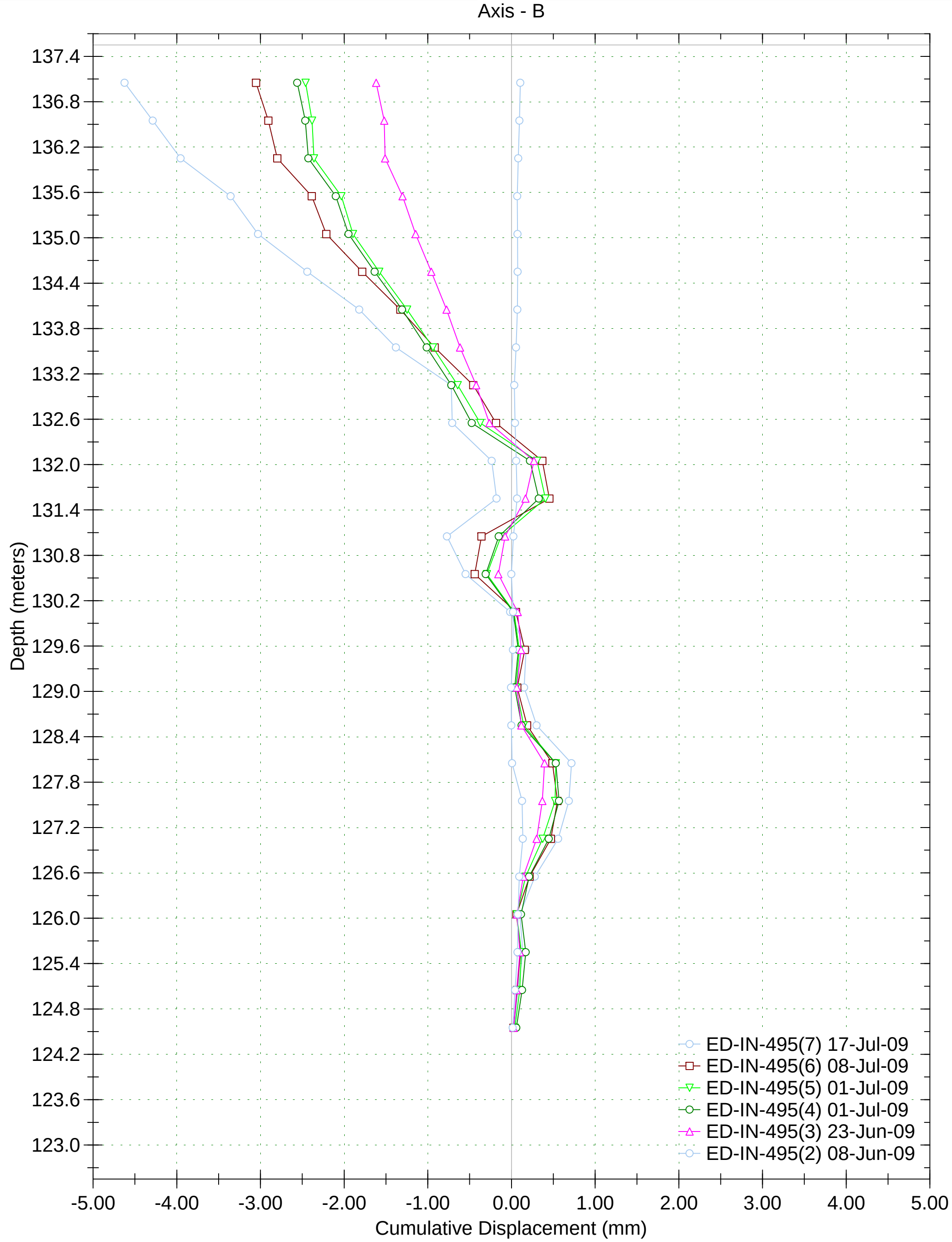
CUMULATIVE DISPLACEMENT

Inclinalysis v.2.30

Borehole : ED-IN-495
Project : Meadowbank, Nunavut
Location : East Dike, ST. 60+194.69m O/S 0.05m
Northing : 7213857.341 mN
Easting : 639366.570 mE
Collar : 0.7m

Spiral Correction : N/A
Collar Elevation : 137.6 meters
Borehole Total Depth : 13.0 meters
North Groove Azimuth :
Base Reading : 2009 Jun 08 11:21
Axis A Azimuth : 0.0 degrees

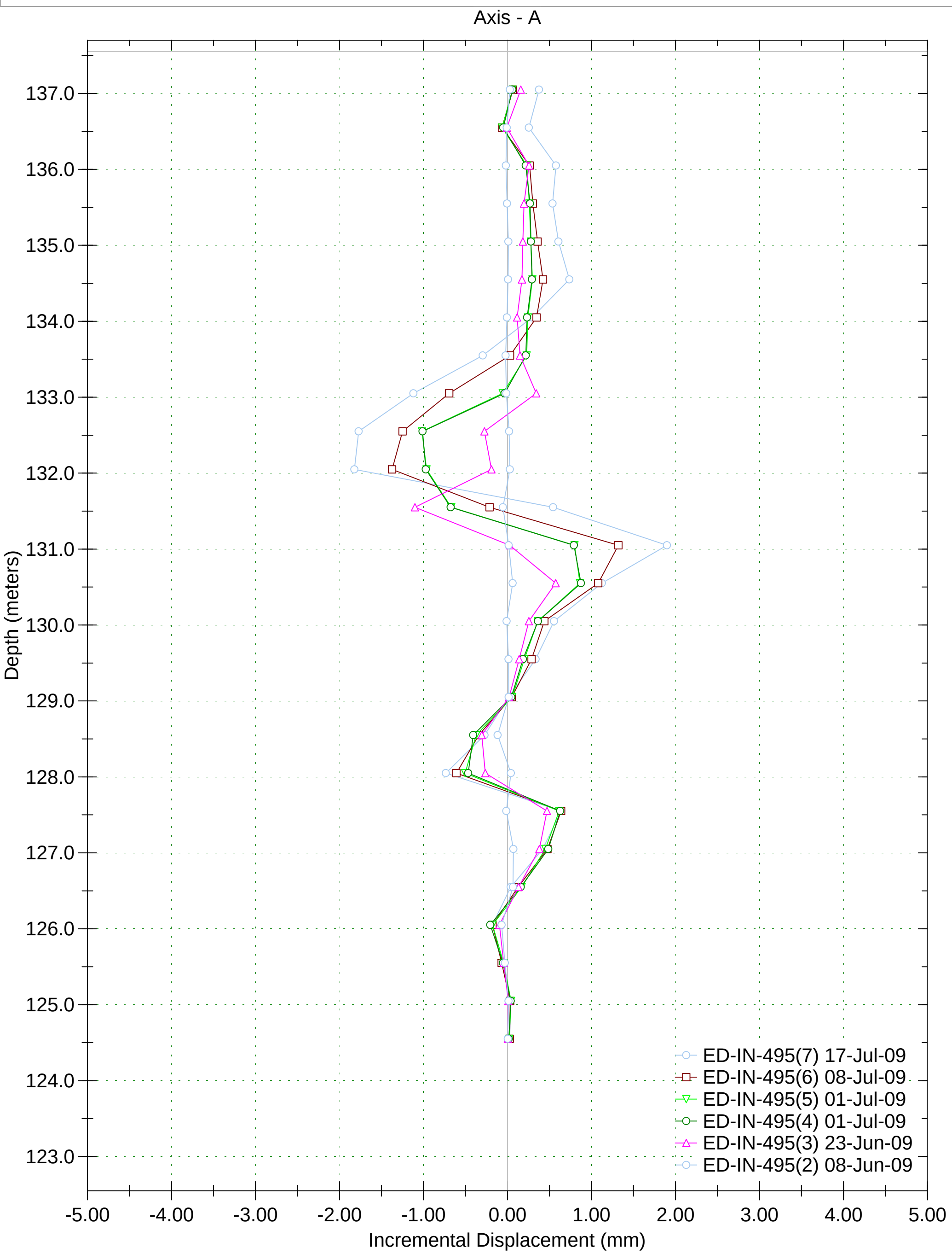


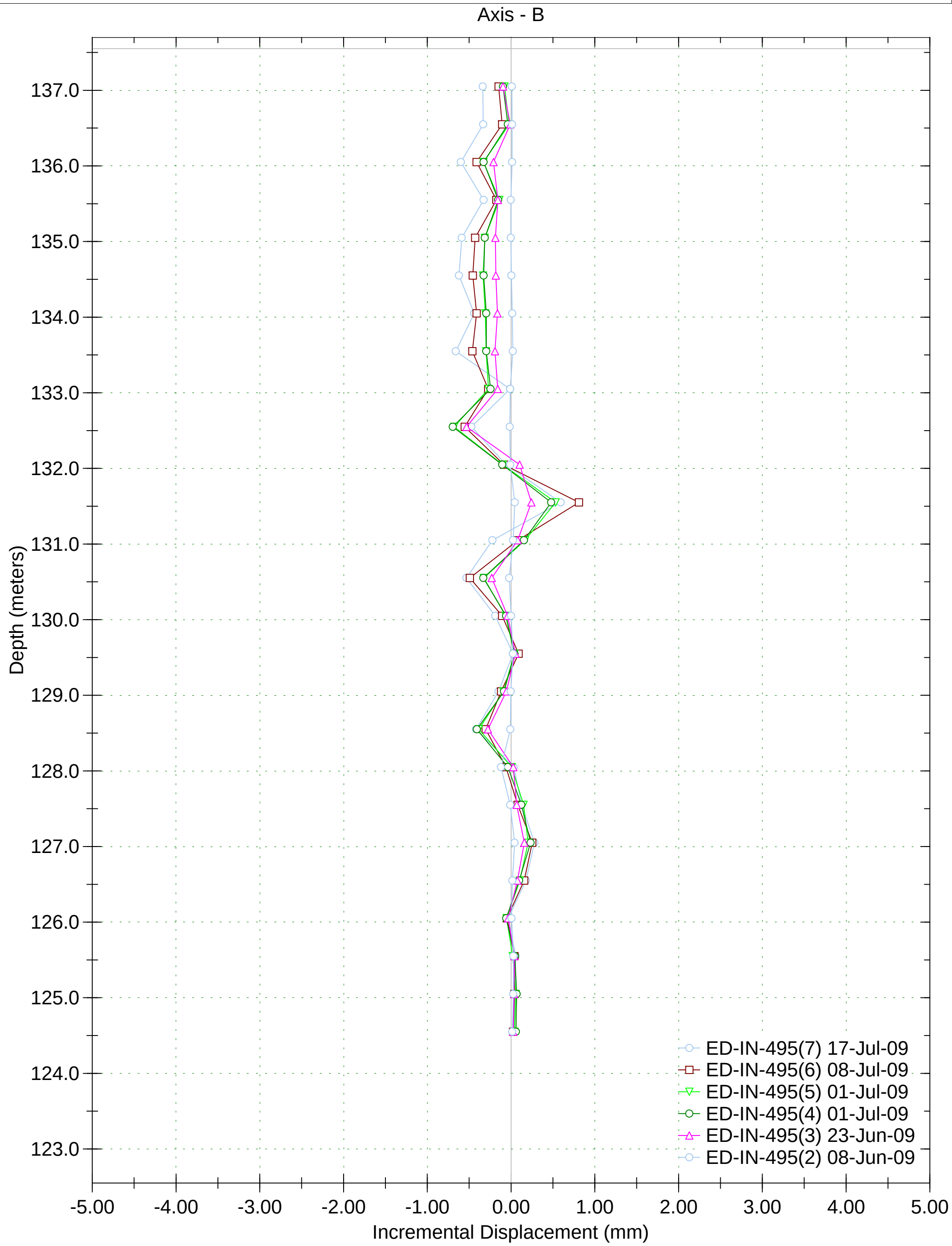


RST Instruments Ltd. INCREMENTAL DISPLACEMENT Inclinalysis v.2.30

Borehole : ED-IN-495
Project : Meadowbank, Nunavut
Location : East Dike, ST. 60+194.69m O/S 0.05m
Northing : 7213857.341 mN
Easting : 639366.570 mE
Collar : 0.7m

Spiral Correction : N/A
Collar Elevation : 137.6 meters
Borehole Total Depth : 13.0 meters
North Groove Azimuth :
Base Reading : 2009 Jun 08 11:21
Axis A Azimuth : 0.0 degrees

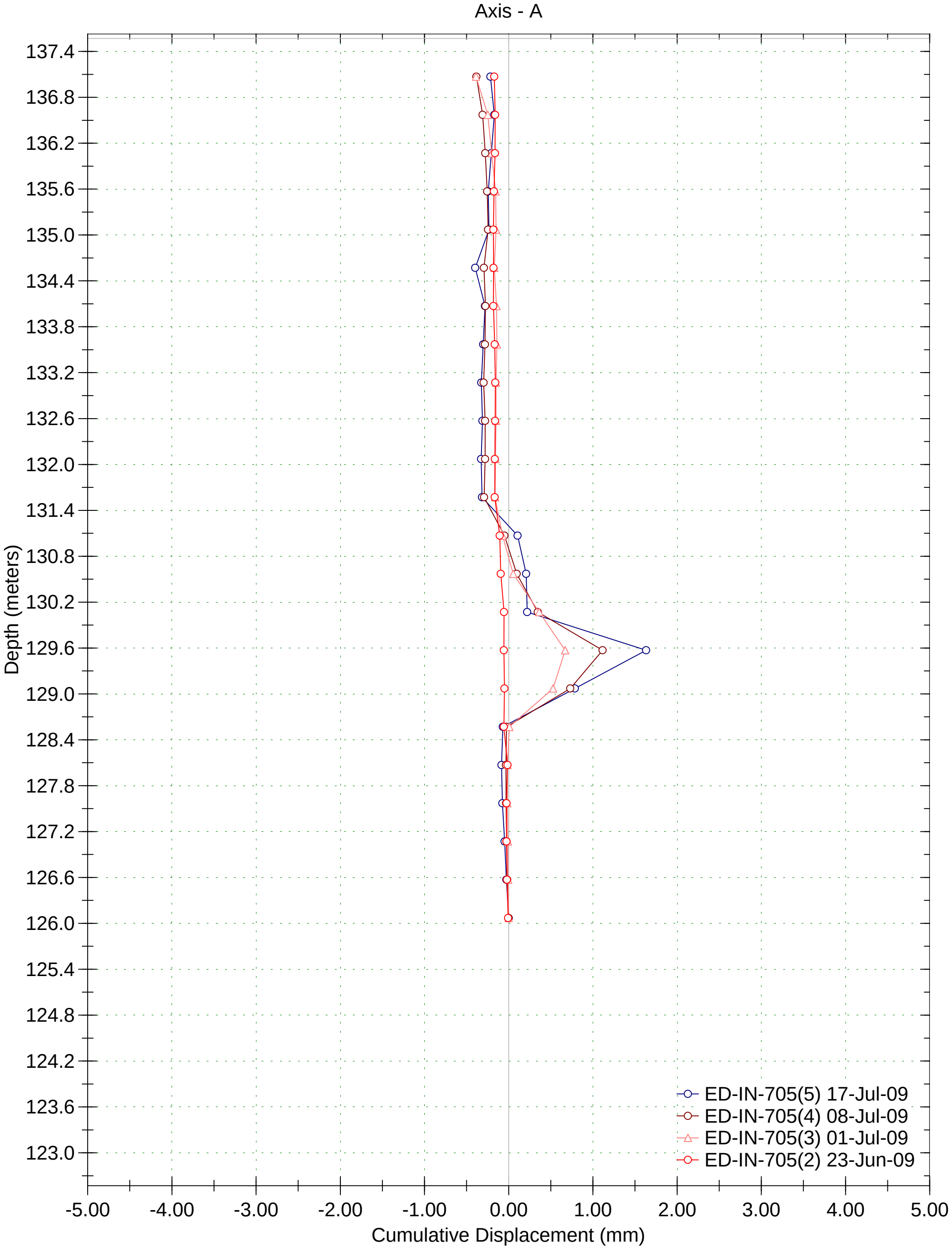


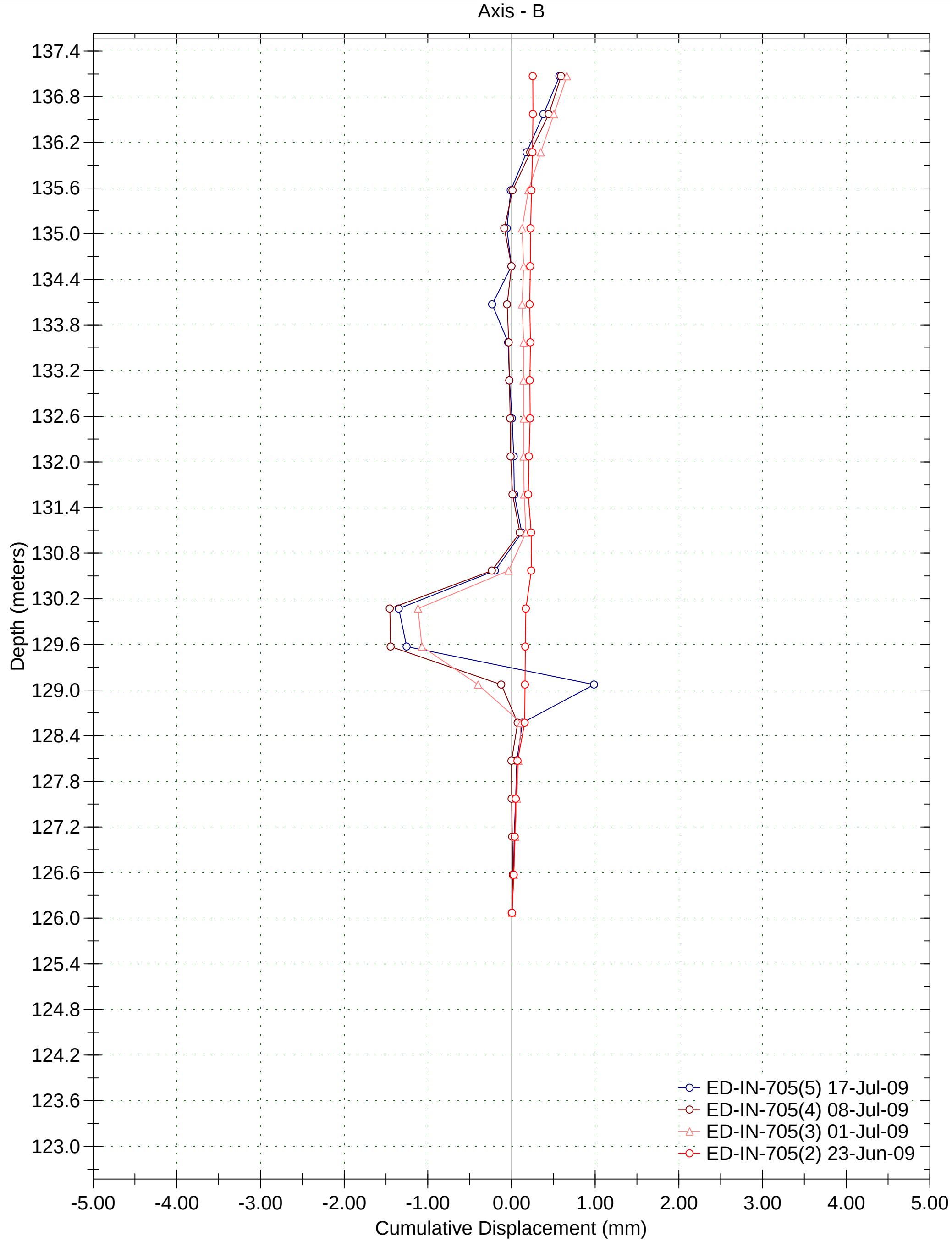


RST Instruments Ltd. CUMULATIVE DISPLACEMENT Inclinalysis v.2.30

Borehole : ED-IN-705
Project : Meadowbank, Nunavut
Location : East Dike, ST. 60+704.83m O/S 0.09m
Northing : 7214359.571 mN
Easting : 639351.450 mE
Collar : 0.8m

Spiral Correction : N/A
Collar Elevation : 137.6 meters
Borehole Total Depth : 11.5 meters
North Groove Azimuth :
Base Reading : 2009 Jun 23 11:13
Axis A Azimuth : 0.0 degrees

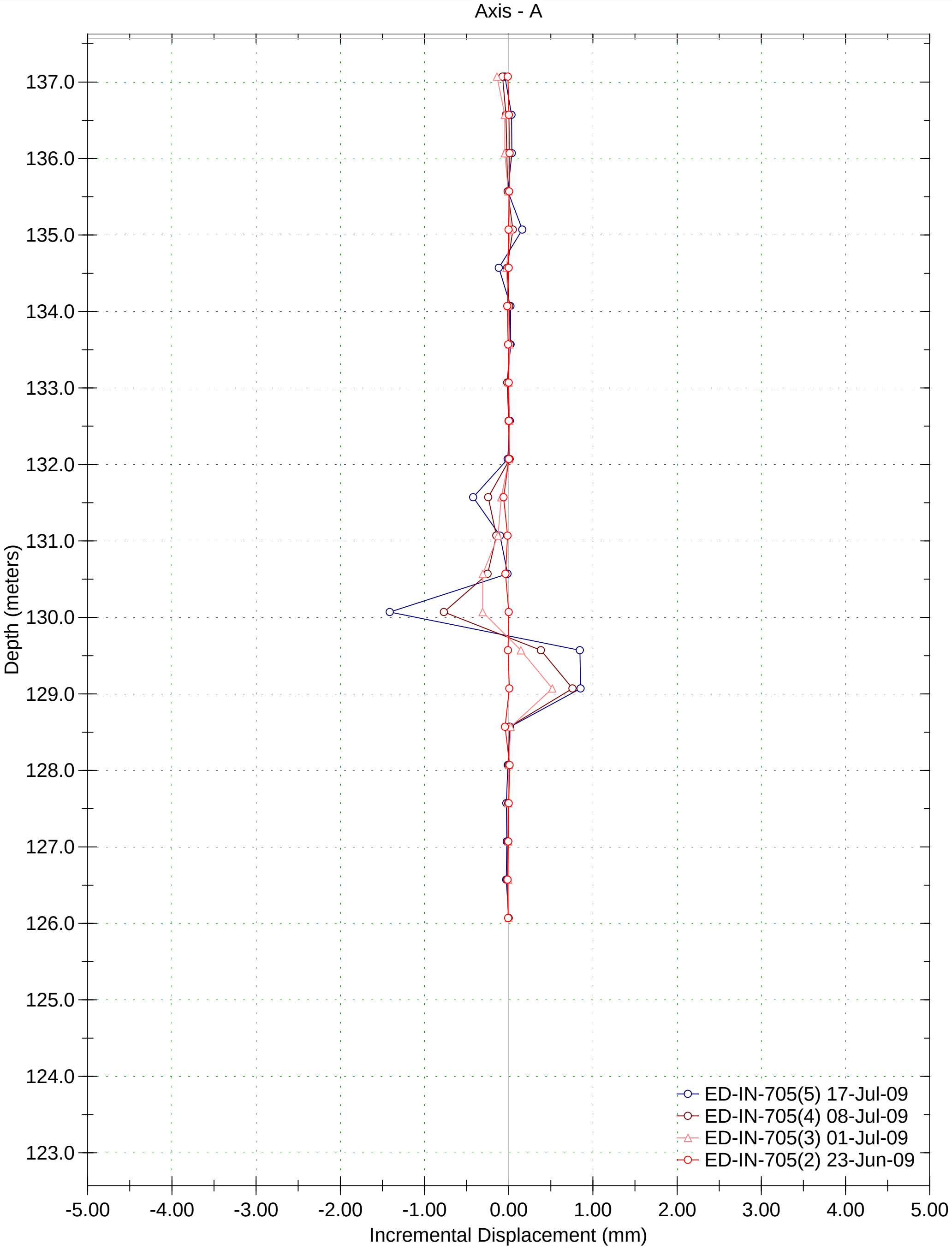


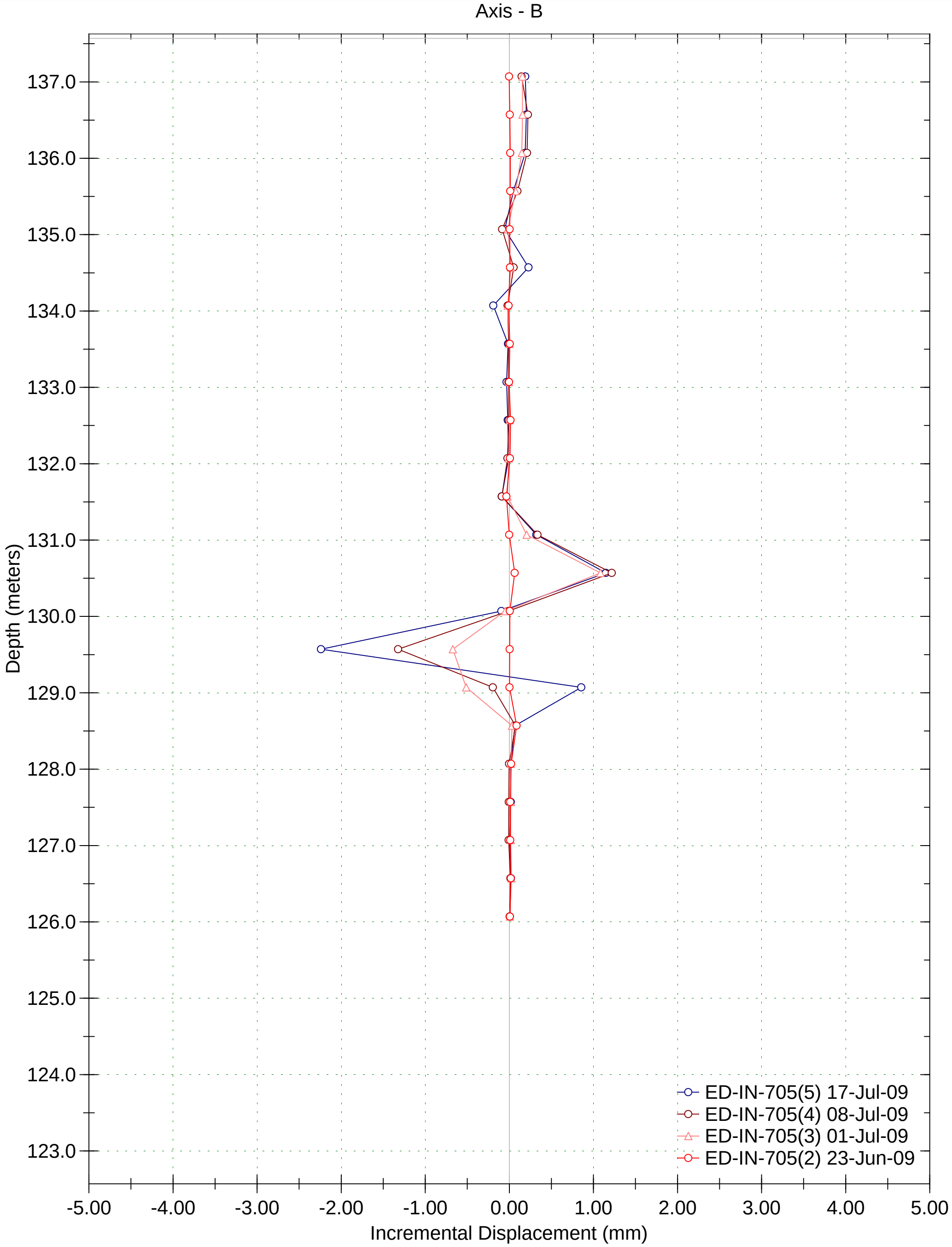


RST Instruments Ltd. INCREMENTAL DISPLACEMENT Inclinalysis v.2.30

Borehole : ED-IN-705
Project : Meadowbank, Nunavut
Location : East Dike, ST. 60+704.83m O/S 0.09m
Northing : 7214359.571 mN
Easting : 639351.450 mE
Collar : 0.8m

Spiral Correction : N/A
Collar Elevation : 137.6 meters
Borehole Total Depth : 11.5 meters
North Groove Azimuth :
Base Reading : 2009 Jun 23 11:13
Axis A Azimuth : 0.0 degrees





APPENDIX G

CD of Report

At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

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South America	+ 55 21 3095 9500

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